RE

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October 28, 1997

Mr. John Feeney
Wisconsin Dept. of Natural Resources
Southeast District Annex
4041 North Richards Street
Milwaukee, WI 53212

Re: Work Plan
Village of Grafton Lime Kiln Landfill
Rust Project No. 101668

Dear Mr. Feeney:

On behalf of the Village of Grafton, Rust Environment & Infrastructure (REI) is pleased to submit two copies of the enclosed Work Plan for Investigation of the Lime Kiln Landfill for your approval. REI is prepared to initiate the field investigation upon the WDNR approval of this Work Plan.

If you have any questions regarding the enclosure, please contact me at 920-451-2465.

Sincerely,

Joan Underwood/JE

Joan E. Underwood, P.G.
Project Manager

Enclosure: As noted

c: Mark Gottlieb - Village of Grafton
Charles Sweeney - Michael Best & Friedreich

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Work Plan for Site Investigation

rec 10/29/97

Quality • Integrity • Creativity • Responsiveness

Quality through teamwork

A6036780 RR

Lime Kiln Landfill
Grafton, Wisconsin

Prepared for:

Village of Grafton
Grafton, Wisconsin

Prepared by:

Rust Environment & Infrastructure
4738 North 40th Street
Sheboygan, WI 53083

October 1997

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1.0 INTRODUCTION

Groundwater sampling of private wells was conducted in the Manchester subdivision, adjacent to the Village of Grafton, Wisconsin, to assess groundwater quality in 1995. Results of this sampling, and sampling of additional wells, indicated the presence of contaminants in groundwater in concentrations exceeding water quality standards set forth in Chapter NR 140 of the Wisconsin Administrative Code (WAC). A possible source of the contamination is the Lime Kiln Landfill located west of the subdivision.

The Wisconsin Department of Natural Resources (WDNR) requested access to the former landfill to install three groundwater monitoring wells to determine if the landfill was the source of contamination. The Village of Grafton, however, decided to conduct an independent site assessment including investigating the site and reviewing potential engineering modifications, if necessary, in order to limit landfill impacts to the environment.

1.1 PROJECT PURPOSE

The primary objective of this project is to determine groundwater quality impacts which may be related to a possible release of contaminants from the Lime Kiln Landfill, and to determine if other upgradient sources may also be contributing to the contaminant plume. If contaminants are found to originate from the Lime Kiln Landfill, the supplemental objective of this project is to assess mitigation strategies to address the contaminant source. These objectives will be achieved by the following:

1. Identify and characterize potential on-site contaminant sources which may impact groundwater quality, including the nature, degree, and extent of potential contaminants which may emanate from the landfill.

2. Characterize the hydrogeology of the study area, particularly in relation to mechanisms of contaminant transport.

3. Characterize the nature and extent of impacts to groundwater.

4. Provide sufficient information to evaluate remedial action alternatives and the need for interim actions.

In turn, this will provide information to the evaluation of the following:

1. Potential for contaminant releases from the Lime Kiln Landfill.

2. Potential pathways for migration.

3. Impacts of contamination on receptors.

4. Known or potential impacts on natural resources.

5. Definition of other potential source areas that could impact the same area.

6. Identification of potential mitigation measures including natural attenuation.

This Work Plan was prepared to define the data needs and data acquisition procedures to implement a Site Investigation and Interim Action Evaluation for the Lime Kiln Landfill. The Work Plan presents the site history, physical and cultural setting, current conditions, data needs to further characterize the facility and to evaluate potential remedial options if needed, and specific procedures for data acquisition. The specific objectives of this Work Plan are to:

1. Provide a scope of work for the site investigation and preliminary remedial options evaluation consistent with the requirements of WAC NR 716 and 722.

2. Document and control the technical conduct of the work.

3. Provide a mechanism for assigning responsibilities and controlling the cost and schedule of the work.

4. Provide a mechanism for communicating to regulatory agencies the management of this effort.

1.2 PROJECT APPROACH

The investigation recognizes the interactive and iterative nature of the evaluation process. The collection of data in the investigative phase is meaningful to both site characterization and the selection of appropriate remedial options. Generally, the investigation will be conducted in the following sequence: 1) characterize the extent of the landfill and potential contaminants; 2) Determine if the landfill is a potential source and if other sources are contributing; 3) assess migration pathways of potential contaminant releases; 4) evaluate potential contaminant receptors; and 5) evaluate potential remedial options, if necessary. This work is most efficient if certain evaluations associated with the remedial options evaluation are completed during the investigation.

The project will be conducted in phases. The phased approach will provide opportunities to assess current conditions and to periodically re-assess data needs and overall project strategy. Currently, the project is planned to be completed in two phases.

1.2.1 Phase 1 - Source Characterization

The objective of Phase 1 of the project is to identify and characterize potential sources of the contaminant plume, with the primary focus being the Lime Kiln Landfill. Phase 1 will involve the following activities:

a. Characterize the extent of the landfill (i.e., limits of waste):

- Review information from the Village of Grafton, including aerial photographs of landfill use.
- Conduct surface geophysical survey to map landfill extent.
- Advance geoprobe borings to determine extent of waste and to assess cover type and thickness.

b. Characterize landfill leachate and gas:

- Construct and sample two leachate/gas wells within the waste if it is saturated or just below the waste at the water table.

c. Assess possible upgradient contaminant sources:

- Conduct a private well search to investigate presence of old private wells west of the site. These wells currently would not be in use, but may be available for sampling and may act as preferential flow paths.
- Install and sample a minimum of one upgradient groundwater monitoring well.

d. Characterize potential contaminant migration pathways:

- Conduct borehole geophysical logging and packer testing, if warranted, of three accessible private wells to evaluate lithology and potential preferential migration pathways.
- Evaluate potential impacts of preferential flow pathways on contaminant concentrations.
- Core and geophysically log a minimum of one new upgradient monitoring well.
- Conduct water level measurements in monitoring wells and accessible private wells.

e. Groundwater/surface water interaction:

- Install and sample one monitoring well between landfill and river.
- Install a marker on the abutment in the river to determine the elevation of the river.
- Sample surface water in the Milwaukee River upgradient, adjacent to, and downgradient of the site.

f. Groundwater modeling:

- Complete one- or two-dimensional model to aid in understanding contaminant migration, selection of private wells for sampling, and evaluating past impacts and contaminant migration from private well pumping.

1.2.2 Phase 2 - Contamination Evaluation

Based on the Phase 1 findings, a sampling plan addendum will be developed for the private wells and additional sampling of monitoring wells, if necessary, to evaluate the rate and extent of contaminant migration. This sampling will allow a comparison of groundwater quality in the area

to the leachate quality. In addition, Phase II will include a preliminary review of remedial alternatives.

1.2.3 Preliminary Remedial Alternatives Review

If the findings of the investigation warrant, a preliminary remedial alternatives review will be completed for the site. Alternatives will be chosen to protect human health and the environment.

The preliminary remedial alternatives review will:

- Identify the existing and projected future contaminant migration pathways to be addressed by the remedial actions.
- Define remedial action objectives for the site.
- Develop a list of potentially feasible remedial technologies and screen the list to retain those which are feasible and applicable.
- Conduct an initial screening of alternative remedial actions eliminating those which do not meet remedial action objectives or are not practical for this site. Appropriate remedial actions are evaluated based on 1) technical criteria including long and short-term effectiveness, implementability and restoration timeframe, 2) economic feasibility, and 3) other considerations such as the practicality, minimization of harmful effects, and other applicable regulations.
- Complete rough-order-of-magnitude performance and reliability evaluations of each alternative.
- Recommend selection of remedial actions for engineering evaluation.

1.3 ORGANIZATION OF THE WORK PLAN

This Work Plan has five chapters. Chapter 1 is this introduction. Chapter 2 presents the facility background and setting. The information in Chapter 2 is from previous investigations in the area and discussions with the Village of Grafton, WDNR, and Wisconsin Department of Health (DOH). Chapter 3 summarizes the current conditions of the landfill. Chapter 4 presents the Work Plan approach and lists the number and location of samples to be obtained in the field program. Chapter 5 is the Field Sampling Plan and defines the specific sampling and analysis procedures to be followed. The Site-Specific Health and Safety Plan is in Appendix A.

Prior to preparation of this Work Plan, REI, and the Village of Grafton held a scoping meeting. The scoping meeting agenda and the memorandum documenting the meeting are in Appendix B.

2.0 FACILITY BACKGROUND AND SETTING

2.1 GENERAL FACILITY INFORMATION

2.1.1 Project Title

The title of this project is Village of Grafton Lime Kiln Landfill.

2.1.2 Project Team

Owner:

Village of Grafton - Mr. Mark Gottlieb, P.E., Director of Public Works
1300 Hickory Street
P.O. Box 125
Grafton, WI 53024

Consultant:

REI
4738 N. 40th Street
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Phone: 920-458-8711

Joan Underwood, P.G., Project Manager

WDNR:

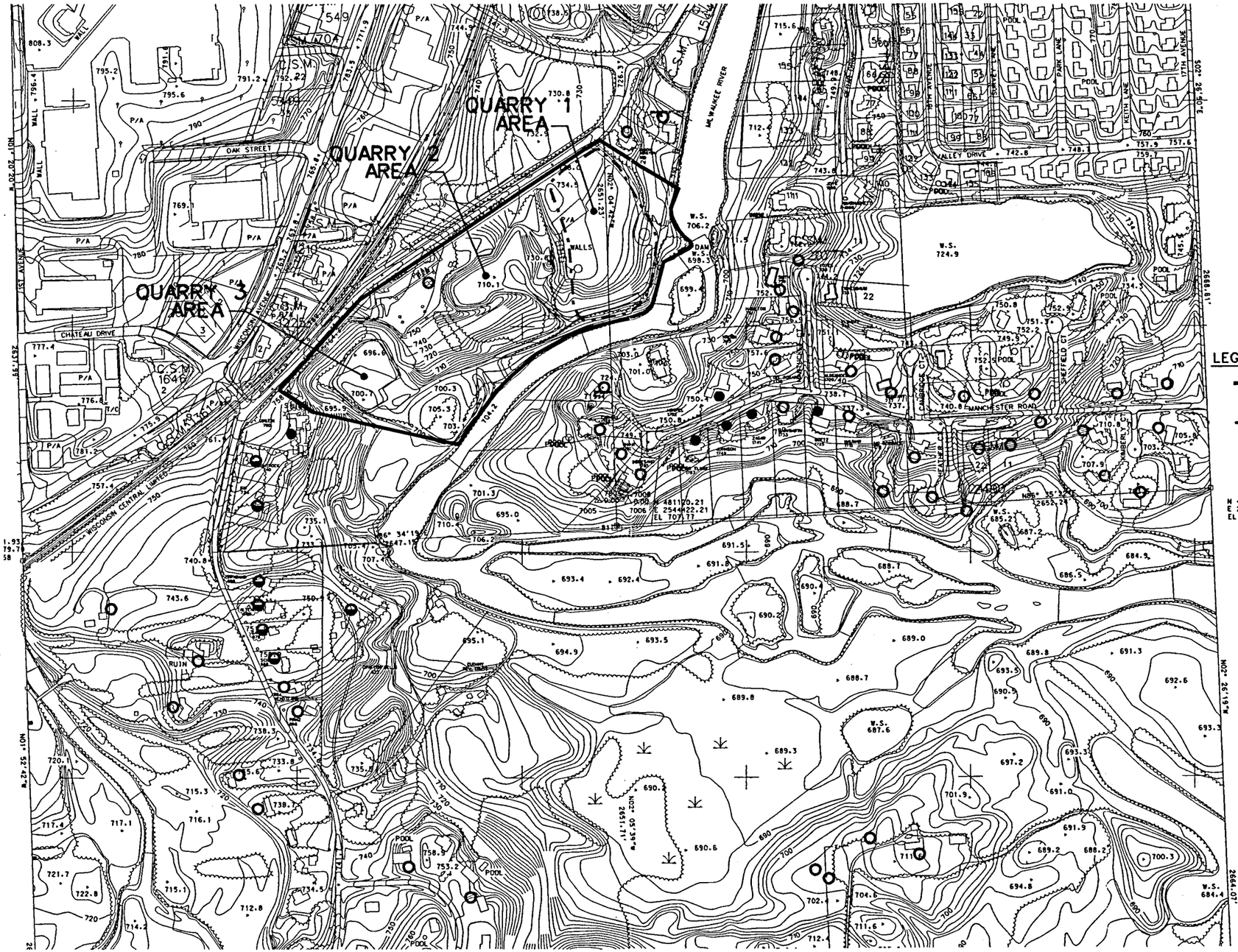
Southeast District:
John Feeney (414) 229-0850
Chad Czarkowski (414) 229-0828

2.2 FACILITY DESCRIPTION

2.2.1 Location

The site is located in the SE 1/4 of the NW 1/4 of Section 25, Township 10 North, Range 21 East of the Cedarburg 7.5-minute quadrangle. The Lime Kiln Landfill site is within the limits of Lime Kiln Park in the Village of Grafton, Ozaukee County. Lime Kiln Park is located off of Green Bay Road, just south of the intersection of Falls Road and Green Bay Road (Figure 2-1).

The Milwaukee River borders the south and east edges of the Park, while residential areas border the northeast, west, and southwest sides of the Park, as well as the east side of the Milwaukee River. Industries and businesses are located west and northwest of the Park, along Wisconsin Avenue.



LEGEND

- LIME KILN PARK PROPERTY BOUNDARY
- ESTIMATED LIMITS OF WASTE
- WELL WATER EXCEEDS A DRINKING WATER STANDARD FOR ONE OR MORE VOLATILE ORGANIC CHEMICALS
- WELL WATER CONTAINS SOME VOLATILE ORGANIC CHEMICALS BUT DOES NOT EXCEED ANY INDIVIDUAL STANDARD
- WELL TESTED FREE OF VOLATILE ORGANIC CHEMICALS IN PRE-LIMARY SURVEY

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SCALE 0' 125' 250' 500'

SOURCE: SAMPLE RESULTS FROM WDNR FILES, 4/18/1997.

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FIGURE 2-1
SITE LOCATION MAP & GROUNDWATER SAMPLING SURVEY RESULTS

WORK PLAN FOR SITE INVESTIGATION
VILLAGE OF GRAFTON
GRAFTON, WISCONSIN

OCT. 1997 101688

2.2.2 Operation

The filling of Lime Kiln Landfill occurred within previously quarried bedrock. Three quarries existed as shown on Figure 2-1. For ease of discussion, the quarries are numbered one through three from north to south. Quarry 1 is the known landfill area. Quarry 2 was not filled, while Quarry 3 shows some surface disturbance in old air photos, but it is not known whether waste was disposed in Quarry 3. Quarry 3 is also used for storage of snow removed during plowing in the winter.

The Quarry 1 area is estimated at about 1 to 2 acres based on the 1979 USGS map; however, a 1971 air photo showing grading associated with the park indicates an area about 4 or 5 acres in size. A 1935 air photo also shows disturbance in an area of about 4 to 5 acres. The depth of waste is unknown but is suspected to be as much as approximately 80 feet on the western portion of the site and 15 feet towards the east (based on the depth of Quarry 2).

There are no clear records on the operation history of the site. However, filling is reported to have started between 1942 - 1946 and continued to 1970. In the late 1950s, the Village leased the site from a private owner; the Village became owner about 1961. The site reportedly received general residential and commercial garbage and industrial waste from Grafton and surrounding communities. It was an open dump with no gate. Closure was precipitated by both the inability to get it licensed and the startup of the Village incinerator in 1971. In 1971, the site was closed and became Lime Kiln Park. The WDNR Parks Department files indicated that funding was provided by the WDNR for site grading. The original agreement was dated June 1972 and amended in 1973 and 1974. The closure was reportedly reviewed by WDNR although no records have been found at this time.

2.2.3 Types and Generators of Waste

Several categories of industries are in the area and types of wastes that could be expected to have been generated by those industries and potentially disposed at the site include:

1.	Metal stamping	TCE (trichloroethylene), toluene, xylene, lacquer thinner
2.	Tool and die	PERC or PCE (tetrachloroethylene), TCE
3.	Porcelainized, enamel finisher	Unknown
4.	Printed circuits	Acetone, plastic resins, TCE, silver screen process wastes, toluene
5.	Unknown	MEK (methyl ethyl ketone), hydraulic fluids, dry cleaners solvents
6.	Silk screening (paint)	Toluene, acetone, MIBK (methylisobutyl-ketone or 4-methyl 2-pentonone), methyl amyl ketone, n-propyl acetate, Dowanol® PM glycol ether, Dowanol® EB consolve 100, xylene
7.	Vinyl coated products	MEK
8.	WDNR records	Solvents, volatile solvents (lithograph industry), oils, dieldrin, possible medical wastes (autoclaved serums)

2.3 ENVIRONMENTAL IMPACTS

2.3.1 Groundwater

The Wisconsin DOH and DNR have sampled about 75 residential wells in the vicinity of the site during July 1996 and May 1997. The United States Environmental Protection Agency (EPA) also performed groundwater sampling during this period. The EPA SW-846 analysis Method 8021 was utilized for most of the analyses, however, EPA also used Method 502.2 or 542.2. The state sampled from the faucets located prior to the pressure tank, while EPA sampled the residential groundwater from the outside hose bibs.

Homes with private wells in the vicinity of Lime Kiln Park are shown on Figure 2-1. Well logs on record with the State of Wisconsin for wells with addresses located within the Manchester subdivision, along Green Bay Road and Highknoll, are available in the project file. Qualitative sampling results are shown on Figure 2-1. Private well sampling is continuing through the WDOH with wells that are most likely to be impacted to wells that are less likely to be impacted.

Below is a summary of the analytes detected from these sampling events their Preventive Action Limit (PAL) and Enforcement Standard (ES).

Analytes	Maximum Results (ug/l)	PAL (ug/l)	ES (ug/l)
Vinyl chloride	47	--	--
Trichloroethylene (TCE)	240	0.5	5.0
Cis-1,2-dichloroethylene (DCE)	240	7.0	70.0
Trans-1,2-dichloroethylene (DCE)	4.0	20.0	100.0
Tetrachloroethylene (PCE)	0.61	0.5	5.0
1,1,1-trichloroethane (TCA)	28.0	40.0	200.0
1,1-dichloroethane (DCA)	58.0	85.0	850.0
1,1-dichloroethylene (DCE)	5.7	0.7	7.0
Freon	140.0	--	--
Chloroform	4.4	0.6	6.0
Toluene	0.66	68.6	343.0
Chloromethane	1.0	0.3	3.0

2.3.2 Gas Migration

The possibility of lateral gas migration beyond the limits of waste exists and would most likely occur in surficial soils or fractured rock located above the groundwater. Gas generation may be limited because of the age of the waste and the expected relatively small size of the landfill. The horizontal extent of gas migration will vary through the year, depending on the state of surficial soils, for example:

> If the surficial soils are very wet, due to frequent rain or freezing, as typically occurs in the spring and winter, the horizontal extent of gas migration could be quite far. If the surficial soils

are very dry, due to lack of rain, or have many cracks, lateral gas migration may not occur because gas can vent through the surficial soil.

It is important to note that no lateral gas migration problems have been reported at this site. There was also no evidence of distressed vegetation during the site walk-over.

2.3.3 Other Potential Contaminant Sources

Several other potential contaminant sources are located in the vicinity of the site including industries, properties with USTs or LUSTs, and another quarry located east of the Milwaukee River. In addition, Village Well No. 6 is located in the suspected upgradient groundwater flow direction and has periodic detections of volatile organic compounds (VOCs). These results suggest there are other potential sources for the VOCs detected in groundwater in the vicinity of Lime Kiln Park.

An existing municipal well (No. 6) is located in the parking lot of K-Mart west of the site and has had historical VOC detections. WDNR initially indicated that the Village could not pump this well, but then allowed minimal pumping. When the well is pumped too much, VOCs increase. During 1996, Well No. 6 was pumped too much and contaminant concentrations in this well were unacceptable. This well appears to be upgradient of the Lime Kiln site and therefore may indicate that there are other potential sources of contaminants to the groundwater system other than the Lime Kiln Landfill. Compounds which have been detected in Well No. 6 and their respective NR 140 PALs, ESs, and maximum concentrations based on data through March 1997 include:

Analyte	Concentration (ug/l)	PAL (ug/l)	ES (ug/l)
1,2-dichloroethane	2.0	0.5	5.0
1,1-dichloroethane	2.5	85.0	850.0
1,1-dichloroethylene	1.2	0.7	7.0
Tetratchloroethylene	4.2	0.5	5.0
1,1,1-trichloroethane	3.2	40.0	200.0
Trans-1,2-dichloroethylene	2.8	20.0	100.0
Trichloroethylene	27.3	0.5	5.0
Cis-1,2-dichloroethylene	2.2	7.0	70.0
Methylene chloride	1.9	0.5	5.0
2,2-dichloropropane	2.4	--	--
Bromodichloromethane	1.0	0.06	0.6
Bromoform	0.2	0.44	4.4
Dibromochloromethane	0.9	6.0	60.0
Chloroform	0.9	0.6	6.0

2.4 REGIONAL GEOTECHNICAL INFORMATION

The following section describes the regional geotechnical information as it pertains to the site. Site-specific locational information as required under NR 716 will be collected during the site investigation.

2.4.1 Topography

The Lime Kiln Landfill is located in the Village of Grafton, Ozaukee County. Ozaukee County's topography is a product of the Wisconsin stage of Pleistocene glaciation. Ozaukee County consists primarily of ground moraines and end moraines which are mainly parallel to the Lake Michigan shore and mark various stages of the advancement or recession of glaciers from the Lake Michigan Basin. An end moraine runs north to south through most of Ozaukee County and the Village of Grafton. The Milwaukee River valley eroded through this end moraine immediately south of the site. The river borders the east and southeast sides of the Park.

The Lime Kiln Park topography consists primarily of a sloping river valley. The topography slopes southeast towards the Milwaukee river, and varies from gentle to steep sloping. The dolomite bedrock outcrops along a northeast to southwest ledge which parallels Green Bay Road near the western portion of the Park. Quarry No. 1 existed on the north-northeast side of the Park, which was filled with water. Quarry No. 2 exists near the center of the site and drops approximately 80 feet on the western edge. Quarry 3 is located in the southwest section of the Park.

2.4.2 Surface Water

Surface water in the Lake Michigan Basin is abundant and of good quality, although hardness is a persistent problem. Conductivity generally ranges from 500 to 750 micromhos, and dissolved solids generally range from 310 to 465 milligrams per liter (USGS Hydrogeologic Investigations Atlas). The Milwaukee River flows southward, forming the eastern and southern boundaries of Lime Kiln Park.

A small pond is located at the bottom of Quarry No. 2. Historical information notes the following:

"Another old 'water hole' is located in the Park between the lime kilns and the second quarry to the south. This pond is spring-fed with the water coming from the limestone cliffs in the area. Plans to have it cleared and made into a park-like setting have, to date, never materialized."

2.4.3 Surficial Soils

The majority of the soils on the site are disturbed. Two areas in the west and central portions of the site are identified on the soil survey map as "quarry," and one area in the east portion of the site is identified as "dump" (Soil Survey of Ozaukee County (USDA, 1970)). The Ritchey soil series (0 to 20 percent slope) and an area designated as "loamy land" are identified in the south-central portion of the site. The Ritchey series consists of a well-drained silt loam soil found on nearly level to moderately steep positions in the landscape. This soil formed in a thin 10 to 20-inch layer of silt or glacial drift deposits overlying limestone bedrock. The subsoil ranges from silt loam to clay loam. The area designated as "loamy land" consists of areas on the landscape disturbed by cut and fill activities. The soil characteristics found in this area are dependent on the parent material source but typically consist of loamy glacial till with pockets of sand and gravel or clayey material.

The soil units identified on the surrounding land typify the soils likely present on the site prior to being disturbed. The Knowles soil series (0 to 6 percent slope), the Hochheim-Sisson-Casco complex (2 percent to 20 percent slope) and an area designated as "alluvial land" are identified on the surrounding land. The Knowles series consists of a well drained silt loam soil found on nearly level to gently sloping positions in the landscape. This soil formed in a 20 to 42-inch layer of silt or glacial drift deposits overlying limestone bedrock. The subsoil ranges from silt loam to clay loam.

The Hochheim-Sisson-Casco complex consists of a well-drained silt loam soil found on gently sloping and gently undulating positions in nearly circular upland areas. This complex formed in a thin mantel glacial till overlying limestone bedrock. The subsoil ranges from loam to clay loam intermixed with stratified layers of variable material which affect subsurface water flow.

The area designated as "alluvial land" consists of low-lying silt and sand deposits located near floodplains along major streams and drainageways. The soil material in these areas is dominated by silt loam, but ranges from sandy loam to sand.

2.5 GEOLOGY

Sections 2.5 and 2.6 summarize the information available concerning geology and hydrogeology. This information is used to evaluate expected groundwater flow patterns including geologic layers which may provide easier pathways for groundwater movement, directions of groundwater movement, and information about how contaminants have moved at other sites in the area. This information then provides a basis for evaluating what additional data need to be collected to evaluate where contaminant sources may be located, how they have moved previously, and what may be expected in the future.

2.5.1 Regional Geology

The site is contained within Wisconsin's Eastern Ridges and Lowlands Province, an area characterized by alternating resistant and nonresistant Paleozoic sedimentary rocks overlain by a series of Wisconsinan tills and interbedded outwash deposits (Paull and Paull, 1977).

Generally, unconsolidated glacial Quaternary deposits unconformably overlie bedrock in Ozaukee County. The glacial deposits (drift) are Pleistocene in age and consist of a heterogeneous mixture of gravel, sand, silt, and clay. The glacial sediment in this area was deposited as glacial end moraines and ground moraines. The end moraines in Ozaukee County are mainly parallel to the Lake Michigan shore and mark various stages of the advancement or recession of glaciers from the Lake Michigan Basin. The unconsolidated deposits, which consist of mostly till, range in thickness from 0 (on-site where bedrock outcrops) to more than 50 feet to the west of the site (Young and Batten, 1980).

The unconsolidated glacial deposits are unconformably underlain by Paleozoic sedimentary rocks which dip gently to the east, toward the Lake Michigan Basin, at approximately an 0.5 percent slope. The Paleozoic bedrock throughout most of the Province is resistant Silurian dolomite. Devonian dolomite and shale are present along the eastern edge of Wisconsin, but do not extend to the study

area. The sedimentary rocks consist of Silurian dolomite, which overlies Ordovician shales, dolomites, sandstones, and Cambrian sandstones. The Paleozoic sedimentary rock sequence unconformably overlies Precambrian crystalline rocks, which are present beneath the site at a depth of more than 1,200 feet below grade (Young and Batten, 1980).

The Silurian dolomite is the uppermost bedrock unit in the study area. The Silurian dolomite is generally fractured, massive to thinly bedded, with a total thickness of approximately 550 feet in the study area. The Silurian dolomite was originally divided into two formations, the Niagara and the Waubakee (Chamberlin, 1877; Foley and others, 1953). These formations have since been subdivided into several distinct lithostratigraphic units with characteristic hydraulic conductivity values, thicknesses, and lateral extents that are related to the depositional environments of the original sediments (Rovey, 1990; Rovey and Cherkauer, 1994a). From oldest to youngest, these included the Mayville, Byron, Manistique, Racine, and Waubakee (Figure 2-2). Overlying these units are the Devonian-age Thiensville and Milwaukee Formations.

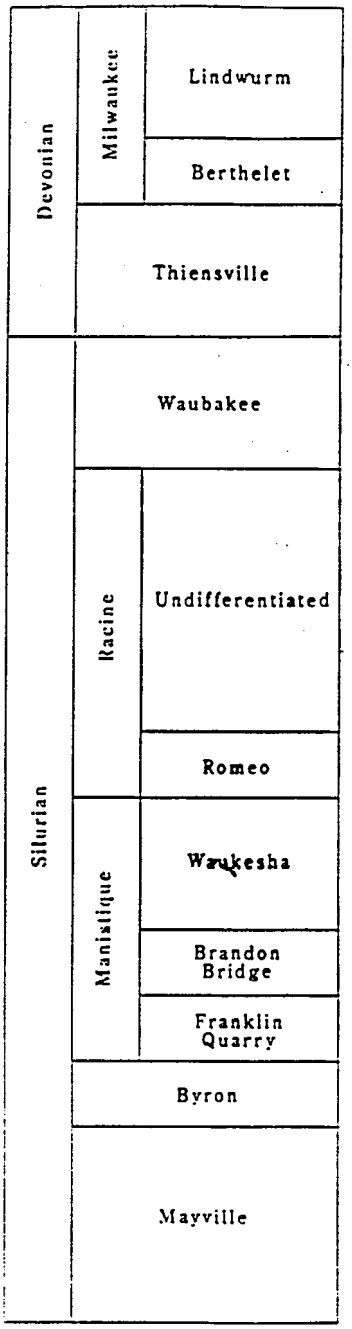
A generalized north-south regional cross-section was constructed through southeast Wisconsin, as shown on Figure 2-3. This cross-section depicts the various bedrock units in the area of Grafton. The most significant feature identified in Figure 2-3 is a northeast to southwest-trending barrier reef complex that passed through the vicinity of Grafton. This reef structure may have substantially different groundwater flow properties because of the way it was formed as compared to the chemically precipitated dolomite. Isolated reefs are characteristic of the Racine dolomite throughout Milwaukee County. The contact between typical non-reef Racine dolomite and the overlying Waubakee dolomite is gradational, but the contact between the Racine dolomite reef facies and the overlying Waubakee dolomite may be locally unconformable (Mikulic and Kluessendorf, 1988). The most permeable portions of the Racine Formation and the thickest sequences of the highly permeable Romeo Member of the Racine Formation are associated with the reef structure. These various stratigraphic units anticipated to be encountered during the investigation are further described below, from oldest to youngest.

2.5.1.1 Racine Formation

The late Silurian Racine dolomite consists of porous, light to dark gray, medium bedded, pure dolostone (Mikulic, 1977). Graziano (1993) describes the Racine dolomite in Milwaukee County as light to dark gray, thin to thick bedded, nonporous, slightly argillaceous, crystalline dolostone. Average thickness of the Racine dolomite in Milwaukee County is about 170 feet, but the formation thickness may increase to approximately 290 feet where reefs occur (Mikulic and Kluessendorf, 1988).

2.5.1.2 Waubakee Formation

The Waubakee dolomite is Late Silurian based on its stratigraphic position above the Racine dolomite and its lithologic similarity to Late Silurian carbonates in the Michigan Basin. The Waubakee dolomite of Milwaukee County is light to dark gray, dense, crystalline, laminated to thin bedded, slightly argillaceous dolostone. Localized dolomitic breccia zones have been identified at the top of the Waubakee dolomite. The Waubakee dolomite is generally 60 to 110 feet thick in



SOURCE: ROVEY AND CHERKAUER (1994).

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FIGURE 2-2
GENERALIZED STRATIGRAPHIC COLUMN

WORK PLAN FOR SITE INVESTIGATION
VILLAGE OF GRAFTON
GRAFTON, WISCONSIN

OCT. 1997

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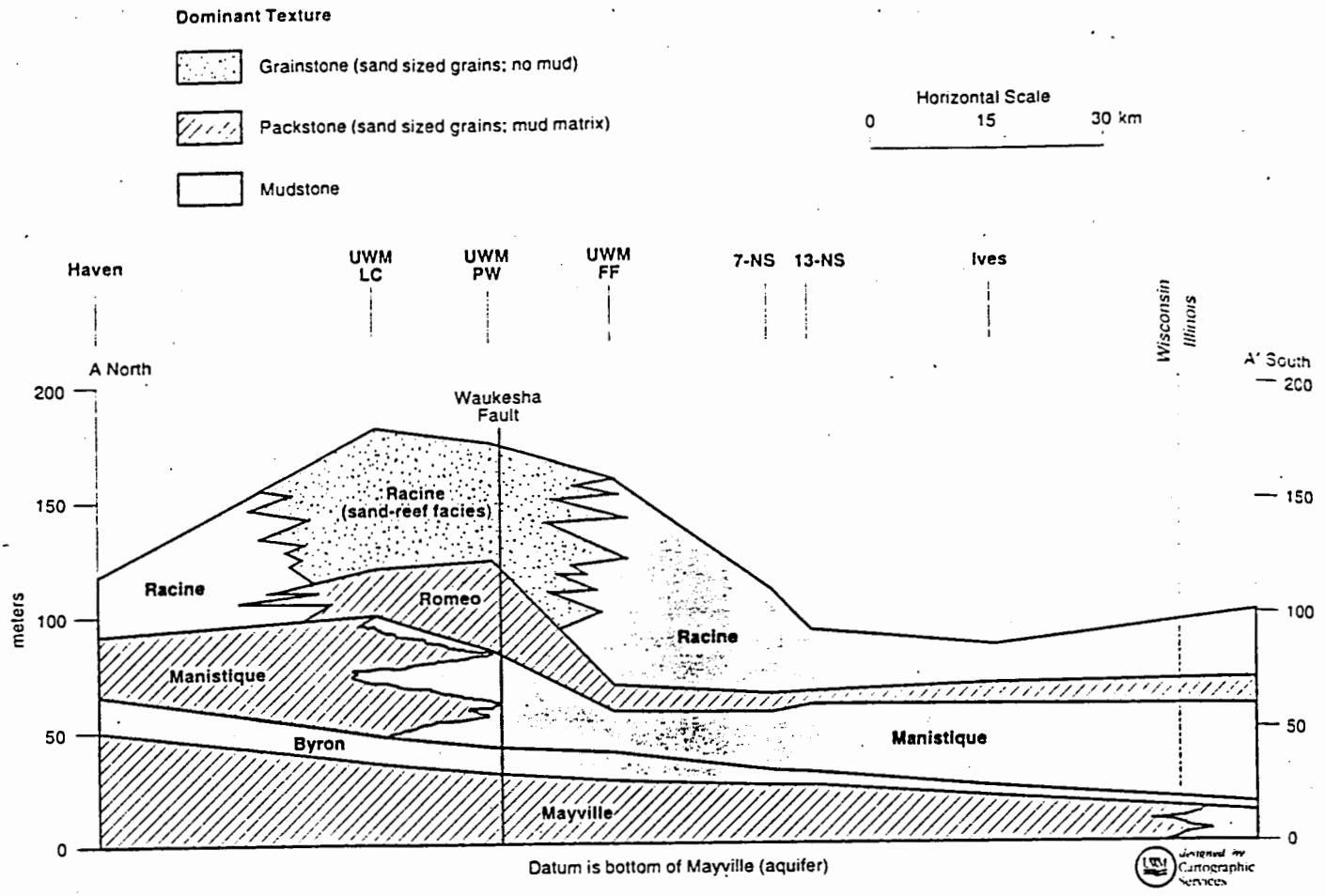
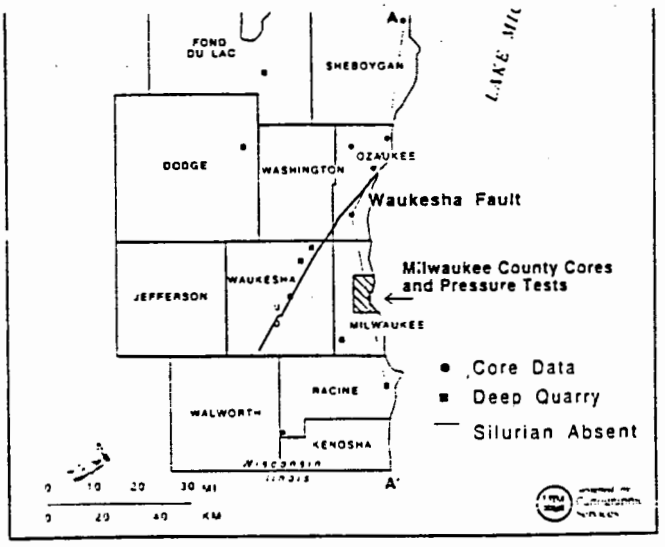


North-south cross section showing major hydrostratigraphic units, dominant textures and major facies changes. See Figure 3 for cross section location. The location of the facies change within the Mayville is highly generalized. Datum is the base of the aquifer; consequently, displacement along the Waukesha Fault is not shown. The apparent width of the Racine sand-reef facies is exaggerated, because the cross section is not perpendicular to strike. Units younger than the Racine are not shown, because of their restricted extent.



Major controls used to delineate facies changes in the dolomite aquifer, eastern Wisconsin.

SOURCE: ROVEY (1990), MIKULIC (1979), AND CHAMBERLIN (1877, 1883).

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FIGURE 2-3
REGIONAL CROSS SECTION
WORK PLAN FOR SITE INVESTIGATION
VILLAGE OF GRAFTON
GRAFTON, WISCONSIN

OCT. 1997

101688

Milwaukee County, but is absent in some locations where Racine dolomite reefs extend upward to the unconformable Silurian-Devonian boundary (Mikulic and Kluessendorf, 1988). The Waubakee dolomite is separated from the overlying Middle Devonian Thiensville Formation by an erosional unconformity.

2.5.1.3 Thiensville Formation

The age of the Thiensville Formation is Middle Devonian based on fossil occurrences. The Thiensville Formation of Milwaukee County is a lithologically complex unit that grades upward from poorly lithified argillaceous sediments, to dense, less argillaceous carbonates near the top. A characteristic lithologic feature of the Thiensville Formation is solution-derived breccias, commonly present in the middle and upper portions of the unit.

2.5.1.4 Maquoketa Shale

The Silurian dolomite (see Figure 2-2) is underlain by the Upper Ordovician Maquoketa Shale, which is primarily a blue-gray dolomitic shale, with some thin beds of dolomite. The dolomite layers are most common in the upper portion of the unit. The Maquoketa Shale occurs at a depth of approximately 600 feet below grade in the study area and is approximately 200 feet thick. The Maquoketa Shale acts as a regional aquitard in the area, separating the Silurian aquifer from the underlying sandstone aquifer. Because of its low permeability, this unit yields little water and restricts the vertical movement of water (Young and Batten, 19890).

2.5.1.5 Sandstone Aquifer

The Maquoketa Shale is underlain by a thick sequence of Cambrian through Middle Ordovician rock units, which are collectively referred to as the "sandstone aquifer." From youngest to oldest, the sandstone aquifer consists of the Galena-Platteville unit, the St. Peter Sandstone, the Prairie du Chien Group, and the Cambrian sandstones. The sandstone aquifer lies on relatively impermeable Precambrian rocks.

2.5.2 Local Geology

Pertinent findings from the Subsurface Investigation Report for Tecumseh Products Company (RMT, April 1997) are summarized in this section to enhance the regional geological and hydrogeological descriptions of the area surrounding the site. The Tecumseh site is located approximately 1 mile north of Lime Kiln Park.

In general, the geology at the Tecumseh site is consistent with the regional geology. The bedrock surface is present at a depth of 30 to 50 feet below grade. The four bedrock units identified to the depth investigated (approximately 320 feet) are, from deepest to shallowest, the Romeo Member of the Racine Formation, undifferentiated Racine Formation, Lake Church Formation [sic Waubakee], and Thiensville Formation. However, the lithological units were difficult to define because of the size of the cuttings from the downhole hammer drilling techniques. It was suspected that the reef facies of the Racine Formation was encountered in the deepest boring drilled.

Aerial photography was used to evaluate the presence and orientation of possible fractures in the bedrock. Two dominant sets of lineaments, oriented at approximately 90 degrees to each other, were identified in the study area. One lineament set is oriented northeast-southwest at approximately 35 to 50 degrees, and one is oriented northwest-southeast of approximately 125 to 135 degrees. This is consistent with regional fracture orientation identified by Jensen (1995) for the Silurian dolomite of eastern Wisconsin, providing a strong indication that the photolineaments represent underlying fractures in the bedrock.

2.6 HYDROGEOLOGY

2.6.1 Regional Hydrogeology

The primary sources of groundwater in the study area are the Silurian and the sandstone aquifers. The Maquoketa Shale acts as a regional confining unit, separating these two aquifers. Water in the Silurian aquifer is generally under water table conditions, and the deep sandstone aquifer is generally under artesian conditions. The Silurian aquifer is the primary aquifer for domestic, commercial, and municipal water supplies in the area. The sandstone aquifer is rarely used for domestic supplies because the overlying Silurian aquifer generally has adequate yields. The regional groundwater flows generally to the east/southeast toward Lake Michigan (Young and Batten, 1980).

Grafton Village wells receive water from both the Silurian and sandstone aquifers. Some wells are open to both formations. In addition, most private wells are constructed as an open borehole from near the top of rock to the total depth. The sampling results of private wells in the area were previously discussed in Section 2.3.1. These wells are all within the Silurian dolomite.

Highly porous packstones and grainstones have an intrinsically high hydraulic conductivity above that which is potentially provided by fractures and secondary dissolution. Hydraulic conductivity values for the Mayville Formation, Romeo Member of the Racine Formation, portions of the Racine Formation associated with reefs, and the Thiensville Formation may exceed 10^{-4} cm/s.

Abundant, but discontinuous, crevices and solution cavities are also present in the dolomite. The upper few feet of the rock generally has a higher hydraulic conductivity than the remainder of the aquifer because of interconnected fractures, joints, and solution openings formed during preglacial erosion.

Flow in the Silurian aquifer is generally under water table conditions. The water table usually occurs within the unconsolidated deposits, but may be within bedrock where bedrock is close to the surface. Groundwater flow is generally from west to east where Lake Michigan serves as a regional groundwater discharge area. Surface water bodies affect the local groundwater flow systems so that this general flow direction is affected. In the Grafton area, the water table slopes from west to east following the bedrock dip. Regional information depicts the Milwaukee River as a losing stream in the vicinity of Grafton, the result of the presence of several dams on the Milwaukee River. Just south of the site, the Milwaukee River changes from a losing to a gaining stream.

There is conflicting information concerning the influence the fractures and joints in the dolomite exert on the groundwater flow system. It appears that where the reef structure is present, primary porosity or bulk porosity will control flow more than the presence of jointing. Where pump tests have been conducted along fracture traces in the Milwaukee area, a strong anisotropy has been found in the direction of the fracture.

2.6.2 Local Hydrogeology

This local hydrogeologic description is taken from the Subsurface Investigation Report for Tecumseh Products Company, 1997. Similar conditions are expected in the area of Lime Kiln Park. Groundwater in the vicinity of Lime Kiln Park is expected to occur at or near the bottom of the landfill. To the west of the site, it is expected that the water table will occur within the bedrock and slope towards the Milwaukee River. Springs have been observed along the face of the quarries in Lime Kiln Park and most likely indicate that the water table occurs above the elevation of any springs. East of the Milwaukee River, the water table may be within unconsolidated deposits overlying bedrock, but whether it is located within the bedrock or unconsolidated deposits will be dependent on the thickness of the unconsolidated deposits and the topography.

2.6.2.1 Groundwater Occurrence and Formation Properties

Results of the study at the Tecumseh facility indicated that the hydraulic conductivity of most of the boreholes is comparable to the higher permeability units defined by Rovey and Cherkauer (1994a): the Thiensville, Romeo, and Racine reef facies. It is believed that the Thiensville and Romeo Formations were not encountered. The highest observed hydraulic conductivity at the site is much higher than any reported by Rovey (1990). The coarse-grained and granular nature of the rock described in two borings suggests the sand-reef facies of the Racine Formation as defined by Rovey (1990) and Rovey and Cherkauer (1994b) is present beneath the site.

The fracture characteristics of the dolomite bedrock were assessed based on the results of borehole video logging that was performed on the bedrock wells. The video logging was interpreted to under-represent fracture frequency, since only the larger fractures are readily visible on the borehole wall. The borehole videos indicated that macroscopic porosity of the dolomite occurs primarily as bedding planes. Vugs and small vertical fractures were also present. Highly porous zones ranging from 1 to 10 feet thick were noted in some of the borings, and a cavern was found in one boring. There was no apparent correlation of these zones of secondary porosity between borings (RMT, 1997).

A distinctive change in the nature of the rock was observed in the deepest boring completed for the Tecumseh Study (RMT, 1997). At an elevation of about 555 feet National Geodedic Vertical Datum (NGVD), the specific capacity as obtained from the packer tests, increased by two to three orders of magnitude, indicating a significant increase in the hydraulic conductivity of the dolomite. There was also an increase in the number and size of fractures observed on the video log in the lower portion of the boring. This highly transmissive zone extends from 555 feet to at least 435 NGVD (bottom of boring). The lateral extent of the high-permeability zone observed at the boring was not well defined and was not observed in the lower portions of nearby borings, suggesting that the high-permeability zone is not laterally extensive to the west. The deep boring may have penetrated the

Silurian reef structure within the Racine Formation that is hypothesized to cross the area from northeast to southwest (Rovey and Cherkauer, 1994a and b).

2.6.2.2 Groundwater Flow

Groundwater at the Tecumseh site flows to the east-southeast toward the Milwaukee River, with a horizontal hydraulic gradient of approximately 0.008. The vertical gradient in the unconsolidated material beneath the site is approximately 0.006 downward. In June 1996, the Milwaukee River acted as a partial recharge/discharge boundary for the dolomite aquifer.

The general pattern of groundwater flow is of strong downward and southeastward flow beneath the site, near horizontal flow near the Milwaukee River, and strong downward flow east of the river. The direction of groundwater flow in the bedrock parallels one of the regional fracture orientations identified by Jensen (1995) for the Silurian dolomite. Based on the strong downward gradient observed in the bedrock, the Milwaukee River does not appear to have much influence on groundwater flow in the bedrock.

The calculated horizontal hydraulic conductivity of five wells at the Tecumseh Grafton Facility ranged from 3.2×10^{-3} to 2.9×10^{-2} cm/s, with a geometric mean gradient of 0.008 and an effective porosity of 0.01, for the portions of the aquifer represented by the mean hydraulic conductivity of 2×10^{-3} cm/s yielding a velocity on the order of 1,600 feet per year.

2.6.2.3 Groundwater Quality

Contaminants from the Tecumseh facility had moved several thousand feet downgradient of the site and beneath the Milwaukee River. The total depth of the contamination was not determined, but concentrations remained fairly constant to a depth of 160 feet directly beneath the site. Because contaminants were found at this depth beneath the site, it was concluded that a dense non-aqueous phase liquid (DNAPL) had been present that resulted in downward contaminant movement at the site.

3.0 INITIAL SITE EVALUATION

3.1 TYPES AND QUANTITIES OF WASTE PRESENT

Waste disposed at the Lime Kiln Landfill reportedly consisted of residential and commercial garbage and industrial waste from Grafton and surrounding communities. As presented in Section 2.2.3, solvents, oils, chlorinated VOCs, paint thinners, hydraulic fluids, and possible medical wastes may have been disposed at the site.

The quantity of waste is unknown, but is suspected to encompass the Quarry 1 area. Based on air photos, this area is estimated at about 4 or 5 acres in size. The depth of waste is suspected to be as much as approximately 80 feet on the western portion of the site and 15 feet towards the east where the site abuts the Milwaukee River. Quarry 3 is suspected not to have received waste, but this will be confirmed through interviews by the Village and limited investigation as described in this Work Plan.

3.2 CHEMICAL CONSTITUENTS OF CONCERN

Based on the private well sampling results presented in Section 2.3.1, VOCs and semi-volatile organic compounds (SVOCs) can be expected to be in leachate if the landfill is the source of groundwater contamination. VOCs are relatively mobile in both aqueous and gaseous phases and are the constituents of highest interest in this evaluation.

3.3 POTENTIAL CONTAMINANT MIGRATION PATHWAYS AND IMPACTS

3.3.1 Primary Sources

The site conceptual model consists of several potential primary sources including the Lime Kiln Landfill, other area industries, UST, and LUST sites. The three potential primary contaminant sources from the landfill include leachate, gas, and waste/soil. These are described in the following sections and a schematic drawing of groundwater flow is provided in the Meeting Minutes contained in Appendix B.

3.3.1.1 Leachate

Leachate is generated from the infiltration of precipitation through the waste. The water will then contain dissolved constituents and become leachate. Leachate may collect at the bottom of the waste or may move through the waste into the groundwater.

Leachate from the Lime Kiln Landfill may contain constituents of concern including VOCs and SVOCs. Leachate will be collected during Phase I of this program and analyzed for the same constituents as the groundwater. Two leachate/gas wells will be constructed at the bottom of waste if it is saturated, or just below the waste at the water table.

3.3.1.2 Landfill Gas

Landfill gas generated during the natural decomposition of organic matter may transport VOCs away from the landfill. VOCs will also naturally volatilize from the leachate and waste. Compounds that are not highly water soluble and that are more volatile are most likely to be released in the gas according to Henry's Law. Gas can then migrate and constituents can be transported through the soils and into the groundwater and air.

3.3.1.3 Waste/Soil

The waste, and soil in contact with waste materials, are potentially a continuing source of contaminants. Small pockets of product may exist, although it is more likely that contaminants are sorbed onto other waste materials or soil.

3.3.2 Secondary Sources

There is the potential that a DNAPL may be acting as a secondary source of contaminants similar to what was described in Section 2.6.2.3.

3.4 PRIMARY RELEASE MECHANISMS

As water infiltrates through the landfill, contaminants may be released from the waste/soil and carried downward to the groundwater table. Waste that is below the water table could also release constituents directly to the groundwater. Thus, the main release will include advective and diffusive flow within the groundwater and the vadose zone. Accordingly, the primary pathway is groundwater and the corresponding primary concern is groundwater impacts as it affects water supply wells.

3.5 PATHWAYS

Pathways of exposure include surface water, groundwater, and air.

3.5.1 Surface Water

Surface water is not expected to be impacted, but if it is, it would be primarily impacted from groundwater seepage into the river.

3.5.2 Groundwater

Groundwater is the most important pathway of concern because it can be impacted by all the primary sources. There may be preferential pathways for groundwater flow in a bedrock reef structure known to occur in the area. The numerous existing private wells in the area also serve to provide preferential pathways within the groundwater flow system because all the wells are constructed with long (up to about 100 feet) open boreholes within the rock. This allows constituents that enter the groundwater system to be mixed throughout the aquifer to at least the depth of the wells because groundwater flow can move freely both up and down the boreholes. Downward migration of

constituents would be limited by an aquitard (Maquoketa Shale) found at a depth of approximately 500 feet.

Fractures in the bedrock may also play a role in contaminant transport, however: 1) Tecumseh, working on a nearby project, found no strong correlation between fracture occurrence and contaminant concentrations, and 2) there are two scientific opinions on the importance of fracture flow in the area. One opinion believes it has a very strong influence, and the other opinion is that other factors, especially bulk permeability, will be a much more dominant influence on flow.

3.5.3 Air

Because the landfill is old and concentrations by contaminants are not high in groundwater, it is not likely that there is an air pathway risk.

3.6 EXPOSURE ROUTES

The potential exposure route for surface water is dermal contact and incidental ingestion. Potential exposure routes for groundwater include ingestion, dermal contact, and inhalation (shower scenario). The potential exposure route for gas is inhalation. To evaluate risk, constituents in the leachate, groundwater, and landfill gas will be characterized.

4.0 INVESTIGATION APPROACH AND PROCEDURES

4.1 DATA NEEDS

This chapter lists the specific data needs for characterizing the site and evaluating remedial actions, and lists the location and number of specific samples for each medium. Laboratory deliverables will include sample results and QA/QC summaries for blanks, duplicates, spikes, surrogates, and laboratory control samples. Deliverables will also provide the date of sample receipt, extraction date, analysis date, and analyst's name.

Analytical data generated for the Lime Kiln Landfill will also be computerized in a format organized to facilitate data review and evaluation. The computerized data set will include the data qualifiers provided by the performing laboratory.

The laboratory-provided qualifiers will include such items as:

- Nondetects.
- Concentration below required detection and reporting limits.
- Estimated concentration due to poor QC data.
- Concentration of chemical also found in the laboratory blank.

Analytical laboratory data will be reviewed to ensure project QC requirements were met. Data validation will be performed by conducting a systematic review of the data for compliance of the summary QA/QC packages to the established QC criteria based on the QC limits provided by the laboratory. An evaluation of data accuracy, precision, sensitivity, and completeness will be performed.

Data validation will be performed using the "National Functional Guidelines for Organic Data Review," February 1994, and "Functional Guidelines for Inorganic Data Review," February 1994. Qualifiers used during the validation process will indicate that the data are: 1) usable as a quantitative concentration; 2) usable with caution as an estimated concentration (coded J); or 3) unusable due to out-of-control QC results (coded R).

Project-specific analytical methods and method detection limits will be presented in a Quality Assurance Project Plan when a project-specific laboratory is chosen. The selected laboratory will be a Wisconsin-certified laboratory.

4.1.1 Surface Water

To assess potential surface water impacts, surface water levels on the nearby Milwaukee River will be measured to determine if the river discharges to groundwater or receives groundwater recharging from local landforms, including the landfill. To accomplish this, a staff gauge or marker will be placed on the abutment in the river nearest the landfill to determine flux in river elevations. Measurements will be recorded.

4.1.2 Groundwater

Existing private wells and newly installed groundwater monitoring wells will be sampled to provide additional information of the impacts of the landfill (if any) on groundwater quality and to develop a better understanding of the hydrogeology of the area. One monitoring well will be installed downgradient of the landfill between the landfill and the Milwaukee River. Private wells will be used to evaluate groundwater movement and distribution of constituents in groundwater flowing east from the site. An upgradient monitoring well will also be installed and sampled to provide background water quality data. If suitable private wells exist west of the site, they will also be sampled.

One set of groundwater levels will be obtained from monitoring wells and representative private wells in Phase I to evaluate the effects of fluctuations in groundwater levels on groundwater flow. Groundwater sample analysis will be based on an evaluation of the constituents found in the leachate. Analyses will also include leachate indicator and natural attenuation parameters and priority pollutants including: VOCs (including VOCs on WDNR Form 4400-107A), SVOCs, PCBs, herbicides/pesticides, metals, and cyanide to determine if sources other than the landfill are inpacting the groundwater.

Semivolatiles

4.1.3 Leachate

Two combination leachate and gas wells will be installed to assess the quantity and quality of leachate and gas generated at the landfill. These wells will be used to monitor leachate levels and extract leachate samples. Leachate samples will be analyzed for leachate and natural attenuation indicator parameters and priority pollutants including: VOCs (including those listed on WDNR Form 4400-107A), SVOCs, PCBs, herbicides/pesticides, metals, and cyanide. Leachate samples will be analyzed prior to groundwater sampling to allow an evaluation of those results prior to groundwater sampling. Because of the unknown chemistry of the leachate and the potential to not need leachate remediation, no pump tests of the leachate/extraction wells are proposed at this time. Should a remedial action be selected that requires leachate pumping, a pump test will be completed during the design phase of the project.

leachate

4.1.4 Landfill Gas

The two wells described in Section 4.1.3 will also be constructed to conduct pressure tests to determine if gas generation is occurring, and to what extent. Samples of landfill gas from the two proposed wells will be analyzed to determine whether hazardous air contaminants exist within the landfill. The gas will be analyzed for methane, oxygen, and VOCs. Gas pressure in the two leachate monitoring/gas wells also will be measured to determine the potential driving forces for lateral gas migration.

4.1.5 Landfill Extent

A search for and evaluation of aerial photographs will be conducted to estimate the extent of the landfill. The limits of the landfill will also be assessed by conducting an EM-31 geophysical survey.

The survey will be completed over the 4- to 5-acre footprint of Quarry No. 1 by collecting data on approximately 25-foot centers to determine the areal boundaries of waste materials. The data generated will be verified by advancement of Geoprobe® borings to evaluate the thickness and type of the cover over the waste materials and horizontal limits of the waste.

If additional background research indicates the potential for waste disposal in Quarry 3, an EM-31 survey will also be conducted in this area. If background information indicates waste disposal was unlikely in this area, then a limited number of geoprobe borings will be advanced to verify that waste is not present. If waste is detected, then this Site Investigation will need to be adjusted to include Quarry 3 for leachate, groundwater, surface water, and gas concerns.

4.2 SAMPLE LOCATIONS, NUMBERS, AND ANALYTES

The sections below describe the number of samples to be collected for each medium and specifies the analyte samples to be collected. The sample and well locations are shown on Figure 4-1.

4.2.1 Surface Water

Three surface water samples will be collected from the Milwaukee River to evaluate potential impacts of the landfill on surface water quality. Surface water samples will be collected: 1) immediately downstream of the estimated limits of waste, 2) adjacent to (north of the first sample), and 3) upstream (north of the estimated limits of waste) of the landfill. Refer to Figure 4-1 for the surface water sample locations. The surface water samples will be collected from running water in the Milwaukee River.

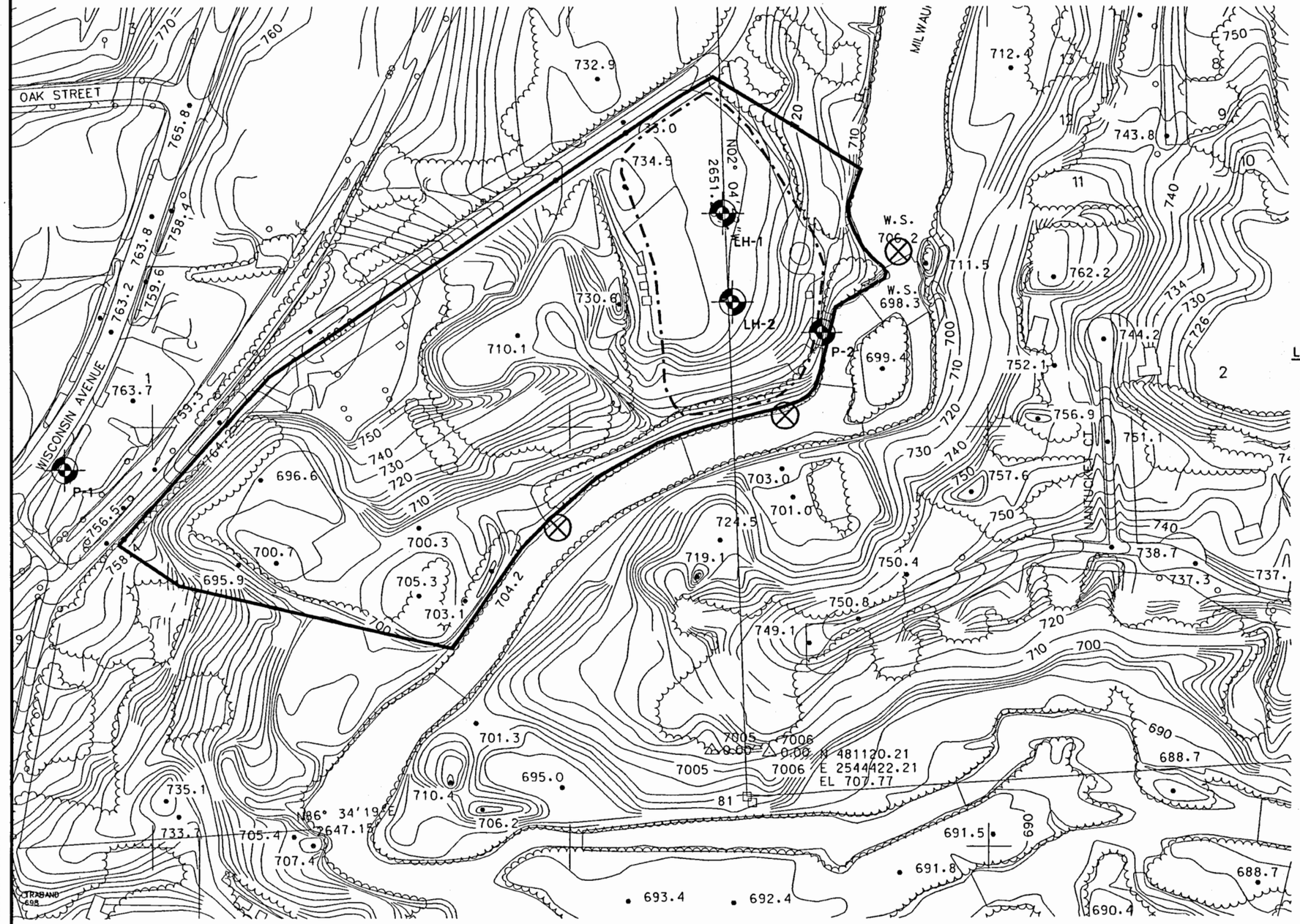
Measurements of pH, temperature, and conductivity will be made at the time of sample collection on the surface water sampling form. The samples will be analyzed for VOCs, SVOCs, metals, PCBs, and herbicides/pesticides and indicator parameters. Sample summaries are provided in Table 4-1.

4.2.2 Groundwater

One shallow (approximately 15 feet) groundwater monitoring well (P-2) will be installed so as to intersect the water table east of the landfill (Figure 4-1). One deeper (approximately 250 feet) upgradient groundwater monitoring well (P-1) will be installed between Wisconsin Avenue and the railroad tracks west-southwest of the landfill (Figure 4-1). This well will be terminated at the approximate depth of private wells in the area.

The soil borings will be continuously sampled. Hollow stem augers will be used to advance the soil borings through unconsolidated soils, while rock coring methods will be used in bedrock.

The deep, upgradient P-1 well corehole will be geophysically logged for natural gamma, caliper, and resistivity prior to well installation. Packer testing of select intervals will be used to evaluate the permeability of various stratigraphic horizons and will also be used to collect groundwater samples at select depth intervals (minimum shallow and deep sampling). A single well will be installed at



LEGEND

- LIME KILN PARK PROPERTY BOUNDARY
- ESTIMATED LIMITS OF WASTE
- LH-2 — PROPOSED GROUNDWATER WELL AND GAS/LEACHATE WELL
- P-1 — PROPOSED MONITORING WELL
- PROPOSED SURFACE WATER SAMPLE

N

SCALE 0' 125' 250'

RUST

Rust Environment & Infrastructure Inc.

FIGURE 4-1
PROPOSED SAMPLING LOCATIONS

WORK PLAN FOR SITE INVESTIGATION
VILLAGE OF GRAFTON
GRAFTON, WISCONSIN

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TABLE 4-1
SAMPLING AND ANALYSIS PLAN
WORK PLAN FOR SITE INVESTIGATION
VILLAGE OF GRAFTON, WISCONSIN

Sample Matrix	No. of Samples	Field Duplicates	Field Blanks	Trip Blanks[1]	MS/MSD[2]	Total Samples	Test Parameters[3]	Field Parameter
Groundwater Investigation								
Groundwater Phase 1	5*	1	1	1	1	9	Volatiles	
	2-4	1	1	1	1	6-8	Volatiles, Semivolatiles, PCB, Pesticide/ Herbicides, Dissolved Metals, Indicator and Natural Attenuation Parameters	pH, Eh, Specific Conductance, Temperature, Dissolved Oxygen, Iron II
Groundwater Phase 2	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Surface Water Investigation								
Surface Water	3	1	---	1	1	6	Volatiles, Semivolatiles, PCB, Pesticides/ Herbicides, Dissolved Metals, Indicator Parameters	pH, Eh, Specific Conductance, Temperature
Landfill Investigation								
Leachate	2	---	---	1	---	3	Volatiles, Semivolatiles, PCB, Pesticides/ Herbicides, Dissolved Metals, Indicator and Natural Attenuation Parameters	pH, Eh, Specific Conductance, Temperature, Dissolved Oxygen, Iron II
Landfill Gas	2	---	---	---	---	2	Volatile Organics	Methane, Oxygen, pressure

TABLE 4-1 (Continued)
SAMPLING AND ANALYSIS PLAN
WORK PLAN FOR SITE INVESTIGATION
VILLAGE OF GRAFTON, WISCONSIN

Sample Matrix	No. of Samples	Field Duplicates	Field Blanks	Trip Blanks(1)	MS/MSD(2)	Total Samples	Test Parameters(3)	Field Parameter

NOTES:

* Samples for quick turn-around, to determine well placement.

(1) A trip blank for VOC analysis will be included with each cooler containing aqueous VOC samples.

(2) Extra volume is required for the MS/MSD: triple the volume for aqueous VOCs, double the volume for SVOCs, PCB, pesticides, and herbicides. Landfill gas, metals, indicator, and natural attenuation parameters require duplicate and spike analysis, but do not require extra volume be collected.

(3) Indicator Parameters: Bicarbonate Alkalinity, Carbonate Alkalinity, Chloride, Sulfate
Natural Attenuation Parameters: Dissolved Oxygen, Nitrate, Sulfate, Iron II, Methane/ethane/ethene, Chloride (field), Dissolved Organic Carbon (Method 9060), Redox Potential (Eh), pH, Temperature

TBD To Be Determined

a depth to be determined based on the depth of private wells, bedrock core, geophysical logging results, and groundwater sampling results from the corehole. If, however, the groundwater sampling results from the corehole indicate potential groundwater impacts from several different intervals within the corehole, a maximum of three such intervals will be monitored via the installation of a multi-level sampling system.

The monitoring wells will be constructed in conformance with Chapter NR 141 of the WAC. The new monitoring wells will be developed in accordance with Chapter NR 141. If a single well is installed, slug testing will be performed to determine hydraulic conductivity. Multiple wells will be installed with a multiport sampler device. Slug tests cannot be conducted within the devices.

Subsequent to development of new monitoring wells, water levels in the wells will be measured. One round of water levels shall be collected during the Phase I field effort.

Monitoring wells will be sampled once in Phase I to determine groundwater quality in the vicinity of the landfill. With the exception of VOCs listed on the WDNR Form 4400-107A and leachate and natural attenuation indicator parameters, constituents not found in the leachate may not be analyzed for in the groundwater. Groundwater samples will be analyzed for VOCs, SVOCs, metals, PCBs, herbicides/pesticides, and natural attenuation and indicator parameters. Sample summaries are provided in Table 4-1.

Select private wells both upgradient (if suitable wells are found) and within the Manchester Subdivision will also be geophysically logged for caliper, natural gamma, and resistivity. One round of water levels in the residential wells that are being geophysically logged will also be completed during Phase I. This will provide a baseline for conditions just after the homes are switched to Village water and a qualitative groundwater flow direction. Based on these results, selected intervals may be packer tested for information on hydraulic conductivity, and possibly sampled for select parameters to evaluate the presence of preferential flow zones. Borehole logs will be correlated with the corehole completed for the upgradient well.

4.2.3 Leachate

The existing physical conditions and chemical composition of leachate will be evaluated.

4.2.3.1 Physical Conditions

Insufficient data are available to evaluate the extent of leachate migration and the potential for groundwater flow or perched leachate within the waste. Leachate monitoring wells will be installed within the waste limits of the landfill to investigate leachate head levels and chemical/composition of any leachate if encountered in the landfill.

The leachate monitoring wells will also be equipped to provide information to evaluate generation and chemical composition of landfill gas. Target well depths will be at the bottom of waste if it is saturated or just below the waste at the water table. Well depths are estimated to be about 50 feet.

Drilling through the base of the site is possible, however, if this occurs, it is not expected to significantly impact the groundwater since no liner exists.

Potential locations for the two proposed gas/leachate wells are shown on Figure 4-1. As-built well locations may vary due to refusal during drilling or poor site access.

4.2.3.2 Chemical Composition

Leachate samples will be collected from the two extraction (gas/leachate) wells located within the limits of waste. Two non-composite samples (one from each well) will be collected and analyzed for leachate indicator parameters and priority pollutants, including VOCs, SVOCs, PCBs, herbicides/pesticides, metals, and natural attenuation and indicator parameters. Table 4-1 is a summary of leachate samples and analysis.

Information obtained concerning the quantity and quality of leachate of the landfill will be reviewed when evaluating potential groundwater impacts at the landfill and determining final groundwater analyses.

4.2.4 Landfill Gas

Landfill gas samples will be obtained from each of the two extraction wells and will be analyzed in the field for methane, oxygen, and pressure, and will be analyzed for VOCs. Samples which require laboratory analysis will be collected in evacuated Summa canisters. Analyses to be performed on the landfill gas are summarized in Table 4-1.

Information obtained during the investigation of landfill gas will be useful in evaluating lateral gas migration resulting from gas pressures within the landfill. In addition, the results of chemical analyses conducted on landfill gas samples will be useful in evaluating the potential for constituents in the landfill gas to be dissolved in the groundwater.

4.2.5 Landfill Extent

An electromagnetic (EM) geophysical survey will be used to estimate the limits of waste both in Quarries 1 and 3. If information prior to field work is found concerning disposal in Quarry 3, this area may be eliminated from the EM survey. Shallow soil borings via a Geoprobe® will be used to confirm EM survey results, both inside and outside the limits of waste in both Quarries 1 and 3. If an EM survey is not conducted in Quarry 3, several geoprobe holes will be completed in Quarry 3 to confirm the absence of waste. The anticipated maximum depth of these Geoprobe® borings is 20 feet below ground surface (bgs).

5.0 MEDIA-SPECIFIC SAMPLING PLANS

5.1 SURFACE WATER SAMPLING AND MONITORING PLAN

5.1.1 Introduction

Surface water sample locations within the Milwaukee River are shown on Figure 4-1. Sample locations will be field identified prior to sampling and noted in field forms with reference to permanent structures or other physical features. A total of three samples will be collected to include one upstream, one downstream, and one adjacent to the site. The surface water samples will be collected to assess potential contaminant impacts resulting from runoff and erosion, or groundwater discharge to the river.

Surface water samples will be analyzed for parameters listed in Table 4-1. In addition, a staff gauge/marker will be installed on the abutment in the Milwaukee River. Data from this gauge will be used with groundwater elevations from monitoring wells to evaluate groundwater/surface water interaction.

5.1.2 Equipment

The following equipment and materials will be used during surface water sampling and staff gauge installation:

1. Sample containers.
2. pH meter.
3. Thermometer.
4. Sample labels.
5. Sample log sheets.
6. Camera and film.

5.1.3 Surface Water Sampling Procedures

Surface water samples will be collected standing on the shore or in the water, if necessary. If samples are collected while in the water, the samples will be collected by entering the river downstream of the sample location point. Samples collected using a dip cup will be transferred to the appropriate sample container from the dip cup. Samples requiring preservation will be collected in a temporary collection vessel and then transferred to the appropriate pre-preserved container.

The sample bottle or temporary collection vessel will be placed into the river, top down, and then positioned approximately 8 inches below the water surface. The bottle or vessel will be turned over at an even rate allowing the running river water to replace the air in the container. The cap will then be placed onto the container under water prior to removing the container from the river.

After sample collection, field measurements or specific conductance, pH, and temperature will be made and recorded on the surface water sample log sheet.

5.1.4 Staff Gauge Installation Procedures

The staff gauge will consist of a surveyed mark such as paint or a chisel mark on the abutment. The mark will be surveyed with respect to mean sea level elevation with an accuracy of 0.01 feet. Surface water level measurements at the staff gauge will be taken on the same day as groundwater levels from the monitoring wells.

5.1.5 Decontamination

There will be no equipment decontamination associated with the surface water sampling and staff gauge installation.

5.1.6 Quality Control

One field duplicate sample will be collected as listed in Table 4-1. The field duplicate will be collected at the same time and in the same manner as the original sample. As described in Section 5.3.6 for the groundwater samples, trip blank samples will be packaged with the field samples and sent to the laboratory for analysis. Field documentation will undergo an internal QC review after the completion of field activities. Original field forms will be reviewed by the Field Manager (FM) who will review the field forms for completeness, accuracy, and compliance with the sampling plan.

5.1.7 Documentation

Surface water sampling information and other observations made by the samplers during sampling and staff gauge installation activities will be recorded on the appropriate field forms contained in Appendix C. This will include:

1. Daily Time Logs.
2. Surface Water Sampling Form.
3. Sample labels.
4. Staff Gauge Information Form.
5. Photographs of staff gauge location.

5.2 LEACHATE SAMPLING AND MONITORING PLAN

Two leachate monitoring/gas extraction wells will be installed for leachate and gas sample collection and gas extraction, if necessary. Approximate locations for the wells are shown on Figure 4-1. Details of the gas/leachate wells are shown on Figure 5-1. This work plan details the procedures to be followed for installing the wells and for collecting leachate samples. Procedures for collecting gas samples from the leachate wells are discussed in Section 5.4.

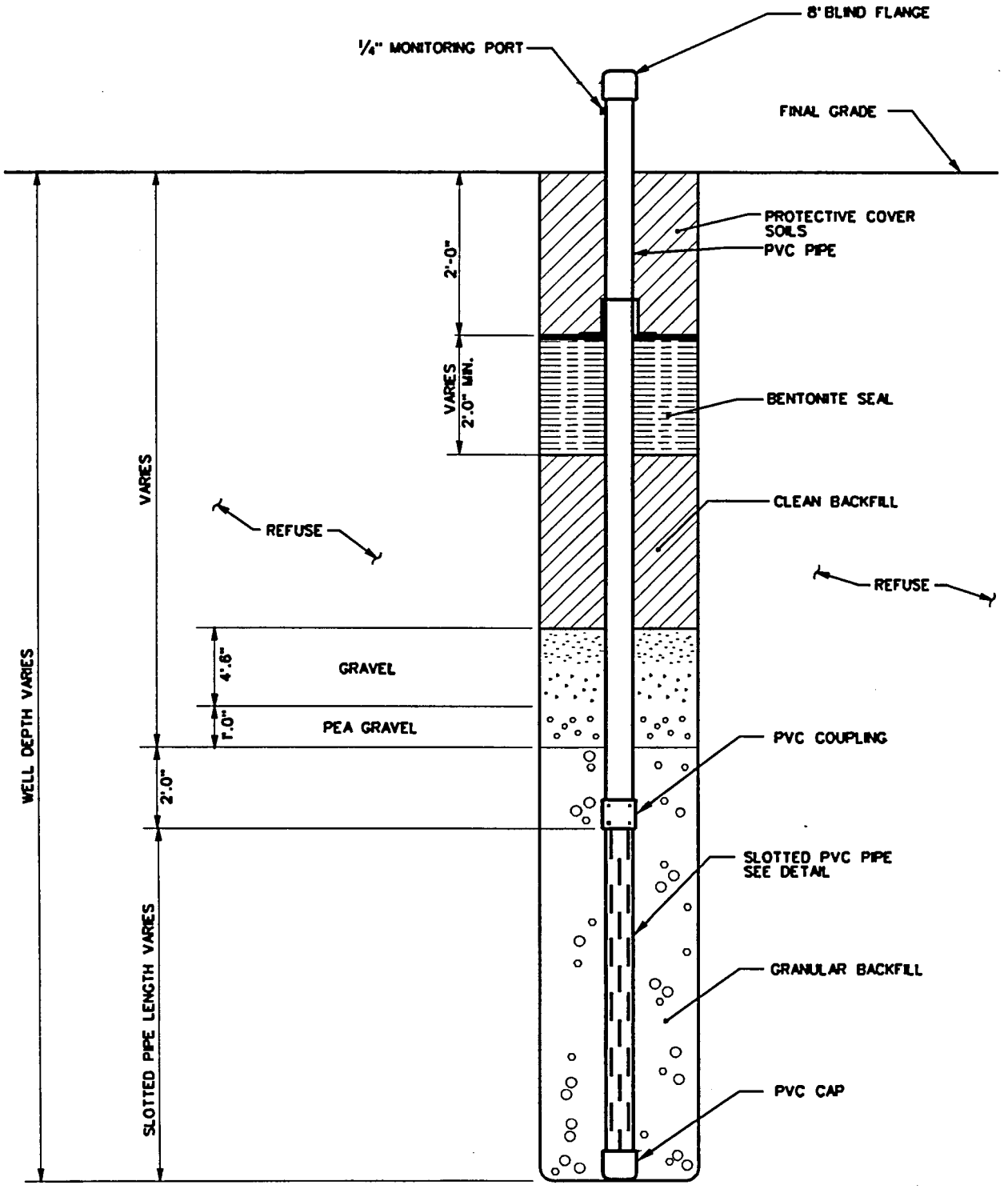

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FIGURE 5-1
TYPICAL LEACHATE/GAS WELL CONSTRUCTION DIAGRAM

WORK PLAN FOR SITE INVESTIGATION
VILLAGE OF GRAFTON
GRAFTON, WISCONSIN

OCT. 1997

101688

5.2.1 Leachate Monitoring/Gas Extraction Well Installation

5.2.1.1 Introduction

Leachate monitoring wells will be constructed from 8-inch diameter Schedule 80 PVC and placed in an 14-inch diameter boring. A variable screen length will be constructed from slotted 8-inch diameter Schedule 80 PVC. The screen length will be dependent on the depth of refuse at each well location. The total depths of wells are dependent on the depth of refuse, but are estimated at 30 to 50 feet.

5.2.1.2 Equipment

The following equipment will be required:

1. Drill rig capable of boring an approximate 14-inch diameter hole into rock as needed, and installing a 8-inch diameter well to a depth of 80 feet.
2. Fiberglass tape of adequate length to measure the bottom of the well.
3. Liquid level indicator with a minimum 100-foot length.
4. Field notebook and field documentation forms.
5. Tap water.
6. Liquinox® detergent.
7. Generator, steam cleaner, and related equipment.
8. Camera and film.
9. Well construction materials.

5.2.1.3 Leachate Well Installation Procedures

The contractor will utilize a drill rig capable of boring a hole with a minimum diameter of 14 inches. The boring will extend through the refuse and stop either at the top of the underlying native materials or into rock until the water table is encountered. An on-site geologist will make this determination based on the drilling. The spoils from the drilling operation will be disposed of at a licensed sanitary landfill. Wastewater from the drilling process will be containerized pending results of wastewater analysis, then appropriately disposed.

Wells will be constructed of 8-inch diameter Schedule 80 PVC pipe and incorporate an unperforated riser section extending to approximately 11 feet below ground surface and a screened section of variable length, depending on the thickness of refuse. Well screens will be 0.010-inch slotted PVC. Riser and screen lengths for each well may require modifications based on site conditions. All modifications will be noted on the well construction log.

Because the wells will be utilized as monitoring locations, solvent cements will not be used. For added support during well installation, all joints below grade will be lag-bolted. Lag bolts will be flush with the interior of the pipe.

Pipe lengths will be lowered into the soil boring by cable. Each section of additional well casing will be positioned above the borehole immediately above the section in-place. The pipe ends will then be lag-bolted together. The new combined section will be lowered into the well. This procedure will be continued until the casing stinger has bottomed out and approximately 2 feet of riser pipe is exposed above the surface elevation.

An 8-inch blind flange will be installed to complete the well. The blind flange will have a 1 ½-inch threaded quick disconnect fitting to allow for easy access. In addition, a 1/4-inch quick connect monitoring port will be installed 12 inches from the top of the casing.

Every attempt will be made to center the well casing before any backfill material is introduced into the borehole. After centering the casing, washed non-calcareous gravel backfill (1 to 3-inch diameter) will be introduced evenly around the casing. This technique will serve to center a well should extraneous material, protruding from the borehole, act to skew the well casing. Gentle shaking of the casing between backfilling loads will promote consolidation of the gravel pack.

Backfilling will continue using the above technique until the gravel reaches a level of 24 inches above the slotted screen pipe. At this point, the borehole annulus will be backfilled with approximately 1 foot of pea gravel and 4.5 feet of gravel. A 2-foot bentonite seal will be installed above the intermediate gravel seal. The bentonite seal will terminate 2 feet below the surface of the existing cover material. Clay backfill will be added and compacted.

An as-built well log will be completed at this time (Appendix C). Static gas pressure will be measured ½-hour after well construction.

For health and safety reasons, volatile organics and combustible gas will be monitored during drilling operations by the drilling contractor utilizing appropriate equipment.

5.2.1.4 Decontamination

The leachate well installation equipment will be decontaminated by steam cleaning upon arrival on-site and before leaving. Decontamination is not necessary between installations. Decontamination fluids will be collected from post-drilling and will be containerized and disposed of properly following analytical results.

5.2.1.5 Quality Control

Field documentation will undergo an internal QC review after the completion of field activities. Original field forms will be reviewed by the Field Manager (FM) who will review the field forms for completeness, accuracy, and compliance with the sampling plan.

5.2.1.6 Documentation

Data collected and observations made during the installation of the monitoring wells will be recorded on the appropriate field forms included in Appendix C. Documentation will include:

1. Daily Time Log.
2. Extraction Well Installation Diagram.
3. Field Meter Instrument Calibration Logs.
4. Daily Drilling Summary.
5. Atmospheric Monitoring Log.
6. Photograph Log Form.

5.2.2 Leachate Level Monitoring

5.2.2.1 Introduction

Leachate level monitoring will be conducted utilizing leachate/gas wells, which will be installed in the landfill. Leachate levels will be used to calculate the volume of leachate present in the landfill. Leachate head levels also will be compared to groundwater levels in nearby groundwater monitoring wells and the Milwaukee River elevation.

5.2.2.2 Equipment

Equipment includes the following:

1. Electric water level indicator and water level popper.
2. Field documentation forms.
3. Field log book.
4. Deionized water.

5.2.2.3 Procedures

After installation of the leachate/gas wells, a survey will be conducted to locate the well (north and east coordinate and top of casing elevation). The installation will be located on a plan sheet of the landfill for future reference. The leachate level will be measured using the electric water level indicator or water level popper. Measurements will reference the top of casing. Measurements will be made to the nearest 0.01 feet. A measurement of the total depth of the installation will be made also referencing the top of the casing.

5.2.2.4 Decontamination

Leachate level measuring equipment will be decontaminated between extraction wells with deionized water rinse and with soap, isopropyl alcohol, and deionized water before being used in a groundwater monitoring well and before leaving the site.

5.2.2.5 Quality Control

Field documentation will undergo an internal QC review after completion of field activities. Original field forms will be reviewed by the Field Manager or senior technical staff for completeness, accuracy, and compliance with the work plan.

5.2.2.6 Documentation

Data collected and observations made during leachate level measurements will be recorded on appropriate field documentation forms. Examples of field documentation forms are included in Appendix C. Forms will consist of:

1. Daily Time Log.
2. Water Elevation Form.

5.2.3 Leachate Sampling

5.2.3.1 Introduction

Samples will be collected from each leachate well and analyzed for leachate indicator parameters and priority pollutants including: VOCs, SVOCs, PCBs, herbicides/pesticides, metals, and natural attenuation and indicator parameters.

5.2.3.2 Equipment

The following equipment will be used for leachate sampling:

1. Disposable teflon bailers and submersible pump.
2. Electric water level indicator, water level popper, or teflon-coated woven tape.
3. Field notebook.
4. Yellow Springs Instrument dissolved oxygen meter/temperature meter and manual, spare membranes, and electrode solution.
5. Conductivity meter.
6. pH meter and calibration buffer solutions, pH paper.
7. Tap water, deionized water, and isopropanol (A.C.S.).
8. Five-gallon pail with cover to collect equipment decontamination rinsates containing isopropanol.
9. Liquinox® detergent.
10. Plastic sheeting.
11. Sample bottles and preservatives.
12. Coolers.
13. Ice.
14. FID/PID.
15. GasTech® tridetector or equivalent.
16. 15-gallon inert plastic container.
17. Field documentation forms.
18. Aluminum foil.
19. Trip blanks.
20. Personal protective clothing.
21. Redox meter.

5.2.3.3 Procedures

Chemical sampling equipment will be transported into the field in clean plastic containers. Equipment removed from the containers will be placed on clean plastic sheets to minimize potential contamination from the ground surface. New sheeting will be used for each sampling location.

A minimum of three well volumes will be removed from the wells prior to sampling. Purge liquids will be collected and disposed off-site at a permitted facility. Field meters will be calibrated on a daily basis, prior to obtaining field measurements.

Samples collected during leachate sampling are listed in Table 4-1.

Air monitoring will occur during the sample collection procedure for percent lower explosive limit (LEL), percent oxygen, hydrogen sulfide, and VOCs. Atmospheric monitoring results will be documented on an Atmospheric Monitoring Form (Appendix C).

Samples will be properly preserved and stored in coolers with ice until custody is relinquished to the laboratory. Caution will be used when adding preservatives to the leachate because they may cause the leachate to foam.

5.2.3.4 Decontamination

The equipment exposed to leachate will be cleaned between each use by:

1. Soap and tap water wash.
2. Deionized water rinse.

The decontamination fluids will be containerized and disposed off-site. Bailers and any other non-reusable equipment will be disposed of in an acceptable permitted landfill.

5.2.3.5 Quality Control

Field documentation will undergo an internal QC after the completion of field activities. Original field forms will be reviewed by the Field Manager or senior technical staff for completeness, accuracy, and compliances with the work plan.

5.2.3.6 Documentation

Data collected and observations made during leachate sampling will be recorded on field forms included in Appendix C. Required field forms include:

1. Daily Time Log.
2. Well Purging and Sample Collection Form.
3. Field Meter Calibration Form.
4. Chain of Custody.

5. Field Meter Instrument Calibration Log.
6. Atmospheric Monitoring Log.

5.3 GROUNDWATER SAMPLING AND MONITORING PLAN

The groundwater sampling and monitoring plan will include borehole/corehole drilling, downhole geophysical logging, packer testing, monitoring well installation, and groundwater sampling from coreholes, monitoring wells, and private wells.

5.3.1 Borehole Drilling/Rock Coring

5.3.1.1 Introduction

One shallow (approximately 15 feet) and one deep (approximately 250 feet) boring will be completed to evaluate the stratigraphy and to facilitate monitoring well installation and groundwater sampling. Subsequent to completing the shallow boring, a groundwater monitoring well will be installed as described in Section 5.3.4. Subsequent to completing the deep boring, geophysical logging and packer testing will be completed as described in Sections 5.3.3 and 5.3.2, respectively. After completion of the geophysical logging and packer testing in the deep boring, a single deep monitoring well or a multilevel sampling system may be installed to monitor select intervals.

5.3.1.2 Equipment

1. Indelible markers (blue and red).
2. Geologist hammer.
3. Acid bottle.
4. Tape measure.
5. Rust core logging standards.
6. Rock color chart.
7. Camera and film.
8. Field notebook and field documentation forms.
9. Drill rig capable of drilling through unconsolidated deposits with hollow stem augers (HSA) and rock coring with 3-inch drill stem and an NX or NQ core barrel.

5.3.1.3 Procedures

The borings will be drilled through unconsolidated deposits with HSA to bedrock. Upon encountering bedrock, 3-inch drill stem and an NX or NQ core barrel will be used to collect 2-inch diameter core samples. The rock core from each hole will be placed in wooden core boxes. Each core run will be clearly marked and numbered. Parallel blue and red lines will be drawn down the length of the core to assure that the core is maintained in its proper orientation. The core run number, recovery, length, and rock quality designation (RQD) will be recorded on each core box lid. The geologist's log will be recorded on field log rock borehole forms with special attention to sample recovery, RQD, fractures and weathered rock, fracture orientation, and whether or not fracture surfaces are fresh, stained, pitted, encrusted, or weathered by solution. After the box and

core are labeled, a photograph will be taken of the full core box. Alternatively, the rock drilling may be advanced by air-rotary methods with samples of the rock cuttings collected and logged at 3-foot intervals.

5.3.1.4 Decontamination

The drill rig and downhole equipment will be decontaminated by steam cleaning upon arrival on site, between borings, and before leaving the site. The decontamination fluids will be discharged to the ground surface downslope to the respective borings.

5.3.1.5 Quality Control

Field documentation will undergo an internal QC after the completion of field activities. Original field forms will be reviewed by the FM or senior technical staff for completeness, accuracy, and compliance with the work plan.

5.3.1.6 Documentation

Data collected and observations made during borehole drilling will be recorded on field forms included in Appendix C. Required field forms include:

1. Daily Time Log
2. Field Boring Log
3. Field Rock Borehole Log
4. Atmospheric Monitoring Log

5.3.2 Packer Testing

5.3.2.1 Introduction

Packer tests will be conducted at various levels within the deep corehole to characterize the hydraulic conductivity of specific stratigraphic intervals and to obtain groundwater samples from these same intervals. Select private wells may also be tested. Packer test intervals will be selected based on visual inspection of the rock core and/or geophysical logs. Packer tests will be performed on a maximum of six 10-foot long zones within the corehole. In turn, groundwater sampling results from select intervals will determine monitoring well depth or intervals to be monitored via a multi-level sampling system.

5.3.2.2 Equipment

1. Drill rig capable of packer testing with a double packer assembly with three pressure transducers.
2. Tape measure.
3. Camera and film.
4. Field notebook and field documentation forms.

5.3.2.3 Packer Test Procedures

The packer testing will be completed using a double packer assembly with three pressure transducers to monitor head conditions above, below, and within each test section. The packer assembly consists of a pair of inflatable rubber cylinders separated by a section of perforated steel pipe. When the packers are inflated, a test zone within the borehole is isolated from the rest of the borehole. Water is then allowed to flow in or out of the test zone via the perforated pipe, and under controlled conditions. The packer tool is equipped with a downhole shut-in valve for testing purposes and for obtaining head values in low permeability strata.

The general packer testing procedure is as follows:

1. Lower the packer assembly to the required depth;

2. Calibrate the pressure transducers;

3. Inflate the packers using compressed nitrogen;

4. Measure the stable water level inside the drill rod (i.e., the potentiometric level of the test zone). In a tight formation; close the downhole shut-in valve to determine the static head value within the test section;

5a. Add water to the drill rods above the shut-in valve in preparation for the falling head test, or

5b. Pump water out of the drill rods in preparation for a rising head test (appropriate for shallow or aboveground potentiometric levels);

6. Open the shut-in valve allowing water in the drill rods to enter the test section;

7. Monitor the change in head with time (flow period/falling head test);

8. Closing of the downhole shut-in valve to complete the "shut-in" testing; and

9. Deflation/opening of all valves and packers.

Packer tests will be conducted at depth intervals starting at the bottom of the completed corehole. The packers will then be inflated to prevent leakage. Successive intervals will be tested sequentially upward within the borehole.

5.3.2.4 Decontamination

The packer assembly, drop pipe, and submersible pump will be decontaminated by steam cleaning prior to being used downhole, and at the completion of testing. Decontamination liquids will be discharged to the ground surface.

5.3.2.5 Quality Control

Field documentation will undergo an internal QC review after the completion of field activities. Original field forms will be reviewed by the Field Manager who will review the field forms for completeness, accuracy, and compliance with the sampling plan.

5.3.2.6 Documentation

Data collected and observations made during the packer tests will be recorded on the appropriate field forms included in Appendix C. Recordable data from each packer test will include the test number, packer inflation pressure, depth interval tested, length of interval, flow meter, water loss, elapsed time, rate of loss, and gauge pressure. Documentation will include:

1. Daily Time Log
2. Schematic of Packer Assembly
3. Field Log Book
4. Purging and Sample Collection Form
5. Chain of Custody

5.3.3 Downhole Geophysical Logging

5.3.3.1 Introduction

Upon completion of the corehole, geophysical logging consisting of natural gamma, caliper, and single point resistance (SPR) will be completed. The results of this logging will be used to determine packer test intervals and the installation depth of monitoring wells installed in bedrock. Select private wells may also be logged.

5.3.3.2 Equipment

The following equipment will be required:

1. Caliper probe.
2. Natural gamma, SPR, and SP probe.
3. Mt. Sopris Model MGX II digital logger.
4. Laptop computer.
5. Field notebook and field documentation forms.

5.3.3.3 Logging Procedures

The logging procedure consists of lowering a probe to the bottom of the open borehole to continuously record the amount of natural gamma radiation present within bedrock or soil as the probe is brought to the surface at a rate of approximately 15 feet per minute. The gamma logs are scaled horizontally in gamma counts per seconds (cps). Caliper logging is performed to measure the diameter of the cased and uncased section of the hole is the size of the drill bit. Differences in hole

diameter are related to the formation material type and can be used in conjunction with natural gamma logs to refine stratigraphic data and may also be indicative of zones of secondary porosity within the rock. Caliper logging will be performed using a three-arm caliper probe which measures the borehole diameter as the probe is withdrawn from the borehole at a rate of approximately 5 feet per minute. For field quality control, digital data will be used in combination with an analog printout to verify that reliable data were being gathered. Digital data will be stored to hard disk with a floppy disk backup.

5.3.3.4 Decontamination

The respective probes will be cleaned prior to use and between each use by:

1. Soap and tap water wash.
2. Deionized water rinse.

The decontamination liquids will be discharged to the ground surface.

5.3.3.5 Quality Control

Field documentation will undergo an internal QC after the completion of field activities. Original field forms will be reviewed by the FM or senior technical staff for completeness, accuracy, and compliance with the work plan.

5.3.3.6 Documentation

Data collected and observations made during geophysical logging will be recorded in a field notebook.

5.3.4 Monitoring Well Installation

5.3.4.1 Introduction

Two groundwater monitoring wells will be installed near the landfill at the proposed locations (Figure 4-1). Actual finished depth for each well will depend on the location of the water table and site stratigraphy and the presence of contaminants as determined in the field by the site geologist. The wells will be used to obtain groundwater samples for analysis, and to evaluate groundwater flow.

5.3.4.2 Equipment

Equipment to be used during monitoring well installation activities will include:

1. Drill rig with the capability of:

    a. Advancing borings with a minimum 6-inch diameter tricone roller bit per NR 141.

b. Completing monitoring well installation.

2. Fiberglass tape of adequate length to measure the bottom of the well.
3. Electric water level indicator of adequate length.
4. Field notebook and field documentation forms.
5. Tap and deionized water.
6. Liquinox® detergent.
7. Generator, steam cleaner, and related equipment.
8. Camera and film.
9. Well construction materials.
10. Isopropanol (A.C.S.).
11. pH and conductivity meters.
12. Thermometer.
13. Submersible pump.
14. Hardhat, safety glasses, and steel-toed shoes.
15. Indelible marking pen and black ink pen.
16. FID/PID.
17. Personal protective equipment, as needed.

5.3.4.3 Well Installation Procedures

The monitoring wells will be constructed of 2-inch (I.D.), 10-foot (water table wells) or 5-foot (piezometers), flush-threaded 0.010-inch slot, PVC with Schedule 40 (or Schedule 80 if needed) PVC riser.

Wells and piezometers will be constructed pursuant to NR 141 requirements as follows:

The annular space between the well screen and the borehole wall will be backfilled with No. 50 sand and will extend 2 feet above the well screen. Two feet of No. 10 sand will then be placed above the No. 50 sand. The well screen will be set so the water table is near the top of the screen. A 2-foot hydrated pellet bentonite seal will be placed above the filter pack. Above the bentonite seal, a Pure-Gold bentonite grout will be used to the ground surface. A 4-inch diameter steel protective casing will be placed around the PVC riser. Three guard posts will be placed around the well.

Wells will be developed after a minimum of 24 hours has elapsed following the completion of well construction. Well development will consist of pumping the well using a submersible pump. Intermittent surging will be performed, if appropriate, to aid in removal of fine-grained material. Well development will continue until at least five well volumes have been removed and the water being removed from the well has the following characteristics:

1. Water is silt-free.
2. Water temperature is stabilized to ± 0.5 degrees Celsius.
3. pH is stabilized to ± 0.1 units.
4. Conductivity is stabilized to ± 10 percent.

Field instruments will be calibrated before use and the results recorded on Field Meter Instrument Calibration Logs.

5.3.4.4 Decontamination

Soil boring, monitoring well, and piezometer installation equipment will be decontaminated upon arrival on-site and between well locations to avoid the possibility of cross-contamination. Decontamination of drill rigs, vehicles, and other equipment will be accomplished with high-pressure hot-water steam cleaning. Additional scrubbing may be required to remove encrusted material.

Decontamination of the riser, well screens, and end caps will consist of high-pressure hot-water steam cleaning. Workers shall use clean cotton gloves when handling riser and well screen. Decontamination of well development equipment will consist of an external 1) soap and tap water wash; 2) followed by a tap water rinse; 3) an isopropanol rinse; and 4) two rinses with deionized water. The pump will be equipped with a check valve to prevent purged water from flowing back into the well. Wastewater fluids generated during drilling and water removed from the wells during development will be disposed of on the surface at each well location with the exception of well P-2 which will have its water containerized for disposal off-site. Soil samples and rock core will be stored at Village of Grafton facilities. Should any landfill waste be encountered in these boreholes, the waste will be drummed for disposal at an acceptable permitted landfill.

5.3.4.5 Quality Control

Field documentation will undergo an internal QC review after the completion of field activities. Original field forms will be reviewed by the Field Manager or senior technical staff for completeness, accuracy, and compliance with the Work Plan.

5.3.4.6 Documentation

Data collected and observations made during the installation of the monitoring wells will be recorded on the appropriate field forms included in Appendix C. Documentation will include:

1. Daily Time Log.
2. Water Table Well Installation Diagram.
3. Piezometer Installation Diagram.
4. Well Development Form.
5. Field Meter Instrument Calibration Logs.
6. Atmospheric Monitoring Log.

5.3.5 Hydraulic Characterization

5.3.5.1 Introduction

Field hydraulic conductivity tests (slug tests) will be performed and water level measurements will be obtained to determine the hydraulic characteristics of the aquifer.

5.3.5.2 Equipment

Equipment includes the following:

1. Stainless steel slug.
2. Rope or cord.
3. Watch with a second hand.
4. Electric water level indicator, water level popper, or teflon-coated woven tape.
5. Water level data logger with pressure transducer.
6. Data log book.
7. Field documentation forms.
8. Liquinox® detergent.
9. Deionized water.
10. Tap water.

5.3.5.3 Procedures

In-Field Hydraulic Conductivity Testing

Unless multi-level monitoring wells need to be constructed, new wells will be slug tested following development of the wells to determine the hydraulic conductivity of the formation materials near each well. Both falling and rising head tests will be recorded on an In-Field Permeability Form (Appendix C).

The pressure transducer will be lowered below the static water level to a depth which allows the slug to be lowered into the water without coming into contact with the transducer. The maximum transducer depth will be limited by the settings of the data logger and will be addressed when setting up the test. The rising or falling water level produced by dropping the slug into or pulling the slug out of the water will be recorded by a data logging device. A computer program using the Bouwer and Rice (1976) method of slug test analysis will be used to calculate the hydraulic conductivity values.

Water Level Measurements

Water level and well depth measurements will be taken immediately after installation of the new wells, and when private wells are sampled, before and after well development, and during groundwater sampling. Water levels will be collected once during Phase I from monitoring and selected private wells for site characterization purposes. Well integrity will also be noted. Static

water levels will be measured and recorded for estimating groundwater flow directions and gradients at the site. The water level surface will be measured using an electric water level indicator. Each well will have a reference point indicated on the top of the PVC well casing from which water level measurements noted to the nearest 0.01 foot will be taken. A reference point elevation on the well will be established by survey with respect to mean sea level elevation with an accuracy of 0.01 feet.

5.3.5.4 Decontamination

Slugs, bailers, and water level measurement equipment, with the exception of the pressure transducer, will be decontaminated prior to use and at each well location by:

1. Washing with soap and tap water solution.
2. Rinsing with tap water.
3. Rinsing twice with deionized water.

A distilled water rinse only (with no soap and water) will be used to decontaminate the pressure transducer. Decontamination liquids will be collected for proper disposal at a permitted facility.

5.3.5.5 Quality Control

Field documentation will undergo an internal QC review after the completion of field activities. Original field forms will be reviewed by the Field Manager or senior technical staff for completeness, accuracy, and compliance with the Work Plan.

5.3.5.6 Documentation

Data collected and observation made during in-field permeability tests and water level measurements will be recorded on the appropriate field documentation forms (Appendix C). Forms will consist of:

1. Daily Time Logs.
2. In-Field Permeability Form.
3. Water Elevation Form.

5.3.6 Groundwater Sampling

5.3.6.1 Introduction

New monitoring wells and selected private wells will be sampled for analyses listed in Table 4-1. Sampling of the monitoring wells and selected private wells will occur once during Phase I.

5.3.6.2 Equipment

The equipment to be used for groundwater sampling consists of:

- Two-inch diameter Grundfos® pump or equivalent.
- Electric water level indicator, water level popper, or steel tape.
- Field notebook.
- Conductivity meter.
- pH meter and pH 4 and 7 calibration buffer solutions.
- Tap water, deionized water, and ACS isopropanol.
- Five-gallon pail with cover for collecting and storing isopropanol rinses.
- Liquinox® detergent.
- Plastic sheeting.
- Sample containers and preservatives.
- Coolers.
- Ice.
- Plastic containers for transport of sampling equipment to the site.
- Large plastic garbage bags to store used plastic sheeting, etc.
- Thermometer.
- Teflon bailer and cord.
- FID/PID.
- Disposable latex gloves.
- Outer nitrile gloves.
- Disposable outer boots.
- Tyvek® coveralls.

5.3.6.3 Sample Collection Procedures

Monitoring Wells

Prior to groundwater sampling collection, the static water levels in the monitoring wells will be measured and recorded. Once water levels are recorded, wells will be purged in order to collect samples for chemical analysis.

A minimum of five well volumes will be removed from the wells using a submersible pump or bailer. Purge water will be allowed to infiltrate the ground except at well P-2, which will have its water containerized. If recharge rates are insufficient to conduct continuous pumping, the wells will be pumped or bailed dry, and a sample will be obtained after sufficient recharge has occurred to obtain enough volume to fill the sample containers.

Pumps used in the purging process will be fitted with a check valve to prevent purge water from flowing back into the well. During the purging process, selected chemical and physical characteristics of the purge water will be monitored and recorded. These characteristics include turbidity, color, odor, conductivity, pH, Eh, and temperature. Field meters will be calibrated daily according to manufacturer's instructions prior to sampling procedures.

Required purge volumes will be calculated as follows:

- To determine the volume of water to be purged from each well and piezometer, measure the depth to the static water level, and depth to the bottom of the well from the reference measuring point.

- Based on the depth to water, the total depth of the well/piezometer, and the diameter of the well/piezometer, the volume of water standing (well volume) shall be calculated using the following formula:

  1 well volume (gallons) = 3.14 $d^2/4$ x h x 7.48 gallons/ft^3

  Where:

  d = diameter of well (ft)
  h (height of water) = depth to bottom (ft) - depth to water (ft)

Samples will be collected within 24 hours of purging, with the exception of those wells where recovery from the purging process exceeds 24 hours. Groundwater samples will be collected from the wells using a teflon bottom-emptying bailer attached to a nylon cord or submersible pump.

Before pumping begins and after each of the five well volumes is removed, measurements of pH, conductivity, temperature, and turbidity will be recorded on the Well Purging and Sample Collection Form. Pumping should continue until the readings have stabilized to pH $\pm$0.1 unit, conductivity $\pm$10 percent, and temperature $\pm$0.5 degrees Celsius. The total volume of water removed during the purging process will be recorded. The water level will be measured as soon as possible after the pump is removed from the well.

Chemical sampling equipment and bottles will be transported into the field in clean plastic pails. Samples, duplicates, and quality control samples to be collected are listed in Table 4-1. Equipment removed from the pails will be placed on clean plastic sheets in order to minimize contamination from the ground surface. New sheeting will be used for each sampling location. Samples for VOCs will be collected in two 40-ml glass vials with teflon septa. The vials will be filled to the top, leaving no headspace or bubbles, then quickly capped to minimize losses of VOCs.

Samples for metals analysis will be collected in a 50-ml HDPE filtration jug and field filtered. Following field filtering, the samples will be preserved with nitric acid. Performance of field filtering will not be indicated on paperwork accompanying samples to the laboratory. Samples will be stored in coolers containing ice in a secure area until custody is relinquished.

Private Wells

Private wells will be sampled for the same parameters and in the same manner as the previously described groundwater samples unless obstructions or access problems are encountered. Other procedures will be the same as for the well sampling.

5.3.6.4 Decontamination

Field equipment used for collection of groundwater samples will be decontaminated using the following method:

1. Wash with Liquinox®, Alconox®, or other suitable detergent and tap water.
2. A tap water rinse.
3. A.C.S. isopropanol rinse.
4. Two rinses with deionized water.

Isopropanol rinses will be containerized for disposal off-site.

5.3.6.5 Quality Control

In order to verify the absence of contamination in field equipment, a rinsate blank (field blank) will be collected in the following manner after 10 groundwater samples are collected.

1. Field equipment used in groundwater sampling will be decontaminated.
2. Distilled water will be placed in the bailer.
3. Appropriate sample containers will be filled, preserved, and sent to the contract lab for analysis.

In order to assess the degree of accidental contamination by VOCs during the sample collection and shipment procedures, 40-ml volatile vials (trip blanks) will be filled by REI with the deionized water source to be used for field decontamination prior to mobilizing to the site. The filled vials will accompany the empty volatile vials that will be used for sample collection in the field. Two filled 40-ml vials will be packed with the site field samples and sent to the laboratory in each cooler containing groundwater samples for VOC analysis. The trip blanks will be analyzed for VOCs to be able to make a comparison to other VOC analyses in the same cooler. Field documentation will undergo an internal QC review after the completion of field activities. Original field forms will be reviewed by the Field Manager (FM) who will review the field forms for completeness, accuracy, and compliance with the sampling plan.

5.3.6.6 Documentation

Data collected and observations made during groundwater sample collection will be recorded on the field documentation forms, as shown in Appendix C. Documentation will consist of:

1. Daily Time Log.
2. Well Purging and Sample Collection Form.
3. Field Meter Instrument Calibration.

4. Air Monitoring Results.
5. Daily Quality Control Report.

5.4 GAS SAMPLING AND MONITORING PLAN

5.4.1 Introduction

Landfill gas generation will be measured at the leachate/gas wells described in Section 5.2.

To establish the presence of landfill gas in the landfill, the two leachate/gas wells will be monitored once. These wells can, if remediation is required, be connected to a pumping system to extract and treat the landfill gas.

5.4.2 Equipment

1. Combustible gas meter.
2. Oxygen meter.
3. Sensidyne pump and stain tubes or equivalent for selected organic compounds:

    a. Vinyl chloride.
    b. Benzene.
    c. Toluene.
    d. Xylenes.
    e. Hydrogen sulfide.
    f. Mercaptens.
    g. Methylene chloride.
    h. Ethyl benzene.
    i. Trichloroethylene.

4. Pressure meter.
5. Field notebook.
6. Sample pump or aspirator.
7. SUMMA canisters.
8. Liquid level indicator with a minimum 100-foot length.
9. Field notebook and field documentation forms.
10. Camera and film.

5.4.3 Procedures

Samples will be extracted from each well for analysis. The laboratory will analyze the sample for the compounds identified in Table 4-1. SUMMA canisters will arrive at the site with chain of custody papers and will have been decontaminated and evacuated by the contract laboratory. The monitoring technician will complete the chain of custody document and extract the sample employing the following procedures.

The canister, which is evacuated, will be connected to the probe via stainless steel tubing outfitted with compression fittings so as to ensure an airtight connection to the canister and the quick connect sampling port on the probe.

A valve on the canister will be opened slowly (one-fourth turn at a time) to allow the sample to enter the canister. Once the canister is filled, the valve is closed and the sample is forwarded to the contract laboratory for analysis. The chain of custody form will accompany the canister at all times. The canister is full when the vacuum hissing sound has stopped or 60 seconds, whichever is less. Care must be exercised when utilizing evacuated canisters. All fittings must be airtight otherwise dilution might occur.

An alternative sampling method will incorporate a metered sample pump capable of delivering 50 cc/min of volume. The canister will be connected to the probe in the same manner as above, but incorporate a purge valve. The metering sample pump will be turned on and allowed to purge 60 seconds prior to opening the valve to the canister. The canister will be allowed to fill. The valve will then be turned off and the canister shipped to the laboratory for analysis. The chain of custody will accompany the canister at all times.

Landfill gas field monitoring will be performed with a dual range, natural gas indicator that measures concentration as percent by volume methane equivalents. Two ranges of detection will be available; 0 to 5 percent, and 0 to 100 percent methane by volume. A device such as the GAS-TECH® Model NP-204 or equivalent will be used. The combustible gas indicator will also have the option to be equipped with a flexible extension hose and rigid metal or fiberglass 30-inch long probe for bar hole monitoring. The oxygen meter will be an IP-204 Oxygen meter or equivalent and measure concentrations as percent by volume. A pressure meter capable of measuring inches of water column such as Neotronics® PDM-204 or equivalent will be used. The meter will have a scale or selectable scales to 100 inches water column. Liquid levels will be measured.

The oxygen and combustible gas meter will be calibrated at the start and end of each monitoring day. The manufacturer's recommended calibration procedures shall be followed to obtain accurate measurements. Two standards will be used to calibrate the meters. A low concentration standard: methane (2.5 percent), oxygen (17 percent) balance nitrogen; and a high concentration standard: methane (50 percent), carbon dioxide (40 percent), and nitrogen (10 percent).

The combustible gas instrument is not to be used at locations where compounds such as tetraethyl lead or hydraulic fluids or lubricants, which contain salines, silicates or silicones may be present in the atmosphere. These chemicals deaden the sensor and thus reduce measurement accuracy. If it is suspected that such compounds may be present in the test area, check the calibration of the instrument after making a maximum of five measurements.

To effectively monitor the probes, the following procedures will be implemented in the following order:

1. Pressure readings will be obtained. The reading will be logged as positive or negative pressure. The temperature and barometric pressure also should be recorded as well as other pertinent weather conditions.

2. Gas quality measurements will be obtained. A predetermined volume of gas will be purged through the meters via a sample pump or aspirator. After purging, the steady state of continuous measurement will be recorded. The combustible gas meter and oxygen meter can be connected in series or used separately following the same procedure listed above.

   Combustible gas monitoring will be done initially in the high range. If the reading is less than 5 percent, the procedure will be repeated at the low range.

3. Liquid level measurements will be obtained from each extraction well. This data will assist with evaluating the performance of the wells. Liquid levels above the screened interval will render the probe ineffective.

Each well will have a number or letter designation corresponding to site maps prepared for the landfill. This designation must be adhered to when completing the monitoring logs.

A field log will be completed for each monitoring event.

5.4.4 Decontamination

The water level indicator will be decontaminated with deionized water between wells. The decontamination liquids will be discharged to the ground surface.

5.4.5 Quality Control

Meters will be calibrated before and after the start and completion of each day of monitoring. The calibration gas will be a certified standard. Field documentation will undergo an internal QC review after the completion of field activities. Original field forms will be reviewed by the Field Manager who will review the field forms for completeness, accuracy, and compliance with the Work Plan.

The laboratory performing the gas analyses will have a QA/QC program in place and will ensure all QA/QC procedures are followed for the analysis of organic compounds. Canisters will be decontaminated by the contract laboratory and evacuated to a known vacuum prior to shipment to the site for sampling. Trip blanks or duplicates will not be required, however the contract laboratory must have a program in place to conduct periodic testing of decontaminated canisters to ensure quality control and the integrity of the sample canisters.

5.4.6 Documentation

A log of daily monitoring activities will be maintained including liquid levels, pressure measurements, atmospheric conditions, and gas quality (Appendix C).

A log of calibrations will be maintained and a copy of the standard gas concentration certificate shall be incorporated into the records of the monitoring operations.

The appropriate copy of the chain of custody will be retained and placed in the records of site monitoring operations.

5.5 SOIL/WASTE MATERIAL INVESTIGATION

5.5.1 Introduction

The limits of the landfill will be assessed by conducting an EM-31 geophysical survey in both Quarry Nos. 1 and 3. The survey will be completed over the 4- to 5-acre footprint of Quarry No. 1 and the approximately 2-acre footprint of Quarry No. 3. The data generated will be verified by advancement of Geoprobe® borings both inside and outside the limits of waste.

5.5.2 EM-31 Survey

5.5.2.1 Equipment

Equipment required for the geophysical survey will consist of:

- Geonics electromagnetic terrain conductivity meter (EM-31) with digital recorder.
- Portable computer, interface cable, downloading software, and printer.
- Data reduction software.
- Computer contouring software.
- Site base map and aerial photographs.
- Field notebook.
- Brunton compass.
- Spray paint and flagging tape.
- Site survey equipment.

5.5.2.2 Procedures

The electromagnetic survey will be conducted along a site survey grid corresponding to the State Plane Coordinate system. The coordinate system will be staked with wooden lath marked with north and east grid coordinates at 50-foot centers across the survey area. The survey traverse lines will be spaced 25 feet apart and positioned based on the 50-foot grid. Electromagnetic data will be collected at 10-foot spacings along each traverse line.

The electromagnetic terrain conductivity survey data will be collected using a Geonics EM-31 Terrain Conductivity Meter with an investigative depth of approximately 18 feet. The electromagnetic survey will be conducted by a one-person survey crew. The data will be digitally recorded in a data logger and input into a computer on-site for contouring or traverse profile plotting. A base station will be established for functional checks and to monitor instrument performance

during the survey. The base station will be occupied at the beginning, middle, and end of each survey day.

5.5.2.3 Decontamination

No equipment decontamination is required.

5.5.2.4 Quality Control

In the field, digital data acquired during the survey will be evaluated on-site to confirm that reliable data have been collected and to verify that adequate survey area coverage was attained to delineate the configuration of electromagnetic anomalies.

Field documentation will undergo an on-site review for completeness, accuracy, and compliance with the Work Plan.

5.5.2.5 Documentation

Data collected during the survey will be digitally recorded and stored on diskette. Field observations, computer contour plots of field data, field notes, and equipment calibration checks will be recorded in a field notebook.

5.5.3 Soil/Waste Borings

5.5.3.1 Equipment

Equipment and materials used during soil/waste boring activities will include:

1. Geoprobe® rig capable of:
    a. Advancing borings to an approximate 20-foot depth.
    b. Performing continuous sampling using appropriate continuous sampling system.
2. Fiberglass tape of adequate length to measure depth of soil boring.
3. Generator, steam cleaner, and related equipment (to be supplied by the driller).
4. Tap water.
5. Camera and film.
6. Munsell Soil Color Chart.
7. Hardhat, safety glasses, and steel-toed shoes.

5.5.3.2 Procedures

Geoprobe® boring will be performed by a qualified subcontractor under the direction/supervision of a geologist or hydrogeologist who will field screen, visually inspect, classify soils according to USCS, log, and containerize soil samples. The drilling log and geotechnical analysis of select soil

samples will be used to evaluate the physical characteristics of the subsurface material. Sufficient geotechnical analyses for grain size distribution and Atterberg limits will be completed to classify cover soils. Field screening results will provide information on the presence of VOCs in the subsurface. Excess soil from the borings will be left on-site. Waste material encountered will be containerized for disposal/storage.

5.5.3.3 Decontamination

Upon mobilization to the site, and prior to leaving the site, the geoprobe rig, and sampling equipment will be decontaminated by steam cleaning to minimize the potential for cross-contamination. Decontamination liquids will be containerized for disposal off-site.

5.5.3.4 Quality Control

Field documentation will undergo an internal QC review after the completion of field activities. Original field forms will be reviewed by the Field Manager or senior personnel for completeness, accuracy, and compliance with the Work Plan.

5.5.3.5 Documentation

Soil boring information and other observations made by the on-site geologist or hydrogeologist during geoprobe activities will be recorded on the appropriate field forms shown in Appendix C. This will include:

1. Daily Time Logs.
2. Field Log - Soil Borehole.
3. Atmospheric Monitoring Logs.
4. Photographs and Descriptions.

5.6 SAMPLE IDENTIFICATION NUMBERS AND DOCUMENTATION

Each sample will be identified using the identification systems described below. These numbers will be used to complete sample documentation required for sample labels, and Chain of Custody Forms.

5.6.1 Sample Location Identifier

Sample location identifiers will be used on sample labels and Chain of Custody Forms. Sample Location Identifiers consist of the following components.

5.6.2 Project Identification Code

A two-letter designation will be used to identify the site where the sample was collected. The two-letter designation for the Lime Kiln Landfill will be LK.

5.6.3 Sample Matrix and Location Codes

Each sample will be identified by an alpha-code corresponding to the sample medium (or sample type), followed by a sample location code. The alpha-codes are as follows:

FB - Field Blank Sample
GS - Gas Sample
LH - Leachate Sample
MW - Monitoring Well Sample
PW - Private Well
TB - Trip Blank Sample

Field blank samples will have an identification code of FB followed by the appropriate alpha-code for the type of sample (for example, a sediment water field blank will be identified as "FBSD"). Field duplicates will have the appropriate alpha-code for the type of sample and a number which will be designated as a field duplicate number in field notes and the sample logbook.

Examples:

Private Well

LK-PW04 Groundwater sample from private Well 4.

Monitoring Well

LK-MW01 Groundwater sample from monitoring Well 1.

Leachate

LK-LH02 Leachate sample from leachate monitoring/gas extraction Well 2.

Gas

LK-GS02 Gas sample from leachate monitoring/gas extraction Well 2.

NOTE: It is very important for database management purposes that the sample numbers be formatted exactly as shown in the examples.

5.6.4 Sample Labels and Tags

Every sample container that is to be transported to a laboratory for analysis of field samples must have a sample label attached to it. If an error is made in completing the sample label, destroy it, and complete a new one. Refer to Appendix C and complete the sample label as follows:

1. Sample Labels

a. Fill in the Project Name and Project Number for the sampling event.
b. Fill in the date the sample was collected.
c. Fill in the Sample Location. Sample location corresponds to the Sample Number.
d. Initial the label in the "Collected By" space.
e. Write in the analysis (or analyses) that the sample in this container will be used for.

5.7 SAMPLE CUSTODY

The EPA sample custody and chain of custody protocols will be followed as described in "NEIC Policies and Procedures," EPA-330/9-78-001-R, revised June 1985. This custody is in three parts: sample collection, laboratory analysis, and final evidence files. Final evidence files, including all originals of laboratory reports and purge files, are maintained under document control in a secure area.

A sample or evidence file is under custody if it:

- Is in the possession of the sampler/analyst.
- Is in the view, after being in the possession of the sampler/analyst.
- Is in the possession of and then placed in a secured location.
- Is in a designated secure area.

5.7.1 Field-Specific Custody Procedures - Chemical Samples

The sample packaging and shipment procedures summarized below should ensure that samples will arrive at the laboratory with the chain of custody intact.

Field procedures are as follows:

1. The field sampler is personally responsible for the care and custody of the samples until they are transferred or properly dispatched. As few people as possible should handle the samples.

2. All sample containers will be labeled with sample numbers and locations.

3. Sample tags are to be completed for each sample using waterproof ink, unless prohibited by weather conditions. For example, a logbook notation will explain that an ink marker was used to complete the sample tag because the ballpoint pen would not function in freezing weather.

Transfer of custody and shipment procedures are as follows:

1. Samples are accompanied by a properly completed Chain of Custody Form. The sample numbers and locations will be listed on the Chain of Custody Form (Appendix C). When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents transfer of custody of samples from the sampler to another person, to the laboratory, or to/from a secure storage area.

2. Samples will be properly packaged for shipment and dispatched to the appropriate laboratory for analysis, with a separate signed custody record enclosed in each sample box or cooler. Shipping containers will be locked and secured with strapping tape and Rust custody seals for shipment to the laboratory. The preferred procedure includes use of a custody seal attached to the front right and back left of the cooler. The person sealing the cooler should date and sign each custody seal. The custody seals are then covered with clear plastic tape. The cooler is strapped shut with strapping tape in at least two locations.

3. All shipments will be accompanied by the Chain of Custody Form identifying the contents. The original and yellow copies will accompany the shipment and the pink copy will be retained by the sampler for inclusion in the project file.

4. Air bills will be used with samples sent by commercial overnight carriers. The air bill number will be recorded on the custody form. Air bills will be retained as part of the permanent custody documentation. Commercial carriers are not required to sign off on the custody forms as long as the custody forms are sealed inside the sample cooler and the custody seals remain intact. If sent by mail, the package will be registered with return receipt requested.

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APPENDIX A

HEALTH AND SAFETY PLAN

Site-Specific Health & Safety Plan

Village of Grafton Lime Kiln Landfill Investigation

Pepared for:

Lime Kiln Landfill
Village of Grafton

Prepared by:

Rust Environment & Infrastructure
4738 North 40th Street
Sheboygan, WI 53083

October 1997

Rust Environment & Infrastructure

SITE-SPECIFIC
HEALTH AND SAFETY PLAN
FOR
INVESTIGATION, STUDY & DESIGN
VILLAGE OF GRAFTON LIME KILN LANDFILL
GRAFTON, WISCONSIN

Prepared by: Stephen T. Rowe-Krumdick — October 23, 1997

Stephen T. Rowe-Krumdick
Environmental Impact Specialist
Rust Environment & Infrastructure

Date

Prepared by: Joan Underwood/jc — October 21, 1997

Joan Underwood
Project Manager
Rust Environment & Infrastructure

Date

Reviewed by: KURT Rubsam/jc — 10-22-97

Kurt Rubsam
Division Health & Safety Representative
Rust Environment & Infrastructure

Date

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1.0 INTRODUCTION

This site-specific Health and Safety Plan (HASP) has been prepared by Rust Environment & Infrastructure (REI) for the Village of Grafton in accordance with the regulatory requirements of 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response."

The purpose of this HASP is to summarize the project organization and responsibilities; establish Standard Operating Procedures (SOPs) for preventing accidents, injuries, and illnesses; identify hazards, discuss the personal protective equipment that may be used at the site; identify personnel health and safety training requirements; summarize the monitoring techniques to be used; establish emergency procedures; describe the medical surveillance program; identify that appropriate first aid equipment is available; provide for accident reporting; and establish a schedule for safety inspections.

The HASP will be implemented by the Site Safety Officer (SSO) during site work. Compliance with this HASP is required of all personnel who enter this site. Assistance in implementing this plan can be obtained from the REI Region Environmental, Health & Safety Manager (REHSM), and the Corporate Environmental, Health & Safety Director (CEHSD).

Using the HASP Modification Form presented in Appendix C, the content of this HASP may change or undergo revision based upon additional information made available to health and safety personnel, monitoring results, or changes in the technical scope of work. Any changes proposed must be approved by the REHSM or CEHSD.

1.1 SCOPE OF WORK

- Staff Gage Installation/Surface Water Sampling
- Soil Borings/Monitoring Well Installation
- Monitoring Well Development/Groundwater Sampling
- Leachate/Gas Extraction Well Installation
- Landfill Gas Sampling
- Water Level Measurement/Pump Test
- Geophysical Survey

1.2 PROJECT PERSONNEL

Name/Firm	Title	Work Phone	Home Phone
TBD REI	Designated Lead	TBD	
Joan Underwood REI	Project Manager	920-451-2465	920-803-0708

Pam Markelz, CSS, CET REI	Corporate Env., Health & Safety Director	920-451-2775	920-457-4570
Mark Robinson REI	Regional Health & Safety Manager	920-451-2862	920-564-2601
TBD REI	Site Safety Officer	TBD	
TBD REI	Site Safety Officer (Alternate)	TBD	

2.0 ASSIGNMENT OF HASP RESPONSIBILITY

The following describes the health and safety designations and general responsibilities which will be implemented for the Lime Kiln Landfill investigation activities.

2.1 CORPORATE ENVIRONMENTAL, HEALTH & SAFETY DIRECTOR (CEHSD)

The CEHSD is responsible for the development of company safety protocols and procedures necessary for field operations and is also responsible for the resolution of any outstanding safety issues which arise during the site work.

2.2 REGION ENVIRONMENTAL, HEALTH & SAFETY MANAGER (REHSM)

The REHSM has overall responsibility for review and approval of this HASP. The REHSM shall approve any changes to this plan due to modification of procedures or newly proposed site activities.

Health and safety-related duties and responsibilities will be assigned only to qualified individuals by the Project Manager (PM). Before personnel may work on site, a current medical examination and acceptable health and safety training must be approved by the division Safety Representative or the REHSM.

2.3 PROJECT MANAGER

The PM is responsible for having a project-specific HASP prepared, reviewed and approved prior to the start of on-site activities. In addition, the PM is responsible for assigning a qualified SSO and project team members. (Refer to REI General Health & Safety Standard T.00.020, Hazardous Waste Site Training, Appendix A - SSO Qualifications).

2.4 SITE SAFETY OFFICER

The REHSM shall direct the site health and safety efforts through a SSO as needed. The SSO will be responsible for implementing the HASP. The SSO may direct or participate in on-site activities as appropriate when this does not interfere with primary SSO responsibilities. The SSO has stop-work authorization which he/she will execute upon determination of an imminent safety hazard, emergency situation, or other potentially dangerous situations, such as detrimental weather conditions. Authorization to proceed with work will be issued by REHSM in conjunction with the PM after such action.

2.5 SUBCONTRACTORS

Subcontracts may be issued for various tasks including soil boring and monitoring and leachate headwell installation. Other subcontracts may be issued for additional tasks, however, none are anticipated. Subcontractors shall comply with the requirements outlined in this HASP and in accordance with OSHA 29 CFR 1910 and 29 CFR 1926; but, in all cases, subcontractors shall be

responsible for site safety related to or affected by their own field operations (i.e., heavy equipment operations).

3.0 SITE LOCATION AND DESCRIPTION

3.1 LOCATION

The site is located in the SE 1/4 of the NW 1/4 of Section 25, Township 10 North, Range 21 East. The Lime Kiln Landfill site is located within the limits of the Lime Kiln Park located in the limits of the Village of Grafton, Ozaukee County. Lime Kiln Park is located off (SE) of Green Bay Road, just south of the intersection of Falls Road and Green Bay Road (Figure 3-1).

3.2 SITE DESCRIPTION

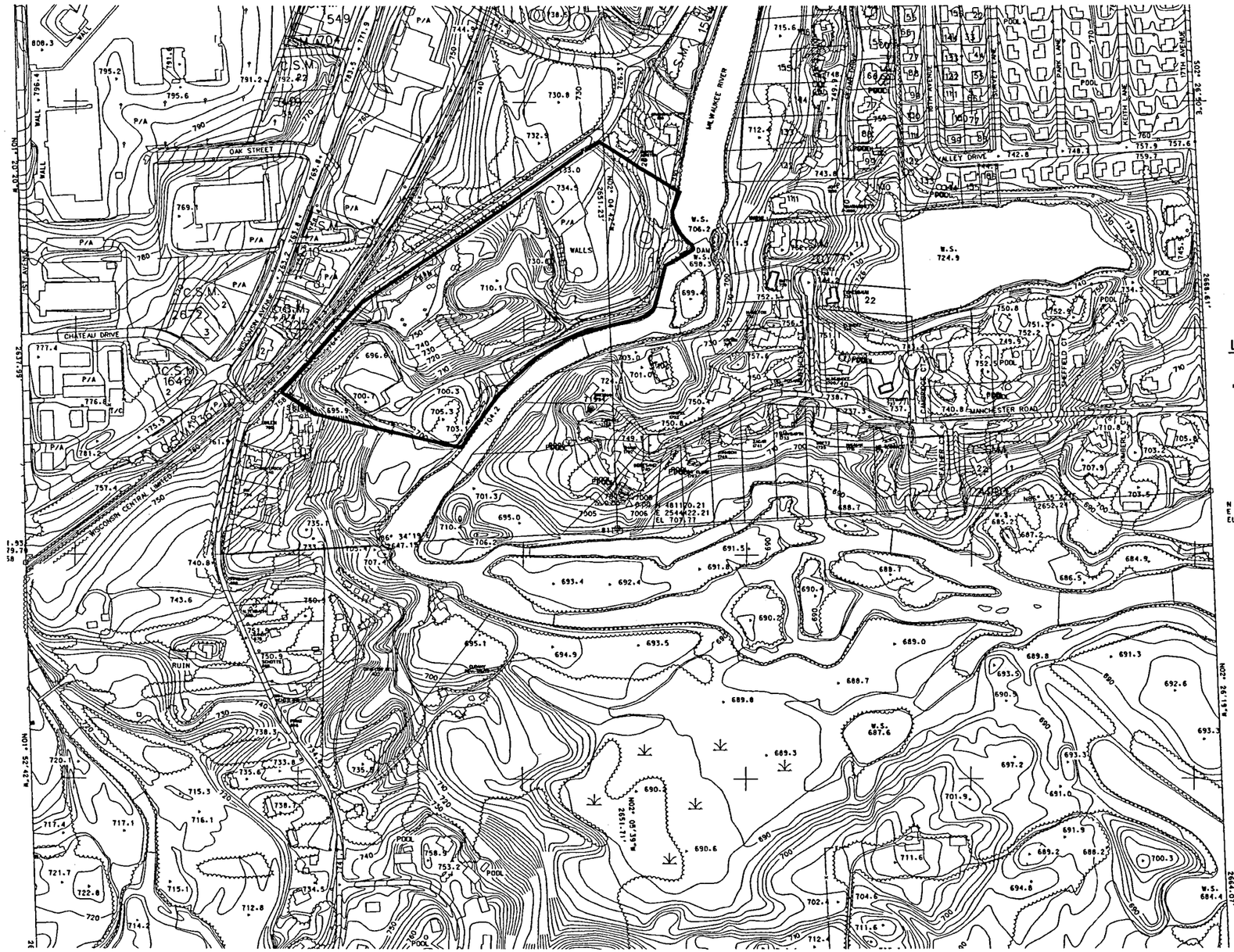
The site is currently a park and was built in an area of three old quarries previously mined for the bedrock dolomite. To differentiate the three quarries at the site, they are numbered 1, 2, and 3 from north to south. Quarry 1 began being used as a disposal site. Disposers of waste would drive up to the quarry face and dump the waste. The site received municipal and commercial waste. It was closed in 1971 and turned into the Lime Kiln Park. The Quarry 1 area is estimated to be approximately 1 to 2 acres based on the 1959 (photo revised 1971 and 1976) USGS map. However, a 1971 air photo shows grading associated with the park development over an area estimated at approximately 4 or 5 acres. A 1935 air photo shows disturbance in an area of about 4 to 5 acres in the Quarry 1 area. Quarry 2 has not been filled, while Quarry 3 shows some surface disturbance, but it is not known whether there was any waste disposed of in the Quarry 3 area.

The site has been closed since 1970 (almost 30 years), which suggests conditions should be steady state. Expected contaminant concentrations in a potential plume should not be changing significantly, and no significant new releases of contaminants from the waste is expected. A slow, declining release of contaminants from the waste as infiltration moves through the waste over time is expected.

An existing municipal well (No. 6) is located in the parking lot of K-Mart and has had historical detections of volatile organic compounds (VOCs). DNR initially said that the Village could not pump this well, but then allowed minimal pumping. When the well is pumped enough, it generates water with increased concentrations of VOCs. This well appears to be upgradient of the Lime Kiln site and, therefore, may indicate that there are other potential sources of contaminants to the groundwater system other than the Lime Kiln Landfill. Compounds which have been detected in Well No. 6 and their NR 140 Preventive Action Limits (PALs), Enforcement Standards (ESs), and maximum concentrations, based on data through March 1997.

Several types of industries are in the area and types of wastes that could be expected to have been disposed at the site include:

1.	Metal stamping	TCE (trichloroethylene), toluene, xylene, lacquer thinner
2.	Tool and die	PERC or PCE (tetrachloroethylene), TCE
3.	Porcelanized, enamel finisher	Unknown
4.	Printed circuits	Acetone, plastic resins, TCE, silver screen process, toluene



LEGEND

LIME KILN PARK PROPERTY BOUNDARY

N

SCALE 0' 125' 250' 500'

RUST

Rust Environment & Infrastructure Inc.

FIGURE 3-1
SITE LOCATION MAP

HEALTH AND SAFETY PLAN
VILLAGE OF GRAFTON
GRAFTON, WISCONSIN

OCT. 1997

101688

5.	Unknown	MEK (methyl ethyl ketone), hydraulic fluids, dry cleaners solvents
6.	Silk screening (paint)	Toluene, acetone, MIBK (methylisobutyl-ketone or 4-methyl 2-pentaonone), methyl amyl ketone, n-propyl acetate, Dowanol® PM glycol ether, Dowanol® EB consolve 100, xylene
7.	Vinyl coated products	MEK
8.	WDNR records	Solvents, volatile solvents (lithograph industry), oils, dieldrin, possible medical wastes (autoclaved serums) from Fromm Laboratories.

4.0 HAZARD ASSESSMENT

4.1 WASTE DESCRIPTION/CHARACTERIZATION

The following chemical information is presented in order to identify the types of materials that may be encountered at the Lime Kiln Park. Detailed information on these materials was obtained from:

- ACGIH, Threshold Limit Values and Biological Exposure Indices for 1994-95.
- Chemical Data Sheets.
- NIOSH Pocket Guide to Chemical Hazards - 1994.

The following is a list of chemicals and compounds that are potentially found on-site. Chemical Data Sheets for each compound listed below, providing information such as the chemical's characteristics, health hazards, protection, exposure limits, and first aid procedures are presented in Appendix A. These chemicals include:

1,2-Dichloroethane	1,1-Dichloroethylene (1,1,-DCE)
Tetrachloroethylene (PCE)	1,2-Dichloroethane
Trichloroethylene (TCE)	Methylene Chloride
Toluene	Chloromethane
Vinyl Chloride	n-Propyl acetate
Xylene	MEK (2-butanone)
Acetone	MIBK (Methyl Isobutyl Ketone)
Dieldrin	Methyl amyl ketone
Dowanol® PM Glycol Ether	Chloroform
Bromodichloromethane	

Waste Types: Liquid X Solid X Gas X
Sludge X Semi-solid _____ Other _____

Characteristics: Corrosive _____ Flammable X
Explosive X Volatile X
Radioactive _____ Inert _____
Other Toxic

Exposure limits for the chemicals of potential concern are presented in Table 4-1 and the tasks, hazards, and control measures are shown in Table 4-2.

TABLE 4 - 1
EXPOSURE LIMITS
LIME KILN LANDFILL

Compound	TLV-TWA (ppm)	TLV-STEL (ppm)	PEL-TWA (ppm)	PEL-STEL (ppm)	IDLH (ppm)	IP ev
1,2-Dichloroethane	10	NL	50	100	NL	NL
1,1-Dichloroethylene (1,1-DCE)	5	20	NL	NL	NL	NL
Tetrachloroethylene (PCE)	25	100	100	200(c)	150	9.32
Trichloroethylene (TCE)	50	100	100	100	1,000	9.45
Methylene Chloride	50	NL	500	1,000(c)	2,300	11.32
Toluene	50	NL	200	300(c)	500	8.82
Chloromethane	50	100	100	NL	2,000	NL
Vinyl Chloride	5	NL	1	5(c)	[ND]	9.99
n-Propyl acetate	200	250	200	NL	1,700	10.04
Xylene	100	150	100	NL	NL	NL
MEK (2-butanone)	200	300	200	300	NL	NL
Acetone	750	1,000	1,000	NL	2,500	9.69
MIBK (Methyl Isobutyl Ketone)	50	75	100	NL	NL	NL
Dieldrin	NL	NL	NL	NL	50 mg/m^3	--
Methyl n-amyl ketone	50	NL	100	NL	800	9.33
Dowanol® PM Glycol Ether[1]	100	150	100	150	ND	--
Bromodichloromethane	NL	NL	NL	NL	NL	NL
Chloroform	10	NL	NL	50(c)	500	11.42

References:

American Conference of Governmental Hygienists (ACGIH) Guide to Occupational Exposure Values - 1996.
TLV - Threshold Limit Value
STEL - Short-Term Exposure Limit
PEL - Permissible Exposure Limit
IP - Ionization Potential
IDLH - Immediately Dangerous to Life & Health
TWA - Time Weighted Average
NIOSH - Pocket Guide to Chemical Hazards, June 1994
[1] Listing is for first ingredient - propylene glycol monomethyl ether
NL - Not Listed
(c) - Ceiling Limit
ND - Not Determined

TABLE 4-2

TASK SPECIFIC HAZARD ASSESSMENT TABLE
LIME KILN PARK

TASK	HAZARD	CONTROL MEASURES
Staff Gage Installation/ Surface Water Sampling	Dermal Contact Slip, Trip, Fall/ Drowning	PPE General Awareness, Shore Sampling, Harness and Lifeline, General Awareness, Waders
Leachate/Gas Extraction Well Installation/Sampling	Slip, Trip, Fall Dermal Contact Inhalation Thermal Stress Toxic/Explosive Atmosphere	General Awareness Flagging, Access Controls PPE Respiratory Protection Work/Rest Cycles, Fluids Continuous Monitoring
Soil Borings/Well Installation	Drill Rig (Heavy Equipment) Dermal Contact Inhalation Thermal Stress Toxic/Explosive Atmosphere	Hard Hat, General Awareness Access Controls PPE Respiratory Protection Work/Rest Cycles, Fluids Continuous Monitoring
Groundwater Well Development/ Sampling and Water Level Measurement/Pump Test	Dermal Contact Inhalation Thermal Stress Slip, Trip, Fall	PPE Respiratory Protection Work/Rest Cycles, Fluids General Awareness
Geophysical Survey	Slip, Trip, Fall	General Awareness
Equipment Decontamination	Dermal Contact Inhalation Thermal Stress Slip, Trip, Fall	PPE Respiratory Protection Work/Rest Cycles, Fluids Access Controls, General Awareness

4.2 DEGREE OF HAZARD

On-site hazards include physical and chemical hazards. No radiological, biological, or laboratory wastes are suspected on-site.

4.2.1 Chemical Hazards

The contaminants of concern at the sites can affect the body if they are inhaled, come in contact with the eyes or skin, or are ingested. These compounds may be released during soil sampling, monitoring well installations, monitoring well development, and well sampling activities. The primary concern is for skin exposure to contaminated soils and potential inhalation of organic vapors or dust released during soil intrusive activities. Exposure to these substances by inhalation (in the breathing zone) is not anticipated due to the relatively low levels found in the soil and water from previous studies.

Atmospheric monitoring, however, will be conducted during all phases of on-site field activities to determine the need for upgrading to appropriate levels of respiratory protection, as found in Section 9.2. Exposure by skin absorption is a low to moderate possibility, but can be prevented by use of proper protective equipment and good hygiene practices. Table 4-1 presents exposure levels for contaminants of concern.

4.2.2 Physical Hazards

Primary physical hazards at the site are those associated with drilling operations. Hazards that could be encountered during subsurface activities include falls and trips, injury from lifting heavy objects, falling objects, eye injuries, head injuries, and pinched or crushed hands and feet. During drilling operations, matting and planking may be needed around the drill rig to provide stability for the drill rig. The drilling contractor will make this decision. REI employees shall not operate subcontractor equipment or handle subcontractor materials and tools, with the exception of subcontractor sampling tools. Also see Section 11.3 Safe Work Practices.

Fire hazards may also be present due to the use of gasoline-powered heavy equipment, and the potential for explosive concentrations of vapors from flammable liquids in subsurface soils or volatile organic compounds associated with exposed wastes. This is especially true when drilling through waste materials. Extra precautions must be taken during the installation of the leachate/gas extraction wells.

Depending on seasonal weather conditions, there is potential for workers on-site to be affected by heat stress or cold exposure. The SSO will monitor for heat stress or cold exposure in accordance with Section 12.6 of this HASP.

Soil boring activities and monitoring well installation provide potential for encountering buried hazards such as utilities. It shall be the subcontractor's responsibility to obtain "clearance" from the local utilities prior to initiating intrusive activities. Overhead electrical lines shall also be identified. If encountered, soil intrusive activities will be halted and the REHSM will be notified.

If dusty conditions exist during soil boring activities, the work zone (WZ) area will be kept wet by spraying the WZ with water to provide dust control.

Noise related to soil boring operations during soil boring and monitoring well installations is expected to be minimal; however, as a precaution, hearing protection will be worn.

Soil, sediment, and surface water sampling activities present the potential for slips and falls associated with wet surfaces and soft unstable sediment surfaces. Sampling from the shoreline of wading into knee deep water in the Milwaukee River during staff gage installation may create the drowning hazard situation. Two workers must be present at the time of the sampling and both must wear life preservers if at least one will be entering the water and conditions warrant. A life belt and lanyard may be worn by the sampler as determined by the SSO. Life preservers are required if sampling is conducted from a boat.

4.2.3 Additional Precautions

Until the final depth has been achieved and the atmospheric monitoring justifies reducing the level of protection, fireproof coveralls should be worn by personnel within the exclusion zone, during installation of the Leachate/Gas extraction wells. A second person with a cellular phone should be located within visual/auditory distance in case of emergency.

4.2.4 Natural Hazards

Natural hazards such as weather, poisonous plants, bites from poisonous or disease-carrying animals and insects (i.e., snakes, ticks), cannot always be avoided. Refer to Section 12.0 for precautions and emergency procedures.

4.2.5 Confined Space Entry

Confined space entry is not anticipated and is, therefore, not addressed in this HASP. If confined space entry is necessary, work will be halted and the REHSM will be notified.

4.2.6 Spill Containment

Field activities associated with this site are unlikely to require spill containment and are, therefore, not addressed in this HASP.

5.0 TRAINING REQUIREMENTS

5.1 BASIC TRAINING REQUIRED

Personnel who are required to work in areas where the potential for toxic exposure exists shall complete training and have site experience conforming to the requirements of 29 CFR 1910.120(e). In keeping with 29 CFR 1910.20, medical records and exposure records will be available to workers or his/her designated representative upon request.

Training includes a 40-hour course which describes procedures for working at hazardous waste sites. The procedures include a safety and health program, medical surveillance, decontamination, site characterization and analysis, protective clothing and monitoring equipment, site control work documentation, emergency response, engineering and administrative control to reduce exposure, and site safety evacuation procedures.

Contractors/subcontractors shall provide written documentation that these training/experience requirements have been met. Personnel shall also be trained in the contents of Appendix B, "Respiratory Protection Program."

5.2 SITE-SPECIFIC TRAINING

Site-specific training will be conducted by the SSO for on-site personnel and visitors to minimize exposure to potential of on-site hazards. Site-specific training will address the activities, procedures, monitoring, and equipment for the field operations.

This training at a minimum will include the following:

1. Site description and history.
2. Project activities, including coordination with other contractors.
3. Hazard evaluation.
4. On-site safety responsibilities.
5. Site control and WZs.
6. Personnel training.
7. Medical monitoring.
8. Atmospheric monitoring.
9. Personal protection, clothing, and equipment.
10. Decontamination procedures.
11. Emergency procedures.
12. Review of site-specific material safety data sheets (MSDSs).
13. Safe work practices.
14. Other elements covered in this site-specific HASP.

This training will also allow field workers to clarify anything they do not understand and to reinforce their responsibilities regarding safe operations. Training must include emergency preparedness,

location of assembly areas, proper entry and exit procedures for exclusion zone (EZ), warning systems, location of emergency equipment, and route to the hospital.

5.3 SAFETY BRIEFINGS

Project personnel will be given briefings by the SSO on a daily or as-needed basis to further assist site personnel in conducting their activities safely. Briefings will be provided when new activities are to be conducted, changes in work practices must be implemented due to new information made available, or if site or environmental conditions change. Briefings will also be given to facilitate conformance with prescribed safety practices when performance deficiencies are identified during routine daily activities or as a result of safety audits.

5.4 SAFETY AUDITS

The REHSM or CEHSD or designee, as necessary, may conduct safety audits of field operations and subcontractor performance to review for compliance with health and safety policies and procedures. Health and safety audit findings will be documented and corrective action taken.

5.5 FIRST AID AND CPR

At least two individuals on-site (can include the subcontractors) shall be trained and qualified to administer first aid and cardiopulmonary resuscitation (CPR).

The SSO will identify the individuals possessing this training in order to ensure that emergency treatment is available during every workshift from a person qualified in first aid and CPR. These courses will be consistent with requirements of the American Red Cross and/or American Heart Association.

6.0 MEDICAL SURVEILLANCE PROGRAM

All REI personnel and subcontractors performing field work at the Lime Kiln Landfill will be required to have passed a pre-assignment and/or periodic medical examination that is consistent with 29 CFR 1910.120(f). Medical examinations shall be performed by or under the supervision of a licensed physician, preferably one knowledgeable in occupational medicine. A release for work will be confirmed by the REHSM before an employee can begin hazardous site activities.

Additional medical testing may be required by the REHSM in consultation with the company physician and CEHSD if an overt exposure or accident occurs, or if other site conditions warrant further medical surveillance.

Contractors/subcontractors will maintain the medical records for their own employees, but shall also provide the SSO with written documentation certifying that each employee at the site has met the requirements of the Medical Surveillance Program. This documentation will be provided before the first day of work for each employee assigned to the site. The pre-assignment and annual examinations are essentially the same in content and are the examining physician's discretion but generally include:

- An updated medical and occupational history
- A screening physical examination
- Blood and urine laboratory tests
- Chest X-ray
- Electrocardiogram
- Pulmonary function tests
- Audiometry
- Visual acuity test

At the end of employment or if deemed necessary after a employee's involvement in project-specific site work, he/she may have to complete a medical examination. This examination may be limited to obtaining an internal medical history of the period since the last full examination (consisting of medical history, physician examination, and laboratory tests).

6.1 JOB EXPOSURE REPORT

A Job Exposure Report must be completed at the end of the project for each REI employee who participated in on-site field activities. The Job Exposure Report must be submitted to the REHSM who will route it to the employee's medical record.

7.0 SITE CONTROL MEASURES

The purpose of the site control measures discussed in this section are to maintain order at the sites and to minimize chemical and physical hazards to on-site personnel, visitors, and the public. Site control zones will include an EZ, a contamination reduction zone (CRZ), and a support zone (SZ). In addition, temporary activity-specific WZ s will be established at specific locations.

7.1 SITE ACCESS

The site is a park that is accessed from South Green Bay Road to the north. There is an access drive that encompasses the periphery of the site and two parking areas (see Figure 3-1). Certain roads on-site may be blocked using cones if necessary to protect the public.

7.2 EXCLUSION ZONE

The EZ is the area containing or suspected of containing contaminated materials. Since investigation activities will be conducted throughout the project site, each investigative area boundary shall be delineated as the EZ.

7.2.1 Work Zones

Temporary activity-specific WZ s shall be established at each sampling activity. While completing soil borings, leachate/gas extraction and monitoring well installations the WZ shall be established and marked by safety rope or tape. The WZ shall be a radius large enough to encompass the drill rig and allow sufficient space for safe work practices. During initial leachate/gas extraction well drilling, the WZ will be extended due to the potential for explosive atmospheres. A CRZ shall be placed at the WZ perimeter at an upwind location. A portable eye wash unit, fire extinguisher, towels, plastic garbage bags, decontamination supplies, and a first aid kit (sufficient to accommodate the field team) shall be placed in this CRZ. These supplies may be located in the vehicle parked adjacent to the WZ.

A temporary WZ shall be established at each sampling location where water level testing, pump testing, and groundwater samples are to be collected. These WZ areas shall be established by laying a sheet of plastic sheeting next to the sampling location for the placement of equipment and supplies. A portable eye wash, first aid kit (sufficient to accommodate the field team), towels, plastic garbage bags, fire extinguisher, and decontamination supplies are also required in this area, which may be located in the truck.

7.3 PERSONNEL DECONTAMINATION

Personnel decontamination areas will be established on-site. Personnel will decontaminate and/or dispose of soiled protective clothing (i.e., disposable boots and gloves, etc.) in the CRZ established next to the temporary WZ. A fixed personnel decontamination area will be established adjacent to the fixed equipment decontamination pad where, after equipment decontamination, personnel can

decontaminate and dispose of protective clothing and equipment before exiting the EZ. Refer to Section 10 for further decontamination procedures.

7.4 EQUIPMENT DECONTAMINATION PAD

To prevent off-site transport of contamination, the drill rig and associated equipment and vehicles will be decontaminated at a decontamination pad prior to exiting the EZ. This location will be selected by the SSO and Field Team Leader prior to start-up of field activities at the project site. Drill equipment (augers, rods, etc.) will be steam-cleaned at the decontamination pad as necessary. Decontamination liquids will be allowed to infiltrate into the soil. Refer to Section 10.0 for further decontamination procedures.

Sampling equipment such as stainless steel hand augers, bowls, and spoons may be decontaminated at each sampling location. During decontamination, isopropanol rinses will be collected for later disposal at an approved location. Other decontamination liquids will be allowed to infiltrate into the soil at each location. Refer to Section 10 for further decontamination procedures.

7.5 SUPPORT ZONE

The SZ is considered the uncontaminated area and will be identified by the SSO before field activities begin. It will contain the Command Post which will provide for team communications and emergency response. A mobile telephone will be located in this area. Appropriate sanitary facilities, safety, medical, and support equipment will be identified. No potentially contaminated personnel or materials are allowed in the SZ except for appropriately packaged/decontaminated and labeled samples.

7.6 SITE VISITORS

Visitors are required to report to the SSO prior to accessing the sites, although none are anticipated. The SSO will document decisions regarding their access to the sites. If granted limited access, visitors must provide the SSO with documented compliance with Section 5.0 of this HASP, comply with other applicable sections, and satisfy additional conditions placed on them as deemed appropriate by the SSO to ensure visitor safety. Visitors must sign in and out daily under the SSO's direction for the duration of their approved visit. Under no circumstances will visitors be allowed to interfere with, or participate in operations within the scope of the field investigation. All visitors shall be escorted throughout the sites by appropriately trained personnel.

As needed, the SSO will establish a designated Level D area as an observation point during intrusive activities. This designated area will be located to offer proximate viewing of site operations, and positioned such that visitors in no way may inhibit site access, logistics, or general operations. Further, the SSO will locate the viewing areas such that visitors present are at minimal risk of exposure to site hazards.

8.0 PERSONAL PROTECTIVE EQUIPMENT

8.1 GENERAL

The level of protection to be worn by field personnel will be defined and controlled by the SSO. Personal protective equipment for general operations will be consistent with the requirements of 29 CFR 1910 Subpart I, "Personal Protective Equipment." Basic levels of protection for hazardous waste operations will be selected in accordance with the provisions of 29 CFR 1910.120(g)(3), "Personal Protective Equipment Selection," and Appendix A, "General Description and Discussion of the Levels of Protection and Protective Gear." Modification to basic protective equipment ensembles may be necessary for specific operations. In these cases, further definition will be provided by review of specific hazards, conditions, and proposed operational requirements, and by conducting air monitoring at the particular operation. Protection may be upgraded or downgraded, as deemed appropriate by the SSO and verified by the REHSM.

8.2 ANTICIPATED LEVELS OF PROTECTION FOR SITE OPERATIONS

• Staff Gage Installation/Surface Water Sampling	Level D
• Geophysical Survey	Level D
• Soil Boring/Monitoring Well Installation	Level D/C
• Monitoring Well Development/Groundwater Sampling	Level D/C
• Leachate/Gas Extraction Well Installation/Sampling	Level D/C/B*
• Water Level Measurement/Pump Test	Level D/C

Action levels used to determine the need to upgrade or downgrade the levels of protection are described in Section 9.2 of this HASP.

Level D personal protective clothing and equipment includes:

- Disposable Tyvek coveralls. (Polyethylene Coated Tyvek required in sampling areas when splashing by contaminated soils or water is a possibility).
- Hardhat (when overhead hazards exist).
- Safety glasses or goggles.
- Steel toe, steel shank boots.
- Disposable latex gloves - required when handling and collecting soil, water, sediment, and tissue samples.
- Outer neoprene gloves - required when handling and collecting soil, water, sediment, and tissue samples.

- Disposable outer boots - required.
- Noise protection - as warranted.

Modified Level D protective clothing and equipment includes:

- Work uniform.
- Tyvek disposable coveralls.
- Polycoated disposable Tyvek coveralls - required for Modified Level D in sampling areas when splashing by contaminated soils or water is a possibility.
- Hardhat - required during drilling, heavy equipment operation, and when other overhead hazards exist.
- Safety glasses or goggles.
- Steel-toe, steel-shank boots.
- Disposable latex/vinyl gloves.
- Outer nitrile/neoprene gloves.
- Disposable outer boots. Rubber steel-toed boots can be worn but must be decontaminated between locations and prior to leaving the site.
- Noise protection, as warranted.

Level C protective clothing and equipment includes:

- Full-face air-purifying respirator National Institute for Occupational Safety & Health (NIOSH), Mining Safety and Health Administration (MSHA) approved fitted with acid gas/organic vapor/HEPA (High Efficiency Particulate Air Filter) cartridges.
- Disposable Tyvek coveralls. (Polyethylene Coated Tyvek required in sampling areas when splashing by contaminated soils or water is a possibility). [*Note: Fireproof coveralls to be worn during initial drilling at the Leachate/Gas Extraction well locations.]
- Disposable latex inner gloves.
- Nitrile outer gloves.
- Hard hat (when overhead hazard exists).

- Steel toe, steel shank boots.

- Disposable outer boots.

Level B protective clothing and equipment includes the above Level C clothing with the addition of a self-contained breathing apparatus (SCBA) or supplied air-line respirator in place of an air-purifying respirator. If action levels are exceeded and based on evaluation of the conditions, and Level C protection is not sufficient and Level B respiratory protection is deemed necessary, work activities will be halted and arrangements for Level B equipment will be implemented.

The use and care of respiratory protection will be in accordance with the protocols described in Appendix B.

9.0 AIR MONITORING AND ACTION LEVELS

9.1 GENERAL

It will be necessary to monitor the atmospheric conditions during on-site field sampling activities to determine the possible need to upgrade the personal protection of on-site workers. Atmosphere at the sample extraction point, soil cuttings, and fluids produced during drilling shall be monitored. In addition, air monitoring will be performed in the worker's BZ.

9.1.1 Geophysical Survey/Surface Water Sampling/Staff Gage Installation

Geophysical survey, surface water sampling, and staff gage installation activities shall be conducted in Level D personal protection unless site conditions warrant an upgrade of the level of protection based on site conditions. Level D personal protective equipment selection is addressed in Section 8.0. While conducting these activities, a PID/FID is not anticipated to be needed due to non-intrusive soil activities. A Modified Level D (i.e., with Tyvek coveralls) may be used.

9.1.2 Soil Boring Operations

These activities shall be initiated in Modified Level D protection with the contingency to upgrade the level of protection based on the action levels.

Monitoring shall be performed continuously during the drilling activities. A flame ionization detector or photoionization detector shall be used to monitor the BZ, the borehole, and all geological samples upon their retrieval. Drill cuttings and fluids produced during drilling shall also be monitored. A Combustible Gas Indicator (CGI) equipped with an oxygen alarm shall be used to monitor the borehole for the presence of combustible gases. Any soil cuttings or fluids produced during drilling shall also be monitored using a PID and/or FID.

9.1.3 Soil Boring Operations/Monitoring Well Installations

Soil boring, and well installation activities will be initiated in Modified Level D personal protection with the contingency to upgrade the level of protection based on the action levels.

Air monitoring will be performed continuously throughout soil boring and well installation activities. A Flame Ionization Detector (FID) or Photoionization Detector (PID) shall be used to monitor the worker's BZ and the geologic samples upon retrieval. Drill cuttings and fluids produced during drilling shall also be monitored. A Combustible Gas Indicator (CGI) equipped with an oxygen alarm will be used to monitor the borehole for the presence of combustible gases.

9.1.4 Monitoring Well Development, Groundwater Sample Collection, Water Level Measurement, and Pump Test

Monitoring well development, groundwater sample collection, water level measurement, and pump test activities shall be initiated in Modified Level D personal protection with the contingency to upgrade the level of protection based on the action levels.

The PID/FID shall be used to continuously monitor the worker's BZ and the well casing during well installation. Prior to initiating development, testing, or sampling activities, the field team will stand upwind of the well casing and remove the well cap, stand back, and allow the well casing to vent for about 5 minutes. If action levels are not exceeded in the worker's BZ, development, testing, and/or sampling activities may proceed.

9.1.5 Leachate/Gas Extraction Well Installation/Sampling

The activities shall be initiated in Level C personal protective equipment (see Section 9.1) with the contingency to upgrade or downgrade the level of protection based on the action levels. The PID/FID and CGI shall be used to continuously monitor the worker's BZ and the well casing during well installation. If action levels are exceeded on the PID/FID. Work will stop immediately to allow the area to vent and work will begin only after levels return below the BZ action level. Continuous air monitoring shall be conducted in the immediate WZ to determine if the WZ is of sufficient size. If action levels are exceeded on the CGI, work will stop immediately to allow the casing to vent and work will begin only after levels return to 0 percent. If venting does not alleviate the problem, the SSO will determine the next course of action with the REHSM and the Division Health & Safety Representative. If action levels are not exceeded upon reaching the bottom of the well casing, personnel may downgrade to the appropriate level of protection determined by the SSO in conjunction with the REHSM or the Division Health & Safety Representative.

Site personnel engaged in the leachate/gas extraction well installation may encounter drums and other wastes; contaminated soils, water, or dust; and toxic, flammable or explosive vapors, or gases. Such occurrences may lead to exposure via inhalation, ingestion, or skin absorption.

Field crews in the immediate proximity of the drill rig face risk of injury caused by operator error and equipment malfunction. Personnel in close proximity to the drill rig must maintain ongoing communication with the operator to avoid potential problems.

9.2 ACTION LEVELS

Instrumentation will include a photoionization detector (PID) equipped with a 11.7 eV lamp and/or a flame ionization detector (FID). A combustible gas indicator (CGI) will be used to monitor for combustibles. The action levels in this HASP will apply to site work during the duration of activities at the project site.

Instrument	Action Levels	Level of Respiratory Protection/Action
PID/FID	Continuous sustained readings to 1 ppm above background (typically to 0.2 ppm) in BZ	Level D
PID/FID*	Continuous sustained readings of 1 ppm to 5 ppm above background	Level C (based on identification of contaminant)
PID/FID	Continuous readings at 5 to 250 ppm above background in BZ	Level B (if applicable)
CGI	<10% LEL	Proceed with caution
CGI	Greater than 10%	Cease work, vent, begin work only after levels return to 0%

If visible dust is detected while working in Level D, upgrade to Level C respiratory protection is required. However, engineering controls, such as wetting the WZ area with water to control dust, will be implemented when feasible.

*In the event any action levels are exceeded, work activities shall be halted, and an attempt will be made to identify the contaminants present using colorimeter indicator tubes so that correct respiratory protection can be selected and action levels may be adjusted higher or more conservatively. The SSO shall notify the REHSM immediately prior to upgrading the level of respiratory protection.

9.3 EXPOSURE MONITORING/AIR SAMPLING PROGRAM

9.3.1 Personal and Perimeter Monitoring

Personal and perimeter air monitoring will not be conducted unless Level D action levels are exceeded in the EZ. The determination to perform personal and perimeter air monitoring will be determined by the REHSM after discussions with SSO. If an air monitoring program is deemed necessary, work activities will be halted and a monitoring plan will be developed.

9.4 INSTRUMENT CALIBRATION AND MAINTENANCE

Instrument calibration and maintenance shall be performed according to manufacturer's specifications and documented on Field Instrument Calibration Logs or Field Log Books. PID calibration shall be completed along with a FID calibration check on a daily basis. Combustible

gas/oxygen meters shall be calibrated according to manufacturer's recommended frequency (i.e., daily or weekly).

10.0 DECONTAMINATION PROCEDURES

The SSO shall determine the level of decontamination necessary based on the evaluation of specific work activities and the potential degree of contamination. Temporary CRZs shall be established at each sampling location.

10.1 EQUIPMENT

The drill rig, associated equipment, and vehicles will be decontaminated at a location on-site selected by the SSO prior to start-up of field activities in the EZ. Drilling equipment (augers, rods, etc.) will be steam-cleaned between sampling locations. These decontaminations will be performed on the ground away from the drilling location.

Non-disposable sampling equipment will be decontaminated before use, between samples, and before leaving the sampling location.

Equipment that cannot be immersed in soap solution and water will be wiped clean and rinsed with distilled water.

10.2 PERSONNEL

Personnel will perform decontamination in the personal decontamination area. Decontamination of personnel in Level D will consist of removal and disposal of coveralls (when worn) disposable boots, and gloves. Decontamination of personnel using Level C protective equipment will consist of:

- Washing boots, waders, or other non-disposable protective equipment (i.e., hard hat, safety glasses/goggles, etc.) suspected of being contaminated using soap solution followed by potable or distilled water rinse.
- Removal and disposal of boot covers and waders if worn.
- Removal and disposal of coveralls.
- Removal and disposal of outer gloves.
- Removal, cleaning, and storage of respiratory equipment.
- Removal and disposal of inner gloves.

10.3 CONTAMINATION PREVENTION

One of the most important aspects of decontamination is the prevention of contamination. Good contamination prevention should minimize worker exposure and help ensure valid sample results by precluding cross-contamination. Procedures for contamination avoidance include:

Personnel

- Know the limitations of all personal protective equipment being used.
- Do not walk through areas of obvious or known contamination.
- Do not handle or touch contaminated materials directly. Do not sit or lean on potentially contaminated surfaces.
- Make sure all personal protective equipment has no cuts or tears prior to donning.
- Fasten all closures on suits, covering with tape, if necessary.
- Particular care should be taken to protect any skin injuries.
- Stay upwind of airborne contaminants.
- Do not carry cigarettes, gum, food, or candy into contaminated areas.
- On-site personnel are encouraged to shower at the end of their work day.

Sampling/Monitoring

- Cover instruments with clear plastic, leaving openings for sampling ports, and sensor points.
- Bag sample containers prior to placement of sample material into containers.

Heavy Equipment

- Care should be taken to limit the surface area of equipment that comes into contact with contamination.

General

- If contaminated tools are to be placed on noncontaminated equipment for transport to the decontamination pad, plastic should be used to keep the equipment clean.
- Spoils from sampling work should be placed so as not to be in the expected paths of individuals.

10.4 DISPOSAL PROCEDURES

Waste materials and other field equipment/supplies shall be handled in such a way as to preclude the potential for spreading contamination, creating a sanitary hazard, or causing litter to be left on-site.

11.0 GENERAL SAFE WORK PRACTICES AND COMMUNICATIONS

11.1 SAFETY EQUIPMENT

Basic emergency and first aid equipment will be available at each CRZ, as appropriate. This shall include communications equipment, first aid kit (sufficient to accommodate field team), emergency eye wash, and other safety-related equipment. Fire extinguishers will be provided, inspected, and available on-site.

11.2 COMMUNICATIONS

Walkie Talkies - Hand-held units shall be used as much as possible by field teams for communication between two on-site personnel where appropriate.

Telephones - A mobile telephone will be located in at least on REI vehicle for communication with emergency support services/facilities.

Hand Signals - Hand signals will be used by downrange field teams in conjunction with the buddy system. These signals are very important when working with heavy equipment. They shall be known by the entire field team before operations commence and reviewed during site-specific training.

Signal	Meaning
Hand gripping throat	Out of air; can't breathe
Grip partner's wrist	Leave area immediately; no debate
Hands on top of head	Need assistance
Thumbs up	OK; I'm all right; I understand
Thumbs down	No; negative

11.3 SAFE WORK PRACTICES

The following safe work practices will be implemented during site operations:

- Only properly trained and equipped personnel will be allowed to work in potentially contaminated areas.
- The number of personnel and equipment in the sampling areas will be kept to a minimum, consistent with safe site operations.

- Workers shall adhere to the "buddy system" while working downrange and in designated EZs. Radio contact shall be maintained between pairs on-site in order to assist each other in case of emergencies.

- Workers shall not exit EZ s until soiled equipment and clothing have been removed and decontaminated or properly disposed of.

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer, ingestion, and inhalation of potentially contaminated materials is prohibited.

- As necessary, personnel will thoroughly wash their hands and faces upon leaving the investigation areas.

- Contact with potentially contaminated materials and surfaces shall be avoided. Personnel shall comply with contamination control measures.

- Personnel with facial hair or other face piece seal obstructions will not be permitted to work where respirators are required.

- Work shall only be conducted if adequate illumination is provided, i.e., visual observation is not impaired due to loss of daylight conditions.

Drilling

While the drilling subcontractor is responsible for safe means and methods of operating their drill rigs, (refer to Section 2.5 of this HASP), personnel working near drill rig operations shall be aware of the following safe work practices:

- Drillers shall inform personnel working with drill rig activities, (i.e., soil boring operations) as to the location of the emergency stop device.

- No drilling within 20 feet in any direction of overhead power lines will be permitted. The locations of all underground utilities must be identified and marked prior to initiating any subsurface activities.

- In the event the drill rig would come in contact with an electrical source, do not touch any part of the equipment or attempt to enter or leave it. Do not touch any person who may be in contact with electrical current. If rescue is attempted, only use a dry, clean rope or unpainted wooden pole.

- Personnel must develop hand signals with equipment operators.

- A remote sampling device must be used to sample drill cutting if the tools are rotating or if the tools are readily capable of rotating. Samplers must not reach into or near the rotating

equipment. If personnel must work near any tools which could rotate, the driller must shut down the rig prior to initiating such work.

- Drillers, helpers, and samplers must secure all loose clothing when in the vicinity of drilling operations.

- "All" compressed gas cylinders must be stored and used in an upright position, properly secured and protected from damage, and segregated and labeled as empty, full, or in use.

- A remote sampling device will be used to sample the Milwaukee River if site conditions dictate that traditional methods cannot be accomplished safely.

12.0 EMERGENCY PREPAREDNESS

12.1 EMERGENCY COORDINATOR

The Site Emergency Coordinator shall be the SSO. The SSO shall verify appropriate emergency contacts before beginning work on-site.

EMERGENCY PHONE NUMBERS:

The 911 response system is in operation in Ozaukee County

Police Department: 911
Fire Department: 911
Hospital: 414-243-7373 St. Mary's Ozaukee County Emergency
Hospital Address: 13111 North Port Washington Road, Mequon, WI
Ambulance: 911

National or Regional Sources of Assistance:

Corporate Environmental, Health & Safety Director: 920-451-2775

Region Environmental, Health & Safety Manager
EPA (RCRA-Superfund Hotline): 800-424-9346

Chemtrec (24 Hours): 800-424-9300

Bureau of Explosives (24 Hours): 202-293-4048

Centers for Disease Control (Biological Agents): 404-633-5313

National Response Center (NRC): 800-424-8802

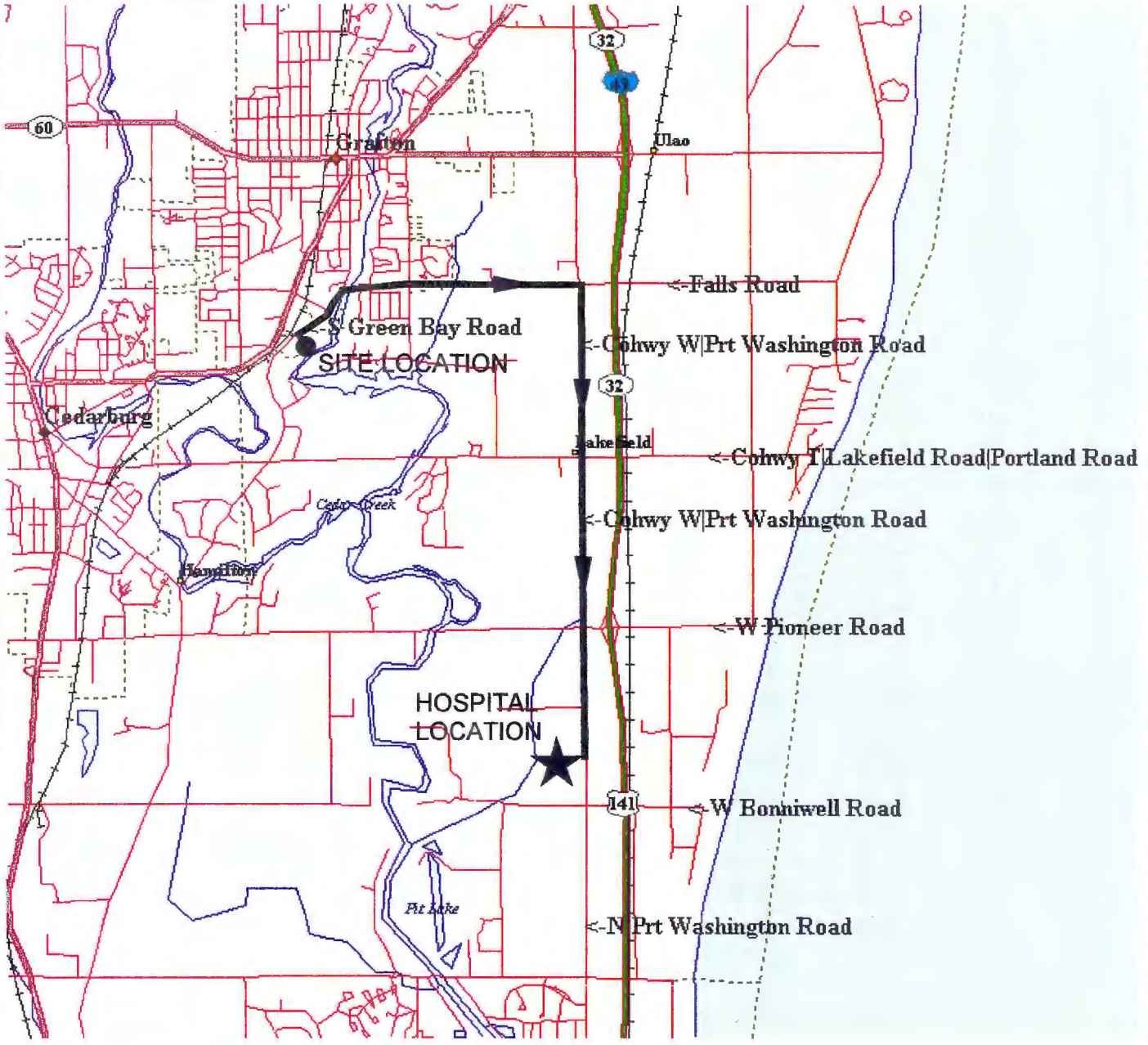
WisDOT (Office of Hazardous Operations): 202-426-0656

WisDOT (Regulatory Matters): 202-426-2075

U.S. Coast Guard (Major Incidents): 800-424-8802

Pesticide Health Hotline: 800-858-7378

EMR Inc. (REI Medical Provider) Dr. Elayne Theriault: 800-229-3674



HOSPITAL ROUTE: ST. MARY'S OZAUKEE

From the site entrance, take a right onto S. Green Bay Road. Take a right on Falls Road. Proceed north/east on Falls Road over the Milwaukee River and proceed east approximately 1½ miles to Port Washington Road. Take a right on Port Washington Road and proceed south approximately 2¾ miles. St. Mary's Hospital Ozaukee will be on the right (west) side of the road (approximately ¾ mile south of Pioneer Road).

ADDRESS:

13111 N. Port Washington Road
Mequon, WI

PHONE: 414-243-7373

N

0' 0.5' 1'
APPROX. SCALE

RUST

Rust Environment & Infrastructure Inc.

FIGURE 12-1
HOSPITAL ROUTE MAP

OCT. 1997

LIME KILN LANDFILL
VILLAGE OF GRAFTON, WI

101688

HOSPITAL ROUTE:

From the site entrance, take a right onto South Green Bay Road. Take a right on Falls Road. Proceed north/east on Falls Road over the Milwaukee River and proceed east approximately 1-1/2 miles to Port Washington Road. Take a right on Port Washington Road and proceed south approximately 2-3/4 miles. St. Mary's Hospital Ozaukee will be on the right (west) side of the road (approximately 3/4-mile south of Pioneer Road).

Once the SZ is established, and before field activity start-up, the Site Emergency Coordinator (i.e., the SSO) shall drive the route to the hospital, post directions and/or a map to the hospital, and set up the first aid station including a 10-pound Type A/B/C fire extinguisher.

12.2 IMPLEMENTATION

The Site Emergency Coordinator (SSO) shall implement the emergency action procedures whenever conditions at the site warrant such action. The Site Emergency Coordinator (SSO) will be responsible for coordinating the evacuation, emergency treatment, and emergency transport of site personnel as necessary, and for notification of emergency response units and the appropriate management staff. In the event an evacuation is necessary, the SSO will take a role count at the designated gathering location with the use of the daily sign in and out sheet. The following conditions may require implementation of emergency action procedures:

- Fire or explosion on-site.
- Serious personal injury.
- Release of hazardous materials, including gases or vapors at levels greater than the maximum use concentrations of respirators.
- Unsafe working conditions, such as inclement weather.

12.3 FIRE OR EXPLOSION

If an actual fire or explosion has taken place, emergency steps will include 1) evacuation of work area and venting, and 2) notification of the fire department and other appropriate emergency response groups if necessary.

12.4 PERSONAL INJURY

Emergency first aid will be administered on-site as appropriate. Then the individual will be decontaminated if possible, depending on the severity of the injury, and transported to the nearest medical facility if needed.

12.5 OVERT CHEMICAL EXPOSURE

Typical response procedures include:

SKIN CONTACT: Use copious amounts of cleaner and water. Wash/rinse affected area thoroughly, then provide appropriate medical attention. Eye wash will be provided on-site at the CRZ and/or SZ. Eyes should be rinsed for 15 minutes upon chemical contamination.

INHALATION: Move to fresh air and/or, if necessary, decontaminate/transport to hospital.

INGESTION: Decontaminate and transport to emergency medical facility.

PUNCTURE WOUND OR LACERATION: Decontaminate and transport to emergency medical facility. The SSO will provide medical data sheets to medical personnel as requested.

12.6 ADVERSE WEATHER CONDITIONS

In the event of adverse weather conditions, the SSO will determine if work can continue without endangering the health and safety of field workers. Some items to be considered before determining if work should continue are:

- Potential for heat stress and heat-related injuries.
- Potential for cold stress and cold-related injuries.
- Treacherous weather-related working conditions (i.e., mud, ice, rain).
- Limited visibility.
- Potential for electrical storms.

12.6.1 Heat Stress

The SSO shall visually monitor personnel to note for signs of heat stress. Field personnel will also be instructed to observe for symptoms of heat stress and methods on how to control it. One or more of the following control measures can be used to help control heat stress:

- Provide adequate liquids to replace lost body fluids. Personnel must replace water and salt lost from sweating. Personnel must be encouraged to drink more than the amount required to satisfy thirst. Thirst satisfaction is not an accurate indicator of adequate salt and fluid replacement.

- Replacement fluids can be commercial mixes such as Gatorade.

- Establish a work regime that will provide adequate rest periods for cooling down. This may require additional shifts of workers.

- Cooling devices such as vortex tubes or cooling vests can be worn beneath protective garments.
- Breaks are to be taken in a cool rest area (77 degrees Fahrenheit is best).
- Personnel shall remove impermeable protective garments during rest periods.
- Personnel shall not be assigned other tasks during rest periods.
- Personnel shall be informed of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress.

One of the following biological monitoring procedures may be used when the workplace temperature is 70 degrees Fahrenheit or above.

- Heart rate (HR) shall be measured by the pulse for 30 seconds as early as possible in the resting period. The HR at the beginning of the rest period should not exceed 110 beats/minute. If the HR is higher, the next work period should be shortened by 10 minutes (or 33 percent), while the length of rest period stays the same. If the pulse rate is 100 beats/minute at the beginning of the next rest period, the following work cycle should be shortened by 33 percent. The length of the initial work period will be determined by using the table below.

PERMISSIBLE HEAT EXPOSURE THRESHOLD LIMIT VALUES

	Work Load		
Work-Rest Regimen	Light	Moderate	Heavy
Continuous Work	80.0°F	80.0°F	77.0°F
75% Work - 25% Rest, Each Hour	87.0°F	82.4°F	78.6°F
50% Work - 50% Rest, Each Hour	88.5°F	85.0°F	82.2°F
25% Work - 75% Rest, Each Hour	90.0°F	88.0°F	86.0°F

- Body temperature shall be measured orally with a clinical thermometer as early as possible in the resting period. Oral Temperature (OT) at the beginning of the rest period should not exceed 99 degrees Fahrenheit. If it does, the next work period should be shortened by 10 minutes (or 33 percent), while the length of the rest period stays the same. However, if the oral temperature exceeds 99.7 degrees Fahrenheit at the beginning of the next rest period, the following work cycle shall be further shortened by 33 percent. OT should be measured at the end of the rest period to make sure that it has dropped below 99 degrees

Fahrenheit. At no time shall work begin with the oral temperature above 99 degrees Fahrenheit.

12.6.2 Cold Exposure

If field activities occur during a period when temperatures average below freezing, the following guidelines will be followed.

Persons working outdoors in temperatures at or below freezing may be subject to frostbite. Extreme cold for a short time may cause severe injury to the surface of the body, or result in profound generalized cooling of the body core, resulting in coma and death. Areas of the body which have high surface area-to-volume ratio such as fingers, toes, and ears are the most susceptible.

Two factors influence the development of a cold injury; ambient temperature and the velocity of the wind. Wind chill is used to describe the chilling effect of moving air in combination with low temperature. For instance, 10 degrees Fahrenheit with a 15-mile per hour (mph) wind is equivalent to chilling still air to -18 degrees Fahrenheit. Refer to Table 12-1 Windchill Index.

As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph. Additionally, water conducts heat 240 times faster than air. Thus, the body cools suddenly when chemical-protective equipment is removed if the clothing underneath is perspiration-soaked.

Local injury resulting from cold is included in the generic term frostbite. There are several degrees of damage. Frostbite of the extremities can be categorized into:

- Frost nip or incipient frostbite: Characterized by sudden blanching or whitening of skin.
- Superficial frostbite: Skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.
- Deep frostbite: Tissue is cold, pale, and solid; extremely serious injury.

Prevention of frostbite is vital. Keep the extremities warm. Wear insulated clothing as part of one's protective gear during extremely cold conditions. Check for symptoms of frostbite at every break. The onset is painless and gradual--you may never know you have been injured until it is too late.

TABLE 12-2
WINDCHILL INDEX

Wind Speed (mph)	Actual Thermometer Reading (° F):									
	50	**40**	**30**	**20**	**10**	**0**	**-10**	**-20**	**-30**	**-40**
	Equivalent Temperature (° F):									
Calm	50	40	30	20	10	0	-10	-20	-30	-40
5	48	37	27	16	6	-5	-15	-26	-36	-47
10	40	28	16	4	-9	-21	-33	-46	-58	-70
15	36	22	9	-5	-18	-36	-45	-58	-72	-85
20	32	18	4	-10	-25	-39	-53	-67	-82	-96
25	30	16	0	-15	-29	-44	-59	-74	-88	-104
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109
35	27	11	-4	-20	-35	-49	-67	-82	-98	-113
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116
over 40 mph - little added effect	Little Danger (for properly clothed person)				Increased Danger				Great Danger (from freezing of exposed flesh)	

Source: Fundamentals of Industrial Hygiene, Third Edition. Plog, B.A., Benjamin, G.S., Kerwin, M.A., National Safety Council, 1988.

To administer first aid for frostbite, bring the victim indoors and rewarm the areas quickly in water between 39 degrees Celsius and 41 degrees Celsius (102 degrees Fahrenheit to 105 degrees Fahrenheit). Give a warm drink--not coffee, tea, or alcohol. The victim should not smoke. Keep the frozen parts in warm water or covered with warm clothes for 30 minutes, even though the tissue will be very painful as it thaws. Then elevate the injured area and protect it from injury. Do not allow blisters to be broken. Use sterile, soft, dry material to cover the injured areas. Keep victim warm and get immediate medical care.

After thawing, the victim should try to move the injured areas a little, but no more than can be done alone (without help).

- Do not rub the frostbitten part (this may cause gangrene).
- Do not use ice, snow, gasoline, or anything cold on frostbite.

- Do not use heat lamps or hot water bottles to rewarm the frostbitten area.
- Do not place the body part near a hot stove.

Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature. Its symptoms are usually exhibited in five stages: 1) shivering; 2) apathy, listlessness, sleepiness, and (sometimes) rapid cooling of the body to less than 95 degrees Fahrenheit; 3) unconsciousness, glassy stare, slow pulse, and slow respiratory rate; 4) freezing of the extremities; and, finally, 5) death.

Effects arising from cold exposure will be minimized by providing workers with insulated clothing when the equivalent chill temperature is less than 30 degrees Fahrenheit as defined and presented in the ACGIH booklet in Table 5. Furthermore, field activities will generally be curtailed or halted if the equivalent chill temperature is below -20 degrees Fahrenheit. The ultimate responsibility for delaying work at a site due to inclement weather rests with the SSO.

12.7 POISON IVY

If personnel come in contact with poison ivy, the individual should immediately wash the affected area with Ivy Cleaner provided in the first aid kit. If a rash develops, it should be treated at a medical facility as soon as possible.

12.8 SNAKES AND TICKS

12.8.1 Snake Bite Prevention and First Aid

On project sites, precautions against the possible presence of snakes should be taken when walking through overgrown vegetation and when moving debris (i.e., lumber, scrap metal, etc.). If someone is bitten by a snake, and the snake bite occurs in a location that is within a 1-hour drive of a medical facility, a conservative approach is safest. Keeping the victim quiet, lying or sitting, and reassuring him/her is all that is required. He/she should be transported safely (no speeding) to the nearest medical facility. For the reassurance of both the victim and the first aider, a snake bite is not nearly as dangerous as popular mythology would suggest. In North America, death from snake bite to healthy adults is very rare. Many bites, even from known poisonous snakes, do not result in a significant amount of venom being injected. Even when significant envenom occurs, symptoms develop slowly over many hours and can be controlled with appropriate treatment. Field treatments advised against include ice, cutting and suction around the wound, and tourniquets. Studies indicate that ice leads to increased tissue destruction. Cutting and sucking out the wound can be shown to offer some help if it is done with the correct technique and equipment and if the victim has received a large dose of venom. In light of the damage that can be done, the risk of such a procedure is too high. It is best to transport the person immediately to a medical facility.

12.8.2 Tick Bite Prevention and First Aid

Routinely check for ticks after being outdoors. Remove ticks as soon as possible before they embed. To minimize exposure, wear light-colored clothing so ticks can be detected. Tuck pants into boots or socks and wear long sleeved shirts. Apply tick/insect repellent to clothing.

When a tick is found embedded, remove it by grasping it with a tweezers as close to the skin as possible and gently pull it straight out. Do not twist or jerk the tick because the head may remain embedded. Once the tick is removed, wash the bite area and your hands with soap and water and apply an antiseptic to the bite. Save the tick in a jar labeled with the date and the place where the tick was acquired. A physician may find this information and the tick specimen helpful in diagnosis if an infection results.

12.9 ACCIDENT/INJURY REPORTING AND RECORDKEEPING

The SSO shall maintain logs and reports covering health and safety aspects of the project throughout the duration of work activities. In the event of an on-site accident resulting in an exposure or injury, the SSO shall immediately complete a Supervisor's Incident Report (SIR) and send a copy to the REHSM. The SSO shall be responsible for maintaining on-site, the routinely completed records and forms presented in Appendix C of this HASP.

13.0 HASP ACCEPTANCE

Each field team member shall sign this section after site-specific training is completed and before being permitted to work on-site.

I have read and understand this Health and Safety Plan. I will comply with the provisions contained therein.

Lime Kiln Landfill, Village of Grafton:

Name Printed	Signature	Date

ATTACHMENT A

CHEMICAL DATA SHEETS

MALLINCKRODT -- TOLUENE - TOLUENE, ACS
MATERIAL SAFETY DATA SHEET
NSN: 6810003633700
Manufacturer's CAGE: 62910
Part No. Indicator: A
Part Number/Trade Name: TOLUENE

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General Information

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Item Name: TOLUENE, ACS
Company's Name: MALLINCKRODT INC
Company's P. O. Box: M
Company's City: PARIS
Company's State: KY
Company's Country: US
Company's Zip Code: 40361
Company's Emerg Ph #: 314-982-5000
Company's Info Ph #: 314-982-5000
Record No. For Safety Entry: 002
Tot Safety Entries This Stk#: 003
Status: SMJ
Date MSDS Prepared: 06APR89
Safety Data Review Date: 06DEC91
MSDS Serial Number: BLXGV
Hazard Characteristic Code: NK

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Ingredients/Identity Information

==========

Proprietary: NO
Ingredient: TOLUENE (SARA III)
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: XS5250000
CAS Number: 108-88-3
OSHA PEL: 200 PPM/150 STEL
ACGIH TLV: 50 PPM; 9293

Proprietary: NO
Ingredient: SUPP DATA:LGR SPILLS & LOT SIZES CAN BE COLLECTED AS HAZ WASTE & ATOMIZED IN SUITABLE RCRA APPRVD COMBUSTION (SEE ING 3)
Ingredient Sequence Number: 02
NIOSH (RTECS) Number: 9999999ZZ

Proprietary: NO
Ingredient: ING 2:CHAMBER/ABSORBED W/VERMICULITE, DRY SAND, EARTH/SIMILAR MATL FOR DISPOSAL AS HAZ WASTE IN RCRA APPRVD (SEE ING 4)
Ingredient Sequence Number: 03
NIOSH (RTECS) Number: 9999999ZZ

Proprietary: NO
Ingredient: ING 3:FACILITY. DO NOT FLUSH TO SEWER!
Ingredient Sequence Number: 04
NIOSH (RTECS) Number: 9999999ZZ

Proprietary: NO
Ingredient: VENT:IT CAN CONTROL EMISSIONS OF CONTAMINANT AT SOURCE, PREVENTING DISPERSION OF IT INTO GENERAL WORK AREA.
Ingredient Sequence Number: 05
NIOSH (RTECS) Number: 9999999ZZ

Proprietary: NO
Ingredient: OTHER PREC:INHALED. VAPOR HARMFUL. FLAMMABLE! MAY AFFECT CNS, LIVER & KIDNEYS. KEEP AWAY FROM HEAT, SPARKS (SEE ING 7)
Ingredient Sequence Number: 06

NIOSH (RTECS) Number: 9999999ZZ

Proprietary: NO
Ingredient: ING 6:& FLAME. KEEP CONTAINER CLOSED. USE W/ADEQUATE VENTILATION. AVOID BREATHING VAPOR.
Ingredient Sequence Number: 07
NIOSH (RTECS) Number: 9999999ZZ

Physical/Chemical Characteristics

Appearance And Odor: CLEAR, COLORLESS LIQUID, AROMATIC BENZENE-LIKE ODOR.
Boiling Point: 231F,111C
Melting Point: -139F,-95C
Vapor Pressure (MM Hg/70 F): 22 @ 68F
Vapor Density (Air=1): 3.14
Specific Gravity: 0.86
Evaporation Rate And Ref: 2.24
Solubility In Water: 0.05G/100G H*2O@20C

Fire and Explosion Hazard Data

Flash Point: 40.0F,4.4C
Flash Point Method: CC
Lower Explosive Limit: 1.27%
Upper Explosive Limit: 7.1%
Extinguishing Media: DRY CHEMICAL, FOAM OR CARBON DIOXIDE.
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N). FLAMMABLE. VAPORS CAN FLOW ALONG SURFACES TO DISTANT IGNITION SOURCE & FLASH BACK.
Unusual Fire And Expl Hazrds: ABOVE FLASH POINT, VAPOR-AIR MIXTURES ARE EXPLOSIVE WITHIN FLAMMABLE LIMITS. CONTACT WITH STRONG OXIDIZERS MAY CAUSE FIRE & EXPLOSIONS.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): HEAT, FLAME. STABLE UNDER ORDINARY CONDITIONS OF USE AND STORAGE. CONTAINERS MAY BURST WHEN HEATED.
Materials To Avoid: STRONG OXIDIZERS, ACIDS NITRIC & SULFURIC, NITROGEN TETRAOXIDE, WILL ATTACK SOME FORMS OF PLASTICS, RUBBER, COATINGS.
Hazardous Decomp Products: TOXIC GASES & VAPORS (E.G.,CO*2 & CO) MAY BE RELEASED IN FIRE INVOLVING TOLUENE.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: LD50:(ORAL,RAT)5000 MG/KG.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: NO
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: INHAL:MAY CAUSE IRRIT OF UPPER RESP TRACT. SYMPS OF OVEREXP MAY INCLUDE FATIGUE, CONFUSION, HDCH, DIZZ & DROWS. PECULIAR SKIN SENSATIONS (E.G.PINS & NEEDLES)/NUMBNESS MAY BE PRODUCED. VERY HIGH CONCS MAY CAUSE UNCON & DEATH. INGEST:SWALLOWING MAY CAUSE ABDOM SPASMS & OTHER SYMPS THAT PARALLEL OVER-(SEE EFTS OF OVEREXP)
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT
Signs/Symptoms Of Overexp: HLTH HAZ:EXPOS FROM INHAL. ASPIR OF MATL INTO LUNGS CAN CAUSE CHEM PNEUM WHICH MAY BE FATAL. SKIN:MAY CAUSE IRRIT. EYE:MAY CAUSE IRRIT, REDNESS, TEARING. SPLASHES HAVE CAUSED TEMPORARY CORNEAL DMG. CHRONIC:REPORTS OF CHRONIC POISONING DESCRIBE ANEMIA,

DECREASED BLOOD CELL COUNT & BONE MARROW HYPOPLASIA. (SUPP DATA)
Med Cond Aggravated By Exp: PERSONS W/PRE-EXISTING SKIN DISORDERS/ IMPAIRED LIVER/KIDNEY FUNCTION MAY BE MORE SUSCEPTIBLE TO EFFECTS OF SUBSTANCE. ALCOHOLIC BEVERAGE CONSUMPTION CAN ENHANCE TOXIC EFFECTS OF SUBSTANCE.
Emergency/First Aid Proc: INHAL:REMOVE TO FRESH AIR. IF NOT BRTHG,GIVE ARTF RESF.IF BRTHG DFCLT,GIVE O*2.CALL MD IMMED. INGEST:ASPIR HAZ. GET IMMED MED ATTN. VOMIT MAY OCCUR SPONTANEOUSLY BUT DO NOT INDUCE!IF VOMIT OCCURS,KEEP HEAD BELOW HIPS TO PVNT ASPIR INTO LUNGS. SKIN:REMOVE ANY CONTAMD CLTHG. WIPE OFF EXCESS FROM SKIN. WASH W/PLENTY OF WATER FOR AT LEAST 15 MIN. GET MD IMMED. EYE:WASH W/PLENTY OF WATER (SUPP DATA)

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: REMOVE ALL SOURCES OF IGNIT. USE NON-SPARKING TOOLS & EQUIP. CLEAN-UP PERS REQ PROT CLTHG & RESP PROT FROM FLAMM VAPS. SML SPILLS MAY BE ABSORBED ON PAPER TOWELS & EVAP IN FUME HOOD. ALLOW ENOUGH TIME FOR FUMES TO CLEAR HOOD, THEN IGNITE (SUPP DATA)
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: ENSURE COMPLIANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.
Precautions-Handling/Storing: PROT AGAINST PHYS DMG. STORE IN COOL,DRY, WELL-VENT LOCATION,AWAY FROM ANY AREA WHERE FIRE HAZ MAY BE ACUTE. OUTSIDE/ DETACHED STORAGE PREFERRED.
Other Precautions: SEPARATE FROM OXIDIZING MATLS. CNTNRS SHOULD BE BONDED & GROUNDED FOR TRANSFERS TO AVOID STATIC SPARKS. STOR & USE AREAS SHOULD BE NO SMOKING AREAS. USE NON-SPARKING TOOLS & EQUIP. DANGER!HARMFUL/FATAL IF SWALLOWED. HARMFUL IF (SEE ING 6)

Control Measures

Respiratory Protection: IF TLV EXCEEDED, NIOSH/MSHA APPROVED HALF MASK CHEMICAL CARTRIDGE RESPIRATOR MAY BE WORN UP TO 10 TIMES TLV/MAXIMUM USE CONCENTRATION SPECIFIED BY RESPIRATOR SUPPLIER, WHICHEVER IS LESS.
Ventilation: SYS OF LOCAL &/OR GEN EXHST RECOMM TO KEEP EXPOS BELOW AIRBORNE EXPOS LIM. LOCAL EXHST VENT GEN PREF BECAUSE (SEE ING 5)
Protective Gloves: IMPERVIOUS GLOVES.
Eye Protection: CHEM WORK GOG/FULL LENGTH FSHLD (FP N).
Other Protective Equipment: IMPERVIOUS PROT CLTHG INCLDG BOOTS,LAB COAT, APRON OR COVERALLS. MAINTAIN EYE WASH FOUNTAIN & QUICK-DRENCH FACILITIES.
Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING. CONTACT LENSES SHOULD NOT BE WORN WHEN WORKING W/MATERIAL.
Suppl. Safety & Health Data: EFTS OF OVEREXP:LIVER & KIDNEY DMG MAY OCCUR. RPTD/PRLNGD CNTCT HAS DEFATTING ACTION, CAUSING DRYING, REDNESS, DERM. FIRST AID PROC:FOR AT LEAST 15 MIN, LIFTING LIDS OCCASNLY. GET MD IMMED. SPILL PROC:PAPER IN SUITABLE LOCATION AWAY FROM COMBUST MATLS. CONTAIN & RECOVER LIQ FOR RECLAMATION WHEN POSS. (SEE ING 2)

Transportation Data

Trans Data Review Date: 92057
DOT PSN Code: OJY
DOT Proper Shipping Name: TOLUENE
DOT Class: 3
DOT ID Number: UN1294
DOT Pack Group: II
DOT Label: FLAMMABLE LIQUID
IMO PSN Code: OSR
IMO Proper Shipping Name: TOLUENE
IMO Regulations Page Number: 3285
IMO UN Number: 1294
IMO UN Class: 3.2
IMO Subsidiary Risk Label: `-
IATA PSN Code: YEL

IATA UN ID Number: 1294
IATA Proper Shipping Name: TOLUENE
IATA UN Class: 3
IATA Label: FLAMMABLE LIQUID
AFI PSN Code: YEL
AFI Prop. Shipping Name: TOLUENE
AFI Class: 3
AFI ID Number: UN1294
AFI Pack Group: II
AFI Label: FLAMMABLE LIQUID
AFI Basic Pac Ref: 7-7

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 06DEC91
Label Status: G
Common Name: TOLUENE
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Severe: X
Contact Hazard-Moderate: X
Fire Hazard-Severe: X
Reactivity Hazard-None: X
Special Hazard Precautions: FLAMMABLE. KEEP AWAY FROM HEAT,SPARKS,FLAME. ACUTE:HARMFUL IF INHALED. MAY CAUSE UPPER RESP TRACT IRRIT. HARMFUL/FATAL IF SWALLOWED. MAY CAUSE ABDOM SPASMS. ASPIR OF MATL INTO LUNGS MAY CAUSE CHEM PNEUM, WHICH MAY BE FATAL. EYE CNTCT MAY CAUSE IRRIT,REDNESS,TEARING. SPLASHES HAVE CAUSED TEMPORARY CORNEAL DMG. SKIN CNTCT MAY CAUSE IRRIT. OVEREXPOS SYMPS MAY INCLUDE:FATIGUE, CONFUSION, HDCH, DIZZ & DROWS. NUMBNESS MAY BE PRODUCED. CHRONIC:REPORTS OF CHRONIC POISONING DESCRIBE ANEMIA, DECREASED BLOOD CELL COUNT & BONE MARROW HYPOPLASIA. LIVER & KIDNEY DMG MAY OCCUR. RPTD/PRLNGD CNTCT HAS DEFATTING ACTION CAUSING DRYING, REDNESS, DERMATITIS.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: MALLINCKRODT INC
Label P.O. Box: M
Label City: PARIS
Label State: KY
Label Zip Code: 40361
Label Country: US
Label Emergency Number: 314-982-5000

URL for this msds http://siri.org. If you wish to change, add to, or delete information in this archive please sent updates to dan@siri.org.

J T BAKER -- METHYLENE CHLORIDE, 5378
MATERIAL SAFETY DATA SHEET
NSN: 681000N046293
Manufacturer's CAGE: 70829
Part No. Indicator: A
Part Number/Trade Name: METHYLENE CHLORIDE, 5378

General Information

Company's Name: J T BAKER
Company's Street: 222 RED SCHOOL LANE
Company's City: PHILLIPSBURG
Company's State: NJ
Company's Country: US
Company's Zip Code: 08865
Company's Emerg Ph #: 908-859-2151;800-424-9300(CHEMTREC)
Company's Info Ph #: 800-582-2537
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 002
Status: SMJ
Date MSDS Prepared: 09MAR92
Safety Data Review Date: 21MAY96
MSDS Serial Number: BTQLN
Hazard Characteristic Code: T4

Ingredients/Identity Information

Proprietary: NO
Ingredient: METHANE, DICHLORO-; (METHYLENE CHLORIDE) (SARA III)
Ingredient Sequence Number: 01
Percent: 98-100
NIOSH (RTECS) Number: PA8050000
CAS Number: 75-09-2
OSHA PEL: 500 PPM;1000 PPM, C
ACGIH TLV: 50 PPM

Proprietary: NO
Ingredient: SUPDAT:EPINEPHRINE IN LAB ANIMALS & COULD HAVE SIMILAR EFT IN HUMANS. ADRENOMIMETICS (E.G., EPINEPHRINE) MAY BE (ING 3)
Ingredient Sequence Number: 02
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 2:CONTRAINDICATED EXCEPT FOR LIFE-SUSTAINING USES IN HUMANS ACUTELY/CHRONICALLY EXPOS TO CHLOROCARBONS (FP N).
Ingredient Sequence Number: 03
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: OTHER PREC:SUNLIGHT. AVOID CONT W/EYES, SKIN, CLTHG. DO NOT BREATHE VAP. USE W/ADEQ VENT. POSSIBLE RISKS OF (ING 5)
Ingredient Sequence Number: 04
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 4:IRREVERSIBLE EFTS. NO SMOKING IN AREA OF USE. DO NOT USE IN GEN VICIN OF ARC WELDING, OPEN FLAMES/HOT (ING 6)

Ingredient Sequence Number: 05
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 5:SURFS. HEAT &/OR UV RADIA MAY CAUSE FORM OF HCL &/OR PHOSGENE (FP N).
Ingredient Sequence Number: 06
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Physical/Chemical Characteristics

Appearance And Odor: CLEAR, COLORLESS LIQUID; ETHER-LIKE ODOR.
Boiling Point: 104F,40C
Melting Point: -139F,-95C
Vapor Pressure (MM Hg/70 F): 350 @ 20C
Vapor Density (Air=1): 2.9
Specific Gravity: 1.32 (H2O=1)
Evaporation Rate And Ref: 27.5 (BUTYL ACETATE=1)
Solubility In Water: MODERATE (1-10%)
Percent Volatiles By Volume: 100
pH: N/A

Fire and Explosion Hazard Data

Flash Point: NOT APPLICABLE
Flash Point Method: CC
Lower Explosive Limit: 12%
Upper Explosive Limit: 19%
Extinguishing Media: USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.
Special Fire Fighting Proc: USE NIOSH/MSHA APPRVD PRESS DEMAND SCBA & FULL PROT EQUIP (FP N). MOVE CNTNRS FROM FIRE AREA IF IT CAN BE DONE W/OUT RISK. USE WATER TO KEEP FIRE-EXPOS (SUPDAT)
Unusual Fire And Expl Hazrds: CONC VAP CAN BE IGNITED BY HIGH INTENSITY IGNITION SOURCE. VAP MAY FORM FLAMM MIXT IN ATM THAT CONTAINS HIGH PERCENTAGE OF OXYGEN. CLSD CNTNRS EXPOS TO (SUPDAT)

Reactivity Data

Stability: YES
Cond To Avoid (Stability): HEAT, FLAME, OTHER SOURCES OF IGNITION, MOISTURE, LIGHT.
Materials To Avoid: ALKALI METALS, STRONG OXIDIZING AGENTS, STRONG BASES, OXIDES OF NITROGEN, ZINC, ALUMINUM, WATER, MAGNESIUM, (SUPDAT)
Hazardous Decomp Products: HYDROGEN CHLORIDE, PHOSGENE, CHLORINE, CARBON MONOXIDE, CARBON DIOXIDE.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: LD50:(ORAL,RAT) 2136 MG/KG.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: ACUTE:INHAL:HDCH, NAUS, VOMIT, DIZZ, NARCOS, WEAK, FATG, IRRIT OF UPPER RESP TRACT, CNS DEPRESS, CAUSES METHEMOGLOBULIN FORM IN BLOOD, PULM EDEMA, UNCON & MAY BE FATAL. SKIN:IRRIT, MAY BE HARMFUL, PRLNG CONT MAY CAUSE DERM. EYE:IRRIT, MAY CAUSE TEMPORARY CORNEAL DMG. INGEST:HDCH, NAUS, VOMIT, DIZZ, (EFTS OF OVEREXP)

Carcinogenicity - NTP: YES
Carcinogenicity - IARC: YES
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: METHYLENE CHLORIDE:IARC MONOGRAPHS, SUPP, VOL 7, PG 194, 1987:GRP 2B. NTP 6TH ANNUAL RPT ON CARCINS, 1991:ANTIC (SUPDAT)
Signs/Symptoms Of Overexp: HLTH HAZ:NARCOS, WEAK, FATG, GI IRRIT, CNS DEPRESS, CAUSES METHEMOGLOBULIN FORM IN BLOOD, UNCON & MAY BE FATAL. CHRONIC:DMG TO LIVER, KIDNEYS, LUNGS, BLOOD, CNS. TARGET ORGANS:RESP SYS, LUNGS, CARDIOVASCULAR SYS, CNS, LIVER, KIDNEYS, EYES, SKIN. TESTS ON LAB ANIMALS INDICATE MATL MAY BE MUTAGENIC. CHLOROCARBON (SUPDAT)
Med Cond Aggravated By Exp: CARDIOVASCULAR DISORDERS, HEART DISORDERS, LIVER OR KIDNEY DISORDERS, CENTRAL NERVOUS SYSTEM DISORDERS, HEAVY DRINKERS, HEAVY SMOKERS.
Emergency/First Aid Proc: INGEST:CALL MD. IF SWALLOWED, DO NOT INDUCE VOMIT. INHAL:REMOVE TO FRESH AIR. IF NOT BRTHG, GIVE ARTF RESP. IF BRTHG IS DFCLT, GIVE OXYGEN. SKIN:IMMED FLUSH W/PLENTY OF WATER FOR AT LST 15 MINS WHILE REMOVING CONTAM CLTHG & SHOES. WASH CLTHG BEFORE RE-USE. EYE:IMMED FLUSH W/PLENTY OF WATER FOR AT LST 15 MINS.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: WEAR NIOSH/MSHA APPRVD SCBA & FULL PROT CLTHG. STOP LEAK IF YOU CAN DO SO W/OUT RISK. USE WATER SPRAY TO REDUCE VAPS. TAKE UP W/SAND OR OTHER NON-COMBUST ABSORB MATL & PLACE INTO CNTNR FOR LATER DISP. FLUSH SPILL AREA W/WATER.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: DISPOSE I/A/W ALL APPLICABLE FEDERAL, STATE & LOCAL ENVIRONMENTAL REGULATIONS. EPA HAZARDOUS WASTE NUMBER: U080 (TOXIC WASTE).
Precautions-Handling/Storing: KEEP CONTAINER TIGHTLY CLOSED. STORE IN SECURE POISON AREA. KEEP CONTAINERS OUT OF SUN & AWAY FROM HEAT. HARMFUL-STOW AWAY FROM FOOD STUFFS.
Other Precautions: MATERIAL IS HYGROSCOPIC. MAY BE FATAL IF SWALLOWED OR REPORTED AS CAUSING CANCER IN LAB ANIMALS. EXERCISE DUE CARE. KEEP AWAY FROM HEAT, MOISTURE & DIRECT (ING 4)

Control Measures

Respiratory Protection: NIOSH/MSHA APPROVED RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS ABOVE 100 PPM, A NIOSH/MSHA APPROVED SELF-CONTAINED BREATHING APPARATUS IS ADVISED.
Ventilation: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS. VENT HOOD.
Protective Gloves: POLYVINYL ALCOHOL GLOVES.
Eye Protection: ANSI APPRVD SAFETY GOGG & FSHLD (FP N).
Other Protective Equipment: UNIFORM, PROTECTIVE SUIT ARE RECOMMENDED. LAB COAT & APRON.
Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING.
Suppl. Safety & Health Data: FIRE FIGHT PROC:CNTNRS COOL. EXPLO HAZ:HEAT MAY EXPLODE. THERMAL DECOMP PRODS MAY INCL HCL & PHOSGENE (FP N). MATLS TO AVOID:AMINES, PLASTICS, RUBBER, SODIUM, POTASSIUM. EXPLAN OF CARCIN:TO BE CARCIN. ANIMAL:LUNG, LIVER, SALIVARY, MAMMARY GLAND (TUMORS). EFTS OF OVEREXP:MATLS HAVE PRDCD SENSIT OF MYOCARDIUM TO (ING 2)

Transportation Data

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 09DEC93
Label Date: 06DEC93

Label Status: G
Common Name: METHYLENE CHLORIDE, 5378
Chronic Hazard: YES
Signal Word: WARNING!
Acute Health Hazard-Slight: X
Contact Hazard-Moderate: X
Fire Hazard-None: X
Reactivity Hazard-None: X
VAPORS MAY CONTRIBUTE TO THE OCCURRENCE OF IRREGULAR HEARTBEAT (FP N). ALSO HEADACHE, NAUSEA, VOMITING, DIZZINESS, NARCOSIS, FATIGUE, RESPIRATORY TRACT IRRITATION, CENTRAL NERVOUS SYSTEM EFFECTS, BLOOD EFFECTS, UNCONSCIOUSNESS & POSSIBLE DEATH. SIMILAR SYMPTOMS IF SWALLOWED. CONTACT CAN CAUSE SKIN CANCER HAZARD. CONTAINS DICHLOROMETHANE, LISTED AS ANIMAL LUNG AND LIVER CARCINOGEN (FP N). DAMAGE TO LIVER, KIDNEY, LUNGS, BLOOD, CENTRAL NERVOUS SYSTEM. ANIMAL STUDIES SHOW MUTAGEN.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: J T BAKER
Label Street: 222 RED SCHOOL LANE
Label City: PHILLIPSBURG
Label State: NJ
Label Zip Code: 08865
Label Country: US
Label Emergency Number: 908-859-2151;800-424-9300(CHEMTREC)

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J T BAKER -- ETHYLENE DICHLORIDE, 9301 - 1,2-DICHLOROETHANE
MATERIAL SAFETY DATA SHEET
NSN: 6810003949394
Manufacturer's CAGE: 70829
Part No. Indicator: A
Part Number/Trade Name: ETHYLENE DICHLORIDE, 9301

General Information

Item Name: 1,2-DICHLOROETHANE
Company's Name: J T BAKER INC
Company's Street: 222 RED SCHOOL LANE
Company's City: PHILLIPSBURG
Company's State: NJ
Company's Country: US
Company's Zip Code: 08865
Company's Emerg Ph #: 908-859-2151;800-424-9300(CHEMTREC)
Company's Info Ph #: 800-582-2537
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 01MAY89
Safety Data Review Date: 07MAR94
MSDS Serial Number: BTZZJ
Hazard Characteristic Code: NK

Ingredients/Identity Information

Proprietary: NO
Ingredient: ETHANE, 1,2-DICHLORO-; (1,2-DICHLOROETHANE) (SARA III)
Ingredient Sequence Number: 01
Percent: 99-100
NIOSH (RTECS) Number: KI0525000
CAS Number: 107-06-2
OSHA PEL: 50 PPM;100 PPM, C
ACGIH TLV: 10 PPM

Physical/Chemical Characteristics

Appearance And Odor: CLEAR, COLORLESS LIQUID; CHLOROFORM-LIKE ODOR.
Boiling Point: 183F,84C
Melting Point: -33F,-36C
Vapor Pressure (MM Hg/70 F): 62 @ 20C
Vapor Density (Air=1): 3.4
Specific Gravity: 1.25 (H*2O=1)
Evaporation Rate And Ref: 6.5 (BUTYL ACETATE=1)
Solubility In Water: SLIGHT (0.1-1%)
Percent Volatiles By Volume: 100
pH: N/A

Fire and Explosion Hazard Data

Flash Point: 53.6F,12.0C
Flash Point Method: CC
Lower Explosive Limit: 6.2%
Upper Explosive Limit: 15.9%
Extinguishing Media: USE ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE. (WATER MAY BE INEFFECTIVE.)
Special Fire Fighting Proc: USE NIOSH/MSHA APPRVD SCBA & FULL PROT EQUIP (FP N). MOVE CNTNRS FROM FIRE AREA IF IT CAN BE DONE W/OUT RISK. USE WATER TO KEEP FIRE-EXPOSED CNTNRS COOL.
Unusual Fire And Expl Hazrds: VAPS MAY FLOW ALONG SURFS TO DIST IGNIT SOURCES & FLASH BACK. CLSD CNTNRS EXPOSED TO HEAT MAY EXPLODE. CONTACT W/

STRONG OXIDIZERS MAY CAUSE FIRE.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): HEAT, FLAME, OTHER SOURCES OF IGNITION.
Materials To Avoid: STRONG OXIDIZING AGENTS, ALUMINUM, MAGNESIUM, AMMONIA, STRONG BASES, NITRIC ACID, POTASSIUM.
Hazardous Decomp Products: HYDROGEN CHLORIDE, PHOSGENE, CARBON MONOXIDE, CARBON DIOXIDE.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: LD50:(ORAL,RAT) 670 MG/KG.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: ACUTE:INHAL:HEADACHE, NAUSEA, VOMITING, DIZZINESS, NARCOSIS, LOW BLOOD PRESSURE, CNS DEPRESSION, RESPIRATORY FAILURE, PULMONARY EDEMA & MAY BE FATAL. SKIN CONTACT:SEVERE IRRITATION OR RAPID ABSORPTION. EYE CONTACT:SEVERE IRRITATION (EFTS OF OVEREXP)
Carcinogenicity - NTP: YES
Carcinogenicity - IARC: YES
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: ETHYLENE DICHLORIDE:IARC MONOGRAPHS, SUPP, VOL 7, PG 56, 1987:GRP 2B. NTP 6TH ANNUAL RPT ON CARCINS, 1991:ANTIC (SUPDAT)
Signs/Symptoms Of Overexp: HLTH HAZ:OR BURNS. INGEST:HEADACHE, NAUSEA, VOMITING, DIZZINESS, GI IRRITATION & MAY BE FATAL. CHRONIC:DAMAGE TO LIVER, KIDNEYS, LUNGS, BLOOD, CNS. TARGET ORGANS:KIDNEYS, LIVER, EYES, SKIN, CNS.
Med Cond Aggravated By Exp: BRONCHITIS, KIDNEY, LIVER OR BLOOD DISORDERS, HEART DISORDERS, ASTHMA, CIRCULATORY DISORDERS.
Emergency/First Aid Proc: INGEST:CALL MD. IF SWALLOWED, DO NOT INDUCE VOMITING. INHAL:REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN. SKIN:FLUSH W/WATER. EYES:IMMEDIATELY FLUSH W/PLENTY OF WATER FOR AT LEAST 15 MINUTES.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: WEAR NIOSH/MSHA APPRVD SCBA & FULL PROT CLTHG. SHUT OFF IGNIT SOURCES; NO FLARES, SMOKING/FLAMES IN AREA. STOP LEAK IF YOU CAN DO SO W/OUT RISK. USE WATER SPRAY TO REDUCE VAPS. TAKE UP W/SAND OR OTHER NON-COMBUST ABSORB MATL & PLACE INTO (SUPP DATA)
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: DISPOSE I/A/W ALL APPLICABLE FEDERAL, STATE & LOCAL ENVIRONMENTAL REGULATIONS. EPA HAZARDOUS WASTE NUMBER: D001 (IGNITABLE WASTE).
Precautions-Handling/Storing: KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY WELL-VENTILATED, FLAMMABLE LIQUID STORAGE AREA. READ & GROUND CONTAINERS WHEN TRANSFERRING LIQUID.
Other Precautions: FLAMMABLE LIQUID, POISON. CAUSES IRRIT. HARMFUL IF SWALLOWED/INHALED. NOTE:RPTD AS CAUSING CANCER IN LAB ANIMALS. EXERCISE DUE CARE. KEEP AWAY FROM HEAT, SPKS, FLAME. AVOID CONT W/EYES, SKIN, CLTHG. AVOID BRTHG VAP. USE W/ADEQ VENT.

Control Measures

Respiratory Protection: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS ABOVE 10 PPM, A NIOSH/MSHA APPROVED SELF-CONTAINED BREATHING APPARATUS IS ADVISED.
Ventilation: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS. VENT HOOD.

Protective Gloves: NEOPRENE GLOVES.
Eye Protection: SAFETY GOGGLES & FACE SHIELD.
Other Protective Equipment: EMERGENCY EYE WASH & DELUGE SHOWER (FP N).
UNIFORM & PROTECTIVE SUIT ARE RECOMMENDED. LAB COAT & APRON.
Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING.
GASTROINTESTINAL, SKIN, LUNGS. SPILL PROC:CONTAINER FOR LATER DISPOSAL.
FLUSH AREA W/WATER. J.T. BAKER SOLUSORB SOLVENT ABSORBENT IS RECOMMENDED
FOR SPILLS OF THIS PRODUCT.

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Transportation Data

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Disposal Data

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Label Data

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Label Required: YES
Technical Review Date: 07MAR94
Label Date: 03MAR94
Label Status: G
Common Name: ETHYLENE DICHLORIDE, 9301
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Moderate: X
Contact Hazard-Severe: X
Fire Hazard-Severe: X
Reactivity Hazard-None: X
INHAL:HEADACHE, NAUSEA, VOMIT, DIZZINESS, NARCOSIS, LOW BLOOD PRESSURE, CNS
SEVERE IRRIT/BURNS, PROLONGED CONTACT MAY CAUSE SKIN SENSIT. SKIN
ABSORPTION:RAPID ABSORPTION. EYE CONT:SEVERE IRRIT/BURNS. INGEST:HEADACHE,
NAUSEA, VOMIT, DIZZINESS, GI IRRIT & MAY BE FATAL. CHRONIC:CANCER HAZARD.
CONTAINS ETHYLENE DICHLORIDE, WHICH IS LISTED AS A LUNG AND LIVER
CARCINOGEN (FP N). DAMAGE TO LIVER, KIDNEYS, LUNGS, BLOOD, CNS. TARGET
ORGANS:KIDNEYS, LIVER, EYES, SKIN, CNS.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: J T BAKER INC
Label Street: 222 RED SCHOOL LANE
Label City: PHILLIPSBURG
Label State: NJ
Label Zip Code: 08865
Label Country: US
Label Emergency Number: 908-859-2151;800-424-9300(CHEMTREC)

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delete information in this archive please sent updates to dan@siri.org.

J T BAKER -- 5376, TRICHLOROETHYLENE
MATERIAL SAFETY DATA SHEET
NSN: 681000N028372
Manufacturer's CAGE: 70829
Part No. Indicator: A
Part Number/Trade Name: 5376, TRICHLOROETHYLENE

General Information

Company's Name: J T BAKER INC
Company's Street: 222 RED SCHOOL LANE
Company's City: PHILLIPSBURG
Company's State: NJ
Company's Country: US
Company's Zip Code: 08865-2219
Company's Emerg Ph #: 908-859-2151;800-424-9300(CHEMTREC)
Company's Info Ph #: 800-582-2537
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 20JUL88
Safety Data Review Date: 17MAR92
MSDS Serial Number: BMSHN
Hazard Characteristic Code: T4

Ingredients/Identity Information

Proprietary: NO
Ingredient: ETHYLENE, TRICHLORO-; (TRICHLOROETHYLENE)
Ingredient Sequence Number: 01
Percent: 99-100
NIOSH (RTECS) Number: KX4550000
CAS Number: 79-01-6
OSHA PEL: 100 PPM/100 STEL
ACGIH TLV: 50 PPM/100,A5STEL;93

Proprietary: NO
Ingredient: SUPP DATA:CHLOROCARBONS (FP N).
Ingredient Sequence Number: 02
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Physical/Chemical Characteristics

Appearance And Odor: CLEAR, COLORLESS LIQUID. CHLOROFORM-LIKE ODOR.
Boiling Point: 189F,87C
Melting Point: -99F,-73C
Vapor Pressure (MM Hg/70 F): 58
Vapor Density (Air=1): 4.53
Specific Gravity: 1.46 (H*2O=1)
Evaporation Rate And Ref: NOT APPLICABLE
Solubility In Water: SLIGHT (0.1-1%)
Percent Volatiles By Volume: 100

Fire and Explosion Hazard Data

Flash Point: NOT APPLICABLE
Lower Explosive Limit: 8%
Upper Explosive Limit: 10.5%
Extinguishing Media: USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPRVD PRESS DEMAND SCBA &

FULL PROT EQUIP (FP N). MOVE CNTNRS FROM FIRE AREA IF IT CAN BE DONE W/OUT RISK. USE H*2O TO KEEP FIRE-EXPOS (SUPDAT)
Unusual Fire And Expl Hazrds: GIVES OFF FLAMM VAPS. VAPS MAY FORM EXPLO MIXT W/AIR. CLSD CNTNRS EXPOSED TO HEAT MAY EXPLODE. CONT W/STRONG OXIDIZERS MAY CAUSE FIRE. CONC VAPS CAN BE (SUPDAT)

Reactivity Data

Stability: YES
Cond To Avoid (Stability): HEAT, FLAME, OTHER SOURCES OF IGNITION, LIGHT.
Materials To Avoid: CHEMICALLY ACTIVE METALS, STRONG BASES, STRONG OXIDIZING AGENTS, POWDERED METALS.
Hazardous Decomp Products: HYDROGEN CHLORIDE, PHOSGENE, CARBON MONOXIDE, CARBON DIOXIDE.
Hazardous Poly Occur: YES
Conditions To Avoid (Poly): NONE SPECIFIED BY MANUFACTURER.

Health Hazard Data

LD50-LC50 Mixture: LD50:(ORAL,RAT)3670 MG/KG.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: NO
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: ACUTE:INHAL OF VAPS MAY CAUSE HDCH, NAUS, VOMIT, NARCOS, WEAK, FATG, DIZZ, IRRIT OF RESP TRACT, NUMB OF EXTREM, CNS DEPRESS, PULM EDEMA & UNCON. CONT W/SKIN/EYES MAY CAUSE IRRIT. PRLNG SKIN CONT MAY CAUSE DERM. INGEST MAY CAUSE NAUS, VOMIT, HDCHS, DIZZ, CONFUSN, JAUNDICE, GI IRRIT, CNS DEPRESS & UNCON.(EFTS OF OVEREXP)
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT
Signs/Symptoms Of Overexp: HLTH HAZ:CHRONIC:EFTS OF OVEREXP MAY INCL DMG RESP SYS, LUNGS, KIDNEYS, LIVER, BLOOD, HEART, CNS, SKIN. TESTS ON LAB ANIMALS INDICATE MATL MAY BE CARCIN & MUTAGENIC. CHLOROCARBON MATLS HAVE PRDCD SENSIT OF MYOCARDIUM TO EPINEPHRINE IN LAB (SUPDAT)
Med Cond Aggravated By Exp: LIVER OR KIDNEY DISORDERS, LUNG DISEASE, CENTRAL NERVOUS SYSTEM DISORDERS.
Emergency/First Aid Proc: CALL MD. INGEST:DO NOT INDUCE VOMIT; IF CONSCIOUS, GIVE LG AMTS OF H*2O. INHAL:REMOVE TO FRESH AIR. IF NOT BRTHG, GIVE ARTF RESP. IF BRTHG DFCLT, GIVE O*2. EYES:IMMED FLUSH W/PLENTY OF H*2O FOR @ LST 15 MINS. SKIN:IMMED FLUSH W/PLENTY OF H*2O FOR @ LST 15 MINS DO NOT USE ADRENALIN OR EPINEPHRINE.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: WEAR NIOSH/MSHA APPRVD SCBA & FULL PROT CLTHG. STOP LEAK IF YOU CAN DO SO W/OUT RISK. USE WATER SPRAY TO REDUCE VAPS. TAKE UP W/SAND OR OTHER NON-COMBUST ABSORB MATL & PLACE INTO CNTNR FOR LATER DISP. FLUSH SPILL AREA W/WATER.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: DISPOSE I/A/W ALL APPLICABLE FEDERAL, STATE & LOCAL ENVIRONMENTAL REGULATIONS. EPA HAZ WASTE NUMBER:U228 (TOXIC WASTE).
Precautions-Handling/Storing: KEEP CNTNR TIGHTLY CLSD. STORE IN SECURE POISON AREA. STORE IN COOL, DRY, WELL-VENTED AREA. ISOLATE FROM INCOMP MATLS. DO NOT BREATHE VAPOR.
Other Precautions: DO NOT GET IN EYES, ON SKIN, ON CLTHG. NO SMOKING IN AREA OF USE. DO NOT USE IN GEN VICIN OF ARC WELDING, OPEN FLAMES/HOT SURFS. HEAT &/OR UV RADIA MAY CAUSE FORM OF HCL &/OR PHOSGENE (FP N). HEAT MAY CAUSE DECOMP & GENERATE CORR VAPS.

Control Measures

Respiratory Protection: NIOSH/MSHA APPROVED RESPIRATORY PROTECTION

REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS ABOVE 50 PPM, A NIOSH/MSHA APPROVED SCBA IS ADVISED.
Ventilation: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS. VENT HOOD.
Protective Gloves: NEOPRENE GLOVES ARE RECOMMENDED.
Eye Protection: CHEM WORK GOGG & FULL LGTH FCSHLD(FP N).
Other Protective Equipment: UNIFORM, PROTECTIVE SUIT ARE RECOMMENDED. LAB COAT & APRON. EMERGENCY EYEWASH & DELUGE SHOWER (FP N).
Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING. EXERCISE DUE CARE. STOW AWAY FROM FOOD STUFFS.
IGNITED BY HIGH INTENSITY HEAT SOURCE. TOX GASES PRDCD:HCL, PHOSGENE, CO, CO*2. EFTS OF OVEREXP:ANIMALS & COULD HAVE SIMILAR EFT IN HUMANS. ADRENOMIMETICS (E.G., EPINEPHRINE) MAY BE CONTRAINDICATED EXCEPT FOR LIFE-SUSTAINING USES IN HUMANS ACUTELY/CHRONICALLY EXPOSED TO (ING 2)

Transportation Data

Trans Data Review Date: 92135
DOT PSN Code: OQK
DOT Proper Shipping Name: TRICHLOROETHYLENE
DOT Class: 6.1
DOT ID Number: UN1710
DOT Pack Group: III
DOT Label: KEEP AWAY FROM FOOD
IMO PSN Code: OVL
IMO Proper Shipping Name: TRICHLOROETHYLENE
IMO Regulations Page Number: 6273
IMO UN Number: 1710
IMO UN Class: 6.1
IMO Subsidiary Risk Label: -
IATA PSN Code: YMD
IATA UN ID Number: 1710
IATA Proper Shipping Name: TRICHLOROETHYLENE
IATA UN Class: 6.1
IATA Label: TOXIC
AFI PSN Code: YMD
AFI Prop. Shipping Name: TRICHLOROETHYLENE
AFI Class: 6.1
AFI ID Number: UN1710
AFI Pack Group: III
AFI Label: KEEP AWAY FROM FOOD
AFI Special Prov: N36
AFI Basic Pac Ref: 10-10

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 17MAR92
Label Date: 13MAR92
Label Status: G
Common Name: 5376, TRICHLOROETHYLENE
Chronic Hazard: YES
Signal Word: WARNING!
Acute Health Hazard-Moderate: X
Contact Hazard-Moderate: X
Fire Hazard-Slight: X
Reactivity Hazard-Slight: X
Special Hazard Precautions: HEAT MAY CAUSE DECOMP & GENERATE CORR VAPS. KEEP CNTNR TIGHTLY CLSD. STORE IN SECURE POISON AREA. THAT IS COOL, DRY, WELL-VENTED. ISOLATE FROM INCOMPAT MATLS. ACUTE:INHAL OF VAPS MAY CAUSE HDCH, NAUS, VOMIT, NARCOS, WEAK, FATG, DIZZ, RESP TRACT IRRIT, NUMB OF

EXTREM, CNS DEPRESS, PULM EDEMA & UNCON. CONT W/EYES OR SKIN MAY CAUSE IRRIT/DERM. INGEST MAY CAUSE NAUS, VOMIT, HDCHS, DIZZ, CONFUSN, JAUNDICE, GI IRRIT, CNS DEPRESS & UNCON. CHRONIC:MAY DMG KIDNEYS, LIVER & BLOOD. CHLOROCARBON MATLS HAVE CAUSED SENSITIVITY OF MYOCARDIUM TO EPINEPHRINE IN LAB ANIMALS & MAY HAVE SIMILAR EFT IN HUMANS. REPORTED AS CAUSING CANCER IN LAB ANIMALS.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: J T BAKER INC
Label Street: 222 RED SCHOOL LANE
Label City: PHILLIPSBURG
Label State: NJ
Label Zip Code: 08865-2219
Label Country: US
Label Emergency Number: 908-859-2151;800-424-9300(CHEMTREC)

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SUPELCO -- 48526 1,1-DICHLOROETHYLENE 5G
MATERIAL SAFETY DATA SHEET
NSN: 681000F029396
Manufacturer's CAGE: 54968
Part No. Indicator: A
Part Number/Trade Name: 48526 1,1-DICHLOROETHYLENE 5G

General Information

Company's Name: SUPELCO INC
Company's Street: SUPELCO PARK
Company's City: BELLEFONTE
Company's State: PA
Company's Country: US
Company's Zip Code: 16823-0048
Company's Emerg Ph #: 814-359-3441
Company's Info Ph #: 814-359-3441
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SE
Date MSDS Prepared: 28DEC89
Safety Data Review Date: 24AUG93
Preparer's Company: SUPELCO INC
Preparer's St Or P. O. Box: SUPELCO PARK
Preparer's City: BELLEFONTE
Preparer's State: PA
Preparer's Zip Code: 16823-0048
MSDS Serial Number: BRWFG

Ingredients/Identity Information

Proprietary: NO
Ingredient: VINYLIDENE CHLORIDE, 1,1-DICHLOROETHENE, 1,1-DICHLOROETHYLENE, VDC
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: KV9275000
CAS Number: 75-35-4
OSHA PEL: 1 PPM
ACGIH TLV: 20 MG/CUM
Other Recommended Limit: 5 PPM

Physical/Chemical Characteristics

Appearance And Odor: CLEAR COLORLESS LIQUID.
Boiling Point: 32C
Melting Point: -123C
Specific Gravity: 1.21
Solubility In Water: INSOLUBLE
Percent Volatiles By Volume: 10

Fire and Explosion Hazard Data

Flash Point: 14F
Lower Explosive Limit: 7.3%
Upper Explosive Limit: 16%
Extinguishing Media: CO2, DRY CHEMICAL, ALCOHOL FOAM
Special Fire Fighting Proc: WEAR SELF-CONTAINED BREATHING APPARATUS WHEN FIGHTING A CHEMICAL FIRE.
Unusual Fire And Expl Hazrds: READILY ADSORBS OXYGEN TO FORM EXPLOSIVE PEROXIDES.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): IGNITION SOURCES, HEAT
Materials To Avoid: OXIDIZING AGENTS, OXYGEN
Hazardous Decomp Products: EXPLOSIVE PEROXIDES, TOXIC VAPORS OF HYDROGEN CHLORIDE
Hazardous Poly Occur: YES
Conditions To Avoid (Poly): COPPER &/OR ALUMINUM

Health Hazard Data

LD50-LC50 Mixture: ORAL LD50 (RAT): 200 MG/KG
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: NO
Health Haz Acute And Chronic: EYES: IRRITATION. INHALATION: IRRITATION TO NOSE & THROAT, NARCOSIS.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: SEE INGREDIENTS.
IRRITATION TO NOSE & THROAT.
Emergency/First Aid Proc: EYES: FLUSH W/WATER FOR 15 MINS. SKIN: PROMPTLY WASH W/MILD SOAP & LARGE VOLUMES OF WATER. REMOVE CONTAMINATED CLOTHING. INHALATION: IMMEDIATELY MOVE TO FRESH AIR. GIVE OXYGEN IF BREATHING IS CONTACT A PHYSICIAN. OBTAIN MEDICAL ATTENTION IN ALL CASES.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: TAKE UP W/ABSORBENT MATERIAL. VENTILATE AREA. ELIMINATE ALL IGNITION SOURCES. FLUSH AREA W/WATER.
Waste Disposal Method: DISPOSE IN ACCORDANCE W/FEDERAL, STATE, OR LOCAL REGULATIONS.
Precautions-Handling/Storing: STORE IN SEALED CONTAINER IN EXPLOSION PROOF REFRIGERATOR. KEEP AWAY FROM HEAT, IGNITION SOURCES, OXIDIZERS.
Other Precautions: AVOID EYE OR SKIN CONTACT. AVOID BREATHING VAPORS.

Control Measures

Respiratory Protection: WEAR FACE MASK W/ORGANIC VAPOR CANISTER.
Ventilation: USE ONLY IN EXHAUST HOOD.
Protective Gloves: REQUIRED
Eye Protection: PROTECTIVE GLASSES
Work Hygienic Practices: REMOVE/LAUNDER CONTAMINATED CLOTHING BEFORE REUSE.

Transportation Data

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 09SEP93
Label Date: 09SEP93
Label Status: F
Common Name: 48526 1,1-DICHLOROETHYLENE 5G
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Moderate: X
Contact Hazard-Moderate: X
Fire Hazard-Severe: X
Reactivity Hazard-Slight: X

Special Hazard Precautions: EYES: IRRITATION. INHALATION: IRRITATION TO EYES, SKIN, NOSE, & THROAT. EYES, SKIN, TEETH, RESPIRATORY & DIGESTIVE TRACTS.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: SUPELCO INC
Label Street: SUPELCO PARK
Label City: BELLEFONTE
Label State: PA
Label Zip Code: 16823-0048
Label Country: US
Label Emergency Number: 814-359-3441
Year Procured: UNK

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J T BAKER -- TETRACHLOROETHYLENE, 5380
MATERIAL SAFETY DATA SHEET
NSN: 681000N044834
Manufacturer's CAGE: 70829
Part No. Indicator: A
Part Number/Trade Name: TETRACHLOROETHYLENE, 5380

General Information

Company's Name: J T BAKER
Company's Street: 222 RED SCHOOL LANE
Company's City: PHILLIPSBURG
Company's State: NJ
Company's Country: US
Company's Zip Code: 08865
Company's Emerg Ph #: 800-424-8802;800-424-9300(CHEMTREC)
Company's Info Ph #: 201-859-2151
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 01MAY89
Safety Data Review Date: 08SEP95
MSDS Serial Number: BTMGN
Hazard Characteristic Code: T6

Ingredients/Identity Information

Proprietary: NO
(ORAL,RAT) 3005 MG/KG.
Ingredient Sequence Number: 01
Percent: 99-100
NIOSH (RTECS) Number: KX3850000
CAS Number: 127-18-4
OSHA PEL: 25 PPM
ACGIH TLV: 50 PPM;200 PPM STEL

Physical/Chemical Characteristics

Appearance And Odor: CLEAR, COLORLESS LIQUID; CHLOROFORM-LIKE ODOR.
Boiling Point: 249F,121C
Melting Point: -7F,-22C
Vapor Pressure (MM Hg/70 F): 13 @ 20C
Vapor Density (Air=1): 5.8
Specific Gravity: 1.62 (H*2O=1)
Evaporation Rate And Ref: 2.8 (BUTYL ACETATE=1)
Solubility In Water: NEGLIGIBLE (50 PPM,
A NIOSH/MSHA APPROVED SELF-CONTAINED BREATHING APPARATUS IS ADVISED.
Ventilation: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS. VENT HOOD.
Protective Gloves: VITON GLOVES.
Eye Protection: ANSI APPVD SFTY GOGGS & FCSHLD (FP N)
Other Protective Equipment: ANSI APPROVED EMERGENCY EYE WASH & DELUGE SHOWER (FP N). UNIFORM, PROTECTIVE SUIT. LAB COAT & APRON.
Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING.
Suppl. Safety & Health Data: EXPLAN OF CARCIN:TO BE CARCINOGEN. OTHER PREC:CLOTHING. USE W/ADEQUATE VENTILATION. KEEP OUT OF REACH OF CHILDREN. HARMFUL - STOW AWAY FROM FOOD STUFFS.

Transportation Data

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 22OCT93
Label Date: 22OCT93
Label Status: G
Common Name: TETRACHLOROETHYLENE, 5380
Chronic Hazard: YES
Signal Word: WARNING!
Acute Health Hazard-Moderate: X
Contact Hazard-Moderate: X
Fire Hazard-None: X
Reactivity Hazard-Slight: X
Special Hazard Precautions: MAY PRODUCE HAZARDOUS DECOMPOSITION PRODUCTS. ACUTE:INHAL:HEADACHE, NAUSEA, VOMITING, DIZZINESS, DROWSINESS, WEAKNESS, CONFUSION, IRRITATION OF RESPIRATORY TRACT, CNS DEPRESSION, RESPIRATORY FAILURE, NARCOSIS, UNCONSCIOUSNESS. SKIN:IRRITATION, PROLONGED CONTACT MAY CAUSE DERMATITIS. EYE:IRRITATION, MAY CAUSE TEMPORARY CORNEAL DAMAGE. INGEST:NAUSEA, VOMITING, HEADACHES, DIZZINESS, GASTROINTESTINAL IRRITATION, CNS DEPRESSION. CHRONIC:CANCER HAZARD. CONTAINS TETRACHLOROETHYLENE WHICH IS LISTED AS A LIVER CARCINOGEN TO LAB ANIMALS (FP N). DAMAGE TO LIVER, KIDNEYS, LUNGS, SPLEEN, CNS. TARGET ORGANS:LIVER, KIDNEYS, EYES, RESP SYSTEM, LUNGS, CNS.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: J T BAKER
Label Street: 222 RED SCHOOL LANE
Label City: PHILLIPSBURG
Label State: NJ
Label Zip Code: 08865
Label Country: US
Label Emergency Number: 800-424-8802;800-424-9300(CHEMTREC)

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SUPELCO -- 48622 CHLOROMETHANE 0.2 MG-ML,1ML
MATERIAL SAFETY DATA SHEET
NSN: 685000F026089
Manufacturer's CAGE: 54968
Part No. Indicator: A
Part Number/Trade Name: 48622 CHLOROMETHANE 0.2 MG/ML,1ML

General Information

Company's Name: SUPELCO INC
Company's Street: SUPELCO PARK
Company's City: BELLEFONTE
Company's State: PA
Company's Country: US
Company's Zip Code: 16823-0048
Company's Emerg Ph #: 814-359-3441
Company's Info Ph #: 804-359-3441
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SE
Date MSDS Prepared: 28DEC89
Safety Data Review Date: 21JAN93
Preparer's Company: SUPELCO INC
Preparer's St Or P. O. Box: SUPELCO PARK
Preparer's City: BELLEFONTE
Preparer's State: PA
Preparer's Zip Code: 16823-0048
MSDS Serial Number: BQHLG

Ingredients/Identity Information

Proprietary: NO
Ingredient: METHYL CHLORIDE (SUSPECTED HUMAN CARCINOGEN BY ACGIH)
Ingredient Sequence Number: 01
Percent: 0.02%
NIOSH (RTECS) Number: PA6300000
CAS Number: 74-87-3
OSHA PEL: 100 PPM
ACGIH TLV: S,50 PPM/100 STEL 94
Other Recommended Limit: 50 PPM

Proprietary: NO
Ingredient: METHANOL (METHYL ALCOHOL), COLUMBIAN SPIRITS
Ingredient Sequence Number: 02
Percent: 99.98%
NIOSH (RTECS) Number: PC1400000
CAS Number: 67-56-1
OSHA PEL: S,200PPM/250STEL
ACGIH TLV: S,200PPM/250STEL; 93
Other Recommended Limit: 200 PPM

Physical/Chemical Characteristics

Appearance And Odor: CLEAR COLORLESS LIQUID
Boiling Point: 65C
Melting Point: -98C
Vapor Pressure (MM Hg/70 F): 100
Vapor Density (Air=1): 1.10
Specific Gravity: 0.790
Evaporation Rate And Ref: (ETHER = 1): >1
Solubility In Water: COMPLETE
Percent Volatiles By Volume: 100%

Fire and Explosion Hazard Data

Flash Point: 50F
Lower Explosive Limit: 6.0
Upper Explosive Limit: 36.5
Extinguishing Media: CO2, DRY CHEMICAL, ALCOHOL FOAM
Special Fire Fighting Proc: WEAR SELF-CONTAINED BREATHING APPARATUS WHEN FIGHTING CHEMICAL FIRE.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): ALL SOURCES OF IGNITION.
Materials To Avoid: OXIDIZING AGENTS, CHROMIC ANHYDRIDE, LEAD PERCHLORATE, PERCHLORIC ACIDS
Hazardous Poly Occur: NO

Health Hazard Data

LD50-LC50 Mixture: LD50 ORAL (RAT): 5628 MG/KG METHANOL
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: NO
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: INHALATION: HARMFUL, HEADACHE NAUSEA. INGESTION: FATAL, GASTROINTESTINAL DISTURBANCES, BLINDNESS.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: SEE INGREDIENTS
Signs/Symptoms Of Overexp: INHALATION: HARMFUL. INGESTION: FATAL, BLINDNESS.
WASH W/LARGE AMOUNTS OF WATER. INHALATION: REMOVE TO FRESH AIR. IF BREATHING HAS STOPPED, GIVED ARTIFICAL RESPIRATION. INGESTION: NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. NEVER TRY TO MAKE AN UNCONSCIOUS VOMIT. GIVE 2 TABLESPOONS OF BAKING SODA IN A GLASS OF WATER PRESS FINGERS TO BACK OF THROAT TO INDUCE VOMIT. OBTAIN MEDICAL ATTN.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: TAKE UP W/ABSORBENT MATERIAL. VENTILATE AREA. ELIMINATE ALL IGNITION SOURCES.
Waste Disposal Method: DISPOSE OF IN ACCORDANCE W/FEDERAL, STATE & LOCAL REGULATIONS.
Precautions-Handling/Storing: STORE IN SEALED CONTAINER IN COOL, DRY LOCATION. KEEP AWAY FROM OXIDIZERS. KEEP AWAY FROM IGNITION SOURCES.
Other Precautions: AVOID EYE/SKIN CONTACT. AVOID BREATHING VAPORS.

Control Measures

Respiratory Protection: WEAR FACE MASK W/ORGANIC VAPOR CANISTER.
Ventilation: USE ONLY IN WELL VENTILATED AREA.
Protective Gloves: RUBBER
Eye Protection: PROTECTIVE GLASSES
Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING.

Transportation Data

Disposal Data

Label Data

Label Required: YES

Technical Review Date: 21JAN93
Label Date: 12JAN93
Label Status: F
Common Name: 48622 CHLOROMETHANE 0.2 MG/ML,1ML
Chronic Hazard: NO
Signal Word: DANGER!
Acute Health Hazard-Severe: X
Contact Hazard-Moderate: X
Fire Hazard-Slight: X
Reactivity Hazard-Slight: X
Special Hazard Precautions: INHALATION: HARMFUL, HEADACHE NAUSEA. INGESTION: FATAL, GASTROINTESTINAL DISTURBANCES. EYES: BLINDNESS. SUSPECTED CARCINOGEN BY ACGIH: METHYL CHLORIDE. CARCINOGEN: CARBON BLACK IS A SUSPECTED HUMAN CARCINOGEN.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: SUPELCO INC
Label Street: SUPELCO PARK
Label City: BELLEFONTE
Label State: PA
Label Zip Code: 16823-0048
Label Country: US
Label Emergency Number: 814-359-3441
Year Procured: UNK

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CHEMICAL NAME
VINYL CHLORIDE

CHEMICAL ABSTRACTS SERVICE REGISTRY NUMBER
75-01-4

REGISTRY OF TOXIC EFFECTS OF CHEMICALS NUMBER
KU9625000

CHEMICAL FORMULA
C2H3CL

SYNONYMS
CHLOROETHYLENE
CHLOROETHENE
MONOCHLOROETHYLENE
VC
VCM
VINYL CHLORIDE MONOMER
ETHYLENE, CHLORO-
CHLORETHENE
CHLORETHYLENE
ETHYLENE MONOCHLORIDE
MONOCHLOROETHENE
TROVIDUR
VINYL C MONOMER
ETHENE, CHLORO-
EXON 470
VINYL CHLORIDE, INHIBITED
STCC 4905792
RCRA U043
UN 1086
OHS24940

PHYSICAL DESCRIPTION
COLORLESS GAS WITH A MILD, SWEET ODOR.

CHEMICAL AND PHYSICAL PROPERTIES
MOLECULAR WEIGHT: 62.5
BOILING POINT AT 1 ATM, F: 9 F (-13 C)
SOLUBILITY IN WATER, G/100 G WATER AT 20C: 0.25%
FLASH POINT, CLOSED CUP, F (OR OPEN CUP IF 0C): -108 F (-78 C)
VAPOR PRESSURE @ 20 C, MMHG: 2515.6 MMHG @ 21.1 C
MELTING POINT, F: -245 F (-154 C)
UPPER EXPLOSIVE LIMIT IN AIR, % BY VOLUME: 33%
LOWER EXPLOSIVE LIMIT IN AIR, % BY VOLUME: 3.6%
AUTOIGNITION TEMPERATURE: 882 F (472 C)
SPECIFIC GRAVITY: 0.9106
VAPOR DENSITY (AIR=1): 2.2
ODOR THRESHOLD: 260 PPM

FIRE AND EXPLOSION
FIRE AND EXPLOSION HAZARDS
DANGEROUS FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

DANGEROUS EXPLOSION HAZARD WHEN EXPOSED TO HEAT OR FLAME.

VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE OF IGNITION AND FLASH BACK.

VAPOR-AIR MIXTURES ARE EXPLOSIVE.

DUE TO LOW ELECTROCONDUCTIVITY OF THE SUBSTANCE, FLOW OR AGITATION MAY GENERATE ELECTROSTATIC CHARGES RESULTING IN SPARKS WITH POSSIBLE IGNITION.

FIREFIGHTING MEDIA
DRY CHEMICAL OR CARBON DIOXIDE
(1993 EMERGENCY RESPONSE GUIDEBOOK, RSPA P 5800.6).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM
(1993 EMERGENCY RESPONSE GUIDEBOOK, RSPA P 5800.6).

FIREFIGHTING
MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. FOR MASSIVE FIRE IN CARGO AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES; IF THIS IS IMPOSSIBLE, WITHDRAW FROM AREA AND LET FIRE BURN. WITHDRAW IMMEDIATELY IN CASE OF RISING SOUND FROM VENTING SAFETY DEVICE OR ANY DISCOLORATION OF TANK DUE TO FIRE. COOL CONTAINER WITH WATER USING UNMANNED DEVICE UNTIL WELL AFTER FIRE IS OUT. LET TANK, TANK CAR OR TANK TRUCK BURN UNLESS LEAK CAN BE STOPPED; WITH SMALLER TANKS OR CYLINDERS, EXTINGUISH/ISOLATE FROM OTHER FLAMMABLES. ISOLATE FOR 1/2 MILE IN ALL DIRECTIONS IF TANK, RAIL CAR OR TANK TRUCK IS INVOLVED IN FIRE (1993 EMERGENCY RESPONSE GUIDEBOOK, RSPA P 5800.6, GUIDE PAGE 17).

EXTINGUISH ONLY IF FLOW CAN BE STOPPED; USE WATER IN FLOODING QUNATITIES AS FOG. COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER, APPLY FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING TOXIC VAPORS, KEEP UPWIND. EVACUATE TO A RADIUS OF 2500 FEET FOR UNCONTROLLABLE FIRES. CONSIDER EVACUATION OF DOWNWIND AREA IF MATERIAL IS LEAKING.

STOP FLOW OF GAS. (NFPA 325, FIRE HAZARD PROPERTIES OF FLAMMABLE LIQUIDS, GASES, AND VOLATILE SOLIDS, 1994).

INCOMPATIBILITIES
ACETYLIDE-FORMING MATERIALS: MAY FORM EXPLOSIVE COMPOUNDS
ALUMINUM: MAY CAUSE POLYMERIZATION
COPPER AND ALLOYS: MAY FORM EXPLOSIVE COMPOUNDS
IRON: MAY CORRODE IN THE PRESENCE OF WATER
MONEL: MAY FORM EXPLOSIVE COMPOUND
NITROGEN OXIDES: EXPLODES
OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD
PEROXIDES: MAY INITIATE POLYMERIZATION
STEEL: MAY CORRODE IN THE PRESENCE OF WATER

FORMS UNSTABLE PEROXIDES WHEN EXPOSED TO AIR WHICH MAY INITIATE POLYMERIZATION. MAY ALSO POLYMERIZE ON EXPOSURE TO HEAT OR LIGHT.

PERMISSIBLE EXPOSURE LIMIT AND TOXICOLOGY
1.0 PPM OSHA TWA; 5.0 PPM OSHA 15 MINUTE CEILING
0.5 PPM OSHA ACTION LEVEL AS AN 8 HOUR TWA
5.0 PPM ACGIH TWA; ACGIH A1-CONFIRMED HUMAN CARCINOGEN
LOWEST FEASIBLE LIMIT NIOSH RECOMMENDED EXPOSURE CRITERIA
OSHA CARCINOGEN; KNOWN HUMAN CARCINOGEN (NTP)
HUMNA SUFFICIENT EVIDENCE FOR CARCINOGENICITY (IARC GROUP-1)
ANIMAL SUFFICIENT EVIDENCE FOR CARCINOGENICITY (IARC GROUP-1)
HUMAN CARCINOGEN (EPA - CATEGORY A)

REPRODUCTIVE EFFECTS DATA (RTECS); MUTAGENIC DATA (RTECS)
TUMORIGENIC DATA (RTECS)
AQUATIC TOXICITY RATING 0 (TLM96 >1000 PPM)
CERCLA HAZARD RATINGS - TOXICITY 3 - IGNITABILITY 3 - REACTIVITY 2 - PERSISTENCE 3

TOXICOLOGY: VINYL CHLORIDE IS AN EYE, SKIN AND MUCOUS MEMBRANE IRRITANT. FROSTBITE MAY OCCUR DUE TO THE RAPID EVAPORATION OF THE GAS. IT IS TOXIC BY INGESTION. VINYL CHLORIDE IS A CENTRAL NERVOUS SYSTEM DEPRESSANT. POISONING MAY AFFECT THE BLOOD, LIVER, AND LYMPHATIC AND RESPIRATORY SYSTEMS. ACUTE EXPOSURE MAY LEAD TO A BURNING SENSATION OF THE SOLES OF THE FEET, NARCOLEPSY AND ANESTHESIA. CHRONIC EXPOSURE MAY RESULT IN A PECULIAR TRIAD OF SYMPTOMS: MODIFICATION OF PERIPHERAL CIRCULATION RESULTING IN CYANOSIS, PALLOR AND THEN REDDNESS (RAYNAUD'S DISEASE); SKELETAL CHANGES OF DISTAL PHALANGES (ACROOSTEOLYSIS); AND SCLERODERMA LIKE SKIN CHANGES. STUDIES SHOW OCCUPATIONAL EXPOSURE RESULTED IN A SIGNIFICANT INCREASE IN ANGIOSARCOMAS OF THE LIVER, AND ALSO TUMORS OF THE BRAIN, LUNG AND HEMATOPOIETIC SYSTEMS. VINYL CHLORIDE WAS CARCINOGNEIC IN RATS, MICE AND HAMSTERS FOLLOWING ORAL AND INHALATION EXPOSURE, PRODUCING ANGIOSARCOMAS OF THE LIVER AND ALSO TUMORS AT VARIOUS SITES, AND WAS CARCINOGENIC IN RATS FOLLOWING PRENATAL EXPOSURE.

THE THRESHOLD LIMIT VALUE WAS ESTABLISHED TO PREVENT THE INCIDENCE OF CANCER, SPECIFICALLY OF ANGIOSARCOMA OF THE LIVER.

STIMULANTS, SUCH AS EPINEPHRINE, MAY INDUCE VENTRICULAR FIBRILLATION.

ORL-RAT LD50: 500 MG/KG IHL-RAT LC50: 18 PPH/15M
IHL-MAM LCLO: 200 PPM/18M

IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONCENTRATION
POTENTIAL CARCINOGEN
NIOSH

ROUTE OF ENTRY INTO BODY
INHALATION
SKIN ABSORPTION
INGESTION
SKIN OR EYE CONTACT

ORGANS AFFECTED BY THE SUBSTANCE
CENTRAL NERVOUS SYSTEM
KIDNEYS
LIVER
SPLEEN
BLOOD
LYMPHATIC SYSTEM
RESPIRATORY SYSTEM

SYMPTOMS
SKIN IRRITATION
EYE IRRITATION
MUCOUS MEMBRANE IRRITATION
DROWSINESS
VERTIGO
CENTRAL NERVOUS SYSTEM DEPRESSION
INCOORDINATION
PARESTHESIA
VISUAL DISTURBANCE
HEARING LOSS
CARDIAC ARRHYTHMIA

DIZZINESS
LIGHTHEADEDNESS
DISORIENTATION
NAUSEA
HEADACHE
FATIGUE
MUSCLE PAIN
DYSPNEA
ANESTHESIA
PULMONARY EDEMA
SENSORY CHANGES
POLYNEURITIS
LEUKOPENIA
WEIGHT LOSS
THROMBOCYTOPENIA
SPLEEN EFFECTS
RAYNAUD'S DISEASE
HEPATIC ANGIOSARCOMA
REPRODUCTIVE EFFECTS
FROSTBITE
ACROOSTEOLYSIS
LIVER DAMAGE
KIDNEY EFFECTS
RESPIRATORY PARALYSIS
LIVER CANCER
DERMATITIS
VESICULATION
CARDIAC ARREST
TUMORS IN EXPERIMENTAL ANIMALS

FIRST AID PROCEDURES

IF THIS SUBSTANCE GETS INTO THE EYES, IMMEDIATELY WASH THE EYES WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). IF FROSTBITE IS PRESENT, WARM WATER MAY BE PREFERRED. GET MEDICAL ATTENTION IMMEDIATELY.

IF THIS CHEMICAL GETS ON THE SKIN, REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF THE CHEMICAL REMAINS. IN CASE OF FROSTBITE, WARM AFFECTED AREA IN WARM WATER AT A TEMPERATURE OF 107 F. IF WARM WATER IS NOT AVAILABLE OR IMPRACTICAL TO USE, GENTLY WRAP AFFECTED PART IN BLANKETS. ENCOURAGE VICTIM TO EXERCISE AFFECTED PART WHILE IT IS BEING WARMED. ALLOW CIRCULATION TO RETURN NATURALLY. (MATHESON GAS, 6TH ED.). GET MEDICAL ATTENTION IMMEDIATELY.

IF THIS CHEMICAL HAS BEEN INHALED, REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION. MAINTAIN AIRWAY AND BLOOD PRESSURE AND ADMINISTER OXYGEN IF AVAILABLE. KEEP AFFECTED PERSON WARM AND AT REST. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

IF THIS SUBSTANCE IS INGESTED AND EXTENSIVE VOMITING HAS NOT OCCURED, THIS SUBSTANCE SHOULD BE REMOVED BY EMESIS OR GASTRIC LAVAGE PROVIDED THAT THE PATIENT IS CONSCIOUS AND CONVULSIONS ARE NOT PRESENT. DO NOT ATTEMPT TO MAKE AN UNCONSCIOUS PERSON VOMIT. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY (DREISBACH, HANDBOOK OF POISONING 12TH ED.). TREATMENT SHOULD BE PERFORMED BY QUALIFIED MEDICAL

PERSONNEL.

GASTRIC LAVAGE - GIVE PATIENT GLASS OF WATER PRIOR TO PASSING OF STOMACH TUBE. LAY PATIENT ON ONE SIDE, WITH HEAD LOWER THAN WAIST. IMMOBILIZE A STRUGGLING PATIENT WITH A SHEET OR BLANKET. MEASURE DISTANCE ON TUBE FROM MOUTH TO EPIGASTRIUM, MARK TUBE WITH INDELIBLE MARKING OR TAPE. REMOVE DENTURES AND OTHER FOREIGN OBJECTS FROM THE MOUTH. OPEN MOUTH, USE GAG IF NECESSARY. EXTEND HEAD BY LIFTING CHIN. PASS TUBE OVER TONGUE AND TOWARD BACK OF THROAT WITHOUT EXTENDING HEAD OR NECK. IF OBSTRUCTION IS MET BEFORE THE MARK ON TUBE REACHES LEVELS OF THE TEETH, DO NOT FORCE, BUT REMOVE TUBE AND REPEAT PROCEDURE UNTIL TUBE PASSES TO MARK. PLACE END OF TUBE IN GLASS OF WATER. IF TUBE IS OBSTRUCTED WHEN INTRODUCED ABOUT HALFWAY TO THE MARK, IT MAY HAVE ENTERED TRACHEA.

AFTER TUBE IS PLACED IN STOMACH, ASPIRATE FIRST TO REMOVE STOMACH CONTENTS BY IRRIGATION SYRINGE. SAVE STOMACH CONTENTS FOR EXAMINATION, AND REPEAT INTRODUCTION AND WITHDRAWL OF 100-300 ML WARM WATER UNTIL AT LEAST 3 LITERS OF CLEAR RETURN ARE OBTAINED. USE ACTIVATED CHARCOAL AT BEGINNING OF LAVAGE TO AID IN POISON INACTIVATION. LEAVE 50 GRAMS OF CHARCOAL SUSPENDED IN WATER IN THE STOMACH. IF INTRODUCTION AND REMOVAL OF LAVAGE FLUID BY GRAVITY REQUIRES MORE THAN FIVE MINUTES, ASSIST WITH ASEPTO SYRINGE. PREVENT ASPIRATION WITH CUFFED ENDOTRACHEAL TUBE. AVOID GIVING LARGE QUANTITIES OF WATER.

IF PATIENT COMATOSE, INTUBATE TRACHEA WITH CUFFED ENDOTRACHEAL TUBE. SUCCINYLCHLORINE MAY BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL TO EASE INSERTION OF TRACHEAL CATHETER PRIOR TO PASSAGE OF STOMACH TUBE. PROCEDURE MUST BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL. (DREISBACH, HANDBOOK OF POISONING, 12TH ED.).

MEDICAL SURVEILLANCE

29CFR1910.1017
THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION REQUIRES EMPLOYEES TO PROVIDE A MEDICAL SURVEILLANCE PROGRAM FOR EACH EMPLOYEE EXPOSED, WITHOUT REGARD TO THE USE OF RESPIRATORS, TO VINYL CHLORIDE IN EXCESS OF THE ACTION LEVEL.
THIS MEDICAL SURVEILLANCE PROGRAM SHALL CONSIST OF:

(1) INITIAL MEDICAL EXAMINATION INCLUDING:
  (A) SPECIAL ATTENTION TO:
    (1) ENLARGEMENT OF LIVER, SPLEEN OR KIDNEYS
    (2) DYSFUNCTION OF LIVER, SPLEEN OR KIDNEYS
    (3) ABNORMALITIY OF SKIN, CONNECTIVE TISSUE OR LUNGS
  (B) MEDICAL HISTORY INCLUDING:
    (1) ALCOHOL INTAKE
    (2) HEPATITIS HISTORY
    (3) WORK HISTORY AND PAST EXPOSURE TO POTENTIAL HEPATOTOXIC AGENTS
    (4) BLOOD TRANSFUSION HISTORY
    (5) HOSPITALIZATION HISTORY
  (C) SERUM SPECIMEN DETERMINING:
    (1) TOTAL BILIRUBIN
    (2) ALKALINE PHOSPHATASE
    (3) SGOT
    (4) SGPT
    (5) GGTP
(2) PERIODIC EXAMINATION - PERFORMING ALL INITIAL EXAM TESTS
  (A) EVERY 6 MONTHS FOR EACH EMPLOYEE WHO HAS BEEN EMPLOYED IN

VINYL CHLORIDE OR POLYVINYL CHLORIDE MANUFACTURING FOR 10 YEARS OR LONGER
(B) ANNUALLY FOR ALL OTHER EMPLOYEES
(3) EMERGENCY EXAMINATION - ANY EMPLOYEE EXPOSED SHOULD BE AFFORDED APPROPRIATE MEDICAL SURVEILLANCE

OTHER MEDICAL SURVEILLANCE RECOMMENDED:

GENERAL MEDICAL HISTORY
40CFR717 RECORDS AND REPORTS OF ALLEGATIONS THAT CHEMICAL SUBSTANCES CAUSE SIGNIFICANT ADVERSE REACTIONS TO HEALTH OR THE ENVIRONMENT
TOXIC SUBSTANCES CONTROL ACT (TSCA) SECTION 8(C) RULE REQUIRES MANUFACTURERS AND CERTAIN PROCESSORS OF CHEMICAL SUBSTANCES AND MIXTURES TO KEEP RECORDS OF SIGNIFICANT ADVERSE REACTIONS TO EMPLOYEE HEALTH FOR 30 YEARS.
PHYSICIAN PRE-PLACEMENT AND ANNUAL EXAMS
ATTENTION TO SMOKING, ALCOHOL, MEDICATION, AND EXPOSURE TO CARCINOGENS
COMPLETE BLOOD COUNT
URINALYSIS
14 BY 17 CHEST P.A. X-RAY
MEDICAL WARNING FOR REFUSAL OF MEDICAL EXAMINATION
29CFR1910.20 OSHA STANDARD
SUBPART C - GENERAL SAFETY AND HEALTH PROVISIONS
PROVIDES FOR EMPLOYEE, DESIGNATED REPRESENTATIVE, AND OSHA ACCESS TO EMPLOYER-MAINTAINED EXPOSURE AND MEDICAL RECORDS RELEVANT TO EMPLOYEES EXPOSED TO TOXIC SUBSTANCES AND HARMFUL PHYSICAL AGENTS.
53FR38140 9/29/88 (AMENDED)

SPECIAL DIAGNOSTIC TESTS
HAND P.A. X-RAY FOR ACROOSTEOLYSIS

CERTIFICATIONS
HEALTH STATUS CLASSIFICATION

OSHA RESPIRATOR CERTIFICATION 29CFR1910.134

DEPARTMENT OF TRANSPORTATION IF OPERATES HEAVY EQUIPMENT

EMPLOYEE HAZARDOUS MATERIALS EDUCATION RECEIPT

EMPLOYEE MEDICAL RECORDS RECEIPT

TOXIC SUBSTANCES CONTROL ACT (TSCA) SECTION 8(C) RULE REQUIRES MANUFACTURERS AND CERTAIN PROCESSORS OF CHEMICAL SUBSTANCES AND MIXTURES TO KEEP RECORDS OF SIGNIFICANT ADVERSE REACTIONS TO EMPLOYEE HEALTH FOR 30 YEARS. CONTACT: CHARLES L. ELKINS, OFFICE OF TOXIC SUBSTANCES, EPA (202) 382-3813.

MEDICAL WARNING REQUIRED FOR MEDICAL EXAM REFUSAL SIGNED BY EMPLOYEE

PROTECTIVE CLOTHING AND EQUIPMENT
29CFR1910.1017 VINYL CHLORIDE
EMPLOYEES ENGAGED IN HAZARDOUS OPERATIONS, INCLUDING ENTRY OF VESSELS TO CLEAN POLYVINYL CHLORIDE RESIDUE FROM VESSEL WALLS, SHALL BE PROVIDED

WITH AND REQUIRED TO WEAR PROTECTIVE GARMENTS TO PREVENT SKIN CONTACT WITH LIQUID VINYL CHLORIDE OR WITH POLYVINYL CHLORIDE RESIDUE FROM VESSEL WALLS. THE PROTECTIVE GARMENTS SHALL BE SELECTED FOR THE OPERATION AND ITS POSSIBLE EXPOSURE CONDITIONS. PROTECTIVE GARMENTS SHALL BE PROVIDED CLEAN AND DRY FOR EACH USE.

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ACGIH "GUIDELINES FOR THE SELECTION OF CHEMICAL PROTECTIVE CLOTHING" INDICATED THE FOLLOWING PROTECTIVE RATINGS FOR MATERIALS COMMONLY USED FOR PROTECTIVE CLOTHING. THESE RATINGS ARE BASED PRIMARILY ON QUANTITATIVE TEST RESULTS AND QUALITATIVE RESISTANCE INFORMATION. (THE RECOMMENDATIONS APPLY TO THE PURE SUBSTANCE ONLY; BREAKTHROUGH-TIME MAY VARY FOR MIXTURES.) (A "+" DESIGNATES A BLEND OF MATERIALS, WHILE A "/" DESIGNATES A COATED OR LAMINATED MATERIAL.)

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VINYL CHLORIDE:

EXCELLENT/GOOD:

NONE INDICATED

GOOD/FAIR:

SILVERSHIELD

CHLORINATED POLYETHYLENE

VITON

POOR/FAIR:

BUTYL RUBBER

POLYVINYL CHLORIDE

POOR:

NITRILE RUBBER

EYE PROTECTION

NO SPECIFIC REGULATIONS UNDER 29CFR1910.

FOLLOWING INFORMATION FROM NIOSH/OSHA "OCCUPATIONAL HEALTH GUIDELINES FOR CHEMICAL HAZARDS":

EMPLOYERS SHALL PROVIDE AND ENSURE THAT EMPLOYEES USE SPLASH-PROOF GOGGLES WHICH COMPLY WITH 29CFR1910.133(A)(2)-(A)(6) WHERE THERE IS ANY POSSIBILITY OF THIS LIQUID CONTACTING THE EYES.

WASHING CHEMICALS FROM THE SKIN

NO SPECIFIC REGULATIONS UNDER 29CFR1910.

FOLLOWING INFORMATION FROM NIOSH/OSHA "OCCUPATIONAL HEALTH GUIDELINES FOR CHEMICAL HAZARDS":

EMPLOYERS SHALL ENSURE THAT EMPLOYEES WHOSE SKIN BECOMES CONTAMINATED WITH THIS SUBSTANCE IMMEDIATELY WASH OR SHOWER TO REMOVE ANY CONTAMINANT FROM THE SKIN.

ROUTINE CHANGING OF WORK CLOTHING

NO SPECIFIC REGULATIONS UNDER 29CFR1910.

FOLLOWING INFORMATION FROM NIOSH/OSHA "OCCUPATIONAL HEALTH GUIDELINES FOR CHEMICAL HAZARDS":

EMPLOYERS SHALL ENSURE THAT EMPLOYEES WHOSE CLOTHING HAS HAD ANY POSSIBILITY OF BEING CONTAMINATED WITH THIS SUBSTANCE CHANGE INTO UNCONTAMINATED CLOTHING BEFORE LEAVING THE WORK PREMISES.

CLOTHING REMOVAL FOLLOWING ACCIDENTAL CONTAMINATION

NO SPECIFIC REGULATIONS UNDER 29CFR1910.

FOLLOWING INFORMATION FROM NIOSH/OSHA "OCCUPATIONAL HEALTH GUIDELINES

FOR CHEMICAL HAZARDS":

EMPLOYERS SHALL ENSURE THAT NON-IMPERVIOUS CLOTHING WHICH BECOMES CONTAMINATED WITH THIS SUBSTANCE BE REMOVED IMMEDIATELY AND NOT REWORN UNTIL THE SUBSTANCE IS REMOVED FROM THE CLOTHING.

SPECIFIC EMERGENCY PROVISIONS

29CFR1910.1017 VINYL CHLORIDE

A WRITTEN OPERATIONAL PLAN FOR EMERGENCY SITUATIONS SHALL BE DEVELOPED FOR EACH FACILITY STORING, HANDLING OR OTHERWISE USING VINYL CHLORIDE AS A LIQUID OR COMPRESSED GAS. APPROPRIATE PORTIONS OF THE PLAN SHALL BE IMPLEMENTED IN THE EVENT OF AN EMERGENCY. THE PLAN SHALL SPECIFICALLY PROVIDE THAT:

(1) EMPLOYEES ENGAGED IN HAZARDOUS OPERATIONS OR CORRECTING SITUATIONS OF EXISTING HAZARDOUS RELEASES SHALL BE EQUIPPED AS REQUIRED IN PARAGRAPH (H) OF THIS SECTION.

(2) OTHER EMPLOYEES NOT SO EQUIPPED SHALL EVACUATE THE AREA AND NOT RETURN UNTIL CONDITIONS ARE CONTROLLED BY THE METHODS REQUIRED IN PARAGRAPH (F) OF THIS SECTION AND THE EMERGENCY IS ABATED.

FOLLOWING INFORMATION FROM NIOSH/OSHA "OCCUPATIONAL HEALTH GUIDELINES FOR CHEMICAL HAZARDS":

WHERE THERE IS ANY POSSIBILITY OF EXPOSURE OF AN EMPLOYEE'S BODY TO THIS SUBSTANCE, EMPLOYERS SHALL PROVIDE FACILITIES FOR QUICK DRENCHING OF THE BODY WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, EMPLOYERS SHALL PROVIDE AN EYE-WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

RESPIRATOR SELECTION

VINYL CHLORIDE

THE FOLLOWING RESPIRATORS ARE THE MINIMUM LEGAL REQUIREMENTS AS SET FORTH BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION FOUND IN 29CFR1910, SUBPART Z.

UNKNOWN OR ABOVE 3600 PPM

- OPEN-CIRCUIT, SELF-CONTAINED BREATHING APPARATUS, PRESSURE DEMAND TYPE, WITH FULL FACEPIECE

NOT OVER 3600 PPM

- COMBINATION TYPE 'C' SUPPLIED-AIR RESPIRATOR, PRESSURE DEMAND TYPE, WITH A FULL OR HALF FACEPIECE AND AUXILIARY SELF-CONTAINED AIR SUPPLY
- COMBINATION TYPE SUPPLIED AIR RESPIRATOR, CONTINUOUS FLOW TYPE, WITH A FULL OR HALF FACEPIECE, AND AUXILIARY SELF-CONTAINED AIR SUPPLY

NOT OVER 1000 PPM

- TYPE 'C' SUPPLIED-AIR RESPIRATOR, CONTINUOUS FLOW TYPE, WITH A FULL OR HALF FACEPIECE, HELMET OR HOOD

NOT OVER 100 PPM

- COMBINATION TYPE 'C' SUPPLIED-AIR RESPIRATOR, DEMAND TYPE, WITH A FULL FACEPIECE, AND AUXILIARY SELF-CONTAINED AIR SUPPLY
- OPEN-CIRCUIT SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE IN DEMAND MODE

- TYPE 'C' SUPPLIED-AIR RESPIRATOR, DEMAND TYPE, WITH FULL FACEPIECE

NOT OVER 25 PPM
- A POWERED AIR-PURIFYING RESPIRATOR WITH HOOD, HELMET, OR FULL OR HALF FACEPIECE, AND A CANISTER WHICH PROVIDES A SERVICE LIFE OF AT LEAST 4 HOURS FOR CONCENTRATIONS OF VINYL CHLORIDE UP TO 25 PPM
- GAS MASK, FRONT- OR BACK-MOUNTED CANISTER WHICH PROVIDES A SERVICE LIFE OF AT LEAST 4 HOURS FOR CONCENTRATIONS OF VINYL CHLORIDE UP TO 25 PPM

NOT OVER 10 PPM
- COMBINATION TYPE 'C' SUPPLIED-AIR RESPIRATOR, WITH A HALF FACEPIECE AND AUXILIARY SELF-CONTAINED AIR SUPPLY
- TYPE 'C' SUPPLIED-AIR RESPIRATOR, DEMAND TYPE, WITH A HALF FACEPIECE
- ANY CHEMICAL CARTRIDGE RESPIRATOR WITH AN ORGANIC VAPOR CARTRIDGE WHICH PROVIDES A SERVICE LIFE OF AT LEAST 1 HOUR FOR CONCENTRATIONS OF VINYL CHLORIDE

ENTRY INTO UNKNOWN CONCENTRATIONS OR CONCENTRATIONS GREATER THAN 36,000 PPM (LOWER EXPLOSION LIMIT) MAY BE MADE ONLY FOR THE PURPOSES OF LIFE RESCUE; AND,
ENTRY INTO CONCENTRATIONS OF LESS THAN 36,000 PPM, BUT GREATER THAN 3600 PPM MAY BE MADE ONLY FOR THE PURPOSES OF LIFE RESUE, FIREFIGHTING OR SECURING EQUIPMENT SO AS TO PREVENT A GREATER HAZARD OF RELEASE OF VINYL CHLORIDE.

THE FOLLOWING RESPIRATORS AND MAXIMUM USE CONCENTRATIONS ARE RECOMMENDATIONS BY THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, NIOSH POCKET GUIDE TO CHEMICAL HAZARDS OR NIOSH CRITERIA DOCUMENTS.

ANY DETECTABLE CONC
- SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACE-PIECE OPERATED IN PRESSURE-DEMAND OR POSITIVE-PRESSURE MODE
- SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE WITH AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN POSITIVE PRESSURE MODE

ESCAPE
- GAS MASK WITH A CANISTER PROVIDING PROTECTION AGAINST SPECIFIC COMPOUND OF CONCERN (CHIN-STYLE OR FRONT- OR BACK-MOUNTED CANISTER)
- APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS

FIREFIGHTING
- SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACE-PIECE OPERATED IN PRESSURE-DEMAND OR POSITIVE-PRESSURE MODE
- SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE WITH AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN POSITIVE PRESSURE MODE

STATUS OF REGULATORY ENFORCEMENT

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FEDERAL REGULATIONS

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29CFR1910.1200 OSHA HAZARD COMMUNICATION STANDARD
REQUIRES CHEMICAL MANUFACTURERS AND IMPORTERS TO ASSESS THE HAZARDS OF CHEMICALS WHICH THEY PRODUCE OR IMPORT, AND ALL EMPLOYERS TO PROVIDE INFORMATION TO THEIR EMPLOYEES CONCERNING HAZARDOUS CHEMICALS BY MEANS OF A HAZARD COMMUNICATION PROGRAM, LABELS AND OTHER FORMS OF WARNING, MATERIAL SAFETY DATA SHEETS, AND INFORMATION AND TRAINING. REQUIRES DISTRIBUTORS TO TRANSMIT REQUIRED INFORMATION TO EMPLOYEES.

OSHA STANDARD 29CFR1910.1017 VINYL CHLORIDE

29CFR1910.1450 SUBJECT TO OSHA STANDARD REGULATING OCCUPATIONAL EXPOSURE TO HAZARDOUS CHEMICALS IN LABORATORIES.
EFFECTIVE DATE: 5/1/90
55FR3300 1/31/90

40CFR60 STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES
SUBPART VV - STANDARDS OF PERFORMANCE FOR EQUIPMENT LEAKS OF VOLATILE ORGANIC COMPOUNDS IN THE SYNTHETIC ORGANIC CHEMICALS MANUFACTURING INDUSTRY

40CFR61 NATIONAL EMMISION STANDARDS FOR HAZARDOUS AIR POLLUTANTS
SUBPART F - NATIONAL EMMISION STANDARD FOR VINYL CHLORIDE APPLIES TO
PLANTS WHICH PRODUCE: ETHYLENE DICHLORIDE BY REACTION OF OXYGEN AND HYDROGEN CHLORIDE WITH ETHYLENE; VINYL CHLORIDE BY ANY PROCESS; AND ONE OR MORE POLYMERS CONTAINING ANY FRACTION OF POLYMERIZED VINYL CHLORIDE.

40CFR401.15 GENERAL PROVISIONS
SUBCHAPTER N - EFFLUENT GUIDELINES AND STANDARDS
THIS SUBSTANCE LISTED AS A TOXIC POLLUTANT DESIGNATED PURSUANT TO SECTION 307(A)(1) OF THE CLEAN WATER ACT

40CFR116 DESIGNATION OF HAZARDOUS SUBSTANCES
SUBSTANCE DESIGNATED AS A HAZARDOUS SUBSTANCE UNDER SECTION 311(B)(2)(A) OF THE CLEAN WATER ACT. INCLUDES ANY ISOMERS AND HYDRATES, AS WELL AS ANY SOLUTIONS AND MIXTURES CONTAINING THESE SUBSTANCES.

40CFR122 EPA ADMINISTERED PERMIT PROGRAMS: THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
APPENDIX D - NPDES PERMIT APPLICATION TESTING REQUIREMENTS
TABLE II - ORGANIC TOXIC POLLUTANTS IN EACH OF FOUR FRACTIONS IN ANALYSIS BY GAS CHROMATOGRAPHY/MASS SPECTROSCOPY (GS/MS)

40CFR141.50 NATIONAL PRIMARY DRINKING WATER REGULATIONS
MAXIMUM CONTAMINANT LEVEL FOR VINYL CHLORIDE: 0.002 MG/L
EFFECTIVE DATE: 01/09/89
52FR25691 07/08/87

40CFR261 IDENTIFICATION AND LISTING OF HAZARDOUS WASTES

40CFR268 LAND DISPOSAL RESTRICTIONS

40CFR148 HAZARDOUS WASTE INJECTION RESTRICTIONS.

53FR28118 7/26/88
53FR30908 8/16/88
54FR25416 6/14/89
54FR26594 6/23/89

40CFR302 CERCLA SECTION 103 DESIGNATION, REPORTABLE QUANTITIES AND NOTIFICATION
REPORTABLE QUANTITY (RQ) : 1 LB. (0.454 KG)

40CFR370 SARA TITLE III SECTION 311 HAZARDOUS CHEMICAL REPORTING: COMMUNITY RIGHT-TO-KNOW
SUBPART B - REPORTING REQUIREMENTS

REPORTING THRESHOLD: 10,000 LBS. (4540 KG)

HAZARD CATEGORIES:

ACUTE HAZARD

CHRONIC HAZARD

40CFR370 SARA TITLE III SECTION 312 HAZARDOUS CHEMICAL REPORTING: COMMUNITY RIGHT-TO-KNOW
SUBPART D - INVENTORY FORMS

SUBSTANCE LISTED TOXIC SUBSTANCES CONTROL ACT INVENTORY

TOXIC SUBSTANCE CONTROL ACT (TSCA) SECTION 8(E) INITIAL EVALUATION OF SUBSTANTIAL RISK SUBMITTED TO EPA, 1982

40CFR717 RECORDS AND REPORTS OF ALLEGATIONS THAT CHEMICAL SUBSTANCES CAUSE SIGNIFICANT ADVERSE REACTIONS TO HEALTH OR THE ENVIRONMENT
SECTION 8(C) OF THE TOXIC SUBSTANCES CONTROL ACT (TSCA) REQUIRES MANUFACTURERS, PROCESSORS, AND DISTRIBUTORS OF CHEMICAL SUBSTANCES AND MIXTURES TO KEEP RECORDS OF SIGNIFICANT ADVERSE REACTIONS TO HEALTH OR THE ENVIRONMENT ALLEGED TO HAVE BEEN CAUSED BY THE SUBSTANCE OR MIXTURE. EPA MAY INSPECT AND REQUIRE REPORTING OF SUCH RECORDS.

49CFR172.101 TABLES OF HAZARDOUS MATERIALS, THEIR DESCRIPTION, PROPER SHIPPING NAME, CLASS, LABEL, PACKAGING, AND OTHER REQUIREMENTS
DESIGNATED IN HAZARDOUS MATERIALS TABLES AS HAZARDOUS MATERIAL FOR THE PURPOSE OF TRANSPORTATION.

INTERNATIONAL MARITIME ORGANIZATION (IMO) - DANGEROUS GOODS CODE
SUBSTANCE SPECIFICALLY REGULATED FOR INTERNATIONAL SHIPMENTS

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA) - TABLE 4.2
DANGEROUS GOODS LIST: THEIR DESCRIPTION, PROPER SHIPPING NAME, CLASS, LABEL, PACKAGING AND OTHER REQUIREMENTS.
DESIGNATED AS A DANGEROUS GOOD FOR THE PURPOSE OF AIR TRANSPORTATION.

46CFR151.50 SPECIAL REQUIREMENTS FOR CERTAIN CARGOES AS REGULATED BY THE COAST GUARD

46CFR151.01-10(B) CARGOES REGULATED BY THE COAST GUARD UNDER SUBCHAPTER O - CERTAIN BULK DANGEROUS CARGOES

33CFR160.211 AND 213 U.S. COAST GUARD REQUIRES 24 HOURS ADVANCE NOTICE TO CAPTAIN OF THE PORT WHEN THIS SUBSTANCE IS SCHEDULED TO ARRIVE AT OR

DEPART FROM PORT.

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STATE REGULATIONS
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THIS SUBSTANCE LISTED IN CALIFORNIA AS A CARCINOGEN UNDER PROPOSITION 65, THE SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986. REGULATION REQUIRES EMPLOYERS BEGINNING FEBRUARY 27, 1988, TO WARN WORKERS, CONSUMERS AND THE PUBLIC WHEN THEY ARE EXPOSED TO A LISTED CHEMICAL AT A LEVEL DEEMED BY THE STATE TO POSE A SIGNIFICANT RISK. WARNING METHODS MAY INCLUDE PRODUCT OR SHELF LABELS, SIGNS, OR MEDIA ANNOUNCEMENTS. BEGINNING OCTOBER 27, 1988, LISTED CHEMICALS CANNOT BE DISCHARGED OR RELEASED INTO ANY KNOWN SOURCE OF DRINKING WATER.

UNDER THE CALIFORNIA AIR TOXICS HOT SPOTS INFORMATION AND ASSESSMENT ACT OF 1987, OPERATORS OF FACILITIES WHICH RELEASE, OR HAVE THE POTENTIAL TO RELEASE, SPECIFIED QUANTITIES OF THIS SUBSTANCE MUST SUBMIT TO THE APPROPRIATE LOCAL AIR POLLUTION CONTROL DISTRICTS, OR AIR QUALITY MANAGEMENT DISTRICTS, COMPREHENSIVE EMISSIONS INVENTORY PLANS AND HEALTH RISK ASSESSMENTS ADOPTED BY THE CALIFORNIA AIR RESOURCES BOARD (ARB).
EFFECTIVE DATE: 1/1/88
AB 2588, CHAPTER 1252

SUBSTANCE LISTED UNDER THE STATE OF CALIFORNIA HAZARDOUS SUBSTANCES INFORMATION AND TRAINING ACT, CALIFORNIA LABOR CODE, DIVISION 5, CHAPTER 2.5

SUBSTANCE LISTED BY THE NEW JERSEY WORKER AND COMMUNITY RIGHT TO KNOW ACT, P.L. 1983, CHAPTER 315, N.J.S.A. 34: A-1. EMPLOYERS COVERED: SIC CODES 20-39, 46-49, 51, 75, 76, 80, 82, AND 84.

SUBSTANCE LISTED UNDER THE STATE OF FLORIDA TOXIC SUBSTANCES IN THE WORKPLACE RIGHT TO KNOW LAW, CHAPTER 442 OF THE FLORIDA STATUTES.

SUBSTANCE LISTED UNDER THE STATE OF PENNSYLVANIA WORKER AND COMMUNITY RIGHT TO KNOW ACT, P.L. 734, NO. 159.

SUBSTANCE LISTED UNDER THE STATE OF ILLINOIS TOXIC SUBSTANCES DISCLOSURE TO EMPLOYEES ACT, TITLE 56, CHAPTER I, SUBCHAPTER B, SECTION 205.

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INTERNATIONAL REGULATIONS
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CANADA: THIS SUBSTANCE SUBJECT TO REQUIREMENTS OF CANADA'S WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS). THE REGULATIONS REQUIRE SUPPLIERS OF HAZARDOUS MATERIALS TO PROVIDE ADEQUATE LABELS AND MATERIAL SAFETY DATA SHEETS (MSDS'S) AS CONDITIONS OF SALE AND IMPORTATION. EMPLOYERS MUST PROVIDE LABELS, MSDS'S AND WORKER EDUCATION PROGRAMS IN THE WORKPLACE.

GERMANY: DFG A1 CARCINOGEN DESIGNATION
CAPABLE OF INDUCING MALIGNANT TUMORS SHOWN BY EXPERIENCE WITH HUMANS

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ADDITIONAL INFORMATION
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CERCLA SECTION 104(I) PRIORITY LIST OF HAZARDOUS SUBSTANCES FOUND AT SUPERFUND SITES.
52FR12866 4/17/87
53FR41280 10/20/88
54FR43615 10/26/89
55FR42067 10/17/90

SUBSTANCE ESTABLISHED AS CONFIRMED OR SUSPECTED CARCINOGEN (POTENTIAL CARCINOGEN) BY THE INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (IARC)

SUBSTANCE LISTED AS "KNOWN HUMAN CARCINOGEN" OR "ANTICIPATED HUMAN CARCINOGEN" BY THE NATIONAL TOXICOLOGY PROGRAM (NTP) ANNUAL REPORT ON CARCINOGENS.

THIS SUBSTANCE TESTED FOR MUTAGENESIS/GENETIC TOXICITY BY THE NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES (NIEHS)

TRANSPORTATION
U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
VINYL CHLORIDE, INHIBITED-UN 1086

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
2.1 - FLAMMABLE GAS

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101 AND SUBPART E:
FLAMMABLE GAS

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: 49 CFR 173.306
NON-BULK PACKAGING: 49 CFR 173.304
BULK PACKAGING: 49 CFR 173.314 AND 49 CFR 173.315

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: FORBIDDEN
CARGO AIRCRAFT ONLY: 150 KG

LEAK AND SPILL PROCEDURES
REPORTABLE QUANTITY (RQ): 1 LB. (0.454 KG)
A REPORTABLE QUANTITY OF ONE POUND APPLIES TO THIS SUBSTANCE ESTABLISHED BY SECTIONS 101(14) AND 102(B) OR ADJUSTED UNDER SECTION 102(A) OF THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT OF 1980 (CERCLA). SECTIONS 103(A) AND 103(B) REQUIRE THAT PERSONS IN CHARGE OF A VESSEL OR FACILITY FROM WHICH A HAZARDOUS SUBSTANCE HAS BEEN RELEASED IN A QUANTITY EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THAT SUBSTANCE IMMEDIATELY NOTIFY THE NATIONAL RESPONSE CENTER (800) 424-8820; IN THE WASHINGTON, D.C.METROPOLITAN AREA (202)426-2675.
40CFR302

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FOLLOWING INFORMATION RECOMMENDED FOR THE EMERGENCY HANDLING OF HAZARDOUS MATERIALS INVOLVED IN A LEAK OR SPILL INCIDENT:

IF MATERIAL ON FIRE OR INVOLVED IN FIRE:
 * EXTINGUISH FIRE ONLY IF FLOW CAN BE STOPPED
 * APPLY FLOODING QUANTITIES OF WATER AS FOG
 * USE FLOODING QUANTITIES OF WATER TO COOL ALL AFFECTED CONTAINERS
 * WATER SHOULD BE APPLIED FROM AS FAR A DISTANCE AS POSSIBLE

IF MATERIAL IS NOT ON FIRE AND IS NOT INVOLVED IN FIRE:
 * KEEP AWAY FROM SPARKS, FLAMES AND OTHER SOURCES OF IGNITION
 * DO NOT ALLOW MATERIAL TO CONTAMINATE WATER SOURCES AND SEWERS
 * ATTEMPT TO STOP LEAK IF WITHOUT HAZARD
 * CONTROL VAPORS WITH WATER SPRAY

PERSONNEL PROTECTION:
 * KEEP UPWIND
 * AVOID BREATHING DUST/VAPORS/FUMES FROM MATERIAL
 * WEAR SELF-CONTAINED BREATHING APPARATUS WHEN FIGHTING FIRES INVOLVING THIS MATERIAL
 * WEAR BOOTS, PROTECTIVE GLOVES AND GAS TIGHT GOGGLES
 * DO NOT HANDLE BROKEN PACKAGES WITHOUT PROTECTIVE EQUIPMENT
 * USE CAUTION WHEN APPROACHING FIRE

EVACUATION PROCEDURE:
 * IF FIRE UNCONTROLLABLE OR CONTAINER EXPOSED TO DIRECT FLAME, EVACUATE FOR A RADIUS OF 1500 FEET
 * EVACUATION DOWNWIND OF SPILLED MATERIAL MUST BE CONSIDERED IF MATERIAL LEAKING (NOT ON FIRE)

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FOLLWING INFORMATION FROM DEPARTMENT OF TRANSPORTATION/U.S. COAST GUARD "CHEMICAL RESPONSE INFORMATION SYSTEM", REGARDING WATER SPILLS:

 * U.S. COAST GUARD REQUIRES 24 HOUR ADVANCE NOTICE TO CAPTAIN OF THE PORT WHEN THIS SUBSTANCE IS SCHEDULED TO ARRIVE AT PORT WHEN TRANSPORTED IN BULK QUANTITY
 * RESTRICT ACCESS OF GENERAL PUBLIC WHEN APPRECIABLE DANGER ARISES FROM SPILL
 * RESTRICT IGNITION SOURCES WHEN SUBSTANCE INVOLVED
 * EVACUATE WHEN THERE IS A VERY REAL DANGER OF SPILL SPREADING OR DEVELOPING A DANGEROUS REACTION WITH WATER
 * RESTRICT HUMAN USE WHEN SUBSTANCE INVOLVED
 * DILUTE AND DISPERSE USING WATER JETS, PROPELLORS, OR SIMILAR MEANS OF AGITATION
 * HIGHLY VOLATILE, AVOID INHALATION, VAPORS OR DUST ARE IRRITATING OR TOXIC
 * HIGHLY CORROSIVE, AVOID DIRECT CONTACT, CONTACT WITH SKIN OR EYES CAN CAUSE IRRITATION OR BURNS
 * BURNING NOT RECOMMENDED, FIRE DIFFICULT TO CONTROL AND/OR POISONOUS GAS IS FORMED
 * SUBSTANCE SHIPPED AS GAS OR LIQUEFIED COMPRESSED GAS, DEPENDING ON ATMOSPHERIC CONDITIONS, A LARGE PORTION OF THE HAZARD WILL BE DISSIPATED WITH NO ACTION NECESSARY

MAXIMUM DOWNWIND DISTANCE OVER WHICH SUBSTANCE MAY BE HARMFUL UNDER WORST CASE WEATHER CONDITIONS FOLLOWING INSTANTANEOUS DISCHARGE OF 0.1 TON: 30,000-60,000 FEET
MAXIMUM WIDTH OF CLOUD WHICH MAY BE HARMFUL UNDER WORST CASE WEATHER CONDITIONS FOLLOWING INSTANTANEOUS DISCHARGE OF 0.1 TON: 1000-5000 FEET
MAXIMUM DOWNWIND DISTANCE OVER WHICH GAS MAY IGNITE UNDER WORST

CASE WEATHER CONDITIONS FOLLOWING INSTANTANEOUS DISCHARGE OF 0.1 TON: 0-600 FEET
MAXIMUM WIDTH OF CLOUD THAT IS FLAMMABLE UNDER WORST CASE WEATHER CONDITIONS FOLLOWING INSTANTANEOUS DISCHARGE OF 0.1 TON: 0-100 FEET
MAXIMUM DOWNWIND DISTANCE OVER WHICH SUBSTANCE MAY BE HARMFUL UNDER WORST CASE WEATHER CONDITIONS FOLLOWING INSTANTANEOUS DISCHARGE OF 1 TON: 60,000-300,000 FEET
MAXIMUM WIDTH OF CLOUD WHICH MAY BE HARMFUL UNDER WORST CASE WEATHER CONDITIONS FOLLOWING INSTANTANEOUS DISCHARGE OF 1 TON: 1000-5000 FEET
MAXIMUM DOWNWIND DISTANCE OVER WHICH GAS MAY IGNITE UNDER WORST CASE WEATHER CONDITIONS FOLLOWING INSTANTANEOUS DISCHARGE OF 1 TON: 600-3000 FEET
MAXIMUM WIDTH OF CLOUD THAT IS FLAMMABLE UNDER WORST CASE WEATHER CONDITIONS FOLLOWING INSTANTANEOUS DISCHARGE OF 1 TON: 0-100 FEET
MAXIMUM DOWNWIND DISTANCE OVER WHICH SUBSTANCE MAY BE HARMFUL UNDER WORST CASE WEATHER CONDITIONS FOLLOWING INSTANTANEOUS DISCHARGE OF 10 TO 100 TONS: >300,000 FEET
MAXIMUM WIDTH OF CLOUD WHICH MAY BE HARMFUL UNDER WORST CASE WEATHER CONDITIONS FOLLOWING INSTANTANEOUS DISCHARGE OF 10 TONS: 5000-25,000 FEET
MAXIMUM DOWNWIND DISTANCE OVER WHICH GAS MAY IGNITE UNDER WORST CASE WEATHER CONDITIONS FOLLOWING INSTANTANEOUS DISCHARGE OF 10 TONS: 600-3000 FEET
MAXIMUM WIDTH OF CLOUD THAT IS FLAMMABLE UNDER WORST CASE WEATHER CONDITIONS FOLLOWING INSTANTANEOUS DISCHARGE OF 10 TONS: 100-500 FEET
MAXIMUM WIDTH OF CLOUD WHICH MAY BE HARMFUL UNDER WORST CASE WEATHER CONDITIONS FOLLOWING INSTANTANEOUS DISCHARGE OF 100 TONS: 25,000-50,000 FEET
MAXIMUM DOWNWIND DISTANCE OVER WHICH GAS MAY IGNITE UNDER WORST CASE WEATHER CONDITIONS FOLLOWING INSTANTANEOUS DISCHARGE OF 100 TONS: 6000-30,000 FEET
MAXIMUM WIDTH OF CLOUD THAT IS FLAMMABLE UNDER WORST CASE WEATHER CONDITIONS FOLLOWING INSTANTANEOUS DISCHARGE OF 100 TONS: 100-500 FEET
MAXIMUM DOWNWIND DISTANCE OVER WHICH GAS MAY IGNITE UNDER WORST CASE WEATHER CONDITIONS FOLLOWING INSTANTANEOUS DISCHARGE OF 1000 TONS: 6000-30,000 FEET
MAXIMUM WIDTH OF CLOUD THAT IS FLAMMABLE UNDER WORST CASE WEATHER CONDITIONS FOLLOWING INSTANTANEOUS DISCHARGE OF 1000 TONS: 1000-2000 FEET

LISTED BY U.S. COAST GUARD UNDER CARGO COMPATIBILITY GROUP VINYL HALIDES, INCOMPATIBLE WITH ORGANIC ACIDS AND CAPROLACTAM SOLUTION

THIS SUBSTANCE LISTED IN CALIFORNIA AS A CARCINOGEN UNDER PROPOSITION 65, THE SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986. LISTED CHEMICALS CANNOT BE DISCHARGED OR RELEASED INTO WATER OR ONTO OR INTO LAND WHERE THERE IS ANY POSSIBILITY OF PASSING INTO ANY SOURCE OF DRINKING WATER.

OCCUPATIONAL SPILL:
SHUT OFF IGNITION SOURCES; NO FLARES, SMOKING OR FLAMES IN THE HAZARD AREA. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. WATER SPRAY MAY REDUCE VAPOR, BUT IS MAY NOT PREVENT IGNITION IN CLOSED SPACES. ISOLATE AREA

UNTIL GAS IS DISPERSED. KEEP UNNECESSARY PEOPLE AWAY; DENY ENTRY. VENTILATE CLOSED SPACES BEFORE ENTERING.

WASTE DISPOSAL

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OBSERVE ALL FEDERAL, STATE OR LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. CONTACT LOCAL AND/OR STATE ENVIRONMENTAL AUTHORITIES TO INSURE PROPER COMPLIANCE.

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THIS SUBSTANCE MEETS THE DEFINITION OF A HAZARDOUS WASTE AS DEFINED BY THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) (40CFR260) AND IS SUBJECT TO THE FOLLOWING CONSIDERATIONS:

40CFR260 HAZARDOUS WASTE MANAGEMENT SYSTEM: GENERAL

PROVIDES DEFINITIONS OF TERMS, GENERAL STANDARDS, AND OVERVIEW INFORMATION APPLICABLE TO 40CFR PARTS 260-265

40CFR261 IDENTIFICATION AND LISTING OF HAZARDOUS WASTE

IDENTIFIES THOSE SOLID WASTES WHICH ARE SUBJECT TO REGULATION AS HAZARDOUS WASTES UNDER 40CFR PARTS 262-265, 270, 271, AND 124 AND WHICH ARE SUBJECT TO THE NOTIFICATION REQUIREMENTS OF SECTION 3010 OF THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) AND IDENTIFIES ONLY SOME OF THE MATERIALS WHICH ARE HAZARDOUS WASTES UNDER SECTIONS 3007 AND 7003 OF RCRA

THIS COMPOUND, DEPENDING ON THE CHARACTERISTIC, CONCENTRATION AND/OR SOURCE OF THE WASTE, MAY BE REGULATED UNDER THE FOLLOWING WASTE NUMBER(S) AND, IN TURN, SUBJECT TO THE CORRESPONDING REPORTABLE QUANTITY (RQ) (IF APPLICABLE):

40CFR261.24 TOXICITY CHARACTERISTIC
EPA HAZARDOUS WASTE NUMBER D043
VINYL CHLORIDE
MAXIMUM CONCENTRATION 0.2 MG/L

40CFR261.31 HAZARDOUS WASTES FROM NON-SPECIFIC SOURCES
EPA HAZARDOUS WASTE NO. F020: WASTES (EXCEPT WASTEWATER AND SPENT CARBON FROM HYDROGEN CHLORIDE PURIFICATION) FROM THE PRODUCTION OR MANUFACTURING USE (AS A REACTANT, CHEMICAL INTERMEDIATE, OR COMPONENT IN A FORMULATING PROCESS) OF TRI-OR TETRACHLOROPHENOL, OR OF INTERMEDIATES USED TO PRODUCE THEIR PESTICIDE DERIVATIVES. (THIS LISTING DOES NOT INCLUDE WASTES FROM THE PRODUCTION OF HEXACHLOROPHENE FROM HIGHLY PURIFIED 1,2,3-TRICHLOROPHENOL). (H)
40CFR261.31 HAZARDOUS WASTES FROM NON-SPECIFIC SOURCES
EPA HAZARDOUS WASTE NO. F024: WASTES, INCLUDING BUT NOT LIMITED TO, DISTILLATION RESIDUES, HEAVY ENDS, TARS, AND REACTOR CLEAN-OUT WASTES FROM THE PRODUCTION OF CHLORINATED ALIPHATIC HYDROCARBONS, HAVING CARBON

CONTENT FROM 1-5, UTILIZING FREE RADICAL CATALYZED PROCESSES.(THIS LISTING DOES NOT INCLUDE LIGHT ENDS, SPENT FILTERS AND FILTER AIDS, SPENT DESSICANTS, WASTEWATER, WASTEWATER TREATMENT SLUDGES, SPENT CATALYSTS, AND WASTES LISTED IN 40CFR261.32). (T)
40CFR261.31 HAZARDOUS WASTES FROM NON-SPECIFIC SOURCES
EPA HAZARDOUS WASTE NO. F028: RESIDUES RESULTING FROM THE INCINERATION OR THERMAL TREATMENT OF SOILD CONTAMINATED WITH EPA HAZARDOUS WASTE NOS. F020, F021, F022, F023, F026 AND F027.

REPORTABLE QUANTITY (RQ) : 1 LB.
A REPORTABLE QUANTITY OF 1 LB. APPLIES TO THIS HAZARDOUS WASTE FROM NON-SPECIFIC SOURCES ADJUSTED UNDER SECTION 102(A) OF THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT (CERCLA) OF 1980 IDENTIFIED IN 40CFR261.31. SECTIONS 103(A) AND 103(B) REQUIRE THAT PERSONS IN CHARGE OF A VESSEL OR FACILITY FROM WHICH A HAZARDOUS SUBSTANCE HAS BEEN RELEASED IN A QUANTITY EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY IMMEDIATELY NOTIFY THE NATIONAL RESPONSE CENTER AT (800) 424-8802; OR IN THE METROPOLITAN WASHINGTON, D.C. AREA (202) 426-2675.

40CFR261.32 HAZARDOUS WASTES FROM SPECIFIC SOURCES
EPA HAZARDOUS WASTE NO. K019: HEAVY ENDS FROM THE DISTILLATION OF ETHYLENE DICHLORIDE IN ETHYLENE CHLORIDE PRODUCTION. (T)
40CFR261.32 HAZARDOUS WASTES FROM SPECIFIC SOURCES
EPA HAZARDOUS WASTE NO. K029: WASTE FROM THE PRODUCT STREAM STRIPPER IN THE PRODUCTION OF 1,1,1-TRICHLOROETHANE. (T)
REPORTABLE QUANTITY (RQ) : 1 LB.
A REPORTABLE QUANTITY OF 1 LB. APPLIES TO THIS HAZARDOUS WASTE FROM SPECIFIC SOURCES ADJUSTED UNDER SECTION 102(A) OF THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT (CERCLA) OF 1980 IDENTIFIED IN 40CFR261.32. SECTIONS 103(A) AND 103(B) REQUIRE THAT PERSONS IN CHARGE OR A VESSEL OR FACILITY FROM WHICH A HAZARDOUS SUBSTANCE HAS BEEN RELEASED IN A QUANTITY EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY IMMEDIATELY NOTIFY THE NATIONAL RESPONSE CENTER AT (800) 424-8802; OR IN THE METROPOLITAN WASHINGTON, D.C. AREA (202) 426-2675.

40CFR261.33 DISCARDED COMMERCIAL CHEMICAL PRODUCTS, OFF-SPECIFICATION SPECIES, CONTAINER RESIDUES, AND SPILL RESIDUES THEREOF
EPA HAZARDOUS WASTE NUMBER U043
VINYL CHLORIDE

40CFR263 STANDARDS APPLICABLE TO TRANSPORTERS OF HAZARDOUS WASTE

ESTABLISHES STANDARDS WHICH APPLY TO PERSONS TRANSPORTING HAZARDOUS WASTE WITHIN THE UNITED STATES IF THE TRANSPORTATION REQUIRES A MANIFEST UNDER 40CFR262

40CFR263 STANDARDS APPLICABLE TO TRANSPORTERS OF HAZARDOUS WASTE

ESTABLISHES STANDARDS WHICH APPLY TO PERSONS TRANSPORTING HAZARDOUS WASTE WITHIN THE UNITED STATES IF THE TRANSPORTATION REQUIRES A MANIFEST UNDER 40CFR262

40CFR264 STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

ESTABLISHES MINIMUM NATIONAL STANDARDS WHICH DEFINE THE ACCEPTABLE MANAGEMENT OF HAZARDOUS WASTE

40CFR265 INTERIM STATUS STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

ESTABLISHES MINIMUM NATIONAL STANDARDS WHICH DEFINE THE ACCEPTABLE MANAGEMENT OF HAZARDOUS WASTE DURING THE PERIOD OF INTERIM STATUS

40CFR267 INTERIM STANDARDS FOR OWNERS AND OPERATORS OF NEW HAZARDOUS WASTE LAND DISPOSAL FACILITIES

ESTABLISHES MINIMUM NATIONAL STANDARDS THAT DEFINE THE ACCEPTABLE MANAGEMENT OF HAZARDOUS WASTE FOR NEW LAND DISPOSAL FACILITIES

40CFR268 LAND DISPOSAL RESTRICTIONS

IDENTIFIES HAZARDOUS WASTES THAT ARE RESTRICTED FROM LAND DISPOSAL AND DEFINES THOSE LIMITED CIRCUMSTANCES UNDER WHICH AN OTHERWISE PROHIBITED WASTE MAY CONTINUE TO BE LAND DISPOSED.

40CFR268.32 WASTE-SPECIFIC PROHIBITIONS - CALIFORNIA LIST WASTES
LIQUID HAZARDOUS WASTES CONTAINING HALOGENATED ORGANIC COMPOUNDS ARE PROHIBITED FROM LAND DISPOSAL AT CONCENTRATIONS GREATER THAN OR EQUAL TO 1000 MG/L.
52FR25760 7/8/87

40CFR268.33 WASTE SPECIFIC PROHIBITIONS - FIRST THIRD WASTES
53FR31138 8/8/88

40CFR268.34 WASTE SPECIFIC PROHIBITIONS - SECOND THIRD WASTES
54FR26594 6/23/89

40CFR268.35 WASTE SPECIFIC PROHIBITIONS - THIRD THIRD WASTES
55FR22520 6/1/90

40CFR270 EPA ADMINISTERED PERMIT PROGRAMS: THE HAZARDOUS WASTE PERMIT PROGRAM

ESTABLISHES PROVISIONS FOR THE HAZARDOUS WASTE PERMIT PROGRAM UNDER SUBTITLE C OF THE SOLID WASTE DISPOSAL ACT, AS AMENDED BY THE RESOURCE CONSERVATION AND RECOVERY ACT

40CFR271 REQUIREMENT FOR AUTHORIZATION OF STATE HAZARDOUS WASTE PROGRAMS

SPECIFIES THE PROCEDURES EPA WILL FOLLOW IN APPROVING, REVISING, AND WITHDRAWING APPROVAL OF STATE PROGRAMS AND THE REQUIREMENTS STATE PROGRAMS MUST MEET TO BE APPROVED BY THE ADMINISTRATION UNDER SECTION 3006(B) OF RCRA

40CFR148 HAZARDOUS WASTE INJECTION RESTRICTIONS

IDENTIFIES HAZARDOUS WASTES THAT ARE RESTRICTED FROM DISPOSAL INTO CLASS I HAZARDOUS WASTE INJECTION WELLS AND DEFINES THOSE CIRCUMSTANCES UNDER WHICH A WASTE, OTHERWISE PROHIBITED FROM INJECTION, MAY BE INJECTED.
53FR28118 7/26/88
53FR30908 8/16/88
54FR25416 6/14/89
54FR26594 6/23/89

40CFR148.12 WASTE SPECIFIC PROHIBITIONS - CALIFORNIA LIST WASTES

40CFR148.14 WASTE SPECIFIC PROHIBITIONS - FIRST THIRD WASTES

40CFR148.15 WASTE SPECIFIC PROHIBITIONS - SECOND THIRD WASTES

40CFR148.16 WASTE SPECIFIC PROHIBITIONS - THIRD THIRD WASTES

BULLETINS

CHRONIC EXPOSURE TO VINYL CHLORIDE HAS CAUSED SEX INHIBITION FROM THE IMPAIRMENT OF THE NERVOUS SYSTEM. GIG. TR. PROF. ZABOL. 1984, (6), 19-23.

SPECIAL INFORMATION

EXTREMELY FLAMMABLE! MAY BE IGNITED BY HEAT, SPARKS OR FLAMES. VAPORS MAY TRAVEL TO A SOURCE OF IGNITION AND FLASH BACK. CONTAINERS MAY EXPLODE IN HEAT OF FIRE. VAPOR EXPLOSION HAZARD INDOORS, OUTDOORS OR IN SEWERS.

J T BAKER CHEMICAL -- ACETONE - ACETONE,TECHNICAL
MATERIAL SAFETY DATA SHEET
NSN: 6810001949477
Manufacturer's CAGE: 70829
Part No. Indicator: A
Part Number/Trade Name: ACETONE

General Information

Item Name: ACETONE,TECHNICAL
Company's Name: J.T.BAKER CHEMICAL CO
Company's Street: 222 RED SCHOOL LANE
Company's City: PHILLIPSBURG
Company's State: NJ
Company's Country: US
Company's Zip Code: 08865
Company's Emerg Ph #: (201) 859-2151/800-424-9300(CHEMTR)
Company's Info Ph #: 800-JTBAKER
Distributor/Vendor # 1: CHEMICAL COMMODITIES AGENCY
Distributor/Vendor # 1 Cage: 60777
Record No. For Safety Entry: 007
Tot Safety Entries This Stk#: 009
Status: SM
Date MSDS Prepared: 05JAN94
Safety Data Review Date: 19MAY94
Supply Item Manager: CX
MSDS Serial Number: BDJBQ
Specification Number: O-A-51
Spec Type, Grade, Class: NONE
Hazard Characteristic Code: F2
Unit Of Issue: PT
Unit Of Issue Container Qty: 1 PINT
Type Of Container: IP.2
Net Unit Weight: 0.8 LBS
NRC/State License Number: NONE
Net Propellant Weight-Ammo: NONE

Ingredients/Identity Information

Proprietary: NO
Ingredient: ACETONE (SARA III)
Ingredient Sequence Number: 01
Percent: 90-100
NIOSH (RTECS) Number: AL3150000
CAS Number: 67-64-1
OSHA PEL: 1000PPM
ACGIH TLV: 750PPM/1000STEL;9293
Other Recommended Limit: NOT ESTABLISHEDN/K

Physical/Chemical Characteristics

Appearance And Odor: CLEAR, COLORLESS LIQUID. SWEET ODOR.
Boiling Point: 133F,56C
Melting Point: -139F,-95C
Vapor Pressure (MM Hg/70 F): 184 MM
Vapor Density (Air=1): 2.0
Specific Gravity: 0.79
Decomposition Temperature: UNKNOWN
Evaporation Rate And Ref: 14.4 (BUTYL ACETATE=1)
Solubility In Water: COMPLETE (100%)
Percent Volatiles By Volume: 100
pH: "N/A"
Corrosion Rate (IPY): UNKNOWN

Fire and Explosion Hazard Data

Flash Point: -2F,-18C
Flash Point Method: CC
Lower Explosive Limit: 2.2%
Upper Explosive Limit: 13%
Extinguishing Media: USE ALCOHOL FOAM, DRY CHEMICAL OR CO2. (WATER MAY BE INEFFECTIVE).
Special Fire Fighting Proc: WEAR PROPER PROTECTIVE EQUIPMENT AND SCBA W/ FULL FACEPIECE OPERATED PRESSURE DEMAND MODE. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.
Unusual Fire And Expl Hazrds: VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL ALONG GROUND OR FLOOR, THEN 'FLASH BACK' FROM A DISTANT IGNITION SOURCE. CONTACT W/STRONG OXIDIZERS MAY CAUSE FIRE.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): HEAT, FLAME, OTHER SOURCES OF IGNITION.
Materials To Avoid: STRONG OXIDIZERS, STRONG ACIDS & BASES, HALOGEN COMPOUNDS, AMINES & AMMONIA,
Hazardous Decomp Products: CO, CO2.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): WILL NOT OCCUR

Health Hazard Data

LD50-LC50 Mixture: LD50 (ORAL RAT) IS 9750 MG/KG.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: INHALED:IRRITATION NOSE,THROAT,HEADACHE, NAUSEA,VOMITING,DIZZINESS,NARCOSIS,RESPIRATORY FAILURE,LOW BLOOD PRESSURE, CNS DEPRESSION,COMA. SKIN:IRRITATION,POSSIBLE DERMATITIS &/OR ABSORPTION. EYE:SEVERE IRRITATION,POSSIBLE TEMP CORNEAL DAMAGE. INGESTED:G/I IRRITATION,HEADACHE,NAUSEA,CNS DEPRES. CHRONIC:LIVER/KIDNEY DAMAGE.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NONE IDENTIFIED
Signs/Symptoms Of Overexp: INHALED:IRRITATION NOSE,THROAT,HEADACHE, NAUSEA,VOMITING,DIZZINESS,NARCOSIS,RESPIRATORY FAILURE,LOW BLOOD PRESSURE, CNS DEPRESSION,COMA. SKIN:IRRITATION POSSIBLE DERMATITIS. EYE:SEVERE IRRITATION,POSSIBLE TEMP CORNEAL DAMAGE. INGESTED:G/I IRRITATION,HEADACHE, NAUSEA,DIZZINESS,CNS DEPRESSION.
Med Cond Aggravated By Exp: CHRONIC RESPIRATORY DISEASE, SKIN DISORDERS, EYE DISORDERS.
Emergency/First Aid Proc: IF ANY IRRITATION PERSISTS OR IS SEVERE, SEE A DOCTOR. EYE:FLUSH W/WATER 15 MIN. SKIN:FLUSH WITH WATER. INHALED:REMOVE TO FRESH AIR. AID/RESTORE BREATHING IF NECESSARY. INGESTED:DO NOT INDUCE VOMITING. GIVE LARGE AMOUNTS WATER. NOTHING BY MOUTH IF UNCONSCIOUS. NOTE TO PHYSICIAN:ASPIRATION HAZARD! IF NECESSARY TO EVACUATE STOMACH, USE METHOD LEAST LIKELY TO CAUSE ASPIRATION INTO LUNGS.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: WEAR SUITABLE PROTECTIVE CLOTHING. ELIMINATE ALL IGNITION SOURCES. STOP LEAK IF POSSIBLE W/OUT RISK. USE H2O SPRAY TO REDUCE VAPORS. TAKE UP W/SAND/OTHER NON-COMBUSTIBLE ABSORBANT & PLACE INTO CONTAINER FOR DISPOSAL. FLUSH AREA W/WATER.
Neutralizing Agent: NO INFORMATION GIVEN ON MSDS BY MFR.
Waste Disposal Method: DISPOSE I/A/W ALL APPLICABLE FEDERAL, STATE & LOCAL ENVIRONMENTAL REGULATIONS. EPA HAZARDOUS WASTE NUMBER:U002 HMIS SUGGESTS

INCINERATION AS DISPOSAL METHOD.
Precautions-Handling/Storing: KEEP TIGHTLY CLOSED. STORE IN COOL,DRY,WELL-VENTED,FLAMMABLE LIQUID STORAGE AREA. ISOLATE FROM INCOMPATIBLE MATERIALS.
Other Precautions: BOND & GROUND CONTAINERS WHEN TRANSFERRING LIQUID.

Control Measures

Respiratory Protection: RESPIRATORY PROTECTION REQUIRED ABOVE TLV: AT CONCENTRATIONS UP TO 5000 PPM, CHEMICAL CARTRIDGE RESPIRATOR W/ORGANIC VAPOR CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, AN SCBA IS RECOMMENDED.
Ventilation: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.
Protective Gloves: BUTYL RUBBER GLOVES.
Eye Protection: SAFETY (CHEMICAL SPLASH) GOGGLES
Other Protective Equipment: NO FURTHER EQUIPMENT GIVEN ON MSDS BY MFR.
Work Hygienic Practices: MFR: ? HMIS:USE GOOD CHEMICAL HYGIENE PRACTICE. AVOID UNNECESSARY CONTACT. WASH THOROUGHLY BEFORE EATING OR DRINKING.
Suppl. Safety & Health Data: NONE

Transportation Data

Trans Data Review Date: 94139
DOT PSN Code: ABF
DOT Proper Shipping Name: ACETONE
DOT Class: 3
DOT ID Number: UN1090
DOT Pack Group: II
DOT Label: FLAMMABLE LIQUID
IMO PSN Code: ADF
IMO Proper Shipping Name: ACETONE
IMO Regulations Page Number: 3102
IMO UN Number: 1090
IMO UN Class: 3.1
IMO Subsidiary Risk Label: -
IATA PSN Code: ACM
IATA UN ID Number: 1090
IATA Proper Shipping Name: ACETONE
IATA UN Class: 3
IATA Label: FLAMMABLE LIQUID
AFI PSN Code: ACM
AFI Prop. Shipping Name: ACETONE
AFI Class: 3
AFI ID Number: UN1090
AFI Pack Group: II
AFI Label: FLAMMABLE LIQUID
AFI Basic Pac Ref: 7-7

Disposal Data

Disposal Data Review Date: 88228
Rec # For This Disp Entry: 03
Tot Disp Entries Per NSN: 004
Landfill Ban Item: YES
Disposal Supplemental Data: IN CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE, CONSULT HEALTH AND SAFETY FILE FOR PRECAUTIONS.
1st EPA Haz Wst Code New: U002
1st EPA Haz Wst Name New: ACETONE; 2-PROPANONE
1st EPA Haz Wst Char New: IGNITABLE (I)
1st EPA Acute Hazard New: NO

Label Data

Label Required: YES
Technical Review Date: 19MAY94

Label Date: 05MAY92
Label Status: G
Common Name: ACETONE
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Slight: X
Contact Hazard-Moderate: X
Fire Hazard-Severe: X
Reactivity Hazard-None: X
Special Hazard Precautions: **TARGET ORGAN(S):SKIN,RESP.SYSTEM**
INHALED:IRRITATION NOSE,THROAT,HEADACHE,NAUSEA,VOMITING,DIZZINESS,NARCOSIS,
IRRITATION,POSSIBLE DERMATITIS &/OR ABSORPTION. EYE:SEVERE IRRITATION,
POSSIBLE TEMP CORNEAL DAMAGE. INGESTED:G/I IRRITATION,HEADACHE,NAUSEA,CNS
DEPRES. CHRONIC:LIVER/KIDNEY DAMAGE. STORE IN COOL,DRY,WELL-VENTED,
WEAR PROTECTIVE CLOTHING. ELIMINATE ALL IGNITION SOURCES. USE H2O SPRAY TO
REDUCE VAPORS. ABSORB W/NON-COMBUSTIBLE ABSORBANT & PLACE INTO CONTAINER
FOR DISPOSAL. FLUSH AREA W/WATER.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: J.T.BAKER CHEMICAL CO
Label Street: 222 RED SCHOOL LANE
Label City: PHILLIPSBURG
Label State: NJ
Label Zip Code: 08865
Label Country: US
Label Emergency Number: (201) 859-2151/800-424-9300(CHEMTR)
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URL for this msds http://siri.org. If you wish to change, add to, or
delete information in this archive please sent updates to dan@siri.org.

J T BAKER -- 9319, METHYL ETHYL KETONE - METHYL ETHYL KETONE, REAGENT
MATERIAL SAFETY DATA SHEET
NSN: 6810001856983
Manufacturer's CAGE: 70829
Part No. Indicator: A
Part Number/Trade Name: 9319, METHYL ETHYL KETONE

General Information

Item Name: METHYL ETHYL KETONE, REAGENT
Company's Name: J T BAKER INC
Company's Street: 222 RED SCHOOL LANE
Company's City: PHILLIPSBURG
Company's State: NJ
Company's Country: US
Company's Zip Code: 08865-2219
Company's Emerg Ph #: 908-859-2151;800-424-9300(CHEMTREC)
Company's Info Ph #: 800-582-2537
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 27MAY88
Safety Data Review Date: 29JUL92
MSDS Serial Number: BPNWF
Hazard Characteristic Code: F3

Ingredients/Identity Information

Proprietary: NO
Ingredient: 2-BUTANONE; (METHYL ETHYL KETONE) (MEK) (SARA III)
Ingredient Sequence Number: 01
Percent: 99-100
NIOSH (RTECS) Number: EL6475000
CAS Number: 78-93-3
OSHA PEL: 200 PPM;300 STEL
ACGIH TLV: 200 PPM;300 STEL

Physical/Chemical Characteristics

Appearance And Odor: CLEAR, COLORLESS LIQUID WITH AN ACETONE-LIKE ODOR.
Boiling Point: 176F,80C
Melting Point: -125F,-87C
Vapor Pressure (MM Hg/70 F): 78
Vapor Density (Air=1): 2.5
Specific Gravity: 0/.81 (H2O =1)
Evaporation Rate And Ref: 5.7 (BUTYL ACETATE = 1)
Solubility In Water: APPRECIABLE (>10%)
Percent Volatiles By Volume: 100

Fire and Explosion Hazard Data

Flash Point: 19.4F,-7.0C
Flash Point Method: COC
Lower Explosive Limit: 1.8%
Upper Explosive Limit: 11.4%
Extinguishing Media: USE ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE. WATER MAY BE INEFFECTIVE.
Special Fire Fighting Proc: USE NIOSH/MSHA APPRVD SCBA & FULL PROT EQUIP (FP N). MOVE CONTRS FROM FIRE AREA IF IT CAN BE DONE W/OUT RISK. USE WATER TO KEEP FIRE-EXPOS CONTRS COOL.
Unusual Fire And Expl Hazrds: VAPS MAY FLOW ALONG SURF TO DISTANT IGNIT SOURCES & FLASH BACK. CLSD CONTRS EXPOSED TO HEAT MAY EXPLODE. CONTACT W/ STRONG OXIDIZERS MAY CAUSE FIRE.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): HEAT, FLAME, OTHER SOURCES OF IGNITION.
Materials To Avoid: STRONG OXIDIZING AGENTS, STRONG BASES, CAUSTICS, MINERAL ACIDS, AMINES & AMMONIA, HALOGENS, PLASTICS, RUBBER.
Hazardous Decomp Products: CO, CO2.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: LD50 (ORAL, RAT):2737 MG/KG
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: INHALATION OF VAPORS MAY CAUSE HEADACHE, NAUSEA, VOMITING, DIZZINESS, DROWSINESS, IRRITATION OF RESPIRATORY TRACT AND UNCONSCIOUSNESS. CONTACT WITH SKIN OR EYES MAY CAUSE IRRITATION. PROLONGED SKIN CONTACT MAY RESULT IN DERMATITIS. EYE CONTACT MAY RESULT IN TEMPORARY CORNEAL DAMAGE. INGESTION MAY (EFTS OF OVEREXPOS)
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT
Signs/Symptoms Of Overexp: HLTH HAZ:CAUSE NAUSEA, VOMITING, HEADACHE, DIZZINESS AND GI IRRITATION. INGESTION MAY CAUSE CNS DEPRESSION. CHRONIC NASAL SEPTUM, LUNGS, EYES, SKIN, MUCOUS MEMBRANES. IN ANIMALS:LIVER, KIDNEYS, LUNGS, SPLEEN AND BRAIN.
Med Cond Aggravated By Exp: RESPIRATORY SYSTEM DISEASE, SKIN DISORDERS.
Emergency/First Aid Proc: CALL A PHYSICIAN. INGEST:DO NOT INDUCE VOMITING. INHAL:REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN. SKIN:FLUSH WITH WATER. EYES:IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: WEAR NIOSH/MSHA APPRVD SCBA & FULL PROT CLTHG. SHUT OFF IGNIT SOURCES; NO FLARES, SMOKING/FLAMES IN AREA. STOP LEAK IF YOU CAN DO SO W/OUT RISK. USE WATER SPRAY TO REDUCE VAPS. TAKE UP W/ SAND/OTHER NON-COMBUST ABSORB MATL & PLACE INTO CONTR (SUPDAT)
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: DISPOSE IN ACCORDANCE WITH ALL APPLICABLE LOCAL, STATE AND FEDERAL ENVIRONMENTAL REGULATIONS. EPA HAZ WASTE #U159 (TOXIC WASTE).
Precautions-Handling/Storing: BOND & GROUND CONTRS WHEN TRANSFERRNG LIQ. KEEP CONR TIGHTLY CLSD. STORE IN A COOL, DRY, WELL VENT, FLAMM LIQ STORAGE AREAS.
Other Precautions: ISOLATE FROM INCOMPATIBLE MATERIALS. LAB TESTS RESULTS INDICATE MATERIAL MAY BE TERATOGENIC. KEEP AWAY FROM HEAT, SPARKS, FLAME. AVOID BREATHING VAPORS. AVOID CONTACT WITH EYES, SKIN AND CLOTHING.

Control Measures

Respiratory Protection: NIOSH/MSHA APPROVED RESP PROT REQ IF AIRBORNE CONC EXCEEDS TLV. AT CONC UP TO 1000 PPM, AN NIOSH/MSHA APPROVED CHEM CARTRIDGE RESP W/ORGANIC VAP CARTRIDGE IS REC. ABOVE THIS LEVEL, A NIOSH/MSHA APPROVED SCBA IS REC.
Ventilation: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.
Protective Gloves: BUTYL RUBBER GLOVES.
Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).
Other Protective Equipment: UNIFORM, APRON RECOMMENDED.

Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING.
Suppl. Safety & Health Data: SPILL PROC:FOR LATER DISPOSAL. FLUSH AREA WITH WATER. J.T. BAKER SOLUSORB SOLVENT ABSORBENT IS RECOMMENDED.

Transportation Data

Trans Data Review Date: 93004
DOT PSN Code: FWQ
DOT Proper Shipping Name: ETHYL METHYL KETONE OR METHYL ETHYL KETONE
DOT Class: 3
DOT ID Number: UN1193
DOT Pack Group: II
DOT Label: FLAMMABLE LIQUID
IMO PSN Code: JYD
IMO Proper Shipping Name: METHYL ETHYL KETONE
IMO Regulations Page Number: 3226 *
IMO UN Number: 1193
IMO UN Class: 3.2
IMO Subsidiary Risk Label: -
IATA PSN Code: LNF
IATA UN ID Number: 1193
IATA Proper Shipping Name: ETHYL METHYL KETONE
IATA UN Class: 3
IATA Label: FLAMMABLE LIQUID
AFI PSN Code: LNF
AFI Prop. Shipping Name: ETHYL METHYL KETONE OR METHYL ETHYL KETONE
AFI Class: 3
AFI ID Number: UN1193
AFI Pack Group: II
AFI Label: FLAMMABLE LIQUID
AFI Basic Pac Ref: 7-7

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 29JUL92
Label Date: 24JUL92
Label Status: G
Common Name: 9319, METHYL ETHYL KETONE
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Moderate: X
Contact Hazard-Moderate: X
Fire Hazard-Severe: X
Reactivity Hazard-Slight: X
Special Hazard Precautions: EXTREMELY FLAMMABLE LIQUID. AVOID OXIDIZERS, BASES, CAUSTICS, MINERAL ACIDS, AMINES, AMMONIA, HALOGENS, PLASTICS, RUBBER. ACUTE:VAPORS MAY CAUSE HEADACHE, NAUSEA, VOMIT, DIZZINESS, DROWSINESS, IRRITATION OF RESPIRATORY TRACT, UNCONSCIOUSNESS. CONTACT MAY CAUSE EYE/SKIN IRRITATION, DERMATITIS, CORNEAL DAMAGE. INGESTION MAY CAUSE CNS DEPRESSION. CHRONIC:MAY CAUSE CNS DEPRESSION, TERATOGENIC EFFECTS.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: J T BAKER INC
Label Street: 222 RED SCHOOL LANE
Label City: PHILLIPSBURG
Label State: NJ
Label Zip Code: 08865-2219
Label Country: US
Label Emergency Number: 908-859-2151;800-424-9300(CHEMTREC)

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J T BAKER -- XYLENE - XYLENE,TECHNICAL
MATERIAL SAFETY DATA SHEET
NSN: 6810005986600
Manufacturer's CAGE: 70829
Part No. Indicator: A
Part Number/Trade Name: XYLENE

General Information

Item Name: XYLENE,TECHNICAL
Company's Name: J.T. BAKER COMPANY
Company's Street: 222 RED SCHOOL LANE
Company's City: PHILLIPSBURG
Company's State: NJ
Company's Country: US
Company's Zip Code: 08865-2219
Company's Emerg Ph #: 908-859-2151/800-424-9300(CHEMTREC)
Company's Info Ph #: 908-859-2151
Record No. For Safety Entry: 005
Tot Safety Entries This Stk#: 012
Status: SE
Date MSDS Prepared: 08DEC95
Safety Data Review Date: 18DEC96
Supply Item Manager: CX
MSDS Serial Number: CCJVX
Specification Number: TT-X-916
Hazard Characteristic Code: F4
Unit Of Issue: GL
Unit Of Issue Container Qty: 1 GALLON
Type Of Container: CAN
Net Unit Weight: 7.2 LBS

Ingredients/Identity Information

Proprietary: NO
Ingredient: XYLENES (O-,M-,P- ISOMERS) (SARA 313) (CERCLA)
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: ZE2100000
CAS Number: 1330-20-7
OSHA PEL: 100 PPM
ACGIH TLV: 100 PPM/150STEL;9596
Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: ETHYL BENZENE (SARA 313)
Ingredient Sequence Number: 02
Percent: 17
NIOSH (RTECS) Number: DA0700000
CAS Number: 100-41-4
OSHA PEL: 100 PPM
ACGIH TLV: 100 PPM/125STEL;9596
Other Recommended Limit: NONE RECOMMENDED

Physical/Chemical Characteristics

Appearance And Odor: CLEAR, COLORLESS LIQUID, CHRACTERISTIC ODOR.
Boiling Point: 279F,137C
Melting Point: -13F,-25C
Vapor Pressure (MM Hg/70 F): 8 @20C
Vapor Density (Air=1): 3.7
Specific Gravity: 0.86
Decomposition Temperature: D
Evaporation Rate And Ref: 0.7 (N-BUTYL ACETATE=1)

Solubility In Water: INSOLUBLE.
Percent Volatiles By Volume: 100
Viscosity: D
pH: D
Autoignition Temperature: 463.8C

Fire and Explosion Hazard Data

Flash Point: 79.2F,26.2C
Flash Point Method: TCC
Lower Explosive Limit: 1.0
Upper Explosive Limit: 7.0
Extinguishing Media: DRY CHEM,FOAM,CARBON DIOXIDE.WATER SPRAY MAY BE USED TO KEEP FIRE EXPO CNTNRS COOL.
Special Fire Fighting Proc: WEAR FULL PROTECIVE CLOTH/NIOSH APPROVED SCBA W/FULL FCPIECE OPERATED IN PRESSURE DEMAND/OTHER POSITIVE PRESSURE MODE.
Unusual Fire And Expl Hazrds: >FLASHPT VAP/AIR MIX EXPLO W/IN FLAMM LIMITS ABOVE.VAP CAN FLOW ALONG SURFACES TO DISTANCE IGN SOURCE & FLASHBACK.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): HEAT AND SOURCES OF IGNITION.
Materials To Avoid: STRONG OXIDIZERS.
Hazardous Decomp Products: INVOLVEMENT IN FIRE CAUSES FORMATION OF CARBON MONOXIDE & UNIDENTIFIED ORGANIC COMPONENTS.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT APPLICABLE

Health Hazard Data

LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: NO
Health Haz Acute And Chronic: INHAL:IRRIT NOSE/THROAT.HI CONC NAU,VOMIT, HEAD,RINGING IN EARS,SEVERE BREATH DIFFI.SUBSTERNAL PAIN,COUG,HOARSENESS, ANESTHETIC,CNS DEPRESS.INGEST:BURNING SENS IN MOUTH/STOMACH,NAU,VOMIT, SALIVATION.ASPIRATED INTO LUNGS SEFVERE HEMORR PNEUITIS W/SEVERE PULM INJURY/DEATH.SKIN:LOSS OF NAT OILS,DERM.EYE:IRRIT,TOXIC TO (SUPP)
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Signs/Symptoms Of Overexp: IRRIT NOSE/THROAT,NAUSEA,VOMIT,HEADAHCE, RINGING IN EAR,SEVERE BREATH DIFF,PAIN,COUGH,HOARSENESS,ANESTHEITC,CNS DEPRESS.BURNING SENS IN MOUITH/STOMACH,NAU,VOMIT,SALIVATION,SEVERE HEMORR PNEUOITIS,PULM INJURY,DEATH.DERM,EYE IRRIT,HEMORR INFLAMM LESIONS.
Med Cond Aggravated By Exp: PERSONS W/PRE-EXISTING SKIN DISORDERS OR EYE PROBELMS OR IMPAIRED LIVER,KIDNEY,BLOOD OR RESP FUNCTION MAY BE MORE SUSCEPTIBLE TO THE EFFECTS OF THE SUBSTANCE.
Emergency/First Aid Proc: ASPIRATION HAZ.INGEST:DO NOT INDUCE VOMIT. KEEP HEAD BELOW HIPS TO PREVENT ASPIRATION IF VOMIT.CALL PHYSICIAN IMMED. INHAL:REMOVE TO FRESH AIR.NOT BREATH GIVE ART RESP.DIFFI BREATH GIVE OXY. EYE:WASH W/PLENTY OF WATER FOR @LEAST 15MINS LIFT EYELIDS.GET MED ATTN IMMED.SKIN:REMOVE CONTAM CLOTH.WASH W/SOAP/MILD DETERGENT/WATER FOR @LEAST 15MINS.IRRIT DEVELOPS/PERSIST GET MED ATTN.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: VENTI AREA.REMOVE IGN SOURCE.WEAR PPE. ISOLATE AREA.CONTAIN/RECOVER LIQ.USE NON-SPARK TOOLS/EQPMT.COLLECT/ABSORB W/INERT MATL(VERMICULITE,DRY SAND,EARTH,NOT SCOMBUST MATL-SAWDUST).REPORT NAT RESP CNTNR 800-424-8802 IF RELEASE INTO WATER/SOIL.RQ:1000LB
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.

Waste Disposal Method: DISPO OF CNTNR/UNUSED CONTENTS IAW FED/STATE/LOC REQMTS.SARA SEC 313 CHEM:XYLENE,ETHYL BENZENE.RCRA SEC 261.3:U239.
Precautions-Handling/Storing: PROTECT AGAINST PHYS DMG.STORE IN COOL DRY WELL VENTI LOC.OUTSIDE/DETACHED STORAGE PREFER.CNTNR BOND/GROUND FOR TRANSFER-AVOID STATIC SPARKS.
Other Precautions: KEEP AWAY FROM HEAT/SPARK/FLAME.AVOID EYE/SKIN/CLOTH CONTACT.KEEP CNTNR CLSD.USE W/ADQU VENTI.AVOID BREATH VAP/USE NON-SPARK TOOL/EQPMT.CNTNR MAY BE HAZ-RETAIN RESIDUE;OBSERVEA LL WARN/PRECAUT WHEN EMPTY.DON'T ATTEMPT TO CLEAN EMPTY CNTNR.

Control Measures

Respiratory Protection: IF EXPO LIMIT EXCEEDED ORG VAP RESP MAY BE WORN FOR UP TO 10X EXPO LIMIT.FOR EMERG/INSTANCES WHERE EXPO LEVELS UNK USE POSITIVE-PRESSURE AIR SUPPLIED RESP.WARNING:AIR-PURIFYING RESP DON'T PROTECT WORKERS IN OXYGEN-DEFICIENT ATMS.
Ventilation: LOC &/OR GEN EXHAU RECOMMEND-KEEP WORKER EXPO BEL AEL.LOC EXHAU PREFER-CNTRL EMISSIONS @SOURCE,PREVENT DISPERS.EXPLO-PRO
Protective Gloves: IMPERVIOUS GLOVES.
Eye Protection: CHEM SAF GOGG,FULL FACE SHIELD.
Other Protective Equipment: WEAR IMPERV PROT CLOTH,BOOTS,LAB COAT,APRON, COVERALLS AS APPROPRIATE FOR SKIN CONTACT.EYEWASH FOUNTIAN,QUICK-DRENCH FACI
Work Hygienic Practices: WASH THOROUGHLY AFT HNDLG.
Suppl. Safety & Health Data: HEALTH HAZ:EYE TISSUE,HEMORR INFLAMM LESIONS.CHRONIC:HEAD,LOSS OF APPETITE,NERVOUSNESS,PALE SKIN,RASH,REVERSIBLE EYE DMG,DMG BONE MARROW,LOW BLOOD CELL COUNT,DMG LIVER/KIDNEYS.

Transportation Data

Trans Data Review Date: 96353
DOT PSN Code: GJL
DOT Proper Shipping Name: FLAMMABLE LIQUIDS, N.O.S.
DOT Class: 3
DOT ID Number: UN1993
DOT Pack Group: III
DOT Label: FLAMMABLE LIQUID
IMO PSN Code: HIA
IMO Proper Shipping Name: FLAMMABLE LIQUID, N.O.S. o *
IMO Regulations Page Number: 3345
IMO UN Number: 1993
IMO UN Class: 3.3
IMO Subsidiary Risk Label: - *
IATA PSN Code: MCA
IATA UN ID Number: 1993
IATA Proper Shipping Name: FLAMMABLE LIQUID, N.O.S. *
IATA UN Class: 3
IATA Label: FLAMMABLE LIQUID
AFI PSN Code: MCA
AFI Prop. Shipping Name: FLAMMABLE LIQUIDS, N.O.S.
AFI Class: 3
AFI ID Number: UN1993
AFI Pack Group: III
AFI Label: FLAMMABLE LIQUID
AFI Basic Pac Ref: A7.3
N.O.S. Shipping Name: XYLENE, EHTYL BENZENE.

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 18DEC96

Label Status: D
Common Name: XYLENE
Chronic Hazard: YES
Signal Word: CAUTION!
Acute Health Hazard-Moderate: X
Contact Hazard-Moderate: X
Fire Hazard-Severe: X
Reactivity Hazard-None: X
Special Hazard Precautions: INHAL:IRRIT NOSE/THROAT.HI CONC NAU,VOMIT, HEAD,RINGING IN EARS,SEVERE BREATH DIFFI.SUBSTERNAL PAIN,COUG,HOARSENESS, ANESTHETIC,CNS DEPRESS.INGEST:BURNING SENS IN MOUTH/STOMACH,NAU,VOMIT, SALIV.ASPIRATED INTO LUNGS SEVERE HEMORR PNEUITIS W/SEVERE PULM INJURY/ DEATH.SKIN:LOSS OF NAT OILS,DERM.EYE:IRRIT,TOXIC TO EYE TISSUE,HEMORR INFLAMM LESIONS.1STAID:ASPIRATION HAZ.INGEST:DON'T INDUCE VOMIT.KEEP HEAD BEL HIPS-PREVENT ASPIRATION IF VOMIT.CALL DR IMMED.INHAL:MOVE TO FRESH AIR. NOT BREATH GIVE ART RESP.DIFFI BREATH GIVE OXY.EYE:WASH W/LOTS OF WATER @LEAST 15MINS,LIFT EYELIDS.GET MED ATTN IMMED.SKIN:REMOVE CONTAM CLOTH.WASH W/SOAP/MILD DETER/WATER 15M
Protect Eye: X
Protect Skin: X
Protect Respiratory: X
Label Name: J.T. BAKER COMPANY
Label Street: 222 RED SCHOOL LANE
Label City: PHILLIPSBURG
Label State: NJ
Label Zip Code: 08865-2219
Label Country: US
Label Emergency Number: 908-859-2151\800-424-9300(CHEMTREC)

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MALLINCRODT -- METHYL ISOBUTYL KETONE - METHYL ISOBUTYL KETONE,ANALYZED REAGENT
MATERIAL SAFETY DATA SHEET
NSN: 6810000521371
Manufacturer's CAGE: 1BF21
Part No. Indicator: A
Part Number/Trade Name: METHYL ISOBUTYL KETONE

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General Information

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Item Name: METHYL ISOBUTYL KETONE,ANALYZED REAGENT
Company's Name: MALLINCRODT INC
Company's P. O. Box: M
Company's City: PARIS
Company's State: KY
Company's Country: US
Company's Zip Code: 40361-0315
Company's Emerg Ph #: 314-982-5000
Record No. For Safety Entry: 003
Tot Safety Entries This Stk#: 011
Status: SE
Date MSDS Prepared: 06APR89
Safety Data Review Date: 27FEB91
Supply Item Manager: CX
MSDS Serial Number: BJPJG
Specification Number: O-C-265
Hazard Characteristic Code: F4
Unit Of Issue: QT
Unit Of Issue Container Qty: ONE
Type Of Container: BOTTLE
Net Unit Weight: 01 LB

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Ingredients/Identity Information

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Proprietary: NO
Ingredient: METHYL ISOBUTYL KETONE (SARA III)
Ingredient Sequence Number: 01
Percent: 100
NIOSH (RTECS) Number: SA9275000
CAS Number: 108-10-1
OSHA PEL: 100 PPM/75 STEL
ACGIH TLV: 50 PPM/75 STEL; 9293
Other Recommended Limit: NONE SPECIFIED

Proprietary: NO
Ingredient: BENZENE (SARA III)
Ingredient Sequence Number: 02
Percent: 30PPM
NIOSH (RTECS) Number: CY1400000
CAS Number: 71-43-2
OSHA PEL: 1PPM/5STEL;1910.1028
ACGIH TLV: 10 PPM; A2; 9192
Other Recommended Limit: NONE SPECIFIED

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Physical/Chemical Characteristics

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Appearance And Odor: CLEAR COLORLESS LIQUID, ACETONE-LIKE ODOR.
Boiling Point: 244F,118C
Melting Point: -112F,-80C
Vapor Pressure (MM Hg/70 F): 16
Vapor Density (Air=1): 3.45
Specific Gravity: 0,803
Decomposition Temperature: UNKNOWN
Evaporation Rate And Ref: 1.62 (BUTYL ACETATE=1)

Solubility In Water: INSOLUBLE

Fire and Explosion Hazard Data

Flash Point: 73F,23C
Flash Point Method: CC
Lower Explosive Limit: 1.4
Upper Explosive Limit: 7.5
Extinguishing Media: USE CARBON DIOXIDE, FOAM, OR DRY CHEMICALS FOR SMALL FIRES. USE ALCOHOL-TYPE OR ALL-PURPOSE-TYPE FOAMS FOR LARGE FIRES.
Special Fire Fighting Proc: FIRE FIGHTERS SHOULD USE NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT WHEN FIGHTING CHEMICAL FIRE. USE WATER SPRAY TO COOL NEARBY CONTAINERS EXPOSED TO FIRE.
Unusual Fire And Expl Hazrds: FIRE OR EXCESSIVE HEAT MAY CAUSE PRODUCTION OF HAZARDOUS DECOMPOSITION PRODUCTS. USE WATER SPRAY TO DISPERSE VAPORS; REIGNITION IS POSSIBLE.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): HIGH TEMPERATURES, SPARKS, AND OPEN FLAMES
Materials To Avoid: STRONG OXIDIZING AGENTS (SUCH AS NITRIC ACID & HCLO), A;DEHYDES AND ALKALIES. VIOLENT REACTION WITH POTASSIUM T-BUTOXIDE.
Hazardous Decomp Products: CARBON MONOXIDE, CARBON DIOXIDE
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NONE

Health Hazard Data

LD50-LC50 Mixture: LD50 (ORAL RAT) IS 2080 MG/KG
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: NO
Health Haz Acute And Chronic: ACUTE-EYE:SEVERE IRRITATION. SKIN:REPEATED CONTACT MAY CAUSE DEFATING/IRRITATION.INHALATION:IRRITATIONG & ITCHING SENSATION OF RESPIRATORY TRACT,NAUSEA/VOMITING,DIZZINESS/UNCONSCIOUSNESS. INGESTION:NAUSEA,HEADACHE,INFLAMATION OF GI-TRACT,LARGE DOSES MAY PRODUCE NARCOSIS. CHRONIC-SKIN:IRRITATION MAY RESULT IN DERMATITIS.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Signs/Symptoms Of Overexp: EYE:IRRITATION, REDNESS/SWELLING OF CONJUCTIVA AND PAIN. SKIN & RESPIRATORY TRACT IRRITATION, COUGHING, VOMITING, HEADACHE,DIZZINESS, LATHARGY AND UNCONSCIOUSNESS.
Med Cond Aggravated By Exp: PERSONS WITH A HISTORY OF AILMENTS OR WITH A PRE-EXISTING DISEASE INVOLVING THE EYES, SKIN, OR RESPIRATORY TRACT MAY BE AT INCREASED RISK FROM EXPOSURE.
Emergency/First Aid Proc: INHALATION:REMOVE TO FRESH AIR. RESUSCITATE IF NOT BREATHING. GET MEDICAL ATTENTION. EYES:IMMEDIATELY FLUSH WITH PLENTY OF REMOVE CONTAMINATED CLOTHING. WASH WITH SOAP AND WATER. IF IRRITATION PERSISTS, GET MEDICAL ADVICE. INGESTION:GIVE TWO GLASSES OF WATR. DO NOT INDUCE VOMITING. GET IMMEDIATE MEDICAL ATTENTION.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: SMALL SPILL: WIPE/SOAK UP WITH PAPER TOWEL OR INERT ABSORBENT. PUT IN DISPOSAL CONTAINER. REMOVE RESIDUE WITH WATER. LARGE SPILL: EVACUATE AND VENTILATE AREA. IF POSSIBLE, STOP LEAK. DIKE TO RETAIN RUN OFF. VACUUM UP FREE LIQUID. ABSORB/WASH RESIDUE
Neutralizing Agent: NONE
Waste Disposal Method: INCINERATE IN A FURNACE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL LAWS AND REGULATIONS.
Precautions-Handling/Storing: STORE IN A COOL, DRY, WELL VENTILATED AREA. KEEP CONTAINERS TIGHTLY CLOSED. PROTECT CONTAINERS FROM PHYSICAL DAMAGE &

STATIC ELECTRICITY.
Other Precautions: DO NOT TAKE INTERNALLY. DO NOT BREATHE VAPORS. AVOID CONTACT WITH EYES. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. DO NOT USE WITH COPPER/COPPER ALLOYS, PLASTICS INCLUDING POLYVINYL CHLORIDE/POLYETHYLENE.

Control Measures

Respiratory Protection: IF VENTILATION DOES NOT MAINTAIN INHALATION EXPOSURES BELOW PEL(TLV), USE NIOSH/MSHA APPROVED ORGANIC VAPOR CARTRIDGE AND DUST/MIST PRE-FILTER RESPIRATORS AS PER CURRENT 29 CFR 1910.134, INSTRUCTIONS/WARNINGS AND NIOSH-RESPIRATOR SELECTION.
Ventilation: MECHANICAL (GENERAL) ROOM VENTILATION IS NORMALLY ADEQUATE. LOCAL EXHAUST MAY BE REQUIRED IF WORK AREA NOT VENTED.
Protective Gloves: NEOPRENE, NITRILE, PVC OR NATURAL RUBBER
Eye Protection: SAFETY GOGGLES WITH OPTIONAL FACE SHIELD
Other Protective Equipment: EYE WASH STATION AND SAFETY SHOWER. INDUSTRIAL-TYPE WORK CLOTHING AND APRON AS REQUIRED.
Work Hygienic Practices: OBSERVE GOOD PERSONAL HYGIENE PRACTICES AND RECOMMENDED PROCEDURES. DO NOT WEAR CONTAMINATED CLOTHING OR FOOTWEAR.
Suppl. Safety & Health Data: AVOID PROLONGED OR REPEATED EXPOSURE. DO NOT GET ON SKIN OR IN EYES. DO NOT BREATHE VAPORS OR MISTS.

Transportation Data

Trans Data Review Date: 91031
DOT PSN Code: ABF
DOT Proper Shipping Name: ACETONE
DOT Class: 3
DOT ID Number: UN1090
DOT Pack Group: II
DOT Label: FLAMMABLE LIQUID
IMO PSN Code: ADF
IMO Proper Shipping Name: ACETONE
IMO Regulations Page Number: 3102
IMO UN Number: 1090
IMO UN Class: 3.1
IMO Subsidiary Risk Label: -
IATA PSN Code: ACM
IATA UN ID Number: 1090
IATA Proper Shipping Name: ACETONE
IATA UN Class: 3
IATA Label: FLAMMABLE LIQUID
AFI PSN Code: ACM
AFI Prop. Shipping Name: ACETONE
AFI Class: 3
AFI ID Number: UN1090
AFI Pack Group: II
AFI Label: FLAMMABLE LIQUID
AFI Basic Pac Ref: 7-7

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 31JAN91
Label Status: F
Common Name: METHYL ISOBUTYL KETONE
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Moderate: X
Contact Hazard-Moderate: X

Fire Hazard-Severe: X
Reactivity Hazard-None: X
Special Hazard Precautions: EXTREMELY FLAMMABLE LIQUID AND VAPORS. VAPORS MAY SPREAD LONG DISTANCES AND IGNITE. KEEP AWAY FROM HEAT, SPARKS, AND FLAME. KEEP CONTAINER CLOSED. USE WITH ADEQUATE VENTILATION. IN CASE OF FIRE, USE DRY CHEMICAL, CO2 OR ALCOHOL FOAM. ACUTE-EYE:SEVERE IRRITATION. SKIN:REPEATED CONTACT MAY CAUSE DEFATING/IRRITATION.INHALATION:IRRITATION/ STINGING & ITCHING SENSATION OF RESPIRATORY TRACT,NAUSEA/VOMITING, DIZZINESS/UNCONSCIOUSNESS.INGESTION:NAUSEA,VOMITING,HEADACHE,DIZZINESS AND UNCNSCIOUSNESS. CHRONIC-SKIN:IRRITATION/ALLERGIC REACTION. SPILL: EVACUATE AREA. REMOVE IGNITION SOURCES. ABSORB WITH INERT MATERIAL/WASH RESIDUE WITH WATER.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: MALLINCRODT INC
Label P.O. Box: M
Label City: PARIS
Label State: KY
Label Zip Code: 40361-0315
Label Country: US
Label Emergency Number: 314-982-5000
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URL for this msds http://siri.org. If you wish to change, add to, or delete information in this archive please sent updates to dan@siri.org.

UNION CARBIDE -- METHYL N-AMYL KETONE
MATERIAL SAFETY DATA SHEET
NSN: 681000N025974
Manufacturer's CAGE: 61637
Part No. Indicator: A
Part Number/Trade Name: METHYL N-AMYL KETONE

General Information

Company's Name: UNION CARBIDE
Company's Street: 39 OLD RIDGEBURY ROAD
Company's City: DANBURY
Company's State: CT
Company's Country: US
Company's Zip Code: 06817-0001
Company's Emerg Ph #: 800-822-4357; 304-744-3487
Company's Info Ph #: 800-822-4357; 304-744-3487
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 22AUG90
Safety Data Review Date: 30JAN92
MSDS Serial Number: BMRHC
Hazard Characteristic Code: F4

Ingredients/Identity Information

Proprietary: NO
Ingredient: 2-HEPTANONE; (METHYL N-AMYL KETONE)
Ingredient Sequence Number: 01
Percent: 100
NIOSH (RTECS) Number: MJ5075000
CAS Number: 110-43-0
OSHA PEL: 100 PPM
ACGIH TLV: 50 PPM

Proprietary: NO
Ingredient: SUPP DATA: AS SAFE OPERATING CONDITIONS. FURTHER INFO IS AVAILABLE IN A TECHNICAL BULLETIN ENTITLED "IGNITION (ING 3)
Ingredient Sequence Number: 02
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 2: HAZARDS OF ORGANIC CHEMICAL VAPORS".
Ingredient Sequence Number: 03
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: VENT: AT POINTS WHERE VAPORS MAY ESCAPE TO THE WORKPLACE AIR.
Ingredient Sequence Number: 04
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Physical/Chemical Characteristics

Appearance And Odor: CLEAR LIQUID; PLEASANT, SWEET ODOR.
Boiling Point: 305F,152C
Melting Point: -27F, -33C
Vapor Pressure (MM Hg/70 F): 2.14
Vapor Density (Air=1): 3.94

Specific Gravity: 0.82 @ 20/20C
Evaporation Rate And Ref: 0.4 (BUTYL ACETATE=1)
Solubility In Water: 0.46% @ 20C
Percent Volatiles By Volume: 100

Fire and Explosion Hazard Data

Flash Point: 102F,39C
Flash Point Method: TCC
Lower Explosive Limit: 1.1%
Upper Explosive Limit: 7.9%
Extinguishing Media: ALCOHOL-TYPE OR ALL PURPOSE TYPE FOAMS BY MFR'S RECOMM TECHNIQUES FOR LARGE FIRES. USE CO*2 OR DRY CHEM MEDIA SM FIRES.
Special Fire Fighting Proc: USE NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire And Expl Hazrds: THIS MATERIAL MAY PRODUCE A FLOATING FIRE HAZARD IN EXTREME FIRE CONDITIONS.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE
Materials To Avoid: OXIDIZING MATERIALS CAN CAUSE A VIGOROUS REACTION.
Hazardous Decomp Products: COMBUST WILL PRDC CO*2, POSS CO. CO IS HIGHLY TOX IF INHAL, CO*2 IN SUFFICIENT CONCS CAN ACT AS AN ASPHYXIANT.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: NO
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: INGEST: MOD TOX: MOUTH & THROAT IRRIT, HEADACHE, ABDOMINAL PAIN, NAUSEA, VOMITING AND NARCOSIS. INHAL: HIGH VAPOR CONC CAUSE NOSE, EYE AND THROAT IRRITATION, HEADACHE, DIZZINESS, AND UNCON. SKIN: CAUSES IRRIT, SEEN AS LOCAL REDNESS. PRLNG(EFTS OF OVEREXP)
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT
Signs/Symptoms Of Overexp: HLTH HAZ: CONTACT AS FROM CLOTHING WET WITH MATERIAL MAY CAUSE DRYING AND CRACKING OF SKIN DUE TO DEFATTING ACTION. EYES: MAY CAUSE MINIMAL IRRITATION, SEEN AS EXCESS REDNESS OF CONJUNCTIVA. ASPIRATION MAY RESULT IN LUNG DAMAGE.
Med Cond Aggravated By Exp: BECAUSE OF ITS IRRITATING AND DEFATTING PROPERTIES, THIS MATL MAY AGGRAVATE AN EXISTING DERMATITIS. BREATHING OF VAPOR &/MIST MAY AGGRAVATE ASTHMA & INFLAMMATORY/FIBROTIC PULMONARY DISEASE.
REMOVE TO FRESH AIR. GIVE ARTF RESP IF NOT BREATHING. QUALIFIED PERSONNEL MAY GIVE O*2 IF BREATHING IS DIFFICULT. CALL MD. EYES: IMMED FLUSH EYES THOROUGHLY WITH WATER AND CONTINUE WASHING FOR SEVERAL MINUTES. OBTAIN MED ATTN. NOTE TO MD: STOMACH CONTENTS SHLD BE (SUPP DATA)

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: WEAR SUITABLE PROTECTIVE EQUIPMENT; AVOID CONTACT WITH LIQUID AND VAPORS. SMALL SPILLS COULD BE FLUSHED WITH LARGE QTYS OF WATER. LARGE SPILLS SHOULD BE COLLECTED FOR DISPOSAL.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: INCINERATE IN A FURNACE WHERE PERMITTED UNDER APPROPRIATE FEDERAL, STATE, LOCAL REGULATIONS.
Precautions-Handling/Storing: HARMFUL IF INHAL. CAUSES SKIN IRRIT.

COMBUST. ASPIR MAY CAUSE LUNG DMG. MAY CAUSE DIZZ & DROW. AVOID BRTHG VAPORS. AVOID CONTACT W/EYES, SKIN, CLTHG.
Other Precautions: DO NOT SWALLOW. KEEP AWAY FROM HEAT & FLAME. KEEP CNTNR CLOSED. USE WITH ADEQUATE VENTILATION. PROCESS HAZARD: SUDDEN RELEASE OF HOT ORG CHEM VAPS/MISTS FROM PROCESS EQUIP OPERATING AT ELEVATED TEMPS & PRESS/SUDDEN INGRESS OF (SUPP DATA)

Control Measures

Respiratory Protection: USE NIOSH/MSHA APPROVED SCBA IN HIGH VAPOR CONCENTRATIONS.
Ventilation: SHOULD BE HANDLED IN COVERED EQUIP, GENL(MECH) ROOM VENT SHLD BE SATISFACTORY. SPECIAL, LOCAL VENT MAY BE NEEDED(ING 4)
Protective Gloves: BUTYL GLOVES.
Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).
Other Protective Equipment: EYE BATH, SAFETY SHOWER.
Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING.
Suppl. Safety & Health Data: FIRST AID PROC: EVACUATED QUICKLY, AVOIDING ASPIRATION. TREATMENT SHLD BE DIRECTED AT CONTROL OF SYMPTOMS AND CLINICAL CNDTNS OF PATIENT. THERE IS NO SPEC ANTIDOTE. OTHER PREC: AIR INTO VACUUM EQUIP MAY RSLT IN IGNIT W/OUT PESENCE OF OBVIOUS IGNIT SOURCES. PUB "AUTOIGNIT"/"IGNIT" TEMP VALUES CANNOT BE TREATED(ING 2)

Transportation Data

Trans Data Review Date: 92125
DOT PSN Code: GJL
DOT Proper Shipping Name: FLAMMABLE LIQUIDS, N.O.S.
DOT Class: 3
DOT ID Number: UN1993
DOT Pack Group: III
DOT Label: FLAMMABLE LIQUID
IMO PSN Code: HIA
IMO Proper Shipping Name: FLAMMABLE LIQUID, N.O.S. o *
IMO Regulations Page Number: 3345
IMO UN Number: 1993
IMO UN Class: 3.3
IMO Subsidiary Risk Label: - *
IATA PSN Code: MCA
IATA UN ID Number: 1993
IATA Proper Shipping Name: FLAMMABLE LIQUID, N.O.S. *
IATA UN Class: 3
IATA Label: FLAMMABLE LIQUID
AFI PSN Code: MCA
AFI Prop. Shipping Name: FLAMMABLE LIQUIDS, N.O.S.
AFI Class: 3
AFI ID Number: UN1993
AFI Pack Group: III
AFI Label: FLAMMABLE LIQUID
AFI Basic Pac Ref: 7-7

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 05FEB92
Label Date: 30JAN92
Label Status: G
Common Name: METHYL N-AMYL KETONE
Chronic Hazard: NO
Signal Word: WARNING!
Acute Health Hazard-Slight: X

Contact Hazard-Moderate: X
Fire Hazard-Moderate: X
Reactivity Hazard-None: X
Special Hazard Precautions: COMBUSTIBLE. KEEP AWAY FROM HEAT AND FLAME. KEEP CONTAINER CLOSED. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. FOR INDUSTRY USE ONLY. ACUTE: HARMFUL IF INHALED. CAUSES NOSE, EYE AND THROAT IRRITATION, HEADACHE, DIZZINESS AND UNCONSCIOUSNESS. INGEST IS MODERATELY TOXIC; MOUTH AND THROAT IRRITATION, HEADACHE, ABDOMINAL PAIN, NAUSEA, VOMITING AND NARCOSIS. SKIN CONTACT CAUSES IRRITATION, SEEN AS LOCAL REDNESS. PROLONGED CONTACT MAY CAUSE DEFATTING. SEEN AS REDNESS OF THE CONJUNCTIVA. CHRONIC: NONE SPECIFIED BY MANUFACTURER.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: UNION CARBIDE
Label Street: 39 OLD RIDGEBURY ROAD
Label City: DANBURY
Label State: CT
Label Zip Code: 06817-0001
Label Country: US
Label Emergency Number: 800-822-4357; 304-744-3487

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CHEM SERVICE -- F48S BROMODICHLOROMETHANE 100 UG-ML IN METHANOL
MATERIAL SAFETY DATA SHEET
NSN: 655000F039042
Manufacturer's CAGE: 8Y898
Part No. Indicator: A
Part Number/Trade Name: F48S BROMODICHLOROMETHANE 100 UG/ML IN METHANOL

General Information

Company's Name: CHEM SERVICE INC
Company's Street: 660 TOWER LN
Company's P. O. Box: 3108
Company's City: WEST CHESTER
Company's State: PA
Company's Country: US
Company's Zip Code: 19381-3108
Company's Emerg Ph #: 610-386-2100/610-692-3026
Company's Info Ph #: 610-692-3026/800-452-9994
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SE
Date MSDS Prepared: 19MAR92
Safety Data Review Date: 22MAR95
Preparer's Company: CHEM SERVICE INC
Preparer's St Or P. O. Box: 660 TOWER LN
Preparer's City: WEST CHESTER
Preparer's State: PA
Preparer's Zip Code: 19381-3108
MSDS Serial Number: BWWFS

Ingredients/Identity Information

Proprietary: NO
Ingredient: BROMODICHLOROMETHANE (ANIMAL CARCINOGEN BY IARC-GROUP 2B, SUSPECTED CARCINOGEN BY NTP) *95-1*
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: PA5310000
CAS Number: 75-27-4

Proprietary: NO
Ingredient: METHANOL (METHYL ALCOHOL), COLUMBIAN SPIRITS *95-1*
Ingredient Sequence Number: 02
NIOSH (RTECS) Number: PC1400000
CAS Number: 67-56-1
OSHA PEL: 260 MG/CUM
ACGIH TLV: 262 MG/CUM (SKIN)
Other Recommended Limit: 200 PPM

Physical/Chemical Characteristics

Appearance And Odor: COLORLESS LIQUID
Boiling Point: 148.28F
Melting Point: -144.4F
Vapor Pressure (MM Hg/70 F): 97
Vapor Density (Air=1): 1.11
Solubility In Water: MISCIBLE

Fire and Explosion Hazard Data

Flash Point: 51.8F
Lower Explosive Limit: 6.7
Upper Explosive Limit: 36
Extinguishing Media: CO2/DRY CHEMICAL POWDER. DON'T USE WATER.

Unusual Fire And Expl Hazrds: FLAMMABLE CHEMICAL.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): MOISTURE
Materials To Avoid: STRONG ACIDS, ACID HALIDES, ANHYDRIDES, STRONG OXIDIZING AGENTS, STRONG REDUCING AGENTS, ACTIVE METALS
Hazardous Decomp Products: TOXIC FUMES
Hazardous Poly Occur: NO

Health Hazard Data

LD50-LC50 Mixture: ORAL LD50(RAT): 5628 MG/KG
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: MAY BE FATAL IF ABSORBED THROUGH THE SKIN, INHALED/SWALLOWED. EYES: REPEATED EXPOSURE TO VAPORS/DUST CAN CAUSE INJURY. EXPOSURE CAN CAUSE LIVER/KIDNEY DAMAGE & CARDIOVASCULAR INJURY. CAN CAUSE BLINDNESS IF SWALLOWED.
Carcinogenicity - NTP: YES
Carcinogenicity - IARC: YES
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: SEE INGREDIENTS.
Signs/Symptoms Of Overexp: GASTROINTESTINAL DISTURBANCES, CONVULSIONS
Emergency/First Aid Proc: EYES: FLUSH CONTINUOUSLY W/WATER FOR 15-20 MINS. SKIN: FLUSH W/WATER FOR 15-20 MINS. IF NO BURNS OCCUR, USE SOAP & WATER TO CLEANSE. INHALATION: REMOVE TO FRESH AIR. GIVE OXYGEN/CPR IF NECESSARY. OBTAIN MEDICAL ATTENTION IN ALL CASES.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: EVACUATE AREA. WEAR APPROPRIATE OSHA REGULATED EQUIPMENT. VENTILATE AREA. ABSORB ON VERMICULITE/SIMILAR MATERIAL. SWEEP UP & PLACE IN AN APPROPRIATE CONTAINER. HOLD FOR DISPOSAL. WASH CONTAMINATED SURFACES TO REMOVE ANY RESIDUES.
Waste Disposal Method: BURN IN A CHEMICALS INCINERATOR EQUIPPED W/AN AFTERBURNER & SCRUBBER IN ACCORDANCE W/FEDERAL, STATE & LOCAL REGULATIONS.
Precautions-Handling/Storing: STORE IN A COOL, DRY PLACE. STORE ONLY W/ COMPATIBLE CHEMICALS. KEEP TIGHTLY CLOSED. THIS PRODUCT IS FOR LABORATORY USE ONLY.
Other Precautions: PERSONS NOT PROPERLY TRAINED SHOULDN'T HANDLE THIS CHEMICAL/ITS CONTAINER. AVOID CONTACT W/EYES, SKIN & CLOTHING. AVOID BREATHING VAPORS. PRODUCTS MAY NOT BE USED AS DRUGS/COSMETICS/PESTICIDAL PRODUCTS/FOOD ADDITIVES/HOUSEHOLD CHEMICALS.

Control Measures

Respiratory Protection: USE APPROPRIATE OSHA/MSHA APPROVED SAFETY EQUIPMENT.
Ventilation: THIS CHEMICAL SHOULD BE HANDLED ONLY IN A HOOD.
Protective Gloves: REQUIRED
Eye Protection: EYE SHIELDS
Work Hygienic Practices: REMOVE/LAUNDER CONTAMINATED CLOTHING BEFORE REUSE. DON'T WEAR CONTACT LENSES IN THE LAB.
Suppl. Safety & Health Data: THE INFORMATION FOR THIS MSDS IS FOR METHYL ALCOHOL.

Transportation Data

Disposal Data

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Label Data

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Label Required: YES
Label Status: G
Common Name: F48S BROMODICHLOROMETHANE 100 UG/ML IN METHANOL
Special Hazard Precautions: MAY BE FATAL IF ABSORBED THROUGH THE SKIN, INHALED/SWALLOWED. EYES: REPEATED EXPOSURE TO VAPORS/DUST CAN CAUSE INJURY. EXPOSURE CAN CAUSE LIVER/KIDNEY DAMAGE & CARDIOVASCULAR INJURY. CAN CAUSE BLINDNESS IF SWALLOWED. GASTROINTESTINAL DISTURBANCES, CONVULSIONS
Label Name: CHEM SERVICE INC
Label Street: 660 TOWER LN
Label P.O. Box: 3108
Label City: WEST CHESTER
Label State: PA
Label Zip Code: 19381-3108
Label Country: US
Label Emergency Number: 610-386-2100/610-692-3026

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URL for this msds http://siri.org. If you wish to change, add to, or delete information in this archive please sent updates to dan@siri.org.

J T BAKER -- CHLOROFORM,9174 - CHLOROFORM,ACS
MATERIAL SAFETY DATA SHEET
NSN: 6810002222639
Manufacturer's CAGE: 70829
Part No. Indicator: B
Part Number/Trade Name: CHLOROFORM,9174

General Information

Item Name: CHLOROFORM,ACS
Company's Name: J.T. BAKER COMPANY
Company's Street: 222 RED SCHOOL LANE
Company's City: PHILLIPSBURG
Company's State: NJ
Company's Country: US
Company's Zip Code: 08865
Company's Emerg Ph #: 908-859-2151/800-424-9300(CHEMTREC)
Company's Info Ph #: 908-859-2151
Record No. For Safety Entry: 011
Tot Safety Entries This Stk#: 012
Status: FE
Date MSDS Prepared: 04JAN94
Safety Data Review Date: 05FEB95
Supply Item Manager: CX
MSDS Preparer's Name: UNKNOWN
MSDS Serial Number: BLXFW
Specification Number: O-C-265C
Spec Type, Grade, Class: NONE
Hazard Characteristic Code: T3
Unit Of Issue: BT
Unit Of Issue Container Qty: 0.625 GAL
Type Of Container: BOTTLE
Net Unit Weight: 7.7 LBS
NRC/State License Number: NOT RELEVANT

Ingredients/Identity Information

Proprietary: NO
Ingredient: CHLOROFORM (SARA 302/313) (CERCLA)
Ingredient Sequence Number: 01
Percent: 98- 100
NIOSH (RTECS) Number: FS9100000
CAS Number: 67-66-3
OSHA PEL: C 50 PPM
ACGIH TLV: 10 PPM; A2; 9495
Other Recommended Limit: NONE SPECIFIED

Physical/Chemical Characteristics

Appearance And Odor: CLEAR, COLORLESS LIQUID WITH A PLEASANT ODOR
Boiling Point: 141F,61C
Melting Point: -83F,-64C
Vapor Pressure (MM Hg/70 F): 159 @ 68F
Vapor Density (Air=1): 4.1
Specific Gravity: 1.48
Decomposition Temperature: UNKNOWN
Evaporation Rate And Ref: 0.09 (N-BUTYL ACETATE=1)
Solubility In Water: SLIGHT (0.1-1%)
Percent Volatiles By Volume: 100
Corrosion Rate (IPY): UNKNOWN

Fire and Explosion Hazard Data

Flash Point: NONE
Extinguishing Media: USE MEDIA APPROPRIATE FOR SURROUNDING FIRE. MOVE CONTAINER AWAY FROM FIRE, IF POSSIBLE. COOL CONTAINER WITH WATER SPRAY.
Special Fire Fighting Proc: WEAR FULL PROTECTIVE CLOTHING AND NIOSH-APPROVED SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN THE POSITIVE PRESSURE MODE.
Unusual Fire And Expl Hazrds: MAY RELEASE TOXIC AND CORROSIVE GASES, INCLUDING CHLORINE, PHOSGENE AND HYDROGEN CHLORIDE.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): HEAT, FLAMES, OTHER SOURCES OF IGNITION, LIGHT, AIR, MOISTURE
Materials To Avoid: STRONG OXIDIZERS, STRONG BASES, ALKALI METALS, ALUMINUM, MAGNESIUM
Hazardous Decomp Products: MAY RELEASE TOXIC/CORROSIVE FUMES, INCLUDING OXIDES OF CHLORINE AND CARBON, PHOSGENE, CHLORINE GAS AND HYDROGEN CHLORIDE
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: LD50 (ORAL, RAT) IS 908 MG/KG.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: NO
Health Haz Acute And Chronic: TARGET ORGANS:LIVER, KIDNEY, HEART, EYE, SKIN. ACUTE- EYE:IRRITATION. MAY CAUSE TEMPORARY CORNEAL DAMAGE. SKIN:RAPID ABSORPTION. MAY CAUSE DERMATITIS. INHALED:MAY BE FATAL. MAY CAUSE IRRITATION, DIZZINESS & LOSS OF CONSCIOUSNESS. ORAL:GI TRACT IRRITATION. MAY BE FATAL. CHRONIC- DERMATITIS, KIDNEY, LIVER DAMAGE.
Carcinogenicity - NTP: YES
Carcinogenicity - IARC: YES
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: THE AGENT IS POSSIBLY CARCINOGENIC TO HUMAN.
Signs/Symptoms Of Overexp: EYES, SKIN, RESPIRATORY AND GASTROINTESTINAL TRACTS IRRITATION; HEADACHE, NAUSEA, VOMITING, DIZZINESS, DROWSINESS, DRYNESS OF MOUTH AND THROAT, UNCONSCIOUSNESS, SKIN DERMATITIS, BURNS TO MOUTH AND THROAT
Med Cond Aggravated By Exp: SKIN DISORDERS, LIVER DISORDERS, KIDNEY DISORDERS, HEART DISORDERS
WASH WITH SOAP & WATER. INHALED:REMOVE TO FRESH AIR. PROVIDE CPR/OXYGEN IF NEEDED. ORAL:CALL PHYSICIAN. IF CONSCIOUS,IMMEDIATELY INDUCE VOMITING. NEVER GIVE FLUID OR INDUCE VOMITING IF PATIENT IS UNCONSCIOUS OR HAS CONVULSION.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: CONTAIN SPILL IMMEDIATELY. DO NOT ALLOW SPILL TO ENTER SEWERS OR WATER COURSES. VENTILATE AREA. USE WATER SPRAY TO REDUCE VAPORS. ABSORB MATERIAL WITH CLAY, SAND, OR SIMILAR ABSORBENT MATERIAL. PLACE IN DISPOSAL CONTAINER. FOR LARGE SPILL, DIKE AHEAD
Neutralizing Agent: NOT RELEVANT
Waste Disposal Method: DISPOSED OF IN ACCORDANCE WITH ALL APPLICABLE U044 (TOXIC WASTE).
Precautions-Handling/Storing: KEEP CONTAINER TIGHTLY CLOSED. STORE IN SECURE POISON AREA AWAY FROM INCOMPATIBLE MATERIALS.
Other Precautions: STORAGE COLOR CODE IS BLUE (HEALTH). CONTAINERS MAY EXPLODE IN HEAT OF FIRE. KEEP AWAY FROM REACH OF CHILDREN. AVOID CONTACT WITH EYES AND SKIN. DO NOT BREATHE VAPORS OR MISTS. USE UNDER THE HOOD OR WELL VENTILATED PLACE.

Control Measures

Respiratory Protection: IF TLV IS EXCEEDED (ABOVE 10 PPM) OR FOR SYMPTOMS OF OVER EXPOSURE, WEAR NIOSH-APPROVED NIOSH-APPROVED POSITIVE-PRESSURE SELF-CONTAINED BREATHING APPARATUS.
Ventilation: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.
Protective Gloves: POLYVINYL ALCOHOL RECOMMENDED
Eye Protection: CHEMICAL SAFETY GOGGLES & FACE SHIELD
Other Protective Equipment: EYE WASH STATION, SAFETY SHOWER, UNIFORM, PROTECTIVE SUIT
Work Hygienic Practices: DO NOT TAKE INTERNALLY. AVOID SKIN CONTACT. WASH SKIN AFTER USING PRODUCT. DO NOT EAT, DRINK OR SMOKE IN WORK AREA.
Suppl. Safety & Health Data: FOR PREVIOUS PER CENT PURITY, SEE P/N A SAME NSN.

Transportation Data

Trans Data Review Date: 95036
DOT PSN Code: DHF
DOT Proper Shipping Name: CHLOROFORM
DOT Class: 6.1
DOT ID Number: UN1888
DOT Pack Group: II
DOT Label: KEEP AWAY FROM FOOD
IMO PSN Code: EEH
IMO Proper Shipping Name: CHLOROFORM
IMO Regulations Page Number: 6103
IMO UN Number: 1888
IMO UN Class: 6.1
IMO Subsidiary Risk Label: -
IATA PSN Code: GJO
IATA UN ID Number: 1888
IATA Proper Shipping Name: CHLOROFORM
IATA UN Class: 6.1
IATA Label: TOXIC
AFI PSN Code: GJO
AFI Prop. Shipping Name: CHLOROFORM
AFI Class: 6.1
AFI ID Number: UN1888
AFI Pack Group: II
AFI Label: POISON
AFI Special Prov: N36
AFI Basic Pac Ref: 10-9

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 05FEB95
MFR Label Number: NOT RELEVANT
Label Status: F
Common Name: CHLOROFORM,9174
Signal Word: WARNING!
Acute Health Hazard-Moderate: X
Contact Hazard-Moderate: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: TARGET ORGANS:LIVER, KIDNEY, HEART, EYE, SKIN. ACUTE- EYE:IRRITATION. SKIN:RAPID ABSORPTION. MAY CAUSE DERMATITIS. INHALED:MAY BE FATAL. MAY CAUSE DIZZINESS & LOSS OF CONSCIOUSNESS. ORAL:MAY BE FATAL. CHRONIC- DERMATITIS, KIDNEY, LIVER DAMAGE. STORE IN SECURE POISON AREA. ABSORB SPILL WITH CLAY/SAND. PLACE IN DISPOSAL CONTAINER. FOR LARGE

WASH WITH SOAP & WATER. INHALED:REMOVE TO FRESH AIR. PROVIDE CPR/OXYGEN IF NEEDED. ORAL:CALL PHYSICIAN. IF CONSCIOUS,IMMEDIATELY INDUCE VOMITING.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: J.T. BAKER COMPANY
Label Street: 222 RED SCHOOL LANE
Label City: PHILLIPSBURG
Label State: NJ
Label Zip Code: 08865
Label Country: US
Label Emergency Number: 908-859-2151/800-424-9300(CHEMTREC)

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ACC97171

****** MATERIAL SAFETY DATA SHEET **** **** MATERIAL SAFETY DATA SHEET ******

n-Propyl acetate, 97%
97171

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: n-Propyl acetate, 97%

1-Acetoxypropane; 1-Propyl Acetate; N-Propyl Ester
Company Identification: Acros Organics N.V.
Janssen Pharmaceuticalaan 3a
2440 Geel, Belgium
For information in North America, call: 800-ACROS-01
For information in Europe, call: 0032(0) 14575211
For emergencies in the US, call CHEMTREC: 800-424-9300
For emergencies outside the US, call: 0032(0) 14575299

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
109-60-4	N-PROPYL ACETATE	97%	203-686-1

Hazard Symbols: F

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

Appearance: Colorless. Flash Point: 14°C.
Warning! Flammable liquid. Causes respiratory tract irritation. May cause skin irritation. Causes eye irritation. May cause digestive tract irritation. May cause central nervous system depression.
Target Organs: Central nervous system.

Potential Health Effects

Eye:
Causes eye irritation.

Skin:
May cause skin irritation.

Ingestion:
May cause irritation of the digestive tract.

Inhalation:
Causes respiratory tract irritation. May cause narcotic effects. May cause drowsiness, unconsciousness, and central nervous system depression.
High vapor concentration will be irritating and cause nausea, vomiting

, and dizziness.

Chronic:
Prolonged or repeated skin contact may cause defatting and dermatitis.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:
Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids. Get medical aid.

Skin:
Get medical aid if irritation develops or persists. Flush skin with plenty of soap and water.

Ingestion:
If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.

Inhalation:
Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Notes to Physician:
Treat symptomatically and supportively.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors can travel to a source of ignition and flash back. Flammable Liquid. Can release vapors that form explosive mixtures at temperatures above the flashpoint. Containers may explode in the heat of a fire.

Extinguishing Media:
Use water spray to cool fire-exposed containers. Use foam, dry chemical, or carbon dioxide.

Autoignition Temperature: 450°C (842.00°F)
Flash Point: 14°C (57.20°F)
NFPA Rating: health-1; flammability-3; reactivity-0
Explosion Limits, Lower: 2.0%
Upper: 8.00%

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:
Absorb spill with inert material, (e.g., dry sand or earth), then place into a chemical waste container. Remove all sources of ignition.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Wash thoroughly after handling. Use with adequate ventilation. Ground and bond containers when transferring material. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, sparks or open flames. Keep container tightly closed. Avoid contact with heat, sparks and flame. Avoid ingestion and inhalation. Use only in a chemical fume hood.

Storage:
Keep away from heat, sparks, and flame. Keep away from sources of

ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
N-PROPYL ACETATE	200 ppm ; 835 mg/m3; 250 ppm STEL; 1040 mg/m3 STEL	200 ppm TWA; 840 mg/m3 TWA; 250 ppm STEL; 1050 mg/m3 STEL	200 ppm TWA; 840 mg/m3 TWA

OSHA Vacated PELs:
N-PROPYL ACETATE:
200 ppm TWA; 840 mg/m3 TWA; 250 ppm STEL; 1050 mg/m3 STEL

Personal Protective Equipment

Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133.

Skin:
Wear appropriate protective gloves to prevent skin exposure.

Clothing:
Wear appropriate protective clothing to prevent skin exposure.

Respirators:
Follow the OSHA respirator regulations found in 29CFR 1910.134. Always use a NIOSH-approved respirator when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State:	Liquid
Appearance:	Colorless
Odor:	Odor of pears
pH:	Not available.
Vapor Pressure:	40 mm Hg @28.8C
Vapor Density:	3.5
Evaporation Rate:	6.1
Viscosity:	0.58 mPas 20°C
Boiling Point:	101.6°C
Freezing/Melting Point:	-92.0°C
Decomposition Temperature:	Not available.
Solubility:	miscible with alcohol, ether
Specific Gravity/Density:	.836
Molecular Formula:	C5H10O2
Molecular Weight:	102.13

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable under normal temperatures and pressures.
Conditions to Avoid:
Incompatible materials, ignition sources, excess heat.

Incompatibilities with Other Materials:
Oxidizing agents, bases, acids, nitrates.
Hazardous Decomposition Products:
Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Will not occur.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 109-60-4: AJ3675000
LD50/LC50:
CAS# 109-60-4: Oral, mouse: LD50 = 8300 mg/kg; Oral, rabbit: LD50 = 6640 mg/kg; Oral, rat: LD50 = 9370 mg/kg; Skin, rabbit: LD50 = >20 gm/kg.
Carcinogenicity:
N-PROPYL ACETATE -
Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Epidemiology:
No data available.
Teratogenicity:
No data available.
Reproductive Effects:
No data available.
Neurotoxicity:
No data available.
Mutagenicity:
No data available.
Other Studies:
No data available.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:
Not available.
Environmental Fate:
Not available.
Physical/Chemical:
Not available.
Other:
Not available.

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Dispose of in a manner consistent with federal, state, and local regulations.
RCRA D-Series Maximum Concentration of Contaminants: Not listed.
RCRA D-Series Chronic Toxicity Reference Levels: Not listed.
RCRA F-Series: Not listed.
RCRA P-Series: Not listed.
RCRA U-Series: Not listed.
Not listed as a material banned from land disposal according to RCRA.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
Shipping Name: N-PROPYL ACETATE
Hazard Class: 3
UN Number: UN1276
Packing Group: II
IMO
Shipping Name: NORMAL-PROPYL ACETATE
Hazard Class: 3.2
UN Number: 1276
Packing Group: II
IATA

Shipping Name: N-PROPYL ACETATE
Hazard Class: 3
UN Number: 1276
Packing Group: II
RID/ADR
Shipping Name: N-PROPYL ACETATE
Dangerous Goods Code: 3(3B)
UN Number: 1276
Canadian TDG
Shipping Name: N-PROPYL ACETATE
Hazard Class: 3
UN Number: UN1276
Other Information: FLASHPOINT 10 C

**** SECTION 15 - REGULATORY INFORMATION ****

FEDERAL
TSCA
CAS# 109-60-4 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA
Section 302 (RQ)
None of the chemicals in this material have an RQ.
Section 302 (TPQ)
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 109-60-4: acute, flammable.
Section 313
No chemicals are reportable under Section 313.
Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
N-PROPYL ACETATE can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
California No Significant Risk Level:
None of the chemicals in this product are listed.
INTERNATIONAL
European Labeling in Accordance with EC Directives
Hazard Symbols: F
Risk Phrases:
Safety Phrases:
S 16 Keep away from sources of ignition - No smoking.
S 23 Do not inhale gas/fumes/vapour/spray.

S 29 Do not empty into drains.
S 33 Take precautionary measures against static discharges.

Canada

CAS# 109-60-4 is listed on Canada's DSL/NDSL List.
CAS# 109-60-4 is listed on Canada's Ingredient Disclosure List.

Exposure Limits:

CAS# 109-60-4:. OEL-AUSTRALIA:TWA 200 ppm (840 mg/m3);STEL 250 ppm (1050 mg/m3). OEL-BELGIUM:TWA 200 ppm (835 mg/m3);STEL 250 ppm (1040 mg/m3). OEL-CZECHOSLOVAKIA:TWA 400 mg/m3;STEL 1600 mg/m3. OEL-DENMARK:TWA 200 ppm (840 mg/m3). OEL-FINLAND:TWA 200 ppm (840 mg/m3);STEL 250 ppm (1050 mg/m3). OEL-FRANCE:TWA 200 ppm (840 mg/m3). OEL-GERMANY:TWA 200 ppm (840 mg/m3). OEL-HUNGARY:TWA 200 mg/m3;STEL 600 mg/m3;Skin. OEL-JAPAN:TWA 200 ppm (830 mg/m3). OEL-THE NETHERLANDS:TWA 200 ppm (840 mg/m3). OEL-THE PHILIPPINES:TWA 200 ppm (840 mg/m3). OEL-POLAND:TWA 200 mg/m3. OEL-RUSSIA:TWA 200 ppm;STEL 200 mg/m3. OEL-SWITZERLAND:TWA 200 ppm (840 mg/m3);STEL 400 ppm. OEL-TURKEY:TWA 200 ppm (840 mg/m3). OEL-UNITED KINGDOM:TWA 200 ppm (840 mg/m3);STEL 250 ppm. OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV. OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

**** SECTION 16 - ADDITIONAL INFORMATION ****

Additional Information:

No additional information available.

MSDS Creation Date: 5/07/1997 Revision #0 Date: Original.

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DOW CHEMICAL USA -- DOWANOL(R) PM GLYCOL ETHER
MATERIAL SAFETY DATA SHEET
NSN: 685000N010860
Manufacturer's CAGE: 96717
Part No. Indicator: A
Part Number/Trade Name: DOWANOL(R) PM GLYCOL ETHER

General Information

Company's Name: DOW CHEMICAL USA
Company's City: MIDLAND
Company's State: MI
Company's Zip Code: 48674
Company's Emerg Ph #: 517-636-4400
Company's Info Ph #: 517-636-4400;800-258-CHEM
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 002
Date MSDS Prepared: 20MAR88
Safety Data Review Date: 15JUL89
MSDS Serial Number: BHVKB

Ingredients/Identity Information

Proprietary: NO
Ingredient: PROPYLENE GLYCOL MONOMETHYL ETHER
Ingredient Sequence Number: 01
Percent: 97
NIOSH (RTECS) Number: UB7700000
CAS Number: 107-98-2
OSHA PEL: 100 PPM/150 STEL
ACGIH TLV: 100 PPM/150STEL;9192
Other Recommended Limit: N/K (FP N/ORNL)

Proprietary: NO
Ingredient: 2-METHOXY-1-PROPANOL
Ingredient Sequence Number: 02
Percent: 3
NIOSH (RTECS) Number: 1004669MP
CAS Number: 1589-47-5
OSHA PEL: N/K (FP N/ORNL)
ACGIH TLV: N/K (FP N/ORNL)
Other Recommended Limit: N/K (FP N/ORNL)

Physical/Chemical Characteristics

Appearance And Odor: CLEAR,COLORLESS LIQUID.INFORMATION NOT AVAILABLE ON ODOR.
Boiling Point: 248.3F,120C
Melting Point: N/K (FP N)
Vapor Pressure (MM Hg/70 F): SUPP DATA
Vapor Density (Air=1): 3.12,AIR=1
Specific Gravity: 0.917 (WATER=1)
Decomposition Temperature: N/K (FP N)
Evaporation Rate And Ref: N/K (FP N/ORNL)
Solubility In Water: INFINITELY

Fire and Explosion Hazard Data

Flash Point: 90F,32C
Flash Point Method: SCC
Lower Explosive Limit: 10.9% @ 151C
Upper Explosive Limit: 1.5% @ 151C
Extinguishing Media: WATER FOG,ALCOHOL RESISTANT FOAM,CO*2,DRY CHEMICAL.

Special Fire Fighting Proc: USE NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N) (POSITIVE PRESSURE).
Unusual Fire And Expl Hazrds: KEEP VAPORS AWAY FROM POSSIBLE IGNITION SOURCES.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): STABLE UNDER NORMAL STORAGE CONDITIONS.
Materials To Avoid: OXIDIZING MATERIAL
Hazardous Decomp Products: NONE KNOWN
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): WILL NOT OCCUR.

Health Hazard Data

LD50-LC50 Mixture: LD50 RAT ORAL 6.6 ML/KG;(SEE SUPP DATA)
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: SEE SIGNS AND SYMPTOMS OF OVEREXPOSURE.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NONE
Signs/Symptoms Of Overexp: EYES:SLIGHT TRANSIENT IRRIT.CORNEAL INJURY SINGLE DOSE TOX LOW.AMTS LARGER THAN AMTS INCIDENTAL TO HANDLING MAY CAUSE INJURY.INHAL:ODOR OBJECTIONABLE AT 100 PPM;HIGHER-EYE,NOSE,THROAT IRRIT. INTOLERABLE AT 1000 PPM;ANESTHETIC EFTS SEEN.(SUP DA)
Med Cond Aggravated By Exp: N/K (FP N/ORNL)
Emergency/First Aid Proc: EYES:IRRIGATE IMMED W/ WATER FOR AT LEAST 15 MIN.SKIN:WASH OFF IN FLOWING WATER/SHOWER.INGEST:INDUCE VOMIT IF LARGE AMTS INGESTED.CONSULT MD.INHAL:REMOVE TO FRESH AIR.IF NOT BREATHING,GIVE MOUTH-TO-MOUTH RESUSCITATION.IF BREATHING IS DIFFICULT,GIVE OXYGEN.CALL MD.MD NOTE:NO SPECIFIC ANTIDOTE.SUPPORTIVE CARE.TREATMENT BASED ON JUDGMENT OF PHYSICIAN.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: SOAK UP W/ SUITABLE,NON-REACTIVE ABSORBENT MATERIAL.COLLECT W/ RUBBER SHOVEL INTO CONTAINERS FOR DISPOSAL.
Neutralizing Agent: N/K (FP N/ORNL)
Waste Disposal Method: DISPOSAL MUST BE IN ACCORDANCE WITH FEDERAL,STATE AND LOCAL REGULATIONS (FP N).BURN IN APPROVED INCINERATOR.
Precautions-Handling/Storing: GROUND ALL EQUIPMENT.HANDLE WITH REASONABLE CARE.AVOID BREATHING VAPORS.
Other Precautions: A DELAYED HEALTH HAZARD.A FIRE HAZARD.

Control Measures

Respiratory Protection: NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FP N).
Ventilation: LOCAL AND GENERAL VENTILATION NECESSARY TO KEEP AIR CONCENTRATION BELOW TLV (FP N/ORNL).
Protective Gloves: IMPERVIOUS
Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).
Other Protective Equipment: FOR BRIEF CONTACT,NO PRECAUTIONS OTHER THAN CLEAN BODY-COVERING CLOTHING.
Work Hygienic Practices: N/K (FP N/ORNL)
Suppl. Safety & Health Data: VP:12.5 MMHG @ 25C,77F.LD50-LC50 MIX:LD50 RABBIT SKIN APPROX 12 ML/KG.ROUTES OF ENTRY:INHAL/SKIN/INGEST (FP N).EFTS OF OVEREXPOS:RPTD EXCESS EXPOS-MINOR LUNG,LIVER,KIDNEY EFTS;ANESTHETIC/ NARCOTIC EFTS.

Transportation Data

Trans Data Review Date: 90170
DOT PSN Code: GJL
DOT Proper Shipping Name: FLAMMABLE LIQUIDS, N.O.S.
DOT Class: 3
DOT ID Number: UN1993
DOT Pack Group: III
DOT Label: FLAMMABLE LIQUID
IMO PSN Code: HIA
IMO Proper Shipping Name: FLAMMABLE LIQUID, N.O.S. o *
IMO Regulations Page Number: 3345
IMO UN Number: 1993
IMO UN Class: 3.3
IMO Subsidiary Risk Label: - *
IATA PSN Code: MCA
IATA UN ID Number: 1993
IATA Proper Shipping Name: FLAMMABLE LIQUID, N.O.S. *
IATA UN Class: 3
IATA Label: FLAMMABLE LIQUID
AFI PSN Code: MCA
AFI Prop. Shipping Name: FLAMMABLE LIQUIDS, N.O.S.
AFI Class: 3
AFI ID Number: UN1993
AFI Pack Group: III
AFI Label: FLAMMABLE LIQUID
AFI Basic Pac Ref: 7-7

Disposal Data

Label Data

Label Required: YES
Label Status: G
Common Name: DOWANOL(R) PM GLYCOL ETHER
Special Hazard Precautions: SEE SIGNS AND SYMPTOMS OF OVEREXPOSURE.
EYES:SLIGHT TRANSIENT IRRIT. CORNEAL INJURY UNLIKELY.SKIN:PRLNG/RPTD
EXPOS-IRRIT.PRLNG CONTACT W/ LRG AMTS-DROW.INGEST:SINGLE DOSE TOX LOW.AMTS
LARGER THAN AMTS INCIDENTAL TO HANDLING MAY CAUSE INJURY.INHAL:ODOR
OBJECTIONABLE AT 100 PPM;HIGHER-EYE, NOSE,THROAT IRRIT.INTOLERABLE AT 1000
PPM;ANESTHETIC EFTS SEEN.(SUP DA)
Label Name: DOW CHEMICAL USA
Label City: MIDLAND
Label State: MI
Label Zip Code: 48674
Label Emergency Number: 517-636-4400

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POLYSCIENCE -- DIELDRIN, 510C-12
MATERIAL SAFETY DATA SHEET
NSN: 681000N047403
Manufacturer's CAGE: 58378
Part No. Indicator: A
Part Number/Trade Name: DIELDRIN, 510C-12

General Information

Company's Name: POLYSCIENCE
Company's Street: 7800 MERRIMAC AVE
Company's City: NILES
Company's State: IL
Company's Country: US
Company's Zip Code: 60648
Company's Emerg Ph #: 321-965-0611
Company's Info Ph #: 321-965-0611
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 01MAR92
Safety Data Review Date: 14NOV95
MSDS Serial Number: BTYBT
Hazard Characteristic Code: T3

Ingredients/Identity Information

Proprietary: NO
Ingredient: 1,4:5,8-DIMETHANONAPHTHALENE, 1,2,3,4,10,10- HEXACHLORO-6,7-EPOXY-1,4,4A,5,6,7,8,8A-OCTAHYDRO, ENDO, EXO-; (ING 2)
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: IO1750000
CAS Number: 60-57-1
OSHA PEL: 0.25 MG/M3, S
ACGIH TLV: 0.25 MG/M3, S

Proprietary: NO
Ingredient: ING 1: (DIELDRIN (SARA III)
Ingredient Sequence Number: 02
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Physical/Chemical Characteristics

Appearance And Odor: ORANGE-TAN POWDER
Melting Point: 289F,143C
Vapor Density (Air=1): 13.2

Fire and Explosion Hazard Data

Extinguishing Media: WATER SPRAY, CARBON DIOXIDE, DRY CHEMICAL POWDER OR APPROPRIATE FOAM.
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire And Expl Hazrds: EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: STRONG OXIDIZING AGENTS.
Hazardous Decomp Products: TOXIC FUMES OF: CARBON MONOXIDE, CARBON

DIOXIDE, HYDROGEN CHLORIDE GAS.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: LD50:(ORAL,RAT) 38300 UG/KG
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: ACUTE: MAY BE FATAL IF INHALED, SWALLOWED, OR ABSORBED THROUGH SKIN. MAY CAUSE IRRITATION. CARCINOGEN. MAY ALTER GENETIC MATERIAL. OVEREXP MAY CAUSE REPROD DISORDER(S) BASED ON TESTS W/LAB ANIMALS. TARGET ORGANS: CNS, LIVER, BLOOD. OVEREXP CAN CAUSE: MALAISE, HEADACHE, NAUSEA, VOMITING, DIZZ, (EFTS OF OVEREXP)
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT
Signs/Symptoms Of Overexp: HLTH HAZ: TREMORS, CLONIC AND TONIC CONVULSIONS, COMA, RESPIRATORY FAILURE.
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: EYE/SKIN: FLUSH WITH COPIOUS AMOUNTS OF WATER REMOVE TO FRESH AIR. IF NOT BRTHG GIVE ARTF RESP. IF BRTHG IS DIFFICULT, GIVE OXYGEN. INGEST: WASH OUT MOUTH WITH WATER PROVIDED PERSON IS CONSCIOUS. CALL A PHYSICIAN. WASH CONTAMINATED CLOTHING BEFORE REUSE.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: EVACUATE AREA. WEAR NIOSH/MSHA APPROVED SCBA, RUBBER BOOTS AND HEAVY RUBBER GLOVES. SWEEP UP, PLACE IN BAG AND HOLD FOR WASTE DISPOSAL. AVOID RAISING DUST. VENTILATE AREA AND WASH SPILL SITE AFTER MATL PICKUP IS COMPLETE.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: DISSOLVE OR MIX THE MATL W/A COMBUSTIBLE SOLVENT AND BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AFTERBURNER AND SCRUBBER. OBSERVE ALL FEDERAL, STATE AND LOCAL LAWS.
Precautions-Handling/Storing: DO NOT BREATHE DUST. DO NOT GET IN EYES, ON SKIN, ON CLOTHING. AVOID PRLNGD/RPTD EXPOSURE. READILY ABSORBED THROUGH SKIN. HIGHTLY TOXIC. CARCINOGEN.
Other Precautions: MUTAGEN. REPRODUCTIVE HAZARD. KEEP TIGHLY CLOSED. STORE IN A COOL DRY PLACE. MAY CAUSE CANCER. MAY CAUSE HERITABLE GENETIC DAMAGE. VERY TOXIC BY INHALATION, IN CONTACT WITH SKIN & IF SWALLOWED.IF YOU FEEL UNWELL, SEEK MED ADVICE.

Control Measures

Respiratory Protection: WEAR APPROPRIATE NIOSH/MSHA APPROVED RESPIRATOR.
Ventilation: USE ONLY IN A CHEMICAL FUME HOOD.
Protective Gloves: CHEMICAL-RESISTANT GLOVES.
Eye Protection: ANSI APPROVED CHEM WORK GOGG (FP N).
Other Protective Equipment: PROTECTIVE CLOTHING. ANSI APPROVED SAFETY SHOWER AND EYE BATH (FP N).
Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING.
Suppl. Safety & Health Data: NONE SPECIFIED BY MANUFACTURER.

Transportation Data

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 26JAN94
Label Date: 19JAN94
Label Status: G
Common Name: DIELDRIN, 510C-12
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Severe: X
Contact Hazard-Severe: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: ACUTE: MAY BE FATAL IF INHALED, SWALLOWED OR MALAISE, HEADACHE, NAUSEA, VOMITING, DIZZINESS, TREMORS, CLONIC AND TONIC CONVULSIONS, COMA, RESPIRATORY FAILURE. CHRONIC: CARCINOGEN. MAY ALTER GENETIC MATERIAL. OVEREXPOSURE MAY CAUSE REPRODUCTIVE DISORDER(S) BASED ON TESTS W/LAB ANIMALS. TARGET ORGANS: CNS, LIVER, BLOOD.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: POLYSCIENCE
Label Street: 7800 MERRIMAC AVE
Label City: NILES
Label State: IL
Label Zip Code: 60648
Label Country: US
Label Emergency Number: 321-965-0611

ATTACHMENT B

RESPIRATOR PROTECTION PROGRAM FOR LIME KILN LANDFILL INVESTIGATION

ATTACHMENT B

RESPIRATOR PROTECTION PROGRAM FOR VILLAGE OF GRAFTON LIME KILN LANDFILL INVESTIGATION

The following respirator program is in accordance with OSHA 29 CFR 1910.134 Respiratory Protection Program requirements. This program governs the selection and use of respirators on-site.

Respirators for REI employees will be provided by REI. The respirator protection program will be administered by, and is the responsibility of, the REHSM and/or SSO for the site. Subcontractors (i.e., drillers) will furnish their own respirators and medical surveillance for their employees. The REHSM and/or SSO will be responsible for ensuring that they are in compliance with this respirator program.

The respirators will be selected according to the hazard and level of protection determined by monitoring action levels and the decision of the REHSM and/or the SSO. The respirators and levels are:

Level	Respirator
B	Positive Pressure-Pressure Demand SCBA or Supplied Air Respirator with 5-minute escape bottle. Level B is 5 to 250 ppm above background in (BZ).
C	Full-face air purifying respirator with combination dust (HEPA) and organic vapor/acid gas cartridge. Level C is 1 ppm to 5 ppm above background in BZ based on identification of contaminant present. The full facepiece respirator with combination dust and organic vapor/acid gas cartridge will be appropriate for the dust conditions and organics that may be encountered.
D	No respirator required. Continuous reading of background (0.2 ppm) to 1 ppm in the worker's BZ.

The respirator users will be fit tested with the size, style, and make of the respirator they will be using on-site. The fit test will be recorded and these Fit Test Records will be maintained in the Command Post.

Employee respirator training is provided on an annual basis and at site-specific training sessions. This training includes:

- A discussion of the nature of the respiratory hazards and the dangers if the respirator is not used properly.
- The reasons that respirators are required for protection, along with any engineering controls that may be used.

- Instruction in the selection, use, sanitary care, maintenance, proper storage, and limitation of the full facepiece respirator with combination cartridge, and the SCBA.

- Practice in proper fitting, wearing, adjusting, and checking face seal of the respirator.

- An opportunity to handle the respirator.

- Instruction on how to recognize and cope with emergency situations requiring respiratory protection.

- Explanation of the requirements for a self-contained breathing device for work in unknown concentrations and Immediately Dangerous to Life or Health (IDLH) atmosphere and for fire fighting.

- Explanation of the medical surveillance program and how it relates to respirator use.

- Explanation of the requirements for maintaining a tight seal, why beard and facial hair is prohibited, and why use of contact lenses while wearing respirators is prohibited.

Respirators will be assigned to individual workers. Each individual shall be responsible for cleaning and maintaining their assigned respirator. They will be cleaned and disinfected before being reassigned. Respirators will be cleaned after each day of work according to manufacturer's instruction. The cleaning will be done at the Command Post. Used cartridges will be disposed of and replaced with new ones.

After cleaning, the respirators will be inspected and checked for defects such as excessive dirt, cracks or other distortions, scratches, incorrectly mounted lens, broken or worn cartridge holders on the facepiece, breaks, loss of elasticity, broken buckles, and excessively worn serrations on head harness that may cause slippage on the head straps or head harness.

Further checks include:

a) A check of the tightness of the connections.

b) A check of the facepiece, valves, connecting tube, and canisters.

c) A check of the regulator and warning devices on SCBA for proper functioning.

d) For air purifying:

(1) Check the exhalation valve after removing its cover for:

- Foreign material, such as detergent residue, dust particles, or human hair under the valve seat

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

(2) Check the air purifying elements for:

- Incorrect cartridges, canister, or filter for the hazard
- Incorrect installation, loose connections, missing or worn gaskets, or cross threading in holder
- Expired shelf life of cartridge or canister
- Cracks, dents, or breaks in the cartridge or canisters case
- Evidence of prior use of cartridge or canister, such as broken seal tape foil or other sealing material.

(3) Check the corrugated breathing tube for:

- Broken or missing end connectors, gaskets, or O-rings
- Missing or loose hose clamp
- Deterioration (done by stretching hose and looking for cracks).

e) For air supplied respirators, check the air supply system for:

(1) Integrity and condition of air supply lines and hoses, including attachments and end fitting

(2) Correct operation and condition of all regulators, valves, or other air-flow regulators

(3) If SCBA, that the cylinder is sufficiently charged for the intended use, preferably fully charged (mandatory on an emergency device). The emergency SCBA will have a tag for logging in the monthly inspections.

Monitoring of the work area will be performed and the results will be used to select the appropriate level of protection. Refer to air monitoring section of the HASP (Section 9.0).

This program will be re-evaluated and revisions and updates added regularly.

Persons will not be assigned to tasks requiring the use of respirators unless it has been determined that they are physically able to perform the work and use the equipment. The REI Medical Director will determine what health and physical conditions are pertinent.

Only those respirators jointly approved by NIOSH/MSHA shall be used. All component parts (i.e., canister, replacement straps, etc.), will be of the same make.

ATTACHMENT C

HEALTH & SAFETY FIELD FORMS

To Include:

Supervisor's Incident Report (SIR)
Job Exposure Report
HASP Modification Form
Site Safety Meeting Form (or Document in Field Log Book)
Instrument Calibration Form (or Document in Field Log Book)
Atmospheric Monitoring Form (or Document in Field Log Book)
First Aid Log

RUST **Rust Environment & Infrastructure** *Supervisor's Incident Report*

Fax this report within 24 hours to your Region Environmental, Health and Safety Manager (REHSM)

Date of this report: ____/____/____

Fax Sent by: _____ Telephone No.: _____
(Print Name)

Group: R66 (Rust E&I) **Region:** _____ **Employee Office Location Name:** _____

TYPE OF INCIDENT: Inspection:_____ Accident:_____ Injury:_____ Spill:_____ Fire:_____Other:_____
Agency: _____ Inspector's Name: _____ Type Inspection: _____
Agency Address: _____ Phone: _____

EMPLOYEE INFORMATION:
Employee's Name: _____Social Security No.: _____
Address: _____Phone: _____
Date of Birth: _____ Number of Minor Dependents: _____ Marital Status: Single _____ Widowed _____ Married _____ Divorced _____
Date of Hire: _____ Wage Rate: $_____ Hourly: _____ Annually: _____ Job No.: _____
Employee Hours on Date of Incident: _____ Employee Hrs. on Project: _____ Days/Wk.: _____ Hrs./Day: _____
Employee's Occupation When Incident Occurred?: _____ Years of Experience in This Occupation?: _____

INCIDENT INFORMATION:
Date of Incident: _____ Time: _____ Witness(s): _____
Date Reported to Supervisor: _____ Was Incident Believed to be Result of Employment?: Yes _____ No ____
If on Job Site, Name of Job: _____ Location on Job Site Where Incident Occurred: _____
Address Where Incident Occurred: _____
If First Aid Applied, by Whom: _____
Type of Injury and Part of Body Affected: _____
Name/Address Medical Provider: _____
Brief Description of Incident: _____

Employee Activity at Time of Incident: _____

Description of Property Damaged: _____

OSHA 200 LOG INFORMATION TO BE COMPLETED BY YOUR REHSM:

Is incident OSHA recordable?:	**Yes** **No**	☐	**Does incident involve fatality?:**	**Yes** **No**	☐	**Does incident involved lost time?:**	**Yes** **No**	☐
Does incident involve medical treatment?:	**Yes** **No**	☐	**Does incident involve first aid only?:**	**Yes** **No**	☐	**Does incident involved restricted activity?:**	**Yes** **No**	☐

Current Status: _____

Employee's Supervisor: _____ Project Manager: _____
(Print Name) (Print Name)

Telephone No.: _____ Telephone No.: _____

See reverse side for instructions.

SUPERVISOR'S INCIDENT REPORT
INSTRUCTIONS

The following types of occurrences and incidents must be reported using this form:

- Serious occupational injury or illness. Includes fatalities and cases resulting in days away from work.
- Incidents with high public or client profile potential.
- Inspections by State or Federal regulatory agencies.
- Reportable quantity spills.
- Incidents with property damage >$5,000.

Instructions:

Verbal (Immediate):

1. Employees must report such incidents to their supervisor **immediately**.
2. The supervisor must verbally notify their Division Manager who in turn must notify their Region Manager and Region Environmental, Health & Safety Manager (REHSM). The REHSM shall notify the Corporate Environmental, Health & Safety Director.
3. The RM must verbally notify the Rust E&I President and/or Vice President of Operations.

Written (Faxed within 24 hours):

1. The Supervisor must complete the applicable sections describing the specific incident. (Enter NA in blanks on form which do not apply to incident). If the incident involved a Rust E&I employee injury or illness subject to workers' compensation, a copy of the Supervisor's Incident Report must **also** be faxed by the Supervisor to their region-specific REHSM.

   If the incident involved property damage greater than $5,000, a copy of the report must be faxed to Kris Froh, Legal Assistant, in the Sheboygan office (Fax: 414-458-0537 or Phone: 414-451-2440).

2. The Division/Office Manager shall fax a copy to their respective Region Manager and REHSM.

3. The RM shall fax a copy to the Executive Vice President of Operations and/or President. The REHSM shall fax a copy of the report to the Rust E&I Corporate Environmental, Health & Safety Director.

RUST ENVIRONMENT & INFRASTRUCTURE

Job Exposure Report

Instructions: This report is to be completed by the Site Safety Officer at the end of each Rust E&I Employee's participation in site activities. A copy of this report must be submitted to the REHSM for placement in the employee's medical file.

Employee Name: _____

Social Security Number: _____

Project Name: _____

Project Number: _____

Location: _____

Site Function: _____

Level of Protection: _____

Dates of Site Participation: _____

1. Were action levels exceeded in the work area (breathing zone)? Yes _____ No _____

2. If yes, list type of monitoring and readings: _____

_____

_____

3. List known or suspected contaminants on-site (list from HASP):

_____ _____

_____ _____

_____ _____

_____ _____

4. Personal exposure monitoring data attached? Yes _____ No_____ N/A _____

SSO Name (Print): _____

SSO Signature: _____

Date: _____

RUST ENVIRONMENT & INFRASTRUCTURE

Health and Safety Plan
Field Modification Form

Page No. _____ of _____

Project: _____

Project Location: _____

Project No.: _____

Site Safety Officer: _____

Field Modification to HASP: _____

Prepared By: _____
Site Safety Officer — Date

Accepted By: _____
Rust Environment & Infrastructure Field Manager — Date

Accepted By: _____
Contractor Representative (If Applicable) — Date

Approved By: _____
Rust Environment & Infrastructure Region Environmental Health and Safety Manager or Alternate HASP Reviewer — Date

NOTE: Field Modifications to HASPs must be discussed with the Rust Environment & Infrastructure REHSM or CEHSD with subsequent written approval. Secure approval through fax.

RUST ENVIRONMENT & INFRASTRUCTURE

Site Safety Meeting

Page _____ of _____

Project: _____ Date: _____

Project Number: _____ Time: _____

Meeting Conducted By: _____ _____

Name Signature

Summary of Items Discussed: _____

_____

_____

_____

_____

Personnel Present

	Name	Representing	Signature
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			

INSTRUMENT: _____

Date Calibrated	Known Standard	Actual Instrument Reading	Adjustments Made	Calibrated By	Comments

COMMENTS: _____

NOTE: Place in project files and/or Instrument Maintenance file.

RUST **Rust Environment & Infrastructure**

Atmospheric Monitoring Log
Field Health and Safety

Page _____ of _____

Date _____/_____/_____

Circle: Sun Mon Tue Wed Thu Fri Sat

Site: _____ Project No.: _____

Site Safety Officer: _____

Action Levels: D ☐ → C ☐ → B ☐ → (stop work, call in for instructions on all upgrades)
(Check box and write in levels for upgrade)

Task/Equipment: _____

Weather: _____

Location	Time	O_2 %	LEL %	H_2S PPM	Circle one: HNu/OVA Readings (ppm)				Comments
					Background	Breathing Zone	Sample Location	Head Space	

Additional Comments: _____

_____

_____

Signature: _____

Checked by: _____ Date: _____/_____/_____

NOTE: Place in project files.

RUST ENVIRONMENT & INFRASTRUCTURE

First Aid Log

Site/Division Location: _____

Date	Employee Name	Injury	Treatment	Care Provider

NOTE: This log is to be maintained by the Division Office Administrator and/or Site Manager.

APPENDIX B

SCOPING MEETING MINUTES

RUST Rust Environment & Infrastructure Inc.

A Rust International Company
4738 North 40th Street
Sheboygan, WI 53083-1883
P.O. Box 1067
Sheboygan, WI 53082-1067

Phone 414.458.8711
Fax 414.458.0537

MEMORANDUM

October 6, 1997

To: Meeting Attendees

From: Joan Underwood

Subject: Village of Grafton Scoping Meeting Minutes
September 11, 1997
REI Project No. 101688

A Scoping Meeting for the Lime Kiln Landfill site was held in Sheboygan on September 11, 1997. Attendees were as follows:

Mark Gottleib (Village of Grafton)
Mike Crosser
Kim Elias
Lisa Smith
Joan Underwood
Charlie Zeal

I. PROJECT DESCRIPTION AND GOALS

The purpose of the Scoping Meeting was to identify the data needs associated with the initial site characterization of the Lime Kiln Landfill along with potential remedial measures. This memorandum summarizes the data needs identified and outlines the procedures for obtaining the required data. This memorandum is organized the same as the attached meeting agenda which also provides a more detailed summary of the site background and history.

II. SITE BACKGROUND INFORMATION

Site background information is provided in the attached Background Materials Memorandum. Additional information which was discussed during the meeting is summarized below.

The site, which is currently a park, was built in an area of three old quarries previously mined for the bedrock dolomite. To differentiate the three quarries at the site, they are numbered 1, 2, and 3

up to the quarry face and dump the waste. The site received municipal and commercial waste. It was closed in 1971 and turned into the Lime Kiln Park. The Quarry 1 area is estimated to be approximately 1 to 2 acres based on the 1959 (photo revised 1971 and 1976) USGS map. However, a 1971 air photo shows grading associated with the park development over an area estimated at approximately 4 or 5 acres. Since the scoping meeting, REI received a 1935 air photo which also shows disturbance in an area of about 4 to 5 acres in the Quarry 1 area. Quarry 2 has not been filled, while Quarry 3 shows some surface disturbance, but it is not known whether there was any waste disposed of in the Quarry 3 area.

The site has been closed since 1970 (almost 30 years), which suggests conditions should be steady state. This means that we would expect contaminant concentrations in a potential plume not to be changing significantly, and that we would not be getting significant new releases of contaminants from the waste. We would expect a slow, declining release of contaminants from the waste as infiltration moves through the waste over time.

A residential well sampling program was conducted by EPA and DNR, and the map showing qualitative results of analyses (Figure 3) is contained in the attached Background Materials Memorandum. The Background Materials Memorandum also contains a map of the homes which will be provided Village water. The Lime Kiln park well is not on Village water.

An existing municipal well (No. 6) is located in the parking lot of K-Mart and has had historical detections of volatile organic compounds (VOCs). DNR initially said that the Village could not pump this well, but then allowed minimal pumping. When the well is pumped enough, it generates water with increased concentrations of VOCs. This well appears to be upgradient of the Lime Kiln site and, therefore, may indicate that there are other potential sources of contaminants to the groundwater system other than the Lime Kiln landfill. Compounds which have been detected in Well No. 6 and their NR 140 Preventive Action Limits (PALs), Enforcement Standards (ESs), and maximum concentrations, based on data through March 1997, include:

Compound	Concentration ug/l	PAL ug/l	ES ug/l
1,2-Dichloroethane	2	0.5	5.0
1,1-Dichloroethane	2.5	85	850
1,1-Dichloroethylene	1.2	0.7	7.0
Tetrachloroethylene	4.2	0.5	5.0
1,1,1-Trichloroethane (TCA)	3.2	40	200
trans-1,2-Dichloroethylene	2.8	20	100
Trichloroethylene (TCE)	27.3	0.5	5.0
cis-1,2-Dichloroethylene	2.2	7	70
Methylene Chloride	1.9	0.5	5.0
2,2-Dichloropropane	2.4	-	-

Bromodichloromethane	1	0.06	0.6
Bromoform	0.2	0.44	4.4
Dibromochloromethane	0.9	6	60
Chloroform	0.9	0.6	6.0
Trihalomethanes - total	3	NA	NA

There are several adjacent facilities, UST, and LUST sites which may be potential sources of groundwater contaminants located predominantly in the suspected upgradient direction from the site. The 1955 aerial photo shows another quarry on the east side of the Milwaukee River not far from Lime Kiln Park which may have received some waste.

The potential list of compounds of concern include both chlorinated and nonchlorinated compounds and their breakdown products. Compounds detected in the private wells are provided in the Background Memorandum. TCE and TCA are two compounds detected in groundwater. Industries typically switched from using predominantly TCE to using TCA about the mid-1950s. Because both compounds have been detected, it is likely that groundwater impacts have occurred over a long period of time, and detected compounds did not occur because of a one-time release.

Freon is suspected to be the leading edge of the plume according to DNR. Freon could result from a number of different activities. Freon is soluble in water and would, therefore, migrate with the groundwater. However, the presence of it in the groundwater at a certain location may be related to when it was released in comparison to the other compounds detected in the groundwater.

III. SITE CONCEPTUAL MODEL

Primary Sources

The site conceptual model consists of several potential primary sources including the Lime Kiln landfill, other area industries, UST, and LUST sites. The three potential primary contaminant sources from the landfill include leachate, gas, and waste/soil.

Primary Release Mechanisms

As water infiltrates through the landfill, contaminants may be released from the waste/soil and carried downward to the groundwater table. Waste that is below the water table could also release constituents directly to the water table. To determine the importance of these release mechanisms, the hydrogeology of the site and leachate head conditions within the landfill will need to be determined.

Landfill gas generated during the natural decomposition of organic mater may transport VOCs. VOCs will also naturally volatilize from the leachate and waste. Compounds that are not highly

water soluble and that are more volatile are most likely to be released in the gas according to Henry's Law. Gas can then migrate and constituents can be transported through the soils and into the groundwater and air. Gas and leachate composition will be investigated along with gas pressure conditions in the landfill to evaluate this release mechanism.

Pathways

Pathways of exposure include surface water, groundwater, and air.

1. Surface Water

We do not expect surface water to be impacted, but if it is, it would be primarily impacted from groundwater seepage into the river.

2. Groundwater

Groundwater is the most important pathway of concern because it can be impacted by all the primary sources. There may be preferential pathways for groundwater flow in a reef structure known to occur in the area. The numerous existing private wells in the area also serve to provide preferential pathways within the groundwater flow system because all the wells are constructed with long (up to about 100 feet) open boreholes within the rock. This allows constituents that enter the groundwater system to be mixed throughout the aquifer to at least the depth of the wells because groundwater flow can move freely both up and down the boreholes.

Fractures in the bedrock may also play a role in contaminant transport, however: 1) Tecumseh, working on a nearby project, found no strong correlation between fracture occurrence and contaminant concentrations; and 2) there are two scientific opinions on the importance of fracture flow in the area. One opinion believes it has a very strong influence, and the other opinion is that other factors, especially bulk permeability, will be a much more dominant influence on flow.

3. Air

Because the landfill is old and concentrations by contaminants are not high in groundwater, it is not likely that there is an air pathway risk.

A site conceptual drawing is attached.

IV. CLEANUP OBJECTIVES BY MEDIA

We discussed the goals and objectives of any cleanup activities. Regulatory drivers are NR 700 codes and not NR 500 because the site was never a permitted landfill. We also need to consider NR 140 groundwater quality regulations which include the standards for groundwater quality - PALs and ESs.

V. PRELIMINARY IDENTIFICATION OF ALTERNATIVES

The Preliminary Alternatives table (attached) was used to identify preliminary response actions that might be feasible at and around the site. These potential response actions then control what data we will need to collect in order to determine the appropriate response action. It allows us to focus on the outcome for the site and save costs by not collecting data that is not necessary to finding a solution. Appropriate media-specific actions are summarized below, and the preliminary response action table should be referred to for specific data needs.

Surface water - It is usually difficult to clearly relate site contaminants to contaminants detected in a river. However, we will investigate potential impacts to the Milwaukee River in case risk from surface water needs to be addressed by taking samples upgradient, adjacent to, and downgradient of the site. We will also collect river water level information and correlate it to groundwater levels to evaluate whether groundwater flows into or out of the river adjacent to the site, and to evaluate the magnitude of groundwater flow (if any) from the site compared to stream flow.

Gas - Several remedies could be appropriate to control the effects of gas migration, such as a gas recovery system or a gas venting system.

Soil/waste material - Soil/waste material can be addressed by containment, treatment in-place, removal, removal with treatment, and replacement. Removal has been preliminarily determined to be not feasible because of implementability problems and the costs associated with it.

Leachate/groundwater - Leachate generation can be minimized with a low permeability cover system as long as the waste is not within the groundwater. If the waste is below the water table, leachate removal with disposal to a sanitary sewer or on-site treatment with discharge to the river may be necessary. We would consider leachate extraction through wells within or just below the waste. There is no sanitary sewer to the park at this time.

Deed restrictions are a potential option to avoid active groundwater remediation. It would prevent disturbance of the waste at the Park and prevent groundwater usage. This is a possibility where the Village has the jurisdiction, but would not work outside the Village limits unless other governmental agencies became involved. Providing an alternative drinking water source is also a common solution to problems such as this and needs to be considered as a potential remedial option for the existing

groundwater problem. Each resident would pay for the water usage once they are hooked up to the system. This is important from a long-term cost evaluation standpoint.

VI. DATA NEEDS

We discussed data needs for each media by evaluating the media with the Preliminary Identification of Data Needs According to Response Action/Remedial Technology table. The table provides a guideline for determining data needs and was marked-up according to potential conditions at the site (attached). The Village will provide us with electronic files of area topography, property lines, utilities, etc.

In general, we need to know the following:

- Is the landfill a source of the constituents detected in the private wells near the site?
- Is the landfill the only source?
- Is the Tecumseh groundwater problem part of this problem?
- Is the plume stable? Is the situation getting better over time (i.e., constituent concentrations decreasing, plume size stable or shrinking) which could indicate natural attenuation? We will need to look at the times samples were taken in the past and consider timing, contaminant type, and distribution when collecting data in the future.
- The nature and extent of contamination around or from the site.
- If the contamination is widespread, and what are the potential risks (now and future) associated with the contamination?
- Is natural attenuation occurring?

VII. SPECIFIC FIELD APPROACH AND ACTIVITIES BY MEDIA

The data to be collected is shown on the attached table. Methods to collect the data are listed below by media.

Surface water

1. Surface water effects:

- Install a marker on the abutment in the river to determine elevation of river. This will be used to evaluate flow with respect to groundwater elevations and whether groundwater flows into or out of the river adjacent to the site.
- Potential impacts to the Milwaukee River will be addressed by taking samples upgradient, adjacent to, and downgradient of the site.

- Historical water level information will be collected and correlated to groundwater levels to evaluate groundwater/surface water interaction and the magnitude of groundwater flow (if any) from the site compared to stream flow.

Soil/waste material

1. Areal and vertical extent of waste will be determined through:

- Aerial photos will be used to plot the potential waste area(s) on a site topographic map.
- An electromagnetic (EM) geophysical survey will be used to estimate the limits of waste both in Quarries 1 and 3. If information prior to field work is found concerning disposal in Quarry 3, this area may be eliminated from the EM survey.
- Shallow soil borings via a geoprobe will be used to confirm EM survey results, both inside and outside the limits of waste in both Quarries 1 and 3. If an EM survey is not conducted in Quarry 3, several geoprobe holes will be completed in Quarry 3 to confirm the absence of waste.

2. Upgradient potential sources:

- Talk to Winter Hess on other potential sources in the vicinity of Lime Kiln Park.
- Determine the need to investigate additional areas based on information provided by Winter Hess.

3. Gas migration:

- Methane concentrations, gas pressure (and, therefore, gas quantity), and gas quality will be investigated through installation of gas/leachate extraction wells. Wells will be constructed to be able to collect samples and pressure readings.

4. Cover thickness:

- Geoprobe borings used to confirm EM survey waste location will also be used for evaluating existing cover thickness and type.

Leachate/groundwater

1. Upgradient/background groundwater quality:

- At least one upgradient well will be located near the intersection near the southwest corner of the site. Coring of the monitoring well hole is recommended, however, we will provide costs for both coring and non-coring. Coring would be helpful for evaluating the site stratigraphy and correlating the information collected from the private wells with the geologic information

collected from the core. The borehole will be geophysically logged for natural gamma, caliper, and resistivity prior to well installation. Packer testing of select intervals will be used to evaluate the permeability of various stratigraphic horizons and will also be used to collect select samples at different depth intervals (minimum shallow and deep sampling), depending on stratigraphy found in private wells and during drilling. The well depth will be determined based on the core, geophysical logging results, and borehole sampling results from the corehole. If additional wells are necessary based on sampling results, up to two additional wells will be installed in the same corehole using multi-level well construction equipment.

Groundwater samples will be analyzed for VOCs, SVOCs, metals, herbicides/pesticides, PCBs, and natural attenuation and indicator parameters.

2. Residential well investigations:

- A well search will be conducted by looking at private well logs located west of the site, checking with the Village, and potentially making a door-to-door call to determine if any wells still exist upgradient of the site.
- Existing private wells in the Manchester subdivision and wells which may potentially exist within the Village limits may provide information on stratigraphy, groundwater flow direction, and water quality.
- Select private wells both upgradient (if any are found) and within the Manchester Subdivision will be geophysically logged for caliper, natural gamma, and resistivity. We would also complete at least one round of water levels in the residential wells that are being geophysically logged. This will provide a baseline for conditions just after the homes are switched to Village water and a qualitative groundwater flow direction. Based on these results, selected intervals may be packer tested for information on hydraulic conductivity, and possibly sampled for select parameters to evaluate the presence of preferential flow zones. Borehole logs will be correlated with the corehole completed for the upgradient well (if it is cored). Upgradient private wells will be sampled for VOCs, SVOCs, metals, herbicides/pesticides, PCBs, and natural attenuation and indicator parameters. Manchester Subdivision well sampling will be for the same parameters, but wells to be sampled will be determined later based on results of the borehole logging and packer testing.
- Map the bottom elevation and open screen intervals of residential wells so that we can compare the open screen intervals and contaminant levels in the wells to determine if there is a correlation.

3. Leachate:

- Two leachate/gas wells will be constructed at the bottom of waste if it is saturated or just below the waste at the water table. Leachate/groundwater samples will be collected and analyzed for VOCs, SVOCs, PCBs, herbicides/pesticides, metals, and natural attenuation and indicator

parameters. Two noncomposite samples (1 from each well) will be collected and analyzed. Well construction will be done with a larger diameter casing so that the wells could be used for pumping, if that is determined necessary. This would be more cost-effective in the long run.

4. Park Well (No. 36):

- We will check the depth of the Park well (Well No. 36) to check the appropriateness of this for an upgradient background sampling point. The laboratory analysis for Well No. 36 will be reviewed and checked for indicator parameter results to see if normal landfill indicators are at elevated concentrations. (Village information on water quality would be for bacteria). Summary lab results from the DNR have no VOC detections. We may need to install another upgradient well in place of this one if it is determined that Well No. 36 is not adequate for monitoring purposes.

5. Groundwater/surface water interaction:

- One shallow well, 15 feet deep, will be installed on the west side of the river. This well will be sampled because we will be taking a river sample to show if there are impacts to the river. This well will be used for water level data and the evaluation of whether the river is a gaining or losing stream.

6. Groundwater modeling:

- We will complete some simple (1 or 2-dimensional) modeling or calculations of what changes to the groundwater levels and groundwater flow direction could be expected because of discontinued use of the private wells. We will vary site conditions (similar to a model sensitivity analysis) so we can estimate what kind of impact pumping of residential wells may have on groundwater flow.

Project Phasing

Work for the investigation will be completed in a phased approach. This will allow us to first characterize the waste and determine if there are a suite of constituents representative of contaminants that could be coming from the landfill. This will also allow us to target certain analytical parameters when completing future sampling to help minimize costs.

Phase I will consist of source characterization (i.e., landfill extent, leachate/gas sampling), including upgradient analysis, and some additional geological analysis, including geophysical logging of residential wells. Phase II will include extent and final plume definition.

The upgradient groundwater quality will also be determined during Phase I so we have an indication of other potential contaminant sources and constituents associated with these other sources. This will help separate potential effects from the landfill vs. other sources. Initial work on the residential wells will include the geophysical logging, water level information, and if necessary, select packer testing.

Based on the Phase I results, we will develop the final Phase II sampling plan for the private wells and additional sampling of monitoring wells so that we can estimate the rate and extent of a plume.

Data validation will not be done, but a data review will be conducted, and a memorandum describing this review will be prepared.

VIII. ACTION ITEMS

A number of action items were identified during the scoping meeting, and these are listed below, along with the person responsible for follow-up.

1) Mark Gottleib will get us CADD files for base map.
2) Mark said we can check into names of the people that may know the limits of fill material in Quarry 3. Joan will call Paul Maloy and Winter Hess.
3) General outline of Work Plan will be presented to the Public Works committee at their meeting on October 13 (Joan).
4) Mark will find out why McCormick changed his well depth when he installed a new well.
5) Mark will find out what the existing mattress business used to be.
6) REI will review private well logs to try to find depth of Well No. 36 (Joan).
7) Kim will ask Chad Czarkowski of DNR-Drinking Water Section if they are sampling the residential wells any more; if so, for what, when, which ones.
8) Kim will check the Park Department's information to determine who did covering of landfill for Park.
9) Joan to call Tom Krueger to get any more recent Village well sampling results.
10) Joan to check with DNR on using private wells instead of having them abandoned. John Feeney replied by phone that this is acceptable.
11) Joan to check with Winter Hess concerning industries who bought property from Bob Ahlers. Also check to see if Winter is trying to determine the years a business was operable which may help with understanding the disposal history at the site. Ask Winter to investigate lab in Mequon which may have disposed at site.

RUST Rust Environment & Infrastructure

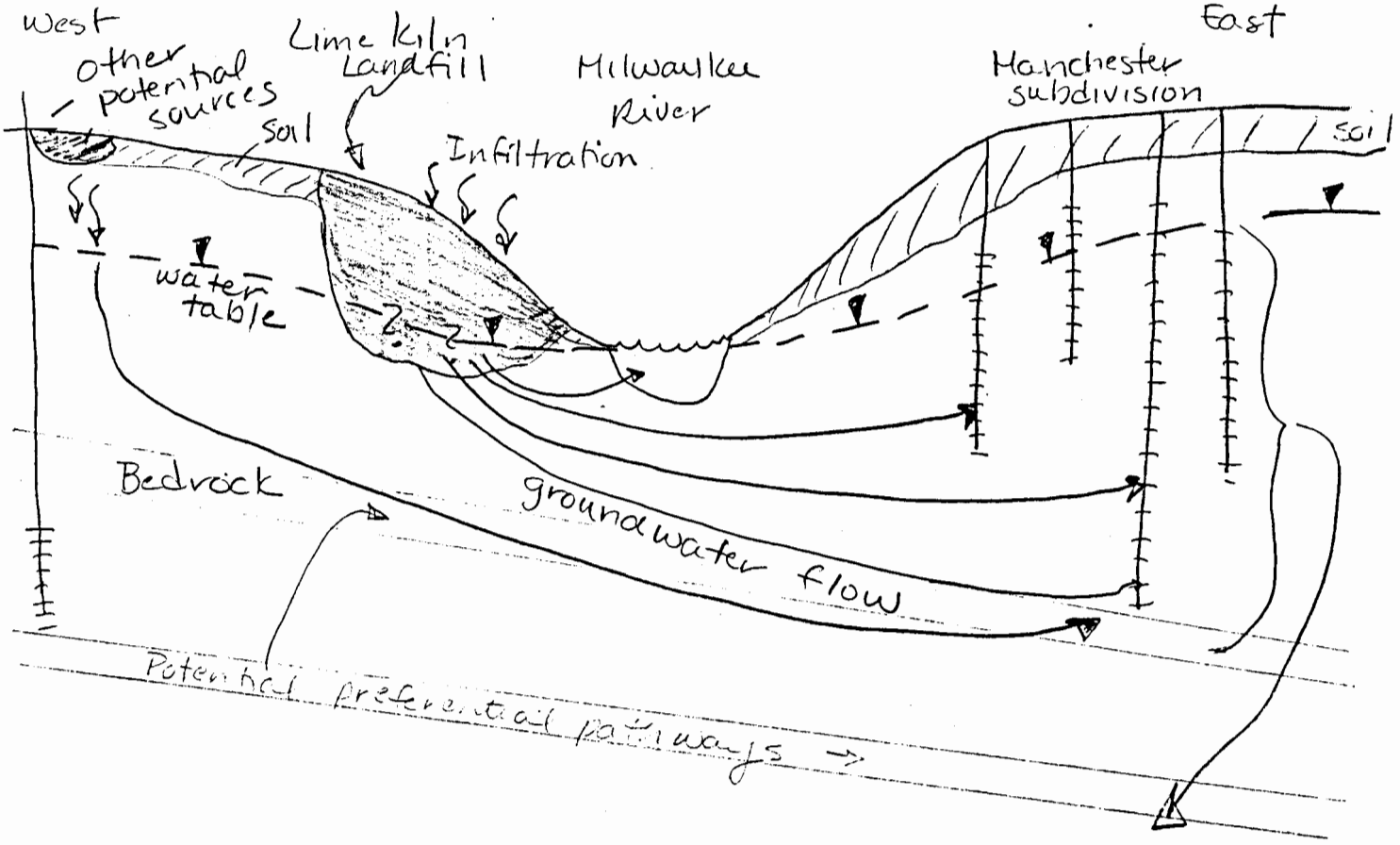
CALCULATION SHEET PAGE 1 OF 1

PROJECT NO. _____

CLIENT Grafton SUBJECT _____ Prepared By JW Date 9/30/97

PROJECT Lime Kiln Conceptual Sketch Reviewed By _____ Date _____

_____ _____ Approved By _____ Date _____



Zone where aquifer water mixed

Aquitard ≈ 500 feet deep

PRELIMINARY IDENTIFICATION OF DATA NEEDS ACCORDING TO RESPONSE ACTION/REMEDIAL TECHNOLOGY

LIME KILN LANDFILL
GRAFTON, WISCONSIN

DATA NEEDS / SITE CHARACTERISTICS	CONTAINMENT: DUST CONTROL	CONTAINMENT: CAPPING/SURFACE SEALING	CONTAINMENT: SLURRY WALLS	CONTAINMENT: GROUNDWATER PUMPING	GAS COLLECTION/RECOVERY: PASSIVE SUBSURFACE GAS CONTROL	GAS COLLECTION/RECOVERY: ACTIVE SUBSURFACE GAS CONTROL	BIOLOGICAL TREATMENT: AEROBIC	BIOLOGICAL TREATMENT: ANAEROBIC	BIOLOGICAL TREATMENT: LAND APPLICATION	BIOLOGICAL TREATMENT: IN-SITU BIOLOGICAL TREATMENT	BIOLOGICAL TREATMENT: PACT SYSTEM
- STORAGE TIME					X	X					
- ACCESSIBILITY		X	X	X						X	
- LAND USE	X	X				X			X	X	
- ECOLOGICAL AREAS									X		
- VEGETATION			X						X	X	
- TOPOGRAPHY			X	X	X				X		
- DRAINAGE			X		X				X	X	
- LOCATION/PERFORMANCE OF RCRA TREATMENT/DISPOSAL FACILITY											
- LOCATION AND NEEDS OF FACILITY OR USER QUALITY, VOLUME	X			X	X	X				X	
CLIMATE											
- PRECIPITATION	X			X	X	X	X	X	X		X
- TEMPERATURE		X			X	X	X	X		X	X
- EVAPORATION									X		
- WIND SPEED DIRECTION	X										
HYDROGEOLOGY											
- DEPTH TO IMPERMEABLE STRATA			X	X	X	X					
- SEISMIC HISTORY											
- SUBSURFACE CHARACTERIZATION			X	X	X	X			X	X	
- TRANSMISSIVITY, STORATIVITY			X	X		X			X	X	
- DEPTH TO GROUNDWATER/LEACHATE		X	X	X	X	X			X	X	
- RATE & DIRECTION OF FLOW			X	X		X			X	X	
- HYDRAULIC CONDUCTIVITY			X	X					X	X	
- PUMPING RATE TO CONTAIN PLUME				X							
- LOCATIONS OF WELLS				X		X					
- WELL INTERFERENCE				X		X					
SOIL/WASTE CHARACTERISTICS											
- AVAILABILITY OF COVER MATERIAL		X			X						
- GRAIN SIZE	X	X	X	X	X	X			X		
- ATTERBERG LIMITS	X	X	X	X	X	X			X		
- % MOISTURE		X			X	X			X		
- PROCTOR COMPACTION	X	X			X	X					
- PERMEABILITY		X	X		X	X			X	X	
- TRIAXIAL & DIRECT SHEAR TEST (STRENGTH)		X									
- % ORGANIC MATTER	X	X								X	
- MICROBIOLOGY CELL ENUMERATIONS					X					X	
- DEPTH, TYPE, THICKNESS OF BOTTOM LINER, AND FINAL COVER											
- RECHARGE RATE											
CONTAMINANT CHARACTERISTICS											
- VOLATILITY	X				X	X	X	X	X		X
- SORPTION, PARTITION COEFFICIENTS	X		X		X	X			X		X
- EFFECTIVENESS OF DUST SUPPRESSION	X										
- BIODEGRADATION					X		X	X	X	X	X
- SOLUBILITY				X					X		
- DENSITY				X							
- COMPATABILITY			X								
- TOXICITY				X			X	X	X	X	X
WASTE CHARACTERIZATION											
- VOLUME	X	X	X		X	X	X	X	X		X
- EXTENT OF CONTAMINATION	X	X	X		X	X	X	X		X	X
- CONCENTRATIONS AND TYPE		X		X	X	X	X	X	X	X	X
- AIR	X								X	X	
- SOILS	X	X			X	X			X	X	
- GROUNDWATER			X	X			X	X	X	X	X
- LIQUID WASTE											
- SEDIMENTS							X	X	X		
- SLUDGE											
- OTHER					X	X	X	X	X	X	X
- AERIAL PHOTO INTERPRETATION		X					X	X	X	X	X
- DRUMS											
- LOWER LIMIT OF WASTE											
- LEACHATE/GAS COLLECTION/VENTING INFORMATION					X	X					
CHEMICAL/PHYSICAL ANALYSIS											
- ORGANIC COMPOUNDS			X		X	X	X	X	X	X	X
- METALS			X		X	X	X	X	X	X	X
- TSS							X	X	X	X	X
- TDS							X	X	X	X	X
- TS							X	X	X	X	X
- TOC					X		X	X	X	X	X
- COD			X		X	X	X	X	X	X	X
- BOD					X		X	X	X	X	X
- TEMPERATURE							X	X	X	X	X
- DISSOLVED OXYGEN							X	X		X	X
- NUTRIENTS					X		X	X	X	X	X
- pH			X				X	X	X	X	X
- Na			X				X	X	X	X	X
- OIL AND GREASE											
- HEAT CONTENT											
- ASH CONTENT											
- VISCOSITY											
- CHLORINE CONTENT							X	X	X		X
- Fe, Mn											
- HARDNESS			X								
- ALKALINITY											
- SULFATES							X	X	X		X
- CHLORIDE											
- NITROGEN, AMMONIA											
- NITORGEN, NITRATE & NITRITE											
- NITROGEN, KJELDAHL											
- PHOSPHATE, ORTHO											
- ELECTRICAL CONDUCTIVITY											
- OXIDATION - REDUCTION											
SURFACE WATER CHARACTERISTICS											
- WATER DEPTH											
- GAUGE MEASUREMENTS											
- STREAM CHANNEL MORPHOLOGY											
- 100 YEAR FLOODPLAIN		X									
SEDIMENT CHARACTERISTICS											
- BOTTOM SEDIMENTS CHARACTERISTIC							X	X	X	X	X
- DREDGABLE VOLUME							X	X	X	X	X
- ARARS	X	X	X	X			X	X	X	X	X
WATER SUPPLY INFORMATION											
- WATER QUALITY OF NEW SOURCE											
- LOCATION OF NEW SOURCE											
- DISTANCE TO NEW SOURCE											
- REQUIRED TREATMENT											
- EXPECTED DURATION OF NEED											
- INSTALLATION REQUIREMENTS											
- CURRENT AND PROJECTED WATER USE AND LOCATIONS											

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PRELIMINARY IDENTIFICATION OF DATA NEEDS ACCORDING TO RESPONSE ACTION/REMEDIAL TECHNOLOGY

LIME KILN LANDFILL
GRAFTON, WISCONSIN

DATA NEEDS / SITE CHARACTERISTICS	CONSTRUCTION RELATED ACTIVITIES: DUST CONTROL	CONSTRUCTION RELATED ACTIVITIES: EXCAVATION/REMOVAL	NO ACTION	INSTITUTIONAL CONTROLS	DIVERSION/COLLECTION: DIKES AND BERMS	DIVERSION/COLLECTION: GROUNDWATER EXTRACTION WELLS	GRADING	SILT FENCES	REVEGETATION
- STORAGE TIME		X						X	X
- ACCESSIBILITY	X		X	X	X			X	X
- LAND USE		X	X	X	X		X	X	X
- ECOLOGICAL AREAS		X	X	X	X			X	X
- VEGETATION		X	X	X	X	X	X	X	X
- TOPOGRAPHY		X	X	X	X		X	X	X
- DRAINAGE									
- LOCATION/PERFORMANCE OF RCRA TREATMENT/DISPOSAL FACILITY									
- LOCATION AND NEEDS OF FACILITY OR USER QUALITY, VOLUME	X	X	X	X	X	X	X	X	X
CLIMATE									
- PRECIPITATION	X	X			X	X	X	X	X
- TEMPERATURE									X
- EVAPORATION									X
- WIND SPEED DIRECTION	X								
HYDROGEOLOGY									
- DEPTH TO IMPERMEABLE STRATA			X	X		X			
- SEISMIC HISTORY									
- SUBSURFACE CHARACTERIZATION		X	X	X		X			
- TRANSMISSIVITY, STORATIVITY			X	X		X			
- DEPTH TO GROUNDWATER/LEACHATE						X			X
- RATE & DIRECTION OF FLOW			X	X		X			
- HYDRAULIC CONDUCTIVITY			X	X		X			
- PUMPING RATE TO CONTAIN PLUME									
- LOCATIONS OF WELLS						X			
- WELL INTERFERENCE						X			
SOIL/WASTE CHARACTERISTICS									
- AVAILABILITY OF COVER MATERIAL									X
- GRAIN SIZE	X	X			X	X	X	X	X
- ATTERBERG LIMITS	X	X			X	X	X	X	X
- % MOISTURE		X							X
- PROCTOR COMPACTION	X				X			X	
- PERMEABILITY					X			X	X
- TRIAXIAL & DIRECT SHEAR TEST (STRENGTH)									
- % ORGANIC MATTER	X	X	X	X			X		X
- MICROBIOLOGY CELL ENUMERATIONS									
- DEPTH, TYPE, THICKNESS OF BOTTOM LINER, AND FINAL COVER									
- RECHARGE RATE						X			
CONTAMINANT CHARACTERISTICS									
- VOLATILITY	X		X	X					
- SORPTION, PARTITION COEFFICIENTS	X		X	X					
- EFFECTIVENESS OF DUST SUPPRESSION	X								
- BIODEGRADATION			X	X					
- SOLUBILITY			X	X		X			
- DENSITY			X	X		X			
- COMPATABILITY									
- TOXICITY		X		X					
WASTE CHARACTERIZATION									
- VOLUME	X	X	X	X		X			
- EXTENT OF CONTAMINATION	X	X	X	X		X			X
- CONCENTRATIONS AND TYPE		X	X	X		X			
- AIR	X		X	X					
- SOILS	X		X	X					X
- GROUNDWATER			X	X		X			
- LIQUID WASTE									
- SEDIMENTS			X	X	X			X	
- SLUDGE									
- OTHER			X	X	X			X	
- AERIAL PHOTO INTERPRETATION				X					
- DRUMS									
- LOWER LIMIT OF WASTE									
- LEACHATE/GAS COLLECTION/VENTING INFORMATION									
- OTHER									
CHEMICAL/PHYSICAL ANALYSIS									
- ORGANIC COMPOUNDS									X
- METALS									X
- TSS									
- TDS									
- TS									X
- TOC									
- COD									X
- BOD									
- TEMPERATURE									
- DISSOLVED OXYGEN									X
- NUTRIENTS									X
- pH									X
- Na									
- OIL AND GREASE									
- HEAT CONTENT									
- ASH CONTENT									
- VISCOSITY									
- CHLORINE CONTENT									
- Fe Mn									
- HARDNESS									
- ALKALINITY									
- SULFATES									
- CHLORIDE									
- NITROGEN, AMMONIA									
- NITORGEN, NITRATE & NITRITE									
- NITROGEN, KJELDAHL									
- PHOSPHATE, ORTHO									
- ELECTRICAL CONDUCTIVITY									
- OXIDATION - REDUCTION									
SURFACE WATER CHARACTERISTICS									
- WATER DEPTH			X	X					
- GAUGE MEASUREMENTS			X	X					
- STREAM CHANNEL MORPHOLOGY			X	X					X
- 100 YEAR FLOODPLAIN			X	X	X			X	
SEDIMENT CHARACTERISTICS									
- BOTTOM SEDIMENTS CHARACTERISTIC		X	X	X					
- DREDGABLE VOLUME	X	X	X	X					
- ARARS		X	X	X	X	X	X	X	
WATER SUPPLY INFORMATION									
- WATER QUALITY OF NEW SOURCE									
- LOCATION OF NEW SOURCE									
- DISTANCE TO NEW SOURCE									
- REQUIRED TREATMENT									
- EXPECTED DURATION OF NEED									
- INSTALLATION REQUIREMENTS									
- CURRENT AND PROJECTED WATER USE AND LOCATIONS									

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PRELIMINARY IDENTIFICATION OF DATA NEEDS ACCORDING TO RESPONSE ACTION/REMEDIAL TECHNOLOGY

LIME KILN LANDFILL
GRAFTON, WISCONSIN

DATA NEEDS	STABILIZATION/ SOLIDIFICATION	THERMAL DESTRUCTION/ INCINERATION				LANDFILL DISPOSAL		EFFLUENT DISCHARGE							
	VITRIFICATION	ROTARY KILN INCINERATION	ENERGY INFRARED THERMAL TREATMENT	CIRCULATING FLUIDIZED BED COMBUSTION	PYROLYSIS	OFF-SITE LANDFILL	AGRICULTRIAL/ INDUSTRIAL USE	TEMPORARY STORAGE	REINJECTION	PUBLICALLY OWNED TREATMENT WORK	SEEPAGE BASIN	SUBSURFACE DRAINS	SURFACE WATER DISCHARGE	CITY WATER SUPPLY/ NEW COMMUNITY WELL
SITE CHARACTERISTICS														
- STORAGE TIME						X		X		X		X	X	X
- ACCESSIBILITY						X					X	X		
- LAND USE						X					X	X		
- ECOLOGICAL AREAS						X					X	X		
- VEGETATION						X		X			X	X		
- TOPOGRAPHY						X		X			X	X		
- DRAINAGE						X					X	X		
- LOCATION/PERFORMANCE OF RCRA TREATMENT/DISPOSAL FACILITY						X								X
- LOCATION AND NEEDS OF FACILITY OR USER QUALITY, VOLUME	X	X	X	X	X	X								
CLIMATE														
- PRECIPITATION	X										X	X		
- TEMPERATURE	X													
- EVAPORATION														
- WIND SPEED DIRECTION														
HYDROGEOLOGY														
- DEPTH TO IMPERMEABLE STRATA												X		
- SEISMIC HISTORY														
- SUBSURFACE CHARACTERIZATION						X			X		X	X		
- TRANSMISSIVITY, STORATIVITY						X			X		X	X		
- DEPTH TO GROUNDWATER/LEACHATE						X			X		X	X		
- RATE & DIRECTION OF FLOW						X								
- HYDRAULIC CONDUCTIVITY											X	X		
- PUMPING RATE TO CONTAIN PLUME														
- LOCATIONS OF WELLS									X					
- WELL INTERFERENCE											X	X		
SOIL/WASTE CHARACTERISTICS														
- AVAILABILITY OF COVER MATERIAL						X								
- GRAIN SIZE	X	X	X	X	X	X					X	X		
- ATTERBERG LIMITS	X					X					X	X		
- % MOISTURE	X	X	X	X	X	X								
- PROCTOR COMPACTION						X					X	X		
- PERMEABILITY											X	X		
- TRIAXIAL & DIRECT SHEAR TEST (STRENGTH)						X								
- % ORGANIC MATTER	X	X	X	X	X	X					X	X		
- MICROBIOLOGY CELL ENUMERATIONS														
- DEPTH, TYPE, THICKNESS OF BOTTOM LINER AND FINAL COVER						X								
- RECHARGE RATE											X	X		
CONTAMINANT CHARACTERISTICS														
- VOLATILITY	X	X	X	X	X									
- SORPTION, PARTITION COEFFICIENTS														
- EFFECTIVENESS OF DUST SUPPRESSION														
- BIODEGRADATION														
- SOLUBILITY														
- DENSITY												X		
- COMPATABILITY														
- TOXICITY							X	X	X	X			X	
WASTE CHARACTERIZATION														
- VOLUME	X	X	X	X	X	X	X	X	X	X	X	X	X	X
- EXTENT OF CONTAMINATION	X	X	X	X	X	X	X	X	X	X	X	X	X	X
- CONCENTRATIONS AND TYPE	X	X	X	X	X	X	X	X	X	X	X	X	X	X
- AIR														
- SOILS														
- GROUNDWATER								X	X	X	X	X	X	
- LIQUID WASTE														
- SEDIMENTS	X	X	X	X	X	X	X							
- SLUDGE														
- OTHER										X				
- AERIAL PHOTO INTERPRETATION														
- DRUMS														
- LOWER LIMIT OF WASTE														
- LEACHATE/GAS COLLECTION/VENTING INFORMATION														
CHEMICAL/PHYSICAL ANALYSIS														
- ORGANIC COMPOUNDS	X	X	X	X	X	X	X	X	X	X	X	X	X	X
- METALS	X	X	X	X	X	X	X	X	X	X	X	X	X	X
- TSS		X					X		X	X	X	X	X	
- TDS							X		X	X	X	X	X	
- TS							X		X	X	X	X	X	
- TOC	X						X		X	X	X	X	X	
- COD							X		X	X	X	X	X	
- BOD										X				
- TEMPERATURE														
- DISSOLVED OXYGEN														
- NUTRIENTS							X		X	X	X	X	X	
- pH	X						X		X	X	X	X	X	
- Na							X		X	X	X	X	X	
- OIL AND GREASE							X		X	X	X	X	X	
- HEAT CONTENT		X	X	X	X									
- ASH CONTENT		X	X	X	X									
- VISCOSITY		X	X	X	X									
- CHLORINE CONTENT		X	X	X	X		X		X	X	X	X		
- Fe Mn							X		X	X	X	X		
- HARDNESS														
- ALKALINITY	X	X												
- SULFATES							X		X	X	X	X		
- CHLORIDE														
- NITROGEN, AMMONIA														
- NITORGEN, NITRATE & NITRITE														
- NITROGEN, KJELDAHL														
- PHOSPHATE, ORTHO														
- ELECTRICAL CONDUCTIVITY														
- OXIDATION - REDUCTION														
SURFACE WATER CHARACTERISTICS														
- WATER DEPTH														
- GAUGE MEASUREMENTS														
- STREAM CHANNEL MORPHOLOGY														
- 100 YEAR FLOODPLAIN												X		
SEDIMENT CHARACTERISTICS														
- BOTTOM SEDIMENTS CHARACTERISTIC	X	X	X	X	X	X								
- DREDGABLE VOLUME	X	X	X	X	X	X								
- ARARS	X					X	X	X	X	X	X	X	X	X
WATER SUPPLY INFORMATION														
- WATER QUALITY OF NEW SOURCE														X
- LOCATION OF NEW SOURCE														X
- DISTANCE TO NEW SOURCE														X
- REQUIRED TREATMENT							X	X	X	X	X	X	X	X
- EXPECTED DURATION OF NEED							X	X	X	X	X	X		X
- INSTALLATION REQUIREMENTS													X	X
- CURRENT AND PROJECTED WATER USE AND LOCATIONS							X	X	X	X	X	X	X	X

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PRELIMINARY IDENTIFICATION OF DATA NEEDS ACCORDING TO RESPONSE ACTION/REMEDIAL TECHNOLOGY

LIME KILN LANDFILL
GRAFTON, WISCONSIN

PHYSICAL/CHEMICAL TREATMENT

DATA NEEDS	PRECIPITATION	PHOTOLYSIS/OXIDATION: ULTRAVIOLET/ PEROXIDE, OZONE	CHEMICAL OXIDATION/ REDUCTION	CARBON ADSORPTION	AIR STRIPPING	DEHALOGENATION	SOLVENT EXTRACTION	SOIL WASHING	STABILIZATION BY ION EXCHANGE RESINS	STEAM STRIPPING	DEWATERING	LOW TEMPERATURE THERMAL DESORPTION	ION EXCHANGE
SITE CHARACTERISTICS													
- STORAGE TIME	X		X			X							
- ACCESSIBILITY		X											
- LAND USE			X										
- ECOLOGICAL AREAS													
- VEGETATION													
- TOPOGRAPHY									X				
- DRAINAGE			X										
- LOCATION/PERFORMANCE OF RCRA TREATMENT/DISPOSAL FACILITY													
- LOCATION AND NEEDS OF FACILITY OR USER QUALITY, VOLUME	X	X	X	X	X	X	X		X	X	X	X	X
CLIMATE													
- PRECIPITATION													
- TEMPERATURE		X											
- EVAPORATION													
- WIND SPEED DIRECTION													
HYDROGEOLOGY													
- DEPTH TO IMPERMEABLE STRATA													
- SEISMIC HISTORY													
- SUBSURFACE CHARACTERIZATION													
- TRANSMISSIVITY, STORATIVITY													
- DEPTH TO GROUNDWATER/LEACHATE													
- RATE & DIRECTION OF FLOW													
- HYDRAULIC CONDUCTIVITY													
- PUMPING RATE TO CONTAIN PLUME													
- LOCATIONS OF WELLS													
- WELL INTERFERENCE													
SOIL/WASTE CHARACTERISTICS													
- AVAILABILITY OF COVER MATERIAL							X	X			X	X	
- GRAIN SIZE											X	X	
- ATTERBERG LIMITS											X	X	
- % MOISTURE											X	X	
- PROCTOR COMPACTION							X	X			X	X	
- PERMEABILITY							X	X					
- TRIAXIAL & DIRECT SHEAR TEST (STRENGTH)													
- % ORGANIC MATTER							X	X	X				
- MICROBIOLOGY CELL ENUMERATIONS				X									
- DEPTH, TYPE, THICKNESS OF BOTTOM LINER, AND FINAL COVER													
- RECHARGE RATE													
CONTAMINANT CHARACTERISTICS													
- VOLATILITY	X		X		X	X	X	X		X		X	
- SORPTION, PARTITION COEFFICIENTS					X		X	X		X		X	
- EFFECTIVENESS OF DUST SUPPRESSION													
- BIODEGRADATION													
- SOLUBILITY	X		X										
- DENSITY													
- COMPATABILITY			X										
- TOXICITY			X										
WASTE CHARACTERIZATION													
- VOLUME	X	X	X	X	X		X	X	X	X	X	X	X
- EXTENT OF CONTAMINATION	X	X	X	X	X		X	X	X	X		X	X
- CONCENTRATIONS AND TYPE	X	X	X	X	X		X	X	X	X		X	X
- AIR													
- SOILS													
- GROUNDWATER	X	X	X	X	X					X			X
- LIQUID WASTE													
- SEDIMENTS						X	X	X	X		X	X	
- SLUDGE													
- OTHER					X					X			X
- AERIAL PHOTO INTERPRETATION													
- DRUMS													
- LOWER LIMIT OF WASTE													
- LEACHATE/GAS COLLECTION/VENTING INFORMATION													
CHEMICAL/PHYSICAL ANALYSIS													
- ORGANIC COMPOUNDS	X	X	X	X	X		X	X	X	X			X
- METALS	X	X	X	X	X		X	X	X	X			X
- TSS	X	X		X	X								X
- TDS				X									X
- TS	X												
- TOC	X	X					X	X					
- COD													
- BOD							X	X					
- TEMPERATURE		X											
- DISSOLVED OXYGEN					X								
- NUTRIENTS			X										
- pH	X	X	X				X	X	X	X			
- Na					X								X
- OIL AND GREASE				X			X	X					
- HEAT CONTENT													
- ASH CONTENT													
- VISCOSITY													
- CHLORINE CONTENT													
- Fe Mn				X									X
- HARDNESS													
- ALKALINITY													
- SULFATES													
- CHLORIDE													
- NITROGEN, AMMONIA													
- NITORGEN, NITRATE & NITRITE													
- NITROGEN, KJELDAHL													
- PHOSPHATE, ORTHO													
- ELECTRICAL CONDUCTIVITY													
- OXIDATION - REDUCTION													
SURFACE WATER CHARACTERISTICS													
- WATER DEPTH													
- GAUGE MEASUREMENTS													
- STREAM CHANNEL MORPHOLOGY													
- 100 YEAR FLOODPLAIN													
SEDIMENT CHARACTERISTICS													
- BOTTOM SEDIMENTS CHARACTERISTIC													
- DREDGABLE VOLUME													
- ARARS	X	X	X	X	X		X		X	X			X
WATER SUPPLY INFORMATION													
- WATER QUALITY OF NEW SOURCE													
- LOCATION OF NEW SOURCE													
- DISTANCE TO NEW SOURCE													
- REQUIRED TREATMENT													
- EXPECTED DURATION OF NEED													
- INSTALLATION REQUIREMENTS													
- CURRENT AND PROJECTED WATER USE AND LOCATIONS													

DGN = I:\work\erd\dgn\limeneed.dgn

APPENDIX C

FIELD FORMS

- Daily Time Logs
- Field Log - Soil Borehole
- Atmospheric Monitoring Logs
- Surface Water Sampling Form
- Sample Labels
- Staff Gauge Information Form
- Extraction Well Installation Diagram
- Field Meter Instrument Calibration Logs
- Daily Drilling Summary
- Photograph Log Form
- Schematic of Packer Assembly
- Chain of Custody
- Well Purging and Sample Collection Form
- Field Boring Log
- Field Rock Borehole Log
- Water Table Well Installation Diagram
- Piezometer Installation Diagram
- Well Development Form
- In-Field Permeability Form
- Water Elevation Form
- Daily Quality Control Report

RUST ENVIRONMENT & INFRASTRUCTURE

Daily Time Log

Date: ____/____/____

Circle: Sun Mon Tue Wed Thu Fri Sat

Site: _____ Project No.: _____

Weather: _____

Task/Equipment: _____

Firm/Contractor's Personnel: _____ Hrs On–Site: _____

RUST's Personnel: _____ Hrs On–Site: _____

Site Visitors: _____

Time Log indicating work in progress, remarks:

0600 – 0630 _____

0630 – 0700 _____

0700 – 0730 _____

0730 – 0800 _____

0800 – 0830 _____

0830 – 0900 _____

0900 – 0930 _____

0930 – 1000 _____

1000 – 1030 _____

1030 – 1100 _____

1100 – 1130 _____

1130 – 1200 _____

1200 – 1230 _____

1230 – 1300 _____

1300 – 1330 _____

1330 – 1400 _____

1400 – 1430 _____

1430 – 1500 _____

1500 – 1530 _____

1530 – 1600 _____

1600 – 1630 _____

1630 – 1700 _____

1700 – 1730 _____

1730 – 1800 _____

Items requiring follow–up: _____

_____

Summary of Daily Activities

Include items such as: boring numbers, footage drilled, well numbers, well construction, wells developed, samples and locations, problems, actions required, stand–by time, etc...

(1) _____

(2) _____

(3) _____

(4) _____

(5) _____

(6) _____

(7) _____

(8) _____

(9) _____

(10) _____

Stand–by time: _____ hrs.

Access delays: _____ hrs.

Actions required: _____

_____

_____

FIELD LOG – SOIL BOREHOLE

SITE NAME AND LOCATION	DRILLING METHOD:					BORING NO.	
						SHEET	
	SAMPLING METHOD:					OF	
						DRILLING	
						START	FINISH
	WATER LEVEL					TIME	TIME
	TIME						
	DATE					DATE	DATE
DATUM ELEVATION	CASING DEPTH						

DRILL RIG	SURFACE CONDITIONS
ANGLE BEARING	
SAMPLE HAMMER TORQUE FT.-LBS	

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN ON SAMPLER (RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	DEPTH IN FEET FROM	DEPTH IN FEET TO	DESCRIPTION OF OPERATION AND REMARKS

DRILLING CONTR_____

FS

LOGGED BY_____

DATE_____ CHK'D BY_____

RUST Rust Environment & Infrastructure

Atmospheric Monitoring Log
Field Health and Safety

Page ____ of ____

Date ____/____/____

Circle: Sun Mon Tue Wed Thu Fri Sat

Site: _____ Project No.: _____

Site Safety Officer: _____

Action Levels: D ☐ → C ☐ → B ☐ → (stop work, call in for instructions on all upgrades)

(Check box and write in levels for upgrade)

Task/Equipment: _____

Weather: _____

Location	Time	O_2 %	LEL %	H_2S PPM	Circle one: HNu/OVA Readings (ppm)				Comments
					Back ground	Breathing Zone	Sample Location	Head Space	

Additional Comments: _____

_____

_____

Signature: _____

Checked by: _____ Date: ____/____/____

NOTE: Place in project files.

RUST ENVIRONMENT & INFRASTRUCTURE

Surface Water/Sediment Data Form

SURFACE WATER

Site _____ Project Number _____

Temperature _____

Date _____ pH _____

Time _____ Conductivity _____

Dissolved Oxygen _____

Collectors _____ Turbidity: Low _____

_____ Medium _____

High _____

Sample Number [ ]

Color: _____

Sampling Equipment _____ Odor: _____

_____ Water Depth: _____

Physical Description of Surface Water Sample Location: _____

_____

_____

_____

_____

SEDIMENT

Date _____

Time _____

Collectors _____

_____

Sample Number [ ]

Sampling Equipment _____

_____

Physical Description of Sediment Location: _____

_____

_____

_____

Physical Description of Sediment: _____

_____

_____

_____

RUST ENVIRONMENT & INFRASTRUCTURE

Stream Gauge Information Form

Sheet ____ of ____

SITE: _____ DATE: _____ GAUGE NO.: _____

BY: _____ PROJECT NO.: _____

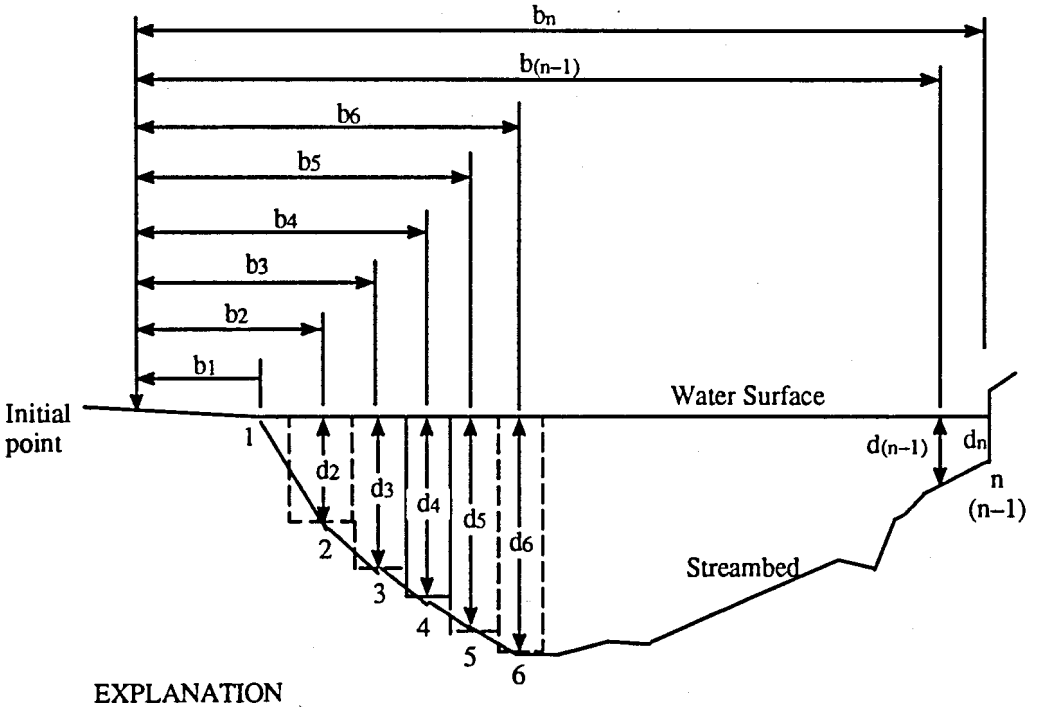
OBSERVATION POINT NUMBER, NUMBERED FROM LEFT BANK LOOKING DOWNSTREAM

	1	2	3	4	5	6	7	8	9	10	11	12
DISTANCE TO OB. PT. FROM INITIAL PT. (FT)												
DEPTH OF WATER (FT)												
DEPTH OF CURRENT METER (0.6 x WATER DEPTH, FT)												
CLICKS/MINUTE												

GENERAL STREAM CONDITIONS: _____

CURRENT METER TYPE: _____

OTHER COMMENTS: _____



EXPLANATION

1,2,3 . . . . . n	Observation points
$b_1, b_2, b_3, \ldots b_n$	Distance, in feet, from the initial point to the observation point
$d_1, d_2, d_3, \ldots d_n$	Depth of water, in feet, at the observation point

RUST ENVIRONMENT & INFRASTRUCTURE

Field Meter Instrument Calibration Log
pH Meter

	4.0 BUFFER		7.0 BUFFER		10.0 BUFFER			
Date Calibrated	True Value	Meter Reading	True Value	Meter Reading	True Value	Meter Reading	Adjustments	Cal. By

COMMENTS: _____

pH Meter: MFG _____ Model: _____ EPA ID No.: _____

Buffers: 4 Source _____ Date Opened _____

7 Source _____ Date Opened _____

10 Source _____ Date Opened _____

RUST ENVIRONMENT & INFRASTRUCTURE

Field Meter Instrument Calibration Log
Temperature, Conductivity, Dissolved Oxygen

	THERMOMETER				CONDUCTIVITY			D.O. METER			
Date Calibrated	NBS Reference ° C	Field Thermo-meter ° C	Correc-tion Factor ° C	Cal. By	True Value umhos	Meter Readings umhos	Cal. By	Air Temp. ° C	Calc. D.O. Air (mg/L)	Read D.O. Air (mg/L)	Cal. By

COMMENTS: _____

Thermometer No.: _____ EPA ID No.: _____

Conductivity Meter: MFG _____ Model: _____ EPA ID No.: _____

Conductivity Standard: MFG _____ Opened Date: _____

D.O. Meter: MFG _____ Model: _____ EPA ID No.: _____

DAILY DRILLING SUMMARY

CONTRACTOR _____ DATE _____ SHIFT _____

SITE NAME _____ LOCATION _____

BOREHOLE NUMBER(S) THIS DATE _____

DRILL TIME LOG: Explain all down and standby time—who authorized—unusual circumstances, etc.

CATEGORY	TOTAL HOURS	A.M. 6 7 8 9 10 11 12	P.M. 1 2 3 4 5 6 7 8 9 10 11 12	A.M. 1 2 3 4 5 6
MOB/DEMOB				
DRILLING				
WELL CONST.				
MOVE/DECON				
TESTING				
STANDBY				
DOWN TIME				
OTHER				

REMARKS

EXPENDABLES: Itemize quantity, size, etc.

ITEM	QUANTITY	PART NO.

BOREHOLE NO.	FROM FEET	TO FEET	FOOTAGE DRILLED FEET	PIPE & CASING IN HOLE SIZE	PIPE & CASING IN HOLE FEET	BITS/CASING SHOES, ETC. SIZE	NUMBER	ON	OFF	FEET

PERSONNEL TIME LOG:

POSITION	NAME	HOURS
GEOLOGIST		
DRILLER		
HELPER		

COMMENTS

GEOLOGIST	CONSULTANT REPRESENTATIVE
DRILLER	CONTRACTOR REPRESENTATIVE

RUST ENVIRONMENT & INFRASTRUCTURE

Packer (Pressure Injection) Test

Page _____ of _____

Project: _____ Test Boring: _____

Boring Location: _____ Static Water Level: _____

Boring Elevation: _____ Depth of Boring: _____

Boring Inclination: _____ Core Type: _____ Driller: _____

Test Interval Depth as feet	L feet	H_1 feet	H_2 feet	H feet	r (C_p) ft (value)	T minutes	Q gallons	k ft/yr

L = Length of test interval

H_1 = below G.W., distance from G.W. to test interval

H = H_1 + H_2 or H = H_2 depending on whether test interval is below the water table

RUST ENVIRONMENT & INFRASTRUCTURE

Well Purging and Sample Collection

Project No.: _____ Well No. (_____) Site: _____

Purging Method: Pumped ☐ Bailed ☐ Other: _____

Pump Type: _____ Bailer Type: _____

Weather Conditions: _____

Volume Calculation: _____

(D.T.B. – D.T.W. x vol./ft. = Gals./well vol.)
(Gals./well vol. x 5 = Total Volume to be removed)

Gals./well vol.: _____

Time	Depth to Water (D.T.W.)	Depth to Bottom (D.T.B.)	Volume Removed (gal.)	pH	Cond.	Temp.	Color	Odor Y/N	Turbidity
		Sample Readings							

Comments: _____

_____

_____

Inside Diameter	vol./ft.
1"	0.04
1.25"	0.06
2"	0.16
4"	0.65

Field Blank Taken ☐ Time: _____

Well Duplicate ☐ No.: _____

Signature: _____

Date: ____/____/____

HNu/PPM	LEL/%	O_2/%	H_2S/PPM	CO/PPM	

RUST ENVIRONMENT & INFRASTRUCTURE

Chain of Custody Record

Custody Seal #	RUST E&I Cooler #

Project Number	Project Name/Client
Sample Custodian: (Signature)	

Item No.	Sample Description (Field ID Number)	Date	Time	Grab	Comp.	PID Reading (ppm)	Label Number	Analysis Required	Preservative Type	X-Field Filtered	Matrix: Sample Type: Soil	Groundwater	Surface Water	Sediment	Leachate	Matrix: Sample Container: 40 mil VOA	120 mil VOA	8 oz	1 Litre Amber	1 Litre HDPE
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				
18																				
19																				
20																				

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Disposed of by: (Signature)	Items:	Date/Time
Relinquished by: (Signature)	Date/Time	Received by: (Signature) [Laboratory]	Disposed of by: (Signature)	Items:	Date/Time

Send Lab Results To:	Remarks: Federal Express Airbill No.: Lab:	Check Delivery Method: ☐ Samples delivered in person ☐ Common carrier	Laboratory Receiving Notes: Custody Seal Intact? Temp. of Shipping Container: Sample Condition:

Rev. 4/94

White Copy – Lab Yellow Copy – File Pink Copy – Client

RUST ENVIRONMENT & INFRASTRUCTURE

FIELD ROCK CORE LOG

Sheet 1 of _____

BORING NO. _____

SITE: _____ PROJECT NO. _____

WATER LEVEL READINGS

	DATE	TIME	DEPTH	CASING

DRILLING RIG: _____

CORE BARREL / BIT: _____

CASING USED: _____

LOGGED BY: _____

FIRM/DRILLER: _____

PHYSICAL SETTING: _____

ABANDONMENT DATE: _____

ABANDONMENT METHOD: _____

GROUND SURFACE ELEV: _____

COORDINATE/TYPE: _____

NORTH: _____

EAST: _____

DATE/TIME START: _____

DATE/TIME COMPLETE: _____

WELL INSTALLATION DATE: _____

Depth in Feet	CORING DATA							FRAC./ FT	GRAPHICS	ROCK TYPE CODE	ROCK DESCRIPTION	COMMENTS
	METHOD	RUN NO	LENGTH	% RECOVERY	MPF	%WATER GAIN/LOSS (GAL.)	% RQD					

&cont&

FIELD ROCK CORE LOG - INSTRUCTIONS

HEADING: LOCATION: Provide coordinates or stationing if available.
DRILLING RIG = Make and Model
CORE BARREL = Type and size designation (NX Wire Line, BO Triple Tube, etc.)
CORE BIT = Type, size and set of diamonds
CASING = Size and Length of casing used
WATER LEVEL READINGS = Record date and time of reading water depth, and the hole depth and casing depth at the time of reading. All readings should be recorded on sheet No. 1.

CORING DATA:

1. METHOD = Designate drilling method with alpha code as follows: AR=AIR ROTARY; CO=CORING; MR=MUD ROTARY.
2. RUN NO = Record coring runs sequentially.
3. LENGTH = Record coring run length in feet (draw a horizontal line between core runs).
4. RECOVERY = Total length of core recovered as a % of run length. Darken intervals of core loss.
5. MPF = Drilling rate in minutes per foot for each 1-foot increment.
6. WATER GAIN/LOSS = Record any water loss or gain in gallons during drilling.
7. RQD (Rock Quality Designation) = The sum of all unweathered core pieces larger than 4 inches (0.33FT) divided by the run length times 100%. Do not count mechanical breaks.
8. FRAC/FT= Number of core seperations for each 1-foot interval. Do not count mechanical breaks. If more than 6 fractures per foot, record as " >6".

ROCK TYPE GRAPHIC LOG AND CODES:

CLAY-STONE	CONGLOM-ERATE	BRECCIA	SAND-STONE	SILT-STONE	SHALE	COAL	LIME-STONE	DOLO-MITE	CHERT	META-MORPHIC	IGNEOUS
CS	CG	BR	SS	ST	SH	CO	LS	DL	CT	MT	IG

Draw a horizontal line at strata changes.
More detailed classifications may be used as needed

ROCK DESCRIPTION:

Describe rock completely once per core run or at any change. Use the following under: Rock name, lithologic modifiers, color (name, #), texture (grain/crystal size), structure (bedding, foliation, etc), cementation, hardness, weathering solution/voids/fracturing, porosity. For physical properties use the following categories:

HARDNESS:

V. HARD: Connot scratch with a knife
HARD: Difficult to scratch with knife
MED: Scratched w/knife
SOFT: Easily scratched with knife

WEATHERING:

FRESH: Rock is unstained, fractures are unstained.
SLIGHTLY: Rock mass is unstained, discontinuities are stained at surface
MEDIUM: Discontinuities are stained, Discoloration extends into rock
HIGH: Rock thoroughly stained, may be softened, discontinuity surfaces thoroughly stained and may be crumbly
SEVERE: Rock consists of gravel - sized fragments which can be broken with fingers

EXAMPLE:

Depth in Feet	CORING DATA: METHOD	RUN NO	LENGTH	% RECOVERY	MPF	%WATER GAIN/LOSS (GAL.)	% RQD	FRAC./ FT	GRAPHICS	ROCK TYPE CODE	ROCK DESCRIPTION	COMMENTS
1	CO	1	10	100	6	0	85	2		DL	DOLOMITE: cherty, light olive gray (5Y 6/1),	
2								>6			medium grained, thinly bedded, clay partings,	
3								3			hard, slightly weathered, vuggy w/pyrite	

RUST ENVIRONMENT & INFRASTRUCTURE

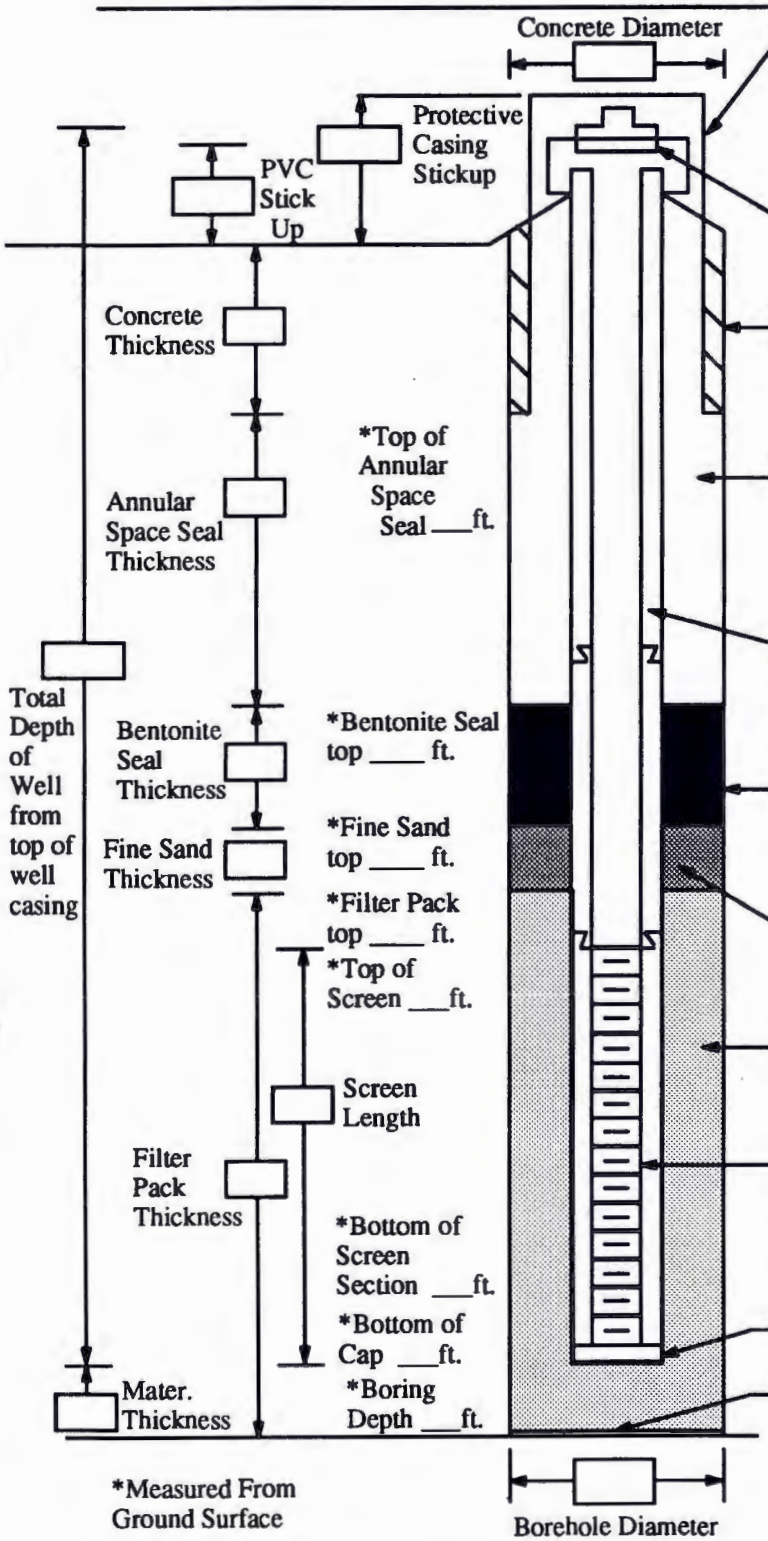
Water Table Well Installation Diagram

Site: _____ Date/Time Start: _____ Date/Time Finished: _____ Well No.: _____

Inspected by: _____ Driller Name: _____

Project No.: _____ Drilling Firm: _____

Survey Coordinates: _____ Ground Surface Elevation: _____



PROTECTIVE CASING | **GUARD POSTS** YES/NO

Type ____ Type ____ Number ____

Diameter ____ Locked ____ Key # ____

Length ____ Vented Yes/No

CAP OR PLUG Vented YES/NO Type ____

Material between protective casing and well casing

CONCRETE COLLAR YES/NO

Cement ____ lbs + Water ____ gal

Total Quantity ____ gal

Manufacturer ____

ANNULAR SPACE SEAL YES/NO

Type of Bentonite ____

Mix ____ lb bentonite + ____ gal H_2O

+ ____ lb cement

Total Quantity ____ gal Mud Wt ____ lbs/gal

WELL CASING Type ____ Schedule ____

OD ____ ID ____ Length/sec. ____

Flush threaded YES/NO Teflon Tape YES/NO

O-rings YES/NO Manufacturer ____

BENTONITE SEAL Manufacturer ____

Bentonite Type ____ Quantity ____ gal or lbs (Circle)

Hydrated ____ gal H_2O ____ Time

FINE SAND SEAL Material/Mesh size ____

Manufacturer ____

Product Name ____ # bags ____ Total lbs ____

FILTER PACK Material/Mesh size ____

Manufacturer ____

Product Name ____ # bags ____ Total lbs ____

SCREEN Slotted length ____

Type ____ Schedule ____

OD ____ ID ____ Length/sec ____

Slot size ____ No. slots/ft ____

Manufacturer ____

CAP OR PLUG Type ____ Length ____

MATERIAL BELOW WELL ____

WATER SOURCE ____

Notes: ____

RUST ENVIRONMENT & INFRASTRUCTURE

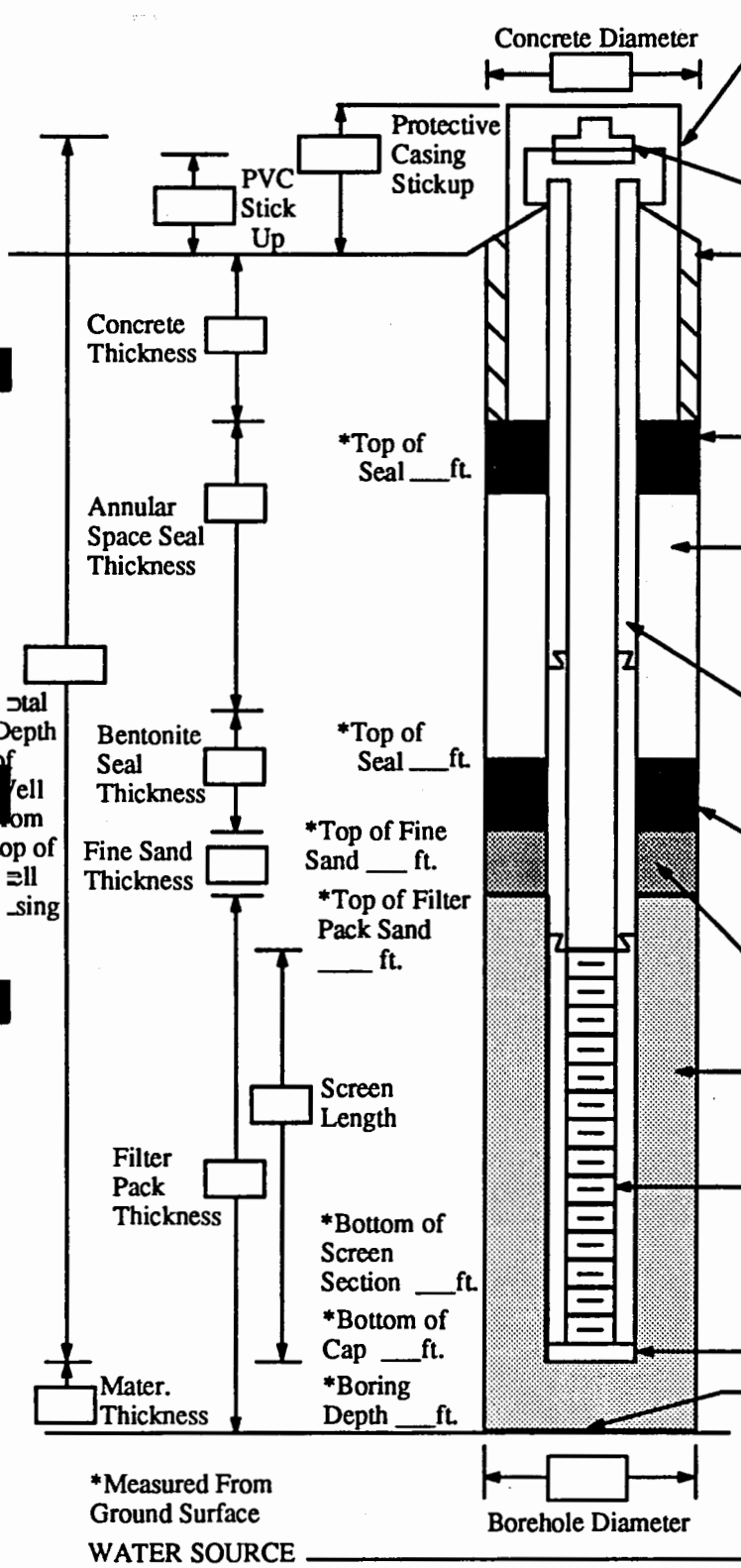
Piezometer Installation Diagram

Site: _____ Date/Time Start: _____ Date/Time Finished: _____ Well No.: _____

Inspected by: _____ Driller Name: _____

Project No.: _____ Drilling Firm: _____

Survey Coordinates: _____ Ground Surface Elevation: _____



PROTECTIVE CASING

Type _____

Diameter _____ Locked _____ Key # _____

Length _____ Vented Yes/No

GUARD POSTS YES/NO

Type _____ Number _____

CAP OR PLUG Vented YES/NO Type _____

CONCRETE COLLAR YES/NO

Cement _____ lbs + Water _____ gal

Total Quantity _____ gal

Manufacturer _____

Material between protective casing and well casing

_____

UPPER SEAL Manufacturer _____

Bentonite Type _____ Quantity _____ gal or lbs (Circle)

Hydrated _____ gal H_2O _____ Time

ANNULAR SPACE SEAL YES/NO

Type of Bentonite _____

Mix _____ lb bentonite + _____ gal H_2O

+ _____ lb concrete

Total Quantity _____ gal Mud Wt. _____ lbs/gal

WELL CASING Type _____ Schedule _____

OD _____ ID _____ Length/sec _____

Flush threaded YES/NO Teflon Tape YES/NO

O-rings YES/NO Manufacturer _____

LOWER SEAL Manufacturer _____

Bentonite Type _____ Quantity _____ gal or lbs (Circle)

Hydrated _____ gal H_2O _____ Time

FINE SAND SEAL Material/Mesh size _____

Manufacturer _____

Product Name _____ # bags _____ Total lbs _____

FILTER PACK Material/Mesh size _____

Manufacturer _____

Product Name _____ # bags _____ Total lbs _____

SCREEN Slotted length _____

Type _____ Schedule _____

OD _____ ID _____ Length/sec _____

Slot size _____ No. slots/ft _____

Manufacturer _____

CAP OR PLUG Type _____ Length _____

MATERIAL BELOW WELL _____

_____

WATER SOURCE _____

Notes: _____

_____

RUST **Rust Environment & Infrastructure**

Well Development
(Must Have Well Construction Diagrams)

Well No. ( )

Date: ___/___/___

Mon. Tues. Weds. Thurs. Fri.

Site: _____

Weather: _____ Project No.: _____

Development Method: Pumped ☐ Bailed ☐ Other: _____

Pump Type: _____ Bailer Type: _____

Volume Calculation: _____

(D.T.B. – D.T.W. x vol./ft. = PVC/well volume) + (N* x H* x Annulus vol./ft.) = Total Well Volume

* (Wells that cannot be purged dry, 10x's the Total Well Volume must be purged)
(Wells that can be purged dry, slowly removing water, without surging until dry)

Time	Depth to Water (D.T.W.)	Depth to Bottom (D.T.B.)	Volume Removed (gal.)	pH	Cond.	Temp.	Color	Odor Y/N	Turbidity

Comments: _____

_____

_____

*N = porosity of filter pack
*H = length of filter pack or length of saturated filter pack (water level within screen length)
* = A 30–minute surge and purge before the 10x's the Total Well Volume

Annulus	vol./ft.
4"	0.42
6"	1.24
8"	2.38
10"	3.85

Inside Diameter	vol./ft.
1"	0.04
1.25"	0.06
2"	0.16
4"	0.65

HNu/PPM	LEL/%	O_2/%	H_2S/PPM	CO/PPM	

Signature: _____

RUST ENVIRONMENT & INFRASTRUCTURE

Infield Hydraulic Conductivity Test (Manual Measurement Form)

Sheet _____ of _____

PROJECT NO.: _____ WELL NO.: _____

SITE: _____ READING METHOD: _____

DATE: _____ TEST PERFORMED BY: _____

Diameter of Borehole (2R): _____ Total Depth of Well: _____

Diameter of Pipe (2r): _____ Static Water Level ▼ (ft.): _____

Screen Length: _____ Length of Water Column in Well (D): _____

Effective Screen Length (L): _____ Δ h Induced Using: slug, pump, bailer (circle)

Observation Well/Piezometer (circle) Data Entered by/Date: _____

Confined/Unconfined (circle) Calculations by/Date: _____

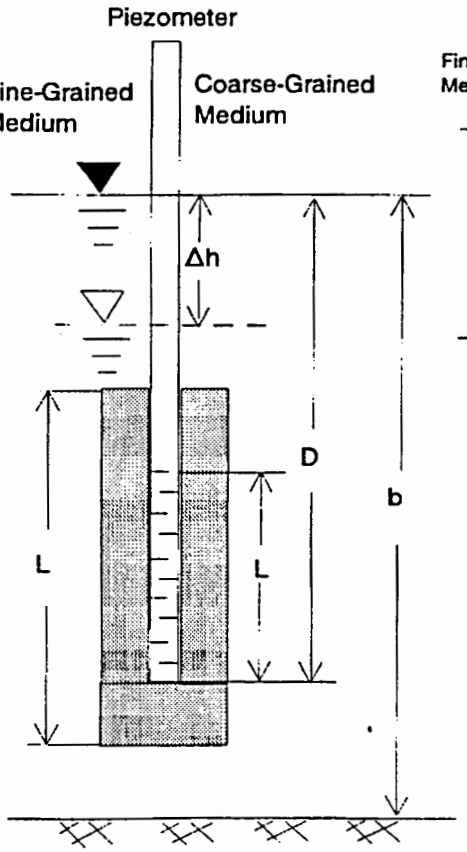
USCS Class of Screened Fmtn: _____ Computer File Name: _____

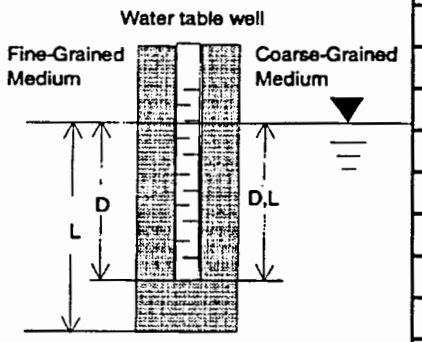
Aquifer Saturated Thickness ft. (b): _____ Location of Backup Files: _____

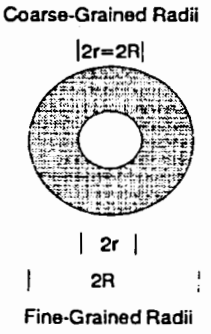
Pump Test Information Only

Pumping Rate: _____ Time Pumping Started: _____

Distance from Pumping Well: _____ Time Pumping Stopped: _____







INFIELD TEST DATA

RDG No.	Time of Reading	Depth to Water	Elapsed Time in Minutes
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			

Notes: _____

Project No., Site, Date, Well No., and Test Performed By: Complete with appropriate information.

Station I.D.: Number entered into the data logger that identifies the test.

Diameter of Borehole (2R): Diameter in feet.

Diameter of Pipe (2r): Inside diameter of well pipe in feet.

Screen Length: From the Well Construction Form, length of the slotted section of pipe

Effective Screen Length (L): Fine-grained environment - piezometer: this is the length of the filter pack including sand above and below the screen; water table wells (water intersects screen): this is the length from the water table to the bottom of the filter pack below the well screen. Coarse-grained environment - piezometer: this is the slotted length of the well screen; water table well: length from the water table well to the bottom of the well.

Observation Well/Piezometer and Confined/Unconsolidated: Circle correct selection.

USCS Class of Screened FMTN: From boring log.

Aquifer Saturated Thickness: From regional information, may be filled out in office.

Total Depth of Well: From the top of the riser.

Static Water Level (ft): From the top of the riser.

Length of Water Column in Well(s): Static water level minus the total depth of well.

Static Transducer Level and Start Time: Record for each test completed (Datalogger form).

Δh Induced Using: Circle appropriate piece of equipment (manual form).

Pressure Transducer (PSI): Record from the transducer.

Slug Length and Diameter: Measure and record.

Pump Test Information Only: Record appropriate information for pump tests.

In-Field Test Data: Record the set-up of the test or the manual water level measurements.

Notes: Any information to note including condition of well or problems encountered during the test.

Logger Downloaded By: Record name.

Calculations By: Record name and date.

Computer File Name: Record name and date.

Location of Backup Files: Record location.

RUST ENVIRONMENT & INFRASTRUCTURE

Infield Hydraulic Conductivity Test (Data Logger Form)

Sheet _____ of _____

Project No.: _____ Well No.: _____

Site: _____ Station ID: _____

Date: _____ Test Performed By: _____

Diameter of Borehole (2R): _____ Total Depth of Well: _____

Diameter of Pipe (2r): _____ Static Water Level (ft.): _____

Screen Length: _____ Length of Water Column in Well(D): _____

Effective Screen Length (L): _____ Fall Rise

Observation Well/Piezometer (circle) Static Transducer Level: _____ _____

Confined/Unconfined (circle) Start Time: _____ _____

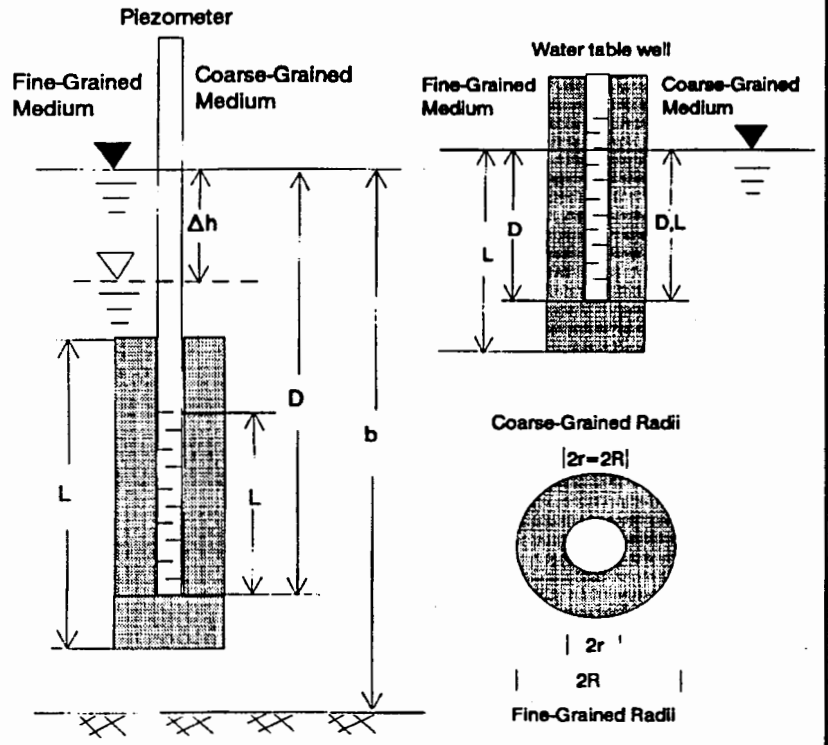
USCS Class of Screened Fmtn: _____ Pressure Transducer (PSI): _____

Aquifer Saturated Thickness in ft. (b): _____ Slug Length and Diameter: _____

Pump Test Information Only

Pumping Rate: _____ Time Pumping Started: _____

Distance from Pumping Well: _____ Time Pumping Stopped: _____



INFIELD TEST DATA

Segment Number	Number of Readings	Reading Interval (Seconds)	Segment Duration (Seconds)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

Notes: _____

Logger Downloaded by: _____

Calculations by: _____ Date: _____

Computer File Name: _____ Date: _____

Location of Backup Files: _____

Project No., Site, Date, Well No., and Test Performed By: Complete with appropriate information.

Station I.D.: Number entered into the data logger that identifies the test.

Diameter of Borehole (2R): Diameter in feet.

Diameter of Pipe (2r): Inside diameter of well pipe in feet.

Screen Length: From the Well Construction Form, length of the slotted section of pipe

Effective Screen Length (L): Fine-grained environment - piezometer: this is the length of the filter pack including sand above and below the screen; water table wells (water intersects screen): this is the length from the water table to the bottom of the filter pack below the well screen. Coarse-grained environment - piezometer: this is the slotted length of the well screen; water table well: length from the water table well to the bottom of the well.

Observation Well/Piezometer and Confined/Unconsolidated: Circle correct selection.

USCS Class of Screened FMTN: From boring log.

Aquifer Saturated Thickness: From regional information, may be filled out in office.

Total Depth of Well: From the top of the riser.

Static Water Level (ft): From the top of the riser.

Length of Water Column in Well(s): Static water level minus the total depth of well.

Static Transducer Level and Start Time: Record for each test completed (Datalogger form).

$\triangle$h Induced Using: Circle appropriate piece of equipment (manual form).

Pressure Transducer (PSI): Record from the transducer.

Slug Length and Diameter: Measure and record.

Pump Test Information Only: Record appropriate information for pump tests.

In-Field Test Data: Record the set-up of the test or the manual water level measurements.

Notes: Any information to note including condition of well or problems encountered during the test.

Logger Downloaded By: Record name.

Calculations By: Record name and date.

Computer File Name: Record name and date.

Location of Backup Files: Record location.