# RESPONSE ACTION

# WORK PLAN

PVO INTERNATIONAL, INC.
Boonton, NJ

*Prepared by:*

Clean Harbors Environmental Services, Inc.
3 Sutton Place
Edison, NJ 08817

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358224

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# 1.0 MOBILIZATION

## 1.1 Initial Set-up

### a. Utilities

Clean Harbors (CHI) will provide for power and telephone services on-site. Prior to any placement of structures, construction activities, alterations of facilities, or movements of materials, notification will be provided to PVO's on site representative.

## 1.2 Required Equipment and Manpower

A. Manpower

CHI

- Foreman
- Lead Chemist
- Equipment Operators
- Field Technicians
- Field Chemists
- Site Safety Officer (Designee)

B. Equipment

- Forklift/Drum Transport
- Pickup truck or light utility vehicle
- Adequate space to perform on site screening operations ( As proposed in Section 4.1)
- Power Washer
- Confined Space Entry Equipment
- Misc. Pumps
- Vacuum Truck / Van Trailer

## 1.3 Security

### a. Security Zone

The existing gates and fencing will be utilized to provide site security barriers for the operations at the facility. On-site access control points, to delineate work zones and hazardous areas will be provided by PVO. Hazard fencing and/or caution tape shall be utilized for this purpose. Barriers and/or gates will be utilized to restrict the site access to all unauthorized personnel.

b. Site Security (To be provided by PVO)

c. Site Personnel

During regular working hours, only authorized personnel will be allowed access to the site. A list of all authorized personnel will be provided to PVO's on site representative and contained within the project files. Any individual who wishes to come on-site but is not on the list, must receive permission from the CHI Lead Chemist or Foreman and/or the PVO rep and be accompanied by an authorized person.

# 2.0 SITE PREPARATION

## 2.1 Management Plan

Clean Harbors' management plan for this site involves the assignment of a team of experienced personnel tasked with overall project responsibility, and compliance with operational, technical, regulatory and health and safety requirements. This project team will be supported by corporate technical and waste management resources and regional operational support from Clean Harbors' Edison, NJ Service Center.

Included in this section is a list of Treatment/Storage and Disposal Facilities, transporter(s) and subcontractors which may be utilized during this project. Each of the TSDF's has been approved by PVO as well as, audited by Clean Harbors Compliance Department.

**Treatment/Storage/Disposal Facility Summary**

**I. Clean Harbors Facilities**

1. Clean Harbors of Baltimore, Inc. - Baltimore, MD
2. Clean Harbors of Braintree, Inc. - Braintree, MA
3. Clean Harbors of Chicago, Inc. - Chicago, IL
4. Clean Harbors of Cleveland, Inc. - Cleveland, OH
5. Clean Harbors of Natick, Inc. - Natick, MA
6. Spring Grove Resource Recovery - Cincinnati, OH

**II. External Facilities**

A. Landfills

RCRA Only
1. CWM/Adams Center - Fort Wayne, IN
2. CWM/CID Landfill - Calumet City, IL
3. CWM/Lake Charles - Lake Charles, LA

RCRA/TSCA
1. CWM/Emelle - Emelle, AL
2. CWM/Model City - Model City, NY

## 2.1 Management Plan (Cont'd)

Non-Hazardous

1. Chicopee - Chicopee, MA
2. Davis Junction - Davis Junction, IL
3. Greentree - Kersey, PA
4. Willow Creek - Atwater, OH
5. E. Bridgewater - E. Bridgewater, MA
6. Fall River - Fall River, MA
7. Niagara - Niagara Falls, NY
8. Winthrop Harbor - Zion, IL
9. Countywide - E. Sparta, OH
10. Elda - Cincinnati, OH
11. Evergreen - Northwood, OH
12. Kankakee - Kankakee, IL
13. Mohawk Valley - Frankfort, NY
14. Pottstown - Pottstown, PA
15. Turnkey Landfill - Rochester, NH
16. Woodland Meadows - Canton, MI
17. Y&S Maintenance - Scottsdale, PA

B. Incinerators

RCRA Only

1. CWM/Port Arthur - Port Arthur, TX
2. CWM/Trade Waste Incineration - Sauget, IL
3. Ensco/El Dorado - El Dorado, AR
4. Laidlaw/Thermal Oxidation Corp. - Roebuck, SC
5. Rollins Environmental Services - Bridgeport, NJ
6. ThermalKEM - Rock Hill, SC
7. Laidlaw/Sarnia - Sarnia, Ontario

TSCA Only

1. Aptus Environmental Services - Coffeyville, KS

RCRA/TSCA

1. Aptus Environmental Services - Aragonite, UT

Non-Hazardous Waste (Industrial/Municipal)

5. Ogden Martin - Haverhill, MA

C. Cement Kilns/Industrial Boilers

1. Giant Cement - Harleyville, SC
2. Systech/Fredonia - Fredonia, KS
3. Systech/Greencastle - Greencastle, IN

## 2.1 Management Plan (Cont'd)

4. Systech/Paulding - Paulding, OH

D. Hazardous Waste Fuel Blending

1. CWM/Morrow - Morrow, GA
2. CWM/Solvent Resource Recovery - West Carrolton, OH
3. PetroChem Processors Inc. - Detroit, MI
4. Rineco Chemical Industries - Benton, AR

E. Wastewater Treatment

1. DuPont/Chambers Works - Deepwater, NJ

F. Specialty Transfer/Treatment/Disposal

1. CWM/Controlled Waste Division - Menomonee Falls, WI
2. CWM/Newark - Newark, NJ
3. CyanoKEM, Inc. - Detroit, MI

G. Transporter

1. Clean Harbors Environmental Services, Inc., Quincy, MA

H. Subcontractor

1. Code Environmental (Ether Stabilization Services)
   1065 US Highway 1
   Edison, NJ 08837

## 2.2 Site Set Up of Office Area

Based on observations made during the site visits, it is assumed that minimal site preparation is required. Any site work necessary will be performed by CHI following approval by PVO's representative.

## 2.3 Construction

Prepare Office/Warehouse Building Area

An entry-way for equipment and personnel to the drums will be designated by the Lead Chemist or Project Foreman and

approved by the PVO representative. This will enable easy transport of each drum to the staging area. It may be necessary to clear structures and warehouse debris, make alterations to drainage patterns by creating and maintaining berms to contain any potential spills during staging operations. Most if not all, of the drums currently on-site will be sampled in the staging area to limit the number of times a drum must be opened.

Construct Staging Areas

The staging area will be located in close proximity to the loading dock as described in Section 4.1 to enable the sampling operation to function efficiently. The staging areas will be constructed upon the existing concrete floor after the area is swept of debris which could puncture the polyethylene liner. The number of drum staging areas will be based upon the compatibility information collected during waste characterization relative to waste type. The size of the staging area(s) will be determined by the number of waste groups and the space available in and about the warehouse. The completed staging area(s) will maintain suitable access around their perimeter for inspection and spill control. Drums will be staged upon a polyethylene liner and where possible on pallets. The pallets/drums will be staged so that a row consists of two drums for the length of the staging area. The staging area's polyethylene liner will be bermed to prevent leaking or spilled materials from exiting the staging area. The berm will be constructed with sand or speedi-dri. Any staging areas that are constructed upon the ground shall be lined with two layers of polyethylene. Rows of drums shall be separated by a ten foot access way to allow the fork truck to maneuver within the area. The staging areas will be equipped with spill control materials and equipment (handtools, sorbents, overpacks etc.) in close proximity as a contingency measure. Waste groupings and potentially incompatible waste materials can be separated by individual cells within a single staging area. Cell separation will be accomplished via the use of berms (Refer to Section 9.0 - Proposed Drum Staging Area Schematic).

## 3.0 PERSONNEL PROTECTION

### 3.1 Preparedness, Prevention & Contingency Plan

An Preparedness, Prevention and Contingency Plan will be implemented to deal with potentially dangerous situations which may occur at the work site. Applicable elements of this plan will be contained in the Site Specific Health & Safety Plan (a copy of the plan has been submitted under separate cover for your review).

Personnel Injury

All injuries, skin contact with chemicals, or unsafe procedures or conditions will be reported immediately to the Lead Chemist or Project Foreman. Ambulance service will be researched for local capabilities during mobilization.

On-Site Evacuation Plan

An Emergency Evacuation alarm (air horn, etc.) will be on-site at all times. This alarm should be sufficient power to be audible by personnel operating heavy equipment. (A series of repeated blasts signifies all personnel to assemble at the command trailer for further instruction.)

a. Warning System

Criteria for alarm activation will be at the first sign of any problem or emergency on-site requiring assistance or evacuation.

b. Fire or Explosion

Should either a fire or explosion occur on-site, all personnel will proceed to the decontamination trailer and await further instruction. At this time, the local fire and police departments will be called for assistance. Once on-site, the acting officer of the fire department, and the Lead Chemist or Project Foreman will determine if further action is necessary. Evacuation planning shall include the local industrial, commercial and residential areas that are nearby the site.

Off-Site Evacuation

The requirement for off-site evacuation may occur in the event of an incident at the site. Off-site evacuation of residential and commercial areas will be executed by local police and fire personnel as necessary following the site incident notification by the Lead Chemist or Project Foreman. Site personnel shall support the emergency efforts as requested by the police and fire chiefs and will be available to attend and present information at a public meeting if so requested by PVO.

## 3.2 Safety Guidelines

Protective Clothing

Protective clothing must be worn by all personnel while in the Exclusion Zone unless sufficient data has been acquired to enable the Lead Chemist and/or Health & Safety Officer to make an informed judgment that protective clothing is not needed. In the absence of site monitoring data that work can proceed safely without protective clothing, required personnel protection will include but not be limited to, chemical-resistant pants, jacket, boots, gloves, hardhat, and respirator.

Workers involved in waste characterization operations will be required to wear, as a minimum, "splash" protection (raingear), steel-toe boots, rubber gloves, hardhat and Level "B" respiratory protection. A minimum of two workers will be required for all drum handling operations. See Site Safety Plan for detailed explanation of guidelines.

Personal Hygiene - All personnel must wash the affected area immediately after obvious contact with hazardous substance.

Undesirable Practices

The following practices during operations on the hazardous waste site are expressly forbidden:

Smoking, eating, drinking, chewing gum, or tobacco, storing food, or food containers while on-site.

Protection Levels - Protection levels will be established on-site, based upon available information (See Site Safety Plan).

Zones - Three work zones will be established, clearly delineated, and posted. (The Site Safety Plan will delineate the work zones specific to the site. Also see Section 15.0 - Site Map)

a... Exclusion Zone - The area which contains hazardous materials must be clearly delineated and posted (hotline). Only persons authorized by the PM may enter a contaminated zone.

b. Contamination Reduction Zone - An area shall be established for decontamination of equipment and personnel and for access control just outside the area of suspected contamination.

c. Support Zone - An area will be designated where the command trailers, personal vehicles, and supply trailers may be parked. While in this area, personnel need not wear protective clothing or respirators. Any non-hazardous activities should be carried out in this area (i.e. carpentry, equipment repair).

## 3.3 Personnel Health Guidelines

a. Monitoring - For immediate evaluation of potential health hazards, direct reading instruments will be utilized. Clean Harbors (CHES) anticipates the requirement for the following direct reading instrumentation: portable combustible gas and oxygen meter, a photoionization meter or a portable gas chromatograph, colorimetric detector tubes and various indicator papers (i.e. pH, Cyanide etc.). The CHI staff shall select the instruments based upon the limitation of these portable direct reading instruments when characterizing unknown chemicals at the hazardous site. An ambient air monitoring program shall be initiated to accumulate quantitative data (See Section 3.5.3).

b. Respirator Protection

All CHES personnel are trained in the use and qualified to wear respirators.

Clean Harbors anticipates the use of self contained breathing apparatus and/or cartridge respirators for most of the site activities. The respirators and the accompanying personal protective clothing will be worn if

the direct reading instruments detect the presence of organic vapor greater than the prescribed Action Level in the Site Safety Plan.

c. Site Entry

1. Entry on-site shall be limited to authorized personnel only; all visitors must be accompanied by an authorized individual.
2. All personnel coming on-site will comply with proper protection levels as outlined by the safety plan.

d. Site Departure - Procedures for leaving the contaminated area shall be outlined in the Site Safety Plan. CHES will coordinate and manage decontamination of equipment and disposal of expendable items, as directed by the Health & Safety Plan.

e. Safety Equipment

Adequate First Aid Kits
Adequate Emergency Eyewash Stations
Emergency Shower Set-up
Fire Extinguishers (Dry Chemical)
Emergency Evacuation Alarm
Stretcher
Portable Radios

## 3.4 Decontamination Zone

Without previous analysis, it shall be assumed that the materials on-site are of a hazardous nature. Due to the lack of data, the execution of the prescribed decontamination procedure is extremely important to ensure that all waste materials stay on-site and adequate protection to all personnel is maintained. The decontamination procedure for personnel is described in the Site Safety Plan and shall consist of a seven step process prior to removal and containerization of the used PPE. Samples requiring off site analysis and shall be processed through the decon line, packaged and delivered to the appropriate laboratory for analysis. Small pieces of equipment and tools can be handled in the same manner. If decon of heavy equipment is required, it must be performed on the "hot side" of the site. Usually this consists of a washing and rinsing of the equipment by hand or steam guns, with drainage of the wash and rinse water towards a central collection point for proper disposal. Decontamination of

equipment if required shall be accomplished by construction of a washing area which will drain to a common collection point, where all water, etc., can be pumped into 55-gallon drums for analysis and proper disposal. Any clean materials, wood, poly, sand, will also be collected and disposed of as solid waste.

## 3.5 Drum Staging

All field sampling and analysis activities on this project will be performed in accordance with the procedures detailed in Sections 5.0, 6.0, 7.0 and 10.0 of this Work Plan.

Drum staging will be executed by the use of a forklift with operator, a chemist and/or two field technicians. Drums shall be placed within the designated staging area if the containers are not leaking. Upon arrival in the staging area, the drums will be inspected for available markings and given a sequential drum identification number. A schematic of the drum staging areas is included in Section 9.0 ; specific locations will be determined in the field by CHES personnel and the PVO representative.

Guidelines for Staging Area Operations

The Lead Chemist or the Project Foreman will be responsible for overseeing the entire drum handling process. Staged drums will be handled as follows:

a. Perform selected waste screening (liquid vs. solid; full vs. empty, etc.) and note obvious characteristics to ascertain preliminary category for each drum.

b. Mark each drum with a sequential number and identify same as directed by the drum information sheet provided. All drums will be listed on an inventory sheet which will contain drum number, drum size, full or empty, liquid or solid, etc.

c. Sample each drum and deliver the sample to the sample storage area for packaging/shipment to the appropriate off-site lab for analysis per Lead Chemist or Project Foreman instructions.

d. At the completion of sampling activities on a drum, the drum will be secured by either replacing the bung cap or covering the sampling port with polyethylene sheeting. Following sampling, drums will be staged in accordance

with Hazardous Waste Regulations and with PVO's approval.

Drum Sampling Operation:

The drum sampling protocol is as follows:

Identification: Drum numbering shall be initiated in order to keep an accurate inventory of the drums from characterization to disposal.

Documentation of the type of drum will be recorded, such as type (steel, plastic, etc.), size, any descriptive label, information or identification and contents (if known). Numbering shall be digitized (001, 002, etc.). An axis line will be drawn on the drum to identify each layer or phase and will be annotated with a description of the corresponding phase (e.g. oil, water, sludge, semi-solid, etc.). In addition to the bar code system, a drum log will be manually filled out to serve as a backup data file should a malfunction occur in the computer assisted system. An example of a drum log has been included in Appendix B.

Any barrels which have discernible information regarding shipper, manufacturer, packing slips, etc. should be brought to the attention of the lead chemist for further examination and documentation. The information will be utilized for potential waste stream and compatibility determinations especially where hazardous waste labels, generator information and waste identification is present.

Drum Opening: Bungs will be removed using a spark proof bung wrench. If drums do not have bungs, or the bungs are damaged or otherwise inoperable, other opening techniques will be used. The appropriate technique will be selected on a drum by drum basis.

Waste Characterization: Once the drum contents have been opened and their contents accessed, a representative number of samples will be taken (Refer to Section 6.0 - Drum Handling Procedures).

Sample Storage

All sample containers will be stored in the staging area. An adequate supply of spill containment equipment will also be stored in this location in the event of an accidental spill. Sample

containers will be stored with compatible samples in individual layers contained in numbered 55 gallon drums. The samples will be packed in vermiculite with the location of each sample noted by layer, on an inventory sheet. The Lead Chemist will be responsible to maintain the sample inventory list.

Field screening will be performed on each sample following the general procedures outlined in Section 8.0.

- Physical State
- Physical Description
- Water Solubility
- Water Reactivity
- pH
- Open Cup Flammability/BTU Estimate
- Organic Chlorine Screen
- Oxidation Potential Screen
- Volatile Organic Screen

Refer to Section 8.0 - Standard Operating Procedures - Field Screening for the specific protocols to be followed and Appendix B for Field Screening Logs. Instrument calibration procedures can be located in Section 8.0 and the Calibration Log Sheets in Appendix C.

All samples shall be identified with the drum number, axis line, and other pertinent sampling data. Sampling and subsequent documentation shall conform to the procedures established in Section 8.0 Standard Operating Procedures for Field Screening and Section 10.0-Field Quality Assurance / Quality Control Project Plan.

The results of the screening techniques will be entered into a log book and will be used to group the materials into waste categories. Each screening method represents a potential waste category.

Additional analyses to be performed off site (as necessary) will be conducted on composite samples prepared from volumetrically-weighted subsamples taken from each container within a particular waste category. Potential off-site analyses that would be conducted include TCLP, metals or herbicides/pesticides. Potential disposal facilities may prefer to conduct their own analyses to determine the best handling methods for the waste and to satisfy the permit requirements of the disposal facility.

Empty Drums

All drums which are visually verified as being empty but contaminated, will be staged in a separate staging area and managed separately by PVO.

Transfer Criteria

Any additional drums which are actively leaking during the removal procedures will be deposited into a containment vessel or overpack drum which shall be staged in close proximity to the staging operation. This will provide rapid containment and the ability to transport the drum to the staging area without further contamination of the site. The spilled materials will be collected and placed within the same containment vessel or overpack drum. Once at the staging area, the drum content can be transferred or sampled for characterization (Refer to Section 6.0 - Drum Handling Procedures).

Any drum that is of suspect structural integrity will be transferred to a new 55 gallon drum or overpacked.

Drums that are missing covers, bungs or slightly damaged but not leaking, will have their openings covered with polyethylene and taped to preclude precipitation from entering the drum and causing spillage by displacement or mixing. These drums will be sampled and remain covered using poly and duct tape. Drums which can be verified as empty will be moved to the empty drum staging area. Any drums awaiting lab results will remain in the staging area until results are obtained and then moved if segregated storage is required.

Grounding Required When Transferring Flammables or Combustibles

All transfer operations will be controlled via bonding and grounding of the containers and vessels to limit the threat of fire or explosion.

Solids Criteria

Drums which contain a manufactured finished product and no free liquids such as filters, hardened paints, still bottoms etc. will be considered drum solids. Materials which are so viscous that they cannot be pumped or poured will also be considered solid. These solid drums will undergo the same drum identification,

sampling, characterization, analysis and storage as outlined in the sampling plan.

NOTE: All personnel involved in close contact with the drum sampling will be required to wear the specified personnel protective gear required by the Site Safety Plan.

Drums which are identified as reactive or incompatible via the sampling/documentation operations with the grouping within the staging area will be moved to their proper grouping or placed in segregated storage.

Upon completion of the sampling and staging operations, the staging area shall be covered with polyethylene plastic to prevent precipitation intrusion into the drums and the resultant displacement of their contents.

### 3.5.1 Lab Pack Materials and Small Containers

Laboratory chemicals will be packed according to the information contained on their labels. The lab pack operations will be performed by experienced lab pack chemists who are well trained in properly characterizing laboratory waste chemicals. The lab pack operation will bulk and composite as many materials as is possible, as well as compile a detailed inventory of the contents of each drum for later use (Refer to Section 5.0- Lab Pack Field Packing Guidelines).

### 3.5.2 Management of Generated Wastes

Decontamination Waste Water

Any water generated during the decontamination of personal protective and other equipment will be collected and stored in 55 gallon 17E or 17H drums which will be staged in a diked area (location to be determined). Composite sampling of the water will occur in 20 drum increments and be subjected to the same waste characterization procedures that existing waste will undergo. A twenty drum lot will also be the action level to consider bulking collected water versus using drum storage. Bulk quantity containers may be brought to the site or may currently exist on site and be suitable for this use. Ashland representatives will be notified prior to any new bulk quantity containers being delivered to the site.

Sampling Supplies

Sampling supplies such as bacon bombs, rags, containers and plastic bags will be disposed of in 55 gallon 17H drums specifically designated for that purpose. The supplies will be drummed with compatible waste and in conformance with disposal outlet parameters. Sampling tools such as glass rods or sampling scoops will be disposed of in the drum on which they were used. On-site field screening will alert the Lead Chemist to any unusual materials which should be immediately segregated. Sampling tools used on this type of drum will also be containerized within that drum or if no room exists in the original container, a separate drum will be used. This waste will also be characterized following procedures used on existing waste.

Protective Equipment

Protective clothing and materials will be bagged and staged in a secure area (location to be determined) for sampling. Sampling and characterization will follow procedures used on existing waste.

Laboratory Waste (As Generated)

Samples and bi-products from sample analysis such as weighing trays, waste solvent, paper towels and expended supplies will be containerized with compatible wastes in 55 gallon 17H drums. When quantities are generated (5 drums) which justify characterization, the waste will be subjected to the same procedures as waste currently existing on site.

### 3.5.3 Ambient Air Monitoring

The only sampling of environmental media anticipated as part of this work plan is ambient air monitoring for purposes of determining appropriate health and safety requirements. General environmental conditions (total vapors) will be monitored on-site by a portable GC (OVA) or an HNU Photoionization Detector. The measurements will assist in determining if health hazards are being created by the outside activities such as tank cleaning or sampling (Refer to Section 4.0 - Site Specific Health & Safety Plan).

### 3.5.4 Tank Sampling Procedures

Access To Tank Contents

Should access to the tanks' contents be impaired by the lack of an adequate opening to collect samples, modifications to the tanks will be made. In the case where a manhole, portal, or vent is accessible, measures will be taken to assure that proper sealing of the existing opening can be accomplished after sampling. Should modification measures become necessary, as a last resort, a measurement of the oxygen content and lower explosive limit will be taken inside the tank. If the results indicate a problem such as tank breaching if power tools be employed, the following measures will be taken;

- Calculate the amount of dry ice or inert gas required to inert the tank.
- Purge the tank with the appropriate material.
- Re-measure the oxygen content and Lower Explosive Limit of the tank. The oxygen content must be within the range of 19.5 and 23.5 % and the Lower
- Explosive Limits must be less than 10 % LEL.
- Create the smallest possible breach in the tank skin to access the contents of the tank.

The method detailed above is considered a last resort. Breaching of the tank may be as simple as removing a stubborn fitting. The resealing of the tank will be accomplished using either a metal cap, rubber plug or a polyethylene cap. At a minimum, a sheet of polyethylene secured with a wire mesh will be installed to secure the opening in the tank.

Sampling Tanks

In most cases the sampling of the tanks will be accomplished using a Bacon Bomb sampling device. The samples will be collected following the protocols detailed in Section 6.0.

For large sludge layers, a solids sampling device such as a Ponar Dredge or Hollow Tube sampler will be utilized to collect a representative sample.

4

CleanHarbors

# PVO International, Inc.

# RESPONSE ACTION

# WORK PLAN

THE SITE SPECIFIC HEALTH & SAFETY PLAN
WILL BE SUBMITTED UNDER SEPARATE COVER

5

CleanHarbors

# CLEAN HARBORS ENVIRONMENTAL SERVICES, INC.

# SELF-PACK PROGRAM PACKING GUIDELINES

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# 1.0 Contact Information

## Your Disposal Facility Contact is:

Patrick O'Toole, Technical Service Manager

**Responsibilities:**

- Maintains overall responsibility for the Self-Pack program.
- Works directly with Self-Pack customer and assist with approvals into Clean Harbors' facilities.
- Provides customer support.
- Communicates to the customer all paperwork corrections, packing discrepancies, off-specs and approvals.

**Location:**

Clean Harbors of Environmental Services, Inc.
10 Mercer Rd.
Natick, MA 01760

**Telephone:** (508) 655-8863 inside Massachusetts
(800) 842-1005 outside Massachusetts
**Fax:** (508) 653-7952

## Your Self-Pack Contact is:

Jay Nolan, Self-Pack Disposal Manager

**Responsibilities:**

- Provides approval of all Self-Pack wastes.
- Manages the technical review and quality of self-packaged waste.
- Communicates paperwork corrections, packing discrepancies and off-specs to Self-Pack specialist.
- Maintains and updates the Self-Pack guidelines to ensure compliance with Clean Harbors' facilities acceptance criteria.

**Location:**

Clean Harbors Environmental Services, Inc.
10 Mercer Road
Natick, MA 01760

**Telephone:** (508) 655-8863 inside Massachusetts
(800) 842--1005 outside Massachusetts
**Fax:** (508) 653-7952

# 2.0 Shipment Procedures

## 2.1 Approval Procedure

All containers must be approved prior to shipment from site of generation to a Clean Harbors facility. The following procedure outlines all requirements to assure approval.

A) All packing lists, manifests, Land Disposal Restriction Notifications and scintillation fluid disposal agreements must be faxed or sent to :

Self-Pack Specialist or Self-Pack Disposal Manager
Clean Harbors of Natick, Inc.
10 Mercer Road
Natick, MA 01760
Fax #: (508) 653-7952
Phone #: (508) 655-8863 in MA
(800) 842-1005 outside MA

B) All waste materials for shipment must be inventoried by container and a packaging list prepared for each drum. One copy of the packing list must be left with the generator, one copy with the transporter and 3 copies attached to each drum. Please use the packing list referenced in the miscellaneous form section or an equivalent multipart form. Clean Harbors will provide multipart forms upon request. Each packing list must contain the following information:

Generator name
EPA I.D. number
Chemical descriptions and waste composition (no trade names)
Amount and weight
D.O.T. shipping name
EPA or State waste codes
Shipping container size
A unique drum I.D. number
Hazards, in words, associated with the waste (sharps, stench, etc.)

C) Upon receipt of packing lists, the Self-Pack Disposal Manager will review the contents of each container for compliance with federal and state regulations as well as packing protocol set forth by Clean Harbors.

D) Any required corrections will be conveyed and subsequent approval will be contingent upon adherence to the corrections. If the required changes are not completed prior to arrival at the Clean Harbors facility the following off-specification, charges may apply:

### Shipping Material Without Prior Approval

Material shipped without the proper approval numbers will be rejected back to the generator. The Self-Pack participant will be held responsible for any transportation charges incurred.

### Misrepresented Waste

Additional pieces found in the drum and not listed as part of the packing list inventory or mislabeled chemicals which could pose a threat to the safety of Clean Harbors employees will be assessed a $300.00 fee per occurrence.

### Improper Packaging Of Chemicals

Mixed hazard classes per the Department of Transportation regulations, broken or leaking containers, or any mislabeled drum will be assessed a $100.00 fee. Materials which have been improperly packaged and require special handling may be assessed on off-spec fee in excess of $100.00.

### Manifest And Land Ban Certificate Discrepancies

Missing or incorrect information on regulatory documents will be assessed a $50.00 fee.

E) The Clean Harbors Self-Pack Disposal Manager will assign an approval number for **EACH** manifest and its corresponding packing lists and Land Disposal Restriction Notification. This approval number **MUST** appear on the top right hand corner of the manifest.

F) Unacceptable Material

The following is a listing of materials restricted from Clean Harbors' Natick facility:

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| K044 | K045 | P006 | P009 | P031 | P033 | P048 | P056 | P063 | P065 | P076 |
| P078 | P081 | P095 | P096 | P112 | P122 | U006 | U020 | U023 | U033 | U096 |
| U133 | U135 | U160 | U189 | U205 | U223 | U234 | U248 | U328 | U353 | U358 |

Explosives
Radioactives
Bio Hazardous waste
Unknowns
Department of Transportation forbidden to transport items

* See Attachment for a complete listing of unacceptable materials at the Clean Harbors of Natick, facility.

OR

G) Unacceptable Material

The following is a listing of materials restricted from Clean Harbors Spring Grove facility:

| | | | | | | |
|---|---|---|---|---|---|---|
| F019 | K091 | K101 | K110 | K123 | U182 | U353 |
| F020 | K093 | K102 | K111 | K124 | U240 | U359 |
| F021 | K094 | K103 | K112 | K125 | U243 | |
| F022 | K095 | K104 | K113 | K126 | U244 | |
| F023 | K096 | K105 | K114 | K131 | U246 | |
| F024 | K097 | K106 | K115 | K132 | U247 | |
| F025 | K098 | K107 | K116 | K136 | U248 | |
| F026 | K099 | K108 | K117 | P118 | U249 | |
| F027 | K100 | K109 | K118 | P123 | U328 | |

Explosives
Radioactives
Bio Hazardous waste
Unknowns
Department of Transportation forbidden to transport items

* See Attachment for a complete listing of unacceptable materials at the Clean Harbors Spring Grove facility.

## 2.2 Scheduling Procedure

Scheduling of all material will be performed according to the following procedures:

A) An approval number will be issued for each manifest upon confirmation of compliance with all approval criteria.

B) All approved material can be routed through the nearest Clean Harbors Service Center. Clean Harbors can provide secondary transportation from our facilities to the materials ultimate destination, if necessary.

C) Approval must be given by the Clean Harbors Disposal Manager prior to scheduling the shipment of material with the local Clean Harbors Service Center providing secondary transportation or if material is to be direct shipped to a Clean Harbors facility.

D) Materials transported to a Clean Harbors facility must utilize an appropriately licensed and permitted transportation company.

## 2.3 Receiving Procedure

Upon delivery of shipment to a Clean Harbors facility, the following procedures will be followed:

A) Each manifest will be reviewed by a receiving chemist for:

1) Accuracy of piece count
2) Land Disposal Restriction Notifications
3) Proper signatures
4) Scintillation fluid disposal agreements (where applicable)
5) Any other paperwork associated with the manifest, when applicable

B) Container labels will be inspected for required information in accordance with D.O.T. Regulations and Clean Harbors specifications.

C) All containers will be inspected upon arrival and must match information provided to the Self-Pack Disposal Manager prior to the shipment.

D) All discrepancies will be noted and may be subject to off-spec charges.

E) Manifest discrepancy notifications will be issued where applicable. The Self-Pack program participant will be notified via telephone when necessary. For this reason, the name of a generator contact authorized to make manifest discrepancies must be provided when the approved material is scheduled into the facility.

F) Materials received that are restricted from the facility will be rejected back to the generator and will be subject to off-spec charges.

G) Clean Harbors will complete the distribution of the hazardous waste manifest and forward a copy to the Self-Pack Program participant.

# 3.0 Packing Protocol

## 3.1 Introduction

Clean Harbors has compiled a comprehensive package that will enable those companies that have the technical expertise to perform a lab pack operation, the ability to do so. All Self-Pack participants are expected to adhere to these guidelines as well as all local, State and Federal laws and regulations pertaining to the packaging and shipment of laboratory quantity chemicals.

## 3.2 Containerization

A. Packaging of Waste for Disposal

1) All waste materials are to be packaged according to the following Self-Pack program packing guidelines.

2) All material that is packed for disposal in the same container must be of the same D.O.T. hazard class (division).

All containers are to be packed in the following manner:

1) Place a four to six inch layer of vermiculite in the bottom of each container.

2) Place a single layer of containerized waste on the vermiculite insuring that there is a two inch space between containers and the side of the drum. Containers should not be touching one another and must be upright and intact.

3) Cover this layer with a two to three inch layer of vermiculite.

4) Alternate layers of waste and vermiculite.

5) Top off the container with four to six inches of vermiculite.

6) Attach the appropriate D.O.T. labels and markings.

7) You must attach a detailed packing list to each container in a waterproof packing envelope. Envelopes can be supplied upon request.

## 3.3 Container Integrity - Overpacking Guidelines

| | |
|---|---|
| AO Liquids- | All "AO" liquids must be put in poly bags and taped before packing. |
| Rubber Stoppers- | Rubber stoppers must be taped in place and container must be poly bagged and taped before packing. |
| Glass Stoppers- | Glass stoppers must be taped in place and container must be placed in poly bag and taped before packing. |
| Leaking 5 Gallon Pails- | Leaking pails must be poly bagged and overpacked in an appropriate size container. |
| Beakers With Parafilm: | |
| Liquids - | Overpack in rigid containers |
| Solids - | Place in poly bag and tape before packing. |
| Bio Haz Bags or Sharps Boxes | Non biohaz material in biohaz bags must be transferred into poly bags. All sharps must be transferred into a rigid overpack such as a quart or gallon overpack or a 5 gallon pail. |
| Broken Solid Bags- | Broken solid bags such as pesticide bags must be overpacked in polybags. |
| Ampules- | Overpack in rigid container or tape rigid container over the glass stem of the ampule. |
| Silanes- | Place in poly bags and tape before packing. |
| Oxidizing Acids- | Place in poly bags and tape before packing. |
| Sharps- | All sharps must be overpacked in rigid containers. |
| Thermometers- | If thermometer is intact it should be poly bagged. If it is broken, it should be packed in a rigid overpack container. |
| Cracked Caps- | Tape cap and place in poly bag before packing. |
| Missing Caps- | Must overpack in a rigid container. |

## 3.4 Packing Categories

All waste is to be packed according to three criteria:

1. Chemical Compatibility
2. Government Regulations (DOT/EPA)
3. Disposal Facility Guidelines

With these criteria in mind, all waste can be broken down into the following categories:

### Batteries (X)

Container sizes: 55,30,5

Packing Material:
- nickel cadmium and lithium batteries are to be packed in vermiculite
- lead acid batteries are to be packed in a drum lined with a poly bag
- place a layer of 4-6 inches of speedi dry absorbent inside the poly bag
- individually overpack any leaking batteries

Acceptable wastes:
- all batteries must be sealed/non-leaking and either completely discharged or insulated to prevent short circuits.

### Fuels Blending (S)

Container Sizes: 55,30,5
Packing Material: Vermiculite
Material Limits:
- Liquids = 1 quart to 5 gallons

Drum Limits:
- Maximum 20 gallons per 55 drum
- Maximum 12 gallons per 30 drum
- Maximum 1 gallon bottle or 2 gallons total per pail

Acceptable Wastes:
- only those materials listed in the guidelines

## Incineration (N, V)

Container Size: 30,16,5 - Fiber only
Packing Material: Vermiculite
Material Limits:
- Liquids = 5 gallons maximum
- Solids = 50 pounds maximum

Container Limits:
- 4 gallons maximum per kiln pack (30 and 16)
- 80 pounds maximum gross weight per kiln pack (30 and 16)
- 5 gallon bulk pails for incineration must be lab packed into a 16 gallon kiln
- Maximum 1 gallon bottle or 2 gallons total per pail
- items over 1 gallon must be packed alone

Acceptable Wastes:
- all listed codes which are prohibited from Landfill/Treatment except for D009
- all contaminated debris from listed wastes (except D009)
- all sharps (specify needles, broken glassware, etc.)
- overpack ampules into puncture proof container
- no asbestos or asbestos containing material
- do not mix hazard classes

## Stabilization (V)

Container Sizes: 55,30,5
Packing Material: Vermiculite
Material Limits:
- Liquids = 5 gallons maximum
- Solids = 50 pounds maximum

Drum Limits:
- Maximum 20 gallons per 55 gallon drum
- Maximum 12 gallons per 30 gallon metal drum (stabilization)
- Maximum 100 pieces per drum
- Maximum 2x5 gallon pails per 55 gallon drum
- Maximum 1 gallon bottle or 2 gallons total per pail
- Maximum 15 pieces per pail

## Landfill (L)

Container Sizes: 55,30,5
Packing Material: Vermiculite
Material Limits:
- Liquids = 5 gallons or less
- Solids = 50 pounds or less

Drum Limits:
- Maximum 20 gallons per 55 drum
- Maximum 12 gallons per 30 drum
- Maximum 100 pieces per drum
- Maximum 15 pieces per pail
- Maximum 1 gallon bottle or 2 gallons total per pail

Acceptable Wastes:
- only those materials listed in packing guidelines
- only non-regulated waste codes accepted
- includes debris contaminated with non-regulated waste
- no sharps

## Mercury and Mercury Bearing Articles (H)

Container sizes: 55,30,5
Packing Material: Vermiculite
Material Limits:
- Liquids = 5 gallons maximum
- Solids = 50 pounds maximum

Drum Limits:
- Maximum 20 gallons per 55 gallon drum
- Maximum 12 gallons per 30 gallon drum
- Maximum 100 pieces per drum (excluding alkaline batteries)
- Maximum 2x5 gallon pails per drum
- Maximum 1 gallon bottle or 2 gallons total per pail
- Maximum 15 pieces per pail (excluding alkaline batteries)

Acceptable wastes:
- all thermometers must be overpacked in rigid containers
- all debris must be sealed to prevent vapor release

## Reactive (O)

Container Sizes: 55,30,16,5
Packing Material: Vermiculite
Material Limits:
- Liquids = 1 gallon liquid maximum
- Solids = 5 pounds solid maximum

Drum Limits:
- Maximum 1 gallon bottle or 2 gallons total per pail
- Maximum 4 gallons total per kiln

Notes: Keep in mind that Clean Harbors has a bulk reactive program. Call your Clean Harbors Self-Pack Program representative when larger quantities of reactives are encountered.

Include total weight of materials per shipping container on packing list.
- do not mix hazard classes.
- check for proper shipping class

## Treatment (Z)

Container Sizes: 55,30,5
Packing Material: Vermiculite
Material Limits:
- Liquids 5 gallons or less
- Solids = 50 pounds or less

Drum Limits:
- Maximum 20 gallons per 55 drum
- Maximum 12 gallons per 30 drum
- Maximum 100 pieces per drum
- Maximum 15 pieces per pail
- Maximum 1 gal bottle or 2 gallons total per pail

Acceptable Wastes:
- all material must be chemically compatible and suitable for aqueous treatment.
- only water soluble material
- no contaminated debris
- no listed waste codes with "P","U","F","K"
- only non-regulated and D002-D011 (except for D003 and D009)
- only D001 inorganic treatable oxidizers

## Unknowns (U)

Container Sizes: 5 gal
Packing Material: Vermiculite
Material Limits:
- Liquids = 1 gallon maximum
- Flammable Liquids = 1/2 gallon maximum
- Solids = 5 pounds maximum

Container Limits:
- Maximum 1 gallon per pail
- Maximum 5 pounds per pail

# 4.0 Acid and Acid Compatible

## 4.1 AO Corrosive (Division 8)

Inorganic acid generating reactives.

ex:
- phosphorous trichloride <PBI>
- stannic chloride (anhydrous)
- chlorosulfonic acid <PBI>
- aluminum chloride (anhydrous)
- phosphorous pentoxide
- phosphorous oxychloride <PBI>
- sulfuryl chloride <PBI>
- boron tribromide <PBI>
- selenium oxychloride <6.1>
- aluminum halides ($AlCl_3$, $AlBr_3$, $AlI_3$)
- multihalogenated inorganic compounds($SbCl_3$, $TiCl_4$)
- inorganic "oyl" chlorides
- antimony trichloride
- tetrachlorosilane
- tellurium tetrahalide
- antimony pentachloride
- thionyl chloride <PBI>
- phosphorous pentachloride
- inorganic chlorosilanes
- sulfur trioxide <PBI>

Limitations:
- no water based solutions
- proper waste codes would be D003, other reactive and D002 only if there is liquid present.

Note: Ship as: Waste Corrosive Solids, N.O.S. (D003)
Corrosive Material, UN 1759, PGI
- add to line 15, "Dangerous when wet - addition of water liberates toxic vapors".

## 4.2 AV Corrosive (Division 8)

Regulated and/or untreatable inorganic acids for incineration.

ex:
- hydrofluoric acid (U134)*
- acid contaminated debris**
- spent hydrofluoric acid (D002)*
- untreatable acid sludges
- virgin hydrofluoric acid spill debris (U134)
- fuming sulfuric acid (pack separately and by itself) <PBI>

* All hydrofluoric acid must be overpacked in accordance with the Hydrofluoric Acid Handling Guidelines. Please refer to Hydrofluoric Acid Handling Guidelines in attachment section of the Self-Pack Program Guidelines.

** If quantities of acid contaminated debris that can not fit into 1x16 gallon container are encountered please call for special packaging instructions.

## 4.3 AV Poison (Division 6.1)

Regulated and/or untreatable inorganic acid compatible poisons for incineration.

ex:
- arsenic acid (P010)
- arsenic pentoxide (P011)
- arsenic trioxide (P012)
- vanadium pentoxide (P120)
- *arsenic trichloride <PBI> (D002,D003,D004)
- lead phosphate (U145)
- thallium chloride (U216)
- selenous acid (U204)

* **Add to line 15, "Dangerous when wet- addition of water liberates toxic vapors."**
**Do not ship in same container with any water based solutions.**

## 4.4 AZ Corrosive (Division 8)

Inorganic mineral acids, acidic heavy metal solutions, inorganic acid salts suitable for aqueous treatment (solids and/or liquids).

ex:
- sulfates
- acidic phosphates
- acidic sulfites
- boric acid
- nitric acid (<40%,D002)
- hydrochloric acid (D002)
- muritic acid (D002)
- tannic chloride (hydrated)
- bromine water*
- acidic halogenated (F, Cl, Br, I)
- acidic fluoborates
- inorganic chlorides
- hydriodic acid (D002)
- aluminum chloride, hydrated
- sulfuric acid (D002)
- phosphoric acid (D002)
- sulfamate salts
- hydrazine sulfate
- stannous chloride
- salts or solutions

Limitations:
- no "oyl" chlorides
- no stannic chloride, anhydrous (D003) or other D003 acid chlorides
- no organics
- only water soluble materials; (no lead oxide, lead carbonate, heavy metal chunks, etc.)
- no solid lead compounds
- no oxidizers (D001)
- enter the words "non-oxidizer" on all packing lists containing nitric acid <40%
- 100 pieces or less per drum
- 15 pieces per pail
- no debris

* Bromine water is a commercial preparation containing 3.2 grams bromine in 100 grams water. It should have a slightly acidic pH and test negative for oxidizing properties. If it does not meet this criteria, pack it in an EO Bromine.

## 4.5 AZ Poison (Division 6.1)

Acidic heavy metal solutions, and inorganic acid salts suitable for aqueous treatment (solids and/or liquids) meeting the guidelines for aqueous treatment listed above.

ex. barium chloride
lead chloride solutions
spent arsenic solutions
cadmium chloride
barium/hydrochloric acid

# 5.0 Alkaline and Alkaline Compatible

## 5.1 BN Cyanide (Division 6.1)

Cyanides and pseudo cyanides.

ex: potassium cyanide (P098)
cyanogen bromide <PBI> (U246)
calcium cyanide (P021)
spent sodium cyanide solution (D003)
potassium thiocyanate [potassium sulfocyanate]
sodium ferricyanide [prussiate of soda]
metal cyanides: [(P030) cyanides, etc...]

Limitation:
- solids not to exceed 20 lbs. per chemical
- no organic isocyanates

NOTE: Psuedo-cyanides can be shipped with D002 acids.
Cyanides can not be shipped with D003 acid solids or non-regulated acidic corrosive solids (D.O.T. Corrosive Materials).

## 5.2 BO Corrosive (Division 8)

ex: hydrazine hydrate (D002)

NOTE: Hydrazine must be in a hydrated form as hydrazine, anhydrous (U113) is restricted from Natick.

## 5.3 BO Poison (Division 6.1)

Organic/inorganic poisons requiring additional handling procedures for incineration, limited to the following materials:

ex: solid sodium azide (P105)
2,4-dinitrotoluene (U105,D030)*
o-dinitrobenzene
difluorodinitrobenzene
4,6-dinitro-m-xylene
2,4-dinitro-1-naphthol sulfonic acid
dinitroaniline
4-(2,4-dinitroanilino) phenol
dinitroanisole
m-dinitrobenzene
p-dinitrobenzene
chlorodinitropyridine
2,4-dinitrobenzene sulfonyl chloride, sodium salt

3,4-dinitrobenzoic acid
2,4-dinitro benzoic acid
3,5-dinitrobenzotrifluoride
3,5-dinitrobenzoic acid
3,5-dinitrobenzyl chloride
3,5-dinitrobenzoyl-alpha-phenylglycine
2,2-dinitrobiphenyl
3,5-dinitrobenzyl alcohol
2,6-dinitro-p-cresol
2-(2,4-dinitrobenzyl) pyridine
2,4-dinitro-n-ethylaniline
4,6-dinitro-o-cresol (P047)
2,4-dinitrosalicylic acid
dinitrocyclohexylphenol
3,5-dinitro-o-toluamide
2,4-dinitroflourobenzene

* All Dinitro compounds must be wetted greater than 20% with the exception of 2,4-dinitrotoluene which must be wetted w/ greater than 90% water with a total volume not to exceed 1 gallon (i.e. do not overpack and wet in anything larger than a 1 gallon overpack)

NOTE: If multinitrated compounds other than those listed above or in the DO hydrophilic section are encountered, you must call your Clean Harbors Self-Pack Program representative for approval prior to packing.

## 5.4 BV Corrosive (Division 8)

Regulated/non-regulated alkaline liquids not suitable for landfill or treatment.

ex: non-flammable amines — amine based cleaners
triethanolamine — triethylene tetramine
thiols — formamides
mercaptans (f.p. >140°F)
sodium hydroxide/chloroform pH>12.5
alkaline soapy detergents-surfactants

## 5.5 BV Corrosive, Poisonous (Division 8)

Regulated D.O.T. division 8, Poison, Flammables

ex: ammonium sulfide (D001, D002, D003)

NOTE: Ammonium sulfide is a D001 wastewater, D002 pH>12.5 wastewater and a D003 reactive sulfide wastewater.

## 5.6 BV Poison (Division 6.1)

Regulated inorganic alkaline compounds with pH>7 not suitable for landfill or treatment.

ex:
- lead acetate (U144)
- osmium tetroxide (P087)
- non-flammable thiols
- thallium acetate (U214)
- thallium oxide (P113)
- brucine (P018)
- aziridine (P054)
- thiosemicarbazide (P116)
- calcium sulfide (D003)
- 4-nitrobenzamine (P077)
- dipyrridylethyl sulfide
- 1,1-dimethyl hydrazine (U098)
- lead metal powder (D008)
- metal chunks, mossy, wire
- thiophenol/phenyl mercaptan
- lead sulfide (D008)
- lead oxide (D008)
- 1-naphthylamine (U167)
- thallium carbonate (U215)
- thioactemide (U218)
- strychnine (P108)
- thiourea (U219)
- thioglycerol (MA99)
- barium sulfide (D003, D005)
- cadmium sulfide (D003, D006)
- arsenic sulfide (D004)
- sulfur
- metal carbonates (RCRA)
- non-regulated inorganic sulfides
- sodium azide solution (P105)-no solids

## 5.7 BZ Corrosive (Division 8)

Inorganic alkaline and heavy metal solutions or salts with pH>7 for aqueous treatment (solids and/or liquids)

ex:
- chromates
- hypophosphites
- tungstates
- bicarbonates
- ammonium hydroxide
- sodium oxide
- borates
- hydroxide cleaners (no organics)
- titanates
- vanadates (nonRCRA)
- sodium hydroxide
- potassium hydroxide
- alkaline phosphate solutions
- hydroquinone based developers
- *hypochlorite solutions (bleach) (D001,D002)

Limitations:
- no metal chunks, mossy, ingots, etc.
- no surfactants
- no solid lead compounds
- no metal carbonates
- no debris

***Ship as Waste Corrosive Liquid, Oxidizing, N.O.S.**

## 5.8 BZ Poison (Division 6.1)

Alkaline heavy metal solutions and alkaline salts for aqueous treatment meeting the guidelines for aqueous treatment listed above.

ex. barium hydroxide
barium/sodium hydroxide
cadmium hydroxide
sodium arsenate solution

# 6.0 Organic Material

## 6.1 CL Liquid -

Non-regulated organic liquid with pH>2 and f.p. >140° F not suitable for aqueous treatment or fuel blending.

ex: aldehydes
silicones (viscous or < quart)
oils/glycols (viscous or < quart)
benzaldehyde
glycerine
laurylaldehyde (< quart)
neutral cleaners
dodecyl acetate (< quart)
ethylene glycol dibutyl ether (< quart)
heavy alcohols (oleyl, dodecanol, etc.)

Limitations:
- no high toxicity organics such as ethidium bromide or diaminobenzidine
- no strong reducing agents (hypophosphites)

## 6.2 CL Organic/Inorganic Solid

Neutral, non-regulated organic and inorganic solids not suitable for treatment, limited to the following materials:

| | |
|---|---|
| albumin | amino acids |
| aluminum carbonate | aluminum silicate |
| calcium carbonate | magnesium carbonate |
| calcium silicate | magnesium silicate |
| clay | copper carbonate |
| zinc carbonate | copper oxide |
| zinc oxide | copper silicate |
| zinc silicate | diatomaceous earth |
| iron carbonate | cobalt carbonate |
| nickel carbonate | iron oxide |
| cobalt oxide | nickel oxide |
| iron silicate | cobalt silicate |
| nickel silicate | lithium carbonate |
| potassium carbonate | sodium carbonate |
| marble chips | mica |
| pumice | silica |
| silicon oxide | silica gel |
| sodium aluminosilicate | sodium silicate |
| talc | titanium dioxide |

## CL Organic/Inorganic Solid (Cont.)

titanium carbonate
titanium oxide
vanadium carbonate
vanadium oxide
aminophenol
charcoal
quartenary ammonium salts
phenolic resins
phthalocyanine dyes
polyacrylate resins
polybutylene resins
polyester resins
polysterene resins
diphenyl amine
adiplic acid
benzene sulfonic acid
chlorophthalic acid
crotonic acid
maleic acid
napthalene sulfonic acid
palmitic acid
salicylic acid
stearic acid
succinic anhydride
thiobenzoic acid
toluic acid
trichloroacetic acid
grease
phenylene diamine
poly acetate resins
polyamine resins
polyester resins
polyurethane resins
PVP (polyvinyl pyrrolidone)
quartenary ammonium salts
stearates

zirconium carbonate
zirconium oxide
manganese carbonate
manganese oxide
carbon
cellulose
latex resins
phenylene diamine
polyacetate resins
polyamine resins
polycarbonate resins
polyol resins
polyurethane resins
organiic/fatty acids
ascorbic acid
boric acid
citric acid
glutamic acid
methane sulfonic acid
oxalic acid
phthalic acid
sebacic acid
succinic acid
tartaric acid
thiomaleic acid
toluene sulfonic acid
glycols
latex resins
phthalocyanine dyes
polyacrylate resins
polycarbonate resins
polyol resins
polystyrene resins
PVA (polyvinyl alcohol)
silicone polymers
tartrates

Limitations:

- must be on above list
- no alkalines
- no sulfur compounds
- no metal chunks, mossy, wire
- non-hazardous, non-regulated waste only

## 6.3 CO Organic Acid Halides and Chlorides (Division 8)

ex: benzoyl chloride (D002)
sebacoyl chloride (D002)
diisopropyl fluorophosphate (P043)
organic oyl chlorides (liquid or solid)
all non-flammable silanes (D002)
chlorosilanes (flashpoint >73.4° F)
2,4-dinitrobenzene sulfenyl chloride*
2,4-dinitrobenzene sulfonyl chloride*
dinitrobenzoyl chloride*
diethyl dichlorosilane (D001, D002)
boron trifluoride diethyl etherate (D001, D002)

* Do not wet these dinitro compounds. They are acceptable in a dry state. Addition of water will generate heat and toxic fumes.

## 6.4 CS Poison (Division 6.1)

Organic solvents and petroleum distillates with a flash point greater than 140° F suitable for fuels blending limited to the following materials:

oils
dimethyl sulfoxide
methylene chloride (U080)
nitrobenzene (U169/D036)
chlorobenzene (U037/F002)
dichloropropane (1,2-1,3)
hexachloroethane (U131/D034)
tetrachloroethylene (U210/F002)
trichloroethane (1,1,1-1,1,2)
trichlorotrifluoroethane (F002)
tribromomethane (U225)
chloroform (U044/D022)
glycols
phenol (U188)
F001, F002, solvents
dichlorobenzene (o,m,p-isomers)
dipropylene glycol methyl ether
perchloroethylene (U210/F002)
trichloroethylene (U228/F001)
trichloropropane
trichlorofluoroethane
carbon tetrachloride(U211)

Limitations:
-must be on above list
-must be a quart or more in volume
-must have a pH between 4 and 10

## 6.5 CS/DS with parts

Formaldehyde or formalin solutions with biological specimens.

ex: 5 gallon pail of frogs in formaldehyde

Limitations:
- containers must be quart or larger and pourable
- inquire as to flashpoint of formalin solutions 37% formaldehyde/15% methanol-f.p. =122° F

* Non-regulated waste that is infectious or contains human parts must be shipped on a Bio-Medical Waste Manifest.

## 6.6 CV Liquid, Corrosive (Division 8)

Regulated organic acids and organic acids not suitable for aqueous treatment or fuels blending.

ex:
- trichloroacetic acid (D002)
- trifluoroacetic acid (D002)
- oleic acid
- formic acid (U123/D002)
- dichloroacetic acid (D002)
- lactic acid
- butyric acid
- organic solvents (HCL and Formalin)*
- inorganic acid solutions mixed with nonflammable solvents

* Separate concentrated inorganic acids from organic materials.

## 6.7 CV Liquid Corrosive, Flammable (Division 8)

ex:
- acrylic acid (U008)
- glacial acetic acid (D001, D002)
- acetic anhydride (D001, D002)
- propionic acid (D001, D002)

## 6.8 CV Liquid, Poison (Division 6.1)

Regulated organic liquids that are not suitable for aqueous treatment or fuels blending.

ex:
- phenol (U188) <quart
- analine (U012)
- non-flammable isocyanates
- o-dichlorobenzene (U070)
- dimethyl phthalate (U102)
- diethyl phthalate (U088)
- diaminobenzidine
- benzyl chloride (P028)
- xylidine (U093)
- di-n-octyl phthalate (U107)
- m-dichlorobenzene (U071)
- di-n-butyl phthalate (U069)
- trypan blue (U236)
- iodine tincture (<qt fp>140f)
- ethidium bromide solutions
- dimethyl sulfate(U103/D002)<PBI>
- virgin and spent formaldehyde (<quart)
- spent formalin solutions (<quart, f.p. > 140° F)
- formalin w/parts (<quart, not pourable, or human tissue)*

* Specify parts (ex. human, rat, pig, etc.).

* Non-regulated waste that is infectious or contains human parts must be shipped on a Bio-Medical Waste Manifest.

## 6.9 CV Liquid Poison, Flammable (Division 6.1)

Regulated D.O.T. division 6.1 flammable liquids.

ex: ethyl chloroformate (D001, D002)<PBI>
epichlorohydrin (U041)
methyl chloroformate (D001, D002)<PBI>

## 6.10 CV Solid, Corrosive (Division 8)

Regulated organic acid solids and organic acids not suitable for aqueous treatment or landfill.

ex: *phthallic anhydride (U190)
*maleic anhydride (U147)
trichloro, dichloro & trifluoro acetic acid solids
non regulated organic acid salts

* Ship as Waste Corrosive Solid, N.O.S.

## 6.11 CV Solid, Poison (Division 6.1)

Neutral or acidic regulated organic acid chloride salts and organic solids. Non-regulated acids not suitable for treatment.

ex:
phenol(U188)
saccharin salts (U202)
p-nitrophenol (U170)
2-chlorophenol (U048)
phenacetin (U187)
1,4-napthaquinone (U166)
p-dichlorobenzene (U072)
benzidine (U021)
glutamic acid
thiobenzoic acid
ethidium bromide solids
succinic anhydride
2,4-dichlorophenol (U081)
hexachlorobenzene (U127)
mitomycin c (U010)
chloronapthalene (U047)
pentachlorobenzene (U183)
resorcinol (U201)
0-toluidine hydrochloride(U222)
tartaric acid
thiomalic acid
diaminobenzidine solids

# 7.0 Ignitable Material

## 7.1 DO Flammable Liquid Acidic (Division 3)

Acidic flammable liquids

ex: methyl trichlorosilane
chlorosilanes (flashpoint <23 C.)

## 7.2 DO Poisonous Flammable Liquids (Division 6.1)

Flammable liquids that are D.O.T. division 6.1 materials.

ex: methyl isocyanate (P064)
trimethoxysilane (D001,D002)

## 7.3 DO Poisonous Flammable Solids (Division 6.1)

Flammable solids that are D.O.T. division 6.1 materials.

ex: beryllium dust (P015)
cadmium metal powder (D001/D006)

## 7.4 DO Pyrophoric Acidic (Division 4.2)

Acidic spontaneously combustible liquids.

ex: ethyl aluminum dichloride (D001, D002, D003)
methyl aluminum sesquibromide (D001, D002, D003)
metal alkyl halides
triethylborane (D001, D003)

NOTE: All Division 4.2 PG I material must be packed by itself.

IT IS ACCEPTABLE TO PACK 4.2 AND 4.1 MATERIAL TOGETHER WHEN THEY ARE CHEMICALLY COMPATIBLE. THE PROPER SHIPPING NAME IS CHOSEN FROM THE D.O.T. PRECEDENCE TABLE.

## 7.5 DO Pyrophoric Alkaline (Division 4.2)

Alkaline spontaneously combustible liquids.

ex: triisobutylaluminum (D001, D003)
phenyl lithium (D001, D003)
butyl lithium (D001, D003)
aluminum methyl hydride (D001, D003)
metal alkyls
metal alkyl hydride

## 7.6 DO Water Sensitive (Hydrophobic, Division 4.1)

Flammable metal powders and flammable sulfides for incineration.

ex: bismuth metal powder
sodium hydrosulfite
aluminum metal powder
calcium resinate
nickel metal powder
thermite
phosphorus heptasulfide (D001)
iron metal powder
cobalt dust
boron dust
calcium resinate
cobalt resinate
red phosphorus (amorphous)
tungsten silicide
strontium sulfide (P107)

## 7.7 DO Water Sensitive (Hydrophobic, Division 4.2)

Flammable solids which are self heating.

ex: zirconium metal powder
sodium sulfide (D001,D003)
sodium hydrosulfite
diethyl zinc
aluminum borohydride (D001, (D003)
sodium hydrosulfide (D001,D003)
potassium sulfide (D001,D003)
sodium, lithium, or potassium ethylates (ethoxides) and methylates (methoxides).

## 7.8 DO Water Stable (Hydrophilic, Division 4.1)

Flammable solids which are stable when mixed with water

ex: *picric acid (D001)
dinitro phenyl hydrazine (D001)
dinitronapthalene (1,5-1,8 isomers) (D001)
2,4 dinitro resorcinol
decaborane (D001,D003) (pack under oil)

NOTE: If multinitrated compounds other than those listed above or in the BO Poison section are encountered, you must call in for approval prior to packing.

- all Dinitro's must be wetted greater than 20%

* Picric acid (picronitric acid; trinitrophenol; carbazotoc acod; nitroxanthic acid; phenoltrinitrite) is listed as having the following hazards:

Severe explosion risk when shocked or heated when completely dry, especially reactive with metals or metallic salt. Toxic by skin absorption. TLV: 0.1 mg/m3 of air. Picric acid is commercialy available with greater than 10% water. End disposal facilities require that it contains 60% water or greater. If it has less than that, it must be hydrated.

## 7.9 DO Water Stable (Hydrophilic, Division 4.2)

Flammable solids which are self heating and must be packed under water.

ex: raney nickel (D001,D003) phosphorus(white/yellow)(D001,D003)

## 7.10 DS (Division 3)

Organic material with a flash point less than 140° F for fuels blending limited to the following material.

| | |
|---|---|
| acetone (U002) | benzene (U019/D018/F005) |
| n-butyl alcohol (U031) | cyclohexane (U056) |
| ethyl acetate (U112) | xylene (U239) |
| cyclohexanone (U057) | isobutyl alcohol (U140) |
| *methanol (U154) | tetrahydrofuran (U213) |
| methyl ethyl ketone (U159/D035) | toluene (U220) |
| methyl isobutyl ketone (U161) | diisobutyl ketone |
| ethly benzene | ethyl butyl ketone |
| gasoline | heptane |
| isobutyl acetate | isopropyl acetate |
| kerosene | laquer thinner |
| methyl acetate | mineral spirits |
| octane | octanol |
| pentanone | petroleum ether |
| propyl acetate | *acetonitrile |
| 1,4-dioxane (U108) | 1,2-dichloroethane (U077) |
| dichloropropane (1,2-1,3) | chlorobenzene (U037/D002) |

petroleum distillate based inks and toners

above solvents mixed with hydrochloric, sulfuric, acetic, phosphoric, and nitric acids provided that the pH>4 and they are non-oxidizers.

Limitations:
-must be on above list
-must be quart or more in volume
-must have pH between 4 and 10

* Ship as: waste flammable liquids, poisonous, n.o.s.

## 7.11 IV (Division 3)

Flammable paints, resins, adhesives, and epoxies for incineration.
Acceptable waste codes: D001, D004, D005, D006, D007, D008, D010 and D011.

ex:
toluene based paint
petroleum distillate based adhesive
oil based paints
urethanes (no isocyanates)
viscous inks and dyes
lead based paint (D001, D008)

Limitations:
- no methacrylates or acrylatres
- if containing asbestos, or codes other than those listed above, call for special packing requitrements.
- no isocyanates

## 7.12 DV Acid (Division 3)

Flammable organic liquids with pH<7 for incineration.

ex:
ethylene oxide (U115)<PBI>
flammable isocyanates
methyl allyl chloride (D001/D002)
T-butyl isocyanate (D001/D002)<PBI>
solvents mixed with acids (f.p.<140 F)*
formalin solutions [f.p. <140 F, <quart (D001)]
pourable solvents <quart
furan (U124)
n-butyl formate (D001)
ethyl ether (U117)

Limitations: -no pyrophorics

* Separate concentrated inorganic acids from organic material.

## 7.13 DV Alkaline (Division 3)

Flammable organic liquids with pH>7 for incineration

ex:
- aziridine (P054)
- morpholine (D001)
- ethyl butylamine (D001)
- flammable amines
- *pyridine (U196)
- dimethyl sulfide (D001)
- flammable thiols or mercaptans (D001)
- 2-picoline (U191)
- 1,4 diaminobutane (D001/D002)
- butyl sulfide (D001)
- *carbon disulfide(P022/F005)
- solvent mixed w/hydroxide

* **Ship as Waste Flammable Liquid, Poisonous, N.O.S.**

## 7.14 DV Flammable Solid (Division 4.1)

D.O.T. Division 4.1 material that will not be billed at a reactive rate.

ex: napthalene

NOTE: This material may be packed with other DO material when small quantities are encountered. When this is done do not add the weight to the reactive total weight.

# 8.0 Oxidizers and Oxidizer Compatible Material

## 8.1 EO Inorganic Oxidizers

**EO Bromine (Division 8)**

ex: bromine (D001, D002-PBI) **<PBI>**
bromine pentafluoride (D001, D002, D003) **<PBI>***

* Bromine pentafluoride is an oxidizing corrosive that is highly reactive and explodes on contact with water. It must be packed by itself per D.O.T. regulations.

NOTE: Bromine in any concentration is a D.O.T. Division 8 <PBI>.

**EO High Hazard Inorganic Oxidizers (Division 5.1)**

ex:
- hydrogen peroxide >30% (D001)
- sodium superoxide (D001)
- barium superoxide (D001, D005)
- potassium superoxide (D001)
- sodium peroxide (D001)
- cesium superoxide (D001)
- potassium peroxide (D001)
- calcium superoxide (D001)

Limitations:-reference D.O.T. manual as many peroxides are forbidden to transport

**EO Perchloric Acid (Division 5.1)**

ex: perchloric acid

Limitations: -concentrations >72% are forbidden to transport

## 8.2 EO Organic Oxidizers

**EO Organic Nitrates (Division 3)**

ex: amyl nitrate
collodion liquids
butyl nitrate

Limitations: -pack collodion liquids separately
-ship using the specific name or as Waste Flammable Liquid (not Waste Organic Peroxide)

**EO Organic Nitrates and Perchlorates (Division 4.1)**

ex: parlodion/collodion solids
nitrocellulose (wetted >25%)
tetraethyl ammonium perchlorate
tetrabutyl ammonium perchlorate
tetrapropyl ammonium perchlorate

Limitations:
-refer to D.O.T. book prior to shipping these chemicals as many of them are forbidden to transport
-nitrocellulose containing <25% solvent is a D.O.T. Explosive A

**EO Organic Peroxide, Liquids (Division 5.2)**

ex: butyl peroxy benzoate
benzoyl peroxide solution
t-butyl hydroperoxide
t-butyl peroxyacetate *
peroxyacetic acid (peracetic acid)**

* greater than 76% solutions are forbidden to transport
** greater than 43% with greater than 6% hydrogen peroxide is forbidden to transport

NOTE: Pack all concentrations alone.

**EO Organic Peroxide, Solids (Division 5.2)**

ex: dodecanoyl peroxide
benzoyl peroxide
cumene peroxide
t-butylisopropyl benzene hydroperoxide

## 8.3 EZ (Division 5.1)

Inorganic oxidizers with pH>7.

ex:
- iodates
- permanganates
- hydrogen peroxide <=30% (D001)
- nitrates
- perchlorates
- potassium permanganate (D001)
- isocyanuric acid
- bromates
- dichromates
- chlorates
- persulfates
- trichloro-s-triazine trione
- ceric sulfate
- hypochlorite solutions (bleach)

Limitations:
-no oxidizing mineral acids
-no metal peroxides/dioxides (lead, manganese, barium, etc.)
-no mercury in any amounts
-no debris

## 8.4 EZ Acid (Division 8)

Inorganic oxidizers with pH<=7.

ex: nitric acid >40% but <85% (D001,D002)
chromic acid solution [chromerge (D001,D002,D007,)]

Limitations:
-no mercury in any amounts
-no debris

## 8.5 EZ Nitric (Division 8)

ex: nitric acid greater than 85%

NOTE: Nitric acid greater than 85%, also known as red fuming nitric acid (RFNA), is poisonous by inhalation and must be packed by itself per D.O.T. regulations.

## 8.6 EV Corrosive (Division 8)

Corrosive oxidizing material unsuitable for aqueous treatment.

ex: mercury/nitric acid mixture

## 8.7 EV Oxidizer (Division 5.1)

Oxidizers not suitable for aqueous treatment.

ex: lead peroxide
manganese dioxide
barium peroxide
oxidizer contaminated debris
urea peroxide

Limitations: - Pack acids separate from alkaline materials

# 9.0 Pesticides

## 9.1 FL

Non-regulated pesticides and herbicides for landfill.

ex: carbaryl (sevin)
ferbam
folpet
captan
picram
piperonyl butoxide
methyl carbamate
malathion

Limitations: - separate or layer solids and liquids

## 9.2 FV (Division 6.1)

Regulated pesticides for incineration.

ex: lindane (U129/D013)
chlordane (U036/D020)
methoxychlor (D014/U247)
thiram (U244)
creosote (U051)
endrin (P051/D012)
toxaphene (P123/D015)
aldrin (P004)
dieldrin (P037)
cresol (U052/D026)
heptachlor (P059)
o,o-dimethyl-o-p-nitrophenyl phosphorothioate (P071)
hexachlorohexahydro-exo,exo-dimethanapthalene (P050)

Limitations:
- no dioxins
- overpack ripped or broken bags in polybags
- separate or layer solids and liquids

# 10.0 Water Reactives

## 10.1 LN (Division 9)

Lithium batteries.

Limitations:

- all batteries must be sealed/non-leaking and protected from short circuiting by separating with a physical barrier or by duct taping the ends of each individual battery.
- individually overpack any leaking batteries
- If you are uncertain that there is any lithium remaining in the battery, ship as:

  Waste Lithium Battery, solid cathode, 9, UN3090, PG II (D001,D003)

- If you are certain that there is no reactive lithium remaining in the battery, you may ship as:

  Lithium Battery, solid cathode, 9, UN3090, PGII

## 10.2 WO Water Reactive Liquids, Acidic (Division 4.3)

D.O.T. division 4.3 material.

ex:
methyl dichlorosilane (D001, D002, D003)
ethyl dichlorosilane (D001, D002, D003)
trichlorosilane (D001, D002, D003)
boron trifluoride dimethyl etherate (D001, D002, D003)

## 10.3 WO Water Reactive Liquids, Alkaline (Division 4.3)

D.O.T. division 4.3 material.

ex:
methyl magnesium bromide (D001, D002, D003)
Grinard reagents (D001, D002, D003)
lithium aluminum hydride in ether (D001, D002, D003)

## 10.4 WO Water Reactive Solids (Division 4.3)

Alkaline generating water reactive solids for incineration.

ex:

calcium cyanamide
sodium metal
lithum aluminum hydride
potassium hydride
sodium borohydride
calcium metal
sodium phosphide
zinc dust
calcium carbide
cesium dust (D001, D003)
zinc borohydride
sodium cyanoborohydride*
barium powder (D001, D003, D005)

* Sodium cyanoborohydride is a flammable solid, water reactive, and a reactive cyanide and is therefore prohibited to be transported with acids.

Limitations:

-no pyrophorics
-no acidic reactive materials
-no aqueous or hydrolized material in any amount

# 11.0 Specialty Containers

## 11.1 Batteries

### AX (Division 8)

Lead acid batteries for reclamation.

ex: car batteries, forklift batteries

Limitations:
- poly line drum with 1 liner
- batteries limited to 50 lbs. each
- batteries > 50lbs. must be approved prior to shipment and shipped on pallets
- batteries are to be shipped on a bill of lading
- do not assign waste codes to this material
- D.O.T. corrosive diamond is required
- packing slips are required
- no alkaline batteries
- when shipping batteries on pallets with metal strapping, place a barrier between the strapping and batteries to prevent short circuits.

NOTE: Do not use a hazardous waste label, cut the words Non-Hazardous Non-Regulated off the top of non-hazardous waste label and use the following description: Batteries, Wet, Filled With Acid 8, UN2794, PG III

### NI (Division 6.1)

Nickel cadmium batteries.

ex: rechargeable nicad batteries
nickel cadmium batteries
nickel iron batteries

Limitations:
- pack normally using vermiculite
- packing lists required
- no lead acid batteries
- no magnesium batteries
- must come in on hazardous waste manifest
- all batteries must be insulated from each other when being shipped or must have the ends duct taped to prevent short circuits.

NOTE: Ship as Waste Poisonous Solid, N.O.S.

## 11.2 GM Asbestos (Division 9)

Asbestos contaminated materials.

ex: asbestos piping
asbestos tiles
friable asbestos

Limitations:

- material must be double bagged and wetted prior to Clean Harbors handling of material
- bags not to exceed 80 lbs. in weight
- do not handle or accept any material that is not double bagged and wetted
- do not transport any pre-packed containers without inspecting them
- no roofing cements or tar containing asbestos fibers, this material is to be packed into a "IV"
- large items (doors, desks, and shingles) containing asbestos will be accepted on a case by case basis. Call your Clean Harbors Self-Pack Program representative for technical assistance and special pricing

NOTE: Ship using an asbestos waste manifest and the following D.O.T. description:

RQ Environmentally Hazardous Substance Solid, N.O.S.,9, UN3077, PG III (Asbestos)

## 11.3 Mercury And Mercury Bearing Materials

**SPECIAL NOTE:** Mercury and materials containing mercury can evolve vapors which are EXTREMELY TOXIC! Use extreme caution when working with these materials. **Pack broken mercury thermometers into overpacks.**

**HV Acid (Division 6.1)**

Acidic mercury compounds or solutions.

ex: mercuric chloride solutions
hydrochloric acid w/mercury
phosphoric acid w/mercury

Limitations:
- all debris must be sealed tightly to prevent vapor release.
- pH <7
- if broken mercury contaminated material is encountered, pack it into overpack jars

NOTE: Mercury compounds are D.O.T. division 6.1, when mixtures of mercury compounds and other D.O.T. divisions are encountered the precedence table must be used to determine the proper shipping name.

**HS (Division 8)**

Metallic mercury for reclamation.

ex: used pourable metallic mercury (D009)
virgin pourable metallic mercury (U151)
*thermometers (broken/intact)
*manometers/barometers (metering devices containing mercury)

* Ship as Waste Mercury contained in manufactured articles, 8, UN2809

**HV (Division 6.1)**

Mercury compounds and debris.

ex: *mercuric oxide (red or yellow)
*mercuric nitrate
mercury zinc amalgams (D009)
mercury debris (D009)
mercury salts (D009)
used mercury spill kits
thirmersol (D009)
mercury batteries (D009)
Nessler's reagent [(D009) check pH]
diphenyl mercuric salts
phenyl mercuric acetate (P092)
potassium hydroxide based alkaline cells
alkaline dry cell batteries [(D009)-low mercury]

* Ship as Waste Poisonous Solid, Oxidizing, N.O.S.

Limitations:
- all debris must be sealed tightly to prevent vapor release
- pH >7
- describe particular contaminant in debris

## 11.4 QN

Flammable, non-flammable, and pesticide based aerosols for incineration limited to the following waste codes: D001, D013, D014, D016, D018, and D035.

ex: pesticide based aerosol freon based aerosols
petroleum distillate based aerosol paint (D001)

Limitations:
- acceptable to mix flammable, non-flammable, and pesticides aerosols in the same container (small quantity)
- packing lists required on all containers
- separate flammable and non-flammable aerosols in large quantities
- separate aerosols containing fluorocarbons (over 20 cans)
- no F027 aerosols acceptable

NOTE: Ship as Waste Aerosols, 2.1, UN1950

## 11.5 QO

Compressed gas cartridges.

ex ethylene oxide (U115 **<PBI>**)
carbon dioxide
oxygen (D001)

Limitations:
- If you encounter other compressed gases, please call your Clean Harbors Self-Pack Program representative for technical assistance.

## 11.6 SV Scintillation Vials (Division 3)

Solvent based scintillation vials.

Limitations:
- material must be accompanied by a scintillation fluid disposal agreement sheet
- only vials in these drums, pack all other size scintillation fluids in fuels blending drums (> quart) or appropriate containers for incineration (<quart)
- if client only has a few vials, pack in DV Acid containers

NOTE: Scintillation fluid in containers other than vials (pints, quarts, etc.) must also have the agreement sheet attached to the container.

# 12.0 Unknowns

## 12.1 Fingerprint Analysis of Unknowns:

Lab Procedures And Quality Control

A. Equipment Preparation and Set-up

1) All unknown testing must take place within a fume hood.

2) Make sure fume hood is operational and drawing well.

3) Line the bottom of fume hood with absorbent pads and replace every 20-30 samples.

4) Place sampling equipment in fume hood (test tub rack, water, sulfuric acid, test papers, pipettes, test tubes and spatula.

5) Number samples with the initial of the customer and then a sample number

ex: ABC1, ABC2, ABC3, etc.

B. Unknown Analysis

1) Set ten test tubes in the rack at a time.

2) Add water to each tube until it is half full.

3) Put ~1 ml of liquid unknown in test tube (approximately 1/4 in.) OR

4) Put < .25 gram of solid unknown in the test tube.

5) Record physical description of sample on result sheet. Note if the sample sinks, floats or dissolves. If there is any reaction (generation of heat, vapors, etc.) note that as well. If a sample sinks or floats then it is insoluble. If it dissolves then it is soluble.

6) Take and record the exact pH of the sample.

7) Test for oxidizing properties using potassium iodide/starch paper.

- If sample is an oxidizer, the potassium iodide/starch paper turns blue/black.
- Record results.

8) Test for cyanides and sulfides.

- Put 3-5 drops of sulfuric acid in each test tube.
- Test for sulfides using lead acetate paper. Immerse paper in solution. If sulfides are present the paper will turn brown.
- Test for cyanides by placing a strip of cyantesmo paper in the test tube. Only the tip of the paper should be in the solution.
- Let sit 5 minutes. Center of paper turns blue in the presence of hydrogen cyanide.
- Record results.

9) Test for polychlorinated biphenyls (PCB'S)

- Only test for PCB'S at a site where PCB's are usually present such as electrical and utility companies.
- Use the Clor-in-oil testing kit to determine the presence of PCB'S.

10) Flash point determination.

- A sample that does not react with water, has a pH between 4-10 and tested negative for cyanides, sulfides, oxidizers and PCB'S is to be listed as having a flash point of < 140 degrees F.
- If a sample reacts with water, has a pH less than 4 or greater than 10 or exhibits the characteristics of a cyanide, sulfide, oxidizer or PCB then it is to be listed as having a flash point greater than 140 degrees F.

C. Unknown Packing and Disposal

1) Pack by compatibility groups for incineration in 5 gallon pails (AU, BU, BCNU, DU, EU, WU).

2) 5 pounds maximum per container for solids.

3) 1 gallon maximum per container for liquids.

4) 1/2 gallon maximum per container for flammable liquids.

5) Liquids and solids must be packed separately.

6) Pack into 5 gallon pails for incineration.

7) Pack test tubes, samples, and debris as acid contaminated lab trash in an overpack jar and pack with the acid unknowns.

8) Must complete packing lists to say everything the unknown is not before identifying what the unknown is. An example of how an unknown flammable liquid should be written up is as follows:

Unknown liquid is not a cyanide or sulfide bearing waste, is not an oxidizer, is not water reactive or radioactive, is not a PCB bearing waste and has a pH between 3-10. Flash point is less than 140°F.

| | |
|---|---|
| unknown #ABC1- clear liquid pH=7 | D001 |
| unknown #ABC4- yellow liquid pH=5 | D001 |

9) D.O.T. shipping information will be assigned based on the outcome of the fingerprint analysis. Remember, if a sample has a neutral pH and is negative for all tests, proper shipping information will be flammable solid for solids and flammable liquid for liquids.

10) Solids with a pH < 2 or >12.5 should be packed as D001 flammable solids but in separate containers.

11) Call in to your Self-Pack Program representative for instructions for unknowns that exceed the weight and volume limitations.

## 12.2 Packing categories:

- AU
  Acid compatable unknowns

- BCNU
  Cyanide compatable unknowns

- BU
  Alkaline compatable unknowns

- DU
  Flammable compatable unknowns

- EU
  Oxidizer compatable unknowns

- WU
  Water reactive compatable unknowns

Limitations:
- separate acidic oxidizer solutions from other oxidizer solutions
- separate acidic flammable solids from alkaline flammable solid

NOTE: Do not use Corrosive Solid, N.O.S. as a shipping name.

# 13.0 Other Waste Types

Clean Harbors can provide disposal for materials not referenced in these packing guidelines such as unknown gas cylinders, bio-hazardous waste, bulk reactives, etc. If materials are encountered that are not included in this package, please call your Clean Harbors' Self-Pack Program representative for disposal options.

# 14.0 Land Disposal Restrictions

## 14.1 Overview Of The Land Disposal Restrictions (LDR's)

A. 1984 Hazardous and Solid Waste Amendments

Mandated that all hazardous waste be automatically prohibited from land disposal unless the waste meets certain treatment standards.

B. Promulgation of Land Disposal Restrictions

EPA has issued several final regulations restricting the land disposal of hazardous waste.

The land disposal restrictions are divided into three general categories, as follows:

| Waste Category | Restricted As Of: |
|---|---|
| Solvents and Dioxins | November 7, 1986 |
| California List Waste | July 8, 1987 |
| Scheduled Waste | |
| • 1st Third | August 8, 1988 |
| • 2nd Third | June 9, 1989 |
| • 3rd Third | August 8, 1990 (Appendix E-1) |

The 3rd Third and final rule for land disposal restrictions can be found in Appendix E-1 (40 CFR 268).

## 14.2 Determining If A Waste Is Restricted From Land Disposal

A. Properly Identify All the EPA Hazardous Waste Codes That Apply

The EPA codes must describe all the hazards of the waste. Each constituent of the waste bearing an EPA hazardous waste code will be referenced against the Treatment Standard Tables to determine land disposal restrictions.

B. Determine the type of facility for D001 and D002 wastes.

1. A centralized wastewater treatment facility discharging under a Clean Water Act (CWA) permit.

2. A Class I deep well injection facility regulated under the Safe Drinking Water Act (SDWA).

3. A "zero discharge system" that engages in "CWA-equivalent" treatment before land disposal. Zeso-discharge facilities treat hazardous wastes using "CWA-equivalent" treatment methods, but do not discharge the treatment effluent to a sewer or water body (e.g., spray irrigation land farm). "CWA-equivalent" treatment methods means biological treatment for organics, alkaline chlorination, or ferrous sulfate precipitation for cyanide, precipitation/sedimentation for metals, reduction of hexavalent chromium, or other treatmnet technology that can be demonstrated to perform equally or greater than these technologies.

4. A facility performing treatment of D001 ignitable waste using one of the three specified alternative treatment technologies, i.e. fuel substitution (FSUBS), recovery of organics (RORGS), or incinertion (INCIN).

C. Determine If The Waste Is A Wastewater Or A Non-Wastewater.

If the waste contains less than one percent by weight total suspended solids (TSS) and has less than one percent by weight total organic carbon (TOC), then it is classified as a wastewater. If the waste does not meet the above criterion, the sample is classified as a non-wastewater.

D. Look For The Waste Codes In The Treatment Standard Tables (Appendix E-1)

1. Table 1 - CCWE - Constituent Concentration in Waste Extract (40 CFR 268.41). This table contains standards based on testing an extract of the waste developed through TCLP. If the concentration of constituents in the waste exceeds the levels in the table, the waste cannot be land disposed.

2. Table 2 - Technology Based Standards (40 CFR 268.42). This table specifies treatment technologies by which waste must be treated before it is allowed to be land disposed. Technologies and their acronyms include INCIN - incineration, DEACT - deactivation, and FSUBS - fuel substitution.

3. Table 3 - CCW - Constituent Concentration in Waste (40 CFR 268.43). This table contains standards based on testing the waste for certain constituents in the waste. Again, if the concentration of constituents in the waste exceeds the levels in the table, the waste cannot be land disposed.

E. Check the California List Restrictions (Appendix E-2)

This list, promulgated by the State of California, also contains standards based on testing the waste itself for certain constituents. Again, if the concentration of constituents in the waste exceeds the levels in the table, the waste cannot be land disposed.

## 14.3 Completing the Land Disposal Restriction Form (LDR1)

A. For D001 through D017 only

Clean Harbors LDR1 form can be found in the miscellaneous forms section of the Self-Pack Program Guidlines. LDR1, page 1 and page 2, can be copied so as to produce a two sided form.

1. Complete the top portion of Pg. 1 with appropriate generator information as it appears on the manifest.

2. Fill in the Manifest number on the space provided in the paragraph below the generator information.

3. Choose the D-code and appropriate subcategory if applicable. If the material is a D001 and/or D002, determine if the material is destined for a Clean Water Act (CWA), Clean Water Act-Equivalent or Class I Safe Drinking Water Act (SDWA) system.

4. Determine if the waste is a wastewater and/or non-wastewater. If no analysis for total organic compounds or total suspended solids is available, make best estimate. Determine what the appropriate disposal technology would be for the waste.

5. Check off the applicable box(es).

6. If it has been determined that the appropriate disposal technology for any waste(s) is "DEACT and meet F039" refer to Section I.A of the LDR1 form.

7. If the waste is destine for disposal within the United States check the first box in section I.A and complete the LDR1 Addendum Form. Instructions on completing this form are given in Section 14.5 of the Self-Pack Guidelines.

8. If the waste is destine for disposal outside the United States check the second box in section I.A and do not complete a LDR1 Addendum Form.

9. Generator signs top portion of Pg. 1 and if applicable, the top of the LDR1 in the space(s) indicated.

B. For F001-F005 only

1. Complete the top portion of Pg. 1 with appropriate generator information as it appears on the manifest.

2. Fill in Manifest number on the space provided in the paragraph below the generator information.

3. Check off box at bottom of Pg. 1 indicating the presence of an F-code.

4. On Pg. 2, Section II, choose applicable F-code(s) and check off applicable box(es).

5. Using the F001-F005 Table in the middle of Pg. 2 as your reference, identify the specific solvent(s) present in the waste and check off the applicable box(es).

6. Determine if the waste is a wastewater and/or non-wastewater. Check off applicable box(es). If no analysis for total organic compound or total suspended solids is available, make your best estimate.

7. Generator and signs top portion of Pg. 1 in the space indicated.

C. California List Wastes

1. Complete the top portion of Pg. 1 with appropriate generator information as it appears on the manifest.

2. Fill in the manifest number on the space provided in the paragraph below the generator information.

3. Identify if material is classified as a California listed waste.

   - Nickel and/or thallium must be in a solution that is also carrying an EPA waste code.
   - A liquid having a concentration of PCB's > or = 50 ppm.
   - A non-EPA regulated waste that contains HOC;s > or = 1,000 mg/kg that is mixed in with other EPA regulated wastes.

4. Check off box at bottom of Pg. 1 indicating the presence of a California listed waste.

5. On Pg. 2, Section III, choose the applicable California listed waste(s).

6. Generator signs top portion of Pg. 1 in the space indicated.

D. Other Waste Codes (F006-F012, F019-F028, F037, F038, All K, P, U)

1. Complete the top portion of Pg. 1 with appropriate generator information as it appears on the manifest.

2. Fill in the Manifest number on the space provided in the paragraph below the generator information.

3. Identify the applicable waste codes(s).

4. Check off box at bottom of Pg. 1 indicting the presence of other waste codes.

5. On Pg. 2, Section IV, list waste codes on spaces indicated.

6. Determine if the waste is a wastewater and/or non-wastewater. If no total organic compounds or total suspended solids analysis is available, make your best estimate. Write WW (wastewater) or NWW (non-wastewater) on the space indicated.

7. Search through the Land Disposal Restrictions Treatment Standard Table to see if the waste has a specified technology, numerical standard or both. This table is listed as an attachment to your Self-Pack Program Guidelines.

   i) If a treatment method is specified, put 5-letter code.
   ii) If a numerical standard is specified, put "N/A"

8. Determine appropriate 40 CFR 268 reference to the table in which the method/number is given. Indicate the applicable reference in the space provided. A listing of CFR references are given at the bottom of LDR1 pages 1 and 2.

9. If the manifest has more waste codes than spaces provided for an LDR1, a continuation sheet may be used.

10. Check bottom of Pg. 2 indicating additional listed waste codes.

11. Fill in the blanks on the continuation sheet.

12. Generator signs top of Pg. 1 and if applicable the top of continuation form in the space(s) indicated.

## 14.4 How To Complete The LDR1 For Mercury

### A. D009 Mercury Wastewaters:

If you have a mercury solution that contains no suspended solids or organic content, you should check D009 Low Hg < 260 mg/kg Hg wastewater.

ex: Nessler's Reagent
mercury with inorganic acids
aqueous mercuric chloride solutions.

### B. Low Mercury Non-Wastewaters:

If you are sure that you have mercury at a level < 260 mg/kg, check the top box in the non-wastewater column.

ex: alkaline batteries with trace of mercury

### C. High Mercury With Organics:

If you had mercury at a level > 260 mg/kg with any amount of organic content or organic debris, you would need to check the middle box.

ex: phenyl mercuric acetate
mercury mixed with solvents
thimerosal
broken mercury thermometer with paper or plastic
other organic matter.

### D. High Mercury, Inorganics Only:

If you had mercury at a level > 260 mg/kg with no organic content you would check the last box.

ex: inorganic salts
mercuric nitrates or oxides
spent metallic mercury
broken thermometers

### E. Virgin Metallic Mercury (U151):

You would list this like other U or P codes under Section IV of the LDR1. It will always be a non-wastewater and the treatment standard will be RMERC, Ref. 2.

## 14.5 Completing the LDR1 Addendum

### A. Background

Under the old LDR rules. the treatment standard for certain ignitables/ corrosive wastes is deactivation ("DEACT"). Under the DEACT standard, EPA required only that the treatment facility treat the waste to remove the hazardous characteristic that makes the material a hazardous waste, and in some cases, allowed the use of dilution to achieve the decharacterization.

Shortly after the LDR Third Third was published in June 1990, some environmental groups challenged the DEACT treatment standard in court on the grounds that deactivation through the use of dilution alone was not protective enough of human health and the environment because it did not necessarily treat any hazardous constituents which might be present in the waste. The challenge was upheld by a Federal appeals court, and EPA was ordered to revise the standards.

Under the revised rule, EPA retained the requirement of deactivation to remove the hazardous characteristic, but also set Numerical treatment standards for all "underlying hazardous constituents" (UHC's) that may be present in the waste. Now, instead of just neutralizing the acid, the treatment facility must treat any other hazardous constituents in the waste. The list of UHC's is based on the current list of constituents contained in the F039 multisource leachate standard. EPA also identified three treatment technologies that may be used as an alternative to the DEACT/F039 standard for D001 wastes.

### B. Filling Out the LDR1 Addendum

1. Complete the top portion of the addendum with the appropriate generator information as it appears on the manifest.
2. Fill in the manifest number on the space provided.
3. On Pg. 1, Section I, check off the applicable EPA waste code.
4. Identify the constituent(s) that are "underlying hazardous constituents" (UHC's) and determine if the constituent(s) are a wastewater and/or a non-wastewater. Check off appropriate box(es).
5. If the constituent(s) is not listed on the addendum, write "None of these constituents present" on each page of the addendum.
6. Generator signs the top of Pg. 1 of the addendum on the space provided.

# 15.0 Poisonous By Inhalation Requirements

## 15.1 Background

The Department of Transportation recently enacted a new set of regulation commonly known as "POPS" (Performance Oriented Packaging) standards. The regulations are going to be phased in over a 4 year period. The initial phase involves the proper packaging, shipping, manifesting and labeling of those compounds identified by the D.O.T. as poisonous by inhalation <PBI>.

## 15.2 Packaging Requirements

At the present time, it is acceptable to pack <PBI> compounds in lab pack containers with other compounds.

## 15.3 Labeling Requirements

Any drum or pail containing a compound that has been identified as <PBI> must have the technical name of the <PBI> compound written on the label (use the EPA name line). In addition, the words "poison by inhalation hazard" must appear on the container (affix a "poison by inhalation hazard" label to the left of the appropriate D.O.T. diamond<s>). Any drum or pail containing a <PBI> compound must have a poison D.O.T. diamond in addition to any other label as prescribed in the D.O.T. pocket guide book.

## 15.4 Proper Shipping Name and Requirements

If using a generic (N.O.S.) shipping name for a <PBI> compound. You must include the word poisonous in the proper shipping name. For example, if you had a lab pack containing various bottles of solvents and a bottle of ethyl isocyanate <PBI>, rather than ship that container as Waste Flammable Liquid, N.O.S., you would ship it as Waste Flammable Liquids, Poisonous, N.O.S.

When using a generic shipping name (N.O.S.), you need to include the words the words poisonous by inhalation and you need to write out the technical name of the <PBI> compound as well. A lab pack pail with various acids and a pint of thionyl chloride would be manifested as follows:

Waste Corrosive Liquid, Poisonous, N.O.S.
Poisonous by Inhalation - Thionyl Chloride
8, PG I, UN2922, AONE B (D002, D003)

A listing of those compounds identified as poisonous by inhalation by the department of transportation can be found on the following pages.

## 15.5 Listing of Poisonous By Inhalation

The following is a listing of hazardous materials descriptions and proper shipping names from 49 CFR part 172.102 that are "poisonous by inhalation". Please note that the special provisions that begin with 1, 2, 3, 4, 5*, 6 & 13 signify an inhalation hazard.

Acetone, Cyanohydrin, Stabilized
Acrolein, Inhibited
Aerosols, Poisons, N.O.S.
Allyl Alcohol
Allylamine
Allyl Chloroformate
Allyl Isothiocyanate, Stabilized
Ammonia, Anhydrous, Liquified Or Ammonia Solutions > 50% Water
Arsenic Trichloride
Arsine
Boron Tribromide
Boron Trichloride
Boron Trifluoride
Bromide Chloride
Bromine
Bromine Pentafluoride
*Bromine Solutions
Bromine Trifluoride
Bromoacetone
Sec-Butylchloroformate
N-Butyl Chloroformate
Tert-Butyl Isocyanate
N-Butyl Isocyanate
Carbon Monoxide
Carbon Monoxide And Hydrogen Mixture
Carbon Monoxide, Refridgerated Liquid
Carbonyl Fluoride
Carbonyl Sulfide
Chlorine
Chlorine Pentafluoride
Chlorine Trifluoride
Chloroacetaldehyde
Chloroacetone, Stabilized
Chloroacetyl Chloride
Chloroformates, N.O.S.
Chloropicrin

Chloropicrin And Methyl Bromide Mixture
Chloropicrin And Methyl Chloride Mixture
Chloropicrin Mixtures, N.O.S.
Chloropivaloyl Chloride
Chlorosulfonic Acid
Coal Gas
Compressed Or Liquified Gases, Flammable, Toxic, N.O.S.
Compressed Or Liquified Gases, Toxic, N.O.S.
Crotonaldehyde, Stabilized
Cyanogen Bromide
Cyanogen Chloirde, Inhibited
Cyanogen, Liquified
Cyclohexyl Isocyanate
Diborane
Diborane Mixtures
Dichlorodifluoromethane And Ethylene Oxide Mixture
Dichlorosilane
3,5 Dichloro -2,4,6 Trifluoropyridine
Diketene, Inhibited
Dimethylhydrazine, Symmetrical
Dimethylhydrazine, Unsymmetrical
Dimethyl Sulfate
Dimethyl Triphosphoroyl Chloride
Dinitrogen Tetraoxide (Nitrogen Dioxide), Liquified
Ethyl Chloroformate
Ethyl Chlorothioformate
Ethyldichlorarsine
Ethylene Chlorohydrin
Ethylene Dibromide
Ethyleneimine, Inhibited
Ethylene Oxide
Ethyl Isocyanate
Ethyl Phosphonothioic Dichloride, Anhydrous
Ethyl Phosphonous Dichloride, Anhydrous
Ethyl Phosphorodichlorodate
Fluorine, Compressed
Germane
Hexachlorocyclopentadiene
Hexaethyl Tetraphosphate And Compressed Gas Mixtures
Hexafluoroacetone
Hydrocyanic Acid, Aqueous Solution (Not >20% Hydrocyanic Acid)
Hydrogen Bromide, Anhydrous
Hydrogen Chloride, Anhydrous
Hydrogen, Chloride, Refrigerated Liquid

Hydrogen Cyanide, Anhydrous, Stabilized
Hydrogen Cyanide, Anhydrous, Stabilized (Absorbed On Porus Inert Material)
Hydrogen Selenide, Anhydrous
Hydrogen Sulfide, Liquified
Insecticide Ases, Toxic, N.O.S.
Iron Pentacarbonyl
Isobutyl Chloroformate
Isobutyl Isocyanate
*Isocyanates, N.O.S. Or Isocyante Solution, N.O.S. (Fp <73.4° F)
Isophoronediisocyanate
Isopropyl Chloroformate
Isopropyl Isocyante
Methoxyhethyl Isocyanate
Methylamine, Anhydrous
Methyl Bromide
Methyl Bromide And Ethylene Dibromide Mixtures, Liquid
Methyl Chloroformate
Methylchloromethyl Ether
Methylchlorosilane
Methyldichloroarsine
Methylhydrazine
Methyl Iodide
Methyl Isocyanate
Methyl Isothiocyanate
Methyl Mercaptan
Methyl Orthosilicate
Methyl Phosphonic Dichloride
Methyl Phosphonic Dichloride (Phyrphoric Liquid)
Nickel Cyrbonyl
Nitric Acid, Red Frming
Nitric Oxide
Nitric Oxide And Dinitrogen Tetroxide Mixtures
Nitrogen Dioxide, Liquidfied
Nitrogen Trifluoride
Nirtogen Trioxide
Nitrosyl Chloride
Tert-Octylmercaptan
Organic Phosphate, Organic Phosphate Compound Or Organic Phosphorous Compound Mixed With A Compressed Gas
Oxygen Difluoride
Parathion And Compressed Gas Mixtures
Pentaborane
Perchloromethylmercpatan

Perchloryl Fluroide
Phenylcarbylamine Chloride
Phenyl Ioscyanate
Phenyl Mercapatan
Phosgene
Phosphine
Phosphorous Oxychloride
Phosphorous Pentaflouride
Phosphouous Trichloride
Poisonous Liquids, Corrosive, N.O.S., Inhalation Hazard, Pg. I, Zone A
Poisonous Liquids, Corrosive, N.O.S., Inhalation Hazard, Pg. I, Zone B
Poisonous Liquids, Flammable, N.O.S., Inhalation Hazard, Pg. 1, Zone A
Poisonous Liquids, Flammable, N.O.S., Inhalation Hazard, Pg. 1, Zone B
Poisonous Liquids, N.O.S., Inhalation Hazard, Pg. 1, Zone A
Poisonous Liquids, N.O.S., Inhalation Hazard, Pg. 1, Zone B
Poisonous Liquids, Oxidizing, N.O.S.
Poisonous Liquids, Oxidizing, N.O.S., Inhalation Hazard, Pg. 1, Zone A
N-Phropyl Chloroformate
N-Propyl Isocyante
Selenium Hexafluoride
Silicon Tetrafluroide
Stibine
Sulfur Chlorides
Sulfur Dioxide, Liquified
Sulfuric Acid, Fuming
Sulfer Tertafluoride
Sulfur Trioxide, Inhibited
Sulfur Trioxide, Uninhibited
Sulfur Fluoride
Tellurium Hexafluoride
Tetraethyl Dithiopyrophosphate And Gases In Solution Or Tetraethyl Dithiopyrophosphate And Gases In Mixtures Lc50 $\leq$ 200 ppm
Tetraethyl Dithiopyrophosphate And Gases In Solution Or Tetraethyl Dithiopyrophosphate And Gas Mixtures (Lc50 > 200 ppm But No Greater Than 5000 ppm)
Tetraethyl Pyrophosphate And Compressed Gas Mixtures (Lc50 $\leq$ 200 ppm)
Tetraethyl Pyrophosphate And Compressed Gas Mixtures (Lc50 > 200 ppm But Not Greater Than 5000 ppm)
Tetranitromethane
*Thia-4-Pentanal
Thionyl Chloride
Thiophosgene
Titanium Tetrachloride

Trichloroacetyl Chloride
Trimethoxysilane
Trimethylacetyl Chlroride
Tungsten Hexafluoride

* COMPOUNDS WITH A PROVISION #5 MIGHT FIT INTO THE CATEGORY OF POISONOUS HAZARDOUS BY INHALATION.

# 16.0 Labeling

## 16.1 Container Labeling Requirements

A. A hazardous waste label is to be used for RCRA and state regulated waste. These labels are to be attached to the upper portion of the shipping container. The diamond shaped D.O.T. label, if required, goes on the left side of the waste label within six inches. The clear poly envelope that holds the packing list goes to the right of the label with the opening facing the label.

B. When filling out a hazardous waste label, all the lines must be completed.

The manifest # is for the state manifest being used to transport the drum being labeled.

The D.O.T. shipping name comes from the 49 CFR 172.101 and is also found in the drivers guide to hazardous waste materials. When appropriate, the word "Waste" is put in front of the shipping name, and the letters RQ and the EPA waste number(s) go on this line if it is a reportable quantity. If the material for shipment is not waste, i.e. it does not have an EPA or state waste code, use a non-hazardous label.

The UN (United Nations) or NA (North America) # also comes from 49 CFR 172.101 and is also found in the drivers guide to hazardous materials.

The EPA name should not be confused with the DOT hazard class. This section of the label is meant to warn the general public of the hazards associated with a particular container. The EPA gives you four possible categories to enter on the EPA name line. The categories are as follows:

**IGNITABLE WASTE:**

Use this EPA name for flammable liquids, flammable solids, oxidizers, compressed gasses, and organic peroxides.

**CORROSIVE MATERIAL:**

Use this EPA name for acids, alkalines and corrosive solids.

**REACTIVE MATERIAL:**

Use this EPA name for reactive cyanides, sulfides, water reactives, other reactives.

TOXIC:

Use this EPA name for any ORM's, poisons, oil, nonflammable solvents and cyanides. In general, if it does not fit any of the other categories, call it toxic.

The EPA # should be the waste code for any technical name listed on the EPA name line.

C. The generator information is the US EPA I.D. number of the generator. It is unique to the generator and it can be either permanent or temporary. The name, address, city, state, zip is the generator's name and mailing address as it appears in item 3 of the manifest. The date of generation/accumulation is the date the drum is packed.

# 17.0 Glossary

**alkyl -** A paraffinic hydrocarbon derived from an alkane by removing one hydrogen from the formula.

**ex: -** methyl CH3-, ethyl C2H5-, propyl CH3CH2CH2-, and isopropyl (CH3) 2CH3

**ampule -** A small sealed glass vial or bottle with a drawn glass seal. These containers are very fragile-always overpack before removal

**grignard reagents-** Reagents are made by the union of metallic magnesium with an organic chloride, bromide, or iodide, usually in the presence of an ether. They must be handled cautiously as contact with water will cause a violent reaction. (ex. methyl magnesium bromide)

**gross -** Total aggregate weight (ex. gross container weight of a drum would be the weight of the drum plus it's entire contents).

**halides -** A salt of the halogen family (fluorine, chlorine, bromine, iodine).

**hydride -** A inorganic compound of hydrogen with another element.

**hydrophilic -** A chemical that is compatible with water.

**hydrophobic -** A chemical that is incompatible with water and aqueous solutions.

**iodine tincture -** A solution of iodine and potassium iodide or sodium iodide in alcohol, a redish brown liquid having the odors of iodine and alcohol, contains 44-50% by volume alcohol, 2g of iodine and 2.4g sodium iodide per 100 cc.

**<PBI> -** Poisonous by inhalation

**pyrophoric material -** Any liquid or solid that will ignite spontaneously in air at about 130F°(54.4C°)

**reactives -** A compound which exhibits any of the following properties characterizes D003:

1) It is normally unstable and readily undergoes violent changes without detonating.
2) It reacts violently with water.
3) It forms potentially explosive mixtures with water.
4) When mixed with water, it generates toxic gases, vapor of fumes in a quantity sufficient to present danger to public health, safety, or welfare, or to the environment.
5) It is a cyanide or sulfide bearing waste which, when exposed to a pH of between 2 and 12.5, can generate toxic gases, vapors or fumes in a quantity sufficient to present a danger to public health, welfare, safety, and/or to the environment.

**scintillation fluid -** Solution which will tend to fluoresce in the presence of a radioactive source. Often, radioactive solids or compounds are dissolved in a scintillation fluid, and the fluorescence is measured to quantify radioactive levels.

**sharps -** Having a thin edge or a fine acute point (ex. glass, needles, sharp metal points, broken plastic, etc...). Particularly referring to something that could penetrate the human skin. All sharps must be overpacked into a puncture-proof container.

**treatment -** Any method, technique or process, including neutralization, incineration, stabilization or solidification, designed to change the physical, chemical or biological character or composition of any hazardous waste so as to neutralize such waste or so as to render such waste less hazardous, non-hazardous, safer to transport, amenable to storage, or reduced in volume, except such method or technique as may be included as an integral part of a manufacturing process at the point of generation.

**water reactive -** A compound which evolves corrosive, flammable, or explosive gases when in contact with moisture.

18.0 Attachments

18.1 Hydrofluoric Acid Handling Procedures

18.2 Land Disposal Restrictions Treatment Standards

18.3 Natick Facility Unacceptable List

18.4 Troubleshooting Guide for Determining Shipping

18.5 Shipping Containers

19.0 Miscellaneous Forms

19.1 Packing List

19.2 Unknown Chemical Packing List

19.3 Land Disposal Restriction Form

19.4 Land Disposal Restriction Form Addendum

19.5 Land Disposal Restriction Form Continuation

19.6 Scintillation Form

# 18.0 Attachments

## 18.1 Hydrofluoric Acid Handling Procedures

**Equipment:**

A) Rigid plastic lab pack overpack containers (pt, qt or gal)

B) Pint bottle of Zephiran
Chloride (Benzalkonium Chloride 0.13%) first aid solution*.

C) Poly shipping containers (5,16 or 30).

D) "POLYSORB absorbent or similar polymer based absorbent.

* Commercially available from any pharmacy.

**Work Area Set-Up:**

A) Set up lab pack area according to normal working parameters.

**On Site Briefing**

Hydrofluoric acid is an aqueous solution of hydrogen fluoride, the following safety information will be discussed with the crew performing the operation by the Site Supervisor regarding hydrogen fluoride's hazards.

- Hydrogen fluoride is readily absorbed through the skin and causes adverse health effects as described in the attached MSDS.
- Hydrogen fluoride should not come in contact with metal as it will emit flammable hydrogen gas.
- Glass and stainless steel are not to be used as shipping containers since hydrogen fluoride attacks both types of materials
- A polymer based absorbent must be used as a packing medium in lab pack containers. Hydrogen fluoride will react with vermiculite, sawdust and speedi dry.
- Field personnel must completely inspect containers for any breach of container integrity (corrosion, condensation or other signs of weakened containerization).

- Containers in poor condition must not be handled until additional direction and arrangements for proper PPE, monitoring and other equipment have been arranged through the local Clean Harbors Service Center.

**Personal Protective Equipment**

A) Level D: Uniform, steel toed shoes, safety glasses and PVC gloves is ample when dealing with closed containers where there is no risk of exposure to liquid or gases.

B) When leaking containers are encountered Level B must be used. Level B includes: Saranax or Barricade protective suits with hood, full faced air supplied respirator, latex inner gloves, elbow length PVC outer gloves, and rubber boots. Hoods, gloves, boots and zippers must be taped to reduce exposure.

**Note:** Do not respond to leaking containers without a prior specific Health and Safety plan.

**Operating Procedures**

A) All hydrofluoric containers must be overpacked in rigid plastic lab pack overpack containers and clearly labeled.

B) Overpack jar must then be filled with polymer based absorbent to act as a packing medium.

C) If gallon bottles are encountered, pack directly in pail or appropriate size container using a polymer based absorbent as a packing medium.

D) Hydrofluoric acid must be packed with other acid compatible material(s) in "AV" containers (poly containers only).

E) Vermiculite absorbent may be used as a packing medium between the lab pack overpack and the shipping container.

**Continency Plan**

A) Lab Pack operations typically do not involve the release of materials, however, field personnel are required to plan for an incident.

B) As a minimum the following must be implemented in the event of an emergency:

- Remove victim(s)
- Administer first aid
- Call for an emergency
- Call for spill response support
- DO NOT re-enter area unless proper personal protective equipment, monitoring, and other equipment is available

**Clean Up/Decontamination**

A) Clean up: If a spill is encountered, follow appropriate guidelines specified in the MSDS for proper clean-up and decontamination procedures. If requested, Clean Harbors will be able to assist with any spills through our local Service Centers.

B) Non-exposure decontamination: Individuals who have handled only closed containers where there has been no exposure to hydrofluoric acid liquid or vapor can remove their protective clothing without the need of a neutralization rinse. Remove PPE following the appropriate sequence outlined by OSHA.

C) Exposure decontamination: Individuals who have come in contact with hydrofluoric acid liquid or vapors must follow complete decontamination sequence using neutralization rinse. Decontamination solution should be a 4:1 mixture of water to lime. Spray the decontamination solution over each individual with a arden sprayer.

6

CleanHarbors

# CHAPTER I

## HANDLING DRUMS AND CONTAINERS

### 1.0 GENERAL

#### 1.1 Purpose

The purpose of this document is to outline and provide Clean Harbors, Inc. employees with guidelines that should be followed when handling drums and containers during hazardous waste site operations and emergency responses. Various types of accidents may occur during the handling of drums and containers. While hazards are always present, proper work practices can minimize the risk to site personnel. This guideline is designed to enable Clean Harbors, Inc. employees to identify and minimize the potential hazards associated with handling drums and containers.

#### 1.2 Proper Selection of New Drums

Drums and containers to be used on-site will meet all Department of Transportation (DOT) requirements as stated in 49 CFR 100.100. (See attached for a description of the various types of DOT containers).

#### 1.3 Drum/Container - Background Information

Prior to determining the appropriate method of handling and removal, it is necessary to visually inspect the container. This is necessary to develop information on the container, such as:

- content;
- sampling required for characterization;
- potential for reaction, leakage, etc.;
- containers that need to be moved;
- ability to be moved;
- etc.

The information gathered will be used to classify the container and determine the safest handling method and the appropriate protection level necessary.

#### 1.4 Buried Containers

Background information described in Chapter B Site Characterization and Analysis should be used to identify and locate containers. Buried containers pose a difficult inspection problem; they must first

be located. To accomplish this several techniques are available, some within Clean Harbors, other not. If buried containers are anticipated, it may be necessary to utilize this equipment. Alternative measures include reviewing site plans, deeds, etc.

- Electromagnetic wave conductors
- Electric resistivity
- Ground penetrating radar
- Magnetometer - available through CHEE
- Metal Detector - available through Tank Division

This equipment should be used to estimate the location and depth of any buried containers.

The following list the purpose and information and advantages and disadvantages of various methods to locate buried container.

1.4.1.1 Geophysical Surveying

Prior to the excavation or the unearthing of any buried drums a geophysical survey shall be conducted on the proposed work area.

1.4.1.2 Purpose

The purpose of conducting the survey is to provide information in the following areas:

- Estimated location of the buried drums
- Estimated boundaries of the buried drums
- Estimated depth of the buried drums
- Estimate the number of buried drums
- Estimate the extent of leakage of material from the buried drums

1.4.1.3 Methods of Detection

There are several method and/or devices which can be used to conduct geophysical survey's.

- Metal detectors
- Magnetometers
- Ground penetrating radar
- Low frequency electromagnetics
- Electric resistivity

1.4.1.4 Selection

Before a geophysical survey can begin it is necessary to determine what the objectives of the survey are (ie. depth, number, or boundaries of drums). Once the objective is determined the most effective device can be decided upon by evaluating each devices advantages and disadvantages. Those advantages and disadvantages are as follows:

1. Metal Detector

Advantages

- widely available
- light weight
- can be used in and around vegetation
- data can be interpreted in the field

Disadvantages

- low sensitivity which results in limited depth detection (4-5 feet)
- not suitable for use on nonmetallic objects
- interference received by metallic objects in area (ie. pipes, chain link fences)
- limited to station to station measurements

2. Magnetometers

Advantages

- more sensitivity, resulting in greater depth detection (10-12 feet)
- can approximate boundaries of buried drums
- data can be interpreted in the field
- no interference from metallic objects in the area (ie. pipes, chin link fences)

Disadvantages

- limited to station to station measurements

3. Ground Penetrating Radar

Advantages

- can detect plastic drums
- can detect soil contamination
- provides depth of burial of drums
- provides orientation of buried drums
- continuous surveying capabilities
- data can be interpreted in the field
- hand held

Disadvantages

- effected by metallic object in the area (ie. pipes, chain link fences)
- effected by presence of clay in the soil
- effected by high groundwater
- limited use in vegetated areas

4. Low Frequency Electromagnetics

Advantages

- detects material leaking from drums
- can provide 3-D imaging
- more sensitivity results in greater depth detection (15-20 feet)

Disadvantages

- can not always distinguish between drums and uncontainerized material
- effected by metallic objects in the area (ie. pipes, chain link fence)
- requires computer processing to interpreted data

5. Electrical Resistivity

Advantages

- detects material leaking from drums
- lightweight and portable
- can determine changes in contamination with depth

Disadvantages

- slow and costly
- effected by metallic objects in the area (ie. pipes, chain link fence)
- data is hard to interpret

THESE DEVICES ARE NOT AVAILABLE WITHIN CLEAN HARBORS INC. AT THIS TIME.

## 1.5 Visible Containers

### 1.5.1 Inspection Items

The following items should be noted for readily visible containers: See figures 1 & 2

- Symbols, words, labels, or other markings which may indicate contents (ie. hazardous waste, corrosive, flammable, radioactive, explosive).
- Signs of deterioration (ie. corrosion, rust, leaks).
- Signs of pressure build -up (ie. swelling, bulging).
- Drum type (ie. steel, plastic, steel with a poly-liner).
- Type of drumhead (ie. bung, open top, bung with a liner).
- Approximate number and location of drums (ie. buried, partially buried, stacked, upright, overturned).
- Immediate area around the drums (ie. stains, dead animals or vegetation).
- Types of product which may be visible in or on the drums (ie. solid, liquid, semisolid).

- Special Drum Type:

  o Polyethylene or PVC-Lined Drums

    Often contain strong acids or bases. If the lining is punctured, the substance usually quickly corrodes the steel, resulting in a significant leak or spill.

  o Exotic Metal Drums (e.g., aluminum, nickel, stainless steel, or other unusual metal)

    Very expensive drums that usually contain an extremely dangerous material.

  o Single-Walled Drums Used as a Pressure Vessel

    These drums have fittings for both product filling and placement of an inert gas, such as nitrogen. May contain reactive, flammable, or explosive substances.

- Laboratory Packs

  Used for disposal of expired chemicals and process samples from university laboratories, hospitals, and similar institutions. Individual containers within the lab pack are often not packed in absorbent material. They may contain incompatible

# 17E DRUM

## Common Areas Integrity is Compromised

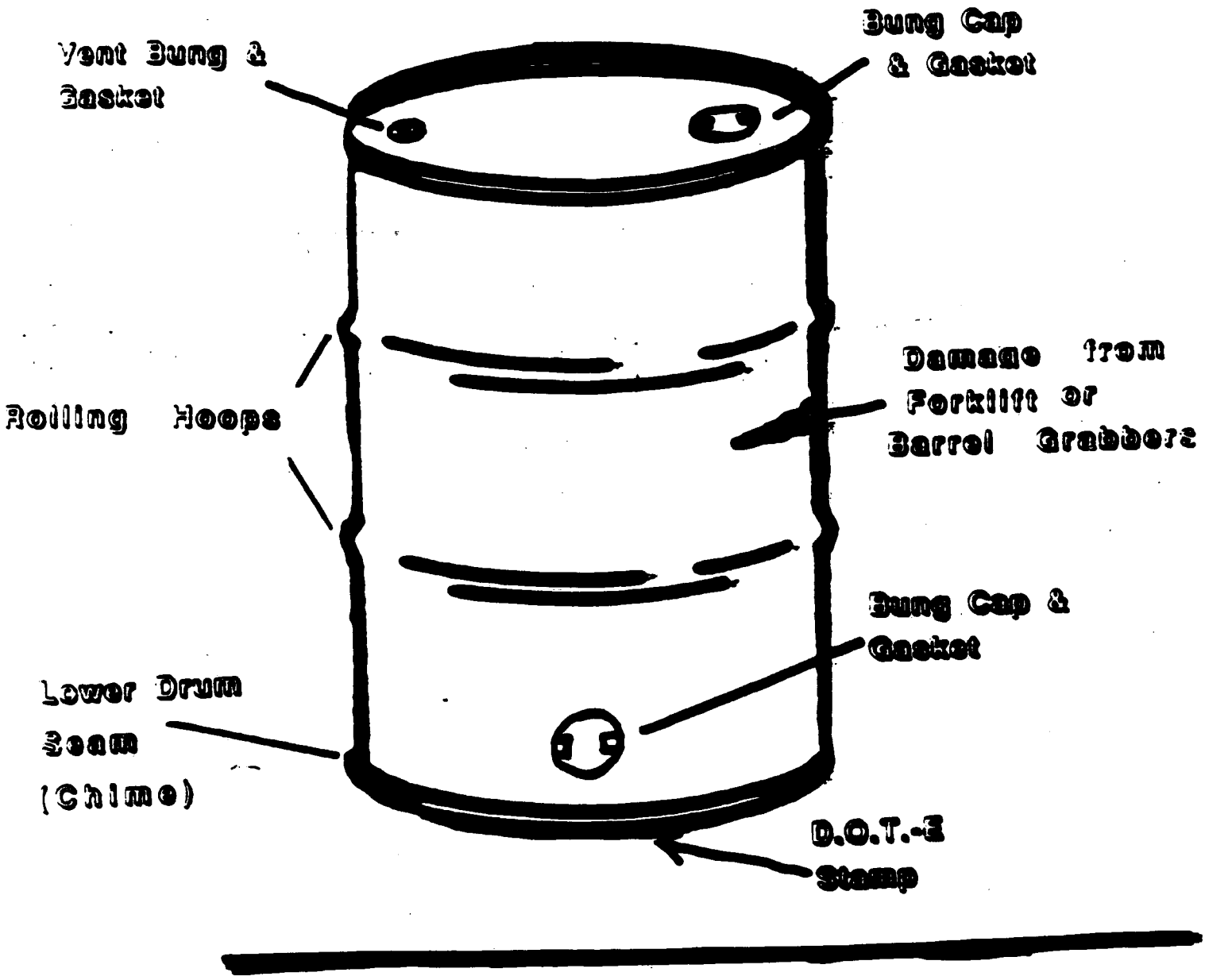



FIGURE 1

# 17 H DRUM

Common Areas Integrity is Compromised

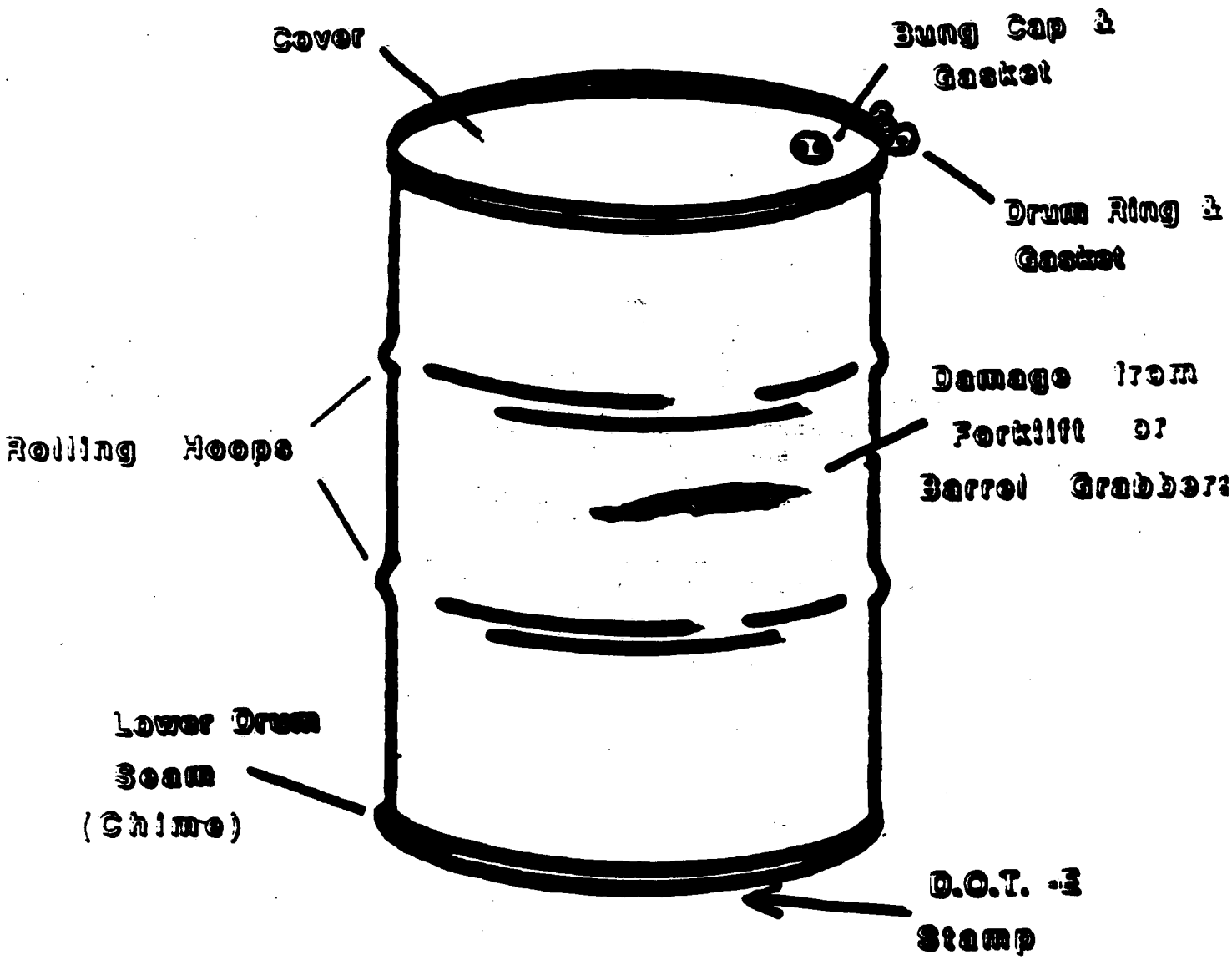



FIGURE 2

materials, radioisotopes, shock-sensitive, highly volatile, highly corrosive, or very toxic exotic chemicals. Laboratory packs can be an ignition source for fires at hazardous waste sites.

- Drumhead Configuration

  - o Whole Lid Removable

    Designed to contain solid material.

  - o Has a Bung

    Designed to contain a liquid.

  - o Contains a Liner

    May contain a highly corrosive or otherwise hazardous material.

At no time during the inspection should there be any attempt to open the container for internal inspection or move the container to acquire a better vantage of sight.

1.5.2 Monitoring

To further characterize the container it may be necessary to perform non-invasive monitoring. Monitoring for the following should be considered.

- Combustible Gas
- Radiation survey (Gamma)
- Organic Vapor (HNu, OVA)

## 1.6 Classifying Containers

Once the site and container have been inspected, it will be necessary to classify the conditions and hazard. The following should be used to classify containers:

1. Radioactive
2. Leaking/Deteriorated or unmovable due to potential for this to occur
3. Bulging
4. Explosive or shock sensitive
5. Lab Pack
6. Unknown Contents

Once the type of drum has been classified refer to appropriate section of this chapter to determine the method of handling.

## 1.7 Handling

### 1.7.1 Introduction

Due to the potential hazards associated with handling containers that contain hazardous materials, it is very important that contact be properly planned and safety precautions thoroughly integrated into each operation. It may be is necessary to handle container for several reasons. These include:

- Decrease hazard potential of the storage i.e. leaking, incompatible materials, stored together;
- Prepare for sampling;
- Stage for further characterization;
- Stage for ultimate disposal, consolidation, shipment, etc.

### 1.7.2 Hazard Communication

Once an action plan is determined it will be necessary to discuss with the crew the hazards of handling the containers. As each situation will differ, hazard communication will vary from site-to-site. However, all information gathered to this point in the operation shall be discussed with employees prior to proceeding further. Additionally, the following will also be discussed:

- MSDS of any known materials
- Classification of containers
- Monitoring results
- Continued site activity
- Information contained in the SSH&SP
- Other information as is or becomes available

This action shall be documented and maintained on file at the site.

### 1.7.3 Handling Minimization

If it is determined that handling is necessary, steps must be taken to assure this is done in the most efficient and safest manner possible. An action plan should be established to plan the operation to minimize the handling. This is done by assessing first whether any work on the containers can be done in place. If not, or when handling the containers for a purpose specified in 1.7.1 of this section, appropriate parts of this section shall be reviewed and implemented. These include:

- Spill containment - Materials, spill containment procedures (1.8)
- Transfer, overpack and patching procedures (1.9)
- Excavation procedure (1.11)
- Opening drums and containers (4.0)
- Material handling equipment (1.12)
- Static electricity (1.13)
- Ventilation (1.9.2.3)
- Fire extinguishing equipment (1.14)

### 1.7.4 Handling Safety Programs

Once handling is deemed to be necessary and preliminary procedures/programs specified in Section 1.7.3 have been reviewed and implemented it will be necessary to review and implement an appropriate, or several, Handling Safety Program (s). These fall into the following categories (references indicate sections of this chapter):

- Unlabeled/unknown containers (2.0)
- Staging (3.0)
- Opening (4.0)
- Sampling (9.0)
- Radioactive waste (6.0)
- Shock sensitive waste (7.0)
- Lab waste packs (8.0)
- Bulking (10.4)
- Shipment and transport (10.0)
- Tank and vault entry (11.0)

### 1.7.5 Safe Handling Work Practices

The following safe work practices shall be implemented to minimize hazards associated with container/drum handling:

- Utilize proper lifting techniques at all times. (Refer to Back Safety Training Module)
- Assure materials are lifted or moved with power of legs and not the back;
- Assure vehicles have appropriate classification, rating and capacity to handle anticipated loads;
- Assure road surface is devoid of ruts, crevices holes, etc. to provide smooth operation and prevent jarring, etc;
- Availability of blast or splash shield where necessary and/or appropriate;
- Have all anticipated material, equipment, personnel available prior to initiating any activity to minimize false starts;
- Determine the most efficient sequence of action; and
- Use only nonsparking tools while handling flammable materials.

## 1.8 Spill Containment

### 1.8.1 Equipment

Materials must be available on-site for use in the event of a spill, leak, or rupture during the operation. These materials should include, but not limited to, the following:

- DOT approved salvage drums
- DOT approved 17H open top drums
- Sorbent pads
- Sorbent boom
- "Speedi-dri" or other absorbent material

### 1.8.2 Work Practices

In the event that a release of hazardous materials occurs, the following actions will be necessary to control and contain the release.

- Notify on-site Supervisor.
- Evaluate the spill from a safe distance.
- Keep unnecessary people away from the release.
- Isolate the area and deny entry.
- Determine the appropriate level of protection. (Refer to the SSH&SP or Chapter F of this manual.)
- Eliminate all ignition sources in the area but <u>do not</u> turn any electrical equipment on or off. This could create an ignition souce.
- Keep all personnel upwind of the release.
- Keep flammable and combustible materials away form the area.
- Monitor the area for flammable and toxic vapors.
- Classify the material or refer to characterization procedures.
- Use only nonsparking tools to handle flammable materials.

### 1.8.3 Spill Containment Procedure

In the event that an inadvertent release (spill) of the hazardous materials occurs on a job site from a drum and/or container, the following actions shall then be taken to protect the health and well being of the employees and the public and to also contain and control the released material.

- Evaluate the area
- Isolate the area
- Keep unnecessary people away
- Notify the on-site supervisor
- Eliminate all ignition sources in the area
- Keep all personnel upwind of the release
- Monitor the area for flammable and toxic vapors

### 1.8.4 Containment Techniques

The following spill containment and/or clean up techniques shall be followed if a release of hazardous waste materials occurs.

<u>Small Solid/Dry Material Spill</u>

- Shovel the spilled material and any other material which it has contaminated into an appropriate approved drum
- Cover and seal the drum
- Label the drum as to its contents

<u>Small Liquid Material Spill Onto Land</u>

- Absorb the material with an appropriate absorbent material
- Shovel the contaminated material and any other material which it has contaminated into an appropriate approved drum
- Cover and seal drum
- Label the drum as to its contents

<u>Large Liquid Material Spill Onto Land</u>

- Contain the material by creating a dike around the liquid
- Pump the liquid into a vacuum truck
- Absorb any small pools of the spilled material with an appropriate absorbent material
- Shovel the contaminated material and any other material which it has contaminated into and appropriate approved drum
- Cover and seal drum
- Label the drum as to its contents

<u>Small or Large Material Spills Into Waterways</u>

- Contain the material with containment and/or absorbent boom
- Pump the material into a vacuum truck and/or absorb the material with absorbent material
- Place the absorbent material into an appropriate approved drum
- Cover and seal the drum
- Label the drum as to its contents

### 1.8.5 Protective Equipment

During all phases of spill containment and clean up, the appropriate levels of personnel protection shall be worn as determined in Chapter on personal protective equipment.

## 1.9 Transfer, Overpack, And Patching Procedures

### 1.9.1 Introduction

Any drum that can not be moved without the threat of leaking, spilling, and/or rupturing shall be either patched, overpacked or its contents transferred into a suitably sound container.

### 1.9.2 Transfer

#### 1.9.2.1 Transferring - Introduction

Transferring, or pumping, liquid material from one drum to another maybe necessary in some situations. If so, there are several pieces of equipment which can be utilized to accomplish this task.

- Electric transfer pump
- Electric barrel pump
- Air driven double diaphragm pump
- Plastic "zep" hand pump

**NOTE:** Please review section 1.10, Static Electricity prior to initiating any transfer procedures

#### 1.9.2.2 Electric Transfer Pump

When an electric transfer pump is utilized, the following procedures shall be followed.

- Place the pump on a solid level surface;
- Ground and bond the pump to the container(s);
- Insert the discharge hose into the drum receiving the material;
- Remove the bung of the drum being pumped;
- Insert the suction hose into the drum being pumped; and
- Turn the pump on.

#### 1.9.2.3 Ventilation

When pumping off drums containing toxic, flammable, or combustible liquids, an air driven or hydraulic powered fan might be needed (ie. coppus blower) to prevent the build-up of flammable vapors . The fan should be placed on the upwind side of the drum and positioned such that the flow of air will disperse any vapors emitted from the drum and carry them away from the work zone. If a blower is to be used it shall be properly bonded and grounded.

1.9.2.4 Electric Barrel Pump
(Intrinsically safe or explosion proof ASSURE THROUGH TESTING. See NOTE in Section 1.12.1)

When an electric barrel pump is used, the following procedures shall be followed:

- Ground and bond all containers;
- Insert the discharge hose into the drum receiving the material;
- Remover the bung of the drum being pumped;
- Place the barrel pump into the drum being pumped; and
- Turn the pump on.

1.9.2.5 Air Driven Double Diaphragm Pump

When an air driven double diaphragm pump is used, the following procedures shall be followed:

- Place the pump on a solid level surface;
- Ground and bond the pump to the container (s);
- Connected the air hose to the pump;
- Insert the discharge hose into the drum receiving the material;
- Remove the bung of the drum being pumped;
- Insert the suction hose into the drum being pumped; and
- Turn the pump on.

1.9.2.6 Plastic "ZEP" Hand Pump

When a plastic "zep" hand pump is used, the following procedures shall be followed:

- Ground and bond all containers;
- Insert the discharge hose into the drum receiving the material;
- Remove the bung of the drum being pumped;
- Insert the suction hose into the drum being pumped; and
- begin pumping

### 1.9.3 Overpacking - Introduction

There are several methods which can be used to overpack drums. Choosing the appropriate one will depend on the accessibility to the leaking drum. The methods are as follows:

- Using a machine, such as a fork-lift, back-hoe, or bob-cat to lift the leaking drum and lower it into the overpack.
- Rolling the leaking drum into the overpack on the ground at an angle.

All attempts should be made to overpack the leaking drum so that it remains in an up-right position. By doing this it will allow for easier sampling of the leaking drum.

Overpacking consists of placing a drum which cannot be moved without the threat of leaking, spilling, and/or rupturing into a larger container so that it contains and secures the leaking container.

#### 1.9.3.1 Preparation

Before overpacking may begin consideration must be given to the compatibility of the overpack drum with the material in the drum that is to be overpacked. The following test shall be conducted to determine what type of overpack to use.

#### 1.9.3.2 Testing For pH

The pH of the material to be overpack shall be tested using litmus paper to determine if the material is one of the following.

- Acid pH from 1 to 5
- Neutral pH from 6 to 8
- Base pH from 9 to 13

After it has been determined what the pH of the material is, the selection of the correct type of overpack to be used can take place. Selection is as follows.

- Acid poly overpack to be used
- Neutral steel overpack to be used
- Base poly overpack to be used

Once the selection of the overpack to be used is completed, overpacking procedures may begin.

1.9.3.3 Using Mechanical Equipment

- Lift the drum up using a fork-lift, bobcat, or backhoe with either a drum sling or drum grappler;
- Slowly lower the drum into the overpack;
- Seal the overpack by placing a gasket then cover and ring in place; and
- Secure

1.9.3.3 Inverted Method

- Place the overpack over the drum in question so that the overpack is upside down;
- Both drums are simultaneously flipped over so that the overpack is now right side up and the drum in question is upside down inside the overpack; and
- The gasket, cover, and ring of the overpack are securely sealed; or
- Placing an overpack onto the leaking container.

## 1.10 Overpacking Vs. Transferring

### 1.10.1 Selection

Selection of the appropriate method to be used, overpacking or transferring, will depend on the evaluation of a number of questions. Theseinclude:

- Accessibility of the drum by both personnel and equipment:

  o drum off the road 200 yards - overpack
  o drum on a loading dock - overpack or transfer

- The number of drums to be handled:

  o few - overpack or transfer
  o hundreds - overpack

- The type of operation being conducted:

  o emergency response to one leaking drum at a factory - overpack or transfer
  o the excavation of several hundred drums at a superfund site - overpack

- The size of the drums:

  o 55 gallon - overpack or transfer
  o 5 gallon pail - overpack)

- Are the drums to be stored for future evidence in their present state - overpacking

- The availability of the equipment needed to complete the job

- The physical state of the drums:

  o good condition - overpack or transfer
  o bad condition - transfer

- Is the contents of the drum known or unknown:

  o known - transfer
  o unknown - overpack

- Is the material in the drum to be disposed of or is it to be saved for future use:

  o save - transfer
  o dispose - overpack

- The physical state of the drums material, solid or liquid:

  o solids - overpack
  o liquids - transfer

Only after these and/or other questions and/or concerns are answered and/or addressed can the choice be made between overpacking or transferring of the drum's contents be made.

### 1.10.2 Plugging and/or Patching

Plugging and/or patching a leaking container can be done using a number of methods. The selection of the best method will depend on the size and shape of the leak.

#### 1.10.2.1 Small Punctures

One of the following techniques can be used to plug and/or patch a small puncture:

a. <u>Rubber/ball, toggle bolt with washer and wing nut</u>;

The toggle bolt is inserted into the puncture and the wing nut is tightened to compress the rubber/ball on the opening. See figure 3

b. Soft wooden plug with felt padding;

The felt padding is wedged into the puncture and secured in place with the plug. See figure 3

c. Self tapping screw with washer and/or gasket;

The screw is inserted into the puncture and tightened to compress the washer and/or gasket on the opening. See figure 3

d. Chemical patch;

Combining of two (2) base products to create a compound which will seal the puncture when it is applied to the opening. See figure 3

NOTE: This technique is not recommended for patching pressure leaks.

e. Insoluble mastic and/or putty

The mastic and/or putty is applied onto and over the puncture. See figure 3

NOTE: This technique is not recommended for patching pressure leaks.

1.10.2.2 Small Linear Cracks

The following technique shall be used to patch and/or plug a small linear crack:

Oakum, mastic, or cloth and a wedge;

The oakum, mastic, or cloth is wedged into the crack and secured in place using the wedge. See figure 6

1.10.2.3 Large Irregular Holes

One of the following techniques may be used to plug and/or patch a large irregular hole:

a. Chemical patch;

Combining of two (2) base products to create a compound which will seal the puncture when it is applied to the opening. See figure 4

NOTE: This technique is not recommended for patching pressure leaks.

## TECHNIQUES FOR PATCHING AND STABILIZING LEAKING CONTAINERS

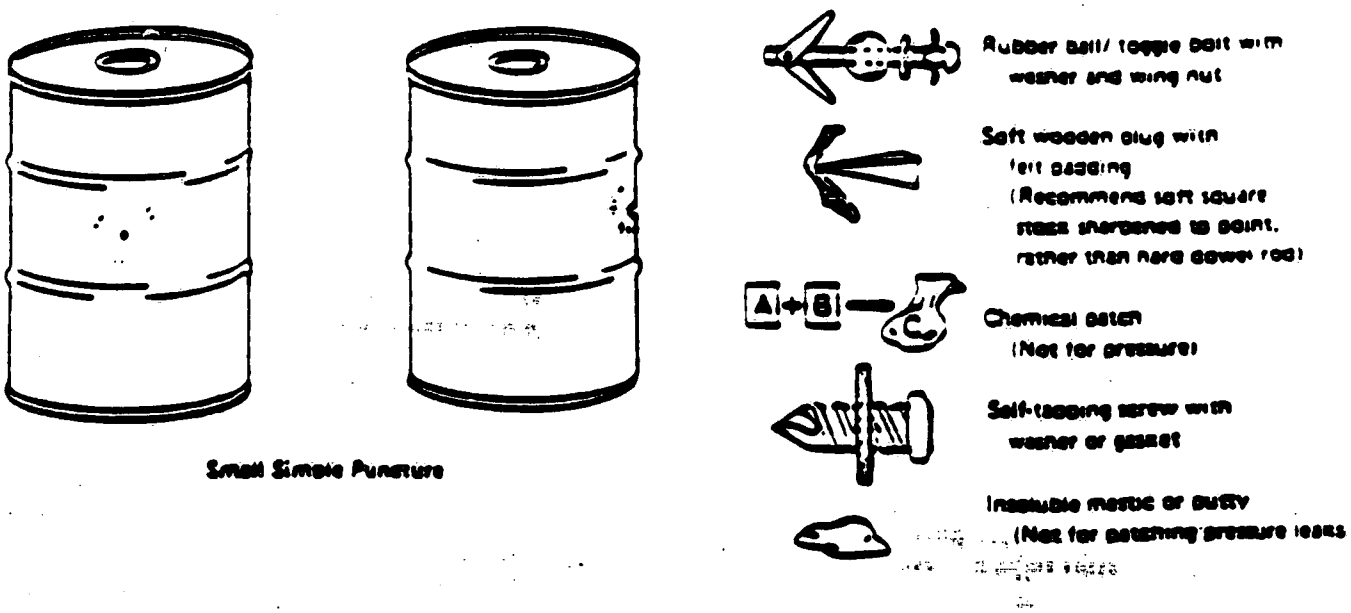



FIGURE 3

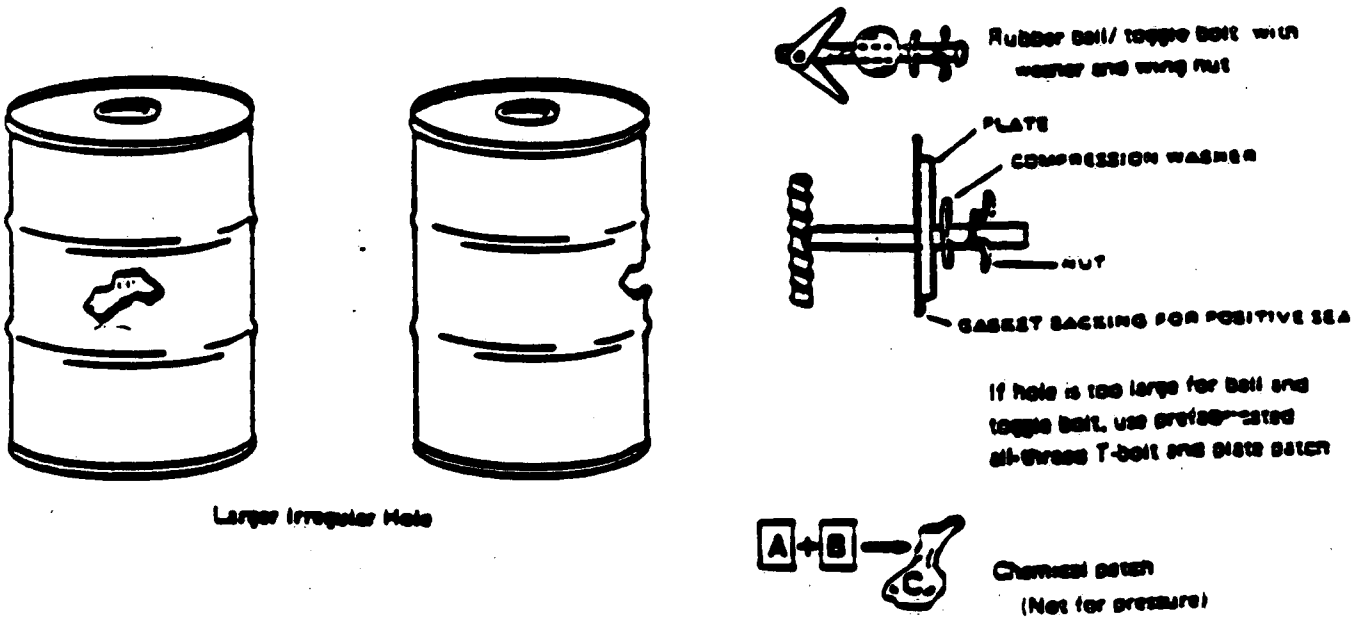
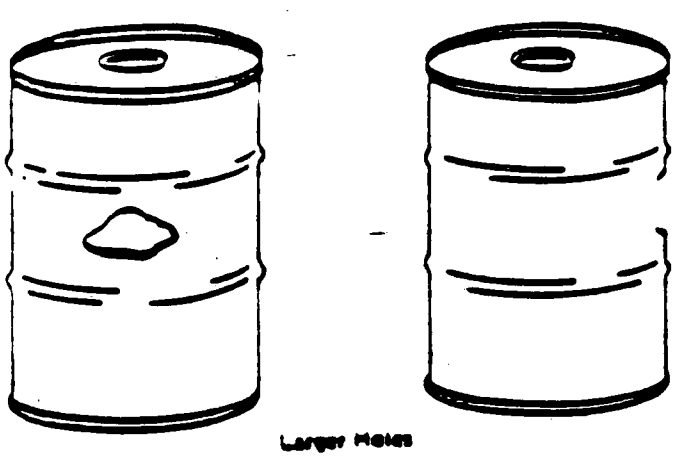
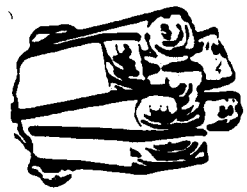



FIGURE 4

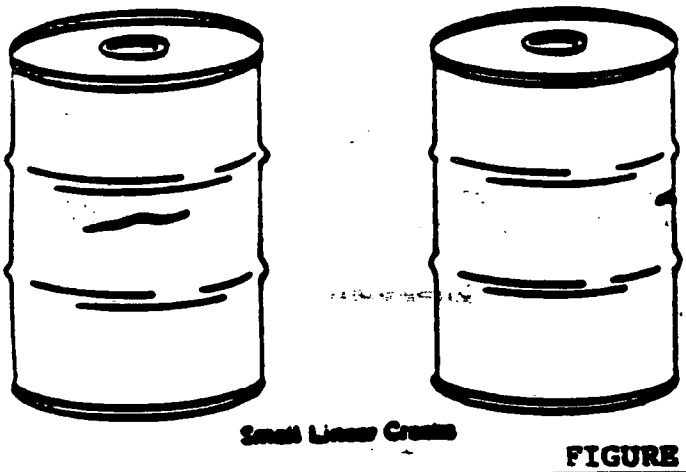
## TECHNIQUES FOR PATCHING AND STABILIZING LEAKING CONTAINERS

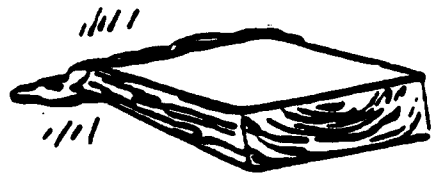


Combinations of square, conical, and wedge-shaped wooden plugs (Wrap plugs with felt or cloth before inserting)

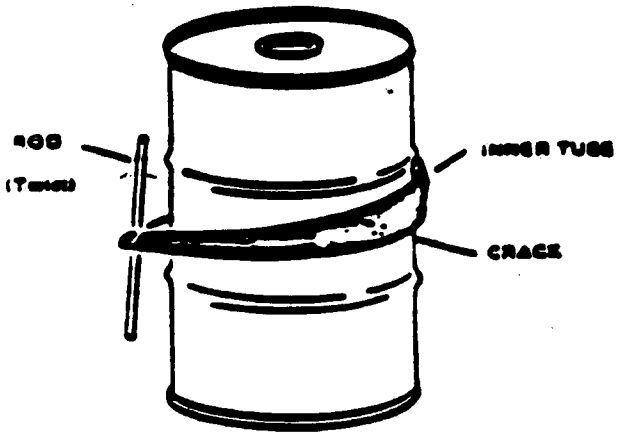
FIGURE 5

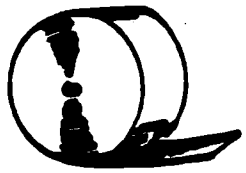


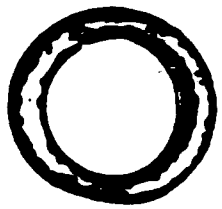
Drive oakum, mastic, or cloth into crack with wedge

FIGURE 6



Heavy duty duct tape makes a good temporary seal in many cases



A bread inner tube placed over the crack in a drum can be tightened with a rod or stick to form a fairly good seal

b. Rubber/ball toggle bolt with washer and wing nut;

The toggle bolt is inserted into the puncture and the wing nut is tightened to compress the rubber/ball on the opening. See figure 4

c. T-Bolt and plate patch;

The t-bolt is inserted into the hole and the wing nut is tightened to compress the plate patch on the opening. See figure 4

d. Combination of various shaped wooden plugs with felt;

The felt padding is wedged into the hole and secured in place with various shaped wooden plugs. See figure 5

## 1.11 Excavation

### 1.11.1 Introduction

In certain situations it may be necessary to uncover buried drums or containers. This aspect of the handling operation is particularly dangerous because of the potential for contact, puncturing, etc. during the operation. Therefore, these procedures and others applicable from this section should be used as guidance.

### 1.11.2 Locating Buried Drums or Containers

Prior to beginning excavation or unearthing any buried drums or containers a ground penetrating or detection method shall be utilized to determine and estimate the location, depth, and boundaries of the buried drums or containers. See Section 1.4

### 1.11.3 Drum Excavation Procedures

After determining the location of the buried drums or containers excavation procedures will begin. These procedures will include the following steps:

- Excavate to the top of the buried drums.
- Hand excavate the remaining soil away from around the drums.
- Inspect and characterize the containers as far as possible. Apply appropriate safe handling and work practices, outlined in Section 1.7.5 prior to proceeding. Also, review Section 1.5

- Determine if overpacking or transferring of the drum and/or its contents will be required. Review 1.9
- If the drums have been determined to be sound, they shall be removed from the excavation. This shall be done using either a drum grappler or drum sling. (See section 1.12)
- Once the drum has been removed from the ground it shall be immediately placed or brought to the first staging area. (See section 3.0)

1.11.4 Opening and Leaking Containers - Precautions

Under no circumstances shall any drum be opened in the excavation area. This shall only be done in the staging area using the appropriate procedures. If, however, a drum is leaking when it is removed from the excavation it shall be, transferred, patched, or overpacked immediately.

1.11.5 Contaminated Soil

During the excavating process, all contaminated soil should be transferred to a temporary storage area. The soil should be stockpiled on polyethylene until it can be disposed of properly in accordance with state and federal regulations.

1.11.6 If excavation of durms or continers progresses more than four (4) feet into the earth, CHI Excavation Guidelines must be followed.

## 1.12 Material Handling Equipment

1.12.1 There are many different pieces of equipment available for properly handling and transferring products from drums. Below is a list of the various pieces and their uses:

| | |
|---|---|
| - Bobcat and drumgrabber | Moving drums |
| - Drum dolly | Moving drums |
| - Diaphragm pump | Transferring product |
| - Piston type hand pump | Transferring product |
| - Plastic type siphon hand pump | Transferring product |
| - Drum probe | Transferring product |
| - Electric chemical pump | Transferring product |
| - Bung wrench (brass) | Opening drums |
| - Grounding and bonding straps | Grounding and bonding drums and containers |

**NOTE:** An electricity driven pump must not be used when dealing with flammable and combustible liquids, unless it is intrinsically safe or explosion proof and recently evaluated.

1.12.2 Equipment compatibility

Care should be taken to assure that the equipment used to perform the transfer is compatible with the material in the drum, and will not cause a reaction. If the contents of the drum is unknown, samples must first be obtained and analyzed prior to transferring the product.

## 1.13 Static Electricity

1.13.1 Introduction

During the transfers (free flow of fluids) of an liquid, static electricity is always generated. Typically this is only a problem when handling flammable materials. However, due to the potential for mis-labeled containers, cross-contaimination, etc., and the likely result, this hazard shall always be controlled when transferring liquids. Bonding and grounding of container is the method used to control static electricity.

1.13.2 Grounding and Bonding - Background

- Bonding is the process of connecting two or more conductive objects together by means of a conductor.
- Grounding is the process of connecting one or more conductive objects to the ground, and is a specific form of bonding.

Some objects are inherently bonded or grounded by the fact that they are in contact with the ground. Such is the case with underground storage tanks. However, other situations such as drums in contact with the soil is not sufficient to assure grounding. Therefore, it will be necessary to drive a ground. Bonding minimizes potential differences between conductive objects. Grounding minimizes potential differences between objects and the earth.

1.13.3 Method

1.13.3.1 Grounding

To obtain a deliberate ground it will be necessary to drive a low resistance (copper) rod into the soil to a sufficient depth that it reached groundwater. This will vary from location to location.

Contact Health and Safety for further direction. (Review section 1.7.2 prior to driving any ground). A copper cable from the ground to the containers will be needed for grounding purposes. The ground shall be attached to a clean, non-corroded, unpainted surface of the container. If one does not exist, it may be created with the use of emery cloth or sand paper, be aware of friction hazard. See figure 6

1.13.3.2 Bonding

Cables, wire, etc. must be connected between containers where liquid is transferred. There must be a minimum of one bond wire between any two containers involved in a transfer (and one wire to ground.) The cable shall be connected to a clean, non-corroded, unpainted surface of the containers. If one does not exist, it may be created with the use of emery cloth or sand paper, be aware of friction hazard. See figures 7 & 8

1.14 Fire Extinguishing Equipment

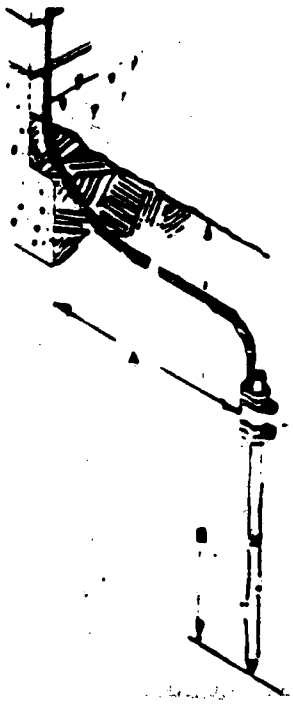
Fire extinguishing equipment must be made available on-site. The equipment will consist of at least two (2) 20 lb. multi-pupose dry chemical extinguishers for every 50 feet of travel distance. They shall be available in areas where work is being performed. Extinguishers agents for combustible metal fires must also be available on the job site if this material is handled.

## 2.0 UNIDENTIFIED CONTAINERS

Due to the inability to identify the hazards of unlabeled containers, extreme measures must be employed when such containers are located or anticipated. A thorough inspection must be conducted in order to properly classify the contents. Unlabeld containers shall be considered unknowns and anticipated to contain the most extreme hazards until they are classified. Information described in section 1.5. should be used to evaluate the container contents.

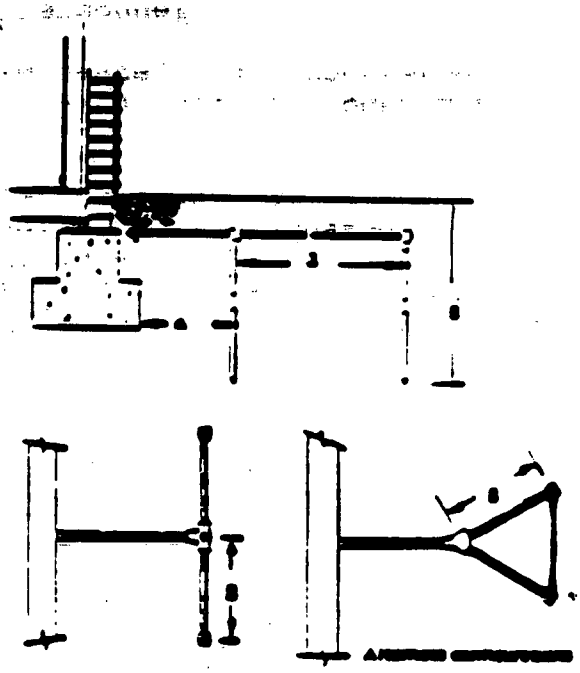
Assessment shall be made from a distance using binoculars and other techniques. Information specified in 1.5 shall be used to determine if the unlabeled containers can be approached for further evaluation, characterization, and possible movement. This decision shall only be made by the highest company official on the scene and in conjunction with the Manager - Occupational Health and Safety.

GROUNDING IN MOIST CLAY TYPE SOIL



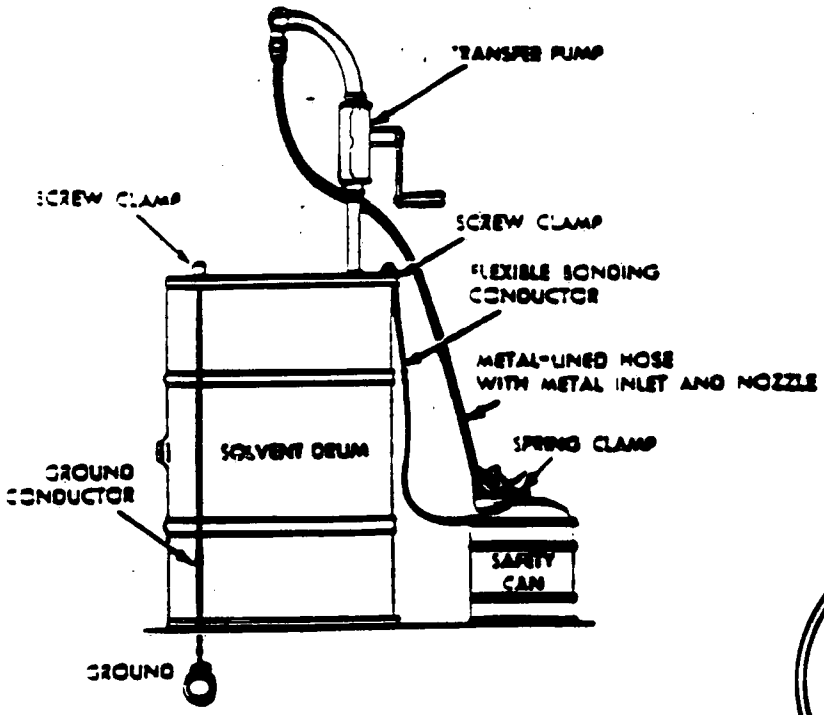

A = 2 feet (610 mm) minimum.
B = 10 feet (3.0 m) minimum.

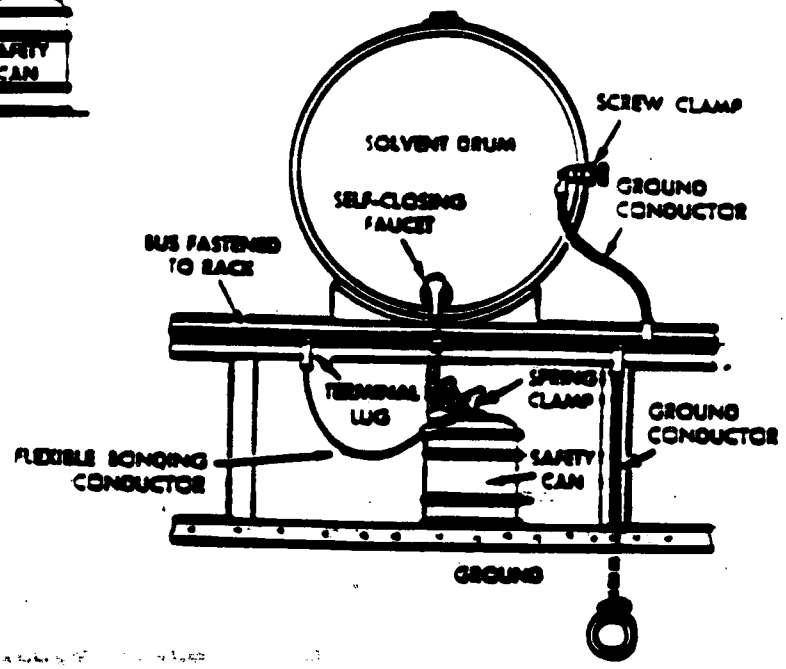
GROUNDING IN SANDY OR GRAVELLY SOIL



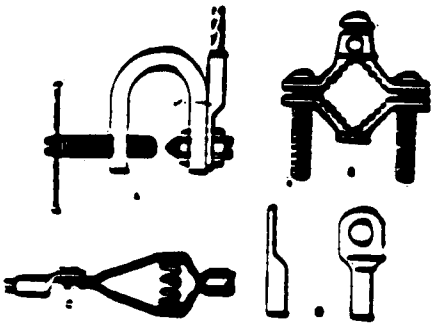

A = 2 feet (610 mm) minimum.
B = 10 feet (3.0 m) minimum.

FIGURE 6




In dispensing flammable liquids from upright drum with transfer pump (top) or from horizontal drum with self-closing faucet (bottom), metal-lined hose contacts portable container to maintain continuous bonding. Otherwise, dispensing and receiving containers should be bonded by separate wire with suitable clamps. (Courtesy The Protectoseal Co.)



Types of bonding or grounding clamps: A) screw, B) pipe or rod, C) spring, and D) bolt-on. Courtesy The Protectoseal Co.)

FIGURE 7

### 4-7.2 Tankers and Barges.

4-7.2.1 The loading and unloading of steel tank ships and barges does not require any special measures to protect against external static sparks. Bonding cables between the vessel and shore are not required. The hull of the vessel is inherently grounded by virtue of its contact with the water. Consequently, the accumulation of static charges on the hull is prevented.

4-7.2.2 Loading or discharging liquids from vessels is through closed systems. These vessels are, in general, in adequate contact with the earth so that external static sparks are prevented. Even in the unlikely event that an external static spark did occur, it would also be unlikely that this would occur in the presence of a flammable vapor-air mixture. (*See Sections 4-3 and 4-4.*)

4-7.2.3 The discussion given in Section 4-3 regarding pumping of flammable liquids into storage tanks having a vapor space also applies to the flow of such liquids into ships' tanks.

### 4-8 Container Filling.

4-8.1 Filling portable containers is analogous to filling tank vehicles except that the smaller size and lower flow rates may permit less rigorous static control measures. (*See Section 4-3.*)

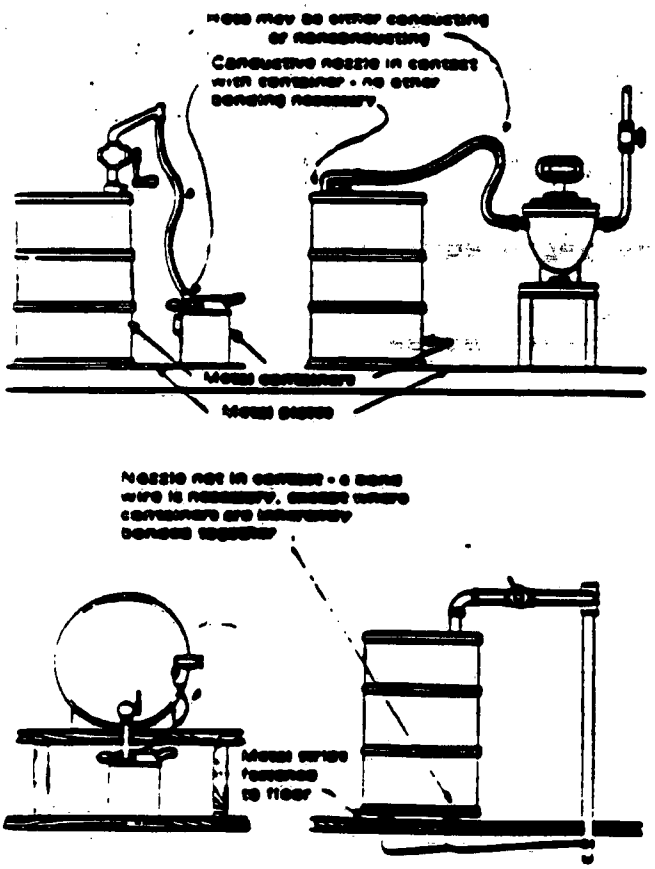



Figure 4 Bonding During Container Filling.

4-8.2 In filling metal cans and drums, a fill spout, nozzle, or fill pipe, if conductive, should be kept continuously in contact with the edge of the fill opening. Conductive funnels, strainers, or other devices should likewise be kept in contact with both the fill nozzle and the container to avoid the possibility of a spark at the fill opening. Under these circumstances the additional precaution of providing a bond wire between the container and the fill connection is not warranted.

4-8.3 The need for extending a downspout to the bottom of the container has not been demonstrated by experience in filling containers up to and including 55-gal (208-L) drums.

4-8.4 When contact cannot be maintained between the fill pipe and the container, and the two are not inherently bonded, a bond wire should be used between them. Figure 4 illustrates various protective measures used in container filling.

4-8.5 Containers of glass or other nonconducting materials of 5 gal (19 L) or less capacity are usually filled without special precaution. For larger containers, see Section 7-8.

4-8.6 Bonding is not required where a container is filled through a closed system.

4-8.7 Microfilters, if used, should be as far upstream of the nozzle as practicable. Transfer lines downstream of the filters should be conductive.

## Chapter 5 Dusts and Fibers

5-1 **General.** This chapter contains a discussion of some of the static electricity problems associated with the handling and processing of dusts and fibers.

### 5-2 Parameters Affecting Charge Generation.

5-2.1 A transfer of an electric charge occurs when two materials in contact are separated. Dust dispersed from a surface may develop a considerable charge. The ultimate charge depends on the inherent properties of the substance, size of particle, amount of surface contact, surface conductivity, gaseous breakdown, external field, and leakage resistance in a system. Electrification develops during the first phase of separation. Subsequent impact of airborne particles on obstructions may affect their charge slightly, but if the impact surface becomes coated with the dust, this effect is slight.

5-2.2 Charge generation seldom occurs if both materials are good electrical conductors, but it is likely to occur with a conductor and a nonconductor or two nonconductors. When like materials are separated, as in dispersing quartz dust from a quartz surface, positive and negative charges are developed in the dispersed dust in about equal amounts to give a net zero charge. With materials differing in composition, a charge of one polarity may predominate in the dust. Each of the materials becomes equally charged but

FIGURE 8

## 2.1 Assessment Sequence

The assessment of unlabeled containers shall be made using a hierarchy of hazard, model. This is done by characterizing the drums to the best ability of experienced on-site (or other company) personnel. See the following sections 1.4; 1.5; 1.6; and 1.7.

If the unlabeled containers can be classified into one of the other categories listed in 1.7.4, then refer to the appropriate section of this chapter. If, in the judgment of onsite supervision (in conjunction with Health and Safety) the containers cannot be characterized, it may be necessary to employ extreme measures to identify the contents. This will only be done with the concurrence of top level company officials. Contact the Branch Manager, Regional Vice President and Manager-Occupational Health and Safety.

## 2.2 Handling Precautions

If sufficient information is available to characterize the contents of unlabeled containers, the containers may be approached to perform the appropriate activity. However, the following precaution will be discussed with all employees involved and will be strictly followed.

### 2.2.1 Container Reaction

If at any time during the handling process any drum or container begins to react, all drum handling procedures shall be left undisturbed for a period of no less than 24 hours. If at the end of this time period the reaction has stopped or is completed may the drum may again be considered for handling.

### 2.2.2 Transporting Unknowns

The transporting of unknown drums shall be done using the appropriate material handling equipment outlined in section 1.12 of this document.

# 3.0 STAGING

When large numbers of drums are handled it is necessary to develop and implement a staging system to organize and minimize the handling.

## 3.1 Staging Areas

Staging locations are divided into the following see figure 9:

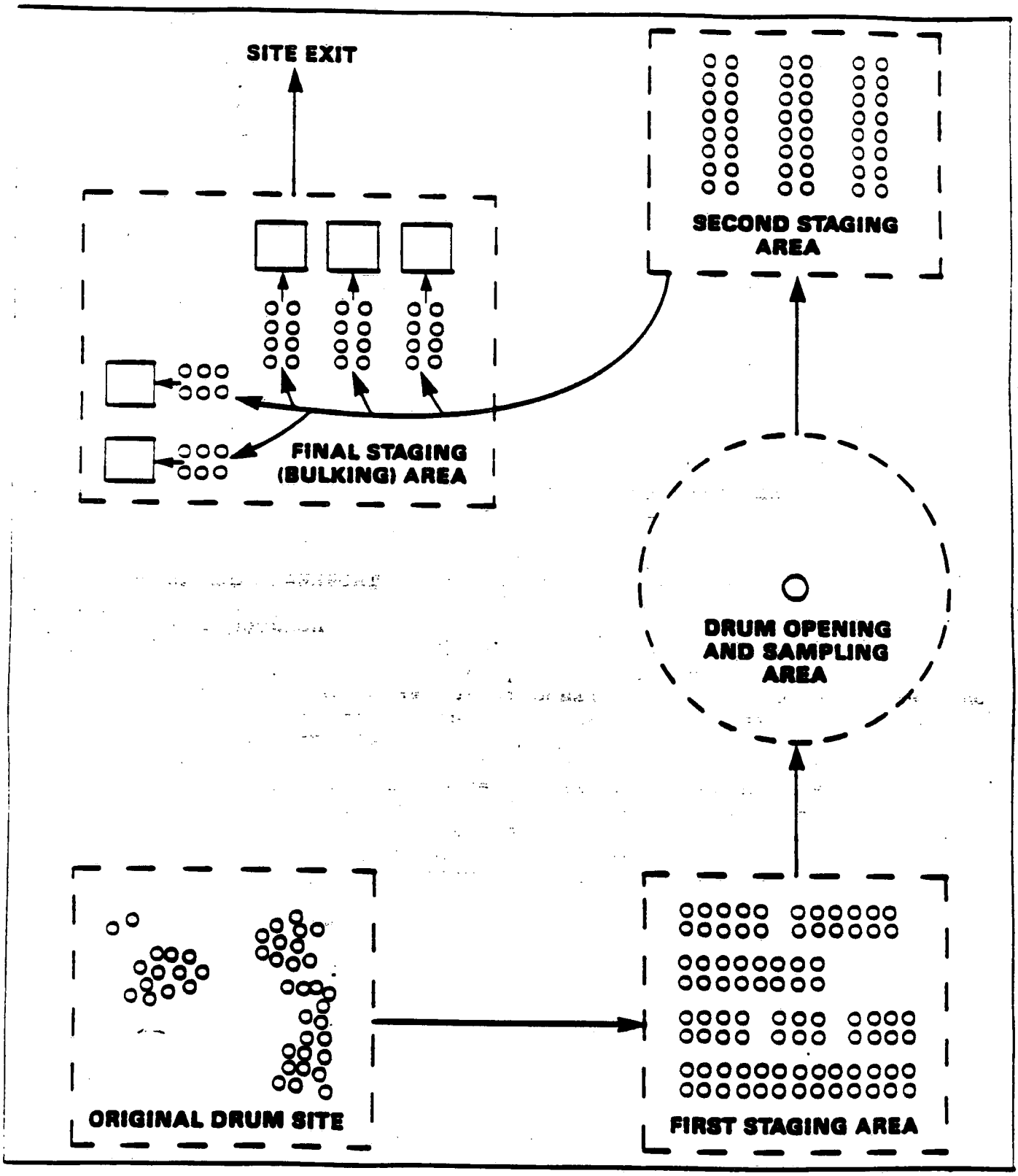

SITE EXIT
SECOND STAGING AREA
FINAL STAGING (BULKING) AREA
DRUM OPENING AND SAMPLING AREA
ORIGINAL DRUM SITE
FIRST STAGING AREA

Figure 9

First Staging Area - Used as a temporary storage in preparation for sampling. Drums are brought here from the original excavation or dump site. Drums are organized into type, size, and suspected contents.

Drum Opening and Sampling Area - Area where individual (single) drums are brought to be opened and sampled.

Second Staging Area (Holding Area) - Used as a temporary storage area after sampling analysis is complete. Pending Characterization.

Final Staging/Bulking Area - Area where drums are brought, after they have been characterized, to be either shipped individually or bulked for disposal. In this final staging area, drums pending shipment for disposal shall be segregated in groups according to their chemical characterization (i.e. flammable liquids, acids, PCB's, etc.) for bulking see section 10.4

## 3.2 Staging Area Design

Each staging area shall be constructed in the following manner:

- Grade the area as level as possible;
- Cover the area with a layer of impervious plastic sheeting;
- Construct a one foot high dike wall around the staging area; and
- Construct ramps over the dike to allow for entry and exit into the staging area.

## 3.3 Drum Arrangement

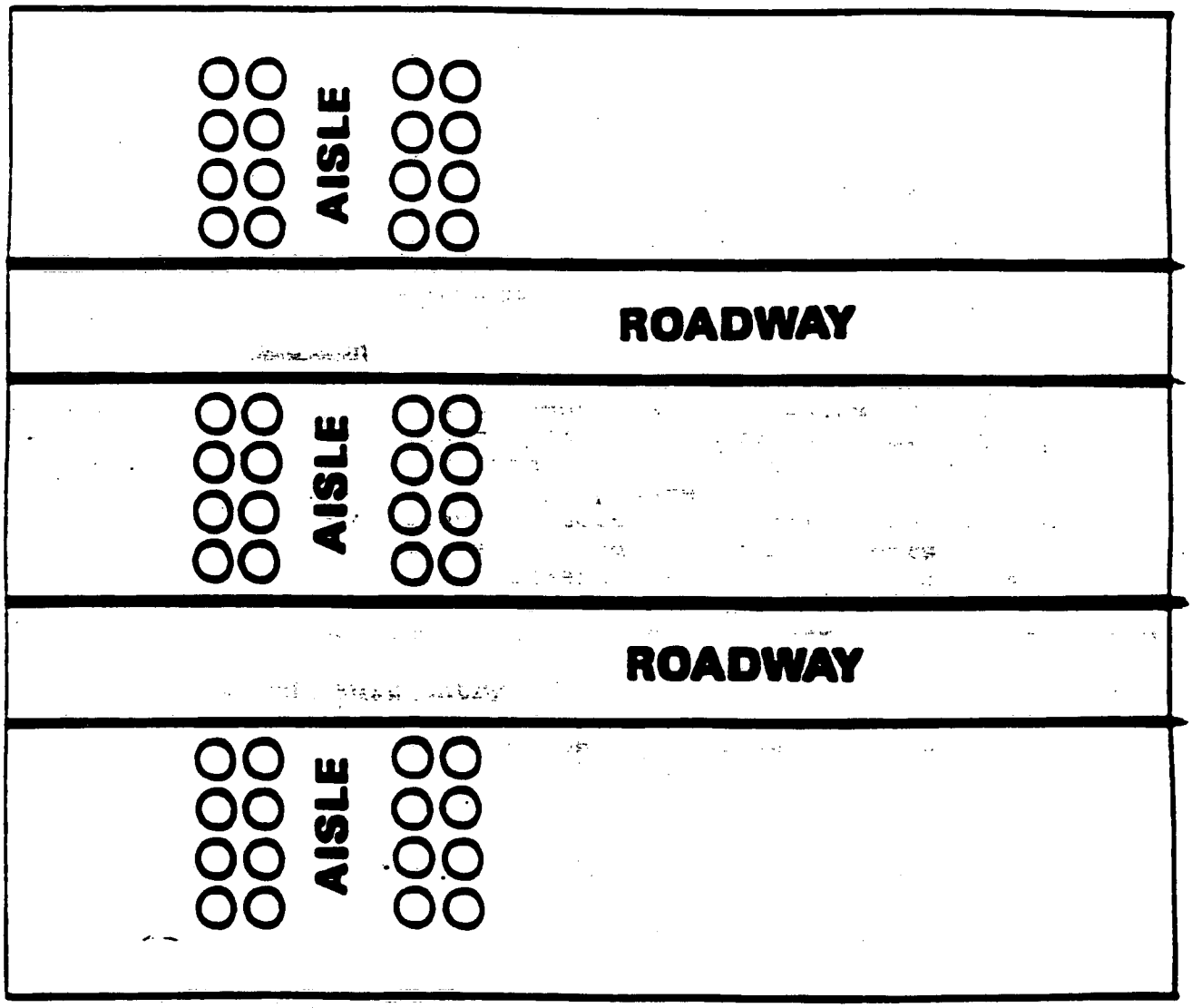
In any staging area where more than one drum is stored, the drums shall be arranged in the following manners.

- Drums shall be arranged in rows of two(2); and
- Space the rows 8-10 feet apart to all for access.

The final staging area should be located as close as possible to the site exit. The whole staging area should be covered with poly sheeting and have a dike wall of at least on foot high surrounding it. Ramps shall be constructed over the dike for used as routes of entry and exit.

All drums located in the final staging area should be segregated according to hazard class ( flammable, corrosive, etc.). All areas of staged drums should be just two drums wide with only two rows per area. Each hazard class area should be separated by a minimum of at eight to ten feet.

SEE FIGURE 10




Sample Drum Staging Layout.

Figure 10

## 4.0 OPENING DRUMS AND CONTAINERS

### 4.1 Introduction

A closed container of hazardous material, whether it is a 5 gallon pail or a 10,000 gallon tank, can pose a major threat to the person who is responsible for opening that container. Because of the possible hazards involved in the opening of drums, specific precautions shall be taken to protect the personnel opening the container, the personnel in the immediate area and the equipment in the area.

### 4.2 Purpose

Hazards associated with the opening of hazardous waste containers are, but not limited to:

- The release of toxic and/or flammable gases and vapors;
- Explosions;
- Spills;
- Exposure to the contents beyond TLV levels; and
- Mechanical injuries to the hands, back, etc.

The following procedures will attempt to reduce or eliminate the hazards associated with opening drums and containers.

**NOTE:** Before opening procedures commence, drums shall be staged in order that all drums can be reached. (See section 3.0 of this document.) At no time shall drums be walked over or stood upon to reach other drums.

### 4.3 Protection Of Personnel Involved In Opening Procedures

#### 4.3.1 Employees Right To Know

Refer to section 1.7.2 of this document

#### 4.3.2 Protection Of P.P.E.

Refer to personal protective equipment Chapter.

#### 4.3.3 Protection From Pressurized Drums And Containers

Containers that are believed to be under pressure, by evidence of bulging, shall be handled with extreme caution. When possible, remote equipment shall be used to open the pressurized containers. This equipment shall be a sufficient distance away as to protect it from any type of explosion or a protective explosion- proof barrier shall be constructed between the drum and the equipment.

If remote equipment is not used, an explosion-proof shield shall be placed between the container and the person opening the container. Pressure shall be released as slowly as possible by utilizing the procedures listed below.

The purpose of this section is to make employees aware of the hazards of handling pressurized drums and procedures for handling those drums.

The need to use extreme caution when handling pressurized drums is because of the threat of explosion.

In the event that a pressurized drum is encountered the following steps shall be initially taken.

- The pressurized drum shall not be moved
- Isolate the area
- Keep unnecassary people away from the area
- Notify the on-site supervisor immediately

4.3.3.1 Pressure Reduction Procedures

Once the pressurized drum has been isolated, pressure reduction may begin using the following procedures.

- An explosion proof shield shall be placed between the pressurized drum and the employee who is to open the drum
- A non sparking bung wrench (ie. bronze) shall be placed onto the bung which is to be opened
- The bung shall be opened/turned one quarter (1/4) turn
- Any pressure shall be allowed to be released completely
- Once the pressure has been completely released, the bung shall be opened/turned another one quarter (1/4) turn
- The pressure again shall be allowed to be completely released

This process shall be continued until one of the following results has been reached.

- All of the pressure from inside the drum has been released
- The bung has been completely removed from the drum

4.3.4 Ignition Protection For Opening Hazardous Materials Containers

Containers that are believed to contain hazardous material shall be opened either by remote equipment or opened with non sparking hand tools (brass hammer, chisel, and bung wrench). During all opening procedure all potential ignition sources shall be eliminated within 100 feet of the operation.

4.4 **Protection Of Personnel In Adjacent Areas**

Employees that are not actually involved in the opening process shall be required to be situated in the support zone. All opening procedures shall be perform within the exclusion zone.

If employees must work adjacent to the staging area where container opening is taking place, an explosion-proof barrier must be constructed/placed between the containers and the employees. Staging areas should be placed in remote areas to limit this from occurring. Both the staging area and the explosion barrier should be discussed in the site health and safety plan. (refer to section - site control)

## 5.0 RADIOACTIVE WASTES

5.1 **Introduction**

Clean Harbors Inc. has in effect strict guidelines regulating radio-active material. Clean Harbors will not accept any radioactive materials or waste into any of the inter-company facilities. Therefore, it is a company policy for the field service branches not to perform any remedial clean up at sites where they may come in contact with radioactive material or waste.

5.2 **Purpose**

The purpose of the following procedures is to protect the health and safety of the employees of Clean Harbors and to guarantee that Clean Harbors **WILL NOT BE HANDLING RADIOACTIVE MATERIAL.**

5.3 **Determining The Presence Of Radioactive Material**

The following instruments are available for field service work (Refer toSire Characterization and Air Monitoring):

- Geiger Counter - Model 3 (Ludlum Measurements Inc.)
- Probe - Model 44-7 (Ludlum Measurements Inc.)
  - Model 43-2 (Ludlum Measurements Inc.)
  - Model 44-2 (Ludlum Measurements Inc.)
  - Model 44-3 (Ludlum Measurements Inc.)

### 5.4 What To Do If Radioactivity Is Discovered

If readings are encountered which are three (3) times above normal background readings for that area, all personnel will evacuate the area immediately and contact Dr. Richard Fix at the Wood Road laboratory and Robert Spielvogel at the corporate office.

Normal background readings shall be considered to be the average reading which is found in areas at least 100 yards outside and upwind of the support zone.

## 6.0 SHOCK SENSITIVE WASTES

### 6.1 Purpose

The purpose of this section is to outline and provide Clean Harbors Inc. employees with in the event that they encounter or suspect the presence of shock sensitive wastes during hazardous waste site operations and emergency responses.

### 6.2 Recognizing Shock Sensitive Materials

Materials shall be considered shock sensitive if any crystalline materials are noted on any of the drums or containers; the drums or containers are pressurized, the drums and container appear to contain lab pack material, or any written marking indicate shock sensitive material.

### 6.3 Evacuation Of Nonessential Personnel

If drums of shock sensitive waste are encountered or their presence suspected the following initial procedures will be followed:

- All work activities on the job site shall stop.
- All non-essential personnel will be evacuated from the job site to a safe distance.
- The onsite site safety officer will be notified of the discovery.
- Notify the corporate Health and Safety Manager immediately.
- Handling procedures will be determined only after an adequate evaluation of the situation has been performed.

### 6.4 Use Of Personal Alarm Systems

Prior to the commencement of handling waste which is considered shock sensitive, an audible siren signal system shall be sounded. This signal must be louder than the noise conditions in and around the job site. The same audible siren signal shall be sounded at the completion of the

handling operations. Additionally, it may be necessary to use a visible strobing yellow light throughout the duration of the handling operations to indicate that operations are being conducted. This will be determined by on-site supervisor. This must be communicated to all personnel during site training.

### 6.5 Communications

During handling operations involving shock sensitive waste, a continuous line of communications shall be maintained. The communication shall be between the foreman in charge of the handling operation and the command post. The site supervisor and site safety officer shall both be present at the command post at this time. The type of communications system that will be used will depend on each situation. It is required, however, that the system to be used be intrinsically safe or explosion proof.

### 6.6 Handling Drums Under Pressure

If drums or containers are encountered which appear to be under pressure refer to section 1.8.5 of this document.

## 7.0 LABORATORY WASTE PACKS

Contact Natick or Project Support for additioanl guidance in identifying or handling Lab Packs

### 7.1 Purpose

This section will outline and provide Clean Harbors Inc. employees with guidance in the event that laboratory waste packs are encounterd or suspected during hazardous waste site operations or emergency responses.

### 7.2 Recognizing Laboratory Waste Packs

Laboratory waste packs shall be defined as any drum or container which contains or is suspected to contain individual containers of laboratory materials. This material is normally surrounded by cushioning absorbent material. These individual containers can range in size from one (1) ounce to five (5) gallons.

### 7.3 Evacuation Of Nonessential Personal

If drums of laboratory waste packs are encountered or their presence suspected the following initial procedures will be followed:

- All work activities on the job site shall stop.
- All non-essential personnel will be evacuated from the job site to a safe distance.

- The onsite site safety officer will be notified of the discovery.
- Notify the corporate Health and Safety Manager immediately.
- Handling procedures will be determined only after an adequate evaluation of the situation has been performed.

## 7.4 Use Of Personal Alarm Systems

Prior to the commencement of handling waste which is considered laboratory waste packs, an audible siren signal system shall be sounded. This signal must be louder than the noise conditions in and around the job site. The same siren signal shall be sounded at the completion of the handling operations. Additionally, it may be necessary to use a visible strobing yellow light throughout the duration of the handling operations to indicate that operations are being conducted. This will be determined by on-sire supervision. This must be communicated to all personnel during Site training.

## 7.5 Communications

During handling operations involving laboratory waste packs a continuous line of communications shall be maintained. The communication shall be between the foreman in charge of the handling operation and the command post. The site supervisor and the site safety officer shall both be present at the command post at this time. The type of communications system that will be used will depend on each situation. It is required, however, that the system to be used be intrinsically safe or explosion proof.

## 7.6 Handling Drums Under Pressure

If drums or containers are encountered which appear to be under pressure refer to section 1.8.5 of this document.

7.7 Handling Crystallized Materials

If crystalline materials are noted on any drum or container, the contents of that drum or container shall be considered to be shock sensitive handled as such until the contents have been properly identified. Refer to section 4.3.3 of this document.

## 8.0 SAMPLING DRUMS AND CONTAINERS

### 8.1 Purpose

This section will outline procedures to perform drum sampling of unknown or known material during hazardous waste sit operations or emergency responses.

Review the following sections before proceeding: 1.7, 1.13, 4.0 and 1.7.4

### 8.2 Personal Protection Of Employees

During all phases of unknown material drum sampling, employees involved in the procedures will be required to wear level A protection. If, however, background information of the job site (ie. history) and the drums contents are available, level B protection may be substituted for level A.
(refer to Personnal Protective Equipment for a description of level A and B protection)

### 8.3 Sampling Procedures

8.3.1 Liquid Material Drum Sampling Procedures - non flammable.

See Attachment .

8.3.2 Solid Material Drum Sampling Procedures

The following procedures will be followed when sampling unknown or known solid material from drums:

- Remove the lid from the sample container and prepare the container for the sample material;
- Open and remove the top from the drum;
- Insert a trowel (explosion proof, if flammable solids are being sampled) into the solid material, doing so at an angle (it may required that the drum be tilted in order to reach and extract the sample);
- Slowly remove the trowel and the material from the drum;
- Transfer the material from the trowel into the sample container;

- Repeat these steps if more material is needed to fill the sample container;
- Close the lid of the sample container; and
- Close the top of the drum.

8.3.3 Flammable

## 8.4 Cross Contamination

Cross contamination of samples shall be avoided at all times. If cross contamination occurs, it will result in an unrepresentitive sample of a particular drum or container. This in turn will result in an incorrect analysis result of that particular drum or container.

To avoid cross contamination of samples being taken the following steps should be considered:

- Do not use a sampling tube on more than one drum or container, after it has been used it should be discarded.
- Thoroughly clean and decontaminate the sampling device before it is used to sample another drum or container

# 9.0 SHIPPING AND TRANSPORT

## 9.1 Introduction

This section will cover the methods for properly identifying and labeling drums for disposal, the staging of drums, and the proper procedures for compatibility testing and bulking of drum contents.

When dealing with drums containing unknown materials, it is of great importance that all possible efforts are made to properly identify its contents. This will insure that the drums will be shipped and disposed of in accordance with all local, state, and federal regulations.

## 9.2 Fingerprinting

If no information is available from the drums such as labels, product description, etc., field fingerprinting can be conducted on each drum so that staging and transport may be accomplished. The first staging area should be a separate area remote from the work zone. From the initial staging area the drums should be moved individually to the drum opening and sampling area, where fingerprinting will be conducted. Only one drum at a time should be located in the drum opening and sampling area. The fingerprinting procedure is outlined in attachment # may be followed. A sample of the material should be obtained at this time for further laboratory analysis.

Once fingerprinting of each drum is conducted the drum should be labeled. Labeling of drums should be accomplished utilizing the latest edition driver's guide to hazardous materials published by J.J. Keller & Associates and E.P.A. waste codes (1940 CFR).

## 9.3 Staging

After fingerprinting, sampling, and labeling are accomplished the drum should be now moved to a second staging area to await placement into the final staging area. Once all drums are sampled and labeled they should be placed in the final staging area.

The only time bulking of liquids can be done is after a full analysis has been done on the product or products and they are known to be compatible.

## 9.4 Bulking

### 10.4.1 Preparation

Bulking, or mixing and combining, of materials from individual drums into larger containers for both onsite storage and shipment for disposal shall only be performed after the following have been completed.

- A more extensive chemical analysis, than that performed to characterize drum contents, has been performed by a certified laboratory.
- The results of that analysis has been received and reviewed to determine which materials may be safely combined.

### 9.4.2 Inspection

Once the results of the analysis have been received and prior to the bulking of the materials the following areas of concerns shall be addressed.

- Inspect and insure that the container which is to receive the bulked material is clean and free of any residual material which may cause a reaction with the material that is to be pumped
- Use only pumps and hoses that are designed and approved for the material that is to be pumped
- Inspect and assure at all pumps and hoses to be used are free of leaks and deterioration and are in good working order

9.4.3 Bulking Procedures

Bulking procedures shall be the same as those used for transferring material from drum to drum (See section 1.9) with the addition of the following.

A compatibility test shall be performed prior to the pumping of each drum. This test will involve the following.

- A small quantity of each drum shall be mixed in a five gallon pail to observe for signs of incompatibility.
- Signs of incompatibility would be:
  - heat generation
  - smoking
  - vapor generation
  - splashing
  - bubbling
- If any of these signs are observed, all bulking procedures shall stop and site health and safety and Site Supervisor shall be notified.

## 10.0 TANK AND VAULT PROCEDURES

### 10.1 Introduction

Tanks and vaults present special hazards to all CHI workers who have to perform work in and around them. Entering a tank or vault to perform any type of work requires special precautions be taken to assure the safety of all involved. The many different aspects of entering and working in any confined space are covered in Clean Harbors Confined Space Entry Program (attachment # ). These requirements should be followed by all CHI employees, so as to minimize the risks associated with the entry or work in confined spaces.

### 10.2 Tank and Vault Entry

The following procedures should be followed when dealing with tanks and vaults:

- When opening a tank or vault the same procedures for opening sealed drums should be utilized. The tank should first be vented to relive excess pressure from substances which might be stored. A deflecting shield should be placed between the workers and the tank opening to prevent coming in direct contact with the stored material.
- Secure the area to prevent workers from falling into the tank opening.
- If the material in the tank is unknown, a sample should be taken and sent for analysis. If the material is known and MSDS are available, the scope of work to be performed can begin.

- If entry into the tank of vault is necessary refer to CHI's Confined Space Entry Procedures must be followed.

## 11.0 REFERENCES


National Fire Protection Association
Standard # 77
Recommended Practice on Static Electricity
1988

National Fire Protection Association
Fire Protection Handbook 16th Edition
1986

Environmental Protection Agency
Standard Operating Safety Guides Handbook
November 1984

Environmental Protection Agency
Sampling at Hazardous Materials Incidents Handbook
May 1984

Drum Handling Manual For Hazardous Waste Sites
Bryson, Furman, Hodge, Wagner, Wetzer, and Wickline
1987

Occupational Safety And Health Guidance Manual For Hazardous Waste Site Activities
NIOSH, OSHA, USCG, EPA
October 1985


## 12.0 ATTACHMENTS

### 12.1 Grounding And Bonding

### 12.2 Fingerprinting

### 12.3 Confined Space Entry Procedures

#### 12.3.1 Guidance Procedures For Oil Confined Space Entry

This guidance procedure specifies the steps that must be followed prior to and during entry into confined space that contain or previously contained oil materials.

Background

Confined Spaces are locations that by design satisfy the following definition:

- Limited means of entry or exit; (Limited-configuration, location, size, number, etc.)

- Poor natural ventilation that could contain, retain or produce an: oxygen deficient, flammable, or toxic atmosphere; and
- Not intended for continuous worker occupancy.

Confined spaces present the risk of oxygen deficiency, flammable atmospheres and/or toxic environments as well as physical hazards such as electrocution, mechanical activation, inadequate lighting, etc. Confined space entry risks can be minimized by understanding the hazards and taking appropriate corrective action.

Clean Harbors (CHI) confined space entry program is designed to enable CHI employees to identify confined space hazards and minimize their risks. The program includes: theoretical instruction in confined space hazards (provided during CHI's 40 hour training program); written program hazard information (CHI's Confined Space Entry Program in the "Green" Book); and practical instruction provided during 40 hour training. This guidance procedure completes the elements of CHI's Oil Confined Space Program. Additional guidance procedures are under development in the confined space program including flammable and toxic atmosphere and confined space emergency rescue procedures. Please contact the Health and Safety Department for special precautions necessary for entry into environments other than oil.

In addition to requirements specified in this guidance procedure, by August 1989 at least two individuals participating in each Confined Space Entry (Foreman and Standby Personnel) must be CPR/First Aid certified.

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PART I

# COMPATIBILITY FIELD TESTING PROCEDURES FOR UNIDENTIFIED HAZARDOUS WASTES

RODNEY D. TURPIN
JOSEPH P. LAFORNARA
HARRY L. ALLEN
Environmental Response Team
U.S. Environmental Protection Agency
UWE FRANK
Oil and Hazardous Materials Spills Branch
Municipal Environmental Research Laboratory—Ci.
Edison, New Jersey

## INTRODUCTION

US EPA's Environmental Response Team was established in October 1978 to provide technical assistance to On-Scene Coordinators (OSCs), Regional Response Teams (RRT), EPA Headquarters and Regional Offices, as well as other governmental agencies in the area of multi-media, emergency environmental problems.

The Office of Research and Development (ORD), Municipal Environmental Research Laboratory (MERL) in Cincinnati, Ohio, has the lead role for research and development relating to hazardous waste environmental emergencies. Through a program at its Oil and Hazardous Materials Spills Branch (OHMSB) in Edison, New Jersey, MERL is developing prototype equipment and experimental techniques for controlling wastes and providing analytical support to environmental incidents requiring emergency response.

In this paper, the authors describe ERT's field testing procedures for segregating unidentified hazardous waste with portable identification equipment. The compatibility classification scheme is based on pH, total organic vapors, oxidation potential, flammability, water reactivity and radioactivity.

## COMPATIBILITY TESTS

The primary purpose of the Compatibility Field Test is to have a method for segregating uncharacterized drums of waste into separate storage areas. The tests (Table I) can be either performed at the drum head (staging area) or at a mobile unit located within the site's "hot zone." This procedure permits rapid analysis and results in an expedited drum segregation operation. The selection criteria for the different categories is shown in Table II.

## FLAMMABILITY

Although a standard flash point test would furnish helpful information about the unidentified hazardous waste, this method becomes impractical when dealing with large numbers of drums on an emergency operation. For example, if a test could be performed every 20 minutes, it would take approximately 3 man-years to analyze 20,000 drums.

Since it is possible to move, stage and sample between 100-200 drums per day, the drum segregation operation would range between 20-40 weeks. Thus, a simple flammability technique is used to separate flammables from non-flammables.

Such a technique could simply consist of placing 2-5 ml representative hazardous waste sample in a disposable beaker. The beaker is placed in a large sand box and a propane torch is slowly passed over the unidentified waste. Obviously, the ambient temperatures will affect the results, therefore, it is important to simulate ambient summertime temperature. If a flame is observed, then the sample is classified as flammable. A non-flammable classification is assigned to the waste after the torch has been passed over the waste several times.

## RADIATION

Radiation monitoring should be one of the initial tests performed on unidentified hazardous waste drums and it should be performed as soon as possible to prevent worker exposure. Thus, the monitoring should be conducted as soon as drums are placed in the staging area and opened.

Since normal environmental gamma radiation background is approximately 0.01 to 0.02 milliroentgen per hour (mR/hr) on a gamma survey instrument, routine employee exposure should not be more than 2-3 times background levels. At no time should routine employee exposure be 10 mR/hr or above without the advice of a qualified health physicist.

## pH

The pH of a waste affects not only its corrosivity, but also its compatibility with other wastes. If a barrel of acidic wastes were to leak and come in contact with a barrel of another waste containing a sulfide or cyanide, accelerated corrosion of the second drum would occur and the resultant co-mingling of the wastes would evolve poisonous hydrogen sulfide or hydrogen cyanide gas.

Table I.
Compatibility Field Tests

| Test | Category | Category |
|---|---|---|
| pH* | Caustic (NF) | A |
| | Caustic (F) | B |
| | Acid (NF) | C |
| | Acid (F) | D |
| 2. Water Reactive | | E |
| 3. Oxidative/Reductive | Oxidizer (F) | F |
| | Oxidizer (NF) | G |
| 4. Radioactive | | H |
| 5. Volatile vapor/gas | | |
| 6. Flammable | | |

*pH can be determined by a variety of colorimetric and electrochemical techniques, each of which has its disadvantages when used on "dirty" samples containing organic layers, sludges or concentrated solutions. For instance, standard pH electrodes are easily fouled and require constant cleaning and recalibrating. Most colorimetric indicators and papers are easily obscured by grease, sludges or deeply colored solutions. Interfering chemicals may even cause false color changes.

F: Flammable
NF: Non-flammable

Similarly, co-mingling of caustic wastes with ammonium salts or amine salts could lead to the evaluation of irritant ammonia gas or amine vapors.

The guard against these possibilities, caustic and acid wastes must be segregated. It is widely accepted that both cyanide and sulfide ions must be kept above a pH of 9 in order to remain in aqueous solution. Therefore, caustic wastes (Categories A and B) were defined as those with a pH above 9, and acidic wastes (Categories C and D) were defined as those with a pH below 9.

pH can be determined by a variety of colorimetric and electrochemical techniques, each of which has its disadvantages when used on "dirty" samples containing organic layers, sludges or concentrated solutions. For instance, standard pH electrodes are easily fouled and require constant cleaning and recalibrating. Most colorimetric indicators and papers are easily obscured by grease, sludges or deeply colored solutions. Interfering chemicals may even cause false color changes.

The pH method selected for this protocol utilizes a multi-band pH paper strip which contains a reaction zone and a series of indicator colors (fixed) for reference. The entire strip is dipped into the waste and the color reaction allowed to occur. The strip is withdrawn and any excess sludge, organic or water wiped-off by squeezing it between the thumb and forefinger, while wearing rubber gloves. The color comparison of the reaction zone and the indicator color is made assuming that the indicator color and the reaction zone are both affected in the same way by the grease, sludge or concentrated solution.

## WATER REACTIVITY

One purpose of hazardous waste segretation at a site or a spill is to ensure that antagonistic effects do not occur due to contact between incompatible wastes. While many hazardous substances at a scene may be relatively stable and compatible in a dry state, the high probability that water may contact these materials warrants consideration of the consequences of such an occurrence. Thus, water reactivity, aside from being among the characteristics identifying a solid waste as a hazardous waste, is important in assessing the waste segregation strategy.

The characteristic of reactivity, as defined in the RCR regulations (40 CFR 261.23), is exhibited if a representative sample of the waste has any of several properties. Properties 2, 3 and 4 of the material are of principal concern to this discussion:

(2) It reacts violently with water
(3) It forms potentially explosive mixtures with water
(4) When mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger of human health or the environment.

The EPA laboratory manual, "Physical Chemical Methods for Evaluating Solid Waste," does not include a specific procedure for evaluating reactivity. The reason given is the diversified nature of the material properties listed in the regulation. In practice, however, water reactivity is commonly observed during the course of other tests. The authors believe the dangers posed by the three properties above explain why water reactivity should be determined.

In routine hazardous waste management, established laboratory safety procedures and a general knowledge of waste composition, are helpful in preventing a potential disaster due to the wetting of the reactive substance. Since the EPA proposed Comprehensive Hazardous Substance List contains 21 reactive chemical wastes and nine additional acutely hazardous chemical wastes, caution must obviously be observed in the laboratory. But what about in the field?

The same analytical safety precautions should be applied in the field where reactive substances are known to be present. Such items as ammonium picrate or fulminate of mercury should be segregated and perhaps not even sampled if such materials are labeled or strongly presumed to be present. In questionable cases, however, the authors recommend a simple water reactivity screening test be applied to check for the evaluation of heat or other violent reaction or the generation of toxic vapors.

While the authors have not tried this test yet, it should be relatively safe if precautions against explosion and toxic vapor hazards are taken. Unknown organic vapors, cyanide, hydrogen sulfide, chlorine, ammonia and hydrogen could be generated in small amounts. Hence, the authors recommend the reactivity test be conducted after other waste characterization testing has been evaluated and some idea of the waste composition has been gained.

Briefly, the tests should be conducted as follows:

(1) Place 500 ml distilled water in a one liter metal beaker in an explosion-proof hood, if available, or behind a substantial barrier. Analysts should wear appropriate protective gear.
(2) Insert a thermometer in the beaker and record the temperature after equilibration.
(3) Place an explosive atmosphere measuring device and an organic vapor measuring device in position to pick up any gases generated in the beaker headspace using laboratory clamps, etc.
(4) Introduce about one gram (one ml) of waste into the beaker.
(5) Observe the beaker measuring devices.

6) If no changes are observed in temperature or head-space gases, add an additional 4 grams (4 ml) of waste, added 1 gram (1 ml) at a time and recheck instruments.

7) If still no reaction is observed, add an additional 5 grams (5 ml).

Wastes testing positive to water reactivity should be isolated and protected from rain or other water sources as well as possible. Complete confinement, however, (i.e., enclosure in a walled building) is not recommended because of a possible explosion hazard from confining explosive vapors.

## REDOX FIELD TEST KIT

The oxidation reduction (REDOX) potential field test kit was developed as a screening procedure for analyzing and classifying drums as those containing oxidizing or reducing agents at uncontrolled hazardous waste sites. The segregation of drums by redox potential is a necessary first step in a clean-up activity due to the danger of explosion associated with proximate storage or shipment of waste chemicals which have strong oxidizing or reducing properties. This hazard was recently demonstrated when approximately 40,000 drums containing chemical wastes exploded at the abandoned "Chemical Control Corporation" hazardous waste site in Elizabeth, New Jersey.[11]

The REDOX Test Kit permits measurement of the REDOX potential of drum samples through use of a portable battery-operated instrument, electrode probes and electrolyte solutions. The measurement of oxidation-reduction potential (ORP) or Electromotive Force (EMF) of a sample solution can be performed with a platinum sensing electrode and a standard reference electrode, usually calomel or silver-silver chloride. Although the instrument and electrode probes are readily available, the unique feature of the Test Kit rests in its ability to perform REDOX measurements not only in aqueous but also organic matrices such as are found at hazardous waste sites. Operation of the kit involves using the electrolyte solutions to generate a known REDOX potential (EMF) and monitoring changes in the EMF caused by the addition of sample to the electroyle. The entire procedure for obtaining REDOX measurements requires only a few minutes and can be performed by inexperienced operators.

The feasibility of ORP measurements is based on the ability of the sensing electrode to generate and the meter to indicate, 10 mv or less change in potential. At very low concentrations, microgram quantities can cause measurable EMF changes. However, such sensitivity would mean that most tests would be positive. Therefore, it is preferable to use a standard test solution that will generate a known EMF, and monitor changes in the EMF caused by the addition of the sample. For example, a 0.001 N solution of ferrous ammonium sulfate will generate a cell po-

**Table II**
**Selection Criteria for the Compatibility Field Testing Methods**

| Category | High pH 9 | Low pH 9* | HNU or OVA on vapor space | | Flam. | Redox | R/A | B/T |
|---|---|---|---|---|---|---|---|---|
| A-Caustic (NF) | + | - | - | - | - | - | - | - |
| B-Caustic (F) | + | - | + | + | + | - | - | -, + |
| C-Acid (NF) | - | + | - | - | - | - | - | - |
| D-Acid (F) | - | + | + | + | + | - | - | -, + |
| E-Water Reactive | - | - | - | - | - | - | - | + |
| F-Oxidizers (F) | - | - | + | + | + | + | - | - |
| G-Oxidizers (NF) | - | - | - | - | - | + | - | - |
| H-Radioactives | - | - | - | - | - | - | + | - |

*High pH is because of cyanide, sulfide and sulfide stain take a times

F: Flammable  R/A: Radioactive
NF: Non-Flammable  B/T: Reactive (on water reaction)

potential of approximately 380 mv versus a silver-silver chloride reference electrode. When an oxidizing agent is added to the test solution, the $Fe^{++}$ of the ferrous ammonium sulfate will be oxidized to $Fe^{+++}$, raising the cell EMF.

The test is very sensitive and a reaction with only a small portion of an oxidizing agent will give a positive test. Failure to obtain a positive test would indicate an absence of any strong oxidizing agents. Potassium chromate can be used in place of the ferrous ammonium sulfate as a standard test solution for determining the presence of reducing agents.

The test kit consists of a portable pH meter capable of EMF measurements (Fisher Scientific Accumet Model 150, for example), and a platinum sensing combination electrode with a silver-silver chloride reference electrode. Two types of combination electrodes are currently used: Orion Model 96-78 and Fisher Scientific platinum REDOX electrodes. In addition, the kit contains 0.001 normal ferrous ammonium sulfate and 0.001 normal potassium chromate standard test solutions, measuring flasks, disposable 50 ml volume beakers, and disposable containers for taking sample measurements.

In the field, a chemical waste sample is added to a standard test solution and then the change in potential (mv) is measured with the pH meter and electrodes. Each standard test solution gives a constant reading. Changes in those readings either in the negative or positive direction upon addition of sample, indicates the presence of an oxidizing or reducing agent.

Thus by using the ferrous ammonium sulfate test solution, the standard reading with the silver-silver chloride reference electrode is 380 mv. A threshold change of 50 mv in the positive direction (over 430 mv) indicates the presence of oxidizing agents. The potassium chromate test solution gives a standard reading of 630 mv. A threshold change of 50 mv in the negative direction (less than 580 mv) indicates the presence of reducing agents.

An actual field evaluation was performed during January 1980 at the Ottati and Goss site in Kingston, N.H. Two test kits were successfully used to screen drums containing chemical wastes for the presence of strong oxidizing agents. Two minor problems were encountered: electrode probe clogging and freezing temperatures. The clogging problem was easily resolved, however, by proper probe cleaning between samples. The cold weather, however, caused the probe electrolyte to freeze and therefore prevented use of the kit at ambient temperatures. Remedial measures involved using the kit in a small heated shed, located at the site.

## VOLATILE VAPOR/GASES

The objective of taking total vapor concentration values just inside the barrel's bung hole is to assist in determining whether or not the headspace has a potentially explosive atmosphere. In utilizing total vapor concentrations as a guide for determining the presence of organic materials or explosion materials, a number of factors should be considered:

(1) The uses, limitations and operating characteristics of the monitoring instrument must be recognized and understood. Instruments such as photoionizers and organic vapor analyzer (OVA) do not respond to all substances that may be present or may respond differently to identical substances when compared to one another.

(2) Hazardous other than detectable gases/vapors such as phosgene, HCN, chlorine, liquid/solid particulates and other harmful conditions may exist.

(3) Potential for an explosive atmosphere exists when the instrument reaches its maximum reading of 2,000 ppm and should be checked with an explosive meter.

The primary purpose of the total vapor testing is to determine explosion potential. If the selected instrument reads 2,000 ppm, one has to make a decision as to the classification. The authors practice has been to classify the waste as flammable if 2,000 ppm readings are obtained until further confirmation is available. This decision takes into consideration instrument limitations, ambient temperatures, weather conditions, operator experience and sampling rate.

## ACKNOWLEDGEMENT

The authors express their appreciation to all members of EPA's Environmental Response Team, EPA's Oil and Hazardous Materials Spill Branch, Municipal Environmental Research Laboratory, Edison, New Jersey and Princeton Testing Laboratory, Princeton, New Jersey.

## REFERENCES

1. Frank, U., Gruenfeld, M., Losche, R., and Lafornara, J.P., "Mobile Laboratory Safety and Analysis Protocols Used for Response to Abandoned Chemical Waste Dump Sites and for Oil and Hazardous Chemical Spills." Proc. 1980 National Conference on Control of Hazardous Material Spills, May 13-15, 1980, Louisville, Ky., 259.

## II. CONTAINERIZED LIQUIDS SAMPLING METHODS

### METHOD 5-71 COLLECTION OF LIQUID CONTAINERIZED WASTES USING GLASS TUBES

**Description**

Liquid samples from opened containers (55-gallon drums) are collected using lengths of glass tubing. The glass tubes are normally 122 cm in length and 6 to 16 mm inside diameter. Larger diameter tubes may be used for more viscous fluids if sampling with the small diameter tube is not adequate. The tubing is broken up and discarded in the container after the sample has been collected, eliminating difficult cleanup and disposal problems. This method should not be attempted with less than a two-man sampling team.

**Uses**

This method provides for a quick, relatively inexpensive means of collecting concentrated containerized wastes. The major disadvantage is from potential sample loss which is especially prevalent when sampling low viscosity fluids. Splashing can also be a problem and proper protective clothing (e.g., butyl rubber apron, face shields, boot covers) should always be worn.

**Procedures for Use**

1. Remove cover from sample container opening.

2. Insert glass tubing almost to the bottom of the container. Try to keep at least 30 cm of tubing above the top of the container.

3. Allow the waste in the drum to reach its natural level in the tube.

4. Cap the top of the tube with a safety-gloved thumb or a rubber stopper.

5. Carefully remove the capped tube from the drum and insert the uncapped end in the sample container.

6. Release the thumb or stopper on the tube and allow the sample container to fill to approximately 90 percent of its capacity.

7. Repeat steps 2 through 6 if more volume is needed to fill the sample container.

8. Remove the tube from the sample container and replace the tube in the drum.

9. Cap the sample container tightly with a Teflon-lined cap and affix the sample identification tag.

10. Break the glass sampling tube in such a way that all parts of it are discarded inside the drum. (Note: see the initial discussion to this section for exceptions.)

11. Replace the bung or place plastic over the drum.

12. Place sample container in a Ziplock plastic bag (one per bag).

13. Place each bagged container in a 1-gallon metal paint can (or appropriate sized container) and pack in vermiculite packing material. Place lid on the can.

14. Mark the sample identification number on the outside of each paint can and complete chain-of-custody log and the field logbook.

<u>Optional Method</u> (if sample of bottom sludge is desired)

1. Remove cover from container opening.

2. Insert glass tubing slowly almost to the bottom of the container. Try to keep at least 30 cm of tubing above the top of the container.

3. Allow the waste in the drum to reach its natural level in the tube.

4. Gently push the tube towards the bottom of the drum into the sludge layer. Do not force it.

5. Cap the top of the tube with a safely-gloved thumb or rubber stopper.

6. Carefully remove the capped tube from the drum and insert the uncapped end in the sample container.

7. Release the thumb or stopper on the tube and allow the sample container to fill to approximately 90 percent of its capacity. If necessary, the sludge plug in the bottom of the tube can be dislodged with the aid of a stainless steel laboratory spatula.

8. Repeat if more volume is needed to fill sample container and recap the tube.

9. Proceed as in Steps 9 through 14 above.

<u>Note</u>:

1. If a reaction is observed when the glass tube is inserted (violent agitation, smoke, light, etc.) the investigators should leave the area immediately.

2. If the glass tube becomes cloudy or smokey after insertion into the drum, the presence of hydrofluoric acid is indicated and a comparable length of rigid plastic tubing should be used to collect the sample.

3. When a solid is encountered in a drum (either layer or bottom sludge) the optional method described above may be used to collect a core of the material, or the material may be collected with a disposable scoop attached to a length of wooden or plastic rod.

Sources

American Society for Testing and Materials. "Standard Recommended Practices for Sampling Industrial Chemicals," ASTM E-300-73.

U.S. Environmental Protection Agency, "Technical Methods for Investigating Sites Containing Hazardous Substances, Technical Monograph 1-29, Draft," Ecology and the Environment, June 1981.

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# FLAMMABLE CONFINED SPACE ENTRY GUIDELINES

Scope: This guideline covers entry into confined spaces that contain or contained flammable materials. For the purpose of this procedure "flammable" will be considered any material with an LEL and/or a Flash Point below 140°F.

Included in this definition are unknown materials and "waste oils". Unknowns may be evaluated (and possibly down-rated) by laboratory evaluation.

Purpose: The purpose of this guideline is to provide guidance on how to enter and work safely in confined spaces that contain or previously contained flammable materials.

## I. INTRODUCTION

Due to the hazards associated with entry into confined spaces that contain or previously contained flammable material, entry into such spaces will under level "B" with continuous ventilation.

## II. PRELIMINARY

A. Obtain information on the material contained in the space (spaces containing unknown material shall never be entered)

- Review MSDSs
- Discuss previous use with Health and Safety Department
- Obtain sample (Under level "B") for laboratory determination of flash point.

B. Gather the appropriate safety equipment

1. Monitoring
   - Consult Health and Safety to determine appropriate monitoring equipment
   - Combustible Gas Meter (CGM)/Oxygen Meter

2. Personal Protective Equipment (Consult Health and Safety for compatable material)

   - Respiratory Protection - SCBA, Level B, Cascade
   - Protective Clothing (Check with Health and Safety for specific material)

- Coveralls
- Gloves
- Rubber overboots

- Fire extinguishers-appropriate types (A-B-C, $CO^2$, Halon) and adequate number (2 units per entry)
- Ventilation
  Coppus blower and compressor
- Harness, tripod, rescue winch

C. Designate the standby person
This person has the following responsibilities:

- Maintain communication
- Monitor for oxygen, LEL, Toxic - Continuously or at 15 minute intervals
- Initiate rescue procedures

III. PREPARATION

A. Physically walk off or describe and discuss routes to phones, emergency showers, assistance, etc. (Entire crew should participate). Document information on CONFINED SPACE PERMIT.

B. Isolate product lines

- All product lines to the space should be physically disconnected and blanked lines. (Double block and bleed)
- Bleed material from blanked lines.
- Lock-out and tag-out fill, suction, return, etc. lines on underground flammable tanks.

C. Lock-out and Tag-out electrical lines.

- Each electrical circuit to the space must be locked and tagged out-of-service.
- If this cannot be performed by Clean Harbors, verify that the customer has locked and tagged out electrical lines.

D. Pump product form the space. Follow proper bonding and grounding techniques.

E. Test the space in the following order:

| MATERIAL | ACCEPTABLE CONCENTRATION |
|---|---|
| Oxygen | 19.5 - 22.0% |
| Flammable | < 10% LEL |
| Toxic | 1/2 IDLH (see Appendix A for method to calculate IDLH) |

- Take REPRESENTATIVE reading of the space following this formula:

| SPACE VOLUME (IN GALLONS) | MINIMUM SAMPLING LOCATIONS |
|---|---|
| 20,000 | 1 |
| 20,000-50,000 | 2 |
| 50,000-100,000 | 3 |
| >100,000 | 4 |

Representative - Remote locations, equally spaced areas, various locations within the space (see ENTRY for representative monitoring procedures.)

Test top, middle and bottom at each location as flammable material may stratify.
Test remote locations following guidelines described under ENTRY. Record levels on the safety sheet (Confined Space Permit).

Ventilate the space in the exhaust mode (exhausting tank vapors) for a minimum of 15 minutes. Assure proper bonding and grounding of ventilator. Use only air driven ventilator. Continually monitor downwind locations to assure levels do not exceed "ACCEPTABLE CONCENTRATIONS".

After 15 minutes shut down ventilation system and immediately re-check level in the space.

If "ACCEPTABLE CONCENTRATIONS" are noted, resume ventilation and prepare to enter space.

Consult Health and Safety if "ACCEPTABLE CONCENTRATIONS" cannot be achieved.

(NOTE: WASH DOWN AND FURTHER VENTILATION MAY HELP TO ACHIEVE "ACCEPTABLE CONCENTRATIONS")

F. Conduct the Safety meeting. Discuss the following information:

- Hazardous Chemicals (MSDSs) including odor and appearance and signs and symptoms of exposure.

- Steps to take if: odors are detected inside the respirator; the respirator fails, or signs or symptoms are experienced by even one individual

- Explain rescue procedures (see Section IV)

- Hazard of confined spaces
  (oxygen deficiency, flammable materials, toxic atmosphere)

- Physical Hazards (obstructions, sumps, limited entry configuration, number of accessible locations, etc.)

- Designate responsibilities - standby person
- Discuss work responsibilities

G. Complete the CONFINED SPACE PERMIT.

H. Have crew sign-off.

NOTE: Monitoring must be conducted every 15 minutes. If monitoring is interrupted for more than 30 minutes or the space lapses from view or the air compressor used to maintain acceptable concentrations is shut down (i.e. lunch), remonitoring from "E" must be performed.

IV. ENTRY FOR REPRESENTATIVE ATMOSPHERIC MONITORING

A. If entire space cannot be adequately monitored from the outside, the first entry person must monitor the remote locations of the space. This person must use the following equipment:

- Airline respirator with escape bottle or SCBA
- Harness, lifeline and tethered
- Appropriate protective clothing.

B. During this in-space monitoring, the standby person must be suited in a harness wearing an SCBA without the facepiece on, or will have a separate airline (cascade) system available.

C. Communications must be continuous

D. If there is failure of communication for 15-30 seconds, the crew should begin pulling the entry person out with the winch (special considerations may be required if the space is baffled). Entry of the standby may be necessary. Assistance should be sought first. (See Rescue)

E. Once the entire space is tested, and acceptable levels are attained the space may be entered.

F. Record the air monitoring readings on the CONFINED SPACE PERMIT.

G. The first entry person should discuss any hazards observed in the space with the crew.

H. The standby person should continually do the following:

- Continuously or at 15 minute intervals, monitor for oxygen, flammable and toxic atmosphere;
- Maintain voice or visual communication;
- Initiate rescue procedures if communication is interrupted for more than 30 seconds.
- If condition changes (air monitoring data, etc.) such that respiratory protection being used is not adequate, the standby person must stop operations and notify the foreman. Appropriate respiratory protection should be selected by the foreman based on the readings obtained by the standby person.
- The space should be remonitored prior to each entry.

I. Foreman or other assigned personnel inside the space will be responsible for observing work crew in the space and communicating observations to the standby person.

V. ENTRY

A. Personnel Protection

All personnel entering "ACCEPTABLE CONCENTRATION" Flammable confined spaces must be fitted in Level "B".

If 1/2 IDLH concentrations are exceeded, personnel must be in Level "B" with the following.

- Escape bottle
- Harness
- Lifeline
- Tethered

B. Ventilation

Ventilation in Flammable Confined Space entries must be:

- Continuous
- Exhausting vapors from the vessel
- Properly bonded and grounded
- ONLY Air driven eductors (Consult Health and Safety if another form must be used.)

DRAFT

# APPENDIX

A. Method for determining IDLH:

$$\frac{\text{LEL metering reading}}{100} \times \text{LEL} \times 10{,}000 = \text{must be below } 1/2\ \text{IDLH Concentration}$$

B. Ventilation Techniques

C. Bonding & Grounding

D. Continuity Testing

E. Explosion Proof tool, lighting

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## Compatibility Field Testing Procedures for Unidentified Hazardous Wastes

**Compatibility Tests** - The primary purpose of the Compatibility Field Test is to have a method for segregating uncharacterized drums of waste into separate storage areas. The tests (Table I) can be either performed at the drum head (staging area) or at a mobile unit located within the site's "hot zone". The procedure permits rapid analysis and results in an expedited drum segregation operation. The selection criteria for the different categories is shown in Table II.

**Flammability** - Although a standard flash point test would furnish helpful information about the unidentified hazardous waste, this method becomes impractical when dealing with large number of drums on an emergency operation. For example, if a test could be performed every 20 minutes, it would take approximately 3-man-years to analyze 20,000 drums.
Since it is possible to move, stage, and sample between 100-200 drums per day, the drum segregation operation would range between 20-40 weeks. Thus, a simple flammability technique is used to separate flammables from non-flammables.

Such a technique could simply consist of placing 2-5 ml representative hazardous waste samples in a disposal beakers. The beaker is placed in a large sand box and a propane torch is slowly passed over the unidentified waste. Obviously, the ambient temperatures will affect the results, therefore, it is important to simulate ambient summertime temperature. If a flame is observed, then the sample is classified as flammable. A non-flammable classification is assigned to the waste after the torch has been passed over the waste several times.

**Radiation** - Radiation monitoring should be one of the initial tests performed on unidentified hazardous waste drums and it should be performed as soon as possible to prevent worker exposure. Thus, the monitoring should be conducted as soon as drums are placed in the staging area and opened.

Since normal gamma radiation background is approximately 0.01 to 0.02 milliroentgen per hour (mR/hr) on a gamma survey instrument, routine employee exposure should not be more than 2-3 times background levels. At no time should routine employee exposure by 10 mR/hr or above without the advice of a qualified health physicist.

**pH** - The pH of a waste affects not only its corrosivity, but also its compatibility with other wastes. If a barrel of acidic waste were to leak and come in contact with a barrel of another waste containing a sulfide or cyanide, accelerated corrosion of the second drum would occur and the resultant co-mingling of the wastes would evolve poisonous hydrogen sulfide or hydrogen cyanide gas.

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Table I
Compatibility Field Tests

| | Test | Category | Category |
|---|---|---|---|
| 1. | pH* | Caustic (NF) | A |
| | | Caustic (F) | B |
| | | Acid (NF) | C |
| | | Acid (F) | D |
| 2. | Water Reactive | | E |
| 3. | Oxidative/Reductive | Oxidizer (F) | F |
| | | Oxidizer (NF) | G |
| 4. | Radioactive | | H |
| 5. | Volatile vapor/gas | | |
| 6. | Flammable | | |

* The pH level depends on when the release of cyanide and sulfide gases pose a threat.

(F) Flammable
(NF) Non-flammable

Table II
Selection Criteria for the Compatibility Field Testing Methods

| Category | High pH9 | Low pH9* | HNU or OVA on vapor space | | Flam | Re-dos | R/A | B/T |
|---|---|---|---|---|---|---|---|---|
| A - Caustic (NF) | + | - | - | - | - | - | - | - |
| B - Caustic (F) | + | - | + | + | + | - | - | -, + |
| C - Acid )NF) | - | + | - | - | - | - | - | - |
| D - Acid (F) | - | + | + | + | + | - | - | -, + |
| E - Water Reactive | - | - | - | - | - | - | - | + |
| F - Oxidizers (F) | - | - | + | + | + | + | - | + |
| G - Oxidizers (NF) | - | - | - | - | - | + | - | - |
| Radioactives | - | - | - | - | - | - | + | - |

* At pH 9 the release of cyanide, sulfide, and sulfide gases pose a threat

(F) Flammable
(NF) Non-flammable
(R/A) Radioactive
(B/T) Breaker test for water reactives

Similarly, co-mingling of caustic wastes with ammonium salts of amine salts could lead to the evaluation of irritant ammonia gas or amine vapors.

The guard against these possibilities, caustic and acid wastes must be segregated. It is widely accepted that both cyanide and sulfide ions must be kept above a pH of 9 in order to remain in aqueous solution. Therefore, caustic wastes (Categories A and B) were defined as those with a pH above 9, and acidic wastes (Categories C and D) were defined as those with a pH below 9.

pH can be determined by a variety of colorimetric and electrochemical techniques, each of which has its disadvantages when used on "dirty" samples containing organic layers, sludges, or concentrated solutions. For instance, standard pH electrodes are easily fouled and require constant cleaning and recalibrating. Most colorimetric indicators and papers are easily obscured by grease, sludges, or deeply colored solutions. Interfering chemicals may even cause false color changes.

The pH method selected for this protocol utilizes a multi-ban pH paper strip which contains a reaction zone and s series of indicator colors (fixed) for references. The entire strip is dipped into the waste and the color reaction allowed to occur. The strip is withdrawn and any excess sludge, organic, or water wiped-off by squeezing it between the thumb and forefinger, while wearing rubber gloves. The color comparison of the reaction zone and the indicator color is made assuming that the indicator color and the reaction zone are both affected in the same way by the grease, sludge, or concentrated solution.

**Water Reactivity** - One purpose of hazardous waste segregation at a site or a spill is to ensure that antagonistic effects do not occur due to contact between incompatible wastes. While many hazardous substances at a scene may be relatively stable and compatible in a dry state, the high probability that water may contact these materials warrants consideration of the consequences of such an occurrence. Thus, water reactivity, aside from being among the characteristics identifying a solid waste as a hazardous waste, is important in assessing the waste segregation strategy.

**Screening** - The characteristic of reactivity, as defined in the RCRA regulations (40 CFR 261.23), is exhibited if a representative sample of the waste has any of several properties. Properties 2, 3, and 4 of the material are of principal concern to this discussion:

2) It reacts violently with water
3) It forms potentially explosive mixtures with water
4) When mixed with water, it generates toxic gases, vapors, or fumes in a quantity sufficient to present a danger of human health or the environment.

The EPA laboratory manual, "Physical Chemical Methods for Evaluating Solid Waste", does not include a specific procedure for evaluating reactivity. The reason given is the diversified nature of the material properties listed in the regulation. In practice, however, water reactivity is commonly observed during the course of other tests. The authors believe the dangers posed by the three properties above explain why water reactivity should be determined.

In routine hazardous waste management, established laboratory safety procedures and a general knowledge of waste composition, are helpful in preventing a potential disaster due

to the wetting of the reactive substance. Since the EPA proposed Comprehensive Hazardous Substance List contains 21 reactive chemical wastes and 9 additional acutely hazardous chemical wastes, caution must obviously be observed in the laboratory. But what about in the field?

The same analytical safety precautions should be applied in the field where reactive substances are known to be present. Such items as ammonium picrate or fulminate of mercury should be segregated and perhaps not even sampled if such materials are labeled or strongly presumed to be present. In questionable cases, however, the authors recommend a simple water reactivity screening test be applied to check for the evaluation of heat or other violent reaction or the generation of toxic vapors.

While the authors have not tried this test yet, it should be relatively safe if precautions against explosion and toxic vapor hazards are taken. Unknown organic vapors, cyanide, hydrogen sulfide, chlorine, ammonia, and hyrdogen could be generated in small amounts. Hence, the authors recommend the reactivity test be conducted after other waste characterization testing has been evaluated and some idea of the waste composition has been gained.

Briefly, the tests should be conducted as follows:

1. Place 500 ml distilled water in a one liter metal beaker in an explosion proof hood, if available, or behind a substantial barrier. Analysts should wear appropriate protective gear.
2. Insert a thermometer in the beaker and record the temperature after equilibration.
3. Place an explosive atmosphere measuring device and an organic vapor measuring device in position to pick up any gases generated in the beaker headspace using laboratory clamps, etc.
4. Introduce about one gram (one ml) of waste into the beaker.
5. Observe the beaker measuring devices.
6. If no changes are observed in temperature or headspace gases, add an additional 4 grams (4 ml) of waste, added 1 gram (1 ml) at a time and recheck instruments.
7. If still no reaction is observed, add an additional 5 grams (5 ml).

Wastes testing positive to water reactivity should be isolated and protected from rain or other water sources as well as possible. Complete confinement, however, (i.e., enclosure in a walled building) is not recommended because of a possible explosion hazard from confining explosive vapors.

**Redox Field Test Kit** - The oxidation reduction (REDOX) potential field test kit was developed a screening procedure for analyzing and classifying drums as those containing oxidizing or reducing agents at uncontrolled hazardous waste sites. The segregation of drums by redox potential is a necessary first step in a clean-up activity due to the danger of explosion associated with proximate storage or shipment of waste chemicals which have strong oxidizing or reducing properties. This hazard was recently demonstrated when approximately 40,000 drums containing chemical wastes exploded at the abandoned "Chemical Control Corporation" hazardous waste site in Elizabeth, New Jersey.

standard reference electrode, usually calomel or silver-silver chloride. Although the instrument and electrode probes are reality available, the unique feature of the Test Kit rests in its ability to perform REDOX measurements not only in aqueous but also organic matrices such as are found at hazardous waste sites. Operation of the kit involves using the elecrolyte solutions to generate a known REDOX potential (EMF) and monitoring changes in the EMF caused by the addition of sample to the electroyle. The entire procedure for obtaining REDOX measurements requires only a few minutes and can be performed by inexperiences operators.

The feasibility of ORP measurements is based on the ability of the sensing electrode to generate and the meter to indicate, 10 mv or less change in potential. At very low concentrations, microgram quantities can cause measurable EMF changes. However, such sensitivity would mean that most tests would be positive. Therefore, it is preferable o use a standard test solution that will generate a known EMF, and monitory changes in the EMF caused by the addition of the sample. For example, a 0.001 N solution of ferrous ammonium sulfate will generate a cell potential of approximately 380 mv versus a silver-silver chloride reference electrode. When an oxidizing agent is added to the test solution, the Fe of the ferrous ammonium sulfate will be oxidized to Fe, raising the cell EMF.

The test is very sensitive and a reaction with only a small portion of an oxidizing agent will give a positive test. Failure to obtain a positive test would indicate an absence of any strong oxidizing agents. Potassium chromate can be used in place of the ferrous ammonium sulfate as a standard test solution for determining the presence of reducing agents.

The test kit consists of a portable pH meter capable of EMF measurements (Fisher Scientific Accumet Mode 150, for example), and a platinum sensing combination electrode with a silver-silver chloride reference electrode. Two types of combination electrodes are currently used: Orion Model 96-78 and Fisher Scientific Platinum REDOX electrodes. In addition, the kit contains 0.001 normal potassium chromate standard test solutions, measuring flasks, disposable 50 ml volume beakers, and disposable containers for taking sample measurements.

In the field, a chemical waste sample is added to a standard test solution and then the change in potential (mv) is measured with the pH meter and electrodes. Each standard test solution gives a constant reading. Changes in those readings either in the negative or positive direction upon addition of sample, indicates the presence of an oxidizing or reducing agent.

Thus by using the ferrous ammonium sulfate test solution, the standard reading with the silver-silver chloride reference electrode is 380 mv. A threshold change of 50 mv in the positive direction (over 430 mv) indicates the presence of oxidizing agents. The potassium chromate test solution gives a standard reading of 630 mv. A threshold change of 50 mv in the negative direction (less than 580 ms) indicates the presence of reducing agents.

An actual field evaluation was performed during January 1980 at the Ottati and Goss site in Kingston, NH. Two test kits were successfully used to screen drums containing chemical wastes for the presence of strong oxidizing agents. Two minor problems were encountered: electrode probe clogging and freezing temperatures. The clogging problem was easily resolved, however, by proper probe cleaning between samples. The cold weather, however,

caused the probe electrolyte to freeze and therefore prevented use of the kit at ambient temperatures. Remedial measures involved using the kit in a small heated shed.

**Volatile Vapor/Gases** - The objective of taking total vapor concentration values just inside the barrel's bung hole is to assist in determining whether or not the headspace has a potentially explosive atmosphere. In utilizing total vapor concentrations as a guide for determining the presence of organic materials or explosion materials, a number of factors should be considered:

1. The uses, limitations, and operating characteristics of the monitoring instrument must be recognized and understood. Instruments such as photoionizers and organic vapor analyzer (OVA) do not respond to all substances that may be present or may respond differently to identical substances when compared to one another.
2. Hazardous other than detectable gases/vapors such as phosgene, HCN, chlorine, liquid/solid particulates, and other harmful conditions may exist.
3. Potential for an explosive atmosphere exists when the instrument reaches its maximum reading of 2,000 ppm and should be checked with an explosive meter.

The primary purpose of the total vapor testing is to determine explosion potential. If the selected instrument reads 2,000 ppm, one has to make a decision as to the classification. The authors' practice has been to classify the waste as flammable if 2,00 ppm readings are obtained, until further confirmation is available. This decision takes into consideration instrument limitations, ambient temperatures, weather conditions, operator experience, and sampling rate.

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## Containerized Liquids Sampling Methods
## Method 5-7: Collection of Liquid Containerized Wastes Using Glass Tubes

**Description** - Liquid samples from opened containers (55-gallon drums) are collected using lengths of glass tubing. The glass tubes are normally 122 cm in length and 6 to 16 mm inside diameter. Larger diameter tubes may be used for more viscous fluids if sampling with the small diameter tube is not adequate. The tubing is broken up and discarded in the container after the sample has been collected, eliminating difficult cleanup and disposal problems. This method should not be attempted with a less than two-man sampling team.

**Uses** - This method provides a quick, relatively inexpensive means of collecting concentrated containerized wastes. The major disadvantage is from potential sample loss which is especially prevalent when sampling low viscosity fluids. Splashing can also be a problem and proper protective clothing (e.g., butyl rubber apron, face shields, boot covers) should always be worn.

**Procedures for Use:**

1. Remove cover from sampling container opening.
2. Insert glass tubing almost to the bottom of the container. Try to keep at least 30 cm of tubing above the top of the container.
3. Allow the waste in the drum to reach its natural level in the tube.
4. Cap the top of the tube with a safety-gloved thumb or a rubber stopper.
5. Carefully remove the capped tube from the drum and insert the uncapped end in the sample container.
6. Release the thumb or stopper on the tube and allow the sample container to fill to approximately 90 percent of its capacity.
7. Repeat steps 2 through 6 if more volume is needed to fill the sample container.
8. Remove the tube from the sample container and replace the tube in the drum.
9. Cap the sample container tightly with a Teflon-lined cap and affix the sample identification tag.
10. Break the glass sampling tube in such a way that all parts of it are discarded inside the drum. (Note: see the initial discussion to this section for exceptions.
11. Replace the bung or place plastic over the drum.
12. Place sample container in a Ziplock plastic bag (one per bag).
13. Place each bagged container in a 1-gallon metal paint can (or appropriate sized container) and pack in vermiculite packing material. Place lid on the can.
14. Mark the sample identification number on the outside of each paint can and complete chain-of-custody log and the field logbook.

**Original Method (if sample of bottom sludge is desired):**

1. Remove cover from container opening.
2. Insert glass tubing slowly almost to the bottom of the container. Try to keep at least 30 cm of tubing above the top of the container.
3. Allow the waste in the drum to reach its natural level in the tube.

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4. Gently push the tube towards the bottom of the drum into the sludge layer. Do not force it.
5. Cap the top of the tube with a safety-gloved thumb or rubber stopper.
6. Carefully remove the capped tube from the drum and insert the uncapped end in the sample container.
7. Release the thumb or stopper on the tube an allow the sample container to fill to approximately 90 percent of its capacity. If necessary, the sludge plug in the bottom of the tube can be dislodged with the aid of a stainless steel laboratory spatula.
8. Repeat if more volume is needed to fill sample container and recap the tube.
9. Proceed as in Steps 9 through 14 above.

**Note:**

1. If a reaction is observed when the glass tube is inserted (violent agitation, smoke, light, etc.), the investigators should leave the area immediately.
2. If the glass tube becomes cloudy or smokey after insertion into the drum, the presence of hydrofluoric acid is indicated and a comparable length of rigid plastic tubing should be used to collect the sample.
3. When a solid is encountered in a drum (either layer or bottom sludge) the optional method described above may be sued to collect a core of the material, or the material may be collected with a disposable scoop attached to a length of wooden or plastic rod.

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# STANDARD OPERATING PROCEDURE FOR CHARACTERIZATION OF WASTE USING SCREENING PROCEDURES PHYSICAL DESCRIPTION

Approved:

| Jeanne M. Engel | Christine J. Johnson | Elizabeth Chambers |
|---|---|---|
| Laboratory Director | QA/QC Supervisor (Bedford) | QA/QC Supervisor (Braintree) |

## 1.0 SCOPE AND APPLICATION

This document outlines a procedure used by Clean Harbors Analytical Services, Inc. (CHAS) to characterize waste samples in the field and identify their waste codes for disposal.

## 2.0 SUMMARY OF METHOD

Samples are inspected and the following physical appearances are recorded: color, turbidity, viscosity, physical state, layering and other observed attributes.

## 3.0 INTERFERENCES

Opaque sample containers require removal of a representative sample sufficient for complete observation.

## 4.0 Safety and Precautions

4.1 As required by Clean Harbors, Inc. Health and Safety Plan, appropriate personal protective equipment will be used.

4.2 Analysis will be performed in an area with adequate ventilation.

## 5.0 APPARATUS AND MATERIALS

5.1 Disposable eye dropper or spatula

5.2 Glass sample containers

## 6.0 REAGENTS

Not applicable.

## 7.0 PROCEDURE

7.1 Each sample should be obtained in clear glass containers.

7.2 Each sample should be inspected and findings recorded as soon as possible.

7.3 In order to fully inspect the waste sample it may be necessary to pick up the sample container and tilt, rotate, swirl, invert and/or manipulate the sample with a disposable eye dropper.

7.4 Describe the physical attributes noting the following areas in the Field Notebook:

7.4.1 Color - Describe the visual color of the sample.

7.4.2 Turbidity - Describe the sample in terms of clear (transparent), cloudy (translucent), or opaque.

7.4.3 Viscosity - Describe the viscosity of liquids and semi-solids (sludges). Describe viscosity in reference to the viscosity of water that has a low viscosity and motor oil that has a high viscosity. Tip the container sideways or invert to note the viscosity. If a sample is tipped 90° for 5 seconds and has no visible flow, report it as such.

7.4.4 Physical State - Describe as liquid, solid, semi-solid (sludge), powder, granular, etc.

7.4.5 Layering - Describe any layering in terms of rough percentages of the total sample. Record the color, turbidity and physical state of each layer.

## 8.0 CALCULATIONS

Not applicable.

## 9.0 SPECIAL NOTES

Liquid samples may require time to stabilize.

## 10.0 QUALITY ASSURANCE/QUALITY CONTROL

Not applicable.

## 11.0 REFERENCES

ASTM D4979-89 Standard Test Method for Physical Description Screening Analysis in Waste, December 1989.

# STANDARD OPERATING PROCEDURE FOR CHARACTERIZATION OF WASTE USING SCREENING PROCEDURES - CYANIDES

Approved:

| | | |
|---|---|---|
| Jeanne M. Engel | Christine J. Johnson | Elizabeth Chambers |
| Laboratory Director | QA/QC Supervisor (Bedford) | QA/QC Supervisor (Braintree) |

## 1.0 SCOPE AND APPLICATION

This document outlines a screening procedure used by Clean Harbors Analytical Services, Inc. (CHAS) to characterize waste samples in the field and identify their waste codes for disposal.

## 2.0 SUMMARY OF METHOD

An aliquot of the sample is acidified in a test tube releasing the simple hydrogen cyanide gas from cyanides. The presence of hydrogen cyanide gas is indicated by a color change in the cyanide screening paper that is held just above the solution. This test method will indicate dissociable cyanide that could readily evolve hydrogen cyanide gas.

## 3.0 INTERFERENCES

Common interferences in the analysis include oxidizing agents, sulfides, aldehydes, glucose, and other sugars, high concentrations of carbonate, fatty acids, thiocyanate, and other sulfur containing compounds.

## 4.0 SAFETY AND PRECAUTIONS

4.1 As required by Clean Harbors, Inc. Health and Safety Plan, appropriate personal protective equipment will be used.

4.2 Analysis will be performed in an area with adequate ventilation.

4.3 The addition of acid to waste materials may cause a violent reaction or the evolution of toxic vapors.

## 5.0 APPARATUS AND MATERIALS

5.1 Test tube

5.2 Stopper

5.3 Cyantesmo test paper

5.4 pH paper (0-14 range)

5.5 Deionized (DI) water

## 6.0 REAGENTS

6.1 Sulfuric Acid (6 N) - dissolve 196 ml of concentrated sulfuric acid ($H_2SO_4$) in water and dilute to 1 L in a volumetric flask. **CAUTION: Heat will be generated.**

6.2 Sodium Hydroxide (2.5 N) - Dissolve 100 g sodium hydroxide (NaOH) in water and dilute to 1 liter in a volumetric flask.

6.3 Cyanide, Standard Solution (50 mg/L) - Dilute 0.125 g of potassium cyanide (KCN) with 2.5 N NaOH solution to 1 liter in a volumetric flask.

## 7.0 PROCEDURE

A blank and standard should be run prior to samples to show the validity of the test. (refer to section 10.0)

7.1 Place approximately 5 g of sample into a test tube.

7.2 Moisten a a strip of cyantesmo cyanide paper and place on the side of the test tube, such that the bottom of the paper is above the waste and the remainder of the paper extends up into the test tube.

7.3 Acidify the sample with 5 ml of 6N $H_2SO_4$. Gently mix to prevent the immersion of the paper strip in the solution and immediately stopper the test tube.

7.4 After 2 minutes, examine the strip of cyanide paper for a color change. The presence of cyanide is indicated by a blue color beginning at the edge of the paper.

7.5 Check pH of acidified sample with pH paper to ensure the pH is below 2.0.

## 8.0 CALCULATIONS

Not applicable.

## 9.0 SPECIAL NOTES

This test method is designed and intended as a preliminary test to compliment the analytical methods used by the laboratory.

## 10.0 QUALITY ASSURANCE/QUALITY CONTROL

As specified in the site specific sampling plan, field blanks, field duplicates will be processed through the procedure. A field blank is performed by placing about 5 ml of DI water into a test tube and following steps 7.2 through 7.5. A field standard is performed by placing approximately 5 ml of cyanide standard solution into a test tube and following steps 7.2 through 7.5 to obtain a blue reference color.

## 11.0 REFERENCES

ASTM D5049-90 Standard Test Method for the Screening of Cyanides in Waste, May 1990.

# STANDARD OPERATING PROCEDURE FOR CHARACTERIZATION OF WASTE USING SCREENING PROCEDURES - FLAMMABILITY

Approved:

| Jeanne M. Engel | Christine J. Johnson | Elizabeth Chambers |
|---|---|---|
| Laboratory Director | QA/QC Supervisor (Bedford) | QA/QC Supervisor (Braintree) |

## 1.0 SCOPE AND APPLICATION

This document outlines a screening procedure used by Clean Harbors Analytical Services, Inc. to characterize waste samples in the field and identify their waste codes for disposal.

## 2.0 SUMMARY OF METHOD

A sample is exposed to heat and flame. The sample is reported as having a positive or negative flammability potential as described in this procedure.

## 3.0 INTERFERENCES

3.1 Drafts in the field or laboratory hood could cause excessive cooling and false negative results.

3.2 A small sample portion may obscure results by causing decomposition before the positive or negative evidence of flammability is observed.

## 4.0 SAFETY AND PRECAUTIONS

4.1 As required by Clean Harbors, Inc. Site Specific Health and Safety Plan, appropriate personal protective equipment will be used.

4.2 All analysis will be performed in an area with adequate ventilation.

4.3 The analyst must wear flame resistant gloves.

4.4 Extinguish a burning sample by setting an aluminum weighing boat,

watch glass or inverted beaker over the burning sample. As required by Clean Harbors, Inc. Site Specific Health and Safety Plan, appropriate fire protection equipment will be used.

## 5.0 APPARATUS AND MATERIALS

5.1 Aluminum weighing boats

5.2 Matches or lighter

5.3 Watch glass

5.4 Large glass beaker

5.5 Flame resistant gloves

## 6.0 REAGENTS

Not applicable.

## 7.0 PROCEDURE

7.1 Place a well mixed aliquot of sample (approximately 5 g) in an aluminum weighing boat.

7.2 While wearing flame resistant gloves, use a match or lighter to hold a flame immediately above the sample for 2 to 3 seconds without touching the visible flame to the sample.

7.2.1 If ignition (a flash or burning) is observed before or after the source of ignition is removed, the sample is said to have a positive flammability potential. A positive result may require further analysis. (See section 9.3)

7.2.2 If there is no ignition, proceed to Section 7.3.

7.3 While wearing flame resistant gloves, use a match or lighter briefly (for at least 15 seconds) to apply a flame to the sample.

7.3.1 If the sample ignites, the sample is said to have a positive flammability potential. A positive result may require further analysis. (See section 9.3)

7.3.2 If the sample decomposes, boils (if a liquid), or otherwise fails to ignite after at least 15 seconds, the flammability potential is reported as negative.

## 8.0 CALCULATIONS

Not applicable.

## 9.0 SPECIAL NOTES

9.1 Halogenated solvents typically give off visible vapors that may result in a false positive flammability potential.

9.2 Difficult to observe flames resulting from the burning of certain compounds (i.e. methanol) could provide false negative results. If the presence of these compounds is suspected, the presence of flammability might be confirmed by the insertion of a watch glass just above the sample. The watch glass is then examined for products of combustion.

9.3 When a positive result is obtained or more accurate characterization is necessary a flash point analysis may be performed by the laboratory.

## 10.0 QUALITY ASSURANCE/QUALITY CONTROL

As specified in the site specific sampling plan, field blanks and field duplicates will be processed through the procedure.

## 11.0 REFERENCES

ASTM D4982-89 Standard Test Methods for Flammability Potential Screening Analysis of Waste, December 1989.

# STANDARD OPERATING PROCEDURE FOR CHARACTERIZATION OF WASTE USING SCREENING PROCEDURES - SULFIDES

Approved:

| | | |
|---|---|---|
| Jeanne M. Engel<br>Laboratory Director | Christine J. Johnson<br>QA/QC Supervisor<br>(Bedford) | Elizabeth Chambers<br>QA/QC Supervisor<br>(Braintree) |

## 1.0 SCOPE AND APPLICATION

This document outlines a screening procedure used by Clean Harbors Analytical Services, Inc. (CHAS) to characterize waste samples in the field to identify their waste codes for disposal.

## 2.0 SUMMARY OF METHOD

A sample of waste material is acidified in the presence of lead acetate paper. If sulfides are present in the waste, hydrogen sulfide ($H_2S$) is evolved and changes the white lead acetate paper to silvery brown or black.

## 3.0 INTERFERENCES

Compounds evolving gases or vapors upon acidification that react with lead may interfere causing false positives.

## 4.0 SAFETY AND PRECAUTIONS

4.1 As required by Clean Harbors, Inc. Health and Safety Plan, appropriate personal protective equipment will be used.

4.2 Analysis will be performed in an area with adequate ventilation.

4.3 The addition of acid to waste material may cause a violent reaction or the evolution of toxic vapors.

## 5.0 APPARATUS AND MATERIALS

5.1 Test tubes

5.2 Stirring rod

5.3 Lead acetate paper

5.4 pH paper (0-14 range)

## 6.0 REAGENTS

6.1 Hydrochloric Acid (1+1) - Add 1 volume of hydrochloric acid to 1 volume water.

6.2 Sodium Sulfide, Standard Solution (1 ml = 1 mg $Na_2S$) - Dissolve 1.00 g sodium sulfide ($Na_2S$) in water and dilute to 1 liter.

6.3 Deionized (DI) water

## 7.0 PROCEDURE

A blank and standard should be run prior to samples to show the validity of the test. (refer to section 10.0)

7.1 Place approximately 5 to 10 g of sample into a test tube (slurry with approximately 15 ml water if the material is solid).

7.2 Moisten a strip of lead acetate paper with DI water and place it on the inside of the test tube above the sample.

7.3 Slowly adjust the pH to less than 2 with HCL (1+1) and verify with pH paper.

**NOTE:** The addition of HCL to waste materials may cause violent reaction or highly toxic vapors.

7.4 Stir the solution.

7.5 A silvery brown to black color on the lead acetate paper indicates the presence of sulfides (positive). Compare the color observed to a blank and standard solution.

7.6 No color change to the lead acetate paper will be reported as negative.

## 8.0 CALCULATIONS

Not applicable.

## 9.0 SPECIAL NOTES

This test method is designed and intended as a preliminary test to compliment the analytical methods used by the laboratory.

## 10.0 QUALITY ASSURANCE/QUALITY CONTROL

As specified in the site specific sampling plan, field blanks and field duplicates will be processed through the procedure. A field blank is performed by placing approximately 5 to 10 ml of DI water into a test tube and following steps 7.2 through 7.6. A field standard is performed by placing approximately 5 to 10 ml of the $Na_2S$ into a test tube and following steps 7.2 through 7.5 to obtain a silvery brown to black reference color.

## 11.0 REFERENCES

ASTM D4978-89 Standard Test Methods for Screening of Sulfides in Waste, December 1989.

# STANDARD OPERATING PROCEDURE FOR CHARACTERIZATION OF WASTE USING SCREENING PROCEDURES OXIDIZERS

Approved:

| Jeanne M. Engel | Christine J. Johnson | Elizabeth Chambers |
|---|---|---|
| Laboratory Director | QA/QC Supervisor (Bedford) | QA/QC Supervisor (Braintree) |

## 1.0 SCOPE AND APPLICATION

This document outlines a screening procedure used by Clean Harbors Analytical Services, Inc. (CHAS) to characterize waste samples in the field and identify their waste codes for disposal.

## 2.0 SUMMARY OF METHOD

A small portion of the waste sample is placed on a strip of potassium, iodide (KI) starch paper. A dark blue coloring of the paper, which is the result of oxidizing the potassium iodide to iodine ($I_2$) in the presence of starch, indicates a positive test for oxidizers.

## 3.0 INTERFERENCES

3.1 Materials that mask the KI starch paper (i.e. oils, syrups) prevent reaction with the test paper on visual detection of a color change.

3.2 Samples on slurries of samples that are already darkly colored prior to application to the KI starch paper can give false results.

3.3 Oxidizers such as ferric salts may not oxidize organics, however, they may show positive reactions with KI.

## 4.0 SAFETY AND PRECAUTIONS

4.1 As required by Clean Harbors, Inc. Health and Safety Plan, appropriate personal protective equipment will be used.

4.2 Analysis will be performed in an area with adequate ventilation.

## 5.0 APPARATUS AND MATERIALS

5.1 Potassium Iodide (KI) Starch Paper Strips

5.2 Disposable beakers

5.3 Disposable droppers or spatulas

## 6.0 REAGENTS

6.1 Deionized (DI) water

6.2 Hydrogen peroxide solution (3% $H_2O$)

6.3 Nitric Acid (1 volume acid/1 volume DI water)

## 7.0 Procedures

Run a blank and standard before samples to show the validity of the test.

7.1 Collect a representative sample of the waste in a sample jar with a sealed lid.

7.2 The sample should be analyzed as soon as possible.

7.4 Aqueous samples - using a clean dropper, place a drop of sample on a strip of KI starch paper and note color change.

7.5 Non-Aqueous Samples

7.5.1 In a beaker, slurry 1 to 5 g of sample with an equal amount of DI water.

7.5.2 Using a clean dropper, place a drop of slurry on a strip of KI starch paper and note color change.

7.6 All sample results shall be checked against the quality control and blank test strips to determine positive/negative readings.

## 8.0 CALCULATIONS

Not applicable.

## 9.0 SPECIAL NOTES

9.1 Samples may require time to stabilize.

9.2 All positive results (a blue color) shall be reported immediately to prevent potential hazardous reactions that may occur.

## 10.0 QUALITY ASSURANCE/QUALITY CONTROL

As specified in the site specific sampling plan, field blanks, field duplicates and standards will be processed through the procedure. A field blank is performed by placing a drop of DI water on a KI starch test strip while a field standard is performed by placing a drop of 3% $H_2O_2$ solution (or 10% $HNO_3$) on a KI starch test strip to obtain a dark blue reference color. Field spike samples are not to be prepared due to possible adverse reactions.

## 11.0 REFERENCES

11.1 ASTM D4981 Standard Test Methods For The Screening of Oxidizers in Wastes.

# STANDARD OPERATING PROCEDURE FOR CHARACTERIZATION OF WASTE USING SCREENING PROCEDURES pH USING AN ORION SA250 pH METER

Approved:

| | | |
|---|---|---|
| Jeanne M. Engel | Christine J. Johnson | Elizabeth Chambers |
| Laboratory Director | QA/QC Supervisor (Bedford) | QA/QC Supervisor (Braintree) |

## 1.0 SCOPE AND APPLICATION

This procedure is to be followed when using the Orion SA250 portable pH meter to measure pH values.

## 2.0 SUMMARY OF METHOD

The pH of the sample is determined electrometrically with a combination electrode. Calibration of the meter is done using two buffers (7 and 4 or 7 and 10).

## 3.0 INTERFERENCES

3.1 The glass electrode is not subject to solution interferences from color, turbidity, colloidal matter, oxidants, reductants, or high salinity.

3.2 Coatings of oily material or particulate matter can impair electrode response. Clean probe with mild detergent or methanol and drain and refill to 1/4" of filler hole on probe.

3.3 Temperature affects pH results. To overcome this, either calibrate with all buffers and samples at room temperature or use an automatic temperature compensation probe with the pH meter.

## 4.0 SAFETY AND PRECAUTIONS

4.1 As required by Clean Harbors, Inc. Health and Safety Plan, appropriate personal equipment will be used.

4.2 Analysis will be performed in an area with adequate ventilation.

## 5.0 APPARATUS AND MATERIALS

5.1 Orion Model SA250 pH meter.

5.2 Combination refillable or gel-filled pH electrode with BNC connector, or equivalent.

5.3 50 ml beakers.

## 6.0 REAGENTS

6.1 pH 4 Buffer.

6.2 pH 7 Buffer.

6.3 pH 10 Buffer.

6.4 Deionized water.

6.5 Methanol (reagent grade).

6.6 Mild Detergent.

## 7.0 PROCEDURE

### 7.1 METER CHECK OUT

7.1.1 The meter must be checked out prior to use each day. The first analyst using the instrument each day must perform the entire checkout procedure. Slide power switch to ON position. Attach BNC shorting plug to BNC connector on top of meter.

7.1.2 If using optional AC line converter, connect it to meter and appropriate power source. Proceed to step 7.1.4.

7.1.3 If **LO BAT** indicator on LCD remains on, the battery must be replaced.

7.1.4 Slide **mode** switch to **mV**. Display should read 0±0.3.

7.1.5 Slide **mode** switch to **temp**. Display should read 25.0. If 25.0 is not displayed, scroll, using ∧, ∨, and **X10** keys, until 25.0 is displayed and press **enter**.

7.1.6 Slide **mode** switch to **pH .01**. Press **iso**. Display should read the letters **ISO** then a value of 7.00. If 7.00 is not

displayed, scroll until 7.00 is displayed and press **enter**.

7.1.7 Press **slope**. Display should read the letters **SLP** then a value of **100.0**. If **100.0** is not displayed, scroll until **100.0** is displayed and press **enter**.

7.1.8 Press **sample**. Observe the letters **pH** then a steady reading of 7.00 ± 0.02 should be obtained. If not, press **cal** and scroll until 7.00 is displayed and press **enter**. Press **sample** and observe a reading of 7.00.

7.1.9 Remove the shorting plug. After a successful completion of steps 7.1.1 through 7.1.8 the meter is ready to use with an electrode.

7.2 METER CALIBRATION

7.2.1 Attach the combination pH electrode with BNC connector to the sensor input by sliding the connector onto the input, pushing down and turning it clockwise to lock into position. Slide the filling hole cover down. Be sure that the probe is clean and that it has enough KCL filling solution inside. Fill to about 1/4" from the filling hole. Clean and fill as necessary.

7.2.2 Any time the pH calibration is done during the day the ISO potential point of the electrode must be checked. Slide the power switch to the ON position and slide the mode switch to pH 0.01. Check the stored value for ISO before pH calibration. Unless the isopotential point of the electrode is known, verify that the display reads 7.00. If not, scroll until 7.00 is displayed and press enter.

7.2.3 Obtain fresh aliquots every day if possible (or at least every two weeks based on use) for each of the pH buffers. Calibration is first done with the pH 7 buffer. The second pH buffer for calibration is chosen by the analyst in order to bracket the expected pH of the sample.

7.2.4 Both the pH buffers and samples must be at room temperature before proceeding. If necessary the ATC probe can be used. Be sure to stir all solutions gently while measuring pH.

7.2.5 Place the electrode in the pH 7 buffer **Press cal**. The display will alternate between .1. and the pH value of the buffer. Wait for a stable pH display. Record this value in the pH calibration log. Use the arrow (^,v) keys to adjust the reading to 7.00, make note of the adjusted

reading also. Press enter.

7.2.6 The display will freeze for 3 seconds then advance to .2. indicating the meter is ready for the second buffer. Rinse the electrode and place in the second buffer. Wait for a stable pH display, record this value,adjust to the correct value, record this also, and press enter.(See note above.)

7.2.7 After the second buffer value has been entered the letters "pH" will be displayed. The meter is now calibrated and automatically advances to the sample mode. Before measuring sample pH value check the value of the pH 7 buffer to be sure the calibration is correct. This value must be 7.00 ± 0.05. If it is out of this range recalibrate the meter.

7.3 SAMPLE pH MEASUREMENT

7.3.1 After successful calibration of the meter, A sample at room temperature is transferred to a 50 ml beaker

7.3.2 Place the pH probe into the sample.

7.3.3 Allow reading to stabilize. Record pH reading.

7.3.4 Rinse electrodes with deionized water into a waste beaker between samples. Shake off any liquid drops from the probe to prevent carryover of one solution to another. Blot the probe dry with a kimwipe, do not rub or wipe.

## 8.0 CALCULATIONS

Not applicable.

## 9.0 SPECIAL NOTES

9.1 In general, calibration using pH 7 and pH 4 buffers will bracket most samples. This should be done initially. If the sample pH is not in this range then recalibrate with the pH 10 buffer.

9.2 Calibration using the pH 7 and pH 4 buffer is sufficient if the meter is to be used for adjusting a sample pH value even if the pH value is initially greater than 7. In this situation the meter is measuring a changing pH and the value is not being reported as a result. Therefore, recalibration as the pH changes is not necessary.

9.3 See the electrode owners manual for long term storage (greater than 1 week).

9.4 The ATC probe will automatically compensate for temperature differences between samples and pH buffers.

9.5 Consult the SA250 owners manual for trouble shooting, other calibration modes etc...

9.6 Recalibration can be done any time the analyst suspects that there may be problems.

## 10.0 QUALITY ASSURANCE/QUALITY CONTROL

As specified in the site specific sampling plan, field duplicates will be processed through the procedure.

## 11.0 REFERENCES

"SA 250 pH Meter Instruction Manual", 1986 Orion Research Incorporated.

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STANDARD OPERATING PROCEDURES

**Head Space Analysis**

(Using an HNu Model 101 Photoionization Detector)

1) Place sample into a small open mouth glass jar. Be aware that samples containing hydrofluoric acid are not compatible with glass and a substitute material must be used.

2) Place a piece of either Parafilm or commercial grade aluminum foil tightly over the mouth of the container and reattach the cover.

3) Allow the sample and container to come to test temperature (approximately 80 degrees). In order to raise the temperature of the sample, the use of an oven or similar device may be required.

4) Using the HNu PID101 equipped with a 10.2 eV lamp, penetrate the foil or film so that the point of the probe is inside the container, but not in contact with the sample.

5) Wait for the meter reading to stabilize.

6) If the meter shows a reading which is less than full scale (on the low scale setting 0-50ppm) then the sample is considered to have low concentrations of volatile organics. If the meter reading is greater than full scale on the low setting then the sample is considered to have high concentrations of volatile organics.

7) Remove the foil or film and discard into a waste container (eg. 55 gallon steel drum) which will be profiled and disposed of at a later date.

8) Discard the test sample into a container (55 gallon steel drum) containing samples with similar characteristics and which are compatible for profiling and disposal at a later date.

9) Record the readings in the Sample Waste Characterization Log.

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## STANDARD OPERATING PROCEDURES

### Chlorine Screening

1) Insure the proper fire preventative measures are in place in the immediate area.

2) Using the same small aluminum weighing dish or container used in the flammability test, remove and discard the previously tested sample, if it has been extinguished. If the sample is still ignited skip to Step 8.

3) Place a small portion (5-10grams) of sample in the container.

4) Place the container on a secure non-flammable surface.

5) Place the surface into the fume hood.

6) Apply a flame source to the sample. If it ignites skip to Step 8.

7) If the sample does not ignite add a small quantity of Hexane to the sample. Wait 1 minute and re-apply the flame source.

8) As the sample thermally decomposes, using a flame resistant glove, hold a piece of Universal 1-11 pH paper in the plume of the generated fumes.

9) If the paper changes color from yellow to red, then the sample is considered to have organically bound halogens. If there is no change in color then the sample is considered to have no organically bound halogens.

10) Record the results in the Sample Waste Characterization Log.

11) Insure that all vapors produced have been evacuated before opening the hood. Give the sample container sufficient time to cool down before handling.

12) Discard the test sample with its container into a heat resistant receptacle containing samples with similar characteristics and which are compatible.

13) Store the remainder of the sample with samples which have exhibited similar characteristics. Make sure the storage container has the sample number listed on an inventory sheet to facilitate location and retrieval should it become necessary.

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STANDARD OPERATING PROCEDURES

## Sample Compositing

1) Don proper PPE to protect against potential splash, spills or the generation of excessive vapor levels.

2) Each aliquot collected from a sample source (except aliquots to be retained) will be emptied into a stainless steel bucket, under a hood, and manually mixed with a utensil comprised of an inert material. Mixing will continue until the material in the bucket reaches a homogeneous state (by visual observation).

3) Transfer equal portions into DOT approved containers for shipment to recipient disposal outlets.

4) Clean all items such as the hood, bucket, stirers, etc. before beginning the next composting activity.

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## STANDARD OPERATING PROCEDURES

### Water Test

1) Place a small amount of the sample into a small open container containing water. The container should allow for visual observation of the sample to determine if the material floats, sinks or is miscible.

2) First note if the material floats, sinks, dissolves or any combination of the above. Enter information in sample log.

3) Observe the sample for any generation of gas in the water, around the sample or vapor production immediately above the water.

4) Should any gas or vapor generation be observed the sample should be considered as being water reactive.

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## STANDARD OPERATING PROCEDURES

### Sampling Site Generated Solid Wastes

Items such as personal protective clothing, spill prevention materials, laboratory utensils and containers or any other item generated as a result of the Phase I waste characterization activities will hereafter be referred to a site generated solid wastes. As such this material requires sampling and analysis to identify potential disposal outlets. The following procedure will be followed to address site generated solid wastes.

1) When sufficient quantities of solid wastes have been collected (a sufficient quantity in this case equaling either a truck load of drums or a roll-off container of bagged material) a representative composite sample will be collected.

2) For drummed waste, a representative sample would equate to a composite comprised of 25% or 20 samples, based on a full truckload of 80 drums.

3) For a roll-off container of bagged material, a representative sample would equate to a composite comprised of 50% or 10 samples from the twenty cubic yard container.

4) Analysis of the collected composites will follow the Waste Characterization Decision Tree for solids as previously shown in Appendix A.

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# AQUEOUS SAMPLING PROCEDURE

## 1.0 SCOPE AND APPLICATION

1.1 This procedure applies to the manual sampling of aqueous samples from drums, horizontal cylindrical tanks, vertical cylindrical tanks, and from tank trucks.

1.2 This method shall provide a basis for all sampling situations. However, ultimately, the judgement of the person actually taking the sample determines the validity of the sample in question. It is the intent of this procedure that samples taken in the field are representative of the material to be received by a facility or client. In certain instances deviations from this procedure may be necessary to account for specific handling situations. In such instances, the specific sampling method must be duly noted and reported to the testing and processing facilities.

## 2.0 SUMMARY OF METHOD

2.1 Material from drums and tanks with openings that prevent the use of zone samplers are sampled using a cylindrical column sampling device. The sample represents a vertical composite of the material in the tank or drum, analogous to a core sample.

2.2 Deeper tanks and tank trucks are sampled using a liquid zone sampler or Bacon bomb. Three grab samples from the bottom, approximate middle and top of the tank, respectively, are proportionately composited to form a single composite sample of the tank.

2.3 Thin "skim" layers are sampled by compositing several grab samples to accumulate enough sample for analysis.

## 3.0 INTERFERENCES

3.1 Contamination of the sample, sampling device, sample container, or interim composite vessel by the sampler, previously sampled material or foreign matter will compromise the integrity of the sample.

3.2 Improper compositing may result in a sample which is not representative of the load to be shipped. Stratification due to immiscibility or varying density of layers may occur. Tanks of irregular horizontal cross sectional area defeat the purpose of equal proportion compositing of bottom, middle and top samples. Composited samples should accurately represent the contents.

3.3 Pumping or draining of a tank in a manner inconsistent with sampling procedures defeats the purpose of a composite sample. Often tanks contain more material than can be accommodated in one load, thus sampling the entire tank would not be representative of the load to be shipped. When a tank is to be drained from a valve or pumped from a depth located above the bottom of the tank no sample should be taken below that level. Composited samples should represent a single load as it is to be shipped.

3.4 Contamination of the load from transfer lines and equipment may render the sample invalid. All lines, pumps, etc. should be thoroughly decontaminated from previous use.

3.5 The loss of volatile matter may adversely affect analyses for total halogens, flashpoint, sulfur and GC fingerprint through loss of analyte from the sample. Validity of other analyses may be destroyed through evaporation and subsequent concentration of the sample.

3.6 Heavy oils such as #6 fuel oil interfere with the successful operation of each of the samplers listed here. Occasionally, a single grab sample is the only sample that can be taken from such materials.

3.7 Bacon bombs have limitations in their sampling capabilities. Due to the lack of flow-through capacity the Bacon bomb cannot sample skim layers effectively.

## 4.0 SAFETY

4.1 The sampler shall follow all established company safety procedures including, but not limited to, grounding of tanks prior to transfer of sample, removal of ignition sources and use of respirators.

4.2 The toxicity of the materials handled using this method have not been precisely defined. For this reason exposure should be reduced to the lowest possible level.

4.2.1 To minimize absorption through the skin and eyes, the sampler must wear gloves and safety glasses.

4.2.2 Minimize inhalation exposure by sampling in well ventilated areas. Close all tanks, drums and sample containers promptly.

5.0 APPARATUS

5.1 One of the following sampling devices may be used. The sampling situation will determine the type of sampler to be used.

5.1.1 Bacon bomb

5.1.2 Liquid zone sampler.

5.1.3 Pipe samplers with automatic or manual check valves.

6.0 SAMPLE COLLECTION HANDLING AND PRESERVATION

6.1 Samples shall be taken in glass jars with metal lids or with plastic lids having Teflon liners.

6.2 Samples shall be maintained at 4°C (39°F) both in transit by the custodian and by the laboratory until analysis.

6.3 Samples shall be delivered to the laboratory as soon as possible after sampling.

7.0 SAMPLING PROCEDURES

7.1 Procedures are provided for each of the three routinely permissible sampling devices. Additionally, a procedure for sampling "skim" layers is included. The judgement of the sampler will determine which sampling device is appropriate. A Bacon bomb should not be used in situations where only a thin "skim" layer of oil exists over water.

7.2 Chain of custody forms shall indicate the type of device used in sampling, the number and location of grab samples combined to form a composite, and any deviations from this procedure due to special handling situations, irregularities in tank shape or incomplete pumping or draining. Note that irregularly shaped tanks (irregular in that the horizontal cross sectional area varies from top to bottom), including horizontal cylindrical tanks (tank trucks), pose certain sampling problems particularly when stratification occurs.

Equal proportioning of samples from top, middle and bottom from such tanks may inaccurately represent the material within the tank. Prudent judgement by the sampler is necessary to ensure the integrity of the sample.

7.3 Provide sufficient sample. Samples for Maine and Kingston parameters should be 16 oz (0.5L). Analyses for BS&W and API gravity require an additional 16 oz. These volumes refer to aqueous sample required to perform analyses. "Skim" layers of oil on water are not sufficient to perform chemical and physical analyses.

7.4 It is permissible to composite grab samples in one container and to transfer a well mixed composite to the sample jar providing that the compositing vessel has been cleaned properly prior to use and such practice does not jeopardize the validity of the sample. Compositing by this method shall be duly noted on the chain of custody.

7.5 Use a sampling device that has been properly cleaned. In all cases rinse the sampler three times with the material to be sampled prior to actually taking the sample.

7.6 Use of pipe samplers to sample drums and tanks ≤9 ft. in depth having access ports smaller than necessary for the use of Bacon bomb or liquid zone sampler:

7.6.1 With check valve open, insert the sampling column into the tank or drum at a slow constant rate. The insertion should be slow enough such that the sample within the pipe equilibrates sufficiently to accurately represent a core sample of the material.

7.6.2 Manually close the device, where applicable, and withdraw the pipe.

7.6.3 Wipe the device clean and check for leaks.

7.6.4 If a seal was maintained, deliver the sample to the sample container and seal as quickly as possible. Close manhead promptly.

7.6.5 If more sample is necessary, the process may be repeated and the samples combined providing each sample was taken identically and the composition of the material to be sampled has not been altered between samplings.

7.6.6 Promptly clean the sampler to prevent build-up of deposits.

7.8 Sampling with a Bacon bomb:

7.8.1 Three samples will be taken from the bottom, middle and top of the tank, respectively. Beginning with the bottom sample enables a visual examination of tank bottoms.

7.8.2 Allow the Bacon bomb to descend into the liquid to the proper depth. Gauging of bottom depth to be sampled will be done prior to sampling to prevent premature filling of the bomb. The bomb must be thoroughly drained before again being lowered to take the actual sample.

7.8.3 Maintain the bomb at the proper depth and open the sampling valve by pulling the thinner valve wire. Allow the bomb to fill as indicated by air bubbles rising to the surface of the tank. When bubbles no longer rise to the surface, wait thirty seconds. Then allow the valve wire to relax and the bomb to seal.

7.8.4 Raise the bomb, wipe clean and check for leaks. Occasionally, solid matter prevents the valve from seating properly, thus allowing the bomb to leak. Should this occur, discard the contents of the bomb and repeat the sampling.

7.8.5 If the valve seated properly deliver the sample to the sample container. Close manhead promptly. Seal the sample container as quickly as possible.

7.8.6 Proportionately combine grab samples from the bottom, middle and top of the tank, respectively, to form a representative composite of the material to be shipped.

7.8.7 Promptly clean the bomb to prevent build-up of deposits.

7.9 Sampling with a liquid zone sampler:

7.9.1 Three samples will be taken from the bottom, middle and top of the tank, respectively. Beginning with the bottom sample enables a visual examination of tank bottoms.

7.9.2 Allow the liquid zone sampler to descend into the liquid to the proper depth. Gauging of bottom and middle depths to be sampled will occur prior to sampling each to prevent improper filling of the sampler. The sampler shall must be thoroughly

drained before again being lowered to take the actual sample. When the sampler stops its descent, it automatically closes and is ready to withdraw.

7.9.3 Raise the sampler, wipe clean and check for leaks. Occasionally, solid matter prevents the valve from seating properly, thus allowing the sampler to leak. Should this occur, discard the contents of the sampler and repeat the sampling.

7.9.4 If the valve seated properly deliver the sample to the sample container. Close manhead promptly. Seal the sample container as quickly as possible.

7.9.5 Proportionately combine grab samples from the bottom, middle and top of the tank, respectively, to form a representative composite of the material to be shipped.

7.9.6 Promptly clean the sampler to prevent build-up of deposits.

7.10 Sampling of "skim" layers:

7.10.1 Use a pipe sampler or a zone sampler.

7.10.2 Immerse the sampler just enough to draw sample through the entire skim layer. Transfer this sample to the composite container. Alternatively, an overflow sampling device/method may be used. In this case an upright cup is immersed into the liquid until the liquid just overflows its sides. The cup is withdrawn before filling completely. This increases the proportion of skim sampled during each grab.

7.10.3 Repeat this procedure several times until enough oil has been collected to perform all analyses.

7.10.4 Decant the oil layer into the sample jar and close as quickly as possible. Close manhead promptly.

## 9.0 QUALITY CONTROL

9.1 Sampling is to be performed only by individuals who have been trained to use the equipment described in this procedure.

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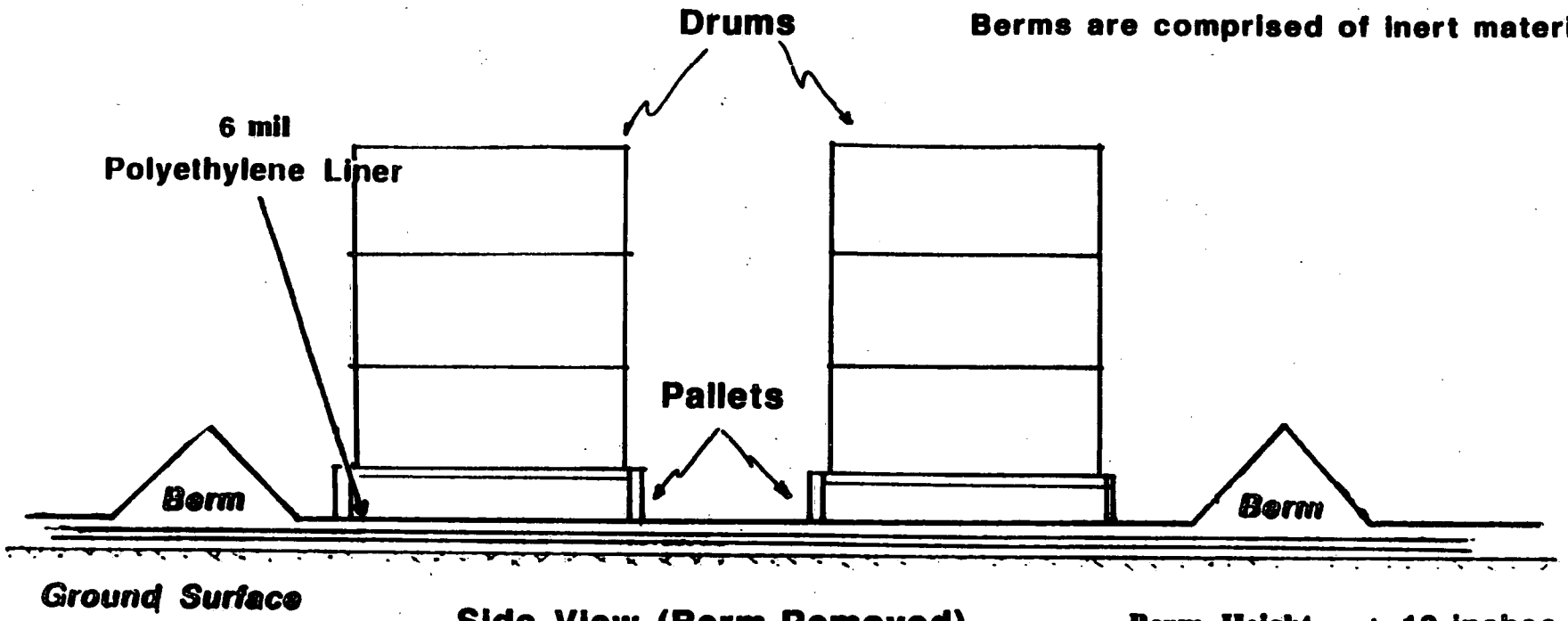


Side View (Berm Removed)

Berm Height = ± 12 inches

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| | |
|---|---|
| Proposed Drum Staging Area<br>Section 9.0 | |
| Approved: [illegible] | Date: 10/22/91 |
| Drawn By: RA | Date: 10/22/91 |
| Drawing # 3A | Not To Scale |

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## QUALITY ASSURANCE/QUALITY CONTROL PROGRAM

The objective of Clean Harbors QA/QC program is to produce precise, accurate, and representative data by conforming to clearly established procedures. This objective is founded on the concept that data generated by the activities performed under this contract may have significant technical, financial, or public health implications. These QA/QC procedures will ensure timely, accurate assessment, containment, removal and/or treatment of oil and hazardous material releases or hazardous wastes at sites in order to protect public health, safety and welfare and to minimize further environmental degradation. Data gathered during emergency response or site support activities may be used to determine the need for implementation of Short-Term Measures, or to link off-site contamination with activities of a Potentially Responsible Party (PRP).

Clean Harbors and its subcontractors are committed to an effective QA/QC program. While Clean Harbors recognizes its responsibility for the overall quality of work done by the project team, the success of the program is the responsibility of all project participants. To ensure that the objective of the QA/QC program is achieved, each key project participant (functional group and subcontractor), will establish a QA/QC contact for their respective responsibilities under the contract. These key areas include engineering, operations, project management, analytical, health and safety, compliance, and administrative. The QA/QC coordinators will be responsible for ensuring that established procedures are followed and for resolving discrepancies and deviations from the QA/QC program procedures.

Functional group and subcontractor QA/QC personnel are responsible for informing the project QA/QC coordinator of any failure of the QA/QC plan. The contract manager and the contract QA/QC coordinator will, in conjunction with the functional group or subcontractor QA/QC coordinator, take measures to resolve any discrepancies, re-evaluate the data and institute changes as required.

### Review of Project Deliverables

The primary product generated by Clean Harbors is the project report. It is essential that the report accurately reflect the work that was done during the course of the project and that the conclusions and recommendations presented in the report be based on the data generated during the project and be presented in a sound and logical manner. Furthermore, the report should be clearly written in a style appropriate to the technical scope of work and the technical sophistication of the intended audience. All text, tables and graphics will be clearly presented and integrated in the report.

To ensure that these objectives are met, Clean Harbors has established a policy of internal review prior to submittal of reports to clients or third parties. This policy applies to all project deliverables including work plans, letter reports,

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bound reports and interim/draft reports. Each department manager is responsible for ensuring that this review is conducted for reports generated in his/her department. Reviewers may include the QA/QC Coordinator, senior technical staff, the department manager or any other person having specialized expertise appropriate to the subject report.

The review process is initiated by the project manager by providing a near complete or complete draft of the report to the department manager. The department manager affixes a review sign-off form on the cover page and identifies appropriate reviewer(s). Each reviewer examines the report for technical content, clarity and grammatical/editorial comment. The report is also checked for internal consistency; for example, numbers in the text should match those on the tables, and consistent names should be used for the site.

Comments may be made on the draft report or on a separate sheet of paper. If a reviewer has significant or extensive comments, these are discussed with the report author(s). Each reviewer signs the review page and returns the report to the author so that changes can be made.

## Maintenance of Project Files

Clean Harbors maintains a system of project files for retention of project documentation. The project file provides a semi-permanent record of the work, and also serves as repository of QA/QC related documentation. Examples of documentation to be maintained in the file include (but are not limited to) field log book, data sheets, analytical data sheets, data validation paperwork, chain-of-custody forms, work plans, reports, photographs, maps, memorandum, and notes. It is the responsibility of the "project manager" to ensure that these items are placed in the project file in a systematic manner.

For certain projects, separate secure file systems are required such that all project documentation can be readily produced for client use, agency review or subpoena. Arrangements for secure filing systems are the responsibility of the Contract Manager.

## Environmental Sampling Protocols

The collection of environmental samples (soil, surface water, sediment, groundwater, air, or waste material) for field chemical screening and/or laboratory analysis represents one of the most visible and important elements of any site assessment project. It is, therefore, essential that the results be accurate, precise, and representative.

The sampling-related elements of CHES's QA/QC program are intended to supplement rather than replace protocols for environmental sampling and laboratory analysis which have been developed and accepted by the U.S.

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Environmental Protection Agency (EPA). Therefore, Clean Harbors has adopted these protocols rather than develop new protocols. As the Department of Environmental Protection's Standard References become available, they will be the governing operating procedures for Clean Harbors work.

The first point at which QA/QC activities affect sampling activities is in the planning process. A sampling plan is developed by the project manager (or designee). The plan outlines sampling rationale, the number and location of samples to be collected by environmental medium, decontamination procedures to be used, field screening or analytical protocols to be applied, and sample handling requirements. The sampling plan should also delineate the number of blanks and duplicate samples to be collected for QA/QC purposes. A sample numbering protocol is developed to assure unique ID numbers are assigned to all of the project samples.

The sampling plan forms the basis for the collection and handling of environmental samples. It is recognized that, on occasion, the project team may deviate from the plan due to unforeseen circumstances. Such deviations must be documented in a field log book along with the reason for the deviation.

The evidentiary value of an environmental sample is largely a function of the accompanying documentation generated at the time of sample collection. Documentation must include sufficient information to uniquely identify the sample by location, date, time, environmental medium, and subsequent handling and analysis. This documentation may be recorded on labels, in a field logbook, or on data sheets, or some combination of these.

Another key element in the evidentiary value of sampling data is maintenance of the chain of custody. Between the time a sample is collected in the field and the time that the laboratory has completed their analysis, it is essential that the sample's disposition and integrity be documented. This documentation is referred to as the chain-of-custody and is typically transcribed on a chain-of-custody form. This form, along with the previously described documentation, is kept in the project file. Chain-of-custody documentation is discussed in detail under Analytical QA/QC.

## Soil Boring and Monitoring Well Installation

One of the most labor- and cost-intensive elements of a field investigative program is the installation of groundwater monitoring wells. The value of the groundwater samples in site characterization is strongly dependent upon the design and installation of the well. While an improperly designed or installed well may lead to misleading data or needless expenditures, the greater risk is the possibility that the well will function as a vertical conduit for contamination (for example, through a confining layer). For these reasons, Clean Harbors QA/QC program requires conformance to standardized procedures as well as careful

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consideration of site-specific conditions for drilling and monitoring well activities.

QA/QC requirements for drilling include the selection of drilling locations and monitoring well design specifications. They must take into account investigative objectives and site conditions as well as logistical and economic considerations. All work plans for drilling and monitoring well installation are reviewed by a senior hydrogeologist. Proposed locations must be verified in the field to ensure their accessibility and appropriateness to project objectives.

Drilling procedures must conform to standard procedures. For many elements of the drilling process, Clean Harbors adheres to American Society of Testing and Materials (ASTM) procedures which are accepted industry wide. Standard Operating Guidelines developed by Region I EPA contractors form the basis for monitoring well installation procedures. Once the Department of Environmental Protection's Standard References have been issued, they will form the basis for drilling and monitoring well installation QA/QC requirements for all field programs.

Clean Harbors provides continuous oversight of drilling subcontractors throughout the drilling process. This oversight is provided by a qualified geologist, hydrogeologist, or engineer at the direction of the project manager. Beyond directing the subcontractor to conduct the required services, the individual is responsible for maintaining field documentation. This documentation includes completion of boring logs, monitoring well installation reports, and log book entries.

The amount of information that can be gained from a boring is strongly dependent upon the experience and observational skill of the inspector. Notations regarding rate of advance, changes in the appearance of spoils or drilling water, loss or gain of water from the borehole, or trends in soil color, texture, or field screening results from split-spoon samples could aid significantly in the interpretation of subsurface conditions.

Similarly, the documentation of monitoring well construction procedures (materials used, screen length and depth, backfill and grouting procedures, security, etc.) is also essential to the project record. In situations where problems are encountered in the well installation process, notes in the log book are sufficiently detailed to document the problem and its solution, and to describe the resultant well construction. This is particularly important in cases where problems precluded conformance to the planned design of the well. These pieces of information will become part of the project file and are reviewed prior to sampling of the wells.

Well development procedures are selected to meet site and project-specific objectives. Documentation is maintained for each well indicating the procedure

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used, the volume of water removed from the well and its disposition, and visual observations, regarding the purged water. Other noteworthy information such as field monitoring instrument measurements, evidence of vandalism or tampering, etc. is documented in the field log book.

Monitoring wells are secured by locks and other methods once completed, to prevent tampering while the site is unattended.

## Test Pit Excavation

Excavation of test pits or trenches provides project investigators with the opportunity for direct visual inspection of subsurface conditions. Since test pits remain open only for a very limited amount of time, it is essential that accurate documentation be maintained for future reference.

For health and safety and compliance planning, DIGSAFE is contacted prior to excavation. Other measure may also be required to verify the presence/location of subsurface utilities and other hazards.

As test pits are advanced, personnel are required to note observations regarding soil conditions, presence of non-natural materials (waste, debris, tanks, etc.) depth to and nature of groundwater and bedrock (if encountered), and unusual odors or measurement from portable monitoring instruments. The stratigraphy and other features of note are recorded on a test pit log form which contains a description of the test pit location and orientation relative to other site features as well as date, time, and personnel on-site.

## Equipment Maintenance and Calibration

Clean Harbors uses a variety of instruments to collect field measurements in support of site activities. These instruments range from thermometers, pH and conductivity meters, water level measuring devices and monitoring instruments. Equipment calibration is completed to ensure that the instrument's response is reproducible. Calibration is conducted at least as often as recommended by the manufacturer of the instrument. The frequency of calibration ranges from: before each use for personal sampling pumps, organic vapor analyzers and HNu's; weekly for LEL meters; and semi-annually for mercury vapor analyzers.

Maintenance and calibration logs are kept for each piece of equipment. Some equipment is maintained by the division office while other pieces of equipment are maintained in the field. Periodic audits of field equipment is performed by Health and Safety Representatives on a random basis.

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### Training

The Clean Harbors' QA/QC Program for Site Remediation Personnel provides and documents extensive training in safety, field instrumentation/testing equipment care and use, sampling protocols and courses of remedial action. A training file is maintained for each employee. The file contains information on the employee's qualifications and documents the training programs in which the employee has participated.

## Operations QA/QC

The Clean Harbors Operations QA/QC program is designed to ensure high performance standards in the following areas:

1. Communications systems
2. Administration training
3. Specific technical training
4. Safety training
5. Equipment maintenance

Progress and integrity in those areas is monitored on a daily, weekly, and monthly basis. The Operations QA/QC coordinator reviews all reports and immediately implements corrective measures as necessary.

### Administrative Training

Given the ever-changing complexities of the environmental service business, employees must be constantly trained to ensure total compliance with existing procedures and policies.

On a weekly basis, the General Manager meets with Project Managers, Field Service Specialists and Field Supervisors to review job folders, and any other information concerning administrative protocol and policy.

### Specific Technical Training

Clean Harbors has made a serious effort to develop an ongoing training program blending the most sophisticated safety equipment with proven emergency response techniques.

Each field services staff meets once per week from 6:00 AM - 7:00 AM. Selected presentations are provided in emergency response procedures, the use of monitoring and personal protective equipment and on special hazards such as confined space entry and PCB handling. The presentations are documented as part of our annual refresher training program.

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Technical training, an important part of employee evaluation, is repeated every eighth week. Test scores reported to the employee's supervisor are maintained in the employee's personnel file. As with administrative and safety training, technical training is an ongoing program which is monitored and evaluated regularly.

### Safety Training

Although our safety training is closely related to our technical training program, it goes beyond the technical phase of every project. Site safety meetings are held before every project, regardless of its size or complexity. The content of safety meetings is discussed in more detail in Section 11.0 of the Site Specific Health & Safety Plan.

### Equipment Maintenance

State-of-the-art equipment in excellent working order is as important as technical expertise to an environmental service company. Clean Harbors has established a QA/QC program to buy quality equipment and keep it regularly maintained.

Our Fleet Manager and Supply Coordinator take field equipment and rolling stock out of service every three months for testing. Every piece of equipment we own has a maintenance record. The service date is entered on the computer by vehicle number, the vehicle number automatically appears on the computer screen on the ninetieth day, and the equipment is taken out of service again.

Our in-house team of certified mechanics quickly repairs rolling stock or field equipment when necessary. The quality of our mechanics' work is controlled and can be prioritized to specify which equipment is serviced first. While rolling stock is serviced every 90 days, safety equipment is tested and measured daily.

The Supply Coordinator tags safety equipment such as SBCA's, explosion meters, oxygen indicators, explosion-proof electrical apparatus, and encapsulating suits, and takes them out of service immediately after each use. They are tested and evaluated through the required written documentation before they are used again.

## Analytical QA/QC Program

### Introduction

The principal objective of the Analytical QA/QC Program pertains to the collection of data which are sufficient to generate requisite disposal data and monitor the effectiveness of the pollution mitigation efforts which are part of the soil and waste removal process. This Plan describes the quality assurance program to be implemented and the quality control procedures to be followed by

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Clean Harbors during the analytical process. All of the data gathered during this project will be reviewed in terms of the following elements: accuracy, precision, comparability, representativeness and completeness. Specific quality assurance objectives will include field blanks, field duplicates, method blanks, trip blanks, surrogate spikes and matrix spikes. The specific criteria will be set forth in detail in the following sections.

| Objective | Frequency |
|---|---|
| Field Blanks | 10% |
| Field Duplicates | 5% |
| Method Blanks | 5% |
| Surrogate Spikes | 100% of GC/MS analyses |
| Matrix Spikes | 5% |

It is a corporate policy of Clean Harbors Environmental Services, Inc. to promote and maintain a strong QA/QC program. If an analytical subcontractor is used on a site, the analytical quality control procedures expected to be followed by any are equivalent to those practiced by Clean Harbors and are enumerated below.

Adherence to this strong quality control policy will be expected from any subcontractor used by Clean Harbors. Clean Harbors recognizes the importance of QA/QC, promotes a quality atmosphere, and makes available the necessary resources to obtain a high grade of QA/QC; provides the appropriate administrative and technical monitoring to assure that high QA/QC standards are always maintained. Implicit in all procedures is the policy to immediately determine the cause of any abnormal result and not to allow data to be used unless the investigating person in the QA/QC organization is confident of the validity of the data.

## Organization and Structure

The QA/QC duties of the personnel involved are as follows:

The Laboratory Director has overall responsibility for the QA/QC program, reviews and approves all analytical procedures, performs periodic audits and holds regularly scheduled meetings. The QA/QC Supervisor reports to the Laboratory Director; oversees and supervises the QA/QC program; participates in regularly scheduled QA/QC meetings; performs audits; etc. The personnel performing the quality assurance functions have sufficient authority and freedom to identify quality related problems, to initiate, recommend or provide solutions and to verify implementation of solutions. Laboratory personnel are instructed in and responsible for implementing QA/QC procedures.

## QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA IN TERMS OF PRECISION, ACCURACY, COMPLETENESS, REPRESENTATIVENESS AND COMPARABILITY

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This section addresses in general terms the program requirements for accuracy, precision, representativeness and completeness for activities to be conducted with the Environmental Protection Agency, Region II.

**Representativeness**

Representativeness (does the subsample have the same measurable characteristics as the total sample?) is defined by the sampling method utilized. Blind duplicate samples monitor the representativeness of the specific sample. A representative sample exhibits the average properties of the whole waste, soil or water which warrants the development of a strategy to evaluate contaminant variability.

**Completeness**

Completeness is a measure of the amount of valid data obtained from the measurement system compared with the amount that was expected under normal conditions. Completeness is expressed as a percentage of the total information which meets all validation criteria. Critical data point samples must be defined in the sampling plan to assure sampling event completion. Completeness of sample collection is met if all critical data point samples and 90% of the remaining designated samples are obtained. For the purposes of the laboratory analysis, it is anticipated that 95% of all samples properly submitted to the laboratory will meet the analytical data validation criteria.

**Accuracy and Precision**

Accurate and precise data will be achieved through the use of sampling and analytical procedures which minimize biases, through the use of standard procedures, through the calibration of analytical equipment and by implementing corrective action whenever accuracy and precision exceed the pre-established limits.

Accuracy and precision will be measured through the analysis of method blanks, surrogate spikes, matrix spike/matrix duplicates and field duplicates. The specific details of these procedures are summarized in this section.

**Quality Control Samples**

The primary objective of any analytical QA/QC program is to ensure the integrity of the analytical results as specified by the regulatory and contractural requirements. All samples collected will be analyzed by approved methodologies and the appropriate procedural QA/QC. All quality control data is retained by Clean Harbors.

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## Duplicate/Spike Samples

On a 5 percent frequency, duplicate (or replicate) and/or spike analyses are performed. At a minimum, one sample from a project batch of twenty samples is characterized by matrix spiking with the appropriate procedural analyte(s) if the parameter permits. The laboratory Log-In Section is responsible for assigning specific samples for duplicate and spike analysis. Per cent relative standard deviation of replicates (%RSD) or relative per cent difference of duplicates (RPD), per cent recovery of spikes (%R) and standard deviation (SD) are calculated and compared to specified control limits. Any difference greater than that expected for the resulting precision and accuracy is investigated prior to release of the analytical report. Duplicate, matrix spike, and matrix spike duplicate data are contained in a computerized data base fort determination of control limits and plotting of appropriate control charts.

## Blanks

As a check on sample preparation, analytical background interferences, glassware or instrumental contamination, and to ensure that proper reagent preparation and analytical techniques are being used, the laboratory will analyze method blank samples at a frequency of 5% of the samples submitted, or once each day, whichever is more frequent. These blanks must contain less than the detection limit of these compounds being analyzed except for common laboratory solvents or phthalate esters for organic analyses, and less than ten times the detection limit of the compounds being analyzed for inorganic analyses. Where appropriate, each batch of samples is accompanied by a method blank. Reagent lots (solvent, acids, and absorbents) are characterized for potential contamination prior to acceptance from the distributor.

In addition, field blanks are used to detect any contamination which may have been introduced in the field through atmospheric contaminants or sampling equipment. Where appropriate, each batch of samples will be accompanied by a field blank. At a minimum, one field blank will be analyzed for every ten samples submitted to the laboratory. Trip blanks (at a rate of one VOA blank for every shipment of samples) will also be used by the laboratory as a determinant of "in transit" contamination.

## Surrogate Compounds/Laboratory Control Samples

For organic characterization, surrogate compounds are spiked into the samples prior to purging or extraction. Surrogate spike recoveries are compared to U.S. Environmental Protection Agency Contract Laboratory Program (CLP) limits designated in SW-846. Often dilutions cause the surrogates to fall below the quantitation limit or high backgrounds mask the evaluation of surrogate recoveries. In these instances,or whenever the surrogate fails to meet the acceptance criteria, the laboratory will take corrective actions. These procedures

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may include: the checking of calculations to assure that no errors have been made; examination for degradation, contamination, and instrument performance; and in certain instances, re-analysis of the sample in question (when sufficient sample is available).

Laboratory control samples are routinely characterized to monitor procedural precision. These samples are usually obtained from the US EPA Chemical Repository or other sources which are traceable to the National Bureau of Standards.

Periodically, the Quality Control Department submits to the analytical sections, samples which the laboratory personnel know nothing about. These blind samples serve as a check on the instrumentation as well as the analytical procedure, and provide information on the accuracy of the analysis.

**Detection Limit**

The laboratory will report the method detection limits for the components analyzed that are no less than twice the instrument background or as consistent with the US EPA guidelines. In some cases, detection limits will be higher due to matrix interferences or required dilutions.

**Orientation and Training Program**

All Clean Harbors Laboratory personnel participate in a thorough orientation and training program to qualify to work on samples. The overall orientation program requires that employees become familiar with the following:

- Laboratory equipment - the major instrumentation in the Laboratory.
- Chemical Hygiene Plan (CHP) - This manual must be read, discussed with the Laboratory Supervisor and/or the QA/QC Supervisor and then signed and dated by the employee.
- Analytical Procedures - Procedures are given in various laboratory procedure manuals.
- The Clean Harbors Analytical Services QA/QC Manual - This manual must be read, discussed with the Laboratory Supervisor and/or the QA/QC Supervisor and then signed and dated by the employee.

Employees may be trained in all items listed above or only in those that are pertinent to their specific position.

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Basic orientation is conducted by experienced personnel under the supervision of the Laboratory Supervisor. Completeness of orientation is assured by spot checks and re-orientation, where appropriate, by the Laboratory Supervisor.

When an individual has been fully familiarized with the above, he or she is then allowed to begin work on samples. This work is directed by the Laboratory Supervisor.

**Sample Handling Procedures**

The sample collector and the laboratory act as a team to ensure that proper sample handling procedures are followed. Sample handling procedures include:

- Bottle Preparation/Preservation
- Chain-of-Custody Documentation
- Sample Management System
- Analysis Scheduling
- Sample Retention and Disposal

## SPECIFIC SAMPLING PROCEDURES

General field sampling procedures are described in the followingsections. Additional information on the sampling procedures maybe found in the CHKI Field Sampling Standard Operating Procedures.

### Water Sampling

Surface water samples will be collected in the shortest possible time while maintaining sampling integrity. Surface waters are sampled using the sample container directly or an empty container of the appropriate type if the ultimate sample container has preservative in it.

Sample bottles should be filled with a minimal amount of air contact. When filling the sample bottles, these important procedures and precautions must be followed:

1. Bottle caps should be removed carefully so that the inside of the cap is not touched. Caps should never be placed upon the ground. Under no circumstances should bottles or caps not supplied by the laboratory be used.

2. Caps for the VOA vials contain teflon lined septum. The teflon side of the septum must be facing the sample to prevent contamination of the sample.

3. The sample bottles should be filled with a minimal amount of air contact, and without allowing the sampling equipment or personnel to contact the inside of the bottles.

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4. TOX and VOA vials must be filled so that they are "head-space free" (i.e. no air bubbles in the sample bottle). These sample bottles need to be overfilled so that the water tension will maintain a convex water surface in the bottle. The caps for these bottles should be replaced gently so as to eliminate any air bubbles in the sample. These bottles must be checked by inverting the bottles and tapping them sharply with a finger. If any air bubbles appear, open the bottle, add more water, and repeat the process until all air bubbles are absent. Do not empty the vial and refill.

5. Samples may have preservatives in the bottle when received. These bottles should be completely filled with sample with as little overflow as possible; bottle caps replaced tightly. Label each sample bottle as described in the Chain-of-Custody section.

6. All sample bottles, once filled and preserved as required, must be iced or refrigerated until ready to be transported. Samples will be protected from breakage and shipped in coolers at 4 degrees Centigrade or less. Samples should be transported to the laboratory the day that they are collected. If an overnight carrier is expected to be used, the carrier should be selected to ensure that the samples can be delivered to the laboratory within 24-36 hours of collection.

**Soil Sampling**

The basis objective of any sampling program is to obtain a set of samples that are representative of the source under investigation and suitable for analyses. The sampling of solid or semi-solid material is complicated by the structural properties of the material. The presence of entrapped gases and fluids is often an integral part of the material and may be of concern with certain sample collection techniques. Care must be exercised to prevent aeration or significant changes in moisture content.

The physical properties of the soil, its grain size,cohesiveness, associated moisture and such factors as depth to bedrock and water table will limit the depth from which samples can be taken and will influence the method utilized to collect them. Collection of samples near the soil surface can be accomplished with tools such as spades, shovels and scoops.

**Sampling with a Spade and Scoop**

The simplest, most direct method of collecting soil samples is with the use of a spade and a scoop. A normal lawn or garden spade can be utilized to remove the top cover of soil to the required depth and then a smaller stainless steel scoop can beused to collect the sample. Disposable plastic scoops can be substituted for the sample collection.

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This method can be used in most soil types but is limited somewhat to sampling near the soil surface. Samples from depths greater than 50 cm can become extremely labor intensive in most soil types. Very accurate representative samples can be collected with this procedure depending upon the care and precision demonstrated by the technician. The use of a flat pointed mason trowel to cut a block of the desired soil will facilitate the collection of an undisturbed profile if required. A stainless steel scoop or lab spoon will suffice in most other applications. Disposable plastic scoops and spoons are also acceptable. Care should be exercised to avoid the use of devices plated with chrome or other materials similar to the contaminants which are being analyzed for.

**To sample the soil:**

1. Carefully remove the top layer of soil to the desired sample depth with a pre-cleaned spade.

2. Using a pre-cleaned stainless steel scoop or trowel (disposable plastic scoop) remove and discard a thin layer of soil from the area which comes in contact with the shovel.

3. Transfer soil into the sample bottle with a stainless steel lab spoon or the disposable plastic scoop.

4. Check that the teflon liner is present in the cap if required. Bottle caps should be removed carefully so that the inside of the cap is not touched. The caps should not be placed upon the ground. Only glassware and caps which are supplied by Clean Harbors Analytical Services should be used.

5. The sample bottles should be filled methodically to minimize the amount of air contact and without allowing the sampling equipment or personnel to touch the inside of the sample bottle.

6. Samples must be refrigerated or placed within a cooler with ice until ready for transport. samples should be transported to the lab the same day that they are collected.

7. Label the sample bottles and complete the documentation as described in the Chain-of-Custody Section.

8. Complete all Chain-of-Custody forms and record the information in the Field Log Book.

9. Decontaminate sampling equipment (if not disposed of) after use and between sample locations.

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10. The sample frequency, sample type and decontamination protocols will be determined by the appropriate personnel in the field. The sampling determinations will be coordinated with the Rhode Island Convention Center Authority.

**Sampling with a Thief (Used to sample drums of liquid)**

This system consists of an approximately 1 meter long open end glass tube of sufficient diameter to allow a sample cross section of materials in the tanks or drums. The sample is taken by carefully opening the storage vessel and inserting the tube into the liquid. The top of the tube is then blocked off to withdraw the sample. The tube is then withdrawn from the fluid and the sample contents are emptied into the appropriate sample container. Documentation of this sample and the procedure shall be in accordance with the above instructions.

**Sampling Gas Cylinders**

Unknown compressed gas cylinders may represent many dangerous hazards. Extremely hazardous materials may be stored in them, they may contain highly reactive or highly toxic compounds and the pressurization itself creates additional potential for injury. Cylinder gas sampling will be performed using extensive safety procedures and will require significant preparation. A special enclosure will be erected to contain a potential escaping gas. Ventilation from the enclosure will be limited to exhaust through a HEPA filter prior to discharge. Each cylinder will be overpacked, and anchored to protect near-by workers from the uncontrolled rupture of a cylinder. Each cylinder will be equipped with a remote sampling device for analysis. Field analysis will utilize sophisticated equipment such as a Fourier Transform Infra-red Spectometer (FTIR) and a mass spectrometer (MS). Any work to be performed near unknown compressed gas cylinders will only be done by qualified personnel in level A protection.

**Bottle Preparation/Preservation**

Sampling bottles will be prepared by the Laboratory and made available to the sampling team.

Proper sample preservatives will be made available to the sampling team or added to the bottle. To ensure that a sample is properly preserved after collection (especially where preservative requires pH adjustment) field personnel are urged to check the pH of the sample after preservation. These data are recorded in a personal notebook or field notebook.

All samples submitted to the laboratory are checked to ensure the proper preservation procedures were used for the sample. This includes the following checks where appropriate:

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- pH
- Temperature (ambient or chilled)
- Color
- Observation of sample for particulates or air bubbles (VOA) All observations will be recorded by laboratory personnel. Chain-of-Custody Documentation All samples must arrive at the Laboratory with a chain-of-custody document.

The following procedures will be used by sampling crews when collecting samples:

- Each time a station is sampled, the chain-of-custody sheet is filled out by one or more members of the sampling crew.
- All members of the sampling crew sign their full names in the space labeled "collector" or "sampler" on the transmittal sheet.
- Field/laboratory log books are used to record field measurements, observations and comments.
- For each sample container used, a sample label is filled out.
- Each sample label is securely attached to the sample container immediately after collection. Every attempt should be made to not obliterate any other label.
  - The sample label contains the following information:
  - Date of sampling
  - Time of sampling
  - Depth of Sample (If applicable)
  - Observations regarding the sample
  - Station number and/location/unique field identification number
  - Analysis requested
  - Preservative type and amount added, if any
  - Each member of the sampling crew checks over each sample label, as soon after collection as possible, to see if it is accurate.

## Sample Management System

-Each member of the sampling crew checks over each sample label, as soon after collection as possible, to see if it is accurate.

-If the contents of a sample container are to be subdivided into several containers in the field prior to analysis, one sample label is filled out for the original sample container. When this sample is subdivided, sample labels are filled out in the same manner as the original label was filled out, and attached to each container that is used. A set of sub-numbers is used to insure that no two sample labels have the same numerical identification.

-Unless a sample remains in the possession of the members of the sampling crew, the sample container or any shipping container holding the sample

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containers is sealed with an appropriate seal and remains unopened until it arrives at the laboratory where analysis of the sample is to be performed.

-Composite soil samples may be taken during the project from soil piles by scooping various portions from the piles. During the collection of the composite sample via an automatic sampler, the automated device and the sample container(s) must be securely locked into place and made as tamper proof as possible.

-At the time the sample container or other shipping container is sealed, the following information is recorded in the log book: the fact that the container was sealed; the date and time of the sealing; the field sample number (and if appropriate) the subnumber of the sample; the name (or initials) of the person sealing the container; and the name (or initials of the person recording the sealing information).

## Sample Storage

All samples are stored in chilled coolers from the time the sample is taken until it is delivered to the receiving laboratory. All samples are stored in refrigerators at the receiving lab at 2 - 6 degrees centigrade. Temperatures of storage refrigerators are monitored daily (except weekends and holidays) by laboratory personnel. Samples are removed from storage only by authorized Clean Harbors personnel for either analysis, long term retention or disposal.

## Documentation of the Analytical Procedure

All data and observations will be recorded in a laboratory log book(s), a bound laboratory notebook(s) or in the LIMS. The entries will include:

- Analyst
- Sample number
- Date starting (and completion date if different)
- Calibration data
- Results of analysis of laboratory quality control samples
- Calculations
- Method reference
- Instrument identification
- Location of raw and final data (if other than the parameter specific notebook)

All deviations from the method and pertinent observations will be recorded in the laboratory notebook. Also, all "out of control" situations observed by the Quality Control Program must be documented in the notebook. This includes all corrective actions taken by the Analyst, Supervisor, and/or the Laboratory QA/QC Supervisor in response to the "out of control" situation.

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## Procurement and Inventory Procedures

Material Purity - Where required, materials (glassware, reagents, solvents) are demonstrated to be free from interferences by running method blanks. The blank samples are carried through all stages of the sample preparation and measurement steps. If contamination is found in the blank samples, appropriate measures are taken to determine and remove the source of the contamination.

Shelf Life - When new chemicals are received or new reagents prepared, the material is dated. Chemicals and reagents are replaced as needed before the shelf life has been exceeded. Chemicals and reagents are used on a first-in, first-out basis.

Traceability - All standard solutions are inventoried to monitor expiration date and origin to determine appropriate traceability to manufacturer, National Institute of Standards and Technology (NIST), or EPA.

## Instrument Maintenance and Calibration

Each instrument has a maintenance log for documenting instrument maintenance. This maintenance log is available near the instrument and is kept current. The following maintenance information is recorded in the maintenance log:

- The manufacturer, model number, serial number and installation date.
- Detailed statement of maintenance activities including date of maintenance and name of person performing or authorizing maintenance.
- Routine maintenance schedules, if required, appear with a checklist in the maintenance log. Contracted preventive maintenance schedules are also on the checklist.

## Calibration Information For Laboratory Instruments

The laboratory instruments have specific written standard operation procedures (SOP's) for calibration. Each system or method is calibrated prior to analyses being conducted. The calibration is checked on an on-going basis to ensure that the system remains within the acceptance ranges for that method. If it fails to meet the established criteria, the system is recalibrated.

## Quality Control For Reporting Results

The Laboratory will report the method detection limits for the components analyzed that are no less than twice the instrument background or are consistent

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with the EPA guidelines. In some cases, detection limits will be higher due to matrix interferences or required dilutions.

## Analytical Modifications

All major changes and rationale for changes from the analytical procedures and/or all QA/QC procedures which have been used as guidance will be placed in the report to the client.

## Quality Control Samples

The primary objective of any analytical quality assurance/quality control program is to ensure the integrity of the analytical results as specified by the regulatory and contractual requirements. All samples collected will be analyzed by approved methodologies and the appropriate procedural QA/QC. All quality control data is retained by Clean Harbors Analytical Services. Quality control for the analytical laboratories is accomplished by the use of duplicate and matrix spike analyses or matrix spike and matrix spike duplicate analyses. QC samples are analyzed on a 5 - 10% frequency of the samples analyzed for any given project. The laboratory, as part of its QA/QC for the _____ will analyze one spiked sample and one duplicate sample of a similar matrix for each case of samples received, or for each 20 samples, whichever is more frequent. (A case consists of a finite, usually predetermined number of samples collected over a given time period for one particular site.) Also, one laboratory reagent blank will be included for each case of samples received or for each 20 samples, whichever is more frequent. For air sample analysis, a spike sample and a duplicate sample will be included for every batch of 10 samples, whichever is more frequent. The QC samples serve to verify the reproducibility of data and act as a check on analytical technique. Any difference greater than that expected for the resulting precision and accuracy is investigated prior to release of the analytical report. Duplicate, matrix spike, and matrix spike duplicate data are plotted on control charts.

## Final Data Review

All laboratory reports, containing analytical results, are reviewed by the appropriate Laboratory Supervisor(s) such that the results are scrutinized for the following:

- Completeness
- Reasonableness
- Conformance with the analytical procedure an the QA/QC procedure After review by the Laboratory Supervisor(s), laboratory reports are approved by one of the following individuals:

- Laboratory Manager

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- Laboratory Director

## Deliverables

Upon completion of the Final Data Review process, the client will receive the laboratory report which includes the following:

- Analytical data including method detection limits
- Procedure method and reference
- Procedure modification if required
- Surrogate recoveries (where applicable)
- Extraction and analysis dates
- Assurance that appropriate QA/QC procedures have been followed
- A cover letter indicating other essential project information such as date received and P.O. number

## Archiving

The analytical laboratory will maintain on file, all the raw data, laboratory notebooks, and other documentation pertinent to the work on a given project. This file will be maintained in storage for at least five years from the date of invoice unless a written request is submitted for changes in the retention time.

## Out Of Control Situations

The occurrence of any of the following events is defined as an "out of control situation":

- a calibration curve or continuing calibration falls outside Clean Harbors Analytical Services' control limits
- a sample is not analyzed within the maximum holding time allowed
- a sample is improperly preserved
- Clean Harbors Analytical Services QA/QC protocols, as set forth in this manual, are not followed
- an inter-laboratory study indicates a result which has fallen outside of the study's control limits
- a laboratory quality control sample suggests that an analytical result may be of questionable or unknown validity.

An investigation of an "out of control" situation is initiated by an analyst, the QA/QC Department or a Laboratory Supervisor. The investigation shall include, where appropriate, the following actions:

- Checking of data for calculation and/or transcription errors.
- Checking of standard curve, minimum absorbance, calibration curve, ILCS, and blanks, whatever is applicable to the method.
- Reanalysis of the sample.

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- Any sample or QC sample in question should be reanalyzed.

### Corrective Action

When an "Out of Control" situation occurs, the Supervisor will be notified as soon as possible. Upon notification, the Supervisor will recommend the appropriate corrective action. The situation and corrective action will be documented by the Supervisor in the appropriate "Out of Control" log. A Laboratory Manager or QA/QC Supervisor will initial the documentation of successful corrective action after its completion and must approve resumption of analysis.

### Performance and System Audits

Clean Harbors Analytical Services performs scheduled internal system audits, interlaboratory comparisons, and a system of corrective actions. Among our inter-laboratory comparisons are the U.S. Environmental Protection Agency National Pollutant Discharge Elimination System, Drinking Water and Water Pollution Performance Evaluation programs. Our QA/QC program is designed to meet or exceed U.S. EPA guidelines.

Performance audits are scheduled on a planned and periodic basis. Results of these internal audits are documented on the appropriate audit report. Follow-up action, including reaudit of deficient areas, is taken where necessary. Results of the follow-up action is also documented on the audit report.

Other external system audits to assess the Laboratory's entire quality assurance system have been conducted by the U.S. EPA Contract Laboratory Program, U.S. EPA EMSL Las Vegas, Nevada, by U.S. Army Corps of Engineers, and numerous other analytical clients.

## Compliance QA/QC

Clean Harbors has a proactive QA/QC program designed to ensure that its operations are conducted in compliance with all applicable rules and regulations and that its liabilities are reduced to the maximum extent possible. This program includes the following:

1. Monthly audits of Clean Harbors facilities and operating centers to make sure that all daily inspection checklists, training documentation and licenses are up-to-date.

2. Weekly inspections of Clean Harbors facilities and job sites to assure proper storage, labeling, placarding and manifesting of hazardous materials.

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3. Annual environmental audits of ultimate disposal facilities to assure that these facilities are being operated in a responsible manner. The purpose of this program is to protect Clean Harbors and its customers, from becoming potentially responsible parties under the comprehensive Environmental Response and Compensation Liability Act (CERCLA) also know as "Superfund".

4. Continual inspection of all vehicles on a prioritized schedule to assure compliance with DOT and state standards. Every Clean Harbors vehicle is inspected at least one every 90 days.

5. Monthly audits of manifests, operating reports and other records, including the PCB logs required under TSCA, for accuracy and proper tracking of materials to ultimate disposal facilities.

All of the above is documented and kept on file in Clean Harbors office at 1200 Crown Colony Drive, Quincy, Massachusetts.

## Administrative QA/QC

The QA/QC program at the administrative level occurs in three stages. The first stage is an ongoing process whereby each employee continually audits the accounting information submitted to them to ensure it has been properly completed and adequately documents any charges which apply to the contract.

The second stage is formal QA/QC procedures. Prior to the submittal of the final invoice, every 10th invoice will be selected for a comprehensive review by the Administration QA/QC representative, or his designee. This review will consist of the following steps:

1. A determination that all job sheets have been approved by the State on-scene coordinator.
2. A random check to insure that the proper prices have been applied to specific services.
3. A check that a minimum of three quotes for all subcontractor work have been received and that the lowest quote was utilized.
4. A check that all charges from subcontractors, and direct charges such as disposal have been approved by a company state contract staff member and that they agree with signed job sheet.
5. A determination that the calculations for daily, weekly and monthly rate reductions have been implemented and that the total of rental charged for a particular item has not exceeded its purchase price.
6. A determination that the subcontractors being requested to bid on various sites will meet or exceed the Massachusetts Business Enterprise requirements.

Each step of the process will be fully documented and made available to state auditors.

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The final process of the QA/QC program involves the affirmative action policy. The company has a Vice President of Human Resources, who will continually review company employment practices to insure that our affirmative action policy is in full force at all times.

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PVO International, Inc.

Containerized Waste Removal

# 10.0

## Chain of Custody Procedures

# STANDARD OPERATING PROCEDURE FOR SAMPLE RECEIPT BY THE LABORATORY

Approved:

| | | |
|---|---|---|
| Jeanne M. Engel<br>Laboratory Director | Christine J. Johnson<br>QA/QC Supervisor<br>(Bedford) | Elizabeth Chambers<br>QA/QC Chambers<br>(Braintree) |

## 1.0 SCOPE AND APPLICATION

This document outlines the procedure by which samples are received by the laboratory and custody is relinquished to Clean Harbors Environmental Services, Inc. (CHES).

## 2.0 SUMMARY OF METHOD

Samples which arrive at CHES are received by the appropriate customer service representative or designate. Appropriate Sample Receipt Checklists (SRC) are initiated and samples are inspected for the following: custody seals; chain-of-custody (COC) documentation completeness and agreement with each sample label/tag; integrity of sample containers; preservation and holding time specifications; sufficient sample aliquots; appropriate sampling containers; and where required appropriate sampling worksheets. Any discrepancies or problems are recorded on the appropriate SRC, a Client Contact Call Log form is initiated and the client is contacted immediately, within 24 hours of sample receipt, for clarification. Samples requiring refrigeration are stored in a refrigerator from the time of receipt until sample login. Sample custody is relinquished to CHES upon signature of the COC by the appropriate customer service representative or designate. Accuracy of the COC is not verified until the customer service representative or designate has initialed the SRC(s).

## 3.0 INTERFERENCES

3.1 Due to the sensitivity and selectivity of the analytical instrumentation associated with base neutral/acid extractables, polychlorinated biphenyls, pesticides, and herbicides analyses, phthalates, which are associated with plastics, may cause analytical interferences. To avoid phthalate contamination the use of plastic materials is prohibited during all stages of sample collection, extraction and analysis.

3.2 Some of the base neutral/acid extractable compounds are light sensitive such that samples should be sampled in an amber glass container with a teflon lined cap.

3.3 Due to the nature of oil and grease and total petroleum hydrocarbon substances, plastics may cause analytical interferences. To avoid this contamination the use of plastic materials is prohibited during all stages of sample collection, extraction and analysis.

## 4.0 SAFETY AND PRECAUTIONS

4.1 Gloves must be worn at all times to protect hands from contact with samples and as a general safety precaution.

4.2 Safety glasses must be worn at all times as a general safety precaution.

4.3 Lab coats must be worn at all times as a general safety precaution.

4.4 A fume hood is present in the sample receipt room and must be used for sample preservation and storage for any sample containers which are leaking and/or are giving off any type of odor.

## 5.0 APPARATUS AND MATERIALS

5.1 Sample Receipt Check Lists

5.1.1 Air Sample Receipt Checklist (Figure 1)

5.1.2 Non-Air Sample Receipt Checklist (Figure 2)

5.2 Chain-of-Custody (Figure 3)

5.3 Sample Containers, Preservatives and Holding Times Required for Environmental Samples List (Figure 4)

5.4 pH and Preservation Checklist (Figure 5)

5.4 Preservation Summary (Figure 6)

5.5 Client Contact Call Log (Figure 7)

5.6 0 to 14 range S/P Brand pH Indicator Strips with 1.0 pH unit increments, or equivalent

5.7 Disposable plastic pipets

5.8 Disposable glass pipets

5.9 Refrigerator(s)

5.10 Scintillation vials

5.11 Pipet bulbs

5.12 Hazard stickers

## 6.0 REAGENTS

6.1 Concentrated Hydrochloric Acid (HCl)

6.2 Concentrated Nitric Acid ($HNO_3$)

6.3 Concentrated Sulfuric Acid ($H_2SO_4$)

6.4 1:1 Hydrochloric Acid (1:1 HCl)

6.5 10N Sodium Hydroxide Solution (10N NaOH)

6.6 2N Zinc Acetate Solution

6.7 Ascorbic Acid

6.8 0.008% Sodium Thiosulfate (0.008% $Na_2S_2O_3$)

## 7.0 PROCEDURE

7.1 Samples which arrive at CHES are received by the appropriate customer service representative or designate.

7.2 Relinquishing Chain of Custody to CHES. **NOTE: If a Chain-of-Custody is not attached to the outside of the container transporting the samples then proceed to steps 7.3.1.1 to 7.3.1.3 for air samples and 7.3.2.1 to 7.3.2.3 for all other types of samples prior to continuing.**

7.2.1 Hand Delivered Samples - To relinquish the Chain-of-Custody (COC) to CHES, the person delivering the sample batch must sign their name in the appropriate

"Relinquished by:" section of the COC and record the correct date and time in the spaces provided. The customer service representative or designate must then sign their name in the appropriate "Received by:" section of the COC and record the correct date and time in the spaces provided. At this point, CHES, has acknowledged receipt of the sample batch.

7.2.2 Shipped Samples - To relinquish the Chain-of-Custody (COC) to CHES, the person delivering the shipped sample batch should sign their name in the appropriate "Relinquished by:" section of the COC and record the correct date and time in the spaces provided. If it is not possible to obtain the signature of the person delivering the shipped samples write "via mail" in the "Relinquished by:" section of the COC and record the correct date in the spaces provided. The customer service representative or designate must then sign their name in the appropriate "Received by:" section of the COC and record the correct date and time in the spaces provided. At this point, CHES, has acknowledged receipt of the sample batch.

7.2.3 Couried Samples - To relinquish the Chain-of-Custody (COC) to CHES, the person delivering the couried sample batch should sign their name in the appropriate "Relinquished by:" section of the COC and record the correct date and time in the spaces provided. If it is not possible to obtain the signature of the person delivering the couried samples write "via courier" in the "Relinquished by:" section of the COC and record the correct date in the spaces provided. The customer service representative or designate must then sign their name in the appropriate "Received by:" section of the COC and record the correct date and time in the spaces provided. At this point, CHES, has acknowledged receipt of the sample batch.

7.3 Immediately upon receipt, the customer service representative, or designate, must initiate an Air Sample Receipt Checklist (Air SRC) for air samples (Figure 1) and/or a Non-Air Sample Receipt Checklist (Non-Air SRC) (Figure 2) for all other types of samples. The Air SRC and the Non-Air SRC are comprised of a series of questions most of which have respective response boxes, where,"YES" is for yes, "NO" is for no, and "N/A" is for not applicable. At the bottom of each checklist is a section for notes where specific problems and/or discrepancies must be documented.

7.3.1 The customer service representative, or designate will follow the following procedure to complete the Air SRC:

7.3.1.1 Where specified on the top portion of the Air SRC, record how the sample set was transported to the laboratory. If samples were shipped; sign, date and retain the bill of lading. If samples were not shipped indicate the name of the person or courier agency delivering the sample set.

7.3.1.2 Item # 1 of the Air SRC Inspect transporting container for an intact custody seal and mark the appropriate box. **NOTE: If a client has not made it known that custody seals are required then check the box labeled "N/A" for not applicable.**

7.3.1.3 Item # 2 of the Air SRC If a chain-of-custody (COC) is present upon receipt of the samples mark the "YES" box. If a COC is not present upon receipt of the samples check the "NO" box and initiate a COC based on the information available (Figure 3). Record that a COC was initiated in the comment section. Each sample set must have a COC.

7.3.1.4 If the COC has not yet been relinquished to CHES follow the steps in 7.2 for relinquishing the COC to CHES.

7.3.1.5 Remove the sample set from the shipping container.

7.3.1.6 Item # 3 of the Air SRC Examine the COC to determine if the following information is complete:

a) Client name, project name, work order/P.O. #;
b) Client contact, client address and phone #;
c) Sample collectors name and sample collection date;
d) Whether or not sample set shipped;
e) Each sample I.D., date and time of sampling, matrix, requested analysis, number and type of sample containers and turnaround time.

f) Check for pertinent hazards in the comment section of the COC. Place appropriate hazard sticker on the sample container and refer to "Prior Approval" SOP for additional information on how to handle these samples.

Mark the appropriate box for each item above and note any problems in the notes section.

7.3.1.7 Once the information on the COC has been checked, record the name, work order/P.O. #, and the project name where specified on the top portion of the Air SRC.

7.3.1.8 Item # 4 of the Air SRC Compare each sample label/tag to the sample I.D. recorded on the COC for accuracy. Mark the appropriate box.

7.3.1.9 Item # 5 of the Air SRC Inspect each sample for an intact custody seal and check the appropriate box on the SRC. **NOTE: If a client has not made it known that custody seals are required then check the box labeled "N/A" for not applicable.**

7.3.1.10 Item # 6 of the Air SRC Examine the air worksheet to determine if the following information is included and complete:

a) Information for one pump;
b) Pre and post pump calibration information;
c) Start and stop times for pump
d) Request for specific analysis;
e) Social security numbers where required;
f) Level of protection used;
g) Task information.

Mark the appropriate box for each item above and note any problems in the notes section.

7.3.1.11 Item # 7 of the Air SRC Examine the air cassette to determine whether the air has been sampled through the correct end and mark the appropriate box on the Air SRC.

7.3.1.12 Item # 8 of the Air SRC Examine the air cassette and determine whether endcaps are present. Mark the appropriate box on the Air SRC.

7.3.1.13 Item # 9 of the Air SRC Mark whether a blank is present for each set of air samples in the appropriate box on the Air SRC.

7.3.2 The customer service representative, or designate will follow the following procedure to complete the Non-Air SRC:

7.3.2.1 Where specified on the top portion of the Non-Air SRC, record how the sample set was transported to the laboratory. If samples were shipped; sign, date and retain the bill of lading. If samples were not shipped indicate the name of the person or courier agency delivering the sample set.

7.3.2.2 Item # 1 of the Non-Air SRC Inspect transporting container for an intact custody seal and mark the appropriate box. **NOTE: If the client has not made it known that custody seals are required then check the box labeled "N/A" for not applicable.**

7.3.2.3 Item # 2 of the Non-Air SRC If a chain-of-custody (COC) is present upon receipt of the samples mark the "YES" box. If a COC is not present upon receipt of the samples check the "NO" box and initiate a COC based on the information available (Figure 3). Record that a COC was initiated in the comment section. Each sample set must have a COC.

7.3.2.4 If the COC has not yet been relinquished to CHES follow the steps in 7.2 for relinquishing the COC to CHES.

7.3.2.5 Item # 3 of the Non-Air SRC If the shipping container contains ice or a combination of ice and ice water then the samples can be assumed to be chilled to 4°C and the "YES" box should be checked. If the shipping container does not contain ice or a combination of ice and ice water and a temperature blank is present in the shipping container determine if the sample set is received chilled to 4°C by placing a thermometer, with graduations of 1°C, into the temperature blank for approximately 5 minutes. Record the temperature of the temperature blank in the notes section and mark the appropriate

box on the non-air SRC. Otherwise determine if the sample set is received chilled to 4°C by placing a thermometer strip, with gradations of 1°C, on one of the samples for approximately 5 minutes. Record the temperature in the notes section and mark the appropriate box on the non-air SRC.

7.3.2.6 **Remove the sample set from the shipping container. NOTE: Samples are removed from chilled storage for inspection purposes only. Samples <u>must not</u> be out of chilled storage for more than 15 minutes.**

7.3.2.7 <u>Item # 4 of the Non-Air SRC</u> Examine the COC to determine if the following information is complete:

a) Client name, project name, work order/P.O. #;
b) Client contact, client address and phone #;
c) Sample collectors name and sample collection date;
d) Whether or not sample set shipped;
e) Whether or not sample set preserved and type of preservative used.
f) Each sample I.D., date and time of sampling, matrix, requested analysis, number and type of sample containers and turnaround time.
g) Check for pertinent hazards in the comment section of the COC. Place appropriate hazard sticker on the sample container and refer to "Prior Approval" SOP for additional information on how to handle these samples.

Mark the appropriate box for each item above and note any problems in the notes section.

7.3.2.8 Once the information on the COC has been checked, record the name, work order/P.O. #, and the project name where specified on the top portion of the Non-Air SRC.

7.3.2.9 <u>Item # 5 of the Non-Air SRC</u> Compare each sample label/tag to the sample I.D. recorded on the COC for accuracy. Mark the appropriate box.

7.3.2.10 <u>Item # 6 of the Non-Air SRC</u> Inspect each sample for an intact custody seal and check the appropriate box on the SRC. **NOTE:** If the

client has not made it known that custody seals are required then check the box labeled "N/A" for not applicable.

7.3.2.11 Item # 7 of the Non-Air SRC Examine the integrity of each sample container and mark the appropriate box.

7.3.2.12 Item # 8 of the Non-Air SRC Determine whether each sample has been received within the proper holding time (Figure 4). Mark the appropriate box. **NOTE: If any sample has a remaining holding time which is <48 hours notify the appropriate supervisors.**

7.3.2.13 Item # 9 of the Non-Air SRC Determine whether each sample has been sampled in the appropriate sample container (Figure 4). Mark the appropriate box.

7.3.2.14 Item # 10 of the Non-Air SRC Determine whether sufficient sample aliquot has been provided for each requested analysis (Figure 4). Mark the appropriate box.

7.3.2.15 Item # 11 of the Non-Air SRC If more than one analysis is requested on one particular sample container determine whether the required preservation for each analysis is compatible. (Figure 4 and Figure 6). Mark the appropriate box.

7.3.2.16 Item # 12 of the Non-Air SRC Examine the samples and determine whether the sample matrix specified on the COC is accurate for each sample. If you have doubts perform a solubility test.

7.4 The customer service representative, or designate must initiate a pH and Preservation Checklist (PPC) (Figure 5) for liquid samples recorded on COC. The customer service representative, or designate will follow the following procedure to complete the PPC:

7.4.1 Record the name, Work order/P.O. #, and the project name where specified on the top portion of the PPC.

7.4.2 Record the sample ID of each liquid sample in the space provided on the PPC.

7.4.3 Record the analysis requested for each liquid sample in the space provided on the PPC.

7.4.4 Check the pH of each sample container, except for any sample container requiring volatiles analysis, containing a liquid as follows:

7.4.4.1 Mix sample by rotating sample end over end two or three times. In a hood, open sample container and to avoid possible contamination, place the cap on the bench top in the hood such that the underside of the cap is facing upward. Dip the indicator strip into the liquid sample.

7.4.4.2 To determine the pH of the sample compare the color that the sample turns the pH paper to the color chart included with the pH paper. The color chart provides the pH unit which corresponds to the color. Record the pH of the sample in the space provided on the PPC. Discard the pH paper. Recap the sample container.

7.4.4.3 Repeat 7.4.4.1 - 7.4.4.2 until the pH of each sample has been recorded on the PPC.

7.4.4.4 Record your name or initials and the date in the space provided on the PPC.

7.4.5 Review the analysis requested for each sample and determine whether pH upon receipt is the proper pH. (Figure 4 and Figure 6) Mark the appropriate box on the PPC. **NOTE: If any sample requires volatiles analysis and the COC indicates that the sample has been preserved with 1:1 HCl mark then mark the box labeled "YES". The pH will be checked by the Organic Lab staff after the analysis has been performed. If the COC does not indicate that the sample has been preserved with 1:1 HCl then mark the box labeled "NO".**

7.4.6 Any sample with a mark in the "YES" box or any sample requiring volatiles analysis with a mark in the "YES" or "NO" box under the "Proper pH" section of the PPC will not require preservation by CHES. Proceed to section 7.5.

7.4.7 Any remaining sample(s) with a mark in the "NO" box under the "Proper pH" section of the PPC will require preservation. For each sample requiring preservation, refer to Figures 4 and 6 for the appropriate

preservatives, place sample in a hood and add the proper preservative as follows:

7.4.7.1 Fill an appropriate disposable pipet with approximately 2 ml of the proper preservative and transfer to the sample container. This pipet may be saved and used repeatedly for dispensing the same preservative so long as it does not come into any contact with the samples or any other source of contamination. **NOTE: If the sample has any apparent reaction with the preservative, such as the generation of heat or the evolution of gas do not add any additional preservative and notify the customer service supervisor or a member of the safety committee. Do not attempt to preserve other liquid samples in that sample batch unless directed otherwise by the customer service supervisor or a member of the safety committee. Document your observations and actions in the notes section of the PPC.**

7.4.7.2 Mix sample by rotating sample end over end two or three times. Open sample container and to avoid possible contamination, place the cap on the bench top in the hood such that the underside of the cap is facing upward. Dip the indicator strip into the liquid sample.

7.4.7.3 To determine the pH of the sample compare the color that the sample turns the pH paper to the color chart included with the pH paper. The color chart provides the pH unit which corresponds to the color.

7.4.7.4 Repeat steps 7.4.7.1 to 7.4.7.3 until the sample pH is within the proper range or you have added more than 6 ml of preservative. **NOTE: Due to the nature of certain samples, sample preservation may not be possible.**

7.4.7.5 Record the preservative, the approximate amount used to adjust the pH and the final pH in the spaces provided on the PPC. If the pH of the sample could not be adjusted within the proper range with more than 6 ml of preservative indicate this in the "Notes" section of the PPC.

7.4.7.6 Repeat steps 7.4.7.1 thru 7.4.7.5 until the pH of each sample of the sample set is within the proper range or more than 6 ml of preservative has been added.

7.5 To acknowledge that each sample within the sample batch has been thoroughly examined and any problems and/or discrepancies have been noted on the appropriate SRC, the customer service representative or designate (the person inspecting the samples) must record their initials in the appropriate "Inspected by" section of the SRC and record the correct date in the space provided. At this point the customer service representative or designate has acknowledged ultimate responsibility for each sample within that sample batch. **NOTE: The "Logged-in by" section of the SRC will be completed by the person who logs the sample batch into the Laboratory Information System (LABSAM).**

7.6 The customer service representative, or designate must initiate a Client Contact Call Log (CCC) (Figure 7) for any "NO" response recorded on the SRC or any problems or discrepancies recorded in the respective notes section. Each problem and/or discrepancy must be described on the CCC. The customer service representative, or designate will follow the following procedure to initiate and complete the CCC:

7.6.1 Record the name of the person to whom you are making the call, your name, the name of the client and the name of the project where specified on the top portion of the CCC.

7.6.2 Within 24 hours of sample receipt, call the client or where appropriate, send an Electronic Mail (E-Mail) message to resolve problems or discrepancies. All verbal response(s) must be recorded on the Client Contact Call Log. The Client Contact Call Log or written documentation from the client will be attached to the original copy of the COC and the sample batch number will be recorded where specified on the CCC after the sample batch has been logged into LABSAM. **NOTE: The customer service representative, or designate who initials the SRC is responsible for making sure that all the appropriate documentation is attached to the original COC after the sample batch has been logged into LABSAM.**

7.6.3 The sample set(s) affected will be on hold until problems or discrepancies are resolved or the client requests that

the analysis or analyses commence. Within each login area there is a designated ambient, chilled and hooded storage area for samples which are on hold. The COC(s), SRC(s), and where appropriate PPH(s) must be retained with the samples. The CCC will be retained by the customer service representative, or designate until any problems or discrepancies have been resolved. **NOTE: Any samples which are known to be hazardous should be stored either in a hood or in flammable storage. If flammable storage is required notify the customer service representative so that an area within flammable storage can be designated for samples which are on hold.**

7.7 The customer service representative, or designate must place each sample batch with exclusively "YES" or "N/A" responses and no problems and/or discrepancies record on the SRC in appropriate temporary storage until the sample batch is logged into LABSAM. Within each login area there is a designated ambient, chilled and hooded storage area for sample batches which are to be logged into LABSAM. The COC(s), SRC(s), and where appropriate PPH(s) must be retained with the samples. Sample batches will be logged into LABSAM within 1 working day of sample receipt.

## 8.0 CALCULATION

Not applicable.

## 9.0 SPECIAL NOTES

9.1 Notify the customer service supervisor of any problems and/or discrepancies which are not clarified by the client. Document that the customer service supervisor was notified on the Client Contact Log.

9.2 Confirm any incoming rush analysis with the customer service supervisor and other appropriate laboratory supervisors.

## 10.0 QUALITY ASSURANCE/QUALITY CONTROL

Not applicable.

## 11.0 REFERENCES

11.1 "Environmental Protection Agency Regulations on Test Procedures for the Analysis of Pollutants", 40 CFR 136, August 15, 1990.

11.2 "Test Methods for Evaluating Solid Waste", SW-846, EPA, Third Edition, 1986, and First Update in 1987.

**Figure 1**
**Air Sample Receipt Checklist**

AIR
SAMPLE RECEIPT CHECKLIST
CHES BATCH #:_____ [SR-ASRC-04/93]

HOW DID SAMPLES ARRIVE AT CHES?_____(Retain Documentation)

CLIENT_____PROJECT NAME:_____P.O. #:_____

| Item # | Item | YES | N/A | NO |
|---|---|---|---|---|
| 1 | Where appropriate, is an intact custody seal present on transporting container? | | | |
| 2 | Is Chain-of-Custody (COC) present upon receipt of sample set? | | | |
| 3 | Is the following COC information complete:<br>a) Client name, project name, work order/P.O.#;<br>b) Client contact, client address and phone #;<br>c) Sample collectors name and date collected;<br>d) Whether or not sample set shipped;<br>e) Each sample I.D., date and time of sampling, matrix, requested analysis, number and type of sample containers and turnaround time. | | | |
| 4 | Does each sample label/tag match the sample information on the COC? | | | |
| 5 | Where required, is there an intact custody seal on each sample? | | | |
| 6 | Does the air worksheet include the following:<br>a) Information for one pump?<br>b) Pre and post pump calibration data?<br>c) Start and Stop times for pump?<br>d) Request for specific analysis?<br>e) Social security numbers where required?<br>f) Level of protection used?<br>g) Task information? | | | |
| 7 | Do the air samples appear to have been collected properly? | | | |
| 8 | Are endcaps present? | | | |
| 9 | Is there a blank for each set of air samples? | | | |

NOTES:

Inspected by_____Date:_____ Logged-in by_____Date:_____

**Figure 2**
**Non-Air Sample Receipt Checklist**

NON-AIR
SAMPLE RECEIPT CHECKLIST
[SR-SRC-04/93]

CHES BATCH #:_____

HOW DID SAMPLES ARRIVE AT CHES?_____(Retain Documentation)

CLIENT_____PROJECT NAME:_____P.O. #:_____

| Item # | Item | YES | N/A | NO |
|---|---|---|---|---|
| 1 | Where appropriate, is an intact custody seal present on transporting container? | | | |
| 2 | Is Chain-of-Custody (COC) present upon receipt of sample set? | | | |
| 3 | Is each sample chilled to 4 degrees C? | | | |
| 4 | Is the following COC information complete:<br>a) Client name, project name, work order/P.O.#?<br>b) Client contact, client address and phone #?<br>c) Sample collectors name and date collected?<br>d) Whether or not sample set shipped?<br>e) Whether or not sample set preserved and type of preservative used?<br>f) Each sample I.D., date and time of sampling, matrix, requested analysis, number and type of sample containers and turnaround time? | | | |
| 5 | Does each sample label/tag match the sample information on the COC? | | | |
| 6 | Where required, is there an intact custody seal on each sample? | | | |
| 7 | Is each sample intact, no breakage or leakage? | | | |
| 8 | Is each sample received within the proper holding time? | | | |
| 9 | Is each sample in an appropriate sample container for the specified analysis or analyses requested? | | | |
| 10 | Is sufficient sample aliquot provided? | | | |
| 11 | If more than one analysis is to be performed on a sample container are the analyses compatable? | | | |
| 12 | Is each sample matrix recorded on the COC accurate? | | | |

NOTES:

Inspected by_____Date:_____ Logged-in by_____Date:_____

**Figure 3**
**Chain-of-Custody**

CleanHarbors

Clean Harbors Analytical Services, Inc., 325 Wood Rd., Braintree, MA 02184 | CHAIN OF CUSTODY RECORD | Sample Custodian — (617) 849-1800 | Page of

Client _____ Project Name _____ Work Order/P.O. #: _____ Date: _____

Report To _____ Address _____ Phone #: _____

Date Samples Collected _____ by _____ Date Samples Received: _____

Airbill/Bill of Lading? Y N NOTE: Samples received unpreserved will be preserved upon arrival at CHAS. Samples were: Preserved Unpreserved

| Sample I.D | Sampling Information | | | | Analysis | | | | | | | | # of con. | CHAS Sample # |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Date | Time | Station Location | Sample Matrix | | | | | | | | | | |
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|---|---|---|---|---|---|---|---|---|---|
| Relinquished by: _____ Date: _____ Time: _____ | VOA Vial | | | | | | | | |
| | Glass Bottle | | | | | | | | |
| Received by: _____ Date: _____ Time: _____ | Plastic Bottle | | | | | | | | |
| Relinquished by: _____ Date: _____ Time: _____ | Pres. | | | | | | | | |
| | Volume | | | | | | | | |
| Received by: _____ Date: _____ Time: _____ | Preservation Key: A — Acidified with _____ B — Filtered. C — Sample chilled. D— NaOH. E — NaThiosulfate. W — Sample Ambient. F — Other | | | | | | | | |

REMARKS/COMMENTS: (Sample storage, nonstandard bottles, cautions, special instructions)

Standard laboratory turnaround time is 2 weeks from date of receipt. Accelerated turnaround may be assessed a surcharge.
Accelerated turnaround requested: _____
Confirmed by: _____ Surcharge: _____

Location of samples: _____
Turnaround: 24 Hrs. 48 Hrs. 1 Week 2 Weeks Other: _____

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# Figure 4
## Sample Containers, Preservatives and Holding Times Required for Environmental Samples

### ORGANIC ANALYSES
by Gas Chromatograph / Mass Spectroscopy

| Analysis | Container[1] | Preservative[2,3] /Volume | | Maximum Holding Time[4] | |
|---|---|---|---|---|---|
| | | Water | Solid/Waste | Water | Solid/Waste |
| Volatile Organics | G, Teflon lined septum or cap | COOL, 4°C, 0.008% $Na_2S_2O_3$[5], 1:1 HCL to pH 2[6] /(2) 40 ml. | COOL, 4°C /(1) 4 oz. | 14 days | 14 days |
| TCLP - Volatile Organics | G, Teflon lined septum or cap | COOL, 4°C, /(2) 40 ml. | COOL, 4°C /(1) 4 oz. | 14 days to TCLP extraction[7] | 14 days to TCLP extraction[7] |
| Base/Neutral & Acid Extractables | G, amber, Teflon lined cap | COOL, 4°C, 0.008% $Na_2S_2O_3$[5] /(1) liter | COOL, 4°C /(1) 16 oz. | 7 days | 14 days |
| TCLP - Base/Neutral & Acid Extractables | G, amber, Teflon lined cap | COOL, 4°C /(1) liter | COOL, 4°C /(1) 16 oz. | 14 days to TCLP extraction[8] | 14 days to TCLP extraction[8] |

### by Gas Chromatograph

| Analysis | Container[1] | Preservative[2,3] /Volume | | Maximum Holding Time[4] | |
|---|---|---|---|---|---|
| | | Water | Solid/Waste | Water | Solid/Waste |
| Purgeable Halocarbons | G, Teflon lined septum or cap | COOL, 4°C, 0.008% $Na_2S_2O_3$[5] /(2) 40 ml. | COOL, 4°C /(1) 4 oz. | 14 days | 14 days |
| Purgeable Aromatics - BTEX | G, Teflon lined septum or cap | COOL, 4°C, 0.008% $Na_2S_2O_3$[5], HCL to pH 2[6] /(2) 40 ml. | COOL, 4°C /(1) 4 oz. | 14 days | 14 days |
| Purgeable Halocarbons and Aromatics | G, Teflon lined septum or cap | COOL, 4°C, 0.008% $Na_2S_2O_3$[5], HCL to pH 2[6] /(2)40 ml. | COOL, 4°C /(1)4 oz. | 14 days | 14 days |

## Figure 4 (continued)

by Gas Chromatograph (continued)

| Analysis | Container[1] | Preservative[2,3] /Volume | | Maximum Holding Time[4] | |
|---|---|---|---|---|---|
| | | Water | Solid/Waste | Water | Solid/Waste |
| Organochlorine PCB's | G, Teflon lined cap | COOL, 4°C, 0.008% $Na_2S_2O_3$[5] /(1) liter | COOL, 4°C /(1) 16 oz. | 7 days | 14 days |
| Organochlorine Pesticides | G, Teflon lined cap | COOL, 4°C, pH 5-9[9] NaOH or $H_2SO_4$ /(1) liter | COOL, 4°C /(1) 16 oz. | 7 days | 14 days |
| TCLP - Pesticides | G, Teflon lined cap | COOL, 4°C, /(1) liter | COOL, 4°C /(1) 16 oz. | 14 days to TCLP extraction[8] | 14 days to TCLP extraction[8] |
| Chlorinated Herbicides | G, Teflon lined cap | COOL, 4°C, pH 5-9[9] /(1) liter | COOL, 4°C /(1) 16 oz. | 7 days | 14 days |
| TCLP - Chlorinated Herbicides | G, Teflon lined cap | COOL, 4°C, /(1) liter | COOL, 4°C /(1) 16 oz. | 14 days to TCLP extraction[8] | 14 days to TCLP extraction[8] |

### TRACE METALS ANALYSES

| Analysis | Container[1] | Preservative[2,3] /Volume | | Maximum Holding Time[4] | |
|---|---|---|---|---|---|
| | | Water | Solid/Waste | Water | Solid/Waste |
| Mercury (Hg) - Cold Vapor | P, G | $HNO_3$ to pH <2 /500 ml. | COOL, 4°C /(1) 4 oz. | 28 days | 28 days |
| TCLP - Mercury | P, G | COOL, 4°C /500 ml. | COOL, 4°C /(1) 4 oz. | 28 days to TCLP extraction[10] | 28 days to TCLP extraction[10] |
| Chromium (Cr VI) - Hexavalent L | P, G | COOL, 4°C /(1) liter | --- | 24 hours | --- |
| Metals - Total (except Hg and Cr VI) | P, G | $HNO_3$ to pH <2 /(1) liter | COOL, 4°C /(1) 4 oz. | 6 months | 6 months |
| TCLP - Metals (except Hg) | P, G | COOL, 4°C /(1) liter | COOL, 4°C /(1) 4 oz. | 180 days to TCLP extraction[11] | 180 days to TCLP extraction[11] |

## Figure 4 (continued)

TRACE METALS ANALYSES (continued)

| Analysis | Container[1] | Preservative[2,3] /Volume | | Maximum Holding Time[4] | |
|---|---|---|---|---|---|
| | | Water | Solid/Waste | Water | Solid/Waste |
| Metals - Dissolved (except Hg and Cr VI) | P, G | FILTER $HNO_3$ to pH <2 /(1) liter | COOL, 4°C /(1) 4 oz. | 6 months | 6 months |
| Metals - Suspended (except Hg and Cr VI) | P, G | FILTER /(1) liter | COOL, 4°C /(1) 4 oz. | 6 months | 6 months |

INORGANIC ANALYSES

| Analysis | Container[1] | Preservative[2,3] /Volume | | Maximum Holding Time[4] | |
|---|---|---|---|---|---|
| | | Water | Solid/Waste | Water | Solid/Waste |
| Acidity (to pH 8.2) | P, G | COOL, 4°C /250 ml. | --- | 14 days | --- |
| Alkalinity (to pH 4.5) | P, G | COOL, 4°C /500 ml. | --- | 14 days | --- |
| Bacteria | | | | | |
| - Fecal Coliform | P, G | COOL, 4°C, 0.008% $Na_2S_2O_3$[5] /250 ml. | --- | 6 hours | --- |
| - Fecal Streptococci | P, G | COOL, 4°C, 0.008% $Na_2S_2O_3$[5] /250 ml. | --- | 6 hours | --- |
| - Total Coliform | P, G | COOL, 4°C, 0.008% $Na_2S_2O_3$[5] /250 ml. | --- | 6 hours | --- |
| Biochemical Oxygen Demand | P, G | COOL, 4°C /(1) liter | --- | 48 hours | --- |
| Bromide | P, G | NONE REQUIRED /500 ml. | --- | 28 days | --- |
| Chemical Oxygen Demand | P, G | COOL, 4°C, $H_2SO_4$ to pH <2 /100 ml. | --- | 28 days | --- |

Figure 4 (continued)

INORGANIC ANALYSES (Continued)

| Analysis | Container[1] | Preservative[2,3] /Volume | | Maximum Holding Time[4] | |
|---|---|---|---|---|---|
| | | Water | Solid/Waste | Water | Solid/Waste |
| Chloride | P, G | NONE REQUIRED /500 ml. | --- | 28 days | --- |
| Chlorine, Total residual | P, G | NONE REQUIRED /500 ml. | --- | ANALYZE IMMEDIATELY | --- |
| Color | | | | | |
| - Apparent | P, G | COOL, 4°C /500 ml. | --- | 48 hours | --- |
| - True | P, G | COOL, 4°C /500 ml. | --- | 48 hours | --- |
| Conductance, Specific | P, G | COOL, 4°C /500 ml. | --- | 28 days | --- |
| Cyanide | | | | | |
| - Total | P, G | COOL, 4°C, NaOH to pH > 12, 0.6 g of ascorbic acid[5] /(1) liter | COOL, 4°C /(1) 16 oz. | 14 days | 14 days |
| - Amenable to Chlorination | P, G | COOL, 4°C, NaOH to pH > 12, 0.6 g of ascorbic acid[5] /(1) liter | COOL, 4°C /(1) 16 oz. | 14 days | 14 days |
| Detergents (LAS Surfactant) | P, G | COOL, 4°C /500 ml. | --- | 48 hours | --- |
| Fluoride | P | NONE REQUIRED /500 ml. | --- | 28 days | --- |
| Hardness | P, G | COOL, 4°C, $HNO_3$ or $H_2SO_4$ to pH <2 /250 ml. | --- | 6 months | --- |
| Halogens, Total | G, Teflon lined cap | --- | COOL, 4°C /(1) 16 oz. | --- | --- |

Figure 4 (continued)
INORGANIC ANALYSES (Continued)

| Analysis | Container[1] | Preservative[2,3] /Volume | | Maximum Holding Time[4] | |
|---|---|---|---|---|---|
| | | Water | Solid/Waste | Water | Solid/Waste |
| Halogens, Organic | G, amber, Teflon lined cap | COOL, 4°C, $H_2SO_4$ to pH <2 /(1) liter | --- | 28 days | --- |
| Nitrogen | | | | | |
| - Ammonia | P, G | COOL, 4°C, $H_2SO_4$ to pH <2 /(1) liter | --- | 28 days | --- |
| - Kjeldahl | P, G | COOL, 4°C, $H_2SO_4$ to pH <2 /(1) liter | --- | 28 days | --- |
| - Nitrate | P, G | COOL, 4°C, $H_2SO_4$ to pH <2 /250 ml. | --- | 48 hours | --- |
| - Nitrate & Nitrite | P, G | Remove a portion for Nitrite analysis, COOL, 4°C; remaining portion is for Nitrate analysis, COOL, 4°C, $H_2SO_4$ to pH <2 /500 ml. | --- | 28 days | --- |
| - Nitrite | P, G | COOL, 4°C /250 ml. | --- | 48 hours | --- |
| - Organic | P, G | COOL, 4°C, $H_2SO_4$ to pH <2 /(1) liter | --- | 28 days | --- |
| Oil & Grease | | | | | |
| Gravimetric | | | | | |
| - Total | G | COOL, 4°C, HCl or $H_2SO_4$ to pH < 2 /(1) liter | COOL, 4°C (1) 16 oz. | 28 days | 28 days |
| - Petroleum Hydrocarbon | G | COOL, 4°C, HCl or $H_2SO_4$ to pH < 2 /(1) liter | COOL, 4°C (1) 16 oz. | 28 days | 28 days |

## Figure 4 (continued)

INORGANIC ANALYSES (Continued)

| Analysis | Container[1] | Preservative[2,3] /Volume | | Maximum Holding Time[4] | |
|---|---|---|---|---|---|
| | | Water | Solid/Waste | Water | Solid/Waste |
| Oil and Grease (continued) | | | | | |
| Infrared (IR) | | | | | |
| - Total | G | COOL, 4°C, HCl or $H_2SO_4$ to pH < 2 /(1) liter | COOL, 4°C /(1) 16 oz. | 28 days | 28 days |
| - Petroleum Hydrocarbon | G | COOL, 4°C, HCl or $H_2SO_4$ to pH < 2 /(1) liter | COOL, 4°C /(1) 16 oz. | 28 days | 28 days |
| Flame Ionization Detection (FID) | | | | | |
| - Petroleum Hydrocarbon | G | COOL, 4°C, HCl or $H_2SO_4$ to pH < 2 /(1) liter | COOL, 4°C /(1) 16 oz. | 7 days | 14 days |
| pH | P, G | NONE REQUIRED /500 ml. | NONE REQUIRED /(1) 4 oz. | 24 hours | 24 hours |
| Phenols - Total | G only | COOL, 4°C, $H_2SO_4$ to pH <2 /500 ml. | --- | 28 days | --- |
| Phosphorus | | | | | |
| - Total | P, G | COOL, 4°C, $H_2SO_4$ to pH <2 /250 ml. | --- | 28 days | --- |
| - Orthophosphate | P, G | COOL, 4°C /250 ml. | --- | 48 hours | --- |
| Solids | | | | | |
| - Total | P, G | COOL, 4°C /(1) liter | COOL, 4°C /(1) 4 oz. | 7 days | 7 days |
| - Total Dissolved | P, G | COOL, 4°C /(1) liter | --- | 7 days | --- |
| - Total Suspended | P, G | COOL, 4°C /(1) liter | --- | 7 days | --- |

## Figure 4 (continued)

INORGANIC ANALYSES (Continued)

| Analysis | Container[1] | Preservative[2,3] /Volume | | Maximum Holding Time[4] | |
|---|---|---|---|---|---|
| | | Water | Solid/Waste | Water | Solid/Waste |
| Solids (continued) | | | | | |
| - Settleable | P, G | COOL, 4°C /(1) liter | --- | 48 hours | --- |
| - Total Volatile | P, G | COOL, 4°C /(1) liter | COOL, 4°C /(1) 4 oz. | 7 days | 7 days |
| Sulfate | P, G | COOL, 4°C /500 ml. | --- | 28 days | --- |
| Sulfide - Total | P, G | COOL, 4°C and add zinc acetate plus sodium hydroxide to pH > 9 /250 ml. | --- | 7 days | --- |
| Sulfite | P, G | NONE REQUIRED /500 ml. | — | ANALYZE IMMEDIATELY | --- |
| Total Organic Carbon | P, G | COOL, 4°C, HCL or $H_2SO_4$ to pH <2 /(2) 40 ml. | COOL, 4°C (1) 4 oz. | 28 days | 28 days |
| Turbidity | P, G | COOL, 4°C /500 ml. | --- | 48 hours | --- |
| Tritium | P, G | None /(1) liter | --- | 6 months | --- |

**Figure 4 (continued)**
**Notes**

1 Glass (G), Polyethylene (P).

2 Sample preservation should be performed immediately upon sample collection by the field team. Clean Harbors Environmental Services, Inc. will provide preservatives upon request. For composite samples each aliquot should be preserved at the time of collection. When use of an automatic sampler makes it impossible to preserve each aliquot, then samples may be preserved by maintaining them at 4° until compositing and sample splitting are complete.

3 When any sample is to be shipped by common carrier or sent through the US Mail, it must comply with the Department of Transportation Hazardous Materials Regulations (49 CFR Part 172). For preservatives listed, the Department of Transportation has determined that the Hazardous Materials Regulations do not apply to the following materials: HCL in water solutions at concentrations of 0.04% by weight or less (pH about 1.62 or greater); and NaOH in water solutions at concentrations of 0.080% by weight or less (pH about 12.30 or less).

4 Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that all samples may be held before results are still considered valid. Samples may be held for longer periods only if the permitted, monitoring laboratory, has data on file to show that the specific types of samples under study are stable for the longer time.

5 Should only be used in the presence of residual chlorine.

6 Samples receiving no pH adjustment must be analyzed within seven days of sampling. If the laboratory can be assured that the aqueous samples have been pH adjusted, a holding time of 14 days is acceptable.

7 Maximum holding time from TCLP extraction to the determinative analysis is 14 days.

8 Maximum holding time from TCLP extraction to preparative extraction is 7 days and maximum holding time from preparative extraction to determinative analysis is 40 days.

9 The pH adjustment may be performed upon receipt at the laboratory and may be omitted if the samples are extracted within 72 hours of collection. For the analysis of aldrin, add 0.008% $Na_2S_2O_3$ when residual chlorine is present.

10 Maximum holding time from TCLP extraction to the determinative analysis is 28 days.

11 Maximum holding time from TCLP extraction to the determinative analysis is 180 days.

**Figure 5**
**pH and Preservation Checklist**

CleanHarbors pH AND PRESERVATION CHECKLIST (SR-PPC-04/93)

CHES BATCH #: _____

CLIENT _____ PROJECT NAME: _____ P.O. #: _____

| Sample ID of each container | Analysis Requested | pH upon Receipt | Proper pH? YES | N/A | NO | pH adjusted with | amount of pres. in ml | Final pH |
|---|---|---|---|---|---|---|---|---|
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NOTES:

pH checked by: _____ Date: _____

pH adjusted by: _____ Date: _____

**Figure 6**
**Preservation Summary**

[SR-PRES-04/93]

PRESERVATION SUMMARY

| | |
|---|---|
| A | Analyses Which Require the pH of Aqueous Samples to be Adjusted to 5-9 with 10N SODIUM HYDROXIDE OR CONCENTRATED SULFURIC ACID<br>Pesticides — Herbicides |
| B | Analyses Which Require Aqueous Samples to be Preserved With CONCENTRATED HYDROCHLORIC ACID TO pH <2<br>Total Oil and Grease — Total Petroleum Hydrocarbons |
| C | Analyses Which Require Aqueous Samples to be Preserved With CONCENTRATED NITRIC ACID TO pH <2<br>Hardness<br>Total Metals (except hexavalent chromium)<br>Dissolved Metals<br>(NOTE:If not field filtered, filter prior to preservation) |
| D | Analyses Which Require Aqueous Samples to be Preserved With CONCENTRATED SULFURIC ACID TO pH <2<br>Phenols — Total Kjeldahl Nitrogen<br>Ammonia — Total Organic Nitrogen<br>Total Phosphate — Chemical Oxygen Demand (COD)<br>Nitrate (only)* — Total Organic Carbon (TOC)<br>* If combined Nitrate/Nitrite remove portion for Nitrite and then preserve Nitrate portion with Concentrated Sulfuric Acid to pH <2 |
| E | Analyses Which Require Aqueous Samples to be Preserved With 10N SODIUM HYDROXIDE TO pH >12<br>Total Cyanide — Amenable Cyanide |
| F | Analyses Which Require Aqueous Samples to be Preserved With 10N SODIUM HYDROXIDE AND 4 DROPS OF 2N ZINC ACETATE per/100 ml of sample<br>Sulfide |

| | SPECIAL NOTES |
|---|---|
| 1 | All samples, except air samples and those requiring metals analyses only, require refrigeration at 4 degrees C. |
| 2 | Do not preserve TCLP samples, they are not preserved before extraction. |
| 3 | Volatile organic samples are to be preserved in the field with 2 drops 1:1 HYDROCHLORIC ACID. |
| 4 | Volatile organic samples containing residual chlorine are preserved in the field with 2 drops 1:1 HYDROCHLORIC ACID and 0.008% SODIUM THIOSULFATE. |
| 5 | Base neutral/acid extractable, Pesticide, Herbicide and PCB samples containing residual chlorine are preserved in the field with 0.008% SODIUM THIOSULFATE. |
| 6 | Cyanide and amenable cyanide samples containing residual chlorine are preserved in the field with 10 N SODIUM HYDROXIDE to pH >12 and 0.6 g of ASCORBIC ACID. |

Figure 7
Client Contact Call Log

[SR-CCC-04/93]

CLIENT CONTACT CALL LOG

TO: _____ FROM: _____

CLIENT: _____ PROJECT NAME: _____

CHES BATCH #: _____

| DATE | NOTES |
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11

CleanHarbors

# POLICY STATEMENT
# CONFINED SPACES ENTRY
# POLICY

Confined spaces may only be entered when one or more of the followingcondition(s) are met:

A. The space is mechanically ventilated;
B. Level B protection is utilized;
C. A Health and Safety Representative grants an exemption from Condition (1) and/or (2).

**AND**

the following guidelines are followed: (Numbers in parenthesis refer to sections of the Confined Space Entry Guidelines, attached.)

1. Training - The foreman must have received recent (within one year) training on confined space entry and rescue techniques;

2. CPR/First Aid - A minimum of two employees working the operation must maintain current (within one year), valid CPR/Basic First Aid Training. One of these individuals must remain outside the space at all times. (See III. J.)

3. Monitoring - Each space must be monitored prior to entry and at periodic intervals thereafter. (See III. B.)

4. Permit - A Confined Space entry permit is properly and thoroughly completed and valid for appropriate time periods. (See III. E.)

5. Energy Isolation - The space is isolated from all mechanical, pneumatic, hydraulic, electrical, etc. forms of energy that may be inadvertently or unexpectedly introduced to the space. (See III. C.)

6. Emergency Procedures - Emergency procedures have been established and discussed with all crew members and other appropriate parties (i.e. property owners, general contractors, subcontractor, etc.) (See III. H.)

7. Communication Systems - Communication system has been established and understood by all parties involved in the operation. (See III. D.)

8. Hot Work - CHI's Hot Work Guidelines are referenced and thoroughly applied when "hot work" operations will take place. (See III. K.)

9. Personal Protective Equipment (PPE) \- PPE is selected based on the anticipated hazards and used as intended. (See III. F.)

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10. Other Safety Equipment - Appropriate other safety equipment is selected based on the hazard, is available and appropriately utilized. (See III. G.)

11. Safety Meeting - A safety meeting to discuss appropriate information is conducted by the Foreman at the appropriate frequency and properly documented. (See III. A.)

This policy is supplemented by the Confined Space Entry Guidelinesand additional written material on the subject outlined in the 40hour training manual.

**THIS POLICY AND THE GUIDELINES SUPERSEDE ALL OTHER GUIDELINES ISSUED ON THE SUBJECT**

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# CONFINED SPACE ENTRY GUIDELINES

These guidelines specify the steps that should be followed prior to and during entry into confined spaces.

## I. Background

Confined Spaces are locations that by design satisfy the following definition:

- Limited means of entry or exit; (Limited by configuration, location, size, number, etc.)
- Poor natural ventilation that could contain, retain or produce an: oxygen deficient, flammable or toxic atmosphere; and
- Not intended for continuous worker occupancy.

Confined spaces present the risk of oxygen deficiency, flammable atmosphere and/or toxic environments as well as physical hazards such as electrocution, mechanical activation, inadequate lighting, etc. Confined space entry risks can be minimized by understanding the hazards and taking appropriate corrective action.

Clean Harbors, Inc. (CHI) confined space entry program is designed to enable CHI employees to identify confined space hazards and manage these risks. The program includes: instruction in confined space hazards (provided during CHI's 40 hour training program and during "periodic" training); written hazard information; guidance in the "Policy and Procedures Manual"; and practical instruction provided during 40 hour training. This Guideline completes the elements of CHI's confined space program. Please contact the Health and Safety Department for special precautions or additional information.

## II. Responsibilities

### A. Foreman

#### 1. General

The foreman (lead person) is responsible for both the thorough completion and safety of all aspects of confined space entry operations to which they are assigned. He/she has the authority to assign responsibilities; the the authority to hold crew members accountable for those responsibilities; and the responsibility to discontinue operations if any situation poses a threat to the safety of the operation or crew members.

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2. Specific Responsibilities

- Assign responsibilities (tasks); Conduct and document the safety meeting;

- Select appropriate safety equipment - Respirator, protective clothing, lighting, rescue equipment;
- Identify unique characteristics of the space;
- Assure the communication system is established; and
- Assure all participants are familiar with emergency procedures and the above information.

**B. Standby - (Also called Attendant)**

- Conduct appropriate monitoring of the space;
- Maintain constant communications;
- Initiate rescue procedures (if required);
- Discontinue operations in the event the safety of the operation is compromised; and
- Document monitoring results and operational conditions on permits.

**C. Entrants**

- Understand characteristics of the space;
- Adhere to all instructions provided by the Foreman (lead person) and Standby;
- Notify Standby and Foreman of any conditions that compromise the safe conduct of a confined space entry; and
- Wear all assigned safety equipment.

**D. Health and Safety**

- Provide technical assistance to aid crews to identify space characteristics; and
- Conduct site visits to audit compliance with these guidelines.

## III. Entry Guidelines

### A. Safety Meeting

1. Frequency

- A Safety meeting should be conducted at the following times:
  - Prior to the start of any activity;

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- Once the foreman has characterized the space (prior to the start of any activity);
- Whenever new tasks are initiated-such as when the next boiler in a series will be entered;

• For newly assigned entrants, standby, etc.; and
- A minimum of once per shift, preferably at the start of each operation.

2. Content

• The following information must be discussed:

- Chemical and physical hazards of the space and surrounding
- Rescue procedures;
- Material Safety Data Sheets;
- Work assignments; and
- Responsibility of each job function.

3. Documentation

a. The foreman (or his/her designee) must document the following information on the Confined Space Permit:

• Information discussed;
- Those in attendance;
- Any questions posed by the crew; and
- Work assignments.

b. Signature

• Each crew member must sign the permit once they are satisfied they understand all operational and safety aspects of the assigned work.

c. Withholding Signature

• Any crew member who has not had his/her questions answered to their satisfaction , does not thoroughly understand their responsibilities, or is unsure of methods to safely perform the operation may withhold their signature until their questions are answered and the information is provided. No entrants will be compelled to enter a confined space until they understand and agree to information indicated in A.2 above.

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d. Agreement

- An entrants signature is his/her indication that they understand the hazards, agree to their responsibilities and have had all questions answered to their satisfaction.

- No entrant shall be compelled to sign his/her name but should do so only after receiving adequate explanation of applicable information.

## B. Monitoring

1. Substances - The following substances must be evaluated (in the order listed below):

   - Oxygen;
     - Combustible Gas; and
     - Toxic.

2. Monitoring Locations

   A representative number of locations and samples must be obtained to properly characterize the space.

   a. General

   This should be done from OUTSIDE the space, initially and continued while work is being performed. See section B.6. if the entire space cannot be characterized from OUTSIDE prior to entry.

   The following should be considered:

   - Remote locations;
   - Space Volume - larger spaces require more samples; and
   - Sumps, low spots, dead spots.

   b. Locations

| SPACE VOLUME IN GALLONS) | HEIGHT/ or WIDTH | MINIMUM SAMPLING LOCATIONS |
|---|---|---|
| 20,000 | feet | 1 |
| 20,000-50,000 | 20 fee | 2 |
| 50,000-100,000 | 30 feet | 3 |
| >100,000 | 50 feet | 4 |

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3. Monitoring Guidelines

The top, middle and bottom at each location shall be evaluated as chemical may stratify.

Remote locations, where chemicals may accumulate must also be evaluated. This may require entry to accomplish. See Section B.6.

4. Frequency

a. General - So far as possible, the standby should evaluate the substances identified in B.1. above, continuously.

b. Monitoring Frequency - Standard conditions. If standard concentrations (indicated in B.5. below) were found in each location upon initial evaluation and no hazard increasing activity (See B.7.) are being performed, the frequency of monitoring may be reduced to once every 15 minutes.

c. Spaces shall be remonitored before re-entry when:

- All entrants leave the space, i.e. for breaks
  - Space lapse from view of standby

5. a. Acceptable Conditions

| MATERIAL | ACCEPTABLE CONCENTRATIONS |
|---|---|
| Oxygen | 19.5 - 22.0%; |
| Flammable | <10% LEL; AND |
| Toxic | <1/2 the "Allowable Limit" |

b. "Non-Standard" Conditions

If the following situations occur, additional action must be taken to reduce the potential hazards:

- Concentrations beyond the range listed in B.5.a. are detected;
  - All materials listed under Acceptable Conditions cannot be measured;
- The entire space cannot be characterized;
  - "Unknown" conditions exist.

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c. Methods to Obtain Acceptable Conditions - The following action may help bring or maintain AcceptableConditions or permit entry in "non-standard"situations:

- Ventilation;
  - Level "B" protection;
  - Remove product from the space (from outside);
  - Clean the space (from outside); and
  - Inert the atmosphere (contact Health and Safety prior to inerting any Confined Space where ENTRY will be performed).

d. Restricted Entry

A confined space containing any of the following conditions SHALL NOT be entered:

- LEL is greater than 10%;
  - Oxygen Concentration exceeds 22.0%;and
  - One-half the IDLH is exceeded.

6. <u>Entry for Representative air monitoring</u>

a. If entire space cannot be adequately monitored from the outside, the first person entering the space must monitor remote locations. (Entry to perform this work can only be done when ACCEPTABLE CONCENTRATIONS are found at all (any) accessible monitoring location and B.5.d. conditions do not exist) If ACCEPTABLE CONCENTRATIONS are not found, entry cannot occur. (Contact Health and Safety.) The person performing this operation must use the following equipment:

- Airline respirator with escape bottle or SCBA;
  - Harness, lifeline and tethered; (Refer to Section G.1.C.)
  - Appropriate protective clothing; and
  - Adequate lighting.

NOTE: A tripod and extraction winch must be used during this aspect of the operation.

b. Standby - During this in-space monitoring, the standby person must be suited in a harness wearing an SCBA without the facepiece on, or a separate airline (cascade) system available. (Refer to II.B. for additional requirements.)

c. Verbal Communications must be continuous

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d. If there is failure of communication for 15-30 seconds, the crew should begin pulling the entry person out with the winch (Special considerations may be required if the space is baffled). Entry of the standby may be necessary. Emergency assistance must be sought and available on-site before rescue is initiated first. (See Rescue III. H.)

e.. Once the entire space is tested and ACCEPTABLE CONCENTRATIONS are attained the space may be entered. If Acceptable Concentrations are not found refer to III.B.5. b-d.

f. Record the air monitoring readings on the CONFINED SPACE PERMIT.

g. The first entry person should discuss any hazards observed in the space with the crew.

7. Hazard Increasing Activities

The following activities may increase the hazards that exists inside the space. Hazards may develop as a result of these activities. Therefore, special considerations should be given to precautions including: more frequent monitoring; ventilation; mandatory rescue equipment; more effective lighting; etc.

- Cleaning with chemicals;
- Welding and/or cutting (whether oxy-acetylene, sawzall, etc.);
- Movement of sludges, i.e. "mucking";
- Exhaust producing equipment used in the space i.e. generators, vehicles; and
- Space cannot be thoroughly characterized.

8. Documentation

All readings must be recorded on:

- Confined Entry Permit;
- Air Monitoring Log form;
- Additional forms; and
- Blank paper, if additional room is needed.

9. Monitoring - Where mechanical ventilation is used. To monitor a space where ventilation is used, it will be necessary to shut down the ventilation during monitoring (if this does not create am Immediately Dangerous to Life and Health (IDLH) situation.) Immediately upon the shut down of the system, the space should be evacuated following information in Section III.B.

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If ventilation is used, monitoring frequency may be reduced to once every 15 minutes, if the above guidelines are followed.

Alternative monitoring methods when using mechanical ventilation may be available. Contact the Manager- Occupational Health and Safety.

## C. Isolation

1. General - To assure that mechanical and electrical energy or chemicals are not inadvertently or unexpectedly introduced to the space, the space must be isolated.

2. Product Lines

   a. General Requirements

      - Physically disconnect all product lines;
      - Block all lines (Double block with "pans");
      - Bleed materials from both sections;
      - Disconnect and block overflow lines;
      - Alternatives (May be used with concurrence of Health and Safety) including:
      - Close valves and remove handles;
      - lock-out and tag-out each valve;
        - Remove product from drain valve;
      - Check to assure that drain valves are not plugged; and
      - Refer to CHI's Lock-out/Tag-out program

   b. Location - Any blanking should be done at the flange nearest the space.

3. Mechanical - Refer to CHI's Lock-out/Tag-out program.

4. Electrical - Refer to CHI's Lock-out/Tag-out program.

## D. Communications

1. General

   Prior to any entry, an adequate system of communication must be established between the standby and entrants. This must be assured by the foreman. This may be in the form of electronic, verbal, line-jerk signals, or sound (i.e. periodic taps on a vessel.)

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2. Communication Interruption

If communication is interrupted for more than 30 SECONDS, an emergency may exist and the Standby MUST call for an emergency and initiate rescue procedures.

E. Permit

1. Responsibility

a. Foreman - The foreman is responsible for recording meeting minutes, appropriate protective equipment, unusual conditions, space hazards, and othe information pertinent to the entry.

b. Standby - The standby person is responsible for recording monitoring results, entrants in and out times, etc. on the permit.

2. Completion

A permit must be completed for each confined space that is entered. If a job requires entering several different spaces, for example two or three different boilers in one building, one permit must be completed for each boiler.

3. Expiration

A permit is valid for the lesser of the following:

- One shift (not to exceed eight (8) hours
- When a new crew is assigned
- If the space lapses from view, such as during lunch breaks
- If the crew leaves the site

4. Form

The Confined Space Permit/Hazardous Work Permit shall be used and thoroughly completed.

F. Personal Protective Equipment (PPE)

1. Selection - Selection of personal protective equipment will be based on site conditions. The Health and Safety Guidance Manual will be consulted for selection of respirators and protective clothing.

2. Equipment - The following must be considered when evaluating appropriate personal protective equipment.

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a. Respirator - Refer to CHI's Respiratory Protection Program
   - Level "B" is REQUIRED for entry into the following spaces:
   - When organic vapor concentrations exceed ten times, one-half the allowable limit or 1000 ppm, whichever is lower;
   - If a chemical cartridge is not available or provides inadequate protection at concentrations measured for substances known to be present; and
   - If substance cannot be monitored (Egress unit must be used.).
   - Oxygen levels are below 19.5%

b. Protective Clothing - Refer to the Chemical Protective Clothing Program for:

   - Clothing; and
   - Gloves.

c. Eye Protection -

   1. <u>Considerations</u>

      - form of material i.e. dust, liquid, vapor, projectile, etc.
      - Energy exerted - If this is anticipated, you may wish to increase level of eye protection.

   2. <u>Forms</u>

      a) Eyeglasses with side shield - minimum requirement- acceptable in situation where no forcible projectile, flying objects, (liquid or solid) is anticipated. Not acceptable for liquids handling.

      b) Goggles - When solid material is being handled and flying objects can be anticipated. i.e. digging, grinding, solid substance mixing, pick work, etc.

      c) Chemical Protective Goggles - Required whenever handling liquid material that can splash. Required for all liquids including acids, caustics, solvents.

      d) Face Shield - A face shield is required when handling acids and caustics.

      NOTE - Whenever caustic, acidic or solventsliquids are handled a mechanism to flush the eyes and face must be available.

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e) Substitution - Full facepiece respirators (where applicable) may be substituted where it provides equal or greater protection.

d. Hearing Protection - This equipment is required whenever mechanical, electrical or pneumatic equipment is used on a site or force will be applied i.e. hammering, pounding, etc.

e. Foot Protection - Steel toe shoes are required on all CHI operations.

Rubber overboots may also be necessary to protect employees. These must be steel toe unless they can fit over employee's steel toe shoes.

f. Head Protection - Hard hats are required whenever an overhead hazard exists or projectiles are anticipated.

3. Minimum Required PPE

The following PPE must be worn on every Confined Space Entry:

- Appropriate Respirator Protection - Unless an exemption is granted by Health and Safety;
  - Protective Clothing;
  - Eye Protection; and
  - Foot Protection.

G. Other Safety Equipment

1. Tripod, Rogliss, Harness, Lifeline

a. Harness, Safety Belt, Lifeline

Each employee entering a confined space shall wear an an approved safety harness (or safety belt with the concurrence of the Health and Safety Department.) When entry into a confined space is deeper than four (4) feet, an approved life line should be attached. (See C below.)

b. Tripod and Extraction Devices

There are few situations where this equipment will not be required. However, it must be used in the following situations:

- When Acceptable Concentrations are not found or anticipated;

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- Where an employee must enter the space to obtain representative atmospheric monitoring;
  - Where level "B" is required (See III.F. 2.a.)
  NOTE: If Level "B" is used to provide an extra measure of protection (not required) this equipment is not required, if other conditions requiring the equipment do not exist; and
- If descents greater than 10 feet (straight drop) in height is encountered and required for entry.

c. Consult Health and Safety for guidance in the following circumstances:

- Multiple person entries where fouling of the life lines can occur;
- The space contains baffles or other obstructions that may inhibit removal with life lines.

2. Fire Extinguisher

A minimum of two (2) fire extinguishers are required for each space. A minimum of the following is necessary:

10A: 40B:C

3. Flushing Equipment

Whenever acid or caustic material are handled, a means to flushing the eyes, face, or body must be available. Flushing equipment can include:
- Eye wash;
- Safety shower; or
- Water hose (low pressure "garden" type hose.)

The flushing equipment need not be owned by Clean Harbors so long as it is:

- functional (provides adequate flushing capabilities);
- readily accessible (within 10 feet of the space portal);
- pH is neutral; and
- available for use.

4. Lighting

- All work areas shall be adequately lighted for the work being performed.

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- Portable lighting fed by 110 volt supply must be equipped with either:

  - a low voltage isolation transformer; or
  - protected with a ground fault circuit interrupter (GFCI)

- All lighting equipment shall be approved for use in Class I, Division I Hazardous location.

## H. Emergency Procedures

In the event communications are interrupted (See Section III.D.) or an emergency develops, the following steps must be initiated by the Standby Person:

- Lower background noise;
- Call for an emergency - This can be verbal, i.e. yelling out, or calling fire, police, rescue numbers listed on the permit;
- Assess problem;
- Attempt to remove entrants if lifelines are used and the emergency is not a physical injury;
- Don rescue PPE (SCBA, or separate air line with escape unit, harness, lifeline);
- Prepare to provide information to rescue personnel;
- DO NOT ENTER - Wait for arrival of rescue personnel.
- Never enter a space to initiate rescue unless the reason for the emergency has been determined and qualified assistance is available.

NOTE: If ventilation equipment is available and a oxygen deficiency or toxic atmosphere is anticipated, begin or increase air movement into the space. DO NOT do this if the emergency is a fire.

## I. Mechanical Ventilation

### A. General

Ventilation may be used to:

- Maintain Acceptable Concentrations;
- Reduce the hazard presented by toxic, oxygen deficient or flammable environment; and
- Dilute concentration to standard concentration.

### B. Technique

- Air should be exhausted from the space;

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- Only pneumatic driven eductors ("Coppus Blowers") are acceptable (Contact Health and Safety if another form is needed);
- Down wind locations must be monitored to assure toxic and flammable material does not create a hazard. This should be done every 15 minutes.

*NOTE:* The Standby may not be available to do this as a result of communication responsibilities;

- The eductor must be properly bonded and grounded;
- Arrange the unit to avoid recirculation or channeling of air;
- Remove air at the point closest to the location of maximum contamination. i.e. directly above a pool of oil at the bottom of a tank; and
- Arrange the system so that fresh air is drawn through the employee's breathing zone.

## J. CPR/Basic First Aid

A minimum of two people working on each Confined Space Entry must maintain current (within one year) valid CPR/ Basic First Aid training.

One of the CPR/Basic Training First Aid must remain outside the space at all times.

## K. Hot Work

Refer to CHI's Hot Work Guidelines.

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# CLEAN HARBORS ENVIRONMENTAL SERVICES, INC.

# LOAD PREPARATION CHECKLISTS
# &
# GRID SHEET

## CLEAN HARBORS ENVIRONMENTAL SERVICES, INC. DRIVER PAPERWORK CHECKLIST

The following paperwork is required to accompany each shipment of haradous waste, state regulated waste or non-hazardous waste if the document(s) listed below are checked:

| CHECK BOX IF FORM IS REQUIRED | DESCRIPTION OF DOCUMENT |
|---|---|
| | **PRIMARY SHIPPING PAPER:** |
| ☐ | Hazardous waste manifest for all shipments of hazardous waste: |
| | or |
| ☐ | Bill of lading or manifest for all non-hazardous waste streams. |
| ☐ | **LANDBAN FORM**<br>Required for all manifests that have an EPA waste code(s) listed in section I (Waste No.) beginning with the letters D, F, U, K or P. The only exception is the waste codes D018 - D043 which will not require a landban form until December 19, 1994. |
| ☐ | **LANDBAN FORM F039 ADDENDUM**<br>Required whenever a D001 or D002 is listed on a Landban Form and the column under Wastewater or Nonwastewater has "DEACT" and meet F039" checked off. |
| ☐ | **PCBS**<br>The following information must be listed on the manifest or a TSCA continuation sheet whenever PCBs are shipped:<br>- The date of removal from service for each item;<br>- The weight of the PCBs in kilograms;<br>- A serial number or unique ID number;<br>- The appropriate Federal PCB waste code [PCB1 or PCB2] and, if applicable, the state waste code [e.g. MA02 in MA, CR01 in CT]. |
| ☐ | **PCB TRANSFORMERS**<br>PCB Transformer Decommissioning Sheet |
| ☐ | **ASBESTOS MANIFEST**<br>Required whenever asbestos is listed on a manifest or of bill of lading. The Asbestos Manifest is a specific form. It will list the ultimate disposal facility as the destination for the waste - not a CHI facility. This form is in addition to the bill of lading or manifest. |
| ☐ | **GRID SHEET**<br>Grid sheet to be completed to identify the location and hazard class of each container by manifest. |
| ☐ | **LOAD PREPARATION CHECKLIST**<br>Load preparation checklist to be completed for each shipment. |

SEE REVERSE SIDE FOR INFORMATION PERTAINING TO EXPORTS INTO CANADA

## DOCUMENTS REQUIRED WHEN EXPORTING MATERIAL INTO CANADA

The following documents are required when shipping hazardous waste into Canada from the United States.

1. Generator's State Hazardous Waste Manifest;
2. Copy of EPA Acknowledgement of Consent ("AOC");
3. Appropriate landban forms;
4. Appropriate Canadian Hazardous Waste Manifest;
5. Quebec Hazardous Waste Manifest (if Facility is located in Quebec);
6. Copy of Canadian Notification (8 1/2" by 14" document);
7. Copy of Canadian "Written Confirmation";
8. Three (3) copies of Canadian Customs Invoice.

The following documents are required when shipping materials into Canada that are non-hazardous in the United States [i.e. are not a material regualted by the Federal Government] but are hazardous in Canada [e.g. lead acid batteries for reclaimation].

1. Bill of lading completed by the generator;
2. Appropriate Canadian Hazardous Waste Manifest;
3. Quebec Hazardous Waste Manifest (if Facility is located in Quebec);
4. Copy of Canadian Notification (8 1/2" by 14" document);
5. Copy of Canadian "Written Notification";
6. Three (3) copies of Canadian Customs Invoice.

IN THE EVENT A DRIVER IS REQUESTED TO TRANSPORT A REJECTED DRUM(S) FROM A CANADIAN FACILITY BACK TO A CLEAN HARBORS FACILITY, HE OR SHE IS REQUIRED TO CONTACT EITHER THE FACILITY COMPLIANCE MANAGER OR CORPORATE COMPLIANCE BEFORE ACCEPTING THE CONTAINERS FOR TRANSPORTATION.

**CLEAN HARBORS ENVIRONMENTAL SERVICES, INC.**

**LOAD PREPARATION CHECKLIST**

Shipper: _____

Load #: _____ Trailer #: _____

Manifest(s): _____

Load Prepared By: _____

| **NON-BULK PACKAGES:** | **YES** | **NO** | **N/A** |
|---|---|---|---|
| Material approved through CHESI | _____ | _____ | _____ |
| Proper specification container used | _____ | _____ | _____ |
| Container closures in place and secure | _____ | _____ | _____ |
| Adequate container integrity | _____ | _____ | _____ |
| Container free from residual material | _____ | _____ | _____ |
| Required labels and markings present | _____ | _____ | _____ |
| Required marine pollutant markings present | _____ | _____ | _____ |
| Labels and marking match shipping documents | _____ | _____ | _____ |
| Manifest nu[illegible] top of each [illegible] DRUM CHECK LIST AND CONDITIONS | | | _____ |
| **NON-BULK PACKAGES (Lab Packs):** | | | |
| Packing lists attached and reviewed by CHESI | _____ | _____ | _____ |
| All packages prepared in accordance with the applicable DOT Exemption(s) | _____ | _____ | _____ |
| Proper specification container used | _____ | _____ | _____ |
| Container closures in place and secure | _____ | _____ | _____ |
| Adequate container integrity | _____ | _____ | _____ |
| Required labels and markings present | _____ | _____ | _____ |
| Required marine pollutant markings present | _____ | _____ | _____ |
| Labels and marking match shipping documents | _____ | _____ | _____ |
| Manifest number & profile number indicated on top of each container | _____ | _____ | _____ |

| BULK PACKAGING (Cargo Tanks & Roll-offs): | YES | NO | N/A |
|---|---|---|---|
| Proper specification container used | ____ | ____ | ____ |
| Container closures in place and secure | ____ | ____ | ____ |
| Container free from residual material | ____ | ____ | ____ |
| Required labels and markings present | ____ | ____ | ____ |
| Required marine pollutant markings present | ____ | ____ | ____ |
| Required placards affixed to container on 4 sides | ____ | ____ | ____ |
| Labels and marking match shipping documents | ____ | ____ | ____ |
| Tank inspections valid | ____ | ____ | ____ |
| Adequate container integrity | ____ | ____ | ____ |
| Ancillary equipment (i.e. hoses, fittings) secured and ready for travel | ____ | ____ | ____ |
| **BULK PACKAGINGS (Portable Tanks & Flex Bins < 1000 Gallons)1** | | | |
| Proper specification container used | ____ | ____ | ____ |
| Container closures in place and secure | ____ | ____ | ____ |
| Container free from residual material | ____ | ____ | ____ |
| Required labels and markings present | ____ | ____ | ____ |
| Required marine pollutant markings present | ____ | ____ | ____ |
| Required placards affixed to container on 2 sides | ____ | ____ | ____ |
| Labels and marking match shipping documents | ____ | ____ | ____ |
| Tank inspections valid | ____ | ____ | ____ |
| Adequate container integrity | ____ | ____ | ____ |

| SHIPPING DOCUMENTS | YES | NO | N/A |
|---|---|---|---|
| **State Specific Hazardous Waste Manifest:** | | | |
| Lists the correct shipper & transporter information | _____ | _____ | _____ |
| Lists the complete hazardous materials shipping description | _____ | _____ | _____ |
| Contains the required emergency response information | _____ | _____ | _____ |
| Contains the required shipper certification | _____ | _____ | _____ |
| The words "and water" or or "and rail" added to the shippers certification statement indicating that the load is transported by vessel or rail as well as by highway | _____ | _____ | _____ |
| Contains the following information when applicable: | | | |
| ~ the words "Dangerous When Wet" | _____ | _____ | _____ |
| ~ the words "Poisonous By Inhalation" & the applicable hazard zone | _____ | _____ | _____ |
| ~ the words "Marine Pollutant" & description | _____ | _____ | _____ |
| ~ DOT exemption numbers | _____ | _____ | _____ |
| ~ Additional information for n.o.s. descriptions | _____ | _____ | _____ |
| ~ The letters "RQ" for those packages exceeding the value listed in the Hazardous Materials Table | _____ | _____ | _____ |
| **Bill of Lading:** | | | |
| Lists the correct shipper & transporter information | _____ | _____ | _____ |
| Lists the complete hazardous materials shipping description | _____ | _____ | _____ |
| Contains the required emergency response information | _____ | _____ | _____ |
| Contains the following information when applicable: | | | |
| ~ the words "Dangerous When Wet" | _____ | _____ | _____ |
| ~ the words "Poisonous By Inhalation" & the applicable hazard zone | _____ | _____ | _____ |
| ~ the words "Marine Pollutant" & description | _____ | _____ | _____ |
| ~ DOT exemption numbers | _____ | _____ | _____ |
| ~ Additional information for n.o.s. descriptions | _____ | _____ | _____ |
| ~ The letters "RQ" for those packages exceeding the value listed in the Hazardous Materials Table | _____ | _____ | _____ |

| Miscellaneous Required Paperwork: | YES | NO | N/A |
|---|---|---|---|
| Copy of DOT exemption(s) provided to transport when applicable | _____ | _____ | _____ |
| Copy of Vehicle Grid Sheet to accompany each shipment | _____ | _____ | _____ |
| Copy of Landban Disposal Restriction Forms | _____ | _____ | _____ |

**CONTAINER LOADING PROCEDURES**

| | | | |
|---|---|---|---|
| Container loaded according to segregation table listed in 49 CFR 177.848 | _____ | _____ | _____ |
| Container Grid Sheet completed (Attachment II) | _____ | _____ | _____ |
| Packages adequately blocked and braced | _____ | _____ | _____ |
| Required placards and markings affixed to the container | _____ | _____ | _____ |
| Required seals affixed to container and noted on shipping documents (where applicable) | _____ | _____ | _____ |

Container Checklist and Grid Sheet completed by:

_____ _____ _____

(print name) (signature) (date)

1 Portable tanks that have a capacity less than 1000 gallons must be marked and labeled in accordance with the following:

MARKING:

General (§49 CFR 172.302):

- The ID number must be on two opposing sides in numbers at least one inch for bulk packagings with a capacity less than 1000 gallons.
- Each DOT exempt package must have the DOT E# legible marked on the outside.

MARKING REQUIREMENTS (§49 CFR 172.304):

Markings required must:

- Be durable;
- Be in English;
- Printed or affixed to the surface or on a tag or label;
- Displayed on a sharply contrasting color to the background;
- Be unobscured by other markings, labels or attachments.

MARINE POLLUTANTS (§49 CFR 172.322):

A bulk package that contains a marine pollutant must be marked on each side & each end with the MARINE POLLUTANT Marking and must be visible from the direction it faces. This mark must be displayed in black letters on a white square on point configuration (= to a placard).

PORTABLE TANKS (§49 CFR 172.326):

- A portable tank containing hazardous materials must be legible marked on two opposing sides with the proper DOT shipping name.
- The name of the owner or lessee must be displayed on the portable tank (where applicable).
- The ID number (i.e. 1993) must be on 2 opposing sides of the container.

LABELING:

Labeling of a portable tank will be accomplished by properly placarding the tank. For example - if we are shipping a flex bin containing a poisonous solid material, the placard for this package would be the poison placard with 2811 through the center of the placard. This would satisfy both the labeling requirements & ID marking requirements.

ıformation to be entered in the following sequence: Last 3 digits of manifest/hazard class/ size of container/container type

FRONT OF VAN TRAILER OR BOX TRUCK

GRID IS DIVIDED INTO 24 BLOCKS EACH = TOTAL PALLET

| | | | | |
|---|---|---|---|---|
| 1 | | | 2 | |
| 3 | | | 4 | |
| 5 | | | 6 | |
| 7 | | | 8 | |
| 9 | | | 10 | |
| 11 | | | 12 | |
| 13 | | | 14 | |
| 15 | | | 16 | |
| 17 | | | 18 | |
| 19 | | | 20 | |
| 21 | | | 22 | |
| 23 | | | 24 | |

Date: _____

SIGNATURE _____

PRINT _____

Prepared by: _____

REAR OF VAN TRAILER OR BOX TRUCK

MANIFEST #s: _____ _____ _____

_____ _____ _____

Container Types: S = Steel; P = Polyethylene; F = Fiber; O = Other

CleanHarbors®
ENVIRONMENTAL SERVICES, INC.

# DRUM SHIPMENT GUIDELINES

All material must be prepared for shipment and packaged in containers specified by the United States Department of Transportation (D.O.T.) and the Environmental Protection Agency (E.P.A.)
49 CFR part 173 subpart B.

**The following guidelines must be complied with when using Clean Harbors Environmental Services, Inc.**

1) **Container Selection:**
   - Use proper D.O.T. specification or performance oriented packagings for the hazard class and material as outlined in 49 CFR 173.
   - Verify material being shipped is compatible with the container type.
   - Use new or reconditioned drums (meeting D.O.T. requirements).
   - Clean Harbors will only accept bolt rings on open top drums. Lever locks are only acceptable when using "kiln packs" that are packaged in accordance with the terms of the DOT exemption letter (i.e. shipment of "lab packs"). Lever locks on other drums will not be accepted for transportation.
   - For any material containing PCB's, which are regulated by TSCA, use only D.O.T. Specification 17C drums for solids and D.O.T. Specification 17E drums for liquids.
   - All D.O.T. exempt containers that are utilized must comply with all terms and conditions outlined in the Exemption Letter issued for that particular container. Prior to shipment, a copy of the exemption letter must be made available to CHI.

2) **Filling and Storage of Containers:**
   - Use care when filling containers. Leave sufficient head space of at least 3 inches when filling liquid drum(s).
   - The outside of all containers must be clean and free of any residue. Any container found to be contaminated must be either decontaminated or placed into an appropriate salvage drum prior to shipment.
   - All containers that show evidence of damage, leaking or reduced structural integrity, must be placed in an appropriate salvage drum prior to shipment.
   - Prior to shipping, containers should be stored in an appropriate storage facility that would prevent container degradation and material instability sometimes caused by being exposed to various weather conditions (i.e. temperature variations, excessive moisture, etc.)

3) **Labeling and Marking**
   - Mark and label container when waste is first placed into drum. Record accumulation start date on marking.
   - Mark the top and side of the containers with Clean Harbors Profile Number in characters no smaller than 1 1/2 inches in height.
   - Non hazardous, Non D.O.T. regulated material must have the appropriate marking on the side of container.
   - Hazardous waste must be identified with the appropriate marking(s) and label(s).
   - The hazardous waste marking must be filled out completely in permanent ink and placed next to the appropriate D.O.T. hazardous class warning label.
   - Shrink wrap all palletized material. Each container (i.e. each box, pail, carton) on a pallet must be marked and labeled in accordance with all E.P.A. & D.O.T. requirements.
   - Containers between 119-1000 gallon capacity, must be marked and labeled on two opposing sides.
   - Marking, labels and profile numbers are required on all drums placed into appropriate salvage drums as well as on the salvage drum itself.
   - Markings and labels must be unobstructed and in a contrasting color to the color of the container.

*****TO PREVENT ANY CONFUSION PRIOR TO TRANSPORTATION*****

Verify that all markings and labels match those shown on the shipping document used (i.e. uniform hazardous waste manifest, state specific manifest, bill of lading, etc.). Old labels and markings must be removed and torn or illegible markings or labels must be replaced prior to shipment.
*****Do not overlap D.O.T. or E.P.A. markings and labels*****



*"People and Technology Creating a Better Environment"*

Clean Harbors of Chicago
11800 S. Stoney Island Avenue
Chicago, IL 60617
Phone# (312) 646-6202
US EPA ID#
ILD 000 608 471

Clean Harbors of Braintree
385 Quincy Avenue
Braintree, MA 02184
Phone# (617) 849-1807
US EPA ID#
MAD 053 452 637

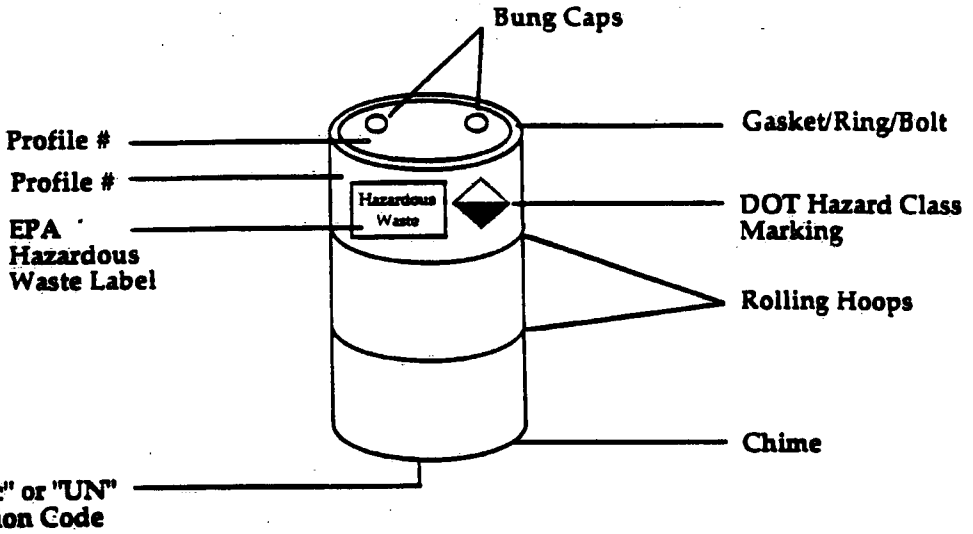
Clean Harbors of Natick
10 Mercer Road
Natick, MA 01760
Phone# (508) 655-8863
US EPA ID#
MAD 980 523 203

Clean Harbors of Connecticut
31 Broderick Road
Bristol, CT 06010
Phone# (203) 583-8917
US EPA ID#
CTD 000 604 488

Clean Harbors of Cleveland
2900 Broadway
Cleveland, OH 44115
Phone# (216) 429-2402
US EPA ID#
OHD 000 724 153

Spring Grove Resource Recovery
4879 Spring Grove Avenue
Cincinnati, OH 42532
Phone# (513) 681-5738
US EPA ID#
OHD 000 816 629

Clean Harbors of Baltimore
1910 Russell Street
Baltimore, MD 21230
Phone# (410) 244-8200
US EPA ID#
MDD 980 555 189



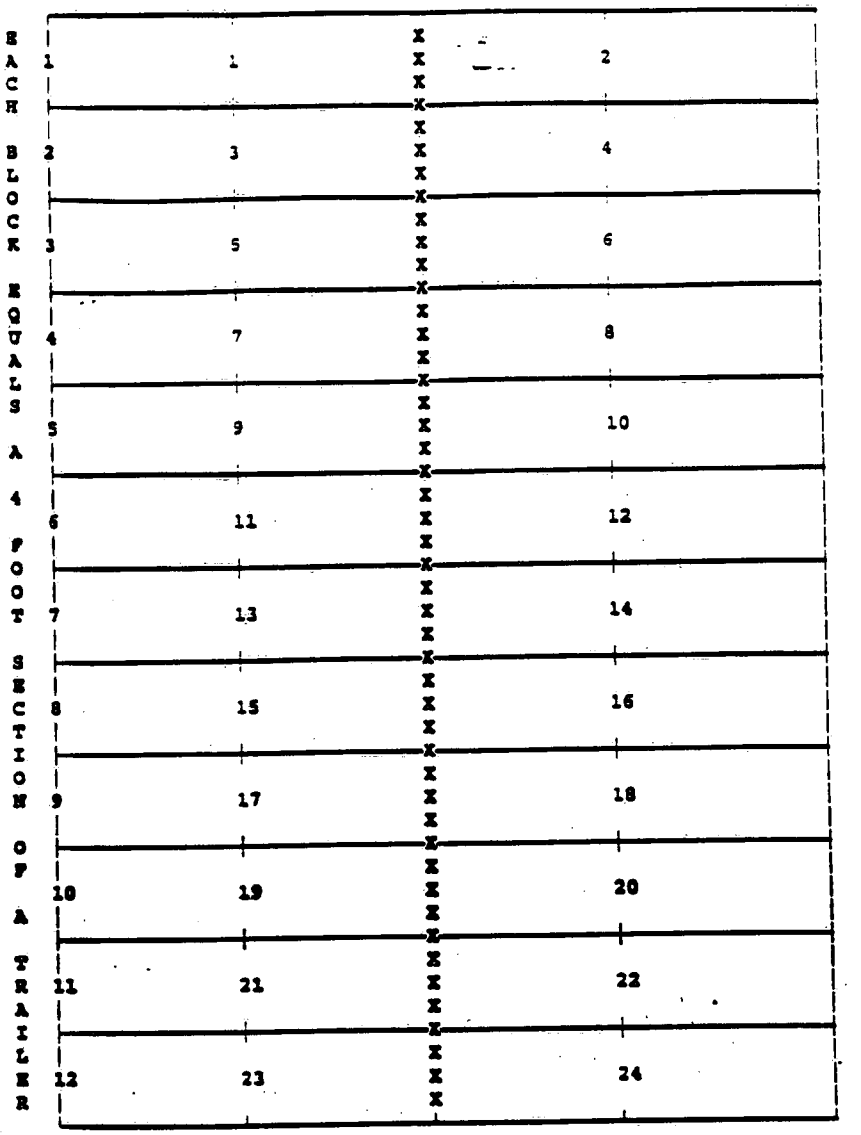

## DRUM CHECK LIST AND CONDITIONS

- ☐ 1. Ring, bolts and bung caps must be tightly secured.
- ☐ 2. No dents on chime and rolling hoops.
- ☐ 3. Use appropriate DOT containers (e.g., 17E or 17H). (Drums must be compatible with waste shipped)
- ☐ 4. Drums must be clean and in good condition with gaskets.
- ☐ 5. Drums must be non-leaking, no creases, minimum rust.
- ☐ 6. Each drum must have an EPA Hazardous Waste label in accordance with EPA requirements.
- ☐ 7. Each drum must have the appropriate DOT Hazard Class marking.
- ☐ 8. Each drum must have the Clean Harbors Profile# printed on top and on the side of each dru
- ☐ 9. No other <u>markings</u> should appear on the drum other than above requirements except for customer control numbers.
- ☐ 10. All waste materials transported must be the same as those described in waste generator profile sheet.
- ☐ 11. Piece count must be double checked to coincide with manifest.

*When using Clean Harbors Transportation, please use the following information:*

| | | | |
|---|---|---|---|
| Transportation company name: | **Clean Harbors Environmental Services, Inc.** | or | **Mr. Frank Inc.** |
| Transporter's ID#: | **MAD039322250** | | **ILD 984 775 049** |
| Illinios ID#: | **1478** | | **0079** |
| Transporter's Phone#: | **(617) 585-5111** | | **(708) 720-0700** |

FRONT OF VAN TRAILER OR BOX TRUCK




REAR OF VAN TRAILER OR BOX TRAILER

1. Grid sheet is divided into 12 rows each of which are further divided into 2 sections for a total of 24 blocks. Each individual block, therefore, represents the space 4 X 55 gallon drums would take up on a van trailer or box truck (roughly equivalent to a pallet). Note - the midline of the grid represents the middle of the trailer.

2. When loading a trailer, the grid sheet is to be completed to satisfy two priorities:
   a) Provide approximate location of each container by manifest & hazard class; and
   b) Assist in insuring proper segregation is achieved.

3. When loading a vehicle, the following information is to be entered on the grid sheet for each container:

   a) The last 3 digits of the manifest number;
   b) Hazard class;
   c) Size of container;
   d) Type of container.

4. Each block on the grid provides 8 spaces to accommodate odd size containers (i.e. 5, 16's, flex bins, etc.).

5. When using the grid sheet for double stacked containers, the 1st & 3rd columns are to be used for the bottom tier while the 2d & 4th columns are to be used for the top tiers. For example Position 1 & 2 of the grid sheet are being loaded with 4 flex bins. The two bins sitting on the trailer floor will be entered in columns 1 & 3 while to 2 bins being stacked will be entered in columns 2 & 4.

[illegible] in the following sequence: Last 3 digits of manifest/hazard class
= size of container/container type

FRONT OF VAN TRAILER OR BOX TRUCK

| | | | | |
|---|---|---|---|---|
| GRID | 1 | | 2 | |
| | | | | |
| | | | | |
| | | | | |
| | 3 | | 4 | |
| IS | | | | |
| | | | | |
| | | | | |
| DIVIDED | 5 | | 6 | |
| | | | | |
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| | | | | |
| | 7 | | 8 | |
| | | | | |
| | | | | |
| | | | | |
| INTO | 9 | | 10 | |
| | | | | |
| | | | | |
| | | | | |
| | 11 | | 12 | |
| 24 | | | | |
| | | | | |
| | | | | |
| BLOCKS | 13 | | 14 | |
| | | | | |
| | | | | |
| | | | | |
| | 15 | | 16 | |
| | | | | |
| | | | | |
| | | | | |
| EACH | 17 | | 18 | |
| | | | | |
| | | | | |
| | | | | |
| = | 19 | | 20 | |
| | | | | |
| TO | | | | |
| | | | | |
| | 21 | | 22 | |
| A | | | | |
| | | | | |
| | | | | |
| PALLET | 23 | | 24 | |
| | | | | |
| | | | | |
| | | | | |

DATE

SIGNATURE

PRINT

Prepared by:

REAR OF VAN TRAILER OR BOX TRUCK

MANIFEST #s: _____ _____ _____

_____ _____ _____

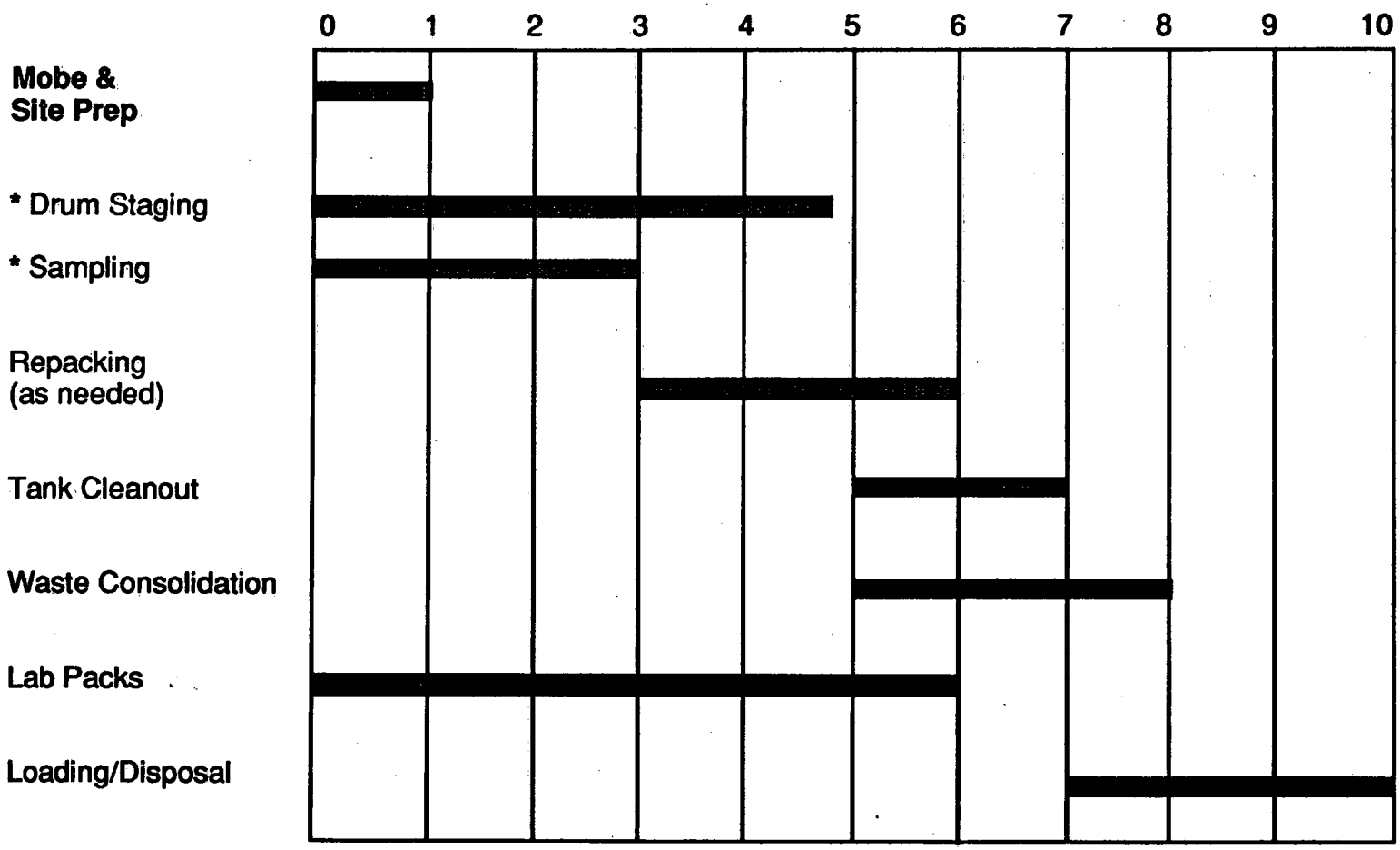
Container types: S = Steel; P = Polyethylene; F = Fiber; O = Other

CleanHarbors

Ashland Chemical
Remediation Work Plan
PVO International, Inc.
Boonton, NJ

## Section 13.0

### Proposed Project Schedule
(Days)




* Known and unknown bulk drums.

Site Tasks to be executed adhering to the following referenced sections:
5,6,7,8,9,11,12

CleanHarbors

## WASTE CONSOLIDATION PROCEDURES

The following is a listing of the minimum equipment required to perform a consolidation of flammable liquids. Flexible grounding cables will be used to connect drums and containers. Damp rags will be available to wipe down containers prior to grounding. A 20 lb. ABC fire extinguisher is needed in order to comply with established safety protocol. 17H open head steel drums will be the receptacles for the consolidated material.

Chemical protective clothing consisting of polycoated tyvek with hoods, chicken boots, latex inner gloves, PVC outer gloves and nitrile gloves in elbow length sizes will be used to provide protection against contact with the consolidation materials. Absorbent materials such as speedi-dri, 3M pads and cotton rags will be available for spill containment and clean up. Non sparking tools such as bung wrenches and screw drivers will be used for opening containers prior to consolidation. Restricted access signs for all entrances will be utilized to prevent unprotected personnel from entering the work area.

The following is an outline of the procedures to be followed in setting up the work area. Ground wire clamps will be connected to all equipment. The fire extinguisher will be placed near the table. The following is a description of flammable materials that are appropriate for consolidation:

acetone
acetonitrile
benzene
carbon tetrachloride
chloroform
dichloromethane
1,4 dioxane
ethyl benzene
formaldehyde
heptane
isopropyl acetate
lacquer thinner
methyl ethyl ketone
methylene chloride
nitrobenzene
octanol
perchloroethylene
petroleum oils
phenol
tetrachlorethane
tribromoethane
vegetable oils

alcohols
butyl acetate
butoxyethanol
chlorobenzene
cyclohexane
dimethylsulfoxide
ethyl acetate
ethyl butyl ketone
gasoline
isobutyl acetate
kerosene
methyl acetate
methyl isoamyl ketone
mineral spirits
octane
pentanone
petroleum ether
petroleum distillates
propyl acetate
tetrachlorethylene
toluene
xylene

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The following materials will not be consolidated: plasticizers, curing agents, hardeners, activator, catalyst, part A and B epoxy resins.

Prior to performing the consolidation, the following information will be discussed with the crew. The supervisor will discuss in detail the appropriate emergency response measures in the event of a fire, reaction, spill or employee exposure. The supervisor will review all operating and grounding procedures as well as flammable liquid or corrosive liquid safety guidelines which include signs and symptoms of exposure to solvents.

The following Personal Protective Equipment will be worn by any employee involved in the consolidation process:

Employees consolidating, bucket testing and opening containers are to be dressed in the following protection. This includes: polycoated tyvek with hood, full faced air supplied respirator, latex inner gloves, elbow length nitrile outer gloves and chicken boots. Gloves, boots and zipper must be taped. Outer gloves should be worn inside the sleeves of the tyvek. Hoods must be taped.

Employees opening drums and cleaning the consolidation area are to be dressed in level "C" protection. This includes: full face air purifying respirator with GMCH cartridges, polycoated tyvek with hood, latex inner gloves, standard length PVC outer gloves and chicken boots. Gloves, boots and zipper must be taped. Outer gloves must be worn inside the sleeves of the tyvek. Hoods must be worn.

The following are the standard operating procedures for consolidating:

Individual containers will be placed on the segregation table. Any containers which are questionable should be removed for later inspection. Wipe entire side and top exterior surfaces of all glass and plastic containers with a wet rag. Open each individual container slowly to relieve any pressure. Allow the container to drain completely. Continue until the 17H drum is filled. Remove the full drum and replace with an empty 17H drum. Full drums will be closed, drum tracking numbers attached and all applicable labels and markings attached.

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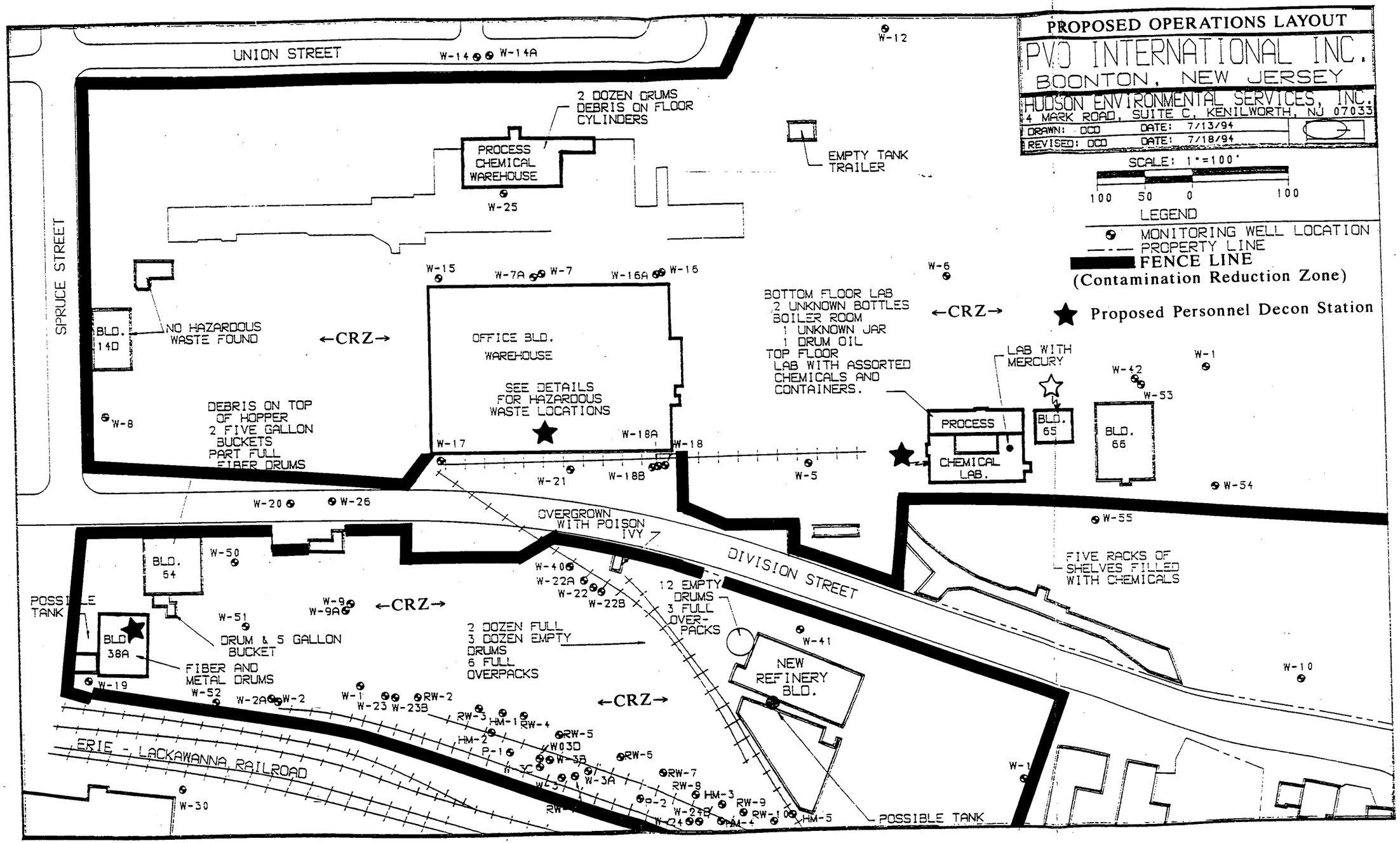
PROPOSED OPERATIONS LAYOUT
PVO INTERNATIONAL INC.
BOONTON, NEW JERSEY
HUDSON ENVIRONMENTAL SERVICES, INC.
4 MARK ROAD, SUITE C, KENILWORTH, NJ 07033
DRAWN: DCD DATE: 7/13/94
REVISED: DCD DATE: 7/18/94
SCALE: 1"=100'
100 50 0 100
LEGEND
MONITORING WELL LOCATION
PROPERTY LINE
FENCE LINE
(Contamination Reduction Zone)
Proposed Personnel Decon Station
UNION STREET
SPRUCE STREET
DIVISION STREET
ERIE - LACKAWANNA RAILROAD
2 DOZEN DRUMS DEBRIS ON FLOOR CYLINDERS
PROCESS CHEMICAL WAREHOUSE
EMPTY TANK TRAILER
BLD. 14D
NO HAZARDOUS WASTE FOUND
←CRZ→
OFFICE BLD. WAREHOUSE
SEE DETAILS FOR HAZARDOUS WASTE LOCATIONS
BOTTOM FLOOR LAB 2 UNKNOWN BOTTLES BOILER ROOM 1 UNKNOWN JAR 1 DRUM OIL TOP FLOOR LAB WITH ASSORTED CHEMICALS AND CONTAINERS.
LAB WITH MERCURY
PROCESS CHEMICAL LAB.
BLD. 65
BLD. 66
DEBRIS ON TOP OF HOPPER 2 FIVE GALLON BUCKETS PART FULL FIBER DRUMS
OVERGROWN WITH POISON IVY
BLD. 64
POSSIBLE TANK
BLD 38A
DRUM & 5 GALLON BUCKET
FIBER AND METAL DRUMS
2 DOZEN FULL 3 DOZEN EMPTY DRUMS 6 FULL OVERPACKS
12 EMPTY DRUMS 3 FULL OVER-PACKS
NEW REFINERY BLD.
FIVE RACKS OF SHELVES FILLED WITH CHEMICALS
POSSIBLE TANK
W-1 W-1A W-2 W-2A W-3 W-3A W-3B W-3C W-3D W-5 W-6 W-7 W-7A W-8 W-9 W-9A W-10 W-12 W-14 W-14A W-15 W-16 W-16A W-17 W-18 W-18A W-18B W-19 W-20 W-21 W-22 W-22A W-22B W-23 W-23B W-24 W-24B W-25 W-26 W-30 W-40 W-41 W-42 W-50 W-51 W-52 W-53 W-54 W-55
RW-1 RW-2 RW-3 RW-4 RW-5 RW-7 RW-8 RW-9 RW-10
HM-1 HM-2 HM-3 HM-4 HM-5
P-1 P-2

# APPENDIX A

CleanHarbors

Drum ID #: _____

# DRUM INVESTIGATION DATA SHEET

Team: _____

1. **Name of Site:** _____
2. **Location On Site:** _____ 3. **Date:** _____
4. **Weather Conditions:** _____
5. **Drum Size:**
   - a. 83 gal ____
   - b. 55 gal ____
   - c. 30 gal ____
   - d. 5 gal ____
   - e. Other _____
6. **Drum Type:**
   - a. Open Top (17H) ____
   - b. Closed Top (17E) ____
   - c. Lined (17D) ____
   - d. Carboy ____
   - e. Paint Can ____
   - f. Stainless Steel ____
   - g. Overpack ____
   - h. Other ____
7. **Drum Condition:**
   - a. Intact ____
   - b. Crushed ____
   - c. Under Pressure ____
   - d. Leaking ____
   - e. Rusted/Corroded ____
   - f. Bungs Missing ____
   - g. Bungs Loose ____
   - h. Cover Missing ____
   - i. Cover Loose ____
   - j. Punctured ____
   - k. Transportable ____
8. **Drum Content Characteristics:**
   - a. Color _____
   - b. Viscosity High _____ Low _____
   - c. Solid ____ % Solid _____
   - d. Liquid ____ % Liquid _____
   - e. Gases ____ Comments: _____
   - f. Lab Pack ____ Comments: _____

   Full ____
   3/4 ____
   1/2 ____
   1/4 ____
   Emtpy ____
9. **Generator Information:**
   - a. Labels ____ Comments: _____
   - b. Shipper ____ Comments: _____
   - c. Generator ____ Comments: _____
   - d. Stencil ____ Comments: _____
   - e. Product ____ Comments: _____
   - f. Placards ____ Comments: _____
   - g. Other ____ Comments: _____
10. **Drum Data/Characteristics:**

HNU _____ ppm pH _____

OVA _____ ppm Radiation _____ mr

Comb/$O_2$ _____ %LEL _____ %UEL _____ % 0

Comments _____

Rev. 1/14/94

# APPENDIX B

CleanHarbors

Clean Harbors

# FIELD SCREENING LOG

PROJECT NO: _____
BOOK NO: _____

Date:

Chemist: _____ (print) _____ (write)

Weather:

Water Solubility:
F=Floats; S=Sinks; M=Mixes

| SAMPLE # | DESCRIPTION | WATER TEST | PH/OXD. | HEAD SPACE CN-/SULFID | IGNITABILITY HALOGEN SCAN | GROUP |
|---|---|---|---|---|---|---|
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# CleanHarbors

Clean Harbors Analytical Services, Inc., 325 Wood Rd., Braintree, MA 02184

**CHAIN OF CUSTODY RECORD**

Sample Custodian — (617) 849-1800

Page of

Client: _____ Project Name: _____ Work Order/P.O. #: _____ Date: _____

Report To: _____ Address: _____ Phone #: _____

Date Samples Collected: _____ by: _____ Date Samples Received: _____

Airbill/Bill of Lading? Y N

NOTE: Samples received unpreserved will be preserved upon arrival at CHAS. Samples were: Preserved Unpreserved

| Sample I.D. | Sampling Information | | | | Analysis | | | | | | | | # of con. | CHAS Sample # |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Date | Time | Station Location | Sample Matrix | | | | | | | | | | |
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| | |
|---|---|
| VOA Vial | |
| Glass Bottle | |
| Plastic Bottle | |
| Pres. | |
| Volume | |

Relinquished by: _____
Date: _____ Time: _____

Received by: _____
Date: _____ Time: _____

Relinquished by: _____
Date: _____ Time: _____

Received by: _____
Date: _____ Time: _____

Preservation Key: A — Acidified with _____
B — Filtered, C — Sample chilled, D— NaOH,
E — NaThiosulfate, W — Sample Ambient, F — Other

REMARKS/COMMENTS: (Sample storage, nonstandard bottles, cautions, special instructions)

Standard laboratory turnaround time is 2 weeks from date of receipt. Accelerated turnaround may be assessed a surcharge.
Accelerated turnaround requested: _____
Confirmed by: _____ Surcharge: _____

Location of samples: _____

Turnaround: 24 Hrs. 48 Hrs. 1 Week 2 Weeks Other: _____

CHI 119

OFFICE COPY

APPENDIX C

CleanHarbors

# Field Instrument

INSTRUMENT MODEL:
CHI NO:
SERIAL NUMBER:

# Calibration Log

## Appendix C

| DATE | CAL. WITH | INITIAL SPAN SETTING | INITIAL READING | FINAL SPAN SETTING | COMMENTS |
|---|---|---|---|---|---|
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APPENDIX D

CleanHarbors

# Chemical Inventory
# PVO Site

| Location | Chemical | # of Containers | Container Size |
|---|---|---|---|
| Lab #1 North Wall Stand | Silicone Grease | 1 | 40 oz |
| Lab #1 North Wall Stand | Unknown Liquid | 1 | 5 gal |
| Lab #1 North Wall Stand | Aerosol | 1 | 8 oz |
| South Wall | Unknown Liquid | 1 | 4 oz |
| South Wall | Deodarant | 1 | 4 oz |
| South Wall | Sodium Hydroxide | 2 | 5 lbs |
| South Wall | Barium Hydroxide | 1 | lb |
| East Wall | Unknown Liquid | 1 | 4 oz |
| East Wall | * Sodium Borohydride | 1 | 2 lbs |
| East Wall | Unknown Solid | 2 | 4 oz |
| East Wall | Cyclohexyl Sulfosnamide | 1 | 4 oz |
| East Wall | Disodium Phosphate | 1 | 4 oz |
| East Wall | Oil | 1 | G |
| East Wall | * Muroxide (kel-Pak Powder) | 1 | 8 oz |
| East Wall | Organic Dye | 1 | 5 lbs |
| Floor | Ammonium Molydate | 1 | 4 oz |
| Floor | Sodium Bisulfate | 1 | lb |
| Floor | Unknown | 1 | lb |
| Floor | Carbon Black | 1 | G |
| Floor | Unknown | 1 | G |
| Floor | Contaminated Debris | 3 | lb |
| Bench #2 | Charcoal | 1 | 5 lbs |
| Bench #2 | Carbonax | 1 | 5 lb bag |
| Bench #2 | Dieldrin | 2 | 5 gal |
| Bench #2 | Unknown | 6 | 2-6 oz |
| North Bathroom | Unknown | 1 | 5 gal |
| North Bathroom | Glycerin | 1 | gal |
| North Bathroom | Molasses | 1 | 1/2 gal |
| South Bathroom | SC Plastic | 1 | pt |
| South Bathroom | Shortening | 1 | gal |
| South Bathroom | Unknown | 1 | qt |
| Chemical Storage Room | Lead-Acid Battery | (car battery) | |
| Chemical Storage Room | Aerosols | 2 | 8 oz |
| Lab #2 South Shelves | Leather | 1 | gal |
| Lab #2 South Shelves | Corn Bran | 1 | gal |
| Lab #2 South Shelves | Unknown | 2 | gal |
| Lab #2 South Shelves | Paint | 1 | gal |

| Location | Chemical | # of Containers | Container Size |
|---|---|---|---|
| Lab #2 South Shelves | Unknown (leg) | 1 | 5 gal |
| Lab #2 South Shelves | Comax Flavoring | 1 | 5 gal |
| Lab #2 South Shelves | Alkaline Battery (Mercury) | 2 | |
| Lab #2 South Shelves | Grease | 1 | 4 oz |
| Lab #2 South Shelves | Oil (?) | 1 | pt |
| Lab #2 South Shelves | Asbestos Valve Packing | 1 | lb |
| Lab #2 South Shelves | Grease | 1 | lb |
| Lab #2 South Shelves | Safety Cans (pet ether) | 3 | 1/2 lb |
| Lab #2 South Shelves | * Sodium Sulfate | 1 | 6 lbs |
| South Room | Unknown | 2 | lb |
| South Room | Mercury Thermometer | 1 | 2 ft long |
| South Room | Zinc Dust | 1 | lb |
| South Room | Potassium Permagnate | 1 | 4 oz |
| South Room | Sodium Bromate | 1 | qt |
| South Room | Ammonium Chloride | 1 | qt |
| South Room | Sodium Hydroxide | 1 | 5 lb |
| South Room | Petroleum Ether | 3 | gal |
| South Room | Unknown | 20 | 4 oz |
| Middle Isle Second Shelve | Oil (?) | 2 | gal |
| East Wall - Middle Bench | Acetic Anhydride/Pyridine | 1 | pt |
| East Wall - Middle Bench | Thermometers | 2 | foot |
| East Wall - Middle Bench | Pyridine | 1 | qt |
| East Wall - Middle Bench | Alcohol/KOH Mixture | 1 | gal |
| Under Bench Desk | Unknown | 2 | 1/2 gal |
| North Floor Pails | Unknown (Liquid) | 1 | 5 gal |
| North Floor Pails | Unknown (Solid) | 1 | 5 gal |
| North Floor Pails | CN80 | 1 | 5 gal |
| North Floor Pails | Unknown | 1 | 5 gal |
| North Floor Pails | Soff lower oil | 1 | gal |
| North Floor Pails | Pyridine | 7 | gal |
| North Floor Pails | Mercury Thermometers | 15 | ft long |
| North Floor Pails | Aerosols | 2 | 8 oz |
| North Floor Pails | Zinc Dust | 1 | lb |
| North Bench | * Morpholine | 1 | gal |
| North Bench | Unknown | 7 | gal |
| North Bench | * Acetone | 2 | gal |
| North Bench | * Acetic Acid | 1 | gal |
| North Bench | Thiosulfate | 1 | 6 gal |
| North Bench | Hydrochloride Acid | 1 | 6 gal |
| North Bench | Sodium Hydroxide | 2 | 6 gal |
| North Bench | * Carbon Tetrachloride | 1 | gal |
| North Bench | * Glycerin | 1 | gal |
| North Bench | * KI | 1 | gal |
| North Bench | Iodine Monochloride | 1 | qt |

| Location | Chemical | # of Containers | Container Size |
|---|---|---|---|
| Room #9 | Phosphoric Acid | 2 | 1/2 gal |
| 3rd Floor | Petroleum Distillate | 3 | gal |
| 3rd Floor | Ethanol | 1 | gal |
| 3rd Floor | TPP | 2 | lb |
| 3rd Floor | Glycerin | 1 | gal |
| 3rd Floor | Unknown | 2 | gal |
| 3rd Floor | Unknown | 1 | qt |
| 3rd Floor | Unknown | 1 | 4 oz |
| 1st Floor Main Building | Fatty Acids | 2 | 1/2 gal |
| 1st Floor Main Building | Unknowns | 20 | qt |
| 1st Floor Main Building | Unknowns | 2 | 5 gal |
| Lab #2 North East Corner | Nitric Acid | 1 | 1/2 gal |
| Lab #2 North East Corner | Fuming Sulfuric Acid | 1 | 1/2 gal |
| Lab #2 North East Corner | Phosphoric Acid | 2 | pt |
| Lab #2 North East Corner | Butyric Acid | 1 | gal |
| Lab #2 North East Corner | Sulfuric Acid | 2 | pt |
| Lab #2 North East Corner | Acetic Anhydride | 2 | gal |
| Lab #2 North East Corner | Mono Ethanol Amine | 1 | gal |
| Lab #2 North East Corner | Ethyl Acetate | 1 | gal |
| Lab #2 North East Corner | Salicylic Acid | 1 | lb |
| Lab #2 North East Corner | Glacial Acetic Acid | 3 | gal |
| Lab #2 North East Corner | Sulfuric Acid/Pot Dichromate | 1 | pt |
| Lab #2 North East Corner | Carbonate Solution | 1 | pt |
| Lab #2 North East Corner | Pump Oil | 1 | gal |
| Lab #2 North East Corner | Benzoik Acid | 1 | gal |
| Lab #2 North East Corner | Phthallic Anhydride | 1 | 25# |
| Lab #2 North East Corner | Hydrazine Based Inhibitor | 1 | 5g |
| Lab #2 North East Corner | Unknowns | 10 | pt |
| Building #65 | * Phosphorous Oxychloride | 1 | gal |
| Building #65 | Chromium Trioxide | 2 | qt |
| Building #65 | Unknowns (in 55 & 30 gl drums) | 100 (est) | 4 oz-qt |
| Building #65 | 1 gal containers | 350 | 1 gal |
| Building #65 | Unknowns | 200 | gal |
| Building #65 | Fatty Acids/Amines/Solvents Samples | 150 | gal |
| Building #65 | * Ethyl Ether (possible peroxide) | 1 | 5 gal |
| Building #65 | Various | 34 | 5 gal |
| Process Chemical Warehouse | Petroleum Hydrocarbons (?) | 5 | * 55 gal |
| Process Chemical Warehouse | Unknowns | 3 | * 5 gal |
| Building #64 | Unknown Drums (TCLP) | 12 | * 55 gal |
| Building #64 | Oil (?) | 5 | 5 gal |

| Location | Chemical | # of Containers | Container Size |
|---|---|---|---|
| Material Outside Refinary Building | Caustic Sludge (TCLP-Incin) (Rusted overpacks ) | 3 | * 85 gal |
| Material Outside Refinary Building | Caustic Sludge (TCLP-Incin) (needs overpacks) | 1 | * 55 gal |
| Outdoor Drum Storage Area | Caustic Sludge (TCLP) (rusted overpacks) w/pm holes | 4 | * 85 gal |
| Outdoor Drum Storage Area | Unknowns (TCLP) (rusted overpacks) w/pm holes | 1 | * 85 gal |
| Outdoor Drum Storage Area | Soil (?)/ Caustic(TCLP) rusted -needs op | 1 | * 55 gal |
| Outdoor Drum Storage Area | Fatty Acid/Water - anaylsis | 1 | * 85 gal |
| Process Chemical Laboratory | Large number of Laboratories containing | 100 | |
| Process Chemical Laboratory | Containers | 5g-lb in size<br>- unknowns<br>- samples<br>- lab chemical<br>- ether conatiners (empty)<br>- mercury waste | |

Other notes

1. * Zinc dust (estimated total) — 250 pds
   * Aerosol containers (estimated total) — 30 cans
   * Lead acid batteries — 2 batteries
   * Mercury thermometers — 80 thermometers

2. Most lab pack items on the original list, indicate the amount of actual chemical ingredients. Actual size of the containers is larger (typically).

3. Symbols used

   * Material was on original list but size of container/weight may be different or not clearly specified.
   gal - gallon
   lbs - pound

4. Need approximately 50 x 85 gallon overpacks drums.

Lab #1

North Wall
Stand

1 - 32 oz. Soda Ash
1 - 400 ml beaker unknown white powder
1 - 3 lb.Calcium Chloride

South Wall

2 - 1 gal. $H_2O$ (one is marked $NO_2$ $SO_3$ .0986N)
1 - 1 gal. Drake oil No. 35 (white oil)
1 - 1 gal. Mineral Oil
1 - 1/4 Std Buffer solution pH 10.0
1 - 1 pt. Cyclohexyl Sulfamic Acid
1 - 1 pt. $CaSO_4$

East Wall

1 - 1/4 Sodium Borohydride
1 - 5 gal. unknown clear liquid
1 - 1.5 gal. DEA Alkanolamide
1 - 1 gal. unmarked clear liquid
1 - 1 gal. Tartaric Acid Reagent
1 - 1 gal. Ethyl Methyl Isopropyl Alcohol Mixture Reagent
1 - 1 gal. unmarked clear liquid
1 - 1 gal. Nitric Acid
1 - 1 gal. unmarked liquid
1 - 1 gal. Zirconnin
1 - 1 gal. $H_2O$
1 - 1 gal. unmarked clear liquid
1 - 1/2 gal. unknown clear liquid
1 - 1/2 gal. Fossilite 24
1 - 5/4 gal. Sodium Hydroxide
1 - 1/4 gal. unknown clear liquid
1 - 1 l. Sodium Cyanide 0.25 N
1 - 1 qt. unknown liquid
1 - 1 qt. unkown solidified liquid
1 - 1 pt. unknown liquid
1 - 1 pt. unmarked clear liquid
1 - 1 pt. beige powder (D/M 625)
1 - 1 pt. Methyl Red Indicator
1 - 500 ml $H_2SO_4$
1 - 500 ml 202 N Thiosulfate (old)
1 - 40 oz. Photovolt Sealant Cat No 27-122-05
2 - 40 ml. Neutralizing Solution Methyl Alcohol + $H_2O$ (Photovolt)
1 - 80 oz. Kel-Pak Powders No.1 Digestion Catalyst Tablets $K_2SO_4$ + $CUSO_4$ + $H_2O$
10 - 12 oz. Nickel Catalyst SO-110B/Flakes

Lab #1 (cont'd)

15- 8 oz. SO 110 (unknown gray flakes)
1 - 8 oz. unmarked white solid
1 - 8 oz. liquid
1 - 8 oz. Benzoic Acid Std.
1 - 8 oz. $C_8$ 98+ (?) Octane >98%?
1 - 4 oz. SOD Methoxide
1 - 4 oz. unknown white solid
1 - 4 oz. unknown white solid
? - TDD-11 (Nonionic Surfactant) Tridecylalcohol
11- 4 oz. Ter Chem (White powder in plastic bags)
1 - 4 oz. gray powder (Ubete Ni)
1 - 4 oz. Hydrogenated Soybean Oil control
1 - 4 oz. unknown white solidified liquid
1 - 2 oz. unknown white solid
1 - 2 oz. stamp inker
1 - 2 oz. unknown white solid
19- 2 oz. $V_1, V_2, V_3$ & $V_4$ samples = green liquid with yellowish ppt.
2 - 1.5 oz. unknown solid
1 - 5 ml. 99%+2,2-Dichlorovinyl Dimethyl Phosphate (insecticide)
1 - 5ml 90% Ciodrin Insecticide
1 - 2 lbs. Naugard Pana (uniroyal)

Floor

1 - 5 gal. TER-Harwick
2 - 5 gal. HB 102 PKO
3 - 5 gal. unmarked oily liquid
1 - 3 gal. (in 5 gal.pail) unknown orange liquid, no lid

Bench

1 - 90 oz. Stoddard Solvent (combustible)
1 - 90 oz. 1-Butanol (combustible)
1 - 80 oz. unknown clear liquid
1 - 64 oz. Cyclohexane (flammable)
1 - 8 oz. Coconut Fatty Acid

West Wall
Bench #1

1 - 2 lb. (bag) Sebacic Acid - Purified
1 - 2 lb. (bag) Stearic Acid
1 - 1 gal. unknown clear liquid - tagged illegible
1 - 1/2 gal. metal container "El Paso Dimethyl Glutarate" (hand written)
1 - 1/4 lb. (bag) Adipic Acid

Lab #1 (cont'd)

Bench #2

1 - 5 lb. Sodium Hydroxide Pellets (Uncontained)
1 - 1 gal. unknown liquid tagged -- CE-55
1 - 1 gal. NC2963 Rex Oil by Viobin
1 - 1/2 gal. unknown light yellow liquid
PEG 300 W/HW356/(7/17/69)
1 - Okenel Chemcial C° (344-1831) Polyester Resin
Sample for Trimethylol-Propane Assay
1 - 1 qt. unknown clear liquid - no label
1 - 1 1/2 pt. Antistat 3G
1 - 1 1/2 pt. FD 0919 (liquid)
1 - 1 pt. clear unknown liquid
1 - 1 pt. Oxadol - (blue liquid)
1 - 1 pt. unknown white powder ("#3" on lid)
1 - 1 pt. Antistat 3G
1 - 1 pt. Ethylene Glycol Base
1 - 1 pt. Tergitol by Union Carbide
1 - 16 oz. 5% Silicon Solution in Kerosene 11/26/79
1 - 10 oz. 5% Silicon Solution in Hexane 11/26/79
1 - 8 oz. "Nacap" Corrosion Inhibitor
1 - 8 oz. Imitation Parmesan Cheese Flavor
1 - 8 oz. "B" Clear liquid
1 - 8 oz. unknown liquid-metal container
1 - 8 oz. Sm. Bag - Naugard Pana "Skin Irritant"
1 - 8 oz. Hexaglycerol - PVO Research (liquid)
1 - 6 oz. Tenox BHT (solid)
2 - 6 oz. TME - HBL
1 - 6 oz. Vanlube 81 - Tan powder
1 - 6 oz. 10% Dow 2oo in Xylene (liquid)
1 - 5 oz. Durkex 25
1 - 5 oz. Double Bleached Lecithin
1 - 5 oz. "A" Clear liquid
2 - 5 oz. Dipentek
1- 5 oz. Hydrog SBO ACFX #10537 BHA by GNC - 0.06%
2-BH • Spot BHA pos. • Odor Phenolic
1 - 5 oz. 10% DOW 200 in Kerosene (liquid)
1 - 5 oz. Hydrog SBO SHPX 20601
BHP by GNC - 0.09%
• spot BHA positive • Odor Phenolic
1 - 4 oz. Tenox BHA L-430 (solid)
1 - 4 oz. Tenox-Eastman (solid)
1 - 4 oz. Tenox 20-Kodak (liq)
1 - 4 oz. "B-152" - white powder
1 - 4 oz. Phenol
1 - 4 oz. "Vitalife 500"
1 - 4 oz. "PO4" Standard Solution
1 - 4 oz. Smoke Flavor #S-1128 by American Flavor &

Lab #1 (cont'd)

Fragance Co.
1 - 4 oz. unknown liquid (unmarked)
1 - 4 oz. Secondary Standards - Triglycerides - 51.9% Trans
1 - 4 oz. Atlox 1045-A (liquid)
1 - 4 oz. Methyl Palmitate (crystals)
1 - 4 oz. Clear liquid - ("G1087,")
1 - 4 oz. unknown liquid - Clear
1 - 4 oz. 10% DOW in Xylene (liquid)
1 - 4 oz. Phosphor - FCX-1239-41D
1 - 4 oz. Phosphor - FCS-1239-41C
1 - <4 oz. Cresol Red
1 - 3 oz. unknown liquid - bright green
4 - 3 oz. TME - ABL
1 - 3 oz. unknown liquid - light red (unmarked)
1 - 3 oz. Secondary Standards - Triglycerides - 24.1% Trans
1 - 2 oz. unknown tablets - pale yellow
1 - 2 oz. unknown liquid - amber jar
1 - 2 oz. unknown white powder - illegible
1 - 2 oz. "B-153" - white powder
1 - 2 oz. Superesin Celery
1 - 2 oz. unknown liquid light orange (unmarked)
1 - 2 oz. Oil - Pimento Leaf
1 - 2 oz. "CaO Mn $O_2$ 10/1"
1 - 2 oz. Rea-lo Lotion (urea 15%)B125-solidified
1 - 2 oz. Secondary Standard - Fatty Acids -59.9% Trans
1- 2 oz. Secondary Standard - Methyl Esters -10.2 Trans
1 - 2 oz. Secondary Standard Methyl Esters - 38.2% Trans
1 - 1 oz. FCP Red (Phosphor)
2 - 1 oz. Sodium Trimetaphosphate
1 - 1 oz. B-glycero phosphate
1 - 1 oz. Magnesium Fluoride
1 - 1 oz. Versamid 900 (crystals)
1 - <1 oz. unknown liquid (plastic bottle)
1 - <1 oz. unknown white powder
1 - <1 oz. Azodicarbonamide (solid)
1 - <1 oz. Metaphosphate
1 - <1 oz. Calcium Lactate
1 - <1 oz. Boiled lipoxidase - 07/12/73
1 - <1 oz. Ketostearic Acid NRRL-2771-45-1
2 - sm. pkgs. Quandad Chloride Titrator B
1 - 10 sm. vials in sealed plastic cup #HBL#426

Lab #1 (cont'd)

Bench #3

1 - 5 gal. Drewclad CF 1009-75192 (metal container - crystals near top)
1 - 5 gal. unknown "Vick International, Manchester, England"
1- 5 gal. metal pail with 10 misc. 10oz. glass containers
2 - 2 1/2 gal. Dieldrin - (handwritten)
1 - 2 lb. (STC-570 (tag inside)) "NA-CHAR"
1 - 16 oz. unknown clear liquid with white sediment
1 - 12 oz. Hexacid Oleic Acid C-18-1-TOD
1 - 4 oz. Peroxide
1 - 4 oz. "Friendy-M" Won Hee Trading-Korea
1 - 4 oz. Norit A
1 - 2 oz. $H_2O_2$
1 - box vials (40ml) "C-526" clear liquid approx. 30 oz. total - 10 vials

North Bathroom

1 - 5 gal. Adol 80 by Sherex
1 - 5 gal. Stokely HB 100-PVO (plastic pail)
1 - 1/2 gal. unknown amber liquid
1 - 1 qt. unknown amber liquid
1 - 1 pt. Molasses
[redacted] - Liquid Carbonic approx. 1500 psi remaining

South Bathroom

[redacted]k by SOS Gas (Tel 469-3515) approx. 150 psi
[redacted] by SOS Gas (Tel 469-3515) No valve to check pressure
1 - 1 gal. Cottonseed Oil
1 - 1/2 gal. Mineral Spirits
1 - 1 gal. Harshaw "NYSEL" Hydrogenation Catalyst
1 - 1 qt. SG - unknown
1 - 1 lb. Calatom - FW - 14 (white solid)
1 - 1 lb. Fatty Alcohol Nf (white flakey solid)
1 - 1 lb. NuChar C115A-FF
1 - 1 pt. KOH
1 - 1 pt. Xylene
1 - 1 pt. Calciumsodium Chelate of Etylenediamine Tetra Acetic Acid (white powder)
1 - 1 pt. Barium Hydroxide
1 - 1 pt. Cubee 76 - white solid



5

Lab #1 (cont'd)

1 - 1 l. Ammonia
1 - 1 l. unknown clear liquid/wht ppt.
1 - 12 oz. Sodium Bisulfite
1 - 12 oz. NaOH
1 - 12 oz. Hexylene Glycol
1 - 8 oz. Ammonium Molybdate Solution
1 - 8 oz. Metylene Blue
1 - 4 oz. red solid
1 - 2 oz. Bromo Thymol Blue Sodium Salt (indicator)

Lab #2
Center Bench
East Side

1 - 2 1/2 gal. HCL
2 - 1 gal. NaOH
1 - 1 gal. Hexagon Plastic C-6/C=10
1 - 1 gal. Hexagon Plastic C-8/C-10
1 - 1 gal."TEG (not used)"-plastic container
1 - 1/2 gal. Dichromate Solution for AOM
1 - 5 lb. Zinc Chloride-Reagent Grade
1 - 5 lb. Ammonium Hydroxide
1 - 4 lb. Acetone
1 - 3 lb. Acetic Acid - Glacial
1 - 3 lb. Acetone
1 - 2 lb. Monoethanolamine
1 - 2 lb. Butyric Acid
1 - 2 lb. Benzoic Acid - Powder
1 - 2 lb. Ammonium Hydroxide (1)
1 - 1 lb. Acetic Acid (Reagent)
1 - 1 lb. Acetic Acid - Glacial
1 - 1 lb. Cocoa Butter Sample
1 - 1 lb. Sodim Cyanide
1 - <1 lb.Carbon Tetrachloride
1 - <1 lb. Glycerin-Plastic Container
1 - <1 lb. KI - Potassium Iodide
1 - 1 qt. Chloroform
1 - 1 qt. Edible Oleic Safflower Oil/Hexanol S-18
R2264
1 - 1/4 lb Celite Analytical Filter Aid
2 - 1 l. Karl Fischer Reagent (Combustible)
1 - 1 l. Karl Fischer Reagent - Stabilized
1 - 1 pt. unknown liquid
1 - 2 oz. Thiosulfate
1 - 16 oz. unknown amber liquid
1 - 8 oz. unknown amber liquid w/crystals illegible
tag
1 - 4 oz. unknown amber liquid
2 - 10 oz. unknown amber liquid
1 - 4 oz. "Alco" - liquid
1 - 4 oz. $H_3PO_4$
1 - 4 oz. Degreasil 80/20
1 - 4 oz. $Ca(Cl_2)$
1 - 3 oz. KCL
1 - 4 oz. $Na_2SO_4$
1 - 6 oz. HCL 2N
1 - 8 oz. "M.S. Union" - clear liquid
1 - 4 oz. Anhydrous Sodium Sulfide - powder
1 - 250 ml. Boron Trifluoride-Methanol Complex
(Corroded)

Lab #2 (cont'd)

1 - 3 oz. Silver Bromide
1 - 4 oz. Sulfanilic Acid-Dried
1 - 2 oz. "Zinc DW" - blue powder
1 - <1 oz. Sodium Cyanate
1 - 6 oz. Dowanol Tripropylene Glycol Methyl Ether (liquid)
1 - 12 oz. unknown white crystals
1 - 2 lb. Sodium Thiosulfate
1 - 1 lb. Sodium Thiosulfate
1 - 3 oz. Sodium Sulfite Anhydrous
1 - 32 oz. Sodium Sulfite Anhydrous
1 - 16 oz. Drummed Sodium Bichromate
1 - 8 oz. Drummed Sodium Bichromate
1 - 6 oz. 80% $H_2SO_4$ Sa+c $K_2Cr_2O_7$
1 - 2 oz. Na Metasilicate Anhydrous
1 - 32 oz. Silver Nitrate Solution N/10
1 - 10 oz. Sodium Thiosulfate
1 - 1lb. Disodium Ethylb--mine Tetra acetate
1 - <1 oz. Hamplex NPG by Hampshire Grace
1 - 1 oz. unknown white powder
1 - 8 oz. Stannous Chloride, Dihydrate
1 - 6 oz. USP Sulfanilamide Reference Solution
1 - 6 oz. Sodium Acid Pyrophosphate-Technical
1 - <1 oz. Potassium Phosphate - Reagent
1 - 6 oz. Tricalcium Phosphate
1 - 8 oz. Stannic Chloride (aqueous layer)

North Bench

1 - Diethanol Amine
1 - #3 Caster Oil (metal can)
1 - 4 lb. Polyoxyethylene Glyceride Ester (sm. metal pail)
1 - 4 lb. Sulfuric Acid - "Fuming"
1 - 3 lb. Morpholine (Hygroscopic)
1 - 1 gal. "Tx" unknown liquid
1 - 1 gal. Alcolec DS - by American Lecithin Co.
1 - 1 gal. Lipal 260 6N
1 - 1 gal. Adipic
1 - 1 gal. Lye
1 - 1/2 gal. Decyl Heavies by Specialty Industrial Products
1 - 1/2 gal Lipal D 1558
1 - 1 qt. Dipal 260 6N
1 - 1 qt. PVO Research (solidified unknown)
1 - 1 qt. Octy Acid Phosphate
1 - 1 qt. Tall Oil Fatty Acids
1 - 1 qt. "PEG 400"



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Lab #2 (cont'd)

North Bench

1 - 1 qt. Emersol 223 Ultra Oleic Acid
1 - 24 oz. Ester 5 OHM - 0402
1 - 24 oz. unknown solidified amber substance
1 - 20 oz. TME Oleate
1 - 16 oz. Dm 10K (solidified)
1 - 16 oz. Oleic acid
1 - 16 oz. Lipal 322
1 - 16 oz. Alcopol PEG 400 by Alkaril Chemicals, Inc.
2 - 16 oz. Hydrophobic Silica
1 - 12 oz. Triton X-102 G1501 (solidified - cracked lid)
1 - 10 oz. Anhydrous Sodium Metasilicate
1 - 8 oz. Buffer Solution
1 - 8 oz. Sorbitol 70%
1 - 8 oz. ?olychloriboric Acid
1 - 8 oz. unknown clear liquid (jar)
1 - 8 oz. "Limonene 125" (clear liquid)
1 - 8 oz. Phosphoric Acid
1 - 8 oz. "Klearol MO"
1 - 8 oz. Lipal 25 OA
1 - 8 oz. Monoamine ALX by Munz
1 - 8 oz. Lipal 2LA
1 - 6 oz. CaO
1 - 4 oz. Buffer Solution
1 - 4 oz. Karl Fischer Reagent
1 - 4 oz. Synthetic Ion Exchange Resin-Amberlite
1 - 4 oz. Hydrophobic Silca
1 - 4 oz. unknown solidified substance
1 - 4 oz. Potassium Silicate
1 - 4 oz. "NaAc"
1 - 2 oz. Lipal 6CSA
1 - 2 oz. Lipal 4-LA
1 - 1 oz. Lipal 400 DL
1 - 1 oz. Sustance - Food Grade Antioxidant
1 - 1 oz. GAFAC "PE 516"
1 - 1 oz. Witco Kemamide W-40 Defoamer
1 - 1 oz. Lipal 25 OA

North Floor Pails

1 - 3 gal. Synotol (solidified)
1 - 5 gal. "Drew ED 830" unknown liquid (blue pail
1 - 3 gal. unknown by Comax "Natural Fortified fc Grade #709
1 - 2 gal. unknown white powder (no label)
1 - 1 gal. Total Alkalinity Indicator
1 - 1 qt. Synotol CN-SOS PVO Reseach

Lab #2 (cont'd)

East Wall
Middle Bench

1 - 2 lb. "Periodic Acid"
1 - 1 qt. Reagent Alcohol Ethyl Methyl Isopropyl Mixture
2 - 80 oz. unknown liquid
1 - 32 oz. unknown solidified substance
1 - 24 oz. Iodine Monochloride - WIJS Solution by Anachemic
1 - 16 oz. unknown solidified substance
1 - 16 oz. Iodine Monochloride Solution
1 - 8 oz. Hengar Granules
1 - 4 oz. PVO Research Relabelled " 75/25 OH"
1 - 4 oz.Neutralized Palm Stearine (metal container/dried powder)
1 - 4 oz. Maprofix ES (solidified)
1 - 4 oz. PVO Research ____ relabelled
2 - 4 oz. unknown clear liquid
1 - 4 oz. unknown white powder/crystals
1 - 2 oz. PVO Research ____ relabelled
1 - 1 pt. PVO Research KOH

Under Bench
Desk

1 - 5 gal. Carbowax 400
1 - 16 oz. M-5 Reg $C_8C_{10}$ (tagged clear liquid)
1 - 8 oz. Dow Corning antifom Lot 0447
1 - 6 oz. Alc. Soluble Silicone Fluid
1 - 6 oz. Distilled C-8 C10
1 - 6 oz. unknown "oily" liquid
1 - 4 oz. unknown "oily" liquid
1 - 4 oz. Clear Guard Protectant
1 - 3 oz. unknown "oily" liquid "118-1 $T_2$ & TE"
1 - 3 oz. unknown clear liquid
1 - >1 oz. Potassium Hydrogen Phthalate

Lab 2 Middle Isle

1 - 1 gal. distilled water
1 - 1 gal. $Na_2S_2O_3$ 0.0962N
1 - 1 gal. Potassium Hydroxide
1 - 3/4 gal. Benzoic Acid Crystals
1 - ½ gal. Chloroform
1 - 1 lt. 2-EH (unknown clear yellowish liquid)
1 - 1 qt. Arsenic Std. (arsenic trioxide in gal $H_2SO_4$)
1 - 1 qt. unknown clear liquid w/ orange ppt.
2 - 1 qt. Aluminum Stearate High gid (nuodex)
1 - 1 qt. Barium Chloride Crystals

Lab #2 (cont'd)

1 - 1 qt. Aluminum Oleate
1 - 1 qt. Nitric Acid Powder
1 - 1 qt. Boric Acid Powder
1 - 1 qt. Calcium Peroxide
1 - 1 qt. Sodium Borohydride Powder $NaBH_4$
5 - 1 qt. Fumaric Acid
1 - 1 qt. Starch
1 - 1 qt. Puracol Pep - 450 clear viscous liquid
1 - 1 qt. Phosphorous Pentoxide
1 - 1 qt. Potassium Ferro Cyanide
1 - 1 qt. Potassium Acid Phthalate (crystals)
1 - 1 qt. Pyrrolidine
1 - 4 qt. Potassium Ferrocyanide
1 - 1 qt. 1290 (unknown white solid-powder)
1 - 1 qt. Bromophenol Blue
1 - 1 pt. Alumina
1 - 1 pt. Ammonium Sulfate
1 - 1 pt. Acetyl--(poison)
1 - 1 pt. Platinum Cobalt Std.
1 - 1 pt. Calcium Carbonate
1 - 1 pt. Sodium Silicate (white solid powder)
1 - 1 pt. Magnesium Oxide
1 - 1 pt. Liquified Phenol
2 - 1 pt. Mercuric Acetate
1 - 1 pt. unmarked semi-solid
1 - 1 pt. Potassium Dichromate
1 - 1 pt. Lead Oxide (red)
1 - 1 pt. Potassium Dichromate (Chrystals)
1 - 1 pt. Pyridine
1 - 8 oz. 2-4 Dichlorophenol
1 - 8 oz. Tetrapotassium Pyrophosphate Anhydrous powdered (2 layers clear liq/white ppt)
1 - 8 oz. Paraperiodic Acid ($H_3IO_6$)
1 - 8 oz. Nitro...(unknown white powder solid)
1 - 8 oz. Disodium Phosphate
1 - 8 oz. Sodium Metasilicate (beige solid)
1 - 8 oz. Monosodium Phosphate (white solid)
1 - 8 oz. Lead Oxide
1 - 8 oz. Phloroglucinol
1 - 8 oz. Periodic Acid
2 - 8 oz. Phenophthalein Powder
1 - 4 oz. Barium Hyroxide
1 - 4 oz. unknown white solid
1 - 4 oz. Ammonium Oxalate
1 - 4 oz. unmarked unknown white powder solid
1 - 4 oz. Fascat -2001 catalyst (white solid)
1 - 4 oz. Magnesium Chloride

Lab #2 (cont'd)

1 - 2 oz. 2,6-Dichloro Quinone Chlorimide
1 - 3/4 oz. Potassium Iodide
1 - 3/4 oz. Sodium Hydroride
1 - 3/4 oz. Sodium Sulfate Anhydrous
1 - 1 ½ oz. Calcium Chloride

Middle Isle
Second Shelf

1 - 1 gal. NAOH 0.484N
1 - 1/2 gal. Local Shampoo (clear visc. liquid)
1 - 1 qt. Metyl Orange
1 - 1 qt. Brown Solidified Liquid
1 - 1 qt. Methanol/NaOH 0.5N
1 - 1 qt. Starch
1 - 1 qt. Phenophthalein - Indicator
1 - 1 qt. Sodium Benzoate
1 - 1 qt. Potassium Ferrocyanide
1 - 7 pt. Composition DL LHT 800280 (liquid)
1 - 1 pt. Methylene Blue
1 - 1 pt. CaO
1 - 1 pt. unmarked liquid
1 - 1 pt. $H_2SO_4$
1 - 1 pt. Orange Oil
1 - 1 pt. unmarked solid
1 - 1 pt. $H_2SO_4$ 0.1N
1 - 1 pt. Concentrated HCL
1 - 1 pt. Shamzed (Viscous clear liquid)
1 - 1 pt. 523B White solid
1 - 1 pt. 52454 clear yellowish liquid
1 - 8 oz. unmarked liquid
1 - 8 oz. Acetic Chloroform
1 - 8 oz. Diglycerol (B-UZO) Laurate
1 - 8 oz. Saturated KI
1 - 8 oz. unknown material (marked WS)
1 - 8 oz. clear liquid (marked Degr.90/10)
1 - 8 oz. Triglyceryl Mono SH
1 - 4 oz. Thyol Blue
1 - 4 oz. Hydroxyl Perchlorate (solidified)
1 - 4 oz. clear liquid - unmarked
1 - 2 oz. Peroxide
1 - 2 oz. unmarked clear liquid
1 - 2 oz. Lube Oil - SAG 10
1 - 2 oz. unmarked brown solid
1 - 1.5 oz. Bromophenol Blue
1 - 1.5 oz. unknown red liquid
1 - .5 oz. Citrous Booster



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Lab #2 (cont'd)

1 - 100 ml. white solid unknown
1 - 50 ml. Unknown solid (surfactant)
1 - 50 ml. unmarked liquid white ppt.

West Bench
Bottom Cabinets

2 - 1 gal. Petroleum Ether
1 - 1 gal. Acetone
1 - 1 gal. Mineral Oil
1 - 1 gal. Isopar H (for recovery-cationic)
1 - 1 gal. Lye-Caustic Soda

West Bench
Table

1 - 1 lt CMC X; Beige powder
1 - 1 qt. High density Oxidized Homopolymers (white powder)
1 - 1 qt. Homopolymers (white powder)
1 - 1 qt. Hystrene 3022 (white powder)
1 - 1 qt. KOH
1 - 4 oz. Sunlite (clear colorless liquid)
1 - 8 oz. unmarked clear colorless liquid
1 - 6 oz. unmarked clear yellowish liquid
1 - 4 oz. unmarked clear brownish liquid
1 - 2 oz. unknown, possible empty, std sol s1.3
1 - 1 oz. α Tocopherol (reddish cristal like clear solid)
1 - 1 oz. Thiourea
1 - 1 oz. Grildein (?) beige solid-flakes/powder
1 - 1 oz. Potassium Iodide
1 - 1 oz. Sodium Flouride
1 - 1 oz. Copper Acetylacetone
1 - 1 qt. Std. Buffer Solution pH=4
1 - 1 qt. 4.1% Alderin; 0.1% Dieldrin
1 - 1 lt. Roxbury Carpet Special Standard (clear colorless liquid)
1 - 1 lt. unmarked clear colorless liquid
1 - 1 lt. $NH_4F$
1 - 1 lt. unmarked white solid
1 - 1 lt. Indicator Buffer (brown liquid)
1 - 1 lt. unmarked clear colorless liquid
1 - 1 pt. Std. Buffer Solution pH=4
1 - 1 pt. unmarked white solid
1 - 1 pt. Drew Clad 2 (yellowish liquid with crystals)

Lab #2 (cont'd)

1 - 1 pt. Iodide Starch Paper with Zinc Chloride
1 - 8 oz. Metylate
1 - 8 oz. unmarked brown liquid
1 - 4 oz. Hexyl Acetate (clear colorless liquid)
1 - 4 oz. Silicone Solution Standard
1 - 4 oz. DDT
1 - 4 oz. unmarked red solid-powder
1 - 4 oz. Aurintricarboxylic Acid Ammonium Salt (Aluminon)
1 - 4 oz. Silver liquid (Hq)
1 - 4 oz. KI
1 - 4 oz. unmarked white solid
1 - 4 oz. Quantab Base Titator 1160
1 - 4 oz. Quantab Base Titator 1162
1 - 4 oz. Egg Albumin
1 - 2 oz. Erioqlaucine
1 - 2 oz. Neutralizing Solution (clear colorless liquid)
1 - 2 oz. $K_2Cr_2O7$
1 - 2 oz. Hydroxilamine HCL
1 - 2 oz. unmarked white solid
2 - 2 oz. unmarked solid
1 - 1 oz. β-Carrotene
1 - 1 oz. Silver liquid (mercury)
1 - 1 oz. TLA-270 (brown viscous liquid)
1 - 1 oz. Ascorbic Acid (golden/yellow powder)
1 - 1 oz. Vegetone (orange/red solid)
1 - 1 oz. 1% NaO Nitroferricyanide in $H_2O$
1 - 1 oz. Resorcin α (golden powder)
1 - 1 oz. Ferric Acetylacetonate (brown powders)
1 - 1 oz. Nickel Formate 31.08% (blue powder)
1 - 1 oz. unmarked white solid
1 - 1 oz. unmarked beige solid powder
1 - 1 oz. Aluminum Sulfate
1 - 1 oz. unknown beige Crystals
[redacted] Crystals
1 - 1 oz. Digitonin
1 - 1 oz. O-Cressol Sulfon Phthalein
1 - 1 oz. Mercury Purified
1 - 1 oz. Glucose
2 - 1 oz. Copper Sulfode, Caustic Soda, Sodium Carbonate, Citic Acid Mix (Dextrocheck)
1 - 500 ml.. Sodium Solution (clear colorless liquid)
2 - 50 ml.. D II, B (clear colorless liquid)
1 - 50 ml.. D II, A (brown solid)
2 - 40 ml. Recrystallized Heod



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Lab #2 (cont'd)

1 - 40 ml. unmarked solid
1 - 20 ml. German Soap Free of Alkali (orarge liquid)
1 - 20 ml. Lipoxidase
1 - 20 ml. Recrystallized Endrin
1 - 20 ml. unmarked white solid
1 - 20 ml. $KH_2PO_4$
1 - 20 ml. $Sn.80_4$
1 - 20 ml.. Iron Powder HV Reduced
1 - 10 ml. Alpha-Bromonaphtaline
1 - 5 ml. Phosdrin (insecticide) α Isomer
1 - 5 ml. Potassium Chloroplatinate
1 - Foil pack Quantab Chloride Titator
1 - 1 qt. Fatty Alcohol Proctor & Gamble
1 - 300 ml. unknown liquid
16 - 115 ml. Photovolt Corporation Vessel Solution
1 - 1 gal. unknown liquid
1 - 1 l. unknown liquid
1 - 1 gal. Methyl Ethyl Keytone
1 - 1 gal. Acetic Anhydrite
3 - 1 gal. unknown clear liquid
1 - 1 pt. unknown liquid

SOUTH ROOM

1 - 1/2 gal. unknown white crystals
1 - 1 qt. PVO Sample No. SL-15 Hershaw Nysel Catalyst

NORTH FLOOR IN BOX

1 - < 10 oz. Pricat 9900 by Stokely
1 - 6 oz. Nikki N122ARS Catalyst by Nikki Chemical Co., Tokyo
1 - 8 oz. Flake Nickel Catalyst S0-110 by Chugai Interntl. Corp. NY,NY
1 - 8 oz. 50-110B
1 - 8 oz. 50-110C
1 - 6 oz. Nickel Catalyst by Emery
1 - 4 oz. unknown gray chips Tag "1739"
1 - 4 oz. unknown gray chips Tag "1738"
1 - 2 oz. unknown gray chips Tag "1737"
1 - 4 oz. unknown gray chips Tag "1720"
1 - 2 oz. unknown gray chips Tag "1708"
1 - 4 oz. unknown gray chips Tag "1710"
1 - 4 oz. unknown gray chips Tag "1719"
1 - 1 oz. unknown gray chips Tag "1725"
1 - 4 oz. unknown gray chips Tag "1736"

Lab #2 (cont'd)

1 - 4 oz. unknown gray chips Tag "1718"
1 - 3 oz. unknown gray chips Tag "1722"
1 - 3 oz. unknown gray chips Tag "1709"
1 - 4 oz. unknown gray chips Tag "1734"
1 - 4 oz. unknown gray chips Tag "1721"
1 - 6 oz. PVO Research 1709/1710 Grey Chips
1 - 6 oz. Harcat I (Harshaw) by Chemol, NC

STOREROOM

1 - 1,000 Tablets Sulfadiazine

South Shelves

1 - 1/2 gal. Coconut Stearine (paint can)
1 - 3 lb. Sodium Sulfate
1 - 1 lb. Sodium Bicarbonate-Analytical (powder)
1 - 1 qt. PGME 72E
1 - 1 qt. Eureka 25 by Atlas
1 - 1 qt. "Trigerol"
1 - 1 qt. "M.O. USP" Plastic Bottle - clear liquid
1 - 3/4 qt. unknown "1410" (White fatty substance)
1 - 1 pt. Calcium Chloride Dihydrate
1 - 1 pt. "1125" Light Amber liquid
1 - 1 pt. OH 1105 G4
1 - 1 pt. Caprot Et by Stokely
1 - 1 pt. unknown solidified substance
1 - 1 pt. unknown dark amber solidifed substance (Tag "Shipped Bunge")
1 - 1 pt. unknown clear solidifed substance
1 - 1 pt. PVO Research Hydrogenated Catalyst Activated Metals & Chemicals
1 - 1 pt. paint can W-11 (liquid)
1 - 1 pt. paint can W-16 (liquid)
1 - 1 pt. paint can RIT TGI (liquid)
1 - 1 pt. paint can unknown (liquid)
1 - 1 pt. unknown liquid
1 - 1 pt. unknown sm. dark amber chips
1 - 1 pt. Triglycerol Mono Solution
1 - 1 pt. PVO Research 6-1.5 Palm Fract
1 - 1/2 pt. Calcium Carbonate
1 - 4 oz. unknown solidified substance
1 - 8 oz. unknown solidified substance
1 - 4 oz. NaOH .15
1 - 8 oz. NaOH .15
1 - 2 oz. unknown clear liquid
1 - 10 oz. unknown clear liquid
1 - 8 oz. AMP 95 2-Amino-2-Methyl-1-Propanol by IMC
1 - 2 oz. Dioxin
1 - 12 oz. Dioxin
1 - 8 oz. unknown liquid
1 - 12 oz. unknown solidified substance



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Lab #2 (cont'd)

1 - 2 oz. XXIX solidified substance
1 - 4 oz. Speciality Industrial Products, SC Ester 5 IHB 2445
1 - 4 oz. Speciality Industrial Products, SC Ester 301 IHG 0477
1 - 4 oz. Speciality Industrial Products, SC Ester 5 IHG 0474
1 - 4 oz. Speciality Industrial Products, SC Ester 5 OHM 0400
1 - 4 oz. Speciality Industrial Products, SC Ester 5 IHD 0465
1 - 4 oz. Speciality Industrial Products, SC Ester 5 OHL 0387
1 - 4 oz. Speciality Industrial Products, SC Ester 7 IHG 0476
1 - 4 oz. Speciality Industrial Products, SC Ester 5 IHG 0473
1 - 4 oz. Speciality Industrial Products, SC Ester 301 9HC 0219
1 - 4 oz. Speciality Industrial Products, SC Ester 5 IHA 0420
1 - 20 oz. Ester 5 IHG 0475
1 - 4 oz. 15 Lipal T (Tag)
1 - 2 oz. "XXX" unknown solidified substance
1 - 6 oz. PVO Research POE-4-SMS solidified
1 - 4 oz. A-2000 (Activated Metals) by Chemol
1 - 4 oz. unknown solidified test material
1 - 2 oz. Solusol 75 WS-2078 by Cyanamid (Solidified)
1 - 8 oz. Acme Conc. liquid Concrete Plasticizer b Acme-Hardesty Co.
1 - 2 oz. A-3000 (Activated Metals) by Chemol
1 - 8 oz. Anionic Phosphate Acid
1 - 8 oz. Azalaic Acid
1 - 8 oz. "DP 60K" Solified
1 - 8 oz. "XXIX" unknown solidified substance
1 - 8 oz. "XXX" unknown solidified substance
2 - 4 oz. Mannitol USP Powder
1 - 4 oz. "B30" by ABM Chemicals LTD, Cheshire, Eng.
1 - 4 oz. Viscoleo Extra Imported by Irving Booty & Co., 1 World Trade Ctr.,NY

Lab #2 (cont'd)

BOX ON SHELF

1 - 1/2 lb Potassium Dichromate
1 - 6 oz. Oxalic Acid (Brazilian)
1 - 6 oz. Bichromat de Sodiu - $Cr_2O_7Na_2 \cdot 2H_2O$ Romania
1 - 6 oz. Dimethyl-2,2-Dichloro-Vinyl Phosphate
1 - 4 oz. "BK60" ABM Chemicals, Ltd.
1 - 4 oz. "Nervanaid BK60" ABM Chemicals, Ltd.
1 - 4 oz. Sulfamic Acid & NaCl
1 - 2 oz. Sulfamic Acid
7 - unknown foil wrapped metal containers

BOX EAST OF SOUTH SHELVES

1 - 2 lb. Granular Mannitol USP
1 - 1 qt. Citric Acid Anhydrous by Fursan, Turkey
1 - 1 pt. Potassium Hydroxide
3 - 4 oz. Guarpak Natural Guar Gum
8 - 4 oz. Mannitol
1 - 4 oz. Trikaliunzitrat Monohydrat by Jungbunzlauer - $C_6H_5O_7K_3 - H_2O$
2 - 50 g. Citroenzour Anhydraat USP by Aako, Holland
1 - 4 oz. Nervanaid NTA Acid ABM Chem., Ltd.
1 - 4 oz. Calcium Phosphate Feed Grade "Knofos 21"
1 - 6 oz. Nerv. B65 by ABM Chemicals, Ltd.
1 - 8 oz. Sorbitol Powder SP100
1 - 6 oz. Nervanaid B Acid by ABM Chemicals, Ltd.
2 - 8 oz. Sorbital Powder USP
1 - 8 oz. Sorbital Powder SP20
1 - 4 oz. Agar Agar by Gomas Marinas S.A. La Coruna, Spain
1 - 2 oz. Citric Acid Anhydrous BP/USP by DCT Chemie, BV, Holland
1 - 4 oz. Zno by Cathay Chemical Works, Taiwan
1 - 2 oz. Potassium Permanganate
1 - 4 oz. Citric Acid Anhydrous $C_6H_8O_7$ by Jungbunzlauer
1 - 6 oz. Sorbitol Powder SP60
1 - 2 oz. Citric Acid Anhydrous USP



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Lab #2 (cont'd)

WEST BENCH - SHELVES

1 - 1 lb. Phenolphthalein
1 - 1 lb. Sodium Sulfate
1 - 3/4 lb. Starch
1 - 3/4 lb. Soluble Starch
1 - 1 qt. Isostearyl Alcohol by Ashland Chemical
1 - 3/4 qt. "Brite Sorb" (White Powder)
1 - 3/4 qt. Methyl Orange Indicator
1 - 1 pt. Cab-o-sil (White Powder)
1 - 1 pt. "-81 Pluronic" (clear liquid)
1 - 1 pt. p-Nitrobenzyl Chloride by Aldrich
1 - 1 pt. Oleyl 50/50 by Henkyl
1 - 1 pt. "Metro Talc"
1 - 1 pt. "536 Fluid" by Dow Corning
1 - 1 pt. "200 Fluid" by Dow Corning
1 - 1 pt. Hexamol PG 810 by Hexagon Industries
1 - 1 pt. Methyl Purple Indicator
1 - 1 pt. "531 Fluid" by Dow Corning
1 - 1 pt. pH Reference Buffer Solution HCL/Potassium Phthalate
1 - 3/4 pt. Carbopol 941 by BF Goodrich
1 - 6 oz. Zinc Dust
1 - 20 oz. unknown white powder
1 - 6 oz. Corn Starch
1 - 4 oz. Sodium Carbonate
1 - 8 oz. Wet Soluble Lanolin
1 - 8 oz. Kessco 1 PEG 600 Monoleate
2 - 2 oz. Sodium Bicarbonate
1 - 8 oz. Sodium Bicarbonate
1 - 10 oz. Sodium Carbonate Anhydrous
1 - 6 oz. Anhydrous Sodium Metasilicate
1 - 2 oz. HPHA Solution (clear liquid)
1 - 2 oz. Potassium Permanganate
1 - 2 oz. Thymol Blue
1 - 2 oz. NB 300 Basic Fuschin
1 - 4 oz. Bromophenol Blue
1 - 1 oz. Quinizarin GAF
1 - 1 oz. Disodium-Tetra-Hydroxy-Quinone Indicat
1 - 1 oz. Bromocresol Green
1 - 2 oz. unknown red liquid (in Medicine Droppe
1 - 6 oz. Silicone Fluid GE
1 - 4 oz. Methyl Orange
1 - <1 oz. Methyl Orange Indicator
1 - 100 ml. 0.01 N Thiosulfate for Peroxides

Chemical Store Room

1 - Compressed gas cylinder, unknown
13 - 55 gal. unknowns
1 - 55 gal. Drepol 10-10-0
1 - 55 gal. hetsorb TS20
1 - 55 gal. Drewplast
1 - 55 gal. Plasticizer
1 - 55 gal. Mineral Spirits, COMBUSTIBLE
1 - 20 gal. carboy Muriatic Acid
1 - 40 lb. Dimethylpolysiloxcan, 60,000 cs viscosity
19 - 5 gal. unknowns
1 - 5 gal. Neeobee
1 - 5 gal. Hex GWC
1 - 5 gal. Wecoline
1 - 5 gal. Molasses
1 - 5 gal. Feedwater Oxygen Scavenger, Hydrazine, Aqueous Solution
1 - 5 gal. Carbitol Solvent - Diethylene Glycol Monoethly Ether, COMBUSTIBLE
1 - 5 gal. Silicone
1 - 5 gal. Foam Degreaser, COMBUSTIBLE, CORROSIVE
1 - 5 gal. Carbowax - Polyethylene Glycol
1 - 5 gal. Pluronic L-81
1 - 5 gal. LIPAL 5-OA (43-3-40)
1 - 1 gal. n-dodecanol-n-tetra decanol (broken)
1 - 1 gal. Pamolyn
1 - 1 gal. Invert Syrup
1 - 1 gal. Emery Trylox co-30 BATCH #I494-M
2 - 1 gal. LIPAL OE 71
1 - 1 gal. Detergent
1 - 1 gal. Jefferson C9 Fatty Acid
1 - 1 qt. Disodium Ethylenediamine Tetracetate Solution
3 - 1 qt. unknown crystal/pellet
1 - 5 lb. Fritzsche FD&C Yellow #5
2 - 1 l. DLBSA
1 - 1 l. Sodium Salt of Kraft Pine Lignia
1 - 1 l. unknown liquid
1 - 1 l. Drewpol 3-2-CN
1 - 1 l. unknown oil ETO Century
1 - 1 l. Witco Industrene 206 LP Lot 4B6046
2 - 1 l. Emery 658 special (CORROSIVE)
1 - 1 l. Hexagon Enterprises LDN-3 106 shortchain acids mix Caprylic/Capric
2 - 1 l. unknown clear oil
1 - 1 l. unknown
1 - 1 l. ETO 2-Ethylhexanol
1 - 1 l. Nysel Catalyst Harshaw Chem.
1 - 1 pt. Monsanto Sodium Benzoate
1 - 1 pt. unknown silver powder

Chemical Store Room
(cont'd)

1 - 1 pt. Norda Diacetyl #M6377
1 - 1 pt. Pfizer Food Color
1 - 1 pt. General Mills Fluid Double Bleached Lecithin BL 6878
1 - 16 oz. unknown red liquid
1 - 8 oz. unknown fat
1 - 6 oz. unknown powder (marked MR 100)
1 - 4 oz. H. Kohnstamm FD&C yellow #5
1 - 500 ml Viscoleo Extra (alumimum bottle)
1 - 500 ml Stearic Acid 35 mol
1 - 500 ml Titanium Dioxide
1 - 500 ml Wecobee R-Monoglyceride
3 - 500 ml unknown liquid
1 - 500 ml Meterine Chemical Co. Monyl Phenol + 4 E.O.
1 - 500 ml Meterene Chemical co. Monyl Phenol + 9 E.O.
1 - 500 ml Mitsubishi Med-chain Triglyceride COCONAD.RK
1 - 500 ml Sodium Hydrosulfite
1 - 500 ml LIPAL TE 76
5 - LIPA 25 OA (500 ml)
1 - 500 ml Sodium Benzoate Prime
1 - 500 ml Warner-Jenkinson #9465 Red Lake Dispersion
1 - 500 ml unknown metal tin
69 - lab container unknowns
1 - 100 ml Stannous Chloride
1 - 250 ml Gallic Acid
1 - 250 ml ISO-V
1 - 250 ml Dodecyl Benzene Sulforic Acid
1 - 50 ml Dry Starch Acid Indicator
1 - 5 ml Dieldrin Standard
1 - 10 g Potassium Chloropatinate
1 - 100 ml Isopropyl Titanate
1 - 100 ml ABCB Alkali Test
1 - 50 ml Tenox BHA
1 - 10 ml Wecobee R Mono, PVO
1 - 1 lb. Rubbergrade ? Acid
1 - 250 ml Triglycerol Benzoate (?)
1 - 250 ml 49° n-Butanol
1 - 100 ml PVP Iodine Pharmacetical Grade
1 - 200 ml Butyl Titanates
1 - 50 ml Unflavored Flavor Island Blue Color
1 - 250 ml Drewmulse - 35
1 - 25 ml Jet Lube
1 - 100 ml Soloid Solvent Thickner
1 - 500 g. Florisil Chromatigraphic Absorbent

Chemical Store Room
(cont'd)

1 - 1 lb. Activated Charcoal
1 - 1 unknown liquid in sealed glass container
1 - 40 ml General Mills Monoammonium Glutemate
1 - 200 ml unknown oil
1 - 150 ml unknown oil
2 - 100 ml Tumeric Blend
1 - 100 ml Raspberry Flavorings
17 - 100 ml Misc. unknowns, food dyes & Beta carotene
2 - 250 ml Flake Nickel Catalyst SAKAI Chemicals
1 - 250 ml Copper Chromite Catalyst SAKIAI Chemic
1 - 1 lb. bag unknown powder
1 - 300 ml Fascat 4201 catalyst (caustic)
1 - 300 ml glass jar unknown powder
1 - 200 ml unknown
1 - 150 ml unknown liquid
2 - 300 ml clear oil (unknown)
1 - 300 ml unknown fat
1 - 200 ml Sentry Chemical PEG 400 Mono Oleate
1 - 150 ml unknown oil
1 - 250 ml unknown
1 - 150 ml unknown red powder
1 - Warner-Jenkinson FD & C Red Dye #2 (Amaranth)
1 - 300 ml unknown oil
1 - 55 ml Allied Chemical IOSOL Blue 6.G
2 - 55 ml Warner Jenkinson FD & C Blue #2
1 - 50 ml unknown oil
1 - 50 ml Margarine Flavor
1 - 50 ml National FD & C Blue #1
1 - 50 ml National Brilliant Oil Blue
1 - 50 ml unknown red powder
2 - 30 ml Soybean Oil
1 - 50 ml Allied Chemical FD & C Green #2

Table 2

1 - 1 gal. Durkex 100
1 - 1 gal. Ethylene Glycol
1 - Open dish, looks like speedy dry, approx 1 p
1 - 5 gal. red liquid
1 - 8 oz. Imitation Chocolate Flavor
1 - 32 oz. Polyethylene Glycol Di-2-Ethylhexoate
1 - 8 oz. Deodecyl
1 - 12 oz. Annatol (?)
1 - 32 oz. Denatured Ethyl Alcohol
1 - 16 oz. Isopropyl Palmitite
1 - 16 oz. Annatol
8 - 4 oz. sample jars, red liquid

Chemical Store Room
(cont'd)

1 - 6 oz. red liquid
1 - 8 oz. Mustard Seed "Liquid"
1 - 1 gal. CitriKleen - Biodegradable Solvent
1 - 1 gal. Solvent Blank Virgin
1 - 6 oz. yellow liquid
1 - 8 oz. Molecular Sieve
1 - 8 oz. CZA421
1 - 16 oz. unknown
1 - 12 oz. unknown
1 - 16 oz. Malabate 93 F-W
1 - 12 oz. Soya Gum
1 - 24 oz. Imitation Butter Flavor
1 - 24 oz. Hydrochloric Acid
1 - 1 gal. Corn Syrup
1 - 6 oz. unknown
1 - 4 oz. Stabilized Natural Carotenes
1 - 16 oz. unknown
1 - 4 oz. unknown
1 - 8 oz. unknown
9 - Box 9 oz. glass jars, empty

TABLE 3

1 - 4 oz. Yellow #6 Dye
3 - 4 oz. Stabilized Natural Carotenes for Popcorn
1 - 4 oz. Hydrogenated Vegetable Oil
1 - 4 oz. β-Carotene
1 - medicine dropper, unknown
1 - 12 oz. Corn Oil
1 - 8 oz. #9477 Red Lake Dispersion
1 - 12 oz. unknown
1 - 12 oz. unknown
1 - 12 oz. unknown
1 - 16 oz. Yellow Dye #5
1 - 16 oz. unknow
1 - 12 oz. unknown
1 - 24 oz. unknown
1 - 24 oz. Sorbic Acid
1 - 4 oz. unknown
1 - 6 oz. Red Lake Blend
1 - 6 oz. unknown
1 - 2 oz. Green Dye #1
1 - 4 oz. unknown
1 - 12 oz. unknown
1 - 4 oz. Yellow #5 Dye
1 - 8 oz. unknown
1 - 4 oz. Blue #1 Dye
1 - 2 oz. unknown
1 - 4 oz. Red Dye #3



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Chemical Store Room
(cont'd)

1 - 4 oz. Red Shade
1 - 6 oz. FD #6
1 - 12 Oz Bixin in Hydrogenated Vegetable Oil
1 - 12 Oz Dispersion 33
1 - 16 oz. Fluid Natural Lecithin
1 - 16 oz. unknown
1 - 16 oz. unknown
2 - 12 oz. unknown
1 - 1 lb. Benzoic Acid
1 - 1 gal. unknown
1 - 5 gal. Emmersol Oleic Acid
2 - 5 gal. unknown
1 - 2 l. Erika 34, Aluminum
1 - 8 oz. Glyceryl

ROW 3

2 - 5 lbs. Methanol
2 - 5 gal. unknown
1 - 1 gal. Genepoxy
1 - 5 gal. A-C Cleaning Compound
1 - 7 1/2 gal. Urenmulse - 13026, PD-030
13 - 5 gal. unknown
1 - 5 gal. Droper
1 - 5 gal. Di-2-Ethylhexyl Pthalate
1 - 5 gal. Isodecyl Ester
1 - 5 gal. Hexaglycem
1 - 5 gal. Neodol 23-G5
1 - 5 gal. red liquid (open)
1 - 1 gal. white oil

Chemical Store Room
(cont'd)

LEFT SIDE SMALLER
CONTANIERS

70 - 32 oz. unknown
15 - 16 oz. unknown
1 - 8 oz. unknown
10 - 12 oz. unknown
1 - 32 oz. unknown
1 - 12 oz. "an improved cell stabilizer"
20 - 32 oz. Crude VRO
1 - 2 1/2 gal. unknown
1 - 32 oz. Decyl---
1 - 32 oz. Carprylic
1 - 6 oz. n-Cyclohixoyl Alanis
3 - 1 gal. unknown
50 - 6 oz. unknown
1 - 12 oz. Nuodex
1 - 24 oz. Nudodex
1 - 24 oz. Noctyl Alcohol
1 - 1 gal. Phosphoric Acid
5 - 1 gal. unknown
1 - 6 oz. unknown
1 - Box Approx. 14 various jars
1 - 8 oz. Emulphogene BL-840
5 - 32 oz. All Purpose Cleaner
1 - 1 gal. unknown
6 - 1 gal. NaOH
1 - 1 gal. unknown



21

Room #1
Maintenance Area

1 - 55 gal. Disodium Phosphate (open)
1 - 55 gal. Ambelite IR122 PVO
1 - 55 gal. Mobil Arctic Oil
1 - 55 gal. unknown
1 - 55 gal. Lubriplate No. 2 (Lubricant)
1 - 110 lbs. Catalysed Sulfite
1 - 200 lbs. Paraline Organic Loaf
1 - 50 lb. bag Lauric Acid, flaked
4 - 100 lb. bags Snow White Crystals (for water softening)
1 - 5 gal. Cement Mix
1 - 120 lb. Texaco Multifak 2 (lubricant)
1 - 1 gal. Lubriplate No. 70 (Lubricant)



29

Room #4

31 - 55 gal. unknowns
1 - 55 gal. Capella Oil C, Texaco
1 - 55 gal. Acryloid 956, Rohm & Haas Co.
5 - 55 gal. Texaco Regal Oil
5 - 55 gal. Texaco Cylinder Oil
4 - 55 gal. Food Packaging Adhesives, United Resin Products, Brooklyn, NY
1 - 55 gal. Dupont Hylene IV Aliaphatic Disocyanate POISON
1 - 55 gal. Adipate Ester, Henia
1 - 55 gal. Coconut Oil, PVO
1 - 55 gal. scrap oil
1 - 275# fiber drum 35% Hydrogen Peroxide OXIDIZER
1 - 100 # fiber drum Calcium Oxide
1 - 55 gal. Triethanolamine 99%
1 - 55 gal. drum Shell Sol 340 HT, Contains Xylene Toluene Ethylbenzene Flashpoint 100 F Combustible (stored next to $H_2O_2$)
4 - 55 gal. CAS# 64741-41-9, Contains Petroleum Hydrocarbons COMBUSTIBLE (defoamer, leaker?)
2 - 55 gal. Polyethylene Glycol Monosterate
1 - 55 gal. Oleic Acid
20 - 55 gal. (68512-92-5)
1 - 55 gal. (142-62-1) (Marked Acid)
1 - 55 gal. (26402-26-2)
12 - 55 gal. (1338-39-2)
1 - 55 gal. (9007-48-1)
2 - 55 gal. (124-07-2)
1 - 55 gal. (24938-91-8)
1 - 55 gal. Diatomaceous Earth
1 - 30 gal. Muriatic Acid
1 - 55 gal. (124-07-02), Caprylic Acid
1 - 55 gal. (61789-05-7)
1 - 55 gal. Aminoethylethanolamine - (Corrosive)
1 - 55 gal. Pennwalt KEEPHOS Alkali Phos.
1 - 55 gal. unknown (corroded, leaking)
1 - 55 gal. (26402-26-6) (unknown) - (68938-3-2) (unknown)
1 - 55 gal. Stearine
1 - 55 gal. Marked "Lab Waste"
1 - 55 gal. WECOBEE - M
2 - 55 gal. CaCl
1 - 50 gal. Anhydrite Phtalique
1 - 40 gal. n-Phenyl a-Naphthylamine
2 - 40 gal. Anthroquinone
1 - 30 gal. Drew Gard 100
3 - 7 gal. unknown
7 - 7 gal. Cocoanut Oil
4 - 7 gal. Drew HL 5746
4 - 7 gal. Drew Creme 100

Room #4 (cont'd)

1 - 7 gal. unknown
1 - 5 gal. Propylene Glycol
1 - 5 gal. Hercoflex Plasticizer, Heracules Chemical Co.
1 - 5 gal. Flexol Plasticizer, A-26 Union Carbide, Di(2-Ethylhexyl) Adipate
3 - 5 gal. unknowns
6 - 1 gal. cans assorted oils, greases and lubricants
1 - 5 gal. Polyglycol
2 - 5 gal. Zinc Dust
1 - 1 gal. Anhydrous CaSO4
1 - 5 gal. Furfural
1 - 5 gal. Triphenyl Phosphite
5 - 2 gal. unknowns
1 - 1 pt. unknown
4 - 5 gal. TDA
1 - 5 gal. Acryloid
1 - 5 gal. unknown
1 - 5 gal. Carbowax (Polyethylene Glycol)
1 - 5 gal. Iso Octanol
1 - 5 gal. Gulf Synfluid SF0203-2
2 - 5 gal. unknown
7 - 5 gal. unknown
2 - 50 lb. Halite (NaCl)

ROOM #5

3 - 20,000 gal. Tanks, #445, #446, #447
2 - 5,000 gal. Tanks, #465, #468
2 - 2,000 gal. Tanks, #466, #467
2 - 2,000 gal. Tanks #415,?
3 - 20,000 gal. tanks, Nos. 445, 446, 447 (appear empty)
2 - 5,000 gal. tanks Nos. 465 & 468 (appear empty
2 - 2,000 gal. tanks Nos. 466, 467 (appear empty)
2 - 2,000 gal. tanks Nos. 415 & ? (status unknown
1 - 55 gal. Sanitary material
2 - 55 gal. unknown
1 - 55 gal. Lipal WD
1 - 55 gal. drum Lipal WD
7 - 20 gal. Carboys Muriatic Acid
1 - 40 gal. unknown
37 - 5 gal. Mixed unknowns
1 - 5 gal. Lipal
2 - 5 gal. unknown
2 - 5 gal. pails, unknowns
1 - 5 gal. poly pail, Lipal
3 - 1 gal. 2,2,4 Trimethyl pentanol
1 - 1 gal. Trimyristin
3 - 1 gal. poly jugs, 2,2,4 Trimethyl pentanol
1 - 1 gal. poly jug, Trimyristin
1 -100 lbs. Calcium Oxide
1 - 100 lbs. Calcium Oxide

Room #9

1 - 85 gal. salvage drum unknown
128 - 55 gal. empty drums
12 - 55 gal. unknowns
1 - 55 gal. unknown catalyst (can cause, ignition of combustable vapors)
1 - 55 gal. Kee Phos, Heavy Duty Alkali, Pennwalt (contains caustic soda - CORROSIVE)
1 - 55 gal. Bankal, Pennwalt (Non-foaming Acid Cleaner Contains Phosphoric Acid, CORROSIVE)
1 - 55 gal. Food Packaging Adhesives, United Resin
2 - 55 gal. Lubricating Oil
4 - 55 gal. "Syn Oil" (CAS# 1330-78-5)
1 - 20 gal. carboy unknown
1 - 10 gal. unknown
1 - 5 gal. Di Pente Ester
1 - 5 gal. Tetra-Di-n-Heptanoate
1 - 5 gal. Lipal 25
4 - 5 gal. unknowns
1 - 5 gal. FD&C No. 4
1 - 5 gal. carboy unknown
145 - 5 gal. unknowns
4 - 1 gal. Offset Etch, AB Dick
1 - 1 gal. Offset Fountain Concentrate, AB Dick
1 - 1 gal. Electrostatic Conversion Solution, AB Dick
1 - 1 gal. Calcium Propionate
8 - 1 gal. AeroMaster Fogging Insecticide
3 - 1 gal. Spirit Fluid (contains methanol, FLAMMABLE)
2 - 1 gal. Penn-mist Insecticide
1 - 1 gal. Skellysolve Petroleum Naphtha
10 - 8 lbs. Corn Oil Concentrate
2 - 1 lbs. Fine Particle Silca



53

Room #10

6 - 55 gal. unknowns
3 - 55 gal. unknown (white crystalline solid)
4 - 55 gal. Vegetable Oil (open, CAS# 25496)
5 - 5 gal. "Syn Oil"

Tank Truck Garage

1 - Tank Trailer (reportedly containing waste fatty acids)
4 - 55 gal. unknowns
3 - 55 gal. Fatty Alcohols
1 - 55 gal. Drewpol 10-10-0
1 - 55 gal. Drewnums GMC-8
1 - 55 gal. Het. Oxol (CAS# 400-40-4)
1 - 55 gal. (CAS# 65381-09-1)
1 - 55 gal. Suppository Base NC13680
1 - 55 gal. Glycerine (CAS# 56-81-5)

Building #65

1 - 100 Lb. fiber Dowicide 1
2 - 100 Lb. fiber 94% Methoxychlor oil concentrate
1 - 55 gal. unknown
2 - 7 gal. unknown
1 - 7 gal. WEC-R unknown
2 - 7 gal. unknown
1 - 7 gal. unknown
1 - 7 gal. Wax 1215
2 - 7 gal. HPHP Stearate
1 - 7 gal. HPHP Lautate
1 - 7 gal. unknown
7 - 7 gal. unknown liquid
4 - 7 gal. unknown liquids
1 - 7 gal. Tetraethylene glycol
5 - 5 gal. ASTM oil #3
1 - 5 gal. LIPAL 12-1-A
2 - 5 gal. Ruger Blandol Mineral Oil
1 - 5 gal. LIPAL 9-0
1 - 5 gal. Wax 213
1 - 5 gal. unknown
1 - 5 gal. LIPAL 25 OA CAS 45-5-40
1 - 5 gal. unknown
1 - 5 gal. Oleic Acid
1 - 5 gal. Texaco Wax L20 1215
1 - 5 gal. Shellsol
2 - 5 gal. Flexal Plasticizer 360
4 - 5 gal. Hexadecyl Stearate
1 - 5 gal. Lipal 7 LA
1 - 5 gal. Pentek Reichold
1 - 5 gal. Bakelite unknown
1 - 5 gal. Drewspin
1 - 5 gal. Drewclad
2 - 5 gal. Kosher Oleic
1 - 5 gal. PAM 100
5 - 5 gal. unknown liquids
1 - Igepal A1G10,
1 - 12 oz. Surapan SF-78
1 - 12 oz. Gafac RD-510
1 - 12 oz. Igepal CO-970
2 - 12 oz. GAF Stat AD-510
1 - 12 oz. Ganex, V-816
1 - 12 oz. Igepal CO-630
1 - 12 oz. Igepal LO-710
1 - 12 oz. Gafac MC-470
1 - 12 oz. Gafac RL-210
1 - 12 oz. unknown
1 - 12 oz. Chellox E18(?)
1 - 12 oz. Agent AT660
2 - 12 oz. Igepal RC-630
1 - 12 oz. unknown

Building #65
(cont'd)

1 - 12 oz. Alipal EO-526
1 - 12 oz. Antara LM-505
1 - 12 oz. Igepon T-33
1 - 12 oz. Nekal BX-78
1 - 12 oz. unknown
1 - 12 oz. Ganex-U-804
1 - 12 oz. Gafanol E550-B
1 - 12 oz. Nekal BA-75
1 - 12 oz. Igepon T-77
1 - 12 oz. Butoxene 158
1 - 12 oz. Ganex V904
1 - 12 oz. Igepon TC-42
1 - 12 oz. Igepal DJ-970
1 - 12 oz. Gantrez AN-149
1 - 12 oz. Igepal CO-520
1 - 12 oz. Gafac RS-710
1 - 12 oz. Gantrez AN-903
1 - 12 oz. Gafac RE-960
1 - 12 oz. Prestabit Oil V
1 - 12 oz. Pregal D
1 - 12 oz. Gafac LO-529
1 - 12 oz. Gafac 241 Dyeing Assistant
1 - 12 oz. Gafac RT-260
1 - 12 oz. Igepal RC-630
1 - 12 oz. unknown
1 - 12 oz. Nekal WS-25
1 - 12 oz. Antara LM-400
1 - 12 oz. Gafac GB-520
1 - 12 oz. Emulphor ON-970
1 - 12 oz. Igepal, CO-880
1 - 12 oz. B/O
1 - 8 oz. Union Carbide
1 - 8 oz. Union Carbide L75
1 - 8 oz. L45
1 - 8 oz. L31
1 - 8 oz. L511
1 - 8 oz. A1100 Silane
1 - 8 oz. unknown
1 - 8 oz. unknown
1 - 12 oz. LE461
1 - 12 oz. L75
1 - 12 oz. L77
1 - 12 oz. Y6165
1 - 12 oz. L49
1 - 12 oz. Y5340
1 - 12 oz. SF96 "350"
1 - 12 oz. unknown
1 - 6 oz. unknown
1 - 8 oz. L45 "350"

Building #65
(cont'd)

1 - 8 oz. Y5110
1 - 8 oz. unknown
1 - 12 oz. SM55, 6E
1 - 12 oz. SM62
1 - 12 oz. L76 OC
1 - 12 oz. unknown GE
1 - 32 oz. Resin #25-2803
1 - 32 oz. Resin #25-2833
1 - 1 qt. Resin 25-2873
1 - 1 gal. Carbon Black
1 - 1 qt. Carbon Black, unknown
1 - 1 gal. HD-OLEYL/CETYL Alcohol
7 - 2 gal. Igetalco 220
1 - 2 gal. Igetalco 850
1 - 2 gal. Igetalco 970
1 - 2 gal. Igetalco P-33
1 - 2 gal. Igetalco 890
1 - 2 gal. Igetalco 730
1 - 2 gal. Igetalco 710
1 - 1 gal. unknown
1 - 2 gal. Igetalco 970
1 - 1 gal. Union Carbide UCA1 TCX 8620
1 - 1 gal. Speed Wet Tergital
1 - 6 oz. unknown
1 - 6 oz., Flexol Plastizer 460
1 - 6 oz., Tergitol Minfoam 1X
1 - 24 oz. Tergitol 45510
1 - 6 oz. Latex 874
1 - 6 oz. Tergitol 15512
1 - 6 oz. Latex 870
1 - 12 oz. (Polyox) WSRN3000
1 - 8 oz. Conco Sulfate Wsg
1 - 16 oz. FF400 Fiber Finisher, Dow Corning
1 - 12 oz. Y5769, Union Carbide
1 - 12 oz. Dow Corning, ZG020-Silane
1 - 12 oz. Union Carbide - Y5766
1 - 12 oz. Syl-Mer 1108
1 - 12 oz. FF400 - Union Carbide
1 - 12 oz. Y5455 - Union Carbide
1 - 12 oz. Y5021 - Union Carbide
1 - 12 oz. Y2967 - Union Carbide
1 - 1 gal. $C_{20}$ + Alcohol, (Drew Chem)
1 - 32 oz. Sodium Xylene Sulfonate (CUCCO)
1 - 8 oz. (Givauclan) 2596-2
2 - 32 oz. Tergitol Min-foam
3 - 8 oz. Zelec Lubricant
2 - 8 oz. Zelec NE-antistatic agent
1 - 12 oz. Trimethylolethane Tribenzoate



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Building #65
(cont'd)

1 - 32 oz. Triethylene Glycol Dibenzoate
1 - 12 oz. Experimental Emulsifier 66 (Tennesse Corp)
1 - 12 oz. Ganex V516
1 - 12 oz. Gafac RE96 ug
1 - 12 oz. Igepal Lu-710
1 - 12 oz. Igepal Cu-890
1 - 12 oz. Ganex V220
1 - 12 oz. Igepal, LO630
1 - 12 oz. Butoxyne 160
1 - 12 oz. Igepon T33
2 - 12 oz. Alcohol Sulfonate
1 - 16 oz. unknown
1 - 10 oz. unknown, Shell Dulpt Co. 5D10576 1100 code (POISON)
1 - 32 oz. Neodol 25-7
6 - 4 oz. unknown
7 - 1 qt. Alfonic 1012-6 Ethoxylate
1 - 8 oz. Conoco gel 2
1 - 8 oz. Concopal 5
1 - 8 oz. Protenol KX
1 - 8 oz. Sulfate 219
1 - 12 oz. Emulsifyer 019-T
1 - 24 oz. Conco AA590C
1 - 8 oz. Sul-fon-ate OE-300
1 - 8 oz. Kelco SCS
2 - 8 oz. Keltex
2 - 8 oz. Kelzan
1 - 8 oz. Kelgin HV
1 - 8 oz. Keltose
1 - 8 oz. Kelgin LV
1 - 8 oz. Keltex 5
1 - 8 oz. Kelcolide
1 - 8 oz. Kelcosol
1 - 8 oz. Kelco SCF
1 - 12 oz. Cyanatex
1 - 12 oz. DO1644 Harcem
1 - 2 lbs. Glycerol Allyl Ether
1 - 2 lb. Allyl Glycidyl Ether
1 - 2 lb. Phenyl Glycidyl Ether
1 - 1 Gal Diphenyl Alkane (Tonoco Petrochem)
1 - 1 gal. Conoco M5B,
1 - 12 oz. Aerotex accelerator #5
1 - 12 oz. Aerotex Reactant
3 - 8 oz. Catanac
1 - 16 oz. Diharp #1
1 - 16 oz. Century 1475
1 - 16 oz. Century CD
2 - 16 oz. Dioctyl Sebacate

Building #65
(cont'd)

2 - 16 oz. Dibutyl Sebacate
1 - 12 oz. Neodol 2265
1 - 32 oz. Drewterge B1
1 - 12 oz. $C_2$ Alkane Sulfonate
1 - 24 oz. Heptanoic Acid
1 - 1 gal. Butyl Benzoate
1 - 1 gal. Igepal (GAF), [13-3-10]
1 - 1 gal. Anoic Acid
1 - 1 gal. Pivalic Acid
1 - 32 oz. Drewterg 82
1 - 32 oz. White Mineral Oil
1 - 32 oz. Pentaerythritol Tetrabenzonate
1 - 32 oz. Phosphated Propylene Glycol, #800
1 - 12 oz. Cyprylic Acid
1 - 1/2 gal. Anethol, Technical (Union Carbide)
1 - Box PVC Reison
1 - 2 1/2 gal. powder, unknown
5 - 8 oz. Special Anionic Surfactant
1 - 12 oz. Triton (Rohm Haas)
1 - 16 oz. Triton (Rohm Haas)
1 - 12 oz. unknown
1 - 16 oz. white powder
1 - 1 gal. Priminox T-25
1 - 32 oz. Rhoplex
1 - 1 gal. Dinonyl Phenol
1 - 1 gal. unknown
1 - 1 gal. empty
1 - 16 oz. Triton
1 - 16 oz. Triton
1 - 32 oz. Triton
1 - 32 oz. Triton
1 - 16 oz. Protolin SX
5 - 8 oz. Surfactant
1 - 16 oz. Surfactant
1 - 24 oz. Tamol
2 - 32 oz. Neodol
1 - 32 oz. Sulfolane W
1 - 4 oz. Catanac
1 - 8 oz. Cobee 92
1 - 4 oz. $H_2O_2$ & Cobee 92
1 - 12 oz. Cobee 92, with Carbon Bleach
2 - 32 oz. Ethoxy 20 M
2 - 32 oz. Regular 6000 Distearate
1 - 12 oz. $H_2O_2$...
1 - 12 oz. unknown
1 - 4 oz. MW 11158, Double Treated
1 - 8 oz. unknown
1 - 32 oz. TMP ISU $C_5$:2EH



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Building #65
(cont'd)

1 - 32 oz. Chevron ULOA 233A TDA 3%
1 - 32 oz. Uniroyl PAO 40
1 - 32 oz. Isopropyl Palmitate
1 - 32 oz. 5700 Base C (Rust inhibiter)
1 - 32 oz. Dipentex, Exxon, ester bleached with $KMnO_4$, $H_2O_2$
1 - 32 oz. Tetra EG $DiC_7$
1 - 32 oz. Uniroyl PA040
1 - 8 oz. DiIso Nonyl Aditate
2 - 4 oz. Chevron 5700, 0109 233A
1 - 8 oz. TDA 3% TCP, 50ppm Chevron 0109 233A
1 - 8 oz. Hydrocarbon Uniroyl
1 - 32 oz. Ethoxy Propyl Adipate, Dibutoxy
1 - 32 oz. Druspin Supr
1 - 32 oz. unknown
1 - 32 oz. unknown
1 - 32 oz. Permaganate Bleached (Exxon)

ROW 5

2 - 5 lb. bags UCB-SIDAC
2 - 4 lb. Dupont Gio, Pure Titanium Dioxide
2 - 5 lb. Colloidal Magnesium Aluminum Silicate
4 - 1 gal. Crude Neobee M20
13 - 1 pt. unknown
18 - 1 pt. unknown
4 - CC-glyc.
6 - 1/2 pt. cc-clyc.
1 - 4 oz. Cobee - 92
1 - 4 oz. $H_2PKO$
1 - 1/2 pt. $H_2PKO$
1 - 1/2 pt. Neofat - 12
1 - 12 oz. Cobee 92
2 - 250 ml Phenylethyl Alcohol-Pure Best
1 - 8 oz. unknown powder
1 - 8 oz. $C_8C_{12}$
3 - 176 ml, Cobee 92
1 - 4 oz. $H_2O_2$
1 - 4 oz. $H_2PKO$
1 - 4 oz. Cobee 92
1 - 4 oz. PP Stearic Acid
1 - 4 oz. Cobee 92
1 - 12 oz. Cubee 92
1 - 4 oz. Wecoline 1495
1 - 4 oz. 50/50 $H_2PKO$
2 - 8 oz. Tergitol Min Foam 1X
3 - 8 oz. Tergitol Min Foam 2X
1 - 8 oz. Tergitol 12 P9

Building #65
(cont'd)

1 - 8 oz. Tergitol Anionic 45-S-T
3 - 8 oz. Tergitol Anionic 08
1 - 8 oz. Tergitol Anionic 15-S-3A sulfate
1 - Tergitol Nonionic 15-S-9
1 - 8 oz. Butoxytriglycol
1 - 8 oz. Methoxytriglycol
1 - 8 oz. Flexol Plastizer 460
1 - 8 oz. Flexol Plastizer 360
1 - 8 oz. Nonionic TM-4691
1 - 8 oz. UCON Textile Lubricant TM 3068
1 - 12 oz. unknown
1 - 8 oz. Tergitol Nonionic XH
1 - 8 oz. Tergitol Nonionic 15-S
1 - 8 oz. Alobrasol
1 - 8 oz. Cellosize CMC P-75-XH
1 - 32 oz. Igepal C0730
1 - 8 oz. Ethoxyl Triglycol
1 - 1 gal. Hysterene
1 - 1 gal. Benzyl Alcohol
1 - 12 oz. Sorbic Acid
1 - 12 oz. unknown
1 - 12 oz. Lubricant, Union Carbide 28-DS-52-1
3 - 5 lb. Hysterene 7022
2 - 2 lb. Hysterene 7022
1 - 2 lb. Naugard 445, Naugatuk Chemicals
1 - 2 lb. Naugawhite powder, Naugatuk Chemicals
1 - 2 lb. Flexzone H, Naugatuk Chemicals
1 - 2 lb. Aranox, Naugatuk Chemicals
1 - 12 oz. unknown
1 - 8 oz. Cellosize CMCP-75-XH
1 - 12 oz. unknown
1 - 16 oz. Tergitol Nonionic 15-5-2
1 - 16 oz. Jiffy Clean Concentrate
1 - 8 oz. Cellosize Hydro Oxy Ethyl Celluose
1 - 8 oz. Ucane Alkylate 12
1 - 8 oz. Tergitol Non-ionic XH
1 - 8 oz. Tergitol Non-ioinic PP-9
1 - 16 oz. Tergitol Anionic #4
1 - 8 oz. unknown
1 - 8 oz. Tergitol Non-ionic XD
[redacted]
1 - 12 oz. Polyox WSR 301
1 - 12 oz. 2-Methyl,2-Ethyl, 1-Propendiol
2 - 8 oz. Tergitol Non-ionic 15-S
1 - 12 oz. Union Carbide Silicone Y-340
1 - 12 oz. Tergitol Non-ionic 15-S-1
1 - 8 oz. Union Carbide 1,2,3,4-Tetrahydropthlene
1 - Tergitol Nonionic 15-S-12
1 - 1 gal. Phenyl Methyl Carbonol



A3

Building #65
(cont'd)

1 - 1 gal. ACTO 632
1 - 1/2 gal. ACTO 636
1 - 1/2 gal. ACTO 639
1 - 32 oz. Mini oil
1 - 16 oz. Alkanolamce (?)
1 - 16 oz. Hercules Turpinoel 318
2 - 16 oz. Hercflex 707
1 - 16 oz. Hercflex 600
1 - 16 oz. Amine Sulfate
1 - 24 oz. REAX ADP
1 - 24 oz. EX 1006
1 - 24 oz. REAX 83 A
1 - 24 oz. REAX 85 A
1 - 24 oz. Polyfon O
1 - 32 oz. Westvaco 14700, Oleic Acid
1 - 32 oz. Westavco 1490
1 - 24 oz. Octadecanamide
1 - 24 oz. Ralidht Flx
1 - 16 oz. Deriphat 1600
1 - 24 oz. Notoptex CPS
1 - 24 oz. Oleomide
1 - 24 oz. Omyxsan HSB
1 - 16 oz. Deriphat 9700
1 - 16 oz. Aston 008
1 - 32 oz. Worsted Oil AL
1 - 16 oz. Espon 1,2,3
1 - 32 oz. Nopco Thane D-615
1 - 12 oz. Polymul MS-O
1 - 12 oz. Polymul CS-41
1 - 12 oz. Worsted Oil
1 - 16 oz. Nopco 2272-R
1 - 6 oz. Worsted Oil
1 - 32 oz. Worsted Oil
1 - 16 oz. Nopco 2272-R
1 - 16 oz. Hyonicpe-90
1 - 8 oz. TPMULS
1 - 16 oz. unknown
1 - 16 oz. PC 175 $NAC_{12}$
1 - 16 oz. unknown
1 - 16 oz. unknown
1 - 32 oz. Hyonac PE-225
1 - 12 oz. Wax
1 - 1 pt. Prycol DA-4
1 - 16 oz. unknown
1 - 12 oz. Leomynxp
1 - 6 oz. Thioglycol
1 - 1 gal. PVC Latex
1 - 6 oz. Tinvin 328

Building #65
(cont'd)

| | | | |
|---|---|---|---|
| 1 - | 4 | oz. | Thiodactic Acid |
| 1 - | 16 | oz. | Melanin |
| 1 - | 6 | oz. | Corexit 7730 |
| 1 - | 32 | oz. | SB-Latex |
| 1 - | 16 | oz. | Pluraxac D-25 |
| 1 - | 16 | oz. | Rocoill/28A |
| 1 - | 16 | oz. | Plurafac RA 10 |
| 1 - | 16 | oz. | Plurafac RA 30 |
| 2 - | 1 | qt. | unknown |
| 2 - | 16 | oz. | unknown |
| 1 - | 2 | oz. | Quinizarin |
| 1 - | 2 | oz. | Irganoxi 2006 |
| 1 - | 2 | oz. | V-8 |
| 1 - | 16 | oz. | unknown |
| 1 - | 8 | oz. | V-13 |
| 1 - | 32 | oz. | unknown |
| 1 - | 16 | oz. | 10-10-5 |
| 1 - | 6 | oz. | V-1 |
| 1 - | 32 | oz. | unknown |
| 1 - | 1 | gal. | unknown plastic |
| 6 - | 32 | oz. | All purpose cleaner |
| 40 - | 10 | oz. | unknowns |
| 1 - | 8 | oz. | unknown liquid |
| 1 - | 32 | oz. | Drewplant 115 |
| 1 - | 1 | gal. | WPAL 5 ISA |
| 1 - | 10 | oz. | 3-497 GSO 2-477 |
| 1 - | 10 | oz. | CSO #17 6-1263 |
| 1 - | 8 | oz. | unknown |
| 1 - | 16 | oz. | S-O |
| 1 - | 16 | oz. | SNS |
| 1 - | 16 | oz. | SNL |
| 1 - | 16 | oz. | SMS |
| 1 - | 32 | oz. | Ethloxylated 200 K |
| 1 - | 6 | oz. | Ethyloxylated |
| 1 - | 16 | oz. | 200 K |
| 1 - | 16 | oz. | 50/50 MULSC TP/POE100 Stearic acid |
| 1 - | 16 | oz. | unknown |
| 1 - | 12 | oz. | unknown |
| 1 - | 16 | oz. | Petro 22 |
| 1 - | 16 | oz. | Petro AG spec. Ultra fine |
| 1 - | 16 | oz. | Mercol 25 beads |
| 1 - | 1 | gal. | 2-MI Houdry |
| 1 - | 1 | gal. | KETEXCF-120 |
| 1 - | 8 | oz. | Penn Dye Colingo |
| 1 - | 16 | oz. | Westvaco Resin 90 |
| 1 - | 32 | oz. | Ultralvet SOL |
| 1 - | 32 | oz. | unknown |
| 2 - | 10 | oz. | unknown |
| 1 - | 12 | oz. | unknown |



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Building #65
(cont'd)

1 - 32 oz. Triton 5C Hydrogerate
1 - 6 oz. unknown
2 - 32 oz 80-CSR231-12 (2 4-OA
1 - 1/2 gal. Isospiri Alcohol
1 - 24 oz. Lauric Acid
1 - 16 oz. Century 1240
1 - 16 oz. Century 1210
1 - 1 gal. AC to 632
1 - 1/2 gal. AC to 636
1 - 1/2 gal. AC to 639
1 - 32 oz. Mini oil
1 - 16 oz. Alkanolamce
1 - 16 oz. Hercules Turpinoel 318
2 - 16 oz. Hercflex 707
1 - 16 oz. Hercflex 600
1 - 16 oz. Amine Sulfate
1 - 24 oz. REAX ADP
1 - 24 oz. EX 1006
1 - 24 oz. REAX 83 A
1 - 24 oz. REAX 85 A
1 - 24 oz. Polyfon O
1 - 32 oz. Westvaco 1470
1 - Oleic Acid
1 - 32 oz. Westavco 1490
1 - 24 oz. Octadecanamide
1 - 24 oz. Ralidht Flx
1 - 16 oz. Deriphat 1600
1 - 24 oz. Notoptex CPS
1 - 24 oz. Oleomide
1 - 24 oz. Omyxsan HSB
1 - 16 oz. Deriphat 9700
1 - 16 oz. Aston 008
1 - 32 oz. Worsted Oil Al
1 - 16 oz. Espon 1,2,3
1 - 32 oz. Nopco Thane D-615
1 - 12 oz. Polymul MS-O
1 - 12 oz. Polymul CS-41
1 - 12 oz. Worsted Oil
1 - 16 oz. Nopco 2272-R
1 - 6 oz. Worsted Oil
1 - 32 oz. Worsted Oil
1 - 16 oz. Nopco 2272-R
1 - 16 oz. Hyonicpe-90
1 - 8 oz. TPMULS
1 - 16 oz. unknown
1 - 16 oz. PC 175 $NAC_{12}$
1 - 16 oz. unknown
1 - 16 oz. unknown

Building #65
(cont'd)

1 - 32 oz. Hyonac PE-225
1 - 12 oz. Wax
1 - 1 pt. Prycol DA-4
1 - 16 oz. unknown
1 - 12 oz. Leomynxp
1 - 6 oz. Thioglycol
1 - 1 gal. PVC Latex
1 - 6 oz. Tinvin 328
1 - 4 oz. Thiodactic Acid
1 - 16 oz. Melanin
1 - 6 oz. Corexit 7730
1 - 32 oz. SB-Latex
1 - 16 oz. Pluraxac D-25
1 - 16 oz. Rocoill/28A
1 - 16 oz. Plurafac RA 10
1 - 16 oz. Plurofac RA 30
2 - 1 qt. unknown
2 - 16 oz. unknown
1 - 2 oz. Quinizarin
1 - 2 oz. Irganxi 2006
1 - 2 oz. V-8
1 - 16 oz. unknown
1 - 8 oz. V-13
1 - 32 oz. unknown
1 - 16 oz. 10-10-5
1 - 6 oz. V-1
1 - 32 oz. unknown
1 - 1 gal. unknown plastic
6 - 32 oz. All purpose cleaner
40 - 10 oz. unknowns
1 - 8 oz. unknown liquid
1 - 32 oz. Drew plant 115
1 - 1 gal. WPAL 5 ISA
1 - 10 oz. 3-497 GSO 2-477
1 - 10 oz. CSO #17 6-1263
1 - 8 oz. unknown
1 - 16 oz. S-O
1 - 16 oz. SNS
1 - 16 oz. SNL
1 - 16 oz. SMS
1 - 32 oz. Ethloxeylated 200 K
1 - 6 oz. Ethyloxylated
1 - 16 oz. 200 K
1 - 16 oz. 50/50 MULSC TP/POE100 Stearic acid
1 - 16 oz. unknown
1 - 12 oz. unknown
1 - 16 oz. Petro 22
1 - 16 oz. Petro AG spec. Ultra fine
1 - 16 oz. Mercol 25 beads

Building #65
(cont'd)

1 - 1 gal. 2-MI Houdry
1 - 1 gal. KETEXCF-120
1 - 8 oz. PENN DYE COLINGO
1 - 16 oz. Westvaco Resin 90
1 - 32 oz. Ultralvet SOL
1 - 32 oz. unknown
2 - 10 oz. unknown
1 - 12 oz. unknown
1 - 32 oz. Triton 5C Hydrogerate
1 - 6 oz. unknown
2 - 32 oz 80-CSR231-12 (2 4-OA
1 - 1/2 gal. Isospiri Alcohol
1 - 24 oz. Lauric Acid
1 - 16 oz. Century 1240
1 - 16 oz. Century 1210
1 - 1 lt. unknown
1 - gal. Hy-Phi 2066
1 - qt. unknown liquid
1 - qt. unknown liquid
1 - qt. unknown liquid
1 - qt. unknown liquid
1 - gal. unknown liquid
1 - 8 oz. unknown liquid
1 - qt. unknown liquid
1 - 8 oz. unknown
1 - 8 oz. NOEBEE 18
1 - qt. unknown liquid
1 - qt. unknown
1 - 8 oz. unknown
1 - 32 oz. unknown
1 - qt. unknown
1 - qt. 2EH in $C_5$ TMP Ester
1 - qt. FDO 700
1 - 1 gal. FDO 7000
1 - qt. Leulyl Adipate
1 - qt. unknown oil
1 - qt. unknown
1 - qt. HCO 357
1 - qt. unknown
1 - qt. $C_7C_{10}$ 5/5 HW 395
1 - qt. 3050 TMT Iso$C_5$/2Ell
1 - gal. unknown
1 - 16 oz. PE-3
1 - 32 oz. AE-1214/3 Ethoxyleted Fatty Alcohol
1 - 32 oz. TAE-20 Ethoxyleted Fatty Alcohol
1 - 32 oz. AE - 1214/45 Ethoxyleted Fatty Alcohc
1 - 32 oz. AE - 124/6 Ethoxyleted Fatty Alcohol
1 - 32 oz. TAE-9 Ethoxyleted Fatty Alcohol

Building #65
(cont'd)

1 - 24 oz. Hyonic LA-45
1 - 24 oz. Hyon FA-20
1 - 24 oz. Hyon FA-40
1 - 24 oz. NOPCO 2272-R
1 - 16 oz. NOPCO 2149-A
1 - 16 oz. NOPCO 9554
1 - 16 oz. NOPCO 1393
1 - 24 oz. NOPCO Thane D-6102
1 - 16 oz. NOPCO TEX 668
1 - 12 oz. Alphonic 1012
1 - 32 oz. Stantex 553 HV
1 - 12 oz. SURFACTOL
1 - 12 oz. unknown
1 - 12 oz. Orthylcryl 25
1 - 12 oz. unknown
1 - 12 oz. Aro Rehfl - 714
1 - 6 oz. Hexadecyl Stearate
1 - 16 oz. Emulsefier WA
1 - 12 oz. Uniroyal
1 - 12 oz. Pyronial 268
1 - 24 oz. Stannex 553-HV (Coning oil)
1 - 6 oz. Emcel 14
1 - 6 oz. Butyl Stearate
1 - 16 oz. unknown
1 - 32 oz. unknown
1 - 8 oz. Abbomeen E-5
1 - 32 oz. Liquid Softener
1 - 16 oz. Surfonic J1
1 - 1 gal. Cyclohexanol
1 - 6 oz. unknown
1 - 6 oz. Irgastab 2002
1 - 1 qt. unknown
1 - 16 oz. Enerest 2660 PEG 600 Monoleate
1 - 16 oz. Ployoll DNT - 190000
1 - 24 oz. Emersol 213 Low titer oleic
1 - 16 oz. Acetone
[redacted]
1 - 16 oz. unknown
1 - 16 oz. Poly oil PE-35
1 - 16 oz. Surfonic A-3
1 - 16 oz. Phanol RS-700
1 - 32 oz. Tergitol Anionic
1 - 32 oz. Span 85
1 - 6 oz. Alarowet D-65
1 - 16 oz. TP-6
1 - 32 oz. Sorvitan PRI Stearate
1 - 16 oz. PP-3
1 - 16 oz. Sulfonic Acid (Toluene/Xylene) TE
1 - 32 oz. Sorbitol Monoluurote



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Building #65
(cont'd)

1 - 6 oz. unknown
2 - 6 oz. Ca Octoat
1 - 32 oz. Sorbitan tristearate
1 - 10 oz. unknown
1 - 12 oz. Sulframin 60 T
1 - 32 oz. Isosteavic Acid
1 - 12 oz. unknown (FLAMMABLE)
1 - 16 oz. unknown (FLAMMABLE)
2 - 16 oz. NACCONOL 60 PL
1 - 32 oz. ENCOLE-607
1 - 24 oz. Polyvinyl acetate emulsion
1 - 12 oz. DDT 1410
1 - 32 oz. Cyclohexanol
1 - 1 pt. unknown yellow liquid
1 - 1 pt. Pergitel Nonionic NRX
1 - Diisodecyl Adapete
1 - 8 oz. Finish 14
1 - 8 oz. unknown white powder
1 - 8 oz. Antistatic
1 - 1 pt. Sulfonic LF-7
3 - 1 pt. Alfonic 1014
1 - 1 pt. Alfonic 1012
2 - 4 oz. unknown white powder
1 - 1 pt. Alfonic 12,18,6
1 - 1 pt. Facid A
1 - 1 qt. Grew Initial Sulfonic (brown powder)
1 - 1 gal. Panak 585
1 - 1 pt. PEG 4000 Monosterate (white crystals)
1 - 1 qt. GB 91-11 (unkown clear liquid)
1 - 1 gal. unkown white solid
1 - 1 gal. 400 DS
1 - 1 qt. unknown liquid
1 - 1 gal. Alfol 14 alcohol
1 - 1 gal. Alfol 1216 Alcohol
1 - 1 gal. Alfol 1214 Alcohol
1 - 1 pt. yellow solid
[redacted]
4 - 1 gal. unmarked white solid
1 - 1 pt. unknown
1 - 4 oz. Tetyle (solidified white mat)
1 - 8 oz. unknown liquid with white ppt
1 - 4 oz. solidified white
1 - 1 qt. STO non yellow sample
1 - 1 pt. DEG Aliphate with NaOH pellets
1 - 1 qt. unknown red solid
1 - 1 qt. unknown clear colorless liquid
1 - 1 qt. FTG - Phenol (white solid)
1 - 4 oz. unknown clear viscous liquid
1 - 4 oz. unknown solidified white

Building #65
(cont'd)

1 - 1 qt. unknown solidified white
1 - 1 qt. TME - Ester
1 - 1 pt. unknown 5 layered liquid/solid
1 - 1 qt. Pentol MFNO 423 2/9/70
1 - 1 gal. unknown white solid
1 - 1 qt. Mona Quat OTES (unknown)
15 - 4 oz. DOBANOL 23
1 - 1 gal. white powder
1 - 4 oz. unknown amber liquid
1 - 1 gal. unknown clear yellowish liquid
1 - 1 gal. Monaquat ties
1 - 1 qt. Sinthetic (unknown) 65
1 - 1/2 gal. Pentene
1 - 1 gal. Trimer Acid
1 - 1 pt. F0065 yellow viscous liquid
1 - 1 gal. unknown clear liquid
1 - 1 gal. unknown white solid
2 - 1 gal. unknown white solid
1 - Sample I (?) (unknown amber liquid)
1 - qt. unknown clear yellowish liquid
5 - 1 qt. unknown white solid
2 - 6 oz. unknown solid
1 - 1 oz. unknown solid
1 - 1 qt. Drew FLJ Methyl Oleate
1 - 1 qt. unknown clear liquid
1 - 1/2 gal. unknown clear liquid
1 - 8 oz. Sorbitan Monooleate
1 - 8 oz. unknown white solid
1 - 8 oz. SMO (unbleached)
1 - 8 oz. GMOCC
1 - 8 oz. Sorbitol Monosearate
1 - 8 oz. unknown white solid
1 - 8 oz. Glycerol
1 - 8 oz. unknown white solid
1 - 8 oz. SMO unbleached
1 - 8 oz. Sorbitan Monolaurate
1 - 6 oz. SML
1 - 6 oz. SMO
1 - unknown brown solid
1 - 8 oz. SML
1 - 8 oz. POE - SML
1 - 8 oz. SML
1 - 8 oz. POE SMC
1 - 1 gal. TMP unknown clear liquid
1 - 1 qt. unknown clear amber liquid H
4 - 1 qt. Hexa Glycerol
4 - 1 qt. POE - SMO
2 - 1 qt. Decaglycerol
2 - 1 qt. Glycerol Mono C7

Building #65
(cont'd)

2 - 1 qt. IO, IO, LO
2 - 1 qt. 10 10 0
1 - 8 oz. unknown white powder
1 - 1 pt. Propylene Oxide
1 - 1 gal. GC 123-12 clear liquid
1 - 1 gal. Resorcinol
1 - 1 gal. unknown solid
1 - 1 pt. unknown amber liquid
1 - 8 oz. unknown amber liquid
1 - 1 gal. Peanut Oil
1 - 1 qt. unknown amber liquid
4 - 8 oz. LDA
1 - 1 pt. floor sweepings
1 - 1 pt. unknown liquid
1 - 1 pt. DC 11 clear liquid
1 - 1 gal. unknown clear liquid
3 - 1 qt. unknown white solid
1 - 1 qt. TME Mono AGL (white solid)
1 - 1 gal. clear liquid
1 - 1 pt. Inositol
1 - 1 gal. SK 114 brown solid
2 - 1 gal. unknown yellow solid
1 - 1 gal. FD - 0754
1 - 1 gal. FD - 1165
1 - 1 gal. FD - 1140
1 - 1 gal. FD - 0799
1 - 1 gal. FD - 0686
1 - 1 gal. N-Hexyl Carbinol (ether)
1 - 1 gal. PEG 600
1 - 1 gal. white solid
1 - 1 qt. unknown white solid
2 - 1 gal. Drudye 90
1 - 1 qt. Tween 80
1 - 1 pt. FD - 0799
1 - 1 pt. FD - 1165 (45%)
1 - 6 oz. FD - 73
1 - 4 oz. FD - 3487
1 - unknown brown liquid
1 - 8 oz. unknown white solid
1 - 1 pt. clear liquid white ppt
1 - 1 pt. Drew Napping Assistant
1 - 1 pt. unknown clear liquid
1 - 1 pt. Drew Lube FN
2 - 1 qt. Clear liquid white ppt
1 - 1 pt. unknown amber liquid
1 - 1 pt. unknown amber liquid
1 - 1 pt. FD - 0055
1 - 1 pt. unknown yellowish liquid
1 - 1 pt. FD - 0919

Building #65
(cont'd)

1 - 6 oz. unknown liquid
1 - 6 oz. Lipel 3 TD
1 - 6 oz. unknown amber liquid
1 - 6 oz. FD -1035
1 - 8 oz. FD - 119
1 - 8 oz. unknown clear liquid/amber liquid
1 - 8 oz. FD - 1041
1 - 6 oz. unknown red liquid
1 - 1 pt. TME Saflower
1 - 1 pt. Nopco N1 clear liquid/amber liquid
1 - 1 pt. Druspin 62 clear yellowish liquid
1 - 1 gal. 2-Carboxy Ethyl Isocyanurate
1 - 1 qt. 48 DET brown liquid
3 - 1 pt. Lansol 80 (brown liquid)
1 - 1 pt. Dusprin WLR
1 - 1 pt. Dusprin WLR Replacement
1 - 1 pt. Dusprin WW
1 - 1 pt. Dusprin PC
1 - 1 pt. Wool Oil
1 - 1 pt. unknown clear viscous liquid
1 - 1 pt. Vanlube 622
1 - 1 pt. Vanlube 73
1 - 1 pt. Armour Jobs
3 - 1 qt. Soramine ATS
3 - 1 pt. Soramine ATS
3 - 8 oz. Soramine ATS
1 - 8 oz. clear unknown liquid
1 - 1 qt. clear viscous liquid
1 - 1 qt. unknown white solid
1 - 1 1/2 gal. unknown solid
1 - 1 qt. unknown white powder
1 - 1 pt. unknown brown solid
1 - 1 qt. unknown liquid
1 - ½ gal. DIS dark liquid
1 - 4 oz. unknown clear liquid white precipitate
1 - 4 oz. unknown clear liquid
1 - 1 qt. Stearyl Alcohol D53
1 - ½ gal. unknown liquid
1 - ½ gal. Red PE cutex chemical
1 - 1 pt. Pentel Distearate
1 - ½ gal. unknown brown liquid
1 - ¼ gal. unknown clear liquid
1 - 4 oz. unknown white crystal
1 - 2 oz. unknown yellow crystal
1 - 1 lt. clear liquid
1 - 1 lt. Chemstrand
1 - 1 lt. Dupont (white solid)
1 - 1 qt. Firestone
15 - 4 oz. unknown samples



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Building #65
(cont'd)

1 - 1 qt. unknown amber liquid
2 - 1 qt. unknown clear liquid
2 - 1 qt. TME Mono
1 - 1 qt. clear liquid/white ppt
1 - 1 pt. unknown beige solid
1 - ½ gal. Nuchar Vegetable Carbon
1 - 1 gal. Hydrg Soybean Oil
1 - 1 gal. unknown clear liquid
1 - ½ gal. PB102 unknown clear liquid
1 - ½ gal. Quarter Seed Condensate
1 - 1 gal. unknown clear liquid/cloudy liquid
1 - 1 pt. FD 0888
1 - 1 pt. FD 0748
1 - 1 pt. FD 0810
1 - 1 pt. FD 0797 - SE
1 - 1 pt. FD 0776 Druspin PE
1 - 1 pt. FD 0777
1 - 1 pt. FD 0776 Andrydrous
1 - 1 pt. FD 0776 Reg
1 - 1 pt. unknown white solid
1 - 1 pt. unknown solid
1 - 8 oz. unknown yellow liquid
1 - 4 oz. FD 0734
1 - Lonopin 5DS brown viscous liquid
1 - 1 pt. FD 06- solid
1 - 1 pt. unknown white solid
2 - 1 qt. FD 0682
1 - 1 qt. Decagliceron Tri-stearate
1 - 1 qt. Safflower oil
1 - 2-Ethyl Hexyl Palmitate
1 - 1 qt. FD 0191
1 - 1 qt. FD 1013
1 - 1 qt. FD 1061
4 - 1 qt. FD 1008
1 - 1 qt. FD 1030
3 - 1 qt. FD 1001
1 - 1 qt. FD 1053
1 - 1 qt. FD 1000
1 - 1 qt. FD 0970
1 - 1 qt. FD 0916
1 - 1 qt. FD 0952
1 - 1 qt. FD 0998
1 - 1 qt. FD 0913
2 - 1 qt. FD 0190
1 - 1 qt. FD S/352
1 - 1 qt. FD 0190-S352 50%
1 - 1 qt. FD 0700
1 - 1 qt. FD 0190 Drew Tex D 100
1 - 1 qt. FD 0158

Building #65
(cont'd)

1 - 1 qt. unknown multiphase visc. liquid
1 - 4 oz. unknown amber visc. liquid
1 - 4 oz. FD 1264
1 - 4 oz. FD 1214
1 - 8 oz. FD 0142
1 - 8 oz. FD 0465 E
1 - 8 oz. FD 0776
1 - 4 oz. unknown visc. liquid
1 - 4 oz. unknown clear liquid
1 - 8 oz. unknown amber liquid
1 - 8 pt. unknow white solid
1 - 8 pt. Soramine AT Conterpart
1 - 4 oz. unknown clear liquid
1 - 1 pt. unknown liquid
1 - 4 oz. unknown clear liquid
5 - 1 pt. Vruspin (amber liquid)
8 - 8 oz. Vruspin (amber liquid)
1 - 4 oz. unknown amber liquid
1 - 8 oz. unknown white solid
1 - 8 oz. unknown amber liquid
1 - 8 oz. Aerosol O (clear solid)
1 - 1 gal. FD 1049
1 - 1 gal. FD 1154
1 - 1 gal. unknown liquid
4 - 1 gal. unknown clear liquid
1 - 1 gal. Drew FKN - 18
1 - 1 qt. Lipal 4MD
1 - ½ gal. unknown amber liquid
1 - ½ gal. Lipal TD
1 - 1 gal. unknown solid
1 - 8 oz. unknown orange liquid
2 - 1 gal. unknown white solid chips
1 - 1 qt. Lipal TE 76
1 - 1 qt. Lipal 94
1 - 1 qt. Lipal 10TD
1 - 1 qt. Lipal CE 38
1 - 1 qt. Lipal 4L
1 - 1 qt. Lipal CE71
1 - 1 qt. Lipal 9L
2 - 1 qt. Lipal 9LA
1 - 1 qt. Lipal 4MA
1 - 1 qt. Lipal CE5S
1 - 1 qt. Lipal SW
1 - 1 qt. Lipal CE64
1 - 1 qt. Lipal 3 TD
1 - 1 qt. unknown viscous liquid
1 - 4 oz. PLO Carrier (white solid)
1 - 4 oz. Mykon 122 Polyethylene
1 - 4 oz. Phemetol-B



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Building #65
(cont'd)

1 - 2 qt. RK-16-15 (assorted unknown)
1 - 3 pt. RK-16-15 (assorted unknown)
1 - 1 4oz. RK-16-15 (assorted unknown)
22 - 4 oz. assorted samples (Alcohol Stearete)
1 - 1 qt. Botyl Stearate
1 - ½ gal. unknown
1 - ½ gal. Molasco Setim Compound
1 - 1 qt. lipal CE-64
1 - 1 qt. Soya Oil
1 - 1 qt. unknown white oily liquid
1 - 1 pt. unknown oily liquid
1 - 1 qt. SD 0895
5 - 1 pt. SD 0895
1 - 4 oz. SD 0895
25 - 4 oz. Gelaton FD 0895 Beaund
4 - 4 qt.s. Modified 3487
2 - 80 oz. Modified 3487
4 - 40 oz. Modified 3487
1 - 1 qt. Hydro-Soya
5 - 4 oz. unknown Oily liquid
1 - 1 gal. unknown solid (WE 19649)
1 - 8 oz. FD 0845
1 - 8 oz. FD 0895
3 - 1 pt. Drewskin
1 - 1 pt. Textyle (oily liquid)
1 - 1 pt. NF - 5 Finish
1 - 1 qt. unknown oily liquid
1 - 8 oz. unknown brown solid
2 - 8 oz. unknown oily liquid
1 - 4 oz. unknown white solid
1 - 1 gal. unknown clear liquid
1 - 1 pt. unknown solid
1 - 1 pt. unknown solid
2 - Polyester Development Samples
1 - 1 pt. Ammonium Soap
4 - 8 oz. unknown white solid

East Wall

1 - 5 gal. unknown Rhoplex by Rohm Haas
1 - 5 gal. unknown Ruger
1 - 5 gal. Octyl-SC
1 - 5 gal. UCON 11 by Unicon Carbide Linde Div.
1 - 5 gal. unknown POE SMH
1 - 5 gal. unknown by GAF Icepon T-77
1 - 5 gal. 3-5-ABL
1 - 5 gal. Di-Pentek Ester
1 - 5 gal. Lipal - HTE 70
1 - 5 gal. Dieldrin

Building #65
(cont'd)

1 - 5 gal. Brew FKN18
1 - 5 gal. unknown
1 - 5 gal. NF-2B unknown
1 - 5 gal. Lipa L-6-TP
1 - 5 gal. Isopro Miristante
1 - 5 gal. Hexaglycerol
1 - 5 gal. Hydr Soya
1 - 5 gal. unknown
1 - 5 gal. DI-Pentek Ester
1 - 5 gal. unknown by Moria Ind.
1 - 5 gal. unknown
1 - 5 gal. unknown
1 - 5 gal. Lipal 25-S
1 - 5 gal. Neodol 25-35 by Shell
1 - 5 gal. Maprof 1X
1 - 5 gal. Drewmolse
1 - 5 gal. Atlox
1 - 5 gal. Maprof 1X
1 - 5 gal. Lipal -39-S
1 - 5 gal. Neodol 25-9 by Shell
1 - 5 gal. Neodol DMD-1 by Shell
1 - 5 gal. Neodol 25-12
1 - 5 gal. Neodol 25-7
1 - 5 gal. Lipal CE-7I
1 - 5 gal. Neofat 255 by Armak
1 - 5 gal. Lipal 25-OA
1 - 5 gal. Trichloroethylene
1 - 5 gal. Synotol-CN-gO
1 - 5 gal. unknown FD-0919
1 - 5 gal. unknown
1 - 5 gal. Methyl Caprilate Lipal CE-71
1 - 5 gal. Synofol-CN-90
1 - 5 gal. Neobee 55-5-50 unknown
1 - 5 gal. TE T unknown
1 - 5 gal. PD-101
1 - 5 gal. unknown
1 - 5 gal. unknown
1 - 5 gal. Sorbitol SOL
1 - 5 gal. Polyethylene Glycol (Carbowax 1540)
1 - 5 gal. unknown PVO Sample
1 - 5 gal. Hydrogenated Castor Oil
1 - 5 gal. unknown
1 - 5 gal. MY RJ 59
1 - 5 gal. Polyoxyethylene (100) Stearate
1 - 5 gal. unknown
1 - 5 gal. Drewmulse-55
1 - 5 gal. Lipal-15-CSA
1 - 5 gal. Lipal-20-OA
1 - 5 gal. Isodecyl.....Ester



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Building #65
(cont'd)

2 - 5 gal. "Synasol" Solvent Anhydrous
1 - 5 gal. 3487 unknown
1 - 5 gal. Neobee-M-5
1 - 5 gal. Lipal-13-O
1 - 3 gal. Lipal 4-P

Aisle #2

1 - 1 gal. Kerosene
1 - 5 gal. unknown liquid
1 - 1 gal. unknown liquid
1 - 1 gal. Xylene (container deteriorated)
[redacted]
2 - 5 gal. unknown liquid
1 - 2 gal. unknown liquid
1 - 1 gal. CP Glycerine (Aug. 69)
2 - 5 gal. unknown liquid
1 - 5 gal. Isooctyl Alcohol by Enjay
1 - 5 gal. Flexol Plasticizer A-26
1 - 5 gal. unknown liquid
1 - 1 gal. "1 Bray Oil"
1 - 1 gal. CALX 5001
1 - 2 gal. unknown liquid
1 - 5 gal. Chevron Sample - Oronite Additives Division
1 - 5 gal. Sunoco Sample - Base Oil
1 - 5 gal. Drewplast 117 Lot D6390 15-5-40
1 - 5 gal. Union Carbide Silicone, L 75 Lot 04405I369
1 - 2 gal. Ethylhexanol
1 - 5 gal. Emery 871 Isostearic by Emery
1 - 5 gal. Emolient 29 Lubricant by Emery
1 - 1 gal. Hydrofol Acids 1255 by Ashland Chemicals
1 - 5 gal. "PNA"
1 - 5 gal. Vanlube
1 - 3 gal. Quinsarin
1 - 8 oz. DEA to pH=8
1 - 1 qt. unknown white solid
1 - 1 qt. unknown yellow clear viscous liquid
3 - 1 gal. unknown liquid
1 - 1 qt. POE - STS
5 - 4 oz. POE - STS
3 - 1 qt. clear yellow liquid/cloudy liquid
1 - 1 qt. Lipate 5 OA2
5 - 8 oz. Lipate $P_2O_5$ (added)
2 - 4 oz. Lipate $P_2O_5$ (added)
1 - 1 qt. Lipate $P_2O_5$ (added)

Building #65
(cont'd)

1 - 1 gal. DEG stearate
1 - ½ gal Butyl Acetate
8 - 4 oz. unknowns
1 - 1 oz. Druspin
1 - 1 qt. unknown white solid
1 - 1 pt. Drustat 75
1 - 1 pt. unknown amber liquid
1 - 1 pt. unknown clear liquid
2 - 1 pt. FD 0653
1 - 8 oz. FD 0228
1 - 1 pt. FD 025X
1 - 1 pt. FD 0754
1 - 1 pt. FD 065S
1 - 1 pt. FD 0911
2 - 1 pt. unknown white solid
1 - 4 oz. unknown white solid
1 - 1 qt. FD - 0719
1 - 1 qt. FD -
1 - 1 qt. FD -
1 - 1 pt. FD 0191
4 - 1 pt. FD 0754
1 - 1 pt. FD 0254
5 - 1 pt. unknowns
1 - 4 oz. unknown
1 - 1 pt. unknown white solid
1 - 1 gal. Sunthend 410
1 - 1 gal. Solvesso 150 Humboldt Oil Co.
3 - qt. Drusoft 100
1 - 1 pt. Sruspin
1 - 1 pt. Mulsa 30
1 - 1 gal. unknown
1 - 1 pt. unknown
1 - 1 pt. Oil 45
3 - 1 qt. FD 1351
1 - 4 oz. FD 1354
1 - 4 oz. FD 1197
1 - 1 pt. FD 0154
1 - 1 pt. KGB 2250
1 - 1 pt. FD 0191
1 - 1 pt. FD 0754
1 - 1 pt. Detergent 76/40
6 - 1 pt. Druspin
1 - 4 oz. Druclad 336
2 - 4 oz. FD 0653
1 - 1 pt. Emmulsifier MD
1 - 1 pt. FD 0653
1 - 1 pt. FD 0754
2 - 4 oz. unknown amber liquid
1 - 1 pt. unknown orange solid



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Building #65
(cont'd)

1 - 1 qt. unknown white solid
1 - 4 oz. Iso Palimitic Acid
1 - 1 gal. HP - HP C16
1 - 1 qt. C18
1 - 1 gal. unknown solid
2 - 1 gal. unknown liquid
1 - 1 gal. PEG400
1 - 1 gal. Propex 30/(Mobil product)
1 - 1 gal. unknown
1 - 1 gal. unknown Drew product
1 - 1 gal. unknown liquid
1 - 1 gal. Texaco 538 oil
1 - 1 gal. Markol II(?)
1 - 1 pt. Sulfonate sodium 4020
1 - 1 pt. unknown
2 - 2 qt. unknown liquid
2 - 2 pt. unknown oily liquid
3 - 1 pt. Emulsifier ND
2 - 4 oz. unknown amber liquid
4 - 8 oz. Lipate
1 - 4 oz. Lipate
1 - 1 gal. Emersol 7700
1 - 1 gal. unknown clear liquid
1 - 1 gal. Soramine - brown liquid
1 - 1 gal. unknown white solid
1 - 1 gal. Emersol 7780
1 - 1 gal. unknown white solid
1 - 1 gal. unknown oily liquid
1 - 1 gal. unknown
1 - 1 gal. unknown
1 - 8 oz. FD 0754
1 - 8 oz. FD -54
1 - 1 pt. FD 1197
1 - 1 qt. GPS
1 - 1 qt. unknown liquid
1 - 1 qt. unknown white powder
2 - 4 oz. unknown oily liquid
1 - 4 oz. crystaline/unknown
1 - 8 oz. Monoqual
1 - 8 oz. unkown - white solid
1 - 1 pt. Ucar lubricant (50-HP-660)
1 - 1 qt. Fatty Acids Arcel 186
1 - 1 pt. Polyethylene Glycol
1 - 4 oz. unknown white solid flakes
1 - 1 pt. Laurel Brand SD 101
1 - 8 oz. unknown white solid
1 - 8 oz. Barqual SD - 25
1 - 1 pt. unknown white powder
1 - 1 oz. Emulsant Polyglycol Palmitic Acid

Building #65
(cont'd)

2 - 1 oz. Monamine AA-100
1 - 8 oz. MCol 66
1 - 8 oz. Ethyl Hexanol
1 - 8 oz. Arlacel 83 Seisquaoliate
1 - 8 oz. Union Carbide lubricant
1 - 4 oz. Tenex
1 - 1 pt. Mono Amid 1502W
1 - 8 oz. Monamine ACO100
1 - 8 oz. Amidox C-2
1 - 1 pt. Water Soluble Resin by Union Carbide
1 - 8 oz. Mapolyrpe 101
1 - Decyl Olcate
1 - 2 Ethyl 1,3 Hexanediol
1 - 4 oz. Ailox
1 - 4 oz. Nopec
1 - 8 oz. Miqlyol by Drew Chemical
1 - 1 pt. Fluoro Phene
4 - 8 oz. M COL MAS
1 - 1 pt. Albagel by Whitaker Clark
1 - 8 oz. Arlatone T
1 - 1 pt. Tri-isopropanolamine
1 - 1 pt. Monamide
2 - 1 gal. unknown solid (large chips)
3 - 1 gal. unknown liquid
1 - 1 gal. solidifed white
1 - 1 gal. Triethylene Glycol
1 - 1 gal. Antistatic Agent 575
1 - 1 gal. unknown liquid
1 - 1 gal. unknown solid crystals
1 - 1/4 gal. PTZ powder phenolthyazine
1 - 1 gal. m-Nitroanylne
2 - 4 pt. unknown solid
1 - 1 pt unknown white solid powder
4 - 1 gal. unknown clear liquid
1 - 1 pt. Herc 707 (clear liquid)
1 - 1 pt. PE Ester
1 - 1 qt. TDX
1 - 1 pt. solvasol 104
1 - 1 pt. unknown white solid
1 - 1 qt. unknown liquid
1 - 1 qt. Pentol Pentaoleate
1 - 1 qt. Pentol Pentastearate
1 - 1 qt. unknown liquid
1 - 1 qt. unknown clear yellow liq/cloudy liquid
1 - 1 gal. unknown
1 - 1 gal. Sodium Carbonate
1 - 1 gal. Sodium Bisulfite
3 - 1 qt. Kotsul Base (American International Refining Corp.)



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Building #65
(cont'd)

1 - ½ gal. unknown clear liquid
1 - 1 qt. DEA
1 - 1 pt. PGME
1 - 1 qt. unknown clear yellowish liquid
1 - 2 oz. unknown clear yellowish liquid
1 - 4 oz. BT Diethylene Glycol Glutarate
1 - 2 oz. $C_8C_{10}$ (clear yellowish liquid)
1 - 4 oz. unknown clear liquid/white ppt.
1 - 2 oz. Heptanoic (clear liquid)
1 - ½ gal. Silane Treated - glass wool (white)
2 - 1 gal. unknown amber clear liquid/cloudy liqui
1 - 1 gal. Ultrawet 4 (clear colorless liquid)
1 - 1 gal. Neutronix by Onix Chem (clear liquid)
1 - 1 gal. Maproxid
1 - 1 gal. unknown clear liquid
1 - 1 gal. amoxyx/By Onix Chem (clear liquid)
1 - 1 gal. Lipel 20 - OX
1 - 1 gal. unknown solid

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Building #65
(cont'd)

Aisle #4

2 - 5 gal. Hercolube 079/UT
1 - 5 gal. Chevron Sample Drew Automatic Oils
1 - <1 gal. Velsicol DCL-Hexachlorocyclopentadiene
1 - 5 gal. Benzene-Purified by Mc & B
1 - 1 gal. Refined Bleached Soybean Oil
1 - 5 gal. Carbowax 4000 - Polyethylene Glycol
1 - 1 qt. GMO WEI/60/21
1 - 4 oz. Anionic Antistatic Lubricant
1 - 8 oz. Allied Chemical, Nacconol 40F, Soft 40% Flake
2 - 1 qt. "AST 0-555, Base Stk, Curren, Product Ion, 2-1289
1 - 1 qt. Drew_____ (Illegible)
1 - 10 oz. Drewclad Carrier
1 - 6 oz. "Tribit 20" (tagged)
1 - 3 oz. Durbsan 2E Insecticide by Dow
1 - 1/2 gal. "Texaco No Lead Gas"
2 - 1 pt. Pelarionic - (Red Liquid)
1 - 1 qt. unknown solidified substance (Tag "SML")
1 - 5 gal. "SMO"
1 - 1 pt. unknown white powder
1 - 1 pt. unknown solidified white substance
1 - 3/4 qt. Disodium Phosphate
1 - 24 oz. "$Na_2So_3$"
1 - 4 oz. unknown white crystals
1 - <1/2 gal. Technical Oleo Sterene
1 - 1 pt. unknown liquid - White
1 - 5 gal. Drewclad
1 - 5 gal. Drewclad C/F3
1 - 5 gal. Neodol 45 $C_{14}$- $C_{15}$ Alcohol
2 - 5 gal. Carbowax 200 - Polyethylene Glycol
1 - 5 gal. Carbowax 750 - Polyethylene Glycol
1 - 5 gal. Carbowax 1000 - Polyethylene Glycol
1 - 5 gal. Carbowax 1000 - Polyethylene Glycol
1 - 5 gal. Carbowax 1540 - Polyethylene Glycol
1 - 5 gal. Carbowax 350 - Methoxy Polyethylene Glycol
1 - 5 gal. Carbowax 550 - Methoxy Polyethylene Glycol
1 - 5 gal. Carbowax 1000 - Methoxy Polyethylene Glycol
1 - 5 gal. Nopco 1055-X by Nopco, Harrison, NJ
2 - 3 gal. & 5 gal. unknown Grey Container
1 - 5 gal. Hercolube Synthetic Ester
1 - 5 gal. Surfactol 380 - Baker Castor Oil
1 - 5 gal. "FDO 895"



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Building #65
(cont'd)

| | | | |
|---|---|---|---|
| 1 | - | 1 | pt. Purecal U-Precipitated Calcium Carbonat |
| 1 | - | 5 | gal. FKN-12 L-146 |
| 1 | - | 5 | gal. Sunpar 107 03/20/68 |
| 1 | - | 3 | gal. Sunpar 110 |
| 1 | - | 3 | gal. Sunpar 120 |
| 1 | - | 5 | gal. Dupont Lorol 22 Fatty Alcohol |
| 1 | - | 3 | gal. Acetonitrile |
| 1 | - | 2 | gal. Eo Almond |
| 1 | - | 1 | gal. "Oily" Substance |
| 3 | - | 1 | gal. "Fatty" Substance |
| 1 | - | 5 | gal. Perma Fresh 183 by Sun Chem |
| 1 | - | 5 | gal. Soil Retard-K |
| 1 | - | 5 | gal. Druterge -CaCo |
| 2 | - | 5 | gal. unknown |
| 1 | - | 5 | gal. unknown by Union Carbide |
| 1 | - | 2 | gal. Hexdecyl Alcohol - Technical by Enjay |
| 1 | - | 5 | gal. Di-glycol_? Laurate SE |
| 1 | - | 5 | gal. M-Chlorobenzene |
| 1 | - | 5 | gal. Sunvis No. 7 |
| 1 | - | 5 | gal. unknown liquid |
| 1 | - | 3 | gal. Di-ethyl Ether |
| 1 | - | 5 | gal. "FD 1214" Lot D8726 45-5-40 |

Building # 38A

30 - 85 gal. salvage drums, contents unknown
1 - 55 gal. "cellulose"