SOIL VAPOR EXTRACTION SYSTEM OPERATIONS, MAINTENANCE, AND MONITORING PLAN

FOR THE

570 MAIN STREET PROPERTY
WESTBURY, NEW YORK

FEBRUARY 1997

PREPARED FOR:

IMC MAGNETICS CORP.

PREPARED BY:

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SOIL VAPOR EXTRACTION SYSTEM
OPERATION, MAINTENANCE, AND MONITORING PLAN
FOR THE INTERIM REMEDIAL MEASURE
FOR THE VADOSE ZONE
570 MAIN STREET PROPERTY
WESTBURY, NEW YORK
NYSDEC Site Code #130043A
(HAI DOCUMENT #NMB004D.040)

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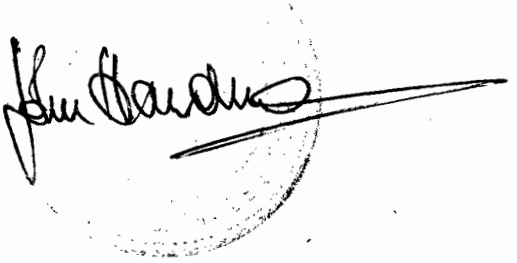

John Hardman, P.E.

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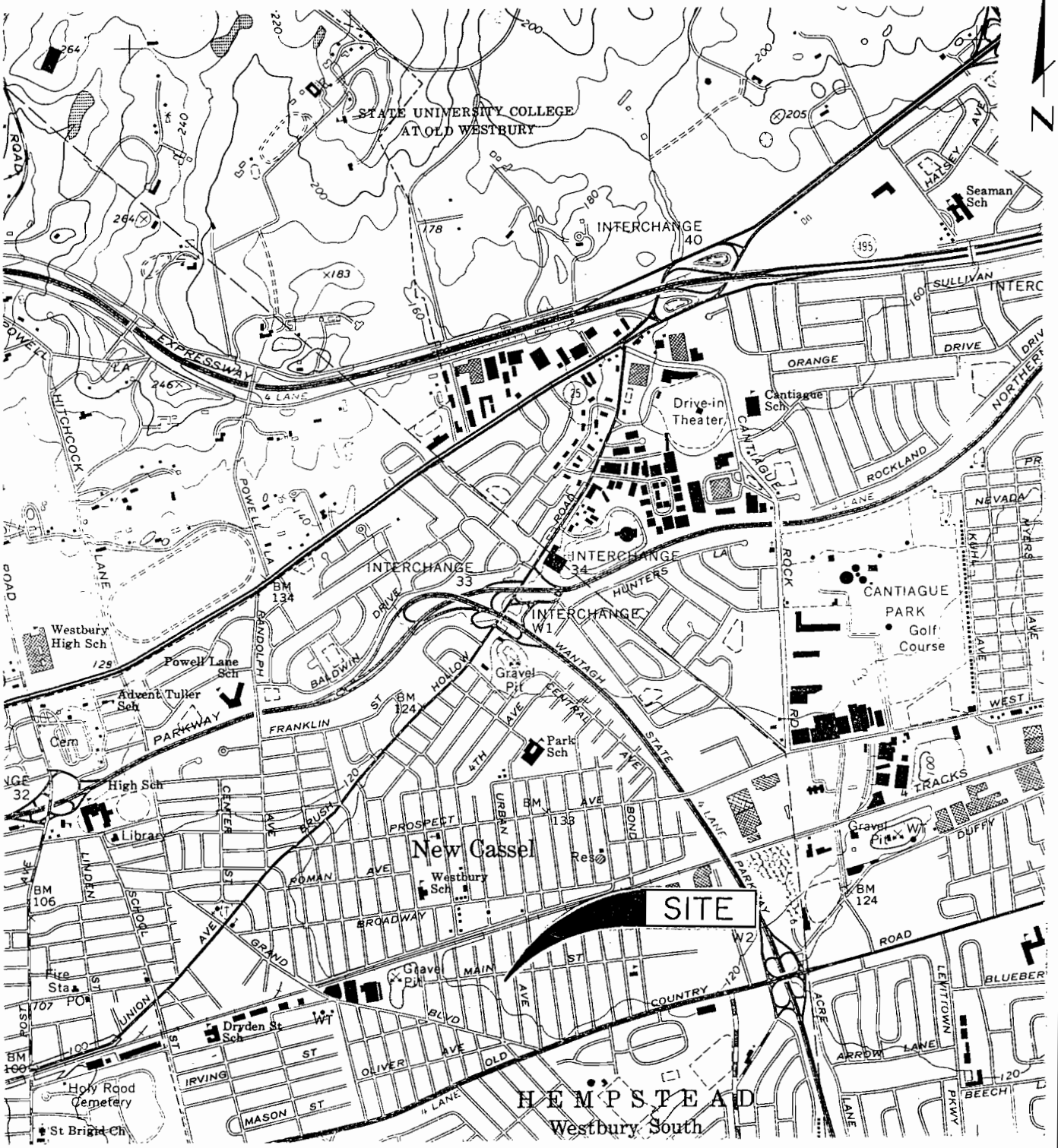
1.0 INTRODUCTION

Hull & Associates, Inc. (HAI) and Land Tech Remedial, Inc. (LTR) have been retained by IMC Eastern Corp. (IMC), to prepare the Operation, Maintenance, and Monitoring Plan for the soil vapor extraction (SVE) system at the 570 Main Street Property in Westbury, New York (Site). The Site lies in the New Castel Industrial Area (NCIA), a Class 2 inactive hazardous waste site as designated by the New York State Department of Environmental Conservation (NYSDEC). The preparation of this document, and all activities performed at the Site have been, to the maximum extent practicable, in accordance with the provisions of Consent Order, Index #1-W1-0750-96-02, effective March 6, 1996 (the Order).

An investigation of the vadose zone at the Site was conducted to determine the area that interim remedial measures (IRM) are appropriate. In addition, an SVE pilot test was conducted to determine the feasibility of utilizing this remedial technology. Based on the type of contaminants detected at the Site, the Site geology, and the results of the pilot test, SVE is appropriate for use at the Site. The results of the vadose zone investigation and SVE pilot test are detailed in the August 1996 Final Investigation Report (HAI Document # NMB004D.032).

1.2 Site Description

The Site is located at 570 Main Street in Westbury, New York, and is within the 170-acre NCIA. A Site Location Map is presented on Figure 1-1. The Site is slightly over two acres with one manufacturing building and a paved parking lot covering most of the area. The Site is currently vacant except for a portion of the southern end of the building which is occupied by Castle Collision, an entity unrelated to IMC. The Site configuration is presented on Figure 1-2. The portion of the Site addressed by this plan is designated as Area 2 on Figure 2 (northwest corner of the Site).



QUADRANGLE LOCATION

0 1,000 2,000

SOURCE: USGS 7.5 MIN. QUADRANGLE
HICKSVILLE, NEW YORK - 1967
(PHOTOREVISED - 1979)

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02/10/97 SCHOONOV

FIGURE 1-1

Hull & Associates, Inc.
DUBLIN, OHIO

570 MAIN STREET PROPERTY
OPERATION MAINTENANCE, AND MONITORING PLAN

SITE LOCATION MAP

WESTBURY, NEW YORK

DATE:
FEBRUARY 1997 NMB 004

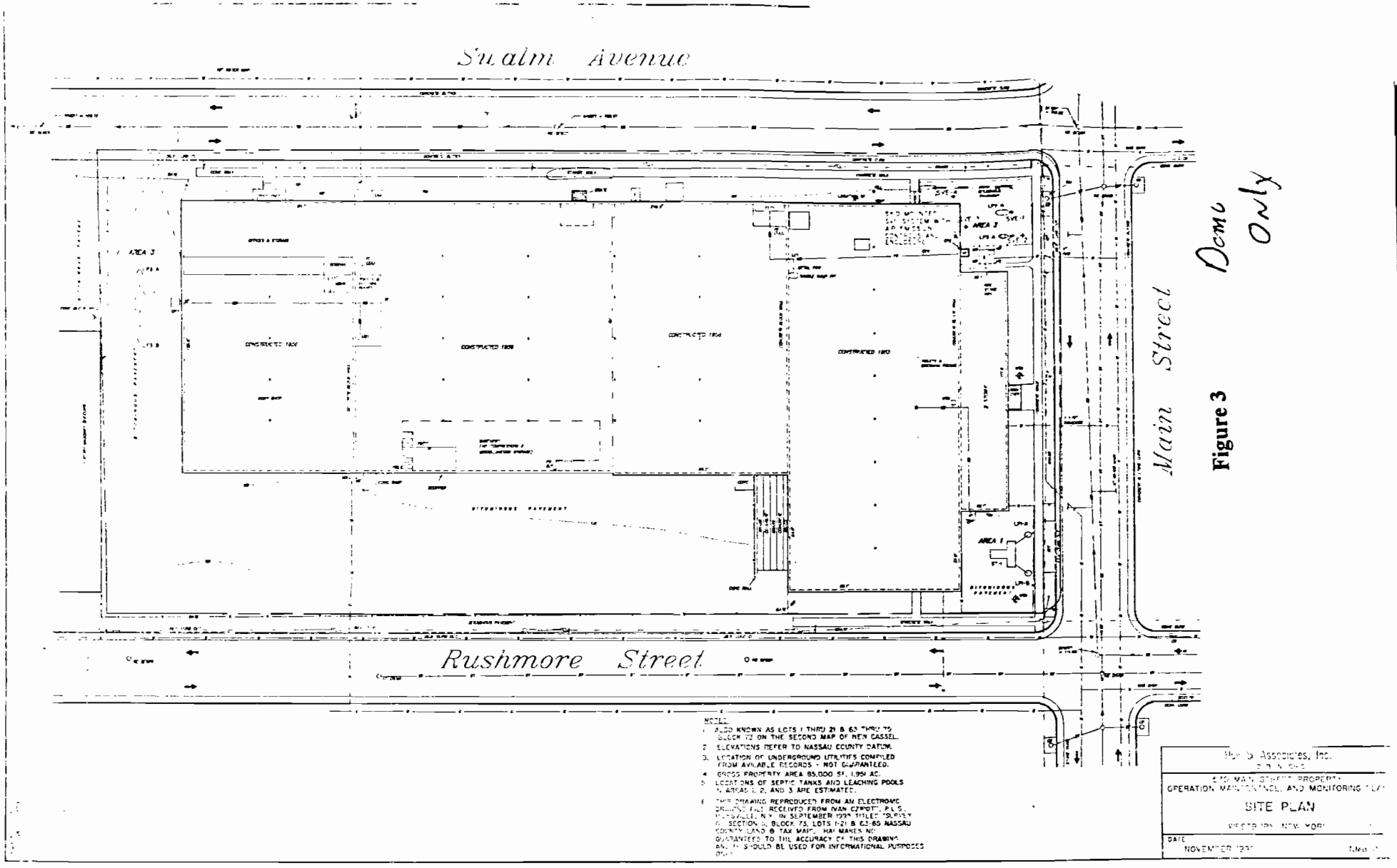

Figure 3

Figure 3

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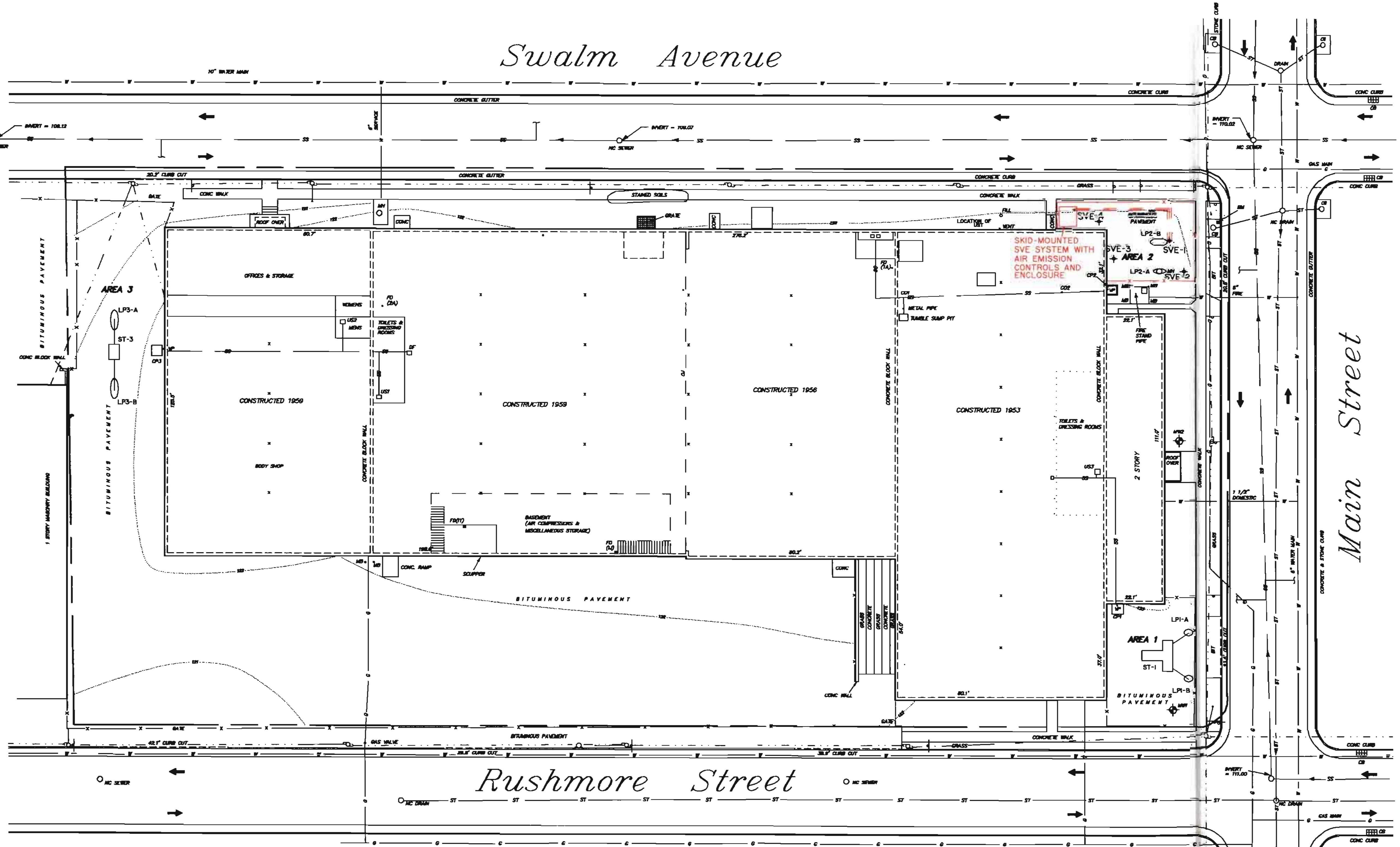


NOTES:

1. ALSO KNOWN AS LOTS 1 THRU 21 & 63 THRU 75 BLOCK 73 ON THE SECOND MAP OF NEW CASSEL.
2. ELEVATIONS REFER TO NASSAU COUNTY DATUM.
3. LOCATION OF UNDERGROUND UTILITIES COMPILED FROM AVILABLE RECORDS - NOT GUARANTEED.
4. GROSS PROPERTY AREA 85,000 SF, 1.951 AC.
5. LOCATIONS OF SEPTIC TANKS AND LEACHING POOLS IN AREAS 1, 2, AND 3 ARE ESTIMATED.
6. THIS DRAWING REPRODUCED FROM AN ELECTRONIC DRAWING FILE RECEIVED FROM IVAN CZIPOTT, P.L.S., HICKSVILLE, N.Y. IN SEPTEMBER 1995 TITLED "SURVEY OF SECTION 11, BLOCK 73, LOTS 1-21 & 63-65 NASSAU COUNTY LAND & TAX MAP". HAI MAKES NO GUARANTEES TO THE ACCURACY OF THIS DRAWING AND IT SHOULD BE USED FOR INFORMATIONAL PURPOSES ONLY.

FIGURE 1-2

Hull & Associates, Inc.
DUBLIN, OHIO

570 MAIN STREET PROPERTY
OPERATION MAINTENANCE, AND MONITORING P

SITE PLAN

WESTBURY, NEW YORK

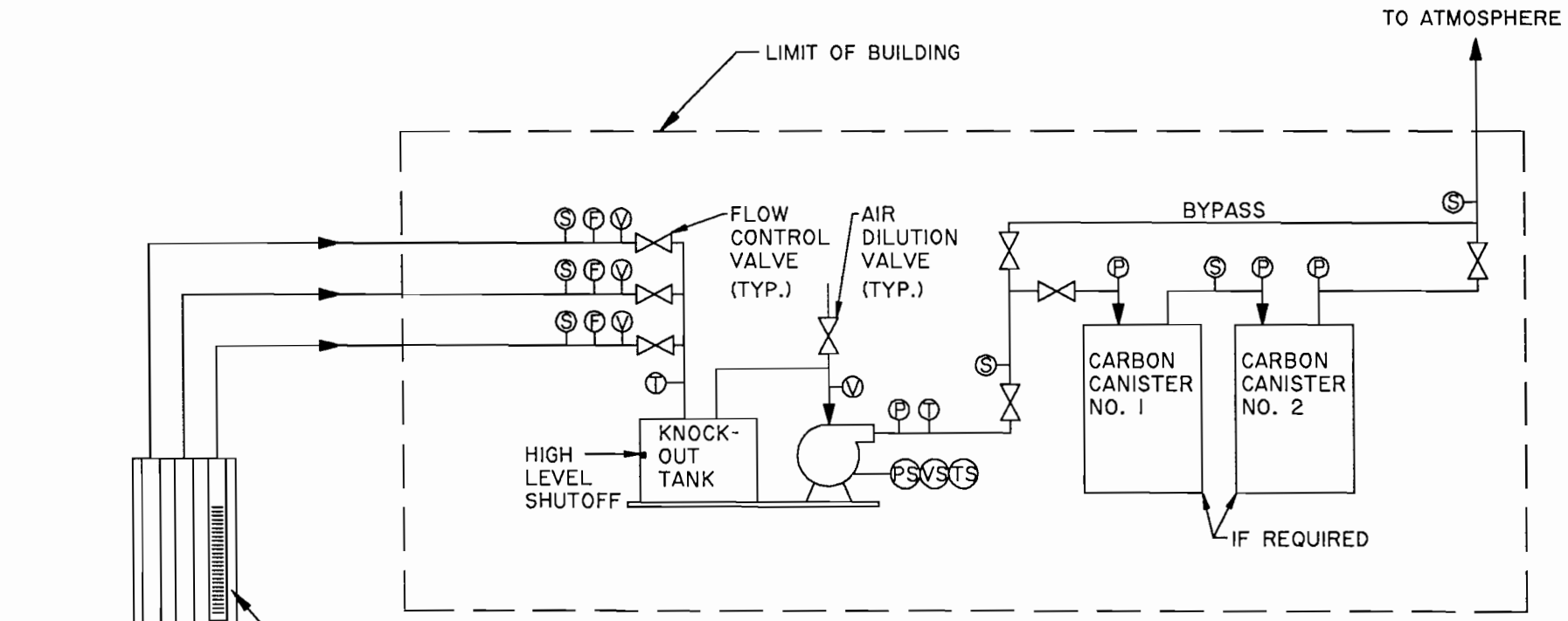
DATE:
FEBRUARY 1997

NMB

1.3 System Description

The SVE system will utilize one extraction well (SVE-1) which was installed to a depth of 56 feet for a pilot test. The well consists of three "nested" extraction wells within the borehole which are screened at different intervals and separated by bentonite seals. The shallow interval is screened from five to 20 feet below grade, the intermediate interval is screened from 23 to 38 feet below grade, and the deep interval is screened from 41 to 56 feet below grade. The operating conditions for each screened interval will be controlled at the manifold assembly inside the SVE system enclosure.

The three vacuum lines will be located below grade and connected to each nested well beneath an eight-inch, water-tight manhole to schedule 40 PVC pipe spaced six inches apart running to the SVE system. These three lines will be sloped approximately one half percent towards the extraction well. At the SVE system, each vacuum line will have a sample port, flow meter, vacuum gauge, and flow control valve prior to a manifold which will route all three vapor streams through the SVE system. Each vacuum line will also be labeled at the manifold to indicate the shallow, intermediate, and deep screened intervals. The SVE system will consist of a moisture tank separator, and in-line particulate filter, and the blower. The blower will be equipped with high temperature and pressure shut-down switches in case of abnormal operating conditions. From the blower, the vapor stream will be routed through two vapor-phase granular activated carbon (GAC) canisters connected in series and will then be discharged to the atmosphere. The SVE system schematic is shown in Figure 1-3. A system operation manual will be provided with the SVE system and will be kept at the Site to supplement this plan.



LEGEND

- (S) SAMPLE PORT
- (F) FLOW METER
- (P) PRESSURE GAUGE
- (V) VACUUM GAUGE
- (T) TEMPERATURE GAUGE
- (PS) PRESSURE SWITCH
- (VS) VACUUM SWITCH
- (TS) TEMPERATURE SWITCH

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FIGURE 1-3

Hull & Associates, Inc.
DUBLIN, OHIO

570 MAIN STREET PROPERTY
OPERATION, MAINTENANCE, AND MONITORING PLAN

SVE SYSTEM SCHEMATIC
WESTBURY, NEW YORK

DATE: NOVEMBER 1996

NMB 004

2.0 MONITORING AND MAINTENANCE

2.1 General

System monitoring will consist of performance and compliance monitoring. Performance monitoring will be conducted to evaluate the effectiveness of the SVE system and to determine if operational adjustments are necessary. Additionally, performance monitoring data will be used to determine the beneficial use of the SVE system and, ultimately, system termination. Compliance monitoring will consist of monitoring air discharge concentrations to determine compliance with operating permits.

2.2 Performance Monitoring

Performance monitoring will consist of the following:

1. measuring air flowrates, vacuums, and temperatures of the SVE system;
2. measuring vacuums at the soil vapor (SV) probes; and
3. collecting air samples for laboratory analysis at the discharge of the extraction well and the vacuum blower and, if required, between the carbon canisters and at the effluent of the second carbon canister.

The data collected will be used for several purposes. First, the vapor flowrate from each screened interval of the extraction well combined with the analytical results of the vapor discharge sample from each screened interval of the extraction well will be used to calculate contaminant removal achieved through the SVE system. Secondly, vapor samples will be used to evaluate treatment effectiveness and determine when carbon change-out is required. These data will be evaluated over time to determine the amount of contaminant removal, treatment efficiency, and the overall beneficial use of the system.

2.2.1 Site Monitoring

During operation of the SVE system, specific Site conditions and parameters shall be monitored. Site visits will be conducted once each week for the first month of operation and once every two weeks, thereafter. The ambient air temperature, barometric pressure, and weather conditions will be noted and logged during every Site visit. All field data gathered will be recorded on the Field Data Worksheet similiar to the example presented in Appendix A.

2.2.2 SVE System Monitoring

SVE system monitoring will be conducted once each week for the first month of operation and once every two weeks, thereafter. System monitoring is performed primarily to evaluate the effectiveness of the SVE system and GAC breakthrough.

In addition to SVE-1, three additional wells (SVE-2, SVE-3, and SVE-4) were installed during the pilot test to measure the influence of the SVE system on surrounding soils and to monitor contaminant migration in soil vapor. These wells will serve as SV probes. Similar to SVE-1, the SV probes are nested and screened at the same intervals; however, these probes are capped with connections for measuring pressure/vacuum. Specifically, vacuum shall be measured at the SV probes during each Site visit.

Inside the SVE building, VOC concentrations, flow rate, and vacuum will be measured at the shallow, intermediate, and deep vacuum lines from SVE-1. VOC concentrations and pressure will be measured at the first carbon influent, the second carbon influent and the second carbon effluent. Field data gathered during Site visits will be logged on the Field Data Worksheet similiar to the example presented in Appendix A. Monitoring and sampling activities are summarized in Table 2-1.

2.2.3 Sampling Procedures

Soil vapor samples for laboratory analysis will be collected from each of the three vacuum lines and from the first carbon influent, the second carbon influent, and the second carbon effluent at system start-up and once every month thereafter. Soil vapor samples will be collected from the sampling port, which consists of a PVC tee containing a valve. The valve shall be kept in the closed position

570 MAIN STREET PROPERTY
MANUFACTURING FACILITY, WESTBURY, NEW YORK

TABLE 2-1

GENERAL MONITORING AND SAMPLING SCHEDULE

SITE VISITS CONDUCTED: ONCE/WEEK FOR 1 MONTH AND THEN ONCE EVERY 2 WEEKS

LOCATION/PARAMETER	METHOD	BASELINE	FREQUENCY
Field			
Air Temperature	Thermometer	-	Every Site Visit
Barometric Pressure	Barometer	-	Every Site Visit
Weather Conditions	Observations	-	Every Site Visit
Soil Vapor (SV) Probes			
Vacuum	Magnehelic Gauge	Yes	Every Site Visit
SVE System - Vacuum Lines and Combined Stream			
Flow Rate	Permanent System Gauge	Yes	Every Site Visit
Temperature	Permanent System Gauge	Yes	Every Site Visit
VOCs	Photoionization Detector with 11.7 eV Lamp	Yes	Every Site Visit
Vapor Analysis	Tedlar Bag Lab - NIOSH Method 1501/1003	Yes	At Start-up and Once a Month After
Vapor Treatment System Effluent			
VOCs	Photoionization Detector with 11.7 eV Lamp	Yes	Every Site Visit
Vapor Analysis	Tedlar Bag Lab - NIOSH Method 1501/1003	Yes	At Start-up and Once a Month After

except during sampling operations. Samples will be collected in *Tedlar* bags using a vacuum chamber. All soil vapor sampling procedures will be completed in accordance with HAI SOP#F3015, "Soil Vapor Sample Collection for the Soil Vapor Extraction (SVE) System," included in Appendix B.

Sample ID numbers will be logged on the Field Data Worksheet located in Appendix A. All soil vapor samples that are collected will be labeled as follows:

NMB004-SVE1D-001-D360

The first set of alpha-numeric characters is the Project identification and will be used throughout the project. The second set of characters identifies the sample location. The sample location will be identified as follows:

1. SV - for soil vapor probes (SV2 through SV4). The soil vapor probe location will be appended with and S, I, or D for shallow, intermediate, or deep screened intervals, respectively (e.g., SV2D for the deep interval of soil vapor probe #2);

2. SVE1 - for extraction well #1. The extraction well location will be appended with and S, I, or D for shallow, intermediate, or deep screened intervals, respectively (e.g., SVE1D for the deep interval of extraction well #1);

3. C - for carbon cannister. The carbon cannister will be appended with a 1 or 2 depending on its location in the vapor stream and an I or E for influent or effluent of the cannister (e.g., C1E for the effluent of the first cannister).

The third set of characters identifies the sample frequency which will begin with one and increase by one for each sampling event at a particular location. The fourth set of characters identifies the person collecting the sample.

2.3 Compliance Monitoring

Compliance monitoring will consist of comparing the analytical results of air emission samples to discharge limitations imposed by the operating permits or permit exemptions.

2.4 Equipment Maintenance

Maintenance procedures will be performed during each Site visit to assure proper operation of the SVE system equipment. Specifically, the SVE blower will be inspected during each Site visit for proper operation, overheating and overpressuring, seals leakages, and possible inlet or outlet obstructions. The moisture separator tank will be drained when necessary and the air filter will be cleaned once every two weeks. The carbon canisters will be inspected for overheating or overpressuring and seals leakages during each Site visit and will be replaced when necessary.

The SVE building lights, heater, and thermostat will be inspected for proper operation and the inside of the building will be cleaned of any unnecessary materials and swept during each Site visit. Also, the outside of the SVE building will be inspected during each Site visit. All locks associated with the SVE system will be oiled or replaced when necessary.

The Operating System Maintenance Checklist included in Appendix A will be completed during each Site visit. Equipment brochures and operating instructions for the SVE equipment are included in Appendix C.

3.0 REMEDIATION EVALUATION AND TERMINATION

3.1 SVE System Evaluation

Data collected during each Site visit will be used to evaluate the effectiveness of the SVE system. Specifically, the VOC concentrations detected from the extraction well for each interval will be plotted over time to evaluate VOC removal rates. In addition, total VOC removal will be calculated using corresponding soil vapor extraction flow rates. In addition, the vacuums at the SV probes will be evaluated to determine the radius of influence during system operation.

3.2 SVE System Beneficial Life Determination

Typically, contaminant removal rates from SVE systems experience a peak soon after system start-up and then gradually decline to a near asymptotic level. The time to move through this curve depends on a variety of factors including extraction flow rates, contaminant physical characteristics, soil moisture, temperature, etc. and is unique to each system installation. Therefore, it is proposed that the SVE system be started monitored for approximately six months to evaluate trends in performance data. This data will provide an actual representation of system operation and allow the system's beneficial use to be more accurately predicted.

3.3 Modification of Operations

During system start-up, operational adjustments will be made to obtain the predicted radius of influence. Once these initial settings have been determined, it is anticipated that the system will be operated at similiar flow rates for approximately six months. During this time the system performance will be evaluated and operational data will be developed. At the end of six months, the effectiveness of the system will be evaluated and, by utilizing the operational data, modifications to the system operation may be proposed. These modifications could include operating the system in a pulse mode (e.g., alternating between a period of system shutdown and a period of system operation), increasing or decreasing the flow rates, or terminating the system permanently. At that time, the monitoring and sampling schedule (summarized in Table 2-1) will be modified accordingly. In any event, the time to modify operations cannot be determined until some performance data is generated. At the end of six months, the NYSDEC will be contacted to discuss the system's performance data and potential modifications to the SVE system operation.

4.0 HEALTH AND SAFETY PLAN

4.1 Purpose and Policy

The purpose of the Health and Safety Plan is to establish general personnel protection standards and mandatory safety practices and procedures. This Plan assigns responsibilities, establishes standard operating procedures, and provides for contingencies that may arise while operations are being conducted at the Site.

The provisions of the Plan are mandatory for all on-Site personnel. All personnel are required to acknowledge this Plan and to abide by it during all procedures conducted on-Site. The designated field team leader must assure that all policies and procedures outlined in this Plan are followed. It is the responsibility of the Field Team Leader to make sure that all personnel who engage in project activities are familiar with this Plan and are in compliance with this Plan.

This Plan is prepared specifically for the Site located in Westbury, New York and applies to the SVE system maintenance and operation conducted at this Site.

4.2 Project Team Organization

Designated personnel will be responsible for all health and safety procedures associated with this Site. Principal personnel associated with this project are listed below:

Project Managers: _____

_____

Field Team Leader/: _____
Site Safety Officer: _____

Field Team Members: _____

Emergency Contacts:		
	Ambulance	911
	Fire Department	911
	Police Department	911
	Hospital	(516) 542-2655
	Poison Control Center	(800) 962-1253
	USEPA National Response Center	(800) 438-2427

If designated personnel change during activities conducted at this Site, the appropriate personnel and their telephone numbers shall be updated in this section. All personnel shall have been appropriately trained in first aid, health and safety procedures, including the operation and fitting of personal protective equipment, and are experienced with the types of field operations that will be employed at the Site.

4.3 Safety Procedures

4.3.1 Site Security

The equipment for the SVE system is housed in a small building located within a fenced area at the northwest corner of the Site. The building shall be locked to prevent unauthorized entrants. The fenced-in area shall also be chained and locked to provide security to the SVE system. A sign will also be posted barring unauthorized personnel from entering the secured area. Flammable materials shall not be stored inside or near the building. Safety equipment on the SVE system has been designed to provide automatic shutdown in the event of an emergency.

4.3.2 Personal Protective Equipment

The appropriate personal protective equipment will be provided to employees conducting activities on-Site. At a minimum, latex sample gloves will be worn when potential for chemical contact may occur. Copies of the Material Safety Data Sheets (MSDSs) for potential chemicals on-Site are located in Appendix D. Decontamination procedures will be strictly followed to reduce the possibility for chemical exposure. If appropriate, hearing protection will be provided when entering the SVE building.

4.4 Emergency Contacts

If an emergency situation occurs on-Site which concerns the SVE system, the appropriate contact(s) should be made from the Emergency Contacts List provided in Section 5.2. For emergency situations where it is not possible for the field personnel to contact the required authorities individually, contact should first be made with the designated Field Team Leader who will notify emergency authorities. Following notification of the emergency services, the project manager will be contacted. A copy of the Emergency Contacts List shall be located near a phone on-Site or at

another easily accessible Site. If a telephone is not located nearby, a portable phone shall be taken to the Site. Directions to the nearest hospital are provided in Appendix E.

APPENDIX A

Field Data Forms

Hull & Associates, Inc.
6130 Wilcox Road
Dublin, Ohio 43016
Telephone (614) 793-8777
Fax (614) 793-9070

FIELD DATA SHEET
VACUUM EXTRACTION SYSTEM

Sampler: _____ Site Location: _____

Project: _____ Project No.: _____

Date: _____ Start: _____ End: _____

VACUUM EXTRACTION UNIT OPERATION DATA	
VACUUM PRESSURE • FILTER INLET ("Hg)	
VACUUM PRESSURE • FILTER DISCHARGE ("Hg)	
VACUUM PRESSURE • TANK ("Hg)	
POSITIVE DISCHARGE PRESSURE ("Hg)	
MOTOR TEMPERATURE (°F)	
CONDENSATE TANK TEMPERATURE (°F)	
CONDENSATE TANK FLUID LEVEL	
POSITION OF AIR DILUTION VALVE	

VACUUM EXTRACTION WELL DATA

WELL I.D.	DIFF. PRESS. ("H_2O)	STATIC PRESS.("H_2O)	TEMP (°F)	TIME	SAMPLE I.D.
VE - 1					
VE - 2					
VE - 3					
VE - 4					

CARBON DATA

LOCATION		TIME	SAMPLE I.D.
CII			
CIE			
C2E			

SOIL VAPOR PROBE DATA

PROBE I.D.	STATIC PRESS. ("H_2O)	TIME	SAMPLE I.D.
SV - 1			
SV - 2			
SV - 3			
SV - 4			
SV - 5			
SV - 6			
SV - 7			
SV - 8			
SV - 9			
SV - 10			
SV - 11			
SV - 12			

GROUND-WATER SPARGING WELL DATA

WELL I.D.	FLOW RATE (CFM)	STATIC PRESS. (psig)	TEMP. (°F)
GWS-1			
GWS-2			

CONVERSIONS:

1"Hg=13.6"H_2O

1"psi=27.7"H_2O

COMMENTS: _____

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MIT 6 DISK II

OPERATING SYSTEM MAINTENANCE CHECKLIST

ite Location: _____ Project No. _____

ecnnician: _____ Date: _____

ITEM	TASK COMPLETED	ACTION REQUIRED	COMMENTS
FIELD - GENERAL			
Ci ck All Locks For Proper O ation		YES NO	
Check Building Lights		YES NO	
Ci ck Heater and Thermostat C trols		YES NO	
Insnect Outside of Building		YES NO	
Sw p Inside of Building		YES NO	
NOTES:			
BLOWER(S)			
Ch k for Operation		YES NO	
Dr n Moisture Separator Tank When Needed		YES NO	
Ch k Temperature for Ov heating		YES NO	
Check Seals/Connections for Le s		YES NO	
Ch k Inlet/Outlets for Obstructions		YES NO	
Ch k Temperature and Pressure Se rs		YES NO	
Clean Air Filter		YES NO	
NC ES:			
CARBON CANISTERS			
Ch k for Operation	#1 #2	YES NO	
Check Seals/Connections for Le s	#1 #2	YES NO	
Check Pressure Gauges and Record Pressure	#1 #2	YES NO	Pressure: _____
Ro e and Replace Canisters as Ne d		YES NO	
NOTES:			

APPENDIX B

Standard Operating Procedures

SOP No. F3015
SOIL VAPOR SAMPLE COLLECTION FOR THE SOIL VAPOR EXTRACTION (SVE) SYSTEM

1.0 Purpose

This section documents the procedures for collecting soil vapor samples from vapor extraction lines, soil vapor probes, and vapor treatment units to monitor the performance of the SVE system.

2.0 Equipment and Materials

A complete list of equipment and materials needed for each sampling location is presented below.

- Vacuum pump (powered by battery or 110 volt)
- Vacuum pump flowmeter
- 0 - 100 inch H_2O magnehelic gauge
- Polyethylene vacuum chamber with detachable, sealing lid
- Two 1/8" O.D. Teflon™ bulkhead unions for connecting tubing through the vacuum chamber lid
- ¼" O.D. polyethylene tubing
- 9" x 9" (max.) Tedlar™ gas sampling bags with on/off valve and replaceable septum
- One mininert valve dedicated to each sampling port
- One mininert valve attached to sample tubing at connection to vacuum chamber
- Generator to operate vacuum pump (if applicable)
- Extension cord(s) (if applicable)
- Arrangements for on-site or laboratory gas chromatograph (GC) analysis
- Cooler and packing material for sample storage/transport

3.0 Procedures

A. Vapor Extraction Line and Soil Vapor Probe Sampling - Figure F3015-1 shows the soil vapor sampling assembly at vapor extraction lines. Figure F3015-2 shows the soil vapor sampling assembly at soil vapor probes. Prior to collecting a soil vapor sample, the sample tubing will be purged with the vacuum pump by connecting the vacuum pump to mininert valve no. 2, and opening valves no. 1 and no. 2. The minimum time required for purging can be calculated by dividing the tube volume to be purged (cross sectional area x length) by the vacuum pump flowrate (determined with flowmeter). The magnehelic gauge should be periodically connected to the inlet of the vacuum pump to check that the pump is pulling a vacuum large enough to overcome the vacuum in the vapor extraction line.

After the line is purged, valve no. 2 will be closed and connected to the center bulkhead union on the outside of the vacuum chamber with a short piece of tubing. A Tedlar™ bag will be placed inside the vacuum chamber, connected to the opposite end of the same bulkhead union, valve no. 2 will be opened, and the Tedlar™ bag valve will be opened. The lid will be sealed on the vacuum chamber and the vacuum pump will be connected to the other bulkhead union. The vacuum pump will be turned on to create a vacuum in the vacuum chamber. When this vacuum exceeds the vacuum in the extraction line, soil vapor will begin to fill the Tedlar™ bag. After the Tedlar™ bag is at least seventy-five percent full, valve no. 2 will be closed and the vacuum pump turned off. The lid to the vacuum chamber will be removed, the Tedlar™ bag valve closed, the Tedlar™ bag removed, and the sample labeled and placed in a sealed (Zip-Loc) plastic bag. Valve No. 1 (located at the sample port) will be closed and the sample tubing disconnected. Sample tubing should be replaced (or decontaminated with Alconox soap and distilled water) prior to collecting the next sample location.

B. Vapor Treatment Unit Discharge Sampling - The sampling procedure for the vapor treatment unit will be similar to the procedure to be followed at soil vapor probes. However, it is not necessary to purge the line prior to sampling as this line will be under positive pressure.

C. Sample Transport - Once the sample is collected, labelled, and placed in a sealed (Zip-Loc) plastic bag, the sample will be ready for analysis. Typically, gas samples must be analyzed within twenty-four hours after collection (check with laboratory regarding specific holding times).

If the samples will be transported off-site for analysis, they should be placed in a cooler, or other insulated container, and the container packed with styrofoam or paper to protect each sample. The laboratory should be consulted regarding the necessity for inclusion of cold packs in the container. The container must be sent to the laboratory with a chain-of-custody record via overnight mail.

If the samples will be analyzed on-site, consult with the laboratory technician for proper storage of samples prior to analysis. Chain of custody procedures must still be followed.

4.0 Documentation

All samples must be labelled immediately after collection. Consult the Quality Assurance Officer to obtain appropriate sample identification numbers.

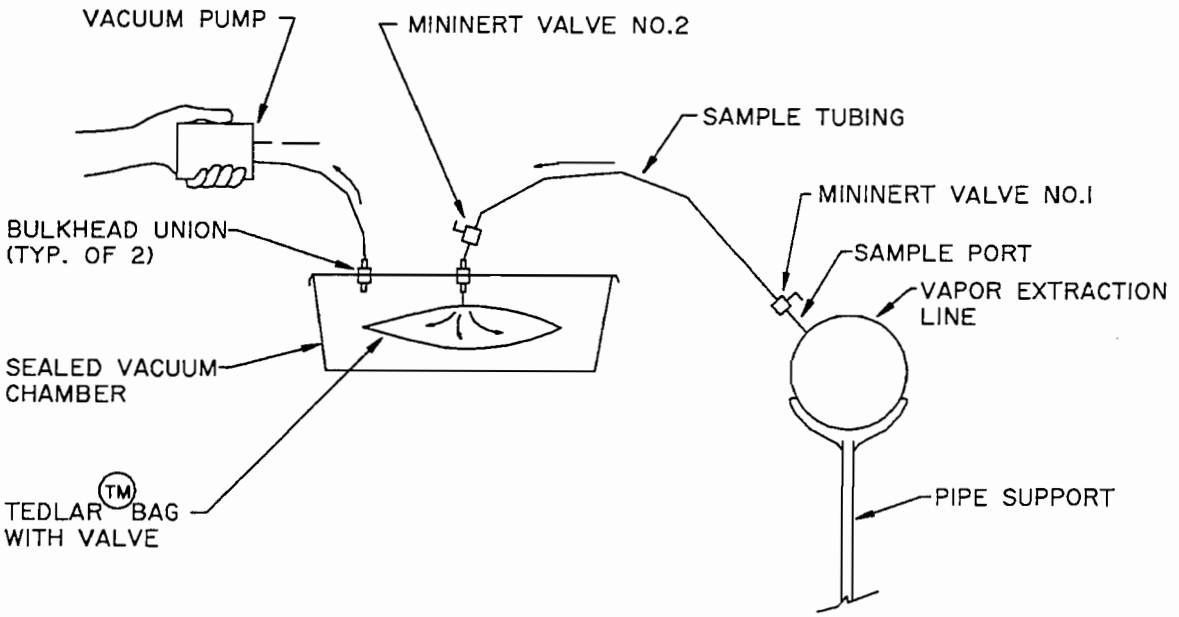
All data collected during sampling, including sampling times and sample numbers, must be recorded on the SVE Field Data Sheet. An example of a Field Data Sheet is shown on Figure F3015-3. It may be necessary to revise this sheet for specific projects.

5.0 Special Notes

None

6.0 Applicable Standards and References

None



SCALE: NONE

NOTES:

1. SAMPLE TUBING IS PURGED PRIOR TO COLLECTING SAMPLE BY OPERATING VACUUM PUMP WHILE CONNECTED TO MININERT VALVE NO. 2. AFTER PURGING, VALVE NO. 2 IS CLOSED, PUMP IS DISCONNECTED, AND SAMPLING IS CONDUCTED AS SHOWN.

FIGURE F3015-1

Hull & Associates, Inc.
DUBLIN, OHIO

570 MAIN STREET PROPERTY
OPERATION MAINTENANCE, AND MONITORING PLAN

SOIL VAPOR SAMPLING ASSEMBLY AT VAPOR EXTRACTION LINE

WESTBURY, NEW YORK

DATE: NOVEMBER 1996 NMB 004

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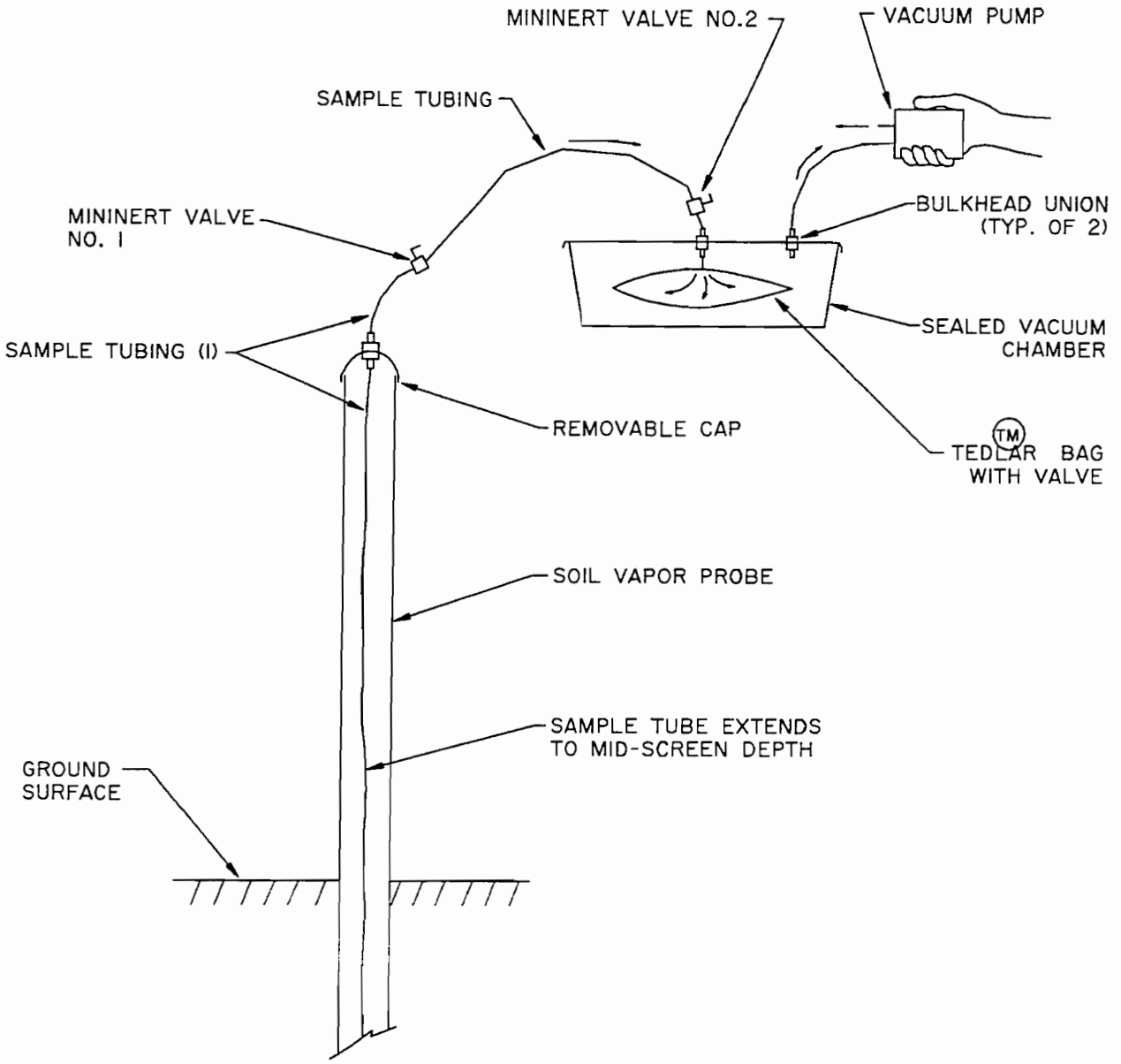
5/96 SCHOONOV
F5 DISK 10



SCALE: NONE

NOTES:
1. SAMPLE TUBING IS PURGED PRIOR TO COLLECTING SAMPLE BY OPERATING VACUUM PUMP WHILE CONNECTED TO MININERT VALVE NO. 1. AFTER PURGING, VALVE NO. 1 IS CLOSED, PUMP IS DISCONNECTED, AND SAMPLING IS CONDUCTED AS SHOWN

FIGURE F3015-2

Hull & Associates, Inc.
DUBLIN, OHIO

570 MAIN STREET PROPERTY
OPERATION MAINTENANCE, AND MONITORING PLAN

SOIL VAPOR SAMPLING ASSEMBLY AT SOIL VAPOR PROBE

WESTBURY, NEW YORK

DATE: NOVEMBER 1996 NMB 004

*B\30300018
6/96 SCHOONOV
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Hull & Associates, Inc.
6631 Commerce Parkway, Suite E
Dublin, Ohio 43017
Telephone (614) 793-8777
Fax (614) 793-9070

FIELD DATA SHEET
VACUUM EXTRACTION SYSTEM

Sampler: _____ Site Location: _____

Project: _____ Project No.: _____

Date: _____ Start Time: _____ End Time: _____

VACUUM EXTRACTION UNIT OPERATION DATA				
SYSTEM FLOWRATE BASED ON SHEAVE SIZE				
VACUUM PRESSURE @ FILTER INLET ("Hg)				
VACUUM PRESSURE @ FILTER DISCHARGE ("Hg)				
VACUUM PRESSURE @ INLET PARTS ("Hg)				
POSITIVE DISCHARGE PRESSURE (psi)				
DISCHARGE AIR TEMPERATURE (°F)				
CONDENSATE TANK TEMPERATURE (°F)				
CONDENSATE TANK FLUID LEVEL				
POSITION OF AIR DILUTION VALVE				

VACUUM EXTRACTION WELL DATA				
WELL I.D.	FLOW GAUGE.("H_2O)	STATIC PRESS.("H_2O)	WELL TEMP (°F)	SAMPLE I.D.
VE - 1				
VE - 2				
VE - 3				
VE - 4				

CARBON DATA			
LOCATION	PID (ppmv)	PRESSURE (psi)	SAMPLE I.D.
C1I			
C1E			
C2E			

SOIL VAPOR PROBE DATA			
PROBE I.D.	STATIC PRESS. ("H_2O)	PID (ppmv)	SAMPLE I.D.
SV - 1			
SV - 2			
SV - 3			
SV - 4			
SV - 5			
SV - 6			
SV - 7			
SV - 8			
SV - 9			
SV - 10			
SV - 11			

GROUND-WATER SPARGING WELL DATA			conversions:
WELL I.D.	FLOW GAUGE READING	STATIC PRESS. ("H_2O)	
			1"Hg=13.6"H_2O
			1"psi=27.7"H_2O

COMMENTS: _____

FIGURE F3015-3

Hull & Associates, Inc.

VACUUM EXTRACTION SYSTEM
FIELD DATA SHEET

DATE: AUGUST 1993 STD

IN\08880036
08/08/93SCHOONOV

APPENDIX C

Equipment Brochures

APPENDIX D

Material Safety Data Sheets

MSDS for BENZENE Page 1

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1 - PRODUCT IDENTIFICATION

PRODUCT NAME: BENZENE
FORMULA: C6H6
FORMULA WT: 78.10
CAS NO.: 71-43-2
NIOSH/RTECS NO.: CY1400000
COMMON SYNONYMS: BENZOL; PHENYL HYDRIDE; COAL NAPHTHA
PRODUCT CODES: 9156,9256,9153,9154,9155,B717,9149
EFFECTIVE: 01/22/87
REVISION #04

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	-	4	EXTREME (CANCER CAUSING)
FLAMMABILITY	-	3	SEVERE (FLAMMABLE)
REACTIVITY	-	0	NONE
CONTACT	-	1	SLIGHT

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER

PRECAUTIONARY LABEL STATEMENTS

POISON DANGER
EXTREMELY FLAMMABLE
CAUTION: CONTAINS BENZENE, CANCER HAZARD
HARMFUL IF SWALLOWED, INHALED, OR ABSORBED THROUGH SKIN
EXCEPTIONAL HEALTH HAZARD - READ MATERIAL SAFETY DATA SHEET
KEEP AWAY FROM HEAT, SPARKS, FLAME. AVOID CONTACT WITH EYES, SKIN, CLOTHING. AVOID BREATHING VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF FIRE, USE ALCOHOL FOAM, DRY CHEMICAL, CARBON DIOXIDE - WATER MAY BE INEFFECTIVE. FLUSH SPILL AREA WITH WATER SPRAY.

SAF-T-DATA(TM) STORAGE COLOR CODE: RED STRIPE (STORE SEPARATELY)

---

2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
BENZENE	90-100	71-43-2

---

3 - PHYSICAL DATA

MSDS for BENZENE Page 2

BOILING POINT: 80 C (176 F) VAPOR PRESSURE(MM HG): 74.6

gopher://gopher.chem.utah.edu:70/00/MSDS/B/BENZENE

MELTING POINT: 6 C (43 F) VAPOR DENSITY(AIR=1): 2.77

SPECIFIC GRAVITY: 0.88 (H2O=1) EVAPORATION RATE: N/A (BUTYL ACETATE=1)

SOLUBILITY(H2O): NEGLIGIBLE (LESS THAN 0.1 %) % VOLATILES BY VOLUME: 100

APPEARANCE & ODOR: CLEAR COLORLESS LIQUID HAVING CHARACTERISTIC AROMATIC ODOR.

---

4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP: -11 C (12 F) NFPA 704M RATING: 2-3-0

FLAMMABLE LIMITS: UPPER - 8.0 % LOWER - 1.3 %

FIRE EXTINGUISHING MEDIA
USE ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE.
(WATER MAY BE INEFFECTIVE.)

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS
VAPORS MAY FLOW ALONG SURFACES TO DISTANT IGNITION SOURCES AND FLASH BACK. CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE. CONTACT WITH STRONG OXIDIZERS MAY CAUSE FIRE.

TOXIC GASES PRODUCED
CARBON MONOXIDE, CARBON DIOXIDE

---

5 - HEALTH HAZARD DATA

THIS SUBSTANCE IS LISTED AS ACGIH SUSPECT HUMAN CARCINOGEN, NTP HUMAN CARCINOGEN, IARC HUMAN CARCINOGEN (GROUP 1). ACCEPTABLE MAXIMUM PEAK ABOVE THE ACCEPTANCE CEILING CONCENTRATION FOR AN EIGHT-HOUR SHIFT = 50 PPM FOR 10 MINUTES; (PEL) CEILING = 25 PPM.

THRESHOLD LIMIT VALUE (TLV/TWA): 30 MG/M3 (10 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 75 MG/M3 (25 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 30 MG/M3 (10 PPM)

TOXICITY:
LD50 (ORAL-RAT) (MG/KG)	-	4894
LD50 (ORAL-MOUSE) (MG/KG)	-	4700
LD50 (IPR-RAT) (MG/KG)	-	2.9
LC50 (INHL-MOUSE-7H) (PPM)	-	9980

CARCINOGENICITY: NTP: YES IARC: YES Z LIST: NO OSHA REG: NO

gopher://gopher.chem.utah.edu:70/00/MSDS/B/BENZENE

EFFECTS OF OVEREXPOSURE
INHALATION MAY CAUSE HEADACHE, NAUSEA, VOMITING, DIZZINESS, NARCOSIS, SUFFOCATION, LOWER BLOOD PRESSURE, CENTRAL NERVOUS SYSTEM DEPRESSION. INHALATION OF VAPORS MAY CAUSE SEVERE IRRITATION OR BURNS OF THE RESPIRATORY SYSTEM, PULMONARY EDEMA, OR LUNG INFLAMMATION. LIQUID MAY BE IRRITATING TO SKIN AND EYES. PROLONGED SKIN CONTACT MAY RESULT IN DERMATITIS. EYE CONTACT MAY RESULT IN TEMPORARY CORNEAL DAMAGE. INGESTION MAY CAUSE NAUSEA, VOMITING, HEADACHES, DIZZINESS, GASTRO-INTESTINAL IRRITATION, BLURRED VISION, LOWERING OF BLOOD PRESSURE. IRREVERSIBLE INJURY TO BLOOD FORMING TISSUE MAY RESULT FROM CHRONIC LOW LEVEL EXPOSURE.

TARGET ORGANS
BLOOD, CENTRAL NERVOUS SYSTEM, EYES, SKIN, BONE MARROW, RESPIRATORY SYSTEM

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

ROUTES OF ENTRY
INGESTION, INHALATION, EYE CONTACT, SKIN CONTACT, ABSORPTION

EMERGENCY AND FIRST AID PROCEDURES
CALL A PHYSICIAN.
IF SWALLOWED, DO NOT INDUCE VOMITING.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.

---

6 - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, FLAME, OTHER SOURCES OF IGNITION

INCOMPATIBLES: STRONG OXIDIZING AGENTS, SULFURIC ACID, NITRIC ACID

DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE

---

7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. SHUT OFF IGNITION SOURCES; NO FLARES, SMOKING OR FLAMES IN AREA. STOP LEAK IF YOU CAN DO SO WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. TAKE UP WITH SAND OR OTHER NON-COMBUSTIBLE ABSORBENT MATERIAL AND PLACE INTO

CONTAINER FOR LATER DISPOSAL. FLUSH AREA WITH WATER.

J. T. BAKER SOLUSORB(R) SOLVENT ADSORBENT IS RECOMMENDED FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: U019 (TOXIC WASTE)

---

8 - PROTECTIVE EQUIPMENT

VENTILATION:	USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.
RESPIRATORY PROTECTION:	RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS ABOVE 10 PPM, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.
EYE/SKIN PROTECTION:	SAFETY GOGGLES AND FACE SHIELD, UNIFORM, PROTECTIVE SUIT, POLYVINYL ALCOHOL GLOVES ARE RECOMMENDED.

---

9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: RED STRIPE (STORE SEPARATELY)

SPECIAL PRECAUTIONS
BOND AND GROUND CONTAINERS WHEN TRANSFERRING LIQUID. KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY, WELL-VENTILATED, FLAMMABLE LIQUID STORAGE AREA.

---

10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	BENZENE (BENZOL)
HAZARD CLASS	FLAMMABLE LIQUID
UN/NA	UN1114
LABELS	FLAMMABLE LIQUID
REPORTABLE QUANTITY	1000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	BENZENE
HAZARD CLASS	3.2
UN/NA	UN1114
LABELS	FLAMMABLE LIQUID

MSDS for TETRACHLOROETHYLENE Page 1

---

1 - PRODUCT IDENTIFICATION

PRODUCT NAME: TETRACHLOROETHYLENE
FORMULA: CL2C:CCL2
FORMULA WT: 165.83
CAS NO.: 00127-18-4
NIOSH/RTECS NO.: KX3850000
COMMON SYNONYMS: PERCHLOROETHYLENE; ETHYLENE TETRACHLORIDE; CARBON BICHLORIDE; CARBON DICHLORIDE
PRODUCT CODES: 9218,9453,5380,9465
EFFECTIVE: 02/12/87
REVISION #03

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	-	3	SEVERE (CANCER CAUSING)
FLAMMABILITY	-	0	NONE
REACTIVITY	-	0	NONE
CONTACT	-	3	SEVERE (LIFE)

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES

PRECAUTIONARY LABEL STATEMENTS

DANGER
HARMFUL IF SWALLOWED OR INHALED
EXCEPTIONAL HEALTH AND CONTACT HAZARDS - READ MATERIAL SAFETY DATA SHEET
NOTE: REPORTED AS CAUSING CANCER IN LABORATORY ANIMALS. EXERCISE DUE CARE.
NOTE: THIS MATERIAL OR ITS VAPORS IN CONTACT WITH FLAMES OR HOT GLOWING SURFACES MAY FORM CORROSIVE ACID FUMES.
KEEP AWAY FROM HEAT, SPARKS, FLAME. DO NOT GET IN EYES, ON SKIN, ON CLOTHING. AVOID BREATHING VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING.

SAF-T-DATA(TM) STORAGE COLOR CODE: BLUE (HEALTH)

---

2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
TETRACHLOROETHYLENE	90-100	127-18-4

---

3 - PHYSICAL DATA

BOILING POINT: 121 C (250 F) VAPOR PRESSURE(MM HG): 13

MELTING POINT: -22 C (-8 F) VAPOR DENSITY(AIR=1): 5.8

SPECIFIC GRAVITY: 1.62 (H2O=1) EVAPORATION RATE: 2.80 (BUTYL ACETATE=1)

SOLUBILITY(H2O): NEGLIGIBLE (LESS THAN 0.1 %) % VOLATILES BY VOLUME: 100

APPEARANCE & ODOR: COLORLESS LIQUID WITH ETHER OR CHLOROFORM ODOR.

---

4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP N/A NFPA 704M RATING: 2-0-0

FLAMMABLE LIMITS: UPPER - N/A % LOWER - N/A %

FIRE EXTINGUISHING MEDIA
USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS
CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE.

TOXIC GASES PRODUCED
HYDROGEN CHLORIDE, PHOSGENE, CARBON MONOXIDE, CARBON DIOXIDE

---

5 - HEALTH HAZARD DATA

ACCEPTABLE MAXIMUM PEAK ABOVE THE ACCEPTANCE CEILING CONCENTRATION FOR AN EIGHT-HOUR SHIFT = 300 PPM FOR 5 MINUTES IN ANY 3 HOURS. (PEL) CEILING = 200 PPM

THRESHOLD LIMIT VALUE (TLV/TWA): 335 MG/M3 (50 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 1340 MG/M3 (200 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): MG/M3 (100 PPM)

TOXICITY: LD50 (ORAL-RAT)(MG/KG) - 8850
LD50 (IPR-MOUSE)(MG/KG) - 4700

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE
INHALATION OF VAPORS MAY CAUSE HEADACHE, NAUSEA, VOMITING, DIZZINESS, DROWSINESS, IRRITATION OF RESPIRATORY TRACT, AND LOSS OF CONSCIOUSNESS. LIQUID MAY BE IRRITATING TO SKIN AND EYES. PROLONGED SKIN CONTACT MAY RESULT IN DERMATITIS. EYE CONTACT MAY RESULT IN TEMPORARY CORNEAL DAMAGE.

INGESTION MAY CAUSE NAUSEA, VOMITING, HEADACHES, DIZZINESS, GASTROINTESTINAL IRRITATION.

CHRONIC EFFECTS OF OVEREXPOSURE MAY INCLUDE DAMAGE TO KIDNEYS, LIVER, LUNGS, BLOOD, OR CENTRAL NERVOUS SYSTEM.

TARGET ORGANS
LIVER, KIDNEYS, EYES, UPPER RESPIRATORY SYSTEM, CENTRAL NERVOUS SYSTEM

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

ROUTES OF ENTRY
INHALATION, INGESTION, EYE CONTACT, SKIN CONTACT

EMERGENCY AND FIRST AID PROCEDURES
CALL A PHYSICIAN.
IF SWALLOWED, DO NOT INDUCE VOMITING.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. FLUSH SKIN WITH WATER.

SOME EXPERIMENTS WITH TEST ANIMALS INDICATED THAT THIS SUBSTANCE MAY BE ANTICIPATED TO BE A CARCINOGEN.

---

6 - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, FLAME, OTHER SOURCES OF IGNITION

INCOMPATIBLES: STRONG OXIDIZING AGENTS, ALKALI METALS, ALUMINUM

DECOMPOSITION PRODUCTS: HYDROGEN CHLORIDE, PHOSGENE, CARBON MONOXIDE, CARBON DIOXIDE

---

7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING.
STOP LEAK IF YOU CAN DO SO WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS.
TAKE UP WITH SAND OR OTHER NON-COMBUSTIBLE ABSORBENT MATERIAL AND PLACE INTO CONTAINER FOR LATER DISPOSAL. FLUSH SPILL AREA WITH WATER.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: U210 (TOXIC WASTE)

---

8 - PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 50 PPM, A CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, A SELF-CONTAINED BREATHING APPARATUS IS RECOMMENDED.

EYE/SKIN PROTECTION: SAFETY GOGGLES AND FACE SHIELD, UNIFORM, PROTECTIVE SUIT, POLYVINYL ALCOHOL GLOVES ARE RECOMMENDED.

---

9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: BLUE (HEALTH)

SPECIAL PRECAUTIONS
KEEP CONTAINER TIGHTLY CLOSED. STORE IN SECURE POISON AREA.
STORE IN A COOL, WELL-VENTILATED AREA AWAY FROM SOURCES OF HEAT, FLAME, OR IGNITION.

---

10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	TETRACHLOROETHYLENE (AIR ONLY)
HAZARD CLASS	ORM-A
UN/NA	UN1897
LABELS	NONE
REPORTABLE QUANTITY	1 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	TETRACHLOROETHYLENE
HAZARD CLASS	6.1
UN/NA	UN1897
LABELS	HARMFUL - STOW AWAY FROM FOOD STUFFS

.

gopher://gopher.chem.utah.edu:70/00/MSDS/T/TOLUENE

MSDS for TOLUENE Page 1

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1 - PRODUCT IDENTIFICATION

PRODUCT NAME: TOLUENE
FORMULA: C6H5CH3
FORMULA WT: 92.14
CAS NO.: 108-88-3
NIOSH/RTECS NO.: XS5250000
COMMON SYNONYMS: METHYLBENZENE; PHENYLMETHANE; TOLUOL
PRODUCT CODES: 9472,9456,9466,9462,V963,9351,9460,9457,9459,9336,5375,9461
EFFECTIVE: 09/08/86
REVISION #02

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	-	2	MODERATE
FLAMMABILITY	-	3	SEVERE (FLAMMABLE)
REACTIVITY	-	0	NONE
CONTACT	-	1	SLIGHT

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER

PRECAUTIONARY LABEL STATEMENTS

WARNING
FLAMMABLE
CAUSES IRRITATION
MAY BE FATAL IF SWALLOWED OR INHALED

KEEP AWAY FROM HEAT, SPARKS, FLAME. AVOID CONTACT WITH EYES, SKIN, CLOTHING. AVOID BREATHING VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF FIRE, USE ALCOHOL FOAM, DRY CHEMICAL, CARBON DIOXIDE - WATER MAY BE INEFFECTIVE. FLUSH SPILL AREA WITH WATER SPRAY.

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
TOLUENE	90-100	108-88-3

3 - PHYSICAL DATA

BOILING POINT: 111 C (232 F) VAPOR PRESSURE(MM HG): 22

MSDS for TOLUENE Page 2

MELTING POINT: -95 C (-139 F) VAPOR DENSITY(AIR=1): 3.2

SPECIFIC GRAVITY: 0.87 (H2O=1) EVAPORATION RATE: 2.24 (BUTYL ACETATE=1)

SOLUBILITY(H2O): NEGLIGIBLE (LESS THAN 0.1 %) % VOLATILES BY VOLUME: 100

APPEARANCE & ODOR: CLEAR, COLORLESS LIQUID WITH BENZENE-LIKE ODOR.

---

4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP 4 C (40 F) NFPA 704M RATING: 2-3-0

FLAMMABLE LIMITS: UPPER - 7.1 % LOWER - 1.2 %

FIRE EXTINGUISHING MEDIA
USE ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE.
(WATER MAY BE INEFFECTIVE.)

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS
VAPORS MAY FLOW ALONG SURFACES TO DISTANT IGNITION SOURCES AND FLASH BACK. CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE. CONTACT WITH STRONG OXIDIZERS MAY CAUSE FIRE.

TOXIC GASES PRODUCED
CARBON MONOXIDE, CARBON DIOXIDE

---

5 - HEALTH HAZARD DATA

ACCEPTABLE MAXIMUM PEAK ABOVE THE ACCEPTANCE CEILING CONCENTRATION FOR AN EIGHT-HOUR SHIFT = 500 PPM FOR 10 MINUTES. (PEL) CEILING = 300 PPM.

THRESHOLD LIMIT VALUE (TLV/TWA): 375 MG/M3 (100 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 560 MG/M3 (150 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): MG/M3 (200 PPM)

TOXICITY:
LD50 (ORAL-RAT)(MG/KG) - 5000
LD50 (IPR-MOUSE)(MG/KG) - 1.12
LD50 (SKN-RABBIT) (G/KG) - 14
LC50 (INHL-MOUSE-8H) (PPM) - 5320

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE
INHALATION AND INGESTION ARE HARMFUL AND MAY BE FATAL.

INHALATION MAY CAUSE HEADACHE, NAUSEA, VOMITING, DIZZINESS, NARCOSIS, SUFFOCATION, LOWER BLOOD PRESSURE, CENTRAL NERVOUS SYSTEM DEPRESSION.
INHALATION OF VAPORS MAY CAUSE COUGHING, CHEST PAINS, DIFFICULTY BREATHING, OR UNCONSCIOUSNESS.
LIQUID MAY BE IRRITATING TO SKIN AND EYES. PROLONGED SKIN CONTACT MAY RESULT IN DERMATITIS. EYE CONTACT MAY RESULT IN TEMPORARY CORNEAL DAMAGE.
INGESTION MAY CAUSE HEADACHE, NAUSEA, VOMITING, GASTROINTESTINAL IRRITATION, UNCONSCIOUSNESS, CONVULSIONS.
CHRONIC EFFECTS OF OVEREXPOSURE MAY INCLUDE KIDNEY AND/OR LIVER DAMAGE.

TARGET ORGANS
CENTRAL NERVOUS SYSTEM, LIVER, KIDNEYS, SKIN

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

ROUTES OF ENTRY
INHALATION, ABSORPTION, INGESTION, EYE CONTACT, SKIN CONTACT

EMERGENCY AND FIRST AID PROCEDURES
CALL A PHYSICIAN.
IF SWALLOWED, DO NOT INDUCE VOMITING.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES.
WASH CLOTHING BEFORE RE-USE.

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6 - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, FLAME, OTHER SOURCES OF IGNITION

INCOMPATIBLES: STRONG OXIDIZING AGENTS, NITRIC ACID, SULFURIC ACID, CHLORINE

DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE

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7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING.
SHUT OFF IGNITION SOURCES; NO FLARES, SMOKING OR FLAMES IN AREA. STOP LEAK IF YOU CAN DO SO WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. TAKE UP WITH SAND OR OTHER NON-COMBUSTIBLE ABSORBENT MATERIAL AND PLACE INTO CONTAINER FOR LATER DISPOSAL. FLUSH AREA WITH WATER.

J. T. BAKER SOLUSORB(R) SOLVENT ADSORBENT IS RECOMMENDED FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: U220 (TOXIC WASTE)

8 - PROTECTIVE EQUIPMENT

VENTILATION:	USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.
RESPIRATORY PROTECTION:	RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 1000 PPM, A CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, A SELF-CONTAINED BREATHING APPARATUS IS RECOMMENDED.
EYE/SKIN PROTECTION:	SAFETY GOGGLES AND FACE SHIELD, UNIFORM, PROTECTIVE SUIT, POLYVINYL ALCOHOL GLOVES ARE RECOMMENDED.

9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

SPECIAL PRECAUTIONS
BOND AND GROUND CONTAINERS WHEN TRANSFERRING LIQUID. KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY, WELL-VENTILATED, FLAMMABLE LIQUID STORAGE AREA.

10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	TOLUENE
HAZARD CLASS	FLAMMABLE LIQUID
UN/NA	UN1294
LABELS	FLAMMABLE LIQUID
REPORTABLE QUANTITY	1000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	TOLUENE
HAZARD CLASS	3.2
UN/NA	UN1294
LABELS	FLAMMABLE LIQUID

MSDS for 1,1,1-TRICHLOROETHANE Page 1

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1 - PRODUCT IDENTIFICATION

PRODUCT NAME: 1,1,1-TRICHLOROETHANE
FORMULA: CH3CCL3
FORMULA WT: 133.41
CAS NO.: 71-55-6
NIOSH/RTECS NO.: KJ2975000
COMMON SYNONYMS: CHLOROETHENE; METHYLCHLOROFORM; METHYLTRICHLOROMETHANE; ALPHA-TRICHLOROETHANE
PRODUCT CODES: W509,5381,W510,9436,9437
EFFECTIVE: 07/30/86
REVISION #02

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	-	1	SLIGHT
FLAMMABILITY	-	1	SLIGHT
REACTIVITY	-	1	SLIGHT
CONTACT	-	2	MODERATE

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT; VENT HOOD; PROPER GLOVES

PRECAUTIONARY LABEL STATEMENTS

WARNING
CAUSES IRRITATION
HARMFUL IF SWALLOWED OR INHALED

AVOID CONTACT WITH EYES, SKIN, CLOTHING.
AVOID BREATHING VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING.

SAF-T-DATA(TM) STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
1,1,1-TRICHLOROETHANE	90-100	71-55-6

3 - PHYSICAL DATA

BOILING POINT: 74 C (165 F)
MELTING POINT: -33 C (-27 F)
VAPOR PRESSURE(MM HG): 100
VAPOR DENSITY(AIR=1): 4.6

SPECIFIC GRAVITY: 1.32 (H2O=1)
EVAPORATION RATE: 12.8 (BUTYL ACETATE=1)

SOLUBILITY(H2O): NEGLIGIBLE (LESS THAN 0.1 %) % VOLATILES BY VOLUME: 100

APPEARANCE & ODOR: COLORLESS LIQUID WITH A MILD ETHER-LIKE ODOR.

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4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP N/A
NFPA 704M RATING: 2-1-0

FLAMMABLE LIMITS: UPPER - 15.0 % LOWER - 7.5 %

FIRE EXTINGUISHING MEDIA
USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE.

TOXIC GASES PRODUCED
HYDROGEN CHLORIDE, PHOSGENE, CHLORINE

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5 - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV/TWA): 1900 MG/M3 (350 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 2450 MG/M3 (450 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 1900 MG/M3 (350 PPM)

TOXICITY: LD50 (ORAL-RAT)(G/KG) - 10.3
LD50 (IPR-RAT)(MG/KG) - 5100

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE
INHALATION OF VAPORS MAY CAUSE NARCOSIS AND DEPRESSION OF CENTRAL NERVOUS SYSTEM.
INHALATION OF VAPORS MAY CAUSE HEADACHE, NAUSEA, VOMITING, DIZZINESS, DROWSINESS, IRRITATION OF RESPIRATORY TRACT, AND LOSS OF CONSCIOUSNESS.
CONTACT WITH SKIN OR EYES MAY CAUSE IRRITATION.
PROLONGED EXPOSURE MAY CAUSE DERMATITIS.
INGESTION MAY CAUSE NAUSEA AND VOMITING.
CHRONIC EFFECTS OF OVEREXPOSURE MAY INCLUDE KIDNEY AND/OR LIVER DAMAGE.

TARGET ORGANS
CENTRAL NERVOUS SYSTEM, SKIN, EYES, CARDIOVASCULAR SYSTEM

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
LIVER DISORDERS, HEART DISORDERS, SENSITIVE SKIN

ROUTES OF ENTRY

INGESTION, INHALATION, SKIN CONTACT, EYE CONTACT

EMERGENCY AND FIRST AID PROCEDURES
CALL A PHYSICIAN.
IF SWALLOWED, DO NOT INDUCE VOMITING.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. FLUSH SKIN WITH WATER.

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6 - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: MOISTURE, INSUFFICIENT INHIBITOR, HEAT, FLAME, OTHER SOURCES OF IGNITION, SUNLIGHT AND ULTRAVIOLET LIGHT

INCOMPATIBLES: WATER, STRONG BASES, ALUMINUM, CHEMICALLY ACTIVE METALS, STRONG OXIDIZING AGENTS

DECOMPOSITION PRODUCTS: HYDROGEN CHLORIDE, PHOSGENE, CHLORINE, CARBON MONOXIDE

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7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING.
STOP LEAK IF YOU CAN DO SO WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS.
TAKE UP WITH SAND OR OTHER NON-COMBUSTIBLE ABSORBENT MATERIAL AND PLACE INTO CONTAINER FOR LATER DISPOSAL. FLUSH SPILL AREA WITH WATER.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: U226 (TOXIC WASTE)

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8 - PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: NONE REQUIRED WHERE ADEQUATE VENTILATION CONDITIONS EXIST. IF AIRBORNE CONCENTRATION IS HIGH, A CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE IS RECOMMENDED. IF CONCENTRATION EXCEEDS CAPACITY OF CARTRIDGE RESPIRATOR, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.

EYE/SKIN PROTECTION: SAFETY GOGGLES, UNIFORM, APRON, POLYVINYL ALCOHOL GLOVES ARE RECOMMENDED.

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9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

SPECIAL PRECAUTIONS
KEEP CONTAINER TIGHTLY CLOSED. SUITABLE FOR ANY GENERAL CHEMICAL STORAGE AREA.

10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	1,1,1-TRICHLOROETHANE (AIR ONLY)
HAZARD CLASS	ORM-A
UN/NA	UN2831
LABELS	NONE
REPORTABLE QUANTITY	1000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	1,1,1-TRICHLOROETHANE
HAZARD CLASS	6.1
UN/NA	UN2831
LABELS	HARMFUL - STOW AWAY FROM FOOD STUFFS

MSDS for TRICHLOROETHYLENE Page 1

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1 - PRODUCT IDENTIFICATION

PRODUCT NAME: TRICHLOROETHYLENE
FORMULA: C2HCL3
FORMULA WT: 131.40
CAS NO.: 79-01-6
NIOSH/RTECS NO.: KX4550000
COMMON SYNONYMS: TRICHLOROETHENE; ETHINYL TRICHLORIDE; ACETYLENE TRICHLORIDE; TCE
PRODUCT CODES: 5376,9458,9454,9455,9464,9473
EFFECTIVE: 01/22/87
REVISION #03

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	-	3	SEVERE (CANCER CAUSING)
FLAMMABILITY	-	1	SLIGHT
REACTIVITY	-	1	SLIGHT
CONTACT	-	1	SLIGHT

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES

PRECAUTIONARY LABEL STATEMENTS

WARNING
HARMFUL IF SWALLOWED OR INHALED
CAUSES IRRITATION

NOTE: THIS MATERIAL OR ITS VAPORS IN CONTACT WITH FLAMES OR HOT GLOWING SURFACES MAY FORM CORROSIVE ACID FUMES.

NOTE: REPORTED AS CAUSING CANCER IN LABORATORY ANIMALS. EXERCISE DUE CARE.

AVOID CONTACT WITH EYES, SKIN, CLOTHING.
DO NOT BREATHE VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING.

SAF-T-DATA(TM) STORAGE COLOR CODE: BLUE (HEALTH)

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2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
TRICHLOROETHYLENE	90-100	79-01-6

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3 - PHYSICAL DATA

BOILING POINT: 87 C (189 F) VAPOR PRESSURE(MM HG): 58

MELTING POINT: -73 C (-99 F) VAPOR DENSITY(AIR=1): 4.53

SPECIFIC GRAVITY: 1.47 (H2O=1) EVAPORATION RATE: N/A (BUTYL ACETATE=1)

SOLUBILITY(H2O): SLIGHT (0.1 TO 1 %) % VOLATILES BY VOLUME: 100

APPEARANCE & ODOR: COLORLESS LIQUID WITH CHLOROFORM ODOR.

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4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP N/A NFPA 704M RATING: 2-1-0

FLAMMABLE LIMITS: UPPER - 10.5 % LOWER - 8.0 %

FIRE EXTINGUISHING MEDIA
USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS
GIVES OFF FLAMMABLE VAPORS. VAPORS MAY FORM EXPLOSIVE MIXTURE WITH AIR. CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE. CONTACT WITH STRONG OXIDIZERS MAY CAUSE FIRE.

TOXIC GASES PRODUCED
HYDROGEN CHLORIDE, PHOSGENE, CHLORINE, CARBON MONOXIDE, CARBON DIOXIDE

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5 - HEALTH HAZARD DATA

SOME EXPERIMENTS WITH TEST ANIMALS INDICATED THAT THIS SUBSTANCE MAY BE ANTICIPATED TO BE A CARCINOGEN.

THRESHOLD LIMIT VALUE (TLV/TWA): 270 MG/M3 (50 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 1080 MG/M3 (200 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): MG/M3 (100 PPM)

TOXICITY: LD50 (ORAL-RAT) (MG/KG) - 7193
LD50 (IPR-MOUSE) (MG/KG) - 3000
LD50 (IV-MOUSE) (MG/KG) - 34

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE
INHALATION OF VAPORS MAY CAUSE HEADACHE, NAUSEA, VOMITING, DIZZINESS,

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DROWSINESS, IRRITATION OF RESPIRATORY TRACT, AND LOSS OF CONSCIOUSNESS. INHALATION OF VAPORS MAY CAUSE PULMONARY EDEMA.

CONTACT WITH SKIN OR EYES MAY CAUSE IRRITATION.
PROLONGED EXPOSURE MAY CAUSE DERMATITIS.
INGESTION MAY CAUSE NAUSEA, VOMITING, HEADACHES,DIZZINESS,
GASTROINTESTINAL IRRITATION, CENTRAL NERVOUS SYSTEM DEPRESSION AND
HEARING LOSS.
CHRONIC EFFECTS OF OVEREXPOSURE MAY INCLUDE DAMAGE TO KIDNEYS, LIVER,
LUNGS, BLOOD, OR CENTRAL NERVOUS SYSTEM.

TARGET ORGANS
RESPIRATORY SYSTEM, HEART, LIVER, KIDNEYS, CENTRAL NERVOUS SYSTEM

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

ROUTES OF ENTRY
INHALATION, INGESTION, EYE CONTACT, SKIN CONTACT

EMERGENCY AND FIRST AID PROCEDURES
CALL A PHYSICIAN.
IF SWALLOWED, DO NOT INDUCE VOMITING.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL
RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT
LEAST 15 MINUTES. FLUSH SKIN WITH WATER.

ACCEPTABLE MAXIMUM PEAK ABOVE THE ACCEPTANCE CEILING CONCENTRATION FOR AN
EIGHT-HOUR SHIFT = 300 PPM FOR 5 MINUTES IN ANY 2 HOURS. (PEL)
CEILING = 200 PPM.

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6 - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, FLAME, OTHER SOURCES OF IGNITION, LIGHT

INCOMPATIBLES: CHEMICALLY ACTIVE METALS, STRONG BASES,
STRONG OXIDIZING AGENTS

DECOMPOSITION PRODUCTS: HYDROGEN CHLORIDE, PHOSGENE, CHLORINE,
CARBON MONOXIDE, CARBON DIOXIDE

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7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING.
STOP LEAK IF YOU CAN DO SO WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS.
TAKE UP WITH SAND OR OTHER NON-COMBUSTIBLE ABSORBENT MATERIAL AND PLACE
INTO CONTAINER FOR LATER DISPOSAL. FLUSH SPILL AREA WITH WATER.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL
ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: U228 (TOXIC WASTE)

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8 - PROTECTIVE EQUIPMENT

VENTILATION:	USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.
RESPIRATORY PROTECTION:	RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 1000 PPM, A CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, A SELF-CONTAINED BREATHING APPARATUS IS RECOMMENDED.
EYE/SKIN PROTECTION:	SAFETY GOGGLES AND FACE SHIELD, UNIFORM, PROTECTIVE SUIT, NEOPRENE GLOVES ARE RECOMMENDED.

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9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: BLUE (HEALTH)

SPECIAL PRECAUTIONS
KEEP CONTAINER TIGHTLY CLOSED. STORE IN SECURE POISON AREA.

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10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	TRICHLOROETHYLENE (AIR ONLY)
HAZARD CLASS	ORM-A
UN/NA	UN1710
LABELS	NONE
REPORTABLE QUANTITY	1000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	TRICHLOROETHYLENE
HAZARD CLASS	6.1
UN/NA	UN1710
LABELS	HARMFUL - STOW AWAY FROM FOOD STUFFS

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gopher://gopher.chem.utah.edu:70/00/MSDS/X/M-XYLENE

MSDS for M-XYLENE Page 1

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1 - PRODUCT IDENTIFICATION

PRODUCT NAME: M-XYLENE
FORMULA: C8H10
FORMULA WT: 106.17
CAS NO.: 108-38-3
NIOSH/RTECS NO.: ZE2275000
COMMON SYNONYMS: 1,3-XYLENE; M-XYLOL
PRODUCT CODES: X523
EFFECTIVE: 09/11/86
REVISION #03

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	-	2	MODERATE
FLAMMABILITY	-	3	SEVERE (FLAMMABLE)
REACTIVITY	-	0	NONE
CONTACT	-	2	MODERATE

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER

PRECAUTIONARY LABEL STATEMENTS

WARNING
FLAMMABLE
CAUSES IRRITATION
HARMFUL IF SWALLOWED OR INHALED

KEEP AWAY FROM HEAT, SPARKS, FLAME. AVOID CONTACT WITH EYES, SKIN, CLOTHING. AVOID BREATHING VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF FIRE, USE ALCOHOL FOAM, DRY CHEMICAL, CARBON DIOXIDE - WATER MAY BE INEFFECTIVE. FLUSH SPILL AREA WITH WATER SPRAY.

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

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2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
M-XYLENE	90-100	108-38-3

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3 - PHYSICAL DATA

BOILING POINT: 139 C (282 F) VAPOR PRESSURE(MM HG): 8.3

MSDS for M-XYLENE

MELTING POINT: -48 C (-54 F) VAPOR DENSITY(AIR=1): 3.66

SPECIFIC GRAVITY: 0.87 (H2O=1) EVAPORATION RATE: 0.51 (BUTYL ACETATE=1)

SOLUBILITY(H2O): NEGLIGIBLE (LESS THAN 0.1 %) % VOLATILES BY VOLUME: 100

APPEARANCE & ODOR: CLEAR, COLORLESS LIQUID WITH AROMATIC ODOR.

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4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP 27 C (81 F) NFPA 704M RATING: 2-3-0

FLAMMABLE LIMITS: UPPER - 7.0 % LOWER - 1.1 %

FIRE EXTINGUISHING MEDIA
USE ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE.
(WATER MAY BE INEFFECTIVE.)

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS
VAPORS MAY FLOW ALONG SURFACES TO DISTANT IGNITION SOURCES AND FLASH BACK. CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE. CONTACT WITH STRONG OXIDIZERS MAY CAUSE FIRE.

TOXIC GASES PRODUCED
CARBON MONOXIDE, CARBON DIOXIDE

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5 - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV/TWA): 435 MG/M3 (100 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 655 MG/M3 (100 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 435 MG/M3 (100 PPM)

TOXICITY: LD50 (ORAL-RAT)(MG/KG) - 5000
LD50 (SKN-RABBIT) (G/KG) - 14.1

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE
INHALATION AND INGESTION ARE HARMFUL AND MAY BE FATAL.
INHALATION OF VAPORS MAY CAUSE HEADACHE, NAUSEA, VOMITING, DIZZINESS, DROWSINESS, IRRITATION OF RESPIRATORY TRACT, AND LOSS OF CONSCIOUSNESS.
INHALATION OF VAPORS MAY CAUSE NARCOSIS.

CONTACT WITH SKIN OR EYES MAY CAUSE IRRITATION.
INGESTION MAY CAUSE NAUSEA, VOMITING, HEADACHES, DIZZINESS, GASTRO-

INTESTINAL IRRITATION, BLURRED VISION, LOWERING OF BLOOD PRESSURE.
CHRONIC EFFECTS OF OVEREXPOSURE MAY INCLUDE KIDNEY AND/OR LIVER DAMAGE.

TARGET ORGANS
CENTRAL NERVOUS SYSTEM, EYES, SKIN, GI TRACT, BLOOD, LIVER AND KIDNEYS

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

ROUTES OF ENTRY
INGESTION, INHALATION, SKIN CONTACT, EYE CONTACT, ABSORPTION

EMERGENCY AND FIRST AID PROCEDURES
CALL A PHYSICIAN.
IF SWALLOWED, DO NOT INDUCE VOMITING.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.

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6 - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, FLAME, OTHER SOURCES OF IGNITION

INCOMPATIBLES: STRONG OXIDIZING AGENTS

DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE

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7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING.
SHUT OFF IGNITION SOURCES; NO FLARES, SMOKING OR FLAMES IN AREA. STOP LEAK IF YOU CAN DO SO WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. TAKE UP WITH SAND OR OTHER NON-COMBUSTIBLE ABSORBENT MATERIAL AND PLACE INTO CONTAINER FOR LATER DISPOSAL. FLUSH AREA WITH WATER.

J. T. BAKER SOLUSORB(R) SOLVENT ADSORBENT IS RECOMMENDED FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: U239 (TOXIC WASTE)

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8 - PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 1000 PPM, A CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, A SELF-CONTAINED BREATHING APPARATUS IS RECOMMENDED.

EYE/SKIN PROTECTION: SAFETY GOGGLES, UNIFORM, APRON, NITRILE GLOVES ARE RECOMMENDED.

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9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

SPECIAL PRECAUTIONS

BOND AND GROUND CONTAINERS WHEN TRANSFERRING LIQUID. KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY, WELL-VENTILATED, FLAMMABLE LIQUID STORAGE AREA.

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10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	XYLENE
HAZARD CLASS	FLAMMABLE LIQUID
UN/NA	UN1307
LABELS	FLAMMABLE LIQUID
REPORTABLE QUANTITY	1000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	XYLENES
HAZARD CLASS	3.3
UN/NA	UN1307
LABELS	FLAMMABLE LIQUID

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gopher://gopher.chem.utah.edu:70/00/MSDS/X/O-XYLENE

MSDS for O-XYLENE Page 1

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1 - PRODUCT IDENTIFICATION

PRODUCT NAME: O-XYLENE
FORMULA: C6H4(CH3)2
FORMULA WT: 106.17
CAS NO.: 95-47-6
NIOSH/RTECS NO.: ZE2450000
COMMON SYNONYMS: O-DIMETHYLBENZENE; 1,2-DIMETHYLBENZENE; O-METHYLTOLUENE; O-XYLOL
PRODUCT CODES: X518
EFFECTIVE: 09/05/86
REVISION #02

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	-	2	MODERATE
FLAMMABILITY	-	3	SEVERE (FLAMMABLE)
REACTIVITY	-	0	NONE
CONTACT	-	2	MODERATE

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER

PRECAUTIONARY LABEL STATEMENTS

WARNING
FLAMMABLE
CAUSES IRRITATION
HARMFUL IF SWALLOWED OR INHALED

KEEP AWAY FROM HEAT, SPARKS, FLAME. DO NOT GET IN EYES, ON SKIN, ON CLOTHING. AVOID BREATHING VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF FIRE, USE ALCOHOL FOAM, DRY CHEMICAL, CARBON DIOXIDE - WATER MAY BE INEFFECTIVE. FLUSH SPILL AREA WITH WATER SPRAY.

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

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2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
O-XYLENE	90-100	00095-47-6

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3 - PHYSICAL DATA

BOILING POINT: 144 C (291 F) VAPOR PRESSURE(MM HG): 5.2

MSDS for O-XYLENE Page 2

MELTING POINT: -25 C (-13 F) VAPOR DENSITY(AIR=1): 3.66

SPECIFIC GRAVITY: 0.88 (H2O=1) EVAPORATION RATE: 0.51 (BUTYL ACETATE=1)

SOLUBILITY(H2O): NEGLIGIBLE (LESS THAN 0.1 %) % VOLATILES BY VOLUME: 100

APPEARANCE & ODOR: CLEAR, COLORLESS LIQUID WITH AN AROMATIC ODOR.

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4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP 32 C (90 F) NFPA 704M RATING: 2-3-0

FLAMMABLE LIMITS: UPPER - 7.0 % LOWER - 1.1 %

FIRE EXTINGUISHING MEDIA
USE ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE.
(WATER MAY BE INEFFECTIVE.)

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS
VAPORS MAY FLOW ALONG SURFACES TO DISTANT IGNITION SOURCES AND FLASH BACK. CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE. CONTACT WITH STRONG OXIDIZERS MAY CAUSE FIRE.

TOXIC GASES PRODUCED
CARBON MONOXIDE, CARBON DIOXIDE

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5 - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV/TWA): 435 MG/M3 (100 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 655 MG/M3 (150 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 435 MG/M3 (100 PPM)

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE
INHALATION AND INGESTION ARE HARMFUL AND MAY BE FATAL.
INHALATION OF VAPORS MAY CAUSE HEADACHE, NAUSEA, VOMITING, DIZZINESS, DROWSINESS, IRRITATION OF RESPIRATORY TRACT, AND LOSS OF CONSCIOUSNESS.
INHALATION OF VAPORS MAY CAUSE NARCOSIS.
CONTACT WITH SKIN OR EYES MAY CAUSE IRRITATION.
INGESTION MAY CAUSE NAUSEA, VOMITING, HEADACHES, DIZZINESS, GASTRO-INTESTINAL IRRITATION, BLURRED VISION, LOWERING OF BLOOD PRESSURE.

CHRONIC EFFECTS OF OVEREXPOSURE MAY INCLUDE KIDNEY AND/OR LIVER DAMAGE.

TARGET ORGANS
CENTRAL NERVOUS SYSTEM, EYES, SKIN, GI TRACT, BLOOD, LIVER AND KIDNEYS

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

ROUTES OF ENTRY
INGESTION, INHALATION, SKIN CONTACT, EYE CONTACT, ABSORPTION

EMERGENCY AND FIRST AID PROCEDURES
CALL A PHYSICIAN.
IF SWALLOWED, DO NOT INDUCE VOMITING.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.

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6 - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, FLAME, OTHER SOURCES OF IGNITION

INCOMPATIBLES: STRONG OXIDIZING AGENTS

DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE

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7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING.
SHUT OFF IGNITION SOURCES; NO FLARES, SMOKING OR FLAMES IN AREA. STOP LEAK IF YOU CAN DO SO WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. TAKE UP WITH SAND OR OTHER NON-COMBUSTIBLE ABSORBENT MATERIAL AND PLACE INTO CONTAINER FOR LATER DISPOSAL. FLUSH AREA WITH WATER.

J. T. BAKER SOLUSORB(R) SOLVENT ADSORBENT IS RECOMMENDED FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: U239 (TOXIC WASTE)

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8 - PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 1000 PPM, A CHEMICAL CARTRIDGE RESPIRATOR WITH

ORGANIC VAPOR CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, A SELF-CONTAINED BREATHING APPARATUS IS RECOMMENDED.

EYE/SKIN PROTECTION: SAFETY GOGGLES, UNIFORM, APRON, NITRILE GLOVES ARE RECOMMENDED.

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9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

SPECIAL PRECAUTIONS

BOND AND GROUND CONTAINERS WHEN TRANSFERRING LIQUID. KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY, WELL-VENTILATED, FLAMMABLE LIQUID STORAGE AREA.

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10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	XYLENE
HAZARD CLASS	FLAMMABLE LIQUID
UN/NA	UN1307
LABELS	FLAMMABLE LIQUID
REPORTABLE QUANTITY	1000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	XYLENES
HAZARD CLASS	3.3
UN/NA	UN1307
LABELS	FLAMMABLE LIQUID

.

MSDS for P-XYLENE Page 1

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1 - PRODUCT IDENTIFICATION

PRODUCT NAME: P-XYLENE
FORMULA: C6H4(CH3)2
FORMULA WT: 106.17
CAS NO.: 106-42-3
NIOSH/RTECS NO.: ZE2625000
COMMON SYNONYMS: P-DIMETHYLBENZENE; 1,4-DIMETHLBENZENE; P-METHYLTOLUENE; P-XYLOL
PRODUCT CODES: X528,9498
EFFECTIVE: 09/05/86
REVISION #02

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	-	2	MODERATE
FLAMMABILITY	-	3	SEVERE (FLAMMABLE)
REACTIVITY	-	0	NONE
CONTACT	-	2	MODERATE

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER

PRECAUTIONARY LABEL STATEMENTS

WARNING
FLAMMABLE
CAUSES IRRITATION
HARMFUL IF SWALLOWED OR INHALED

KEEP AWAY FROM HEAT, SPARKS, FLAME. DO NOT GET IN EYES, ON SKIN, ON CLOTHING. AVOID BREATHING VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF FIRE, USE ALCOHOL FOAM, DRY CHEMICAL, CARBON DIOXIDE - WATER MAY BE INEFFECTIVE. FLUSH SPILL AREA WITH WATER SPRAY.

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

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2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
P-XYLENE	90-100	106-42-3
P-XYLENE	90-100	106-42-3

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3 - PHYSICAL DATA

MSDS for P-XYLENE

BOILING POINT: 138 C (280 F) VAPOR PRESSURE(MM HG): 8.6

MELTING POINT: 13 C (55 F) VAPOR DENSITY(AIR=1): 3.66

SPECIFIC GRAVITY: 0.86 (H2O=1) EVAPORATION RATE: 0.51 (BUTYL ACETATE=1)

SOLUBILITY(H2O): NEGLIGIBLE (LESS THAN 0.1 %) % VOLATILES BY VOLUME: 100

APPEARANCE & ODOR: COLORLESS LIQUID WITH AN AROMATIC ODOR.

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4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP 27 C (81 F) NFPA 704M RATING: 2-3-0

FLAMMABLE LIMITS: UPPER - 7.0 % LOWER - 1.1 %

FIRE EXTINGUISHING MEDIA
USE ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE.
(WATER MAY BE INEFFECTIVE.)

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS
VAPORS MAY FLOW ALONG SURFACES TO DISTANT IGNITION SOURCES AND FLASH BACK. CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE. CONTACT WITH STRONG OXIDIZERS MAY CAUSE FIRE.

TOXIC GASES PRODUCED
CARBON MONOXIDE, CARBON DIOXIDE

---

5 - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV/TWA): 435 MG/M3 (100 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 655 MG/M3 (150 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 435 MG/M3 (100 PPM)

TOXICITY:
LD50 (ORAL-RAT)(MG/KG) - 5000
LD50 (IPR-RAT)(MG/KG) - 3810
LC50 (INHL-RAT-4H) (PPM) - 4550

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE
INHALATION AND INGESTION ARE HARMFUL AND MAY BE FATAL.
INHALATION OF VAPORS MAY CAUSE HEADACHE, NAUSEA, VOMITING, DIZZINESS,

DROWSINESS, IRRITATION OF RESPIRATORY TRACT, AND LOSS OF CONSCIOUSNESS.
INHALATION OF VAPORS MAY CAUSE NARCOSIS.
CONTACT WITH SKIN OR EYES MAY CAUSE IRRITATION.
INGESTION MAY CAUSE NAUSEA, VOMITING, HEADACHES, DIZZINESS, GASTRO-INTESTINAL IRRITATION, BLURRED VISION, LOWERING OF BLOOD PRESSURE.
CHRONIC EFFECTS OF OVEREXPOSURE MAY INCLUDE KIDNEY AND/OR LIVER DAMAGE.

TARGET ORGANS
CENTRAL NERVOUS SYSTEM, EYES, SKIN, GI TRACT, BLOOD, LIVER AND KIDNEYS

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

ROUTES OF ENTRY
INGESTION, INHALATION, SKIN CONTACT, EYE CONTACT, ABSORPTION

EMERGENCY AND FIRST AID PROCEDURES
CALL A PHYSICIAN.
IF SWALLOWED, DO NOT INDUCE VOMITING.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.

---

6 - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, FLAME, OTHER SOURCES OF IGNITION

INCOMPATIBLES: STRONG OXIDIZING AGENTS

DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE

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7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING.
SHUT OFF IGNITION SOURCES; NO FLARES, SMOKING OR FLAMES IN AREA. STOP LEAK IF YOU CAN DO SO WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. TAKE UP WITH SAND OR OTHER NON-COMBUSTIBLE ABSORBENT MATERIAL AND PLACE INTO CONTAINER FOR LATER DISPOSAL. FLUSH AREA WITH WATER.
J. T. BAKER SOLUSORB(R) SOLVENT ADSORBENT IS RECOMMENDED FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: U239 (TOXIC WASTE)

---

8 - PROTECTIVE EQUIPMENT

VENTILATION:	USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.
RESPIRATORY PROTECTION:	RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 1000 PPM, A CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, A SELF-CONTAINED BREATHING APPARATUS IS RECOMMENDED.
EYE/SKIN PROTECTION:	SAFETY GOGGLES, UNIFORM, APRON, NITRILE GLOVES ARE RECOMMENDED.

9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

SPECIAL PRECAUTIONS
BOND AND GROUND CONTAINERS WHEN TRANSFERRING LIQUID. KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY, WELL-VENTILATED, FLAMMABLE LIQUID STORAGE AREA.
PRODUCT MAY SOLIDIFY AT ROOM TEMPERATURE.

10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	XYLENE
HAZARD CLASS	FLAMMABLE LIQUID
UN/NA	UN1307
LABELS	FLAMMABLE LIQUID
REPORTABLE QUANTITY	1000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	XYLENES
HAZARD CLASS	3.3
UN/NA	UN1307
LABELS	FLAMMABLE LIQUID

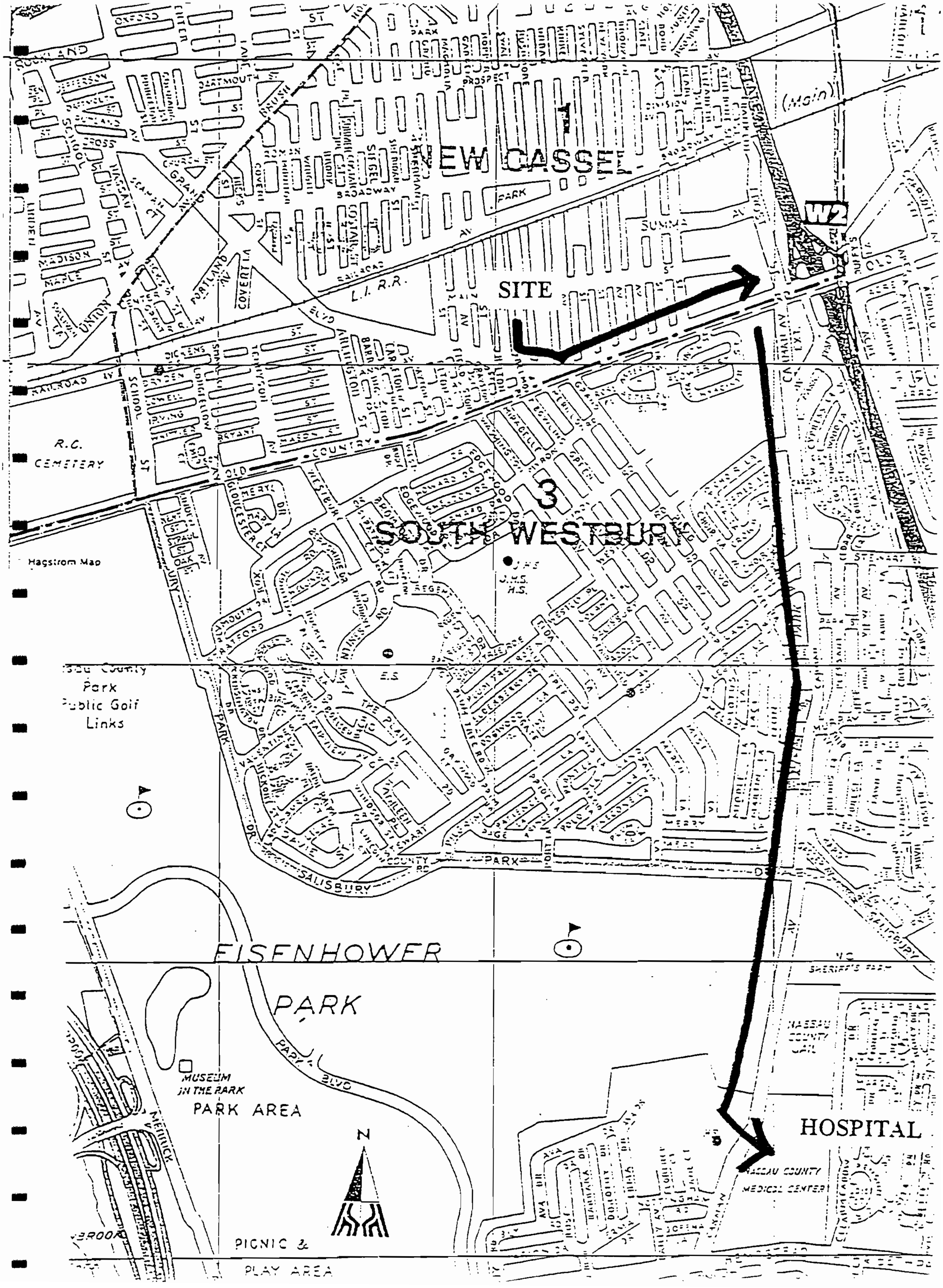
.

APPENDIX E

Directions to Nassau County Medical Center

DIRECTIONS TO NASSAU COUNTY MEDICAL CENTER

- Proceed south from site along Swalm or Rushmore to Old Country Road.
- Proceed east on Old Country Road to Carman Avenue
- Proceed south on Carman Avenue to the Nassau County Medical Center, which is located on the east side of Carman Avenue, north of Hempstead Turnpike (Route 24).


NEW CASSEL
SITE
W2
L.I.R.R.
R.C. CEMETERY
3
SOUTH WESTBURY
Hagstrom Map
J.H.S. H.S.
E.S.
Park
Public Golf Links
EISENHOWER
PARK
MUSEUM IN THE PARK
PARK AREA
N
PICNIC &
PLAY AREA
NASSAU COUNTY JAIL
SHERIFF'S FARM
HOSPITAL
NASSAU COUNTY MEDICAL CENTER