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MCAS CHERRY POINT  
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WORK PLAN PHASE 1 LIMITED SITE ASSESSMENT PIT 6 FUEL HYDRANT SYSTEM MCAS  
CHERRY POINT NC  
8/17/2004  
CATLIN ENGINEERS AND SCIENTISTS

**WORKPLAN  
PHASE I LIMITED SITE ASSESSMENT**

**PIT 6  
FUEL HYDRANT SYSTEM**

**MARINE CORPS AIR STATION  
CHERRY POINT, NORTH CAROLINA**

**ISSUED August 17, 2004**

**NCDENR Incident No. Not Assigned  
Navy Contract No. N62470-01-D-3009  
Delivery Order No. 0113  
CATLIN Project No. 204-052**

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## TABLE OF CONTENTS

	<u>Page</u>
<b>1.0 INTRODUCTION</b>	<b>1</b>
<b>1.1 PURPOSE OF INVESTIGATION</b>	<b>1</b>
<b>1.2 SCOPE OF WORK</b>	<b>1</b>
<b>2.0 PREVIOUS INVESTIGATIONS, REMEDIATION AND/OR CLOSURE</b>	<b>1</b>
<b>3.0 SITE DESCRIPTION</b>	<b>2</b>
<b>3.1 AREA OF INVESTIGATION</b>	<b>2</b>
<b>3.2 CONTAMINANT SOURCE INVENTORY</b>	<b>2</b>
<b>3.3 SITE HISTORY AND OPERATION</b>	<b>2</b>
<b>4.0 SITE INVESTIGATION</b>	<b>2</b>
<b>4.1 PERMANENT MONITORING WELL INSTALLATION</b>	<b>3</b>
<b>4.2 SOIL SAMPLING</b>	<b>3</b>
<b>4.3 GROUNDWATER GAUGING AND SAMPLING</b>	<b>3</b>
<b>4.4 INVESTIGATIVE DERIVED WASTE MANAGEMENT</b>	<b>3</b>
<b>4.5 RECEPTOR SURVEY</b>	<b>3</b>
<b>4.6 SURVEY</b>	<b>4</b>
<b>5.0 SAMPLE ANALYSIS</b>	<b>4</b>
<b>6.0 REFERENCES</b>	<b>4</b>

### TABLES

<b>TABLE 1</b>	<b>Site History – Spill Information</b>
<b>TABLE 2</b>	<b>Site History – Owner/Operator Information</b>
<b>TABLE 3</b>	<b>Project Tasks</b>
<b>TABLE 4</b>	<b>Subsurface Investigation Summary Table</b>
<b>TABLE 5</b>	<b>Sample Analysis Summary</b>

### FIGURES

<b>FIGURE 1</b>	<b>Site Location Map</b>
<b>FIGURE 2</b>	<b>Site Map with Proposed Soil Borings and Monitoring Well Locations</b>

**APPENDICES**

**APPENDIX A**  
**APPENDIX B**

**Catlin Standard Methods Of Investigation**  
**Site Specific Health and Safety Plan**

**WORKPLAN  
PHASE I LIMITED SITE ASSESSMENT**

**PIT 6  
FUEL HYDRANT SYSTEM**

**CATLIN PROJECT NO. 204-052**

**August 17, 2004**

**1.0 INTRODUCTION**

***1.1 PURPOSE OF INVESTIGATION***

The purpose of this Phase I Limited Site Assessment Workplan (Workplan) is to serve as a guidance document and procedural manual for performing tasks to aid in preliminarily determining the extent of soil and groundwater contamination associated with the June 12, 2004 release (approximately 1000 gallons) of JP-5 Fuel associated with the Pit 6 low point drain aboard Marine Corps Air Station (MCAS), Cherry Point, North Carolina.

***1.2 SCOPE OF WORK***

The project involves the sampling of one existing monitoring well, installation of one permanent Type II monitoring well and two soil borings for the collection of site soil and groundwater samples. Off-site laboratory analyses will be performed on the site soil and groundwater samples to determine impact to the subsurface as a result of the petroleum release. Additionally, a receptor survey will be performed to gather information necessary for the State to classify the site risk ranking and land use classification.

A report will be prepared for the Pit 6 Site documenting field activities, data, and findings. Deliverables will include:

Draft and Final "Phase I Limited Site Assessment Report"

**2.0 PREVIOUS INVESTIGATIONS, REMEDIATION AND/OR CLOSURE**

A "Preliminary Site Assessment" was completed in October 2002 in response to a release, which occurred during a valve replacement at the Pit 6 refueling area. It is our understanding that no other investigations, remediation and/or closure activities have been completed as of this workplan submittal at the Pit 6 Site.

### 3.0 SITE DESCRIPTION

Contractors performing work on the Air Station are required to acquire a pass from Pass and ID Office at the Rapids Building (Bldg. 298). An Air Station pass is required in addition to other passes and access that may be required for work at the Naval Aviation Depot (NADEP) and Airfield/Flightline.

Work performed on the airfield or flightline (MCAS Cherry Point or the outlying fields) shall be coordinated with the Air Operations Department, Airport Manager through EAD. All contractors performing work on the airfield's flightline shall take a radio communications class from the Air Operations Department (requires 30 to 60 minutes to complete). When performing work on the airfield or flightline the contractor must gain access to the airfield/flightline area (completed by simply informing the gate guards of your work and that you intend to check-in with Air Operations), check-in with the Air Operations Manager, and receive a radio. Air Operations will use the radio to maintain communications with contract personnel. In addition, the use of amber flashing lights in vehicles is required while on the active portions of the flightline. **Contractors must ensure that Foreign Object Debris (FOD) control is of the highest priority at all times while working on the Airfield. Special precautions to ensure complete control of FOD will be required and enforced.**

#### 3.1 UTILITY LOCATION

Professional Locating Service, Inc. (PLS) will provide on-site utility location prior to the commencement of drilling activities. PLS representative Phil Minix can be contacted via telephone (910) 347-7519.

#### 3.2 AREA OF INVESTIGATION

The Pit 6 Site is located in the active flightline area of MCAS Cherry Point, adjacent to Runway 5R and Alpha taxiway. See Figure 1 for a site location map and Figure 2 for a site map with proposed monitoring well and soil boring locations.

#### 3.3 CONTAMINANT SOURCE INVENTORY

The subject site is suspected to contain contamination from a known release of JP-5 Fuel from Fuel Pit 6. Available information pertaining to the recent release is presented on Table 1.

#### 3.4 SITE HISTORY AND OPERATION

See Table 2 for site owner/operator information.

### 4.0 SITE INVESTIGATION

See Table 3 for a list of tasks to be completed during this investigation.

#### **4.1 PERMANENT MONITORING WELL INSTALLATION**

Refer to Figure 2 for the proposed monitoring well (100GW02) location. EAD personnel will verify the approximate location of monitoring well in the field before commencement of work. The Type II monitoring well will be installed in accordance with the CATLIN Standard Methods of Investigation as included in Appendix A. Table 4 contains monitoring well installation data, including sample intervals.

#### **4.2 SOIL SAMPLING**

As previously stated, Figure 2 illustrates the locations for proposed soil borings and monitoring well boring locations at the Pit 6 Site. As required, soil samples will be collected from both the soil borings and the monitoring well boring in accordance with CATLIN Standard Methods of Investigation (see Appendix A and Table 4).

Two soil samples will be collected from each soil boring and monitoring well location at the highest Flame Ionization Detector (FID) reading or just above the capillary fringe and submitted for laboratory analysis. Soil samples will be obtained continuously during the installation of the soil borings for soil characterization purposes to the water table.

Soil samples will be obtained during the installation of the monitoring well for laboratory analysis and soil characterization purposes at five-foot intervals to the water table.

#### **4.3 GROUNDWATER GAUGING AND SAMPLING**

The existing (100GW01) and new monitoring well (100GW02) will be gauged and sampled approximately two weeks after installation, which should allow ample time for free product to accumulate, if present.

A groundwater sample will be obtained for laboratory analysis from the monitoring wells, if free product is not present. As required, the groundwater samples will be collected in accordance with CATLIN Standard Methods of Investigation (see Appendix A) from monitoring wells at the Pit 6 Site.

#### **4.4 INVESTIGATIVE DERIVED WASTE MANAGEMENT**

Soil cuttings will be spread on-site as allowed by the NCDENR. Purge and development fluids will be containerized and disposed of at the 4075 treatment system.

#### **4.5 RECEPTOR SURVEY**

A receptor survey will be performed for the subject site which will include gathering the information needed by NCDENR to assign a risk classification and land use classification. The receptor survey will include the areas within 1,500 feet of the subject site and will identify at a minimum; potable water supply wells, non-potable

water supply wells, surface water bodies, well head protection areas, surrounding land use, and other factors which may cause the release to pose an imminent danger to the public or environment.

#### **4.6 SURVEY**

A survey of the site will be conducted which will locate the soil borings, monitoring well and pertinent site structures and features. Additionally, the top of casing (TOC) elevation will be determined for the monitoring well.

#### **5.0 SAMPLE ANALYSIS**

As required, soil and groundwater samples will be analyzed at a state certified analytical laboratory. The number and type of samples to be analyzed, sample nomenclature, and the analyses to be conducted are summarized in Table 5. Soil samples will be analyzed per EPA Methods 8260/5035 and 8270, and MADEP VPH/EPH. Groundwater samples will be analyzed per EPA Methods 602 with Purgeable Aromatics + Xylenes and 625 with Base/Neutrals/Acid Extractables + TICS, and MADEP VPH/EPH.

#### **6.0 REFERENCES**

North Carolina Department of Environment and Natural Resources, Division of Waste Management, UST Section, "Guidelines for Assessment and Corrective Action," effective July 1, 2001.

## **TABLES**

**TABLE 1**

**SITE HISTORY  
SPILL INFORMATION**

**PIT 6 SITE  
MCAS, CHERRY POINT, NORTH CAROLINA**

<b>UST ID Number</b>	<b>Product (gasoline, diesel, jet fuel, etc.)</b>	<b>Capacity (gallons)</b>	<b>Date of Spill (m/dd/yy)</b>	<b>Date Permanently Closed (P), or Still in Use* (C) (m/dd/yy)</b>	<b>Was Release Associated With UST System? (Yes / No)</b>
Unknown	JP-5 Fuel	Unknown	06/12/04	(C)	Yes

**TABLE 2**  
**SITE HISTORY**  
**OWNER/OPERATOR INFORMATION**  
**PIT 6 SITE**  
**MCAS, CHERRY POINT, NORTH CAROLINA**

Dates of Ownership/Operation (m/dd/yy) to (m/dd/yy)	UST ID Number	Name of Owner or Operator (indicate which)	Site Use
Currently Active	Unknown	MCAS Cherry Point Owner and Operator	Low-point drainage feature used to remove fuel from line during maintenance
Address		Telephone Number	
Environmental Affairs Department PSC Box 8006 Marine Corps Air Station Cherry Point, North Carolina 28533		(252) 466-4903	

**TABLE 3**  
**PROJECT TASKS**  
**PIT 6 SITE**  
**MCAS, CHERRY POINT, NORTH CAROLINA**

Tasks to be completed:	TASK
X	Utility Locating
X	Drilling
X	Soil Sampling
X	Groundwater Sampling
X	Site Survey
X	Water Well Inventory
X	Receptor Survey
X	Contaminant Source Inventory
X	Well Gauging
X	Investigative Derived Waste (IDW) Management
X	Laboratory Coordination
X	Data Analysis
X	Report Preparation

**TABLE 4**  
**SUBSURFACE INVESTIGATION SUMMARY TABLE**  
**PIT 6 SITE**  
**MCAS, CHERRY POINT, NORTH CAROLINA**

SAMPLE LOCATION I.D.	BORING TYPE AND DIAMETER	TOTAL DEPTH (Feet BLS)	CASING (Feet BLS)	SCREEN INTERVAL (Feet BLS)	SOIL SAMPLE INTERVAL (SOIL DESCRIPTION AND OVA REQUIRED)		LABORATORY SAMPLE INTERVAL	NO. SOIL LAB SAMPLES PER BORING/WELL	GW SAMPLE REQUIRED
					Starting	Interval			
P06SB-01	2" (Soil Boring)	+/- 15	N/A	N/A	0-2' BLS	Continuous	Highest FID or just above capillary fringe	2	NO
P06SB-02	2" (Soil Boring)	+/- 15	N/A	N/A	0-2' BLS	Continuous	Highest FID or just above capillary fringe	2	NO
100GW02	2" (Type II)	+/- 20	±10	±10-20	0-2' BLS	5-feet	Highest FID or just above capillary fringe	2	Yes
100GW01 (Existing Well) (Field Verify)	2" (Type II) (Field Verify)	+/- 20 (Field Verify)	±10 (Field Verify)	±10-20 (Field Verify)	None	None	None	0	Yes

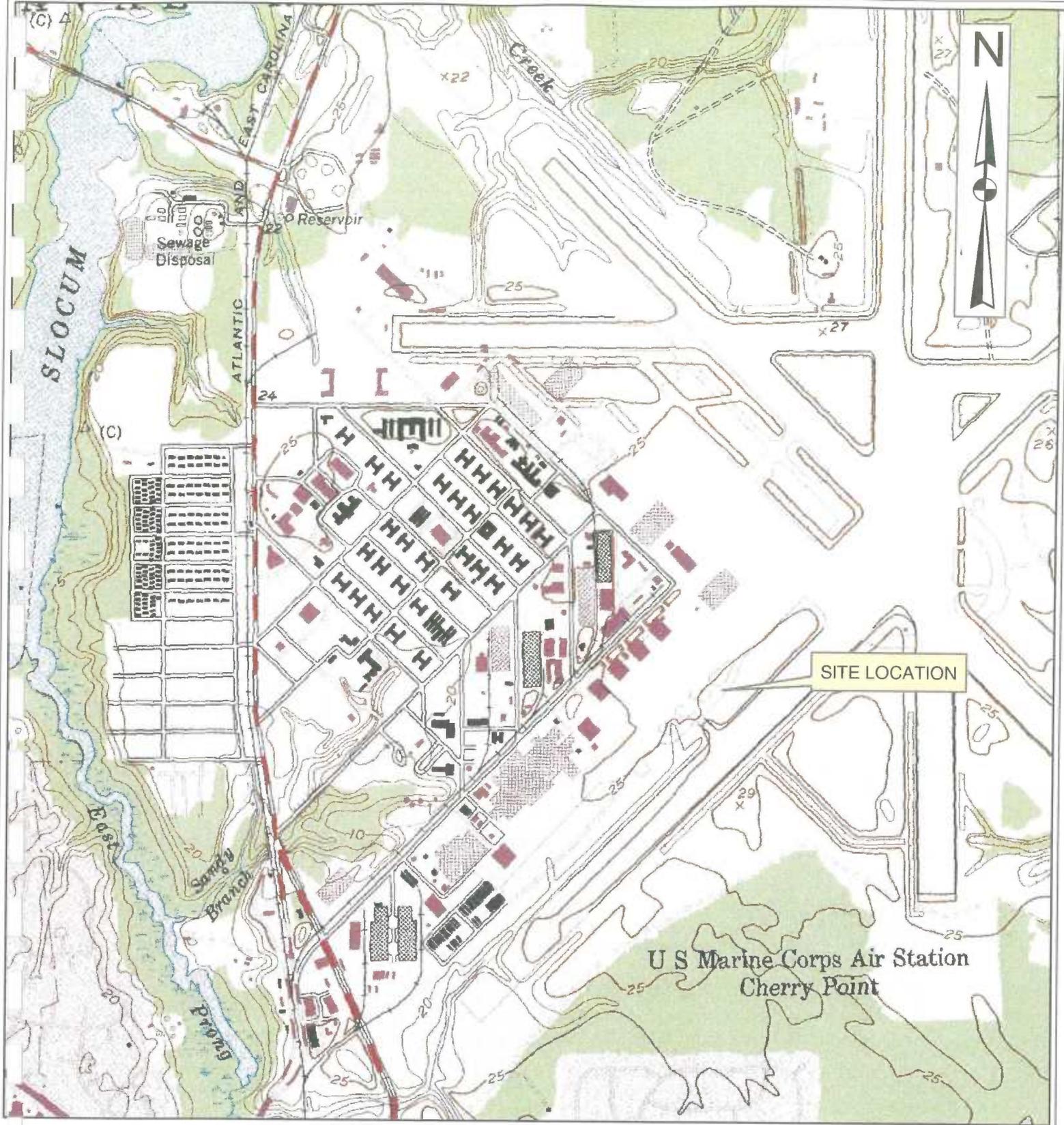
\* WHERE APPLICABLE, NOTE SOIL INTERVAL FROM WHICH SAMPLE WAS COLLECTED ON LABORATORY GLASSWARE AND COC.  
 BLS = below land surface

**TABLE 5**  
**SAMPLE ANALYSIS SUMMARY**  
**PIT 6 SITE**  
**MCAS, CHERRY POINT, NORTH CAROLINA**

DATA POINTS	Total Analysis Quantity						
	Number of Sample Locations	SOIL (EPA Method)			WATER (EPA Method)		
		EPA 8260/5035	EPA 8270	MADEP VPH/EPH	EPA 602	EPA 625 + TICS	MADEP VPH/EPH
*P06SB-01	1	2	2	2	-	-	-
*P06SB-02	1	2	2	2	-	-	-
*100GW02	1	4	4	4	1	1	1
*100GW02-DUP	1	1	-	-	1	1	1
100GW01 (Existing Well; Field Verify well name)	1	-	-	-	1	1	1
TRIP BLANK	1	-	-	-	1	-	-
<b>TOTAL SAMPLE LOCATIONS</b>	<b>6</b>	-	-	-	-	-	-
<b>TOTAL SAMPLES</b>	<b>-</b>	<b>9</b>	<b>8</b>	<b>8</b>	<b>4</b>	<b>3</b>	<b>3</b>

\* WHERE APPLICABLE, NOTE SOIL INTERVAL FROM WHICH SAMPLE WAS COLLECTED ON LABORATORY GLASSWARE AND COC.

## FIGURES



**CALIN**  
ENGINEERS and SCIENTISTS

PROJECT  
WORKPLAN  
PIT 6  
MARINE CORPS AIR STATION  
CHERRY POINT, NC

TITLE  
**SITE LOCATION**

FIGURE

**1**

JOB NO.	204-052	DATE	AUG 2004	SCALE	AS SHOWN	DRAWN BY	THW	CHECKED BY	TWL
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# MCAS CHERRY POINT



## LEGEND

-  PROPOSED SOIL BORING LOCATION
-  PROPOSED MONITORING WELL LOCATION
-  EXISTING MONITORING WELL LOCATION
-  FUEL LINE

## NOTES

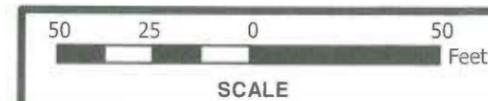
1. Approximate location of Soil Boring and Monitoring Well will be verified by EAD Personal in field prior to commencement of work.



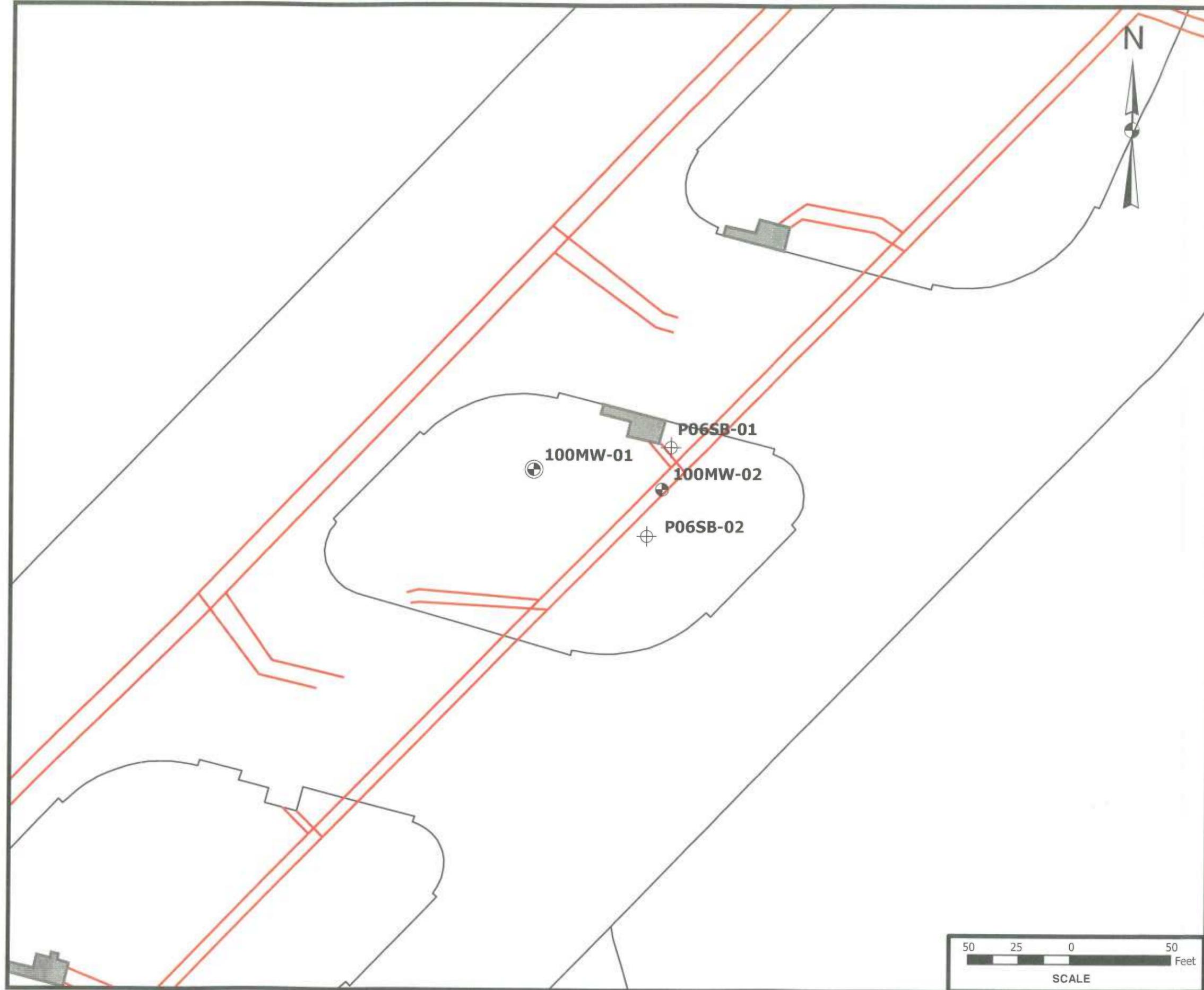
SITE MAP with  
PROPOSED SOIL BORING and  
MONITORING WELL LOCATIONS  
PIT 6

FIGURE

2



Job No.: 204-052	Date: AUG 2004	Scale: AS SHOWN	Drawn By: THW	Checked By: TWL
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**APPENDIX A**

**CATLIN STANDARD METHODS OF INVESTIGATION**

# CATLIN STANDARD METHODS OF INVESTIGATION

## 1.0 DATA COLLECTION

### 1.1 BACKGROUND DATA

Background data and history information relevant to the site investigation is generated through numerous sources. These sources may include, but are not limited to, the following:

- Conversations with the client and regulatory officials involved with the incident.
- Review of pertinent regulatory correspondence.
- Review of previous and existing reports and other technical data.
- Review of available historical records.

### 1.2 SURVEYS AND POTENTIAL RECEPTOR DATA

Physical survey and potential receptor data is collected in accordance with the intended level of investigation. In general, the purpose is to collect sufficient information for site assessment and corrective action planning.

Individual receptors are identified and evaluated in the context of their potential for contaminant impact. Potential receptors of contamination can include surface water bodies, groundwater supply wells, wellhead protection areas, and subsurface building structures.

#### 1.2.1 Horizontal Survey

Horizontal survey data is generated using either accepted general field surveying techniques, or existing survey maps; or by using a combination of existing data and field generated information. The survey area generally extends to a point at least 50 feet beyond suspected plume boundaries. A receptor scale survey of a larger area surrounding a site will be made if appropriate and necessary.

#### 1.2.2 Vertical Survey

A vertical survey is conducted at the site typically within an accuracy of 0.01 foot. The datum plane is generally assumed unless otherwise noted. Assumed temporary benchmarks (TBM) are selected near ground level. The vertical survey includes such points as top of all well casings, selected ground shots, important utility inverts, utility fluid levels, important surface water levels, and other items determined to be significant.

### **1.3 DRILLING AND MONITORING WELL/PIEZOMETER INSTALLATION**

Necessary permits are applied for and obtained in accordance with federal, state, and local requirements prior to drilling or well construction activities. Additionally, the well locations are scanned for underground utilities prior to conducting intrusive subsurface activities. Wells are installed under applicable licensing requirements, and are designed and constructed in accordance with accepted standards and practices. Any wells purposely installed at off-site locations are permitted through appropriate right-of-entry agreements with all necessary property owners and/or their agents.

#### **1.3.1 Drilling Methods and Subsurface Data Collection**

Drilling is accomplished utilizing one or more of the following methods:

##### ***Auger Drilling***

Auger drilling is the preferred, most often used method of subsurface investigation and is accomplished using a vehicle or trailer mounted drill rig. Continuous flight auger types used vary upon the site and situation; ranging from the 4-inch outside diameter solid stem to the 12-inch outside diameter hollow stem. Auger type is selected based upon appropriateness and/or site-specific requirements.

##### ***Hand Augering***

Hand augering is utilized when economically and scientifically feasible, or when no other method is suitable. Hand augers typically produce three-inch diameter holes and are generally limited to depths of less than 15 feet.

##### ***Direct Push***

Direct push methods of subsurface investigation are used generally for soil screening purposes or collection of groundwater samples where permanent wells are not viable.

##### ***Other Methods***

Other drilling methods, such as mud and air rotary, rock coring, cable tool, and large bucket augering are used when site conditions or project requirements dictate.

Regardless of the drilling method used, the drill rig(s) and all drilling tools are thoroughly cleaned between boreholes to prevent cross introduction of contaminants. Split spoon samples are collected and field-described at intervals of five feet or less, and cuttings are continuously monitored for organic vapors.

Drill cuttings are containerized for off-site disposal or are spread on the ground surface in proximity to the well or boring in accordance with North Carolina Department of Environment and Natural Resources (NCDENR) requirements. A geologist or engineer, trained in using visual/manual techniques, is always present during drilling and is responsible for subsurface contaminant and geologic data collection. Soils are classified in general agreement with the Unified Soils Classification System (USCS).

### **1.3.2 Hydropunch Installation**

Hydropunch penetrometers (Hydropunches) are used to delineate the spatial extent of dissolved and free phase plumes. Soil borings are advanced to the appropriate depth and then the Hydropunch is advanced through the soil boring into undisturbed material. Groundwater samples are collected by pulling back on the body of the Hydropunch and allowing the groundwater to enter the screened portion of the sample chamber. Samples are retrieved using a decontaminated Teflon bailer or peristaltic pump.

### **1.3.3 Well Installation**

Wells are typically constructed of threaded PVC casing and screen. No glues or cements are used in joining PVC components. Well diameter, slot sizes, and protective covers vary depending upon site-specific conditions or situation-specific requirements.

### **1.3.4 Well Development**

Wells are developed by over-pumping or surging using appropriate pumps, blocks, or bailers. Through development, unwanted fine materials are removed from the natural formation surrounding the well. Well development will be performed no sooner than 24-hours after grouting is completed for the Type III wells. Water generated during development is containerized and properly disposed or is discharged onto the ground in proximity of the well in accordance with NCDENR requirements.

## **1.4 HYDROGEOLOGIC DATA COLLECTION**

Data used to help characterize hydrogeologic conditions at a site are obtained through various procedures including, but not necessarily limited to, those described below:

### **1.4.1 Regional Geology**

Information pertaining to the regional geologic framework is compiled from existing publications, maps, and scientific papers.

## **1.4.2 Site Geology**

Shallow site geology is generally determined from field descriptions and borehole samples. Interpretations with regard to hydrogeologically important contacts, zones, fractures, faults, cleavage, and face changes are made when possible.

## **1.4.3 Groundwater Occurrence and Characteristics**

Groundwater data is obtained utilizing a number of methods and procedures, not limited to the general list below:

### ***Well Water Levels***

After well development, wells are allowed to stabilize for a minimum of 24 hours prior to measuring. Water level and free product thickness (where applicable) measurements are performed using an electronic interface probe or steel tape with water/product finding pastes.

The specific gravity of any accumulated product is determined and used to calculate true hydraulic grade from measured water levels. This information is combined with vertical survey data to determine relative potentiometric surface elevations for all wells.

### ***Aquifer Testing***

Various aquifer tests may be used to make determinations of hydraulic conductivity. Slug or pumping tests are often used to characterize site hydrogeologic conditions and to develop remedial action alternatives utilizing appropriate pumping technologies.

### ***Other Methods***

Other methods may be deemed appropriate for determining various groundwater characteristics. These other methods may include nested well configurations and/or clustered piezometer installations; sieve or pipette analysis; fracture trace analysis; computer modeling; and geophysical logging.

## **1.5 PETROLEUM HYDROCARBON DATA COLLECTION**

### **1.5.1 Collection Methods**

Petroleum hydrocarbon data is obtained through various methods including, but not limited to, the following:

### *Field Analysis*

- Direct thickness measurement of phase separated components using tapes and/or probes.
- Manual vapor analysis using a photoionization detector (PID) or flame ionization detector (FID).
- Detectable odor and visual observation.

### *Laboratory Analysis*

- Laboratory analysis of phase-separated products.
- Laboratory vapor, soil, and groundwater analysis using appropriate EPA Methods.

## **1.5.2 Field Sampling**

Field sampling procedures are performed in accordance with recommended protocol, accepted industry standards, and under appropriate chain-of-custody procedures. Generally, sampling procedures are as follows:

### *Product Samples*

Product samples are obtained using clean equipment and containers. Each is shipped to the analytical laboratory in protective containers.

### *Vapor Samples*

PID/FID readings are measured from soil sample headspace using containerized samples that have been brought to ambient temperature.

Carbon tubes are utilized in conjunction with a laboratory calibrated vacuum pump to obtain vapor samples. The carbon tubes are sealed and refrigerated for shipment to the analytical laboratory (This method is known as the Carbon Adsorption Method).

### *Soil Samples*

Soil samples are immediately packed into clean containers, and refrigerated for shipment to the analytical laboratory.

### *Groundwater Samples*

Groundwater samples are collected in accordance with the following procedures:

- Creeks/Lakes/Etc.

Grab samples are obtained.

- Domestic Wells

Wells are pumped for a time sufficient to completely purge the well and any pressure or holding tanks prior to sampling.

- Monitoring Wells

Water level measurements are made and well volumes calculated for each well.

Three well volumes are removed from each well using a thoroughly cleaned Teflon bailer or appropriate purging pump. If it is not possible to remove three volumes, due to very low yields, a minimum of one volume is removed prior to obtaining a sample.

Where analysis for metals is required, wells are typically sampled utilizing low flow techniques, which reduce turbidity and the potential for matrix interference.

Samples are collected and containerized in a manner that minimizes agitation and contact with the air.

Sampling records are field prepared.

Samples are labeled and proper chain of custody documents are maintained.

Samples are promptly protectively packed, refrigerated, and shipped to the analytical laboratory for analysis.

## 2.0 DATA EVALUATION

Data obtained as a result of the site investigation is compiled and evaluated and a report is prepared for client review and distribution to the appropriate agencies. Generally, specific data is evaluated as follows:

- Background data is evaluated in context with the suspected or confirmed problem.
- Survey data is utilized to develop site maps and to evaluate contaminant receptors.
- Well construction records are compiled and presented as part of the report. As-built information is used in combination with other data to evaluate subsurface conditions and monitoring well screen settings as they relate to the investigation.
- Subsurface drilling logs are used to develop geologic cross-sections, fence diagrams, isopachs,

structure contours, or other constructions. Regional geologic data are used to obtain an overall framework.

- Hydrogeologic data is used to develop contour maps, flow nets and other constructions. The data is also used to calculate various hydrogeologic parameters that describe aquifer characteristics.
- Hydrocarbon data is utilized to develop various plume geometry and isoconcentration maps.

All data is compiled and utilized for making specific recommendations with regard to remedial action alternatives.

**APPENDIX B**  
**SITE SPECIFIC HEALTH AND SAFETY PLAN**

## TABLE OF CONTENTS

- A. HAZARD EVALUATION
- B. EMERGENCY PLANNING
  - B.1 Hospital Route and Map
  - B.2 Emergency Phone Numbers
  - B.3 First Aid and Emergency Equipment
  - B.4 Accident Procedures
  - B.5 Emergency Communication
- C. PROJECT TASKS/MINIMUM PERSONAL PROTECTIVE EQUIPMENT (PPE) REQUIRED
- D. ORGANIZATION AND RESPONSIBILITIES
- E. SITE CONTROL
- F. AIR MONITORING EQUIPMENT
- G. PERSONAL PROTECTIVE EQUIPMENT (PPE)
- H. DECONTAMINATION PROCEDURES
- I. GENERAL SAFETY RULES
- J. MEDICAL MONITORING
- K. EDUCATION AND TRAINING
- L. ACTION LEVELS
- M. HAZARDOUS SUBSTANCES INFORMATION SHEETS

## SITE SPECIFIC HEALTH AND SAFETY PLAN

Site Fuel Pit 6 Project No. 204-052

Client MCAS Cherry Point Project Manager (PM) Tom W. Landis P.G.

Client Safety & Health Contact Michael E. Mason, P.E. Site Manager (SM) TBD

Plan Prepared By Charles W. Ray Date August 16, 2004

Reviewed By Michael E. Mason, P.E. Date August 16, 2004

Overall Project Objective: To install two soil borings (2) and one (1) Type II monitoring well at Pit 6.  
Collect two soil samples from each soil boring. Collect two soil samples and one groundwater sample  
from the monitoring well. Prepare a Phase 1 Limited Site Assessment Report.

### A. HAZARD EVALUATION

Chemical hazards known or suspected to exist on the site.

CHEMICAL HAZARDS			
CONSTITUENT	EXPOSURE LIMITS		
	NIOSH REL	OSHA PEL	IDLH
Benzene	1 ppm (8hr TWA)	1 ppm	500 ppm
Toluene	100 ppm	200 ppm	500 ppm
Ethyl Benzene	100 ppm (TWA)	200 ppm	500 ppm
Xylenes	100 ppm (TWA)	100 ppm	900 ppm
Naphthalene	10 ppm (TWA)	10 ppm	250 ppm

NOTE: Hazardous substance information sheets for these constituents are provided in Section M.  
PEL-Permissible Exposure Limit; REL-Recommended Exposure Limit; IDLH-  
Immediately Dangerous to Life and Health; NE=No evidence a standard has been  
established; CARC.-Carcinogen; ppm-parts per million

**A. HAZARD EVALUATION (continued)**

One or more of the following physical hazards may be present on the site.

PHYSICAL HAZARDS	
PHYSICAL HAZARD	PHYSICAL HAZARD
Overhead Utilities	Heavy Equipment Operation
Buried Utilities	Insects/Snakes/Plants
Overhead Lift System	Confined Space*
Concrete Surface	Heat/Cold Stress
Slippery Conditions	Noise Hazards
Inclement Weather (Only outside building)	Motor Vehicle Operation

\* **NOTE:** IT SHOULD BE POINTED OUT THAT UNDER NO CIRCUMSTANCE SHOULD ANY CATLIN EMPLOYEE ENTER A CONFINED SPACE.

**B. EMERGENCY PLANNING**

**B.1 HOSPITAL ROUTE (Refer to the map on the following page):**

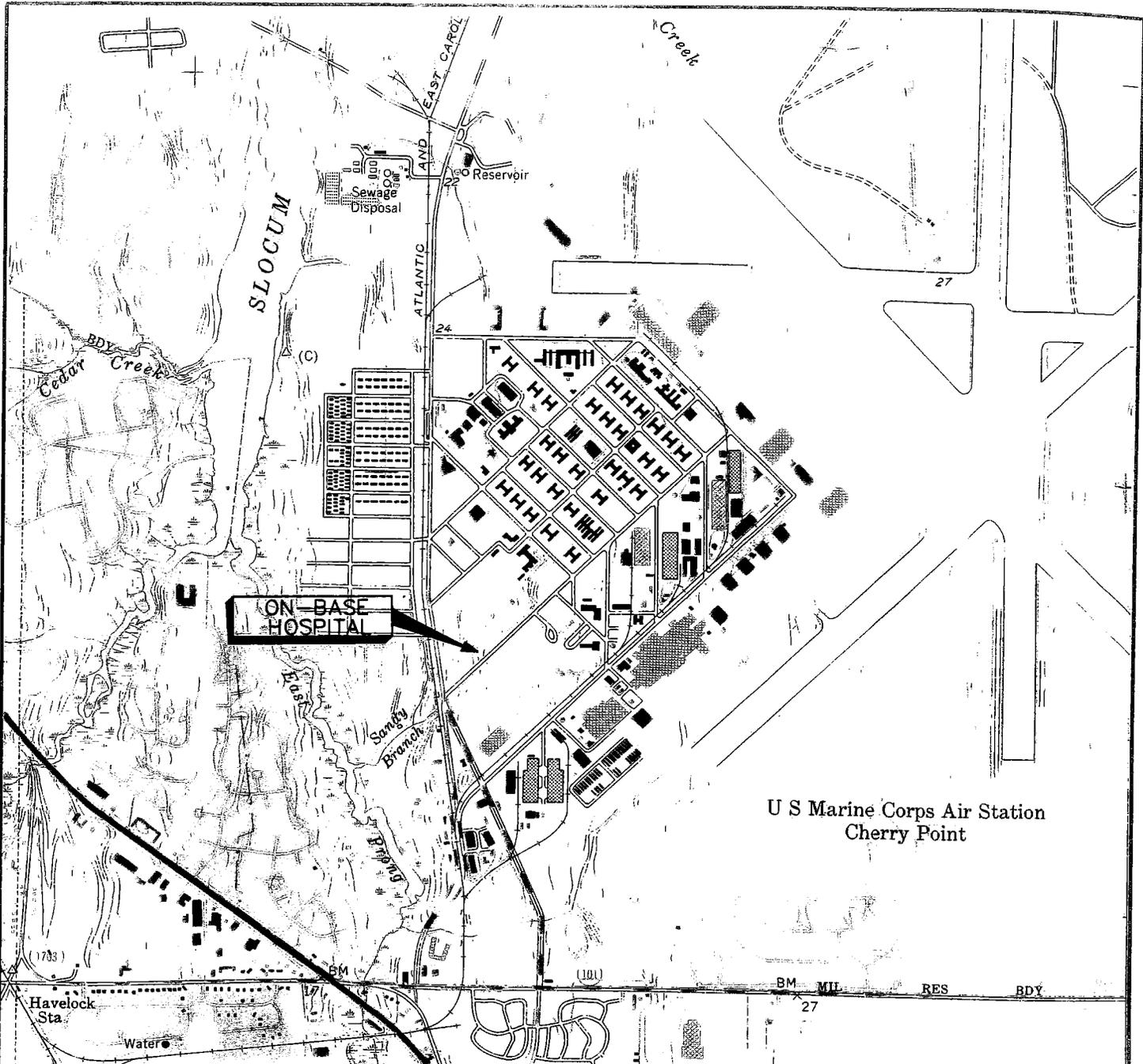
Directions from site to hospital: Refer to the map on the following page for written directions.

**B.2 EMERGENCY PHONE NUMBERS**

**Local Sources of Assistance:**

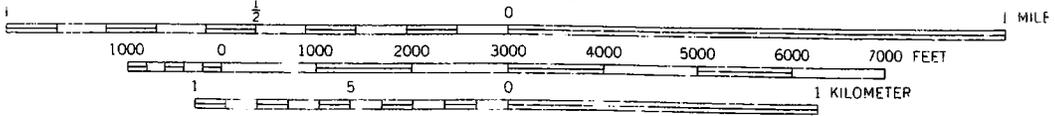
FACILITY	PHONE NUMBER	CONTACT
Provost Marshall's Office (PMO) Military Police	911 or (252) 466-3615	MCAS-CP Military Police Dispatch
Fire/Rescue (On-Base)	911 or (252) 466-2351	MCAS Cherry Point Fire Department
Hospital (On-Base)	(252) 466-0266	Haliburton Naval Hospital Building 4389 Beaufort Road
MCAS Cherry Point EAD	(252) 466-4903	John Myers
CATLIN Engineers and Scientists	1-800-346-7360 (910) 452-5861	Michael E. Mason, PE
Police (Off-Base)	911 or (252) 477-3212	Havelock Police
Sheriff	911 or (252) 504-4800	Carteret County Sheriff Department
EMS (Off-Base)	911 or (252) 444-6443	Havelock Rescue Squad
Hospital (Off-Base)	(252) 247-1616	Carteret General Hospital

## HOSPITAL ROUTE MAP(S)

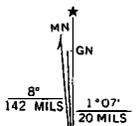


U S Marine Corps Air Station  
Cherry Point

SCALE 1:24 000

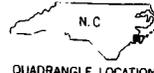


CONTOUR INTERVAL 5 FEET  
NATIONAL GEODETIC VERTICAL DATUM OF 1929



UTM GRID AND 1983 MAGNETIC NORTH  
DECLINATION AT CENTER OF SHEET

HAVELOCK, N. C.  
34076-H8-TF-024



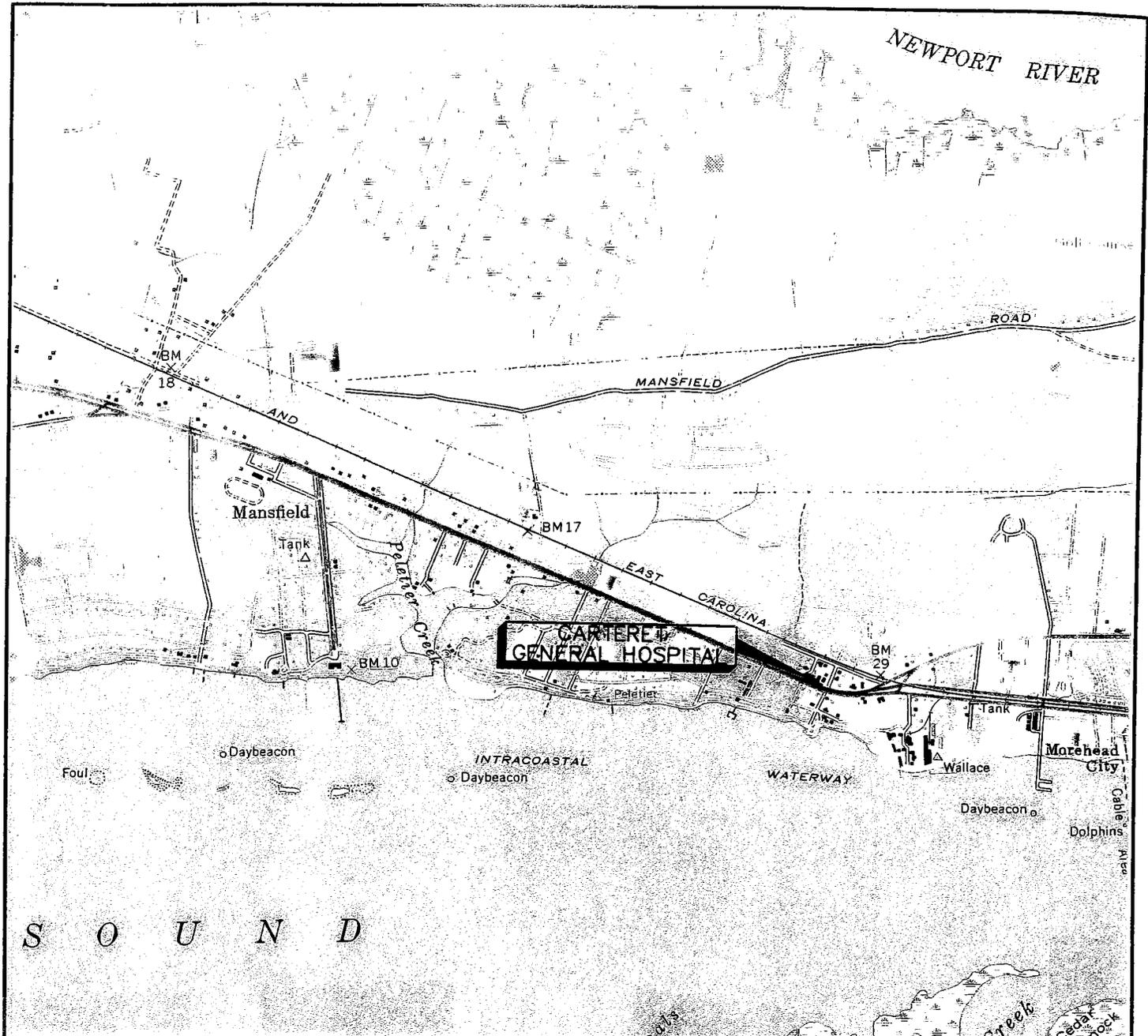
1949  
PHOTOREVISED 1983

**CAELIN**  
ENGINEERS and SCIENTISTS  
WILMINGTON, NORTH CAROLINA

PROJECT MCAS-CHERRY POINT MCOLF-ATLANTIC FIELD MCOLF BOGUE FIELD CARTERET COUNTY, N.C.	
JOB NO: 200163-20	DATE: MAY 2002

TITLE HOSPITAL ROUTE MAP	
SCALE: AS SHOWN	DRAWN BY: HCS
CHECKED BY: TWL	

FIGURE  
**1**



**CAELIN**  
ENGINEERS and SCIENTISTS  
WILMINGTON, NORTH CAROLINA

PROJECT	MCAS—CHERRY POINT MCOLF—ATLANTIC FIELD MCOLF BOGUE FIELD CARTERET COUNTY, N.C.
JOB NO:	200163-20
DATE:	MAY 2002

TITLE	HOSPITAL ROUTE MAP
SCALE:	AS SHOWN
DRAWN BY:	HCS
CHECKED BY:	TWL

FIGURE  
**1A**

**National or Regional Sources of Assistance:**

CATLIN Engineers and Scientists	1-910-452-5861 or 1-800-346-7360
EPA RCRA/Superfund Hotline	1-800-424-9346
Chemtrec (24 Hours)	1-800-424-9300
Bureau of Explosives (24 Hours) (Association of American Railroads)	1-202-293-4048
Communicative Disease Center (Biological Agents)	1-404-633-5313
National Response Center, NRC (Oil/Hazardous Substances)	1-800-424-8802
US DOT, Office of Hazardous Operations	1-202-426-0656
US DOT, (Regulatory Matters)	1-202-426-9280
US Coast Guard (Major Incidents)	1-804-441-3516 1-800-424-8802
Poison Control Center	1-800-672-1697 or 1-800-684-8111
National Agricultural Chemical Association	1-513-961-4300

**B.3 FIRST AID AND EMERGENCY EQUIPMENT**

The following equipment is located in CATLIN field vehicles.

- First Aid Kit
- Eye Wash Kit
- Fire Extinguisher
- Mobile Phone

## B.4 ACCIDENT PROCEDURES

All accidents and injuries should be reported immediately to the SM. The SM will:

- Stop the Job.
- Determine the severity of the situation.
- If needed:
  - Clear the work area.
  - Call or instruct someone to call emergency personnel (fire, ambulance, etc.)
  - Ensure that non-emergency medical attention is obtained if needed.
- Determine the cause and correct it to prevent reoccurrence.
- Call the Project Manager and report the situation.
- Resume work.

Provide basic first aid procedures as required and note time and circumstances of injuries. In the event of injury, the injured person should be transported to the closest hospital (see Figure 3). Notify CATLIN Project Manager.

## B.5 EMERGENCY COMMUNICATION

The SM will be the Emergency Coordinator, and will be responsible for the entry and exit of response personnel, contacting emergency personnel, and reporting to the project manager. The following commands are commonly used for communication when verbal commands can not be used:

Hand gripping throat	Out of air, cannot breathe.
Grip partner's wrist or place both arms around the waist	Leave area immediately, no debate.
Hands on top of head	Need assistance.
Thumbs up	OK, all right, I understand.
Thumbs down	No, negative.

**C. PROJECT TASKS/MINIMUM PERSONAL PROTECTIVE EQUIPMENT (PPE) REQUIRED**

One or more of the following tasks may be performed.

TYPE	Minimum Level of PPE	TYPE	Minimum Level of PPE
Soil Sampling	D	Geophysical Survey	D
Groundwater Sampling	D	Site Visit	D
Surface-Water Sampling	D	Drum Sampling	D
Sediment Sampling	D	Surveying	D
Air Sampling/Monitoring	D	Excavation	D
Drilling/DPT	D	Field Measurements	D
Pilot Testing	D		

**NOTE: Changing site conditions may require a higher level of PPE.**

**Description of Site Operations:** Environmental assessment and/or remediation activities

\_\_\_\_\_

\_\_\_\_\_

**D. ORGANIZATION & RESPONSIBILITIES**

The following personnel are designated to carry out job functions on the site. Their responsibilities and the tasks they will be carrying out on the site are listed below.

NAME	RESPONSIBILITY & TASKS
Program Manager	CATLIN Engineers and Scientists point of contact
Project Manager	Project oversight and point of contact
Site Manager	Responsible for all onsite activities and field safety
Technicians	Performance of field activities

One or more of the following subcontractor work parties may be used to complete the investigation.

SUBCONTRACTOR WORK PARTY	RESPONSIBILITY
Surveyor	Conduct field survey
Waste Disposal Operators	Collect and Dispose of investigative derived waste (IDW)
Utility Locator	Locate utilities
Equipment Operators	Operate earthmoving equipment

**E. SITE CONTROL**

The SM will coordinate access and control security at the site.

**F. AIR MONITORING EQUIPMENT**

This section specifies the air monitoring equipment to be used on site and the action levels to upgrade to higher levels of personal protection.

AIR MONITORING INSTRUMENT	AIR MONITORING INTERVAL	ACTION LEVEL	
		Level D PPE Required (ppm)	Stop Work (ppm)
FID	Periodic	<10	≥10
Explosimeter	Periodic	<5% of LEL	≥5% of LEL

**Comments:** Petroleum products ONLY. Refer to Section L.

LEL = Lower Explosive Limit

## G. PERSONAL PROTECTIVE EQUIPMENT (PPE)

This section lists the equipment that must be present on the site while performing tasks that require Level D PPE. Subcontractors must have the same equipment listed here as a minimum.

- Hard Hat
- Safety Glasses
- Work Gloves
- Steel-Toe Safety Boots

## H. DECONTAMINATION PROCEDURES

Personnel and equipment leaving an exclusion zone shall be decontaminated. Level D decontamination protocol shall be used with the following decontamination procedures:

LEVEL D DECONTAMINATION STEPS	
1	Gather contaminated equipment.
2	Decontaminate equipment.
3	Wash and rinse boots and gloves.
4	Remove disposable garments and gloves.
5	Containerize disposable PPE.

The following equipment is typically required for decontamination.

- Scrub Brushes
- Waste Containers
- Soap
- Plastic Tubs
- Plastic Drop Cloths
- Garbage Bags
- Paper Towels
- Isopropyl Alcohol
- Pump Spray Bottles
- Pump Spray Bottles (water)
- Steam Cleaner

## I. GENERAL SAFETY RULES

1. Report all work injuries and illnesses immediately.
2. Report all Unsafe Acts or Unsafe Conditions to your Supervisor.
3. Use seat belts when on Company business in any vehicles.
4. Firearms, weapons, or explosives are not permitted on Company Property.
5. Use, possession, sale or being under the influence of illegal drugs, misuse of prescription drugs and/or alcohol is not permitted on Company Property or while "on duty".
6. Under no circumstance shall any CATLIN employee enter a confined space.
7. Keep work areas clean and aisles clear. Do not block emergency equipment or exits.
8. Wear and use the prescribed Personal Protective Safety Equipment. This includes foot protection, head protection, eye protection, gloves, warning vests, etc.
9. No smoking, eating, drinking or chewing of gum or tobacco products while on the site. Avoid hand to mouth contact. A designated smoking and break area may be established off-site.
10. In event of potential or actual fire or explosion, evacuate the area immediately. Assemble in the pre-designated area and conduct a head count of all personnel. Notify the fire department. **DO NOT** attempt to fight the fire. Notify CATLIN Project Manager.

## J. MEDICAL MONITORING

CATLIN's Medical Monitoring Program provides medical surveillance of employees who may be exposed to hazardous substances or health hazards, or which may be required to wear respiratory protection. The physical examinations may be performed:

- At least every 12 months;
- At more frequent intervals if determined medically necessary;
- If an employee is injured, becomes ill or develops symptoms due to overexposure involving hazardous substances or health hazards;
- And at termination of employment.

## K. EDUCATION AND TRAINING

CATLIN employees are provided with initial indoctrination and continuing training to enable them to perform their work in a safe manner (as required by OSHA and 29 CFR 1910.120). Training requirements are based on the specific job/tasks that the employee is responsible for performing. Types of training provided to employees include, but may not be limited to:

- 40 Hour Hazardous Waste Operations and Emergency Response (HAZWOPER)
- 8 Hour annual HAZWOPER Refresher
- HAZWOPER Management/Supervisor
- Confined Space Awareness/Entry
- North Carolina Asbestos Hazard Management Branch (NCAHMB) Asbestos Inspector/Management Planner
- First Aid/CPR
- General Construction Safety

## L. ACTION LEVELS

The 10 ppm "Action Level" was derived using the following discussion and calculations, which were prepared by former LAW Industrial Hygienist, Mr. Michael L. Kalar, during 1998. Review of the American Conference of Governmental Industrial Hygienist (ACGIH) Threshold Limit Values for the constituents listed as present at the sites, benzene is listed as the constituent with the greatest toxicity and is listed as a *known human carcinogen*. Therefore, the following criteria were used to develop the 10 ppm "Action Level". CATLIN intends to use the 10 ppm action level for sites which have involved both gasoline and diesel fuel petroleum fuels.

The benzene, ethylbenzene, and total xylenes concentrations identified at the project sites are typically found in gasoline. Review of current data indicates that the TLV for gasoline to be 300 ppm (action level of 150 ppm) and a 15 minute Short Term Exposure Limit (STEL<sub>15</sub>) is 500 ppm. Since benzene is a *known human carcinogen*, we have utilized the current OSHA PEL for benzene (1 ppm) for calculations utilized to determine our action level of 10 ppm.

Based upon experience with previous leaking storage tanks involving gasoline and other petroleum hydrocarbons, benzene (in most instances) comprises approximately 5% of the total mixture in gasoline. Therefore, the 10 ppm action level utilized in this HASP is based upon the following calculation:

	<u>PEL/TLV</u>	=	<u>Action Level</u>
Benzene – OSHA PEL/Action Level =	1.0 ppm	=	0.5 ppm
Gasoline – ACGIH TLV/Action Level =	300 ppm	=	150 ppm
	300 x 0.05 =	=	15 ppm

The following ratio indicates an approximate ten to one ratio of gasoline vapors to benzene in air:

$$\frac{150 \text{ ppm}}{15 \text{ ppm}} = 10 \text{ ppm}$$

Therefore, it can be assumed that for every 10 ppm of gasoline, there is approximately 1.0 ppm of benzene in the air.

Should airborne concentrations exceed 10 ppm in the breathing zone (sustained for 1 to 2 minutes), all site work will cease and the site will be evacuated pending guidance from CATLIN's Project Manager. Should airborne concentrations continue to exceed the 10 ppm "Action Level" additional personal protective equipment (PPE) maybe required. However, prior to any upgrades in PPE, CATLIN's Project Manager should be notified to assure proper selection and donning information.

#### **M. HAZARDOUS SUBSTANCES INFORMATION SHEETS**

The following pages contain information on any hazardous substances which may be present during this investigation.

# MATERIAL SAFETY DATA SHEET

---

## SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

---

**MATHESON TRI-GAS, INC.**  
**959 ROUTE 46 EAST**  
**PARSIPPANY, NEW JERSEY 07054-0624**

**EMERGENCY CONTACT:**  
**CHEMTREC 1-800-424-9300**  
**INFORMATION CONTACT:**  
**973-257-1100**

**SUBSTANCE: BENZENE**

**TRADE NAMES/SYNONYMS:**

MTG MSDS 107; BENZOL; CYCLOHEXATRIENE; BENZOLE; PHENE; PYROBENZOL;  
PYROBENZOLE; CARBON OIL; COAL TAR NAPHTHA; PHENYL HYDRIDE; BENZOLENE;  
BICARBURET OF HYDROGEN; COAL NAPHTHA; MOTOR BENZOL; ANNULENE; (6)ANNULENE;  
RCRA U019; STCC 4908110; UN 1114; C6H6; MAT02610; RTECS CY1400000

**CHEMICAL FAMILY:** hydrocarbons, aromatic

**CREATION DATE:** Jan 24 1989

**REVISION DATE:** Mar 19 2003

---

## SECTION 2 COMPOSITION, INFORMATION ON INGREDIENTS

---

**COMPONENT: BENZENE**  
**CAS NUMBER: 71-43-2**  
**PERCENTAGE: >99**

**COMPONENT: THIOPHENE**  
**CAS NUMBER: 110-02-1**  
**PERCENTAGE: 0.00010**

---

## SECTION 3 HAZARDS IDENTIFICATION

---

**NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=3 REACTIVITY=0**

**EMERGENCY OVERVIEW:**

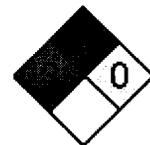
**COLOR:** colorless to yellow

**PHYSICAL FORM:** liquid

**ODOR:** distinct odor

**MAJOR HEALTH HAZARDS:** respiratory tract irritation, skin irritation, eye irritation, central nervous system depression, cancer hazard (in humans)

**PHYSICAL HAZARDS:** Flammable liquid and vapor. Vapor may cause flash fire.



**POTENTIAL HEALTH EFFECTS:**

**INHALATION:**

**SHORT TERM EXPOSURE:** irritation, ringing in the ears, nausea, vomiting, chest pain, difficulty breathing, irregular heartbeat, headache, drowsiness, symptoms of drunkenness, disorientation, blurred vision, lung congestion, blood disorders, paralysis, convulsions, coma

**LONG TERM EXPOSURE:** hearing loss, visual disturbances, reproductive effects, brain damage, cancer

**SKIN CONTACT:**

**SHORT TERM EXPOSURE:** irritation, blisters

**LONG TERM EXPOSURE:** tingling sensation

**EYE CONTACT:**

**SHORT TERM EXPOSURE:** irritation

**LONG TERM EXPOSURE:** no information on significant adverse effects

**INGESTION:**

**SHORT TERM EXPOSURE:** nausea, vomiting, chest pain, headache, drowsiness, symptoms of drunkenness, disorientation, visual disturbances, lung congestion, paralysis, convulsions, coma

**LONG TERM EXPOSURE:** impotence, cancer

---

**SECTION 4 FIRST AID MEASURES**

---

**INHALATION:** If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

**SKIN CONTACT:** Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

**EYE CONTACT:** Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

**INGESTION:** Contact local poison control center or physician immediately. Never make an unconscious person vomit or drink fluids. When vomiting occurs, keep head lower than hips to help prevent aspiration. If person is unconscious, turn head to side. Get medical attention immediately.

**NOTE TO PHYSICIAN:** For inhalation, consider oxygen. For ingestion, consider gastric lavage.

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**SECTION 5 FIRE FIGHTING MEASURES**

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**FIRE AND EXPLOSION HAZARDS:** Severe fire hazard. Moderate explosion hazard. Vapor/air mixtures are explosive. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back. Electrostatic discharges may be generated by flow or agitation resulting in ignition or explosion.

**EXTINGUISHING MEDIA:** regular dry chemical, carbon dioxide, water, regular foam

Large fires: Use regular foam or flood with fine water spray.

**FIRE FIGHTING:** Move container from fire area if it can be done without risk. Cool containers with water

spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck: Evacuation radius: 800 meters (1/2 mile). Water may be ineffective.

**FLASH POINT:** 12 F (-11 C) (CC)  
**LOWER FLAMMABLE LIMIT:** 1.2%  
**UPPER FLAMMABLE LIMIT:** 7.8%  
**AUTOIGNITION:** 928 F (498 C)  
**FLAMMABILITY CLASS (OSHA):** IB

---

## SECTION 6 ACCIDENTAL RELEASE MEASURES

---

### **AIR RELEASE:**

Reduce vapors with water spray. Stay upwind and keep out of low areas.

### **SOIL RELEASE:**

Dig holding area such as lagoon, pond or pit for containment. Dike for later disposal. Absorb with sand or other non-combustible material.

### **WATER RELEASE:**

Cover with absorbent sheets, spill-control pads or pillows. Apply detergents, soaps, alcohols or another surface active agent. Collect with absorbent into suitable container. Absorb with activated carbon. Remove trapped material with suction hoses. Collect spilled material using mechanical equipment. Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Keep out of water supplies and sewers.

### **OCCUPATIONAL RELEASE:**

Avoid heat, flames, sparks and other sources of ignition. Stop leak if possible without personal risk. Reduce vapors with water spray. Small spills: Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Large spills: Dike for later disposal. Remove sources of ignition. Keep unnecessary people away, isolate hazard area and deny entry. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

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## SECTION 7 HANDLING AND STORAGE

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**STORAGE:** Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.106. Grounding and bonding required. Protect from physical damage. Store outside or in a detached building. Store with flammable liquids. Keep separated from incompatible substances. Keep separated from incompatible substances.

---

## SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION

---

**EXPOSURE LIMITS:****BENZENE:**

- 1 ppm OSHA TWA
- 5 ppm OSHA STEL 15 minute(s)
- 0.5 ppm OSHA action level
- 0.5 ppm ACGIH TWA (skin)
- 2.5 ppm ACGIH STEL (skin)
- 0.1 ppm NIOSH recommended TWA 10 hour(s)
- 1 ppm NIOSH recommended STEL

**VENTILATION:** Provide local exhaust or process enclosure ventilation system. Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Ensure compliance with applicable exposure limits.

**EYE PROTECTION:** Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

**CLOTHING:** Wear appropriate chemical resistant clothing.

**GLOVES:** Wear appropriate chemical resistant gloves. **OSHA REGULATED SUBSTANCES:** U.S. OSHA 29 CFR 1910.1028.

**RESPIRATOR:** The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.

**10 ppm**

Any air-purifying respirator with a full facepiece and an organic vapor canister.

**50 ppm**

Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s).

Any air-purifying respirator with a full facepiece and a canister providing protection against this substance.

**100 ppm**

Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s).

**1000 ppm**

Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode.

**For Unknown Concentrations or Immediately Dangerous to Life or Health -**

Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.

**Escape -**

Any air-purifying respirator with a full facepiece and an organic vapor canister.

Any self-contained breathing apparatus with a full facepiece.

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**SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES**

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**PHYSICAL STATE:** liquid

**COLOR:** colorless to yellow

**ODOR:** distinct odor  
**MOLECULAR WEIGHT:** 78.11  
**MOLECULAR FORMULA:** C<sub>6</sub>-H<sub>6</sub>  
**BOILING POINT:** 176 F (80 C)  
**FREEZING POINT:** 43 F (6 C)  
**VAPOR PRESSURE:** 75 mmHg @ 20 C  
**VAPOR DENSITY (air=1):** 2.8  
**SPECIFIC GRAVITY (water=1):** 0.8765 @ 20 C  
**WATER SOLUBILITY:** 0.18% @ 25 C  
**PH:** Not available  
**VOLATILITY:** 100%  
**ODOR THRESHOLD:** 4.68 ppm  
**EVAPORATION RATE:** 5.1 (butyl acetate=1)  
**VISCOSITY:** 0.6468 cP @ 20 C  
**COEFFICIENT OF WATER/OIL DISTRIBUTION:** Not available  
**SOLVENT SOLUBILITY:**  
**Soluble:** acetone, alcohol, carbon disulfide, acetic acid, carbon tetrachloride, chloroform, ether, oils

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## SECTION 10 STABILITY AND REACTIVITY

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**REACTIVITY:** Stable at normal temperatures and pressure.

**CONDITIONS TO AVOID:** Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat. Keep out of water supplies and sewers.

**INCOMPATIBILITIES:** acids, bases, halogens, oxidizing materials, metal salts

**HAZARDOUS DECOMPOSITION:**

Thermal decomposition products: oxides of carbon

**POLYMERIZATION:** Will not polymerize.

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## SECTION 11 TOXICOLOGICAL INFORMATION

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**BENZENE:**

**IRRITATION DATA:**

15 mg/24 hour(s) open skin-rabbit mild; 20 mg/24 hour(s) skin-rabbit moderate; 88 mg eyes-rabbit moderate; 2 mg/24 hour(s) eyes-rabbit severe

**TOXICITY DATA:**

10000 ppm/7 hour(s) inhalation-rat LC50; >9400 ul/kg skin-rabbit LD50; 930 mg/kg oral-rat LD50

**CARCINOGEN STATUS:** OSHA: Carcinogen; NTP: Known Human Carcinogen; IARC: Human Sufficient Evidence, Animal Sufficient Evidence, Group 1; ACGIH: A1 -Confirmed Human Carcinogen; EC: Category 1

**LOCAL EFFECTS:**

Irritant: inhalation, skin, eye

**ACUTE TOXICITY LEVEL:**

Highly Toxic: dermal absorption

Moderately Toxic: ingestion

Slightly Toxic: inhalation

**TARGET ORGANS:** immune system (blood), central nervous system

**MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:** blood system disorders, immune system disorders or allergies

**TUMORIGENIC DATA:** Available.

**MUTAGENIC DATA:** Available.

**REPRODUCTIVE EFFECTS DATA:** Available.

**ADDITIONAL DATA:** May cross the placenta. Alcohol may enhance the toxic effects. Interactions with drugs may occur.

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## SECTION 12 ECOLOGICAL INFORMATION

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**ECOTOXICITY DATA:**

**FISH TOXICITY:** 9200 ug/L 96 hour(s) LC50 (Mortality) Rainbow trout, donaldson trout (Oncorhynchus mykiss)

**INVERTEBRATE TOXICITY:** 10000 ug/L 48 hour(s) EC50 (Immobilization) Water flea (Daphnia magna)

**ALGAL TOXICITY:** 41000 ug/L 8 hour(s) EC50 (Growth) Green algae (Selenastrum capricornutum)

**OTHER TOXICITY:** 25 ug/L 24 day(s) (Residue) Wood frog (Rana sylvatica)

**FATE AND TRANSPORT:**

**BIOCONCENTRATION:** 4360 ug/L 24 day(s) BCF (Residue) Northern anchovy (Engraulis mordax) 97 ug/L

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## SECTION 13 DISPOSAL CONSIDERATIONS

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Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): U019. Hazardous Waste Number(s): D018. Dispose of in accordance with U.S. EPA 40 CFR 262 for concentrations at or above the Regulatory level. Regulatory level- 0.5 mg/L. Dispose in accordance with all applicable regulations.

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## SECTION 14 TRANSPORT INFORMATION

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**U.S. DOT 49 CFR 172.101:**

**PROPER SHIPPING NAME:** Benzene

**ID NUMBER:** UN1114

**HAZARD CLASS OR DIVISION:** 3

**PACKING GROUP:** II

**LABELING REQUIREMENTS:** 3



**CANADIAN TRANSPORTATION OF DANGEROUS GOODS:**

**SHIPPING NAME:** BENZENE

UN NUMBER: UN1114  
CLASS: 3  
PACKING GROUP/RISK GROUP: II

---

SECTION 15 REGULATORY INFORMATION

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**U.S. REGULATIONS:**

**CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):**

**Benzene: 10 LBS RQ**

**SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30):** Not regulated.

**SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.40):** Not regulated.

**SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):**

ACUTE: Yes

CHRONIC: Yes

FIRE: Yes

REACTIVE: No

SUDDEN RELEASE: No

**SARA TITLE III SECTION 313 (40 CFR 372.65):**

**Benzene**

**OSHA PROCESS SAFETY (29CFR1910.119):** Not regulated.

**STATE REGULATIONS:**

**California Proposition 65:**

Known to the state of California to cause the following:

**Benzene**

Cancer (Feb 27, 1987)

Developmental toxicity (Dec 26, 1997)

Male reproductive toxicity (Dec 26, 1997)

**CANADIAN REGULATIONS:**

**WHMIS CLASSIFICATION: BD2**

**NATIONAL INVENTORY STATUS:**

**U.S. INVENTORY (TSCA):** Listed on inventory.

**TSCA 12(b) EXPORT NOTIFICATION:** Not listed.

**CANADA INVENTORY (DSL/NDSL):** Not determined.

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SECTION 16 OTHER INFORMATION

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# MATERIAL SAFETY DATA SHEET

---

## SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

---

**MATHESON TRI-GAS, INC.**  
**959 ROUTE 46 EAST**  
**PARSIPPANY, NEW JERSEY 07054-0624**

**EMERGENCY CONTACT:**  
**CHEMTREC 1-800-424-9300**  
**INFORMATION CONTACT:**  
**973-257-1100**

**SUBSTANCE: TOLUENE**

**TRADE NAMES/SYNONYMS:**

MTG MSDS 134; METHYLBENZENE; TOLUOL; METHYLBENZOL; PHENYLMETHANE;  
METHACIDE; RCRA U220; UN 1294; C7H8; MAT23590; RTECS XS5250000

**CHEMICAL FAMILY:** hydrocarbons, aromatic

**CREATION DATE:** Jan 24 1989

**REVISION DATE:** Mar 19 2003

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## SECTION 2 COMPOSITION, INFORMATION ON INGREDIENTS

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**COMPONENT:** TOLUENE  
**CAS NUMBER:** 108-88-3  
**PERCENTAGE:** 100.0

---

## SECTION 3 HAZARDS IDENTIFICATION

---

**NFPA RATINGS (SCALE 0-4):** HEALTH=2 FIRE=3 REACTIVITY=0

**EMERGENCY OVERVIEW:**

**COLOR:** colorless

**PHYSICAL FORM:** liquid

**ODOR:** distinct odor

**MAJOR HEALTH HAZARDS:** respiratory tract irritation, skin irritation, eye irritation, aspiration hazard, central nervous system depression, nerve damage

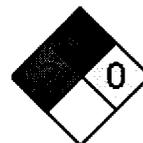
**PHYSICAL HAZARDS:** Flammable liquid and vapor. Vapor may cause flash fire.

**POTENTIAL HEALTH EFFECTS:**

**INHALATION:**

**SHORT TERM EXPOSURE:** irritation, metallic taste, nausea, headache, drowsiness, symptoms of drunkenness, tingling sensation, dilated pupils, kidney damage, liver damage, nerve damage

**LONG TERM EXPOSURE:** ringing in the ears, stomach pain, chest pain, irregular heartbeat, fainting, menstrual disorders, blood disorders, liver enlargement, paralysis, reproductive effects, brain damage, coma



**SKIN CONTACT:**

**SHORT TERM EXPOSURE:** irritation

**LONG TERM EXPOSURE:** same as effects reported in short term exposure

**EYE CONTACT:**

**SHORT TERM EXPOSURE:** irritation (possibly severe), tearing

**LONG TERM EXPOSURE:** same as effects reported in short term exposure

**INGESTION:**

**SHORT TERM EXPOSURE:** same as effects reported in short term inhalation, aspiration hazard

**LONG TERM EXPOSURE:** reproductive effects

---

**SECTION 4 FIRST AID MEASURES**

---

**INHALATION:** If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.

**SKIN CONTACT:** Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

**EYE CONTACT:** Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

**INGESTION:** Aspiration hazard. DO NOT induce vomiting. If vomiting occurs, keep head lower than hips to help prevent aspiration. Get immediate medical attention. Give artificial respiration if not breathing.

---

**SECTION 5 FIRE FIGHTING MEASURES**

---

**FIRE AND EXPLOSION HAZARDS:** Severe fire hazard. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back. Vapor/air mixtures are explosive. Electrostatic discharges may be generated by flow or agitation resulting in ignition or explosion.

**EXTINGUISHING MEDIA:** regular dry chemical, carbon dioxide, water, regular foam

Large fires: Use regular foam or flood with fine water spray.

**FIRE FIGHTING:** Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck: Evacuation radius: 800 meters (1/2 mile). Water may be ineffective.

**FLASH POINT:** 39 F (4 C) (CC)

**LOWER FLAMMABLE LIMIT:** 1.2%

**UPPER FLAMMABLE LIMIT:** 7.1%

**AUTOIGNITION:** 896 F (480 C)  
**FLAMMABILITY CLASS (OSHA):** IB

---

## SECTION 6 ACCIDENTAL RELEASE MEASURES

---

### **AIR RELEASE:**

Reduce vapors with water spray. Stay upwind and keep out of low areas.

### **SOIL RELEASE:**

Dig holding area such as lagoon, pond or pit for containment. Dike for later disposal. Absorb with sand or other non-combustible material. Collect with absorbent into suitable container.

### **WATER RELEASE:**

Absorb with activated carbon. Collect spilled material using mechanical equipment. Cover with absorbent sheets, spill-control pads or pillows. Apply detergents, soaps, alcohols or another surface active agent. Remove trapped material with suction hoses. Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Keep out of water supplies and sewers.

### **OCCUPATIONAL RELEASE:**

Avoid heat, flames, sparks and other sources of ignition. Stop leak if possible without personal risk. Reduce vapors with water spray. Small spills: Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Large spills: Dike for later disposal. Remove sources of ignition. Keep unnecessary people away, isolate hazard area and deny entry. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

---

## SECTION 7 HANDLING AND STORAGE

---

**STORAGE:** Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.106. Protect from physical damage. Store outside or in a detached building. Store with flammable liquids. Keep separated from incompatible substances. Grounding and bonding required. Store in a tightly closed container. Store in a cool, dry place.

---

## SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION

---

### **EXPOSURE LIMITS:**

#### **TOLUENE:**

200 ppm OSHA TWA

300 ppm OSHA ceiling

500 ppm OSHA peak 10 minute(s)

100 ppm (377 mg/m<sup>3</sup>) OSHA TWA (vacated by 58 FR 35338, June 30, 1993)

150 ppm (565 mg/m<sup>3</sup>) OSHA STEL (vacated by 58 FR 35338, June 30, 1993)

50 ppm ACGIH TWA (skin)

100 ppm (375 mg/m<sup>3</sup>) NIOSH recommended TWA 10 hour(s)

150 ppm (560 mg/m<sup>3</sup>) NIOSH recommended STEL

**VENTILATION:** Provide local exhaust ventilation system. Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Ensure compliance with applicable exposure limits.

**EYE PROTECTION:** Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

**CLOTHING:** Wear appropriate chemical resistant clothing.

**GLOVES:** Wear appropriate chemical resistant gloves.

**RESPIRATOR:** The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.

**500 ppm**

Any chemical cartridge respirator with organic vapor cartridge(s).

Any powered, air-purifying respirator with organic vapor cartridge(s).

Any air-purifying respirator with a full facepiece and an organic vapor canister.

Any supplied-air respirator.

Any self-contained breathing apparatus with a full facepiece.

**Escape -**

Any air-purifying respirator with a full facepiece and an organic vapor canister.

Any appropriate escape-type, self-contained breathing apparatus.

**For Unknown Concentrations or Immediately Dangerous to Life or Health -**

Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.

Any self-contained breathing apparatus with a full facepiece.

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## SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

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**PHYSICAL STATE:** liquid

**APPEARANCE:** clear

**COLOR:** colorless

**ODOR:** distinct odor

**MOLECULAR WEIGHT:** 92.14

**MOLECULAR FORMULA:** C<sub>6</sub>-H<sub>5</sub>-C-H<sub>3</sub>

**BOILING POINT:** 232 F (111 C)

**FREEZING POINT:** -139 F (-95 C)

**VAPOR PRESSURE:** 22 mmHg @ 20 C

**VAPOR DENSITY (air=1):** 3.14

**SPECIFIC GRAVITY (water=1):** 0.8669

**WATER SOLUBILITY:** 0.05% @ 20 C

**PH:** Not available

**VOLATILITY:** 100%

**ODOR THRESHOLD:** 10-15 ppm

**EVAPORATION RATE:** 2.24 (butyl acetate=1)

**VISCOSITY:** 0.560 mPa.s @ 25 C

**COEFFICIENT OF WATER/OIL DISTRIBUTION:** Not available

**SOLVENT SOLUBILITY:**

**Soluble:** alcohol, ether, benzene, acetone, ligroin, chloroform, acetic acid, carbon disulfide

---

**SECTION 10 STABILITY AND REACTIVITY**

---

**REACTIVITY:** Stable at normal temperatures and pressure.

**CONDITIONS TO AVOID:** Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat. Keep out of water supplies and sewers.

**INCOMPATIBILITIES:** halogens, combustible materials, acids, oxidizing materials, metal salts

**HAZARDOUS DECOMPOSITION:**

Thermal decomposition products: oxides of carbon, hydrocarbons

**POLYMERIZATION:** Will not polymerize.

---

**SECTION 11 TOXICOLOGICAL INFORMATION**

---

**TOLUENE:****IRRITATION DATA:**

300 ppm eyes-human; 435 mg skin-rabbit mild; 500 mg skin-rabbit moderate; 20 mg/24 hour(s) skin-rabbit moderate; 870 ug eyes-rabbit mild; 2 mg/24 hour(s) eyes-rabbit severe; 100 mg/30 second(s) rinsed eyes-rabbit mild; 250 ul/24 hour(s) skin-pig mild

**TOXICITY DATA:**

49 gm/m<sup>3</sup>/4 hour(s) inhalation-rat LC50; 14100 ul/kg skin-rabbit LD50; 636 mg/kg oral-rat LD50

**CARCINOGEN STATUS:** IARC: Human Inadequate Evidence, Animal Evidence Suggesting Lack of Carcinogenicity, Group 3; ACGIH: A4 -Not Classifiable as a Human Carcinogen

**LOCAL EFFECTS:**

Irritant: inhalation, skin, eye

**ACUTE TOXICITY LEVEL:**

Moderately Toxic: ingestion

Slightly Toxic: inhalation, dermal absorption

**TARGET ORGANS:** nervous system

**MUTAGENIC DATA:** Available.

**REPRODUCTIVE EFFECTS DATA:** Available.

**ADDITIONAL DATA:** Alcohol may enhance the toxic effects. Stimulants such as epinephrine may induce ventricular fibrillation.

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**SECTION 12 ECOLOGICAL INFORMATION**

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**ECOTOXICITY DATA:**

**FISH TOXICITY:** 8110 ug/L 96 hour(s) LC50 (Mortality) Coho salmon, silver salmon (*Oncorhynchus kisutch*)

**INVERTEBRATE TOXICITY:** 6000 ug/L 48 hour(s) EC50 (Immobilization) Water flea (*Daphnia magna*)

**ALGAL TOXICITY:** 9400 ug/L 8 hour(s) EC50 (Growth) Green algae (Selenastrum capricornutum)

**FATE AND TRANSPORT:**

**BIOCONCENTRATION:** 1716 ug/L 6 hour(s) BCF (Residue) Water flea (Daphnia magna) 1.5 ug/L

---

**SECTION 13 DISPOSAL CONSIDERATIONS**

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Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): U220.

---

**SECTION 14 TRANSPORT INFORMATION**

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**U.S. DOT 49 CFR 172.101:**

**PROPER SHIPPING NAME:** Toluene

**ID NUMBER:** UN1294

**HAZARD CLASS OR DIVISION:** 3

**PACKING GROUP:** II

**LABELING REQUIREMENTS:** 3



**CANADIAN TRANSPORTATION OF DANGEROUS GOODS:**

**SHIPPING NAME:** TOLUENE

**UN NUMBER:** UN1294

**CLASS:** 3

**PACKING GROUP/RISK GROUP:** II

---

**SECTION 15 REGULATORY INFORMATION**

---

**U.S. REGULATIONS:**

**CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):**

**TOLUENE:** 1000 LBS RQ

**SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30):** Not regulated.

**SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.40):** Not regulated.

**SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):**

**ACUTE:** Yes

**CHRONIC:** Yes

**FIRE:** Yes

**REACTIVE:** No

**SUDDEN RELEASE:** No

**SARA TITLE III SECTION 313 (40 CFR 372.65):**

**TOLUENE**

**OSHA PROCESS SAFETY (29CFR1910.119):** Not regulated.

**STATE REGULATIONS:**

**California Proposition 65:**

Known to the state of California to cause the following:

**TOLUENE**

Developmental toxicity (Jan 01, 1991)

**CANADIAN REGULATIONS:**

**WHMIS CLASSIFICATION:** BD2

**NATIONAL INVENTORY STATUS:**

**U.S. INVENTORY (TSCA):** Listed on inventory.

**TSCA 12(b) EXPORT NOTIFICATION:** Not listed.

**CANADA INVENTORY (DSL/NDSL):** Not determined.

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**SECTION 16 OTHER INFORMATION**

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# MATERIAL SAFETY DATA SHEET

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## SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

---

**MATHESON TRI-GAS, INC.**  
**959 ROUTE 46 EAST**  
**PARSIPPANY, NEW JERSEY 07054-0624**

**EMERGENCY CONTACT:**  
**CHEMTREC 1-800-424-9300**  
**INFORMATION CONTACT:**  
**973-257-1100**

**SUBSTANCE: ETHYL BENZENE**

**TRADE NAMES/SYNONYMS:**

MTG MSDS 185; BENZENE, ETHYL-; EB; PHENYLETHANE; ETHYLBENZENE; ETHYLBENZOL;  
ALPHA-METHYLTOLUENE; UN 1175; C8H10; MAT08780

**CHEMICAL FAMILY:** hydrocarbons, aromatic

**CREATION DATE:** Jan 24 1989  
**REVISION DATE:** Mar 19 2003

---

## SECTION 2 COMPOSITION, INFORMATION ON INGREDIENTS

---

**COMPONENT:** ETHYL BENZENE  
**CAS NUMBER:** 100-41-4  
**PERCENTAGE:** 100

---

## SECTION 3 HAZARDS IDENTIFICATION

---

**NFPA RATINGS (SCALE 0-4):** HEALTH=3 FIRE=3 REACTIVITY=0

**EMERGENCY OVERVIEW:**

**COLOR:** colorless

**PHYSICAL FORM:** liquid

**ODOR:** aromatic odor

**MAJOR HEALTH HAZARDS:** respiratory tract irritation, skin irritation, eye irritation, aspiration hazard, central nervous system depression, suspect cancer hazard (in animals)

**PHYSICAL HAZARDS:** Flammable liquid and vapor. Vapor may cause flash fire.

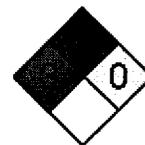
**POTENTIAL HEALTH EFFECTS:**

**INHALATION:**

**SHORT TERM EXPOSURE:** irritation (possibly severe), chest pain, difficulty breathing, headache, drowsiness, dizziness, loss of coordination, coma

**LONG TERM EXPOSURE:** irritation, headache, drowsiness, emotional disturbances, cancer

**SKIN CONTACT:**



**SHORT TERM EXPOSURE:** irritation (possibly severe)

**LONG TERM EXPOSURE:** irritation

**EYE CONTACT:**

**SHORT TERM EXPOSURE:** irritation (possibly severe)

**LONG TERM EXPOSURE:** irritation

**INGESTION:**

**SHORT TERM EXPOSURE:** nausea, vomiting, stomach pain, aspiration hazard

**LONG TERM EXPOSURE:** no information on significant adverse effects

---

## SECTION 4 FIRST AID MEASURES

---

**INHALATION:** If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

**SKIN CONTACT:** Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get immediate medical attention. Thoroughly clean and dry contaminated clothing and shoes before reuse. Destroy contaminated shoes.

**EYE CONTACT:** Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

**INGESTION:** Contact local poison control center or physician immediately. Never make an unconscious person vomit or drink fluids. When vomiting occurs, keep head lower than hips to help prevent aspiration. If person is unconscious, turn head to side. Get medical attention immediately.

**NOTE TO PHYSICIAN:** For inhalation, consider oxygen. For ingestion, consider gastric lavage and activated charcoal slurry.

---

## SECTION 5 FIRE FIGHTING MEASURES

---

**FIRE AND EXPLOSION HAZARDS:** Severe fire hazard. Vapor/air mixtures are explosive above flash point. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back. Electrostatic discharges may be generated by flow or agitation resulting in ignition or explosion.

**EXTINGUISHING MEDIA:** regular dry chemical, carbon dioxide, water, regular foam

Large fires: Use regular foam or flood with fine water spray.

**FIRE FIGHTING:** Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck: Evacuation radius: 800 meters (1/2 mile). Water may be ineffective.

**FLASH POINT:** 59 F (15 C) (CC)  
**LOWER FLAMMABLE LIMIT:** 0.8%  
**UPPER FLAMMABLE LIMIT:** 6.7%  
**AUTOIGNITION:** 810 F (432 C)  
**FLAMMABILITY CLASS (OSHA):** IB

---

## SECTION 6 ACCIDENTAL RELEASE MEASURES

---

### **AIR RELEASE:**

Reduce vapors with water spray. Stay upwind and keep out of low areas.

### **SOIL RELEASE:**

Dig holding area such as lagoon, pond or pit for containment. Dike for later disposal. Absorb with sand or other non-combustible material.

### **WATER RELEASE:**

Cover with absorbent sheets, spill-control pads or pillows. Neutralize. Collect with absorbent into suitable container. Absorb with activated carbon. Remove trapped material with suction hoses. Collect spilled material using mechanical equipment.

### **OCCUPATIONAL RELEASE:**

Avoid heat, flames, sparks and other sources of ignition. Stop leak if possible without personal risk. Reduce vapors with water spray. Small spills: Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Large spills: Dike for later disposal. Remove sources of ignition. Keep unnecessary people away, isolate hazard area and deny entry. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

---

## SECTION 7 HANDLING AND STORAGE

---

**STORAGE:** Store and handle in accordance with all current regulations and standards. Protect from physical damage. Store outside or in a detached building. Store with flammable liquids. Subject to storage regulations: U.S. OSHA 29 CFR 1910.106. Grounding and bonding required. Keep separated from incompatible substances.

---

## SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION

---

### **EXPOSURE LIMITS:**

#### **ETHYL BENZENE:**

100 ppm (435 mg/m<sup>3</sup>) OSHA TWA

125 ppm (543 mg/m<sup>3</sup>) OSHA STEL (vacated by 58 FR 35338, June 30, 1993)

100 ppm ACGIH TWA

125 ppm ACGIH STEL

100 ppm (435 mg/m<sup>3</sup>) NIOSH recommended TWA 10 hour(s)

125 ppm (545 mg/m<sup>3</sup>) NIOSH recommended STEL

**VENTILATION:** Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.

**EYE PROTECTION:** Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

**CLOTHING:** Wear appropriate chemical resistant clothing.

**GLOVES:** Wear appropriate chemical resistant gloves.

**RESPIRATOR:** The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.

**800 ppm**

Any chemical cartridge respirator with organic vapor cartridge(s).

Any air-purifying respirator with a full facepiece and an organic vapor canister.

Any powered, air-purifying respirator with organic vapor cartridge(s).

Any supplied-air respirator.

Any self-contained breathing apparatus with a full facepiece.

**Escape -**

Any air-purifying respirator with a full facepiece and an organic vapor canister.

Any appropriate escape-type, self-contained breathing apparatus.

**For Unknown Concentrations or Immediately Dangerous to Life or Health -**

Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.

Any self-contained breathing apparatus with a full facepiece.

---

## SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

---

**PHYSICAL STATE:** liquid

**COLOR:** colorless

**ODOR:** aromatic odor

**MOLECULAR WEIGHT:** 106.17

**MOLECULAR FORMULA:** C-H3-C-H2-C6-H5

**BOILING POINT:** 277 F (136 C)

**FREEZING POINT:** -139 F (-95 C)

**VAPOR PRESSURE:** 7.1 mmHg @ 20 C

**VAPOR DENSITY (air=1):** 3.66

**SPECIFIC GRAVITY (water=1):** 0.8670

**WATER SOLUBILITY:** 0.015%

**PH:** Not available

**VOLATILITY:** 100%

**ODOR THRESHOLD:** 140 ppm

**EVAPORATION RATE:**

**VISCOSITY:** 0.64 cP @ 25 C

**COEFFICIENT OF WATER/OIL DISTRIBUTION:** Not available

**SOLVENT SOLUBILITY:**

**Soluble:** alcohol, ether, benzene, sulfur dioxide, carbon tetrachloride

**Insoluble:** ammonia

---

## SECTION 10 STABILITY AND REACTIVITY

---

**REACTIVITY:** Stable at normal temperatures and pressure.

**CONDITIONS TO AVOID:** Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat. Keep out of water supplies and sewers.

**INCOMPATIBILITIES:** acids, bases, oxidizing materials, combustible materials

**HAZARDOUS DECOMPOSITION:**

Thermal decomposition products: oxides of carbon

**POLYMERIZATION:** Will not polymerize.

---

## SECTION 11 TOXICOLOGICAL INFORMATION

---

**ETHYL BENZENE:**

**IRRITATION DATA:**

15 mg/24 hour(s) open skin-rabbit mild; 500 mg eyes-rabbit severe

**TOXICITY DATA:**

17800 ul/kg skin-rabbit LD50; 3500 mg/kg oral-rat LD50

**CARCINOGEN STATUS:** IARC: Human Inadequate Evidence, Animal Sufficient Evidence, Group 2B;

ACGIH: A3 -Animal Carcinogen

**LOCAL EFFECTS:**

Irritant: inhalation, skin, eye

**ACUTE TOXICITY LEVEL:**

Moderately Toxic: ingestion

Slightly Toxic: dermal absorption

**TARGET ORGANS:** central nervous system

**MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:** kidney disorders, liver disorders, respiratory disorders, skin disorders and allergies

**TUMORIGENIC DATA:** Available.

**MUTAGENIC DATA:** Available.

**REPRODUCTIVE EFFECTS DATA:** Available.

**ADDITIONAL DATA:** May cross the placenta.

---

## SECTION 12 ECOLOGICAL INFORMATION

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**FATE AND TRANSPORT:**

**KOW:** 154881.66 (log = 5.190) (estimated from water solubility)

**KOC:** 43651.58 (log = 4.640) (estimated from water solubility)

**HENRY'S LAW CONSTANT:** 6.6 E -3 atm-m<sup>3</sup>/mol

**BIOCONCENTRATION:** 36.39 (estimated from water solubility)

**AQUATIC PROCESSES:** 2.6723816 hours (River Model: 1 m deep, 1 m/s flow, 3 m/s wind)

**ENVIRONMENTAL SUMMARY:** Relatively non-persistent in the environment. Not expected to leach through the soil or the sediment. Accumulates very little in the bodies of living organisms. Highly volatile from water.

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## SECTION 13 DISPOSAL CONSIDERATIONS

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Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001.

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## SECTION 14 TRANSPORT INFORMATION

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**U.S. DOT 49 CFR 172.101:**

**PROPER SHIPPING NAME:** Ethylbenzene

**ID NUMBER:** UN1175

**HAZARD CLASS OR DIVISION:** 3

**PACKING GROUP:** II

**LABELING REQUIREMENTS:** 3



**CANADIAN TRANSPORTATION OF DANGEROUS GOODS:**

**SHIPPING NAME:** ETHYLBENZENE

**UN NUMBER:** UN1175

**CLASS:** 3

**PACKING GROUP/RISK GROUP:** II

---

## SECTION 15 REGULATORY INFORMATION

---

**U.S. REGULATIONS:**

**CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):**

**ETHYL BENZENE:** 1000 LBS RQ

**SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30):** Not regulated.

**SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.40):** Not regulated.

**SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):**

**ACUTE:** Yes

**CHRONIC:** Yes

**FIRE:** Yes

REACTIVE: No  
SUDDEN RELEASE: No

**SARA TITLE III SECTION 313 (40 CFR 372.65):  
ETHYL BENZENE**

**OSHA PROCESS SAFETY (29CFR1910.119):** Not regulated.

**STATE REGULATIONS:**

**California Proposition 65:** Not regulated.

**CANADIAN REGULATIONS:**

**WHMIS CLASSIFICATION:** B2.

**NATIONAL INVENTORY STATUS:**

**U.S. INVENTORY (TSCA):** Listed on inventory.

**TSCA 12(b) EXPORT NOTIFICATION:** Not listed.

**CANADA INVENTORY (DSL/NDSL):** Not determined.

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**SECTION 16 OTHER INFORMATION**

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# MATERIAL SAFETY DATA SHEET

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## SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

---

**MATHESON TRI-GAS, INC.**  
**959 ROUTE 46 EAST**  
**PARSIPPANY, NEW JERSEY 07054-0624**

**EMERGENCY CONTACT:**  
**CHEMTREC 1-800-424-9300**  
**INFORMATION CONTACT:**  
**973-257-1100**

**SUBSTANCE: NAPHTHALENE**

**TRADE NAMES/SYNONYMS:**

MTG MSDS 191; NAPHTHALIN; TAR CAMPHOR; WHITE TAR; NAPHTHENE; MOTH BALLS;  
MOTH FLAKES; NAPHTHALINE; NAPHTHALEN; CAMPHOR TAR; RCRA U165; UN 1334; C10H8;  
MAT16120; RTECS QJ0525000

**CHEMICAL FAMILY:** hydrocarbons, polynuclear

**CREATION DATE:** Jun 07 1995  
**REVISION DATE:** Mar 19 2003

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## SECTION 2 COMPOSITION, INFORMATION ON INGREDIENTS

---

**COMPONENT:** NAPHTHALENE  
**CAS NUMBER:** 91-20-3  
**PERCENTAGE:** 100.0

---

## SECTION 3 HAZARDS IDENTIFICATION

---

**NFPA RATINGS (SCALE 0-4):** HEALTH=2 FIRE=2 REACTIVITY=0

**EMERGENCY OVERVIEW:**

**COLOR:** white

**PHYSICAL FORM:** flakes

**ODOR:** mothball odor

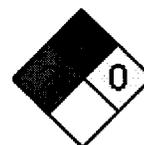
**MAJOR HEALTH HAZARDS:** harmful if swallowed, respiratory tract irritation, skin irritation, eye irritation, allergic reactions

**PHYSICAL HAZARDS:** Flammable solid. Dust/air mixtures may ignite or explode.

**POTENTIAL HEALTH EFFECTS:**

**INHALATION:**

**SHORT TERM EXPOSURE:** irritation, fever, nausea, vomiting, diarrhea, stomach pain, headache, disorientation, eye damage, lung congestion, blood disorders, kidney damage, liver damage, convulsions, coma



**LONG TERM EXPOSURE:** irritation (possibly severe), vomiting, headache, eye damage, lung damage, tumors

**SKIN CONTACT:**

**SHORT TERM EXPOSURE:** irritation, allergic reactions

**LONG TERM EXPOSURE:** irritation (possibly severe), allergic reactions, eye damage

**EYE CONTACT:**

**SHORT TERM EXPOSURE:** irritation (possibly severe), eye damage

**LONG TERM EXPOSURE:** irritation

**INGESTION:**

**SHORT TERM EXPOSURE:** same as effects reported in short term inhalation

**LONG TERM EXPOSURE:** headache, drowsiness, dizziness, emotional disturbances, tremors, loss of coordination, eye damage, reproductive effects

---

## SECTION 4 FIRST AID MEASURES

---

**INHALATION:** If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.

**SKIN CONTACT:** Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

**EYE CONTACT:** Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

**INGESTION:** If vomiting occurs, keep head lower than hips to help prevent aspiration. If person is unconscious, turn head to side. Get medical attention immediately.

**NOTE TO PHYSICIAN:** For ingestion, consider gastric lavage. Consider oxygen.

---

## SECTION 5 FIRE FIGHTING MEASURES

---

**FIRE AND EXPLOSION HAZARDS:** Moderate fire hazard. Dust/air mixtures may ignite or explode.

**EXTINGUISHING MEDIA:** regular dry chemical, dry sand, earth, regular foam, water

Large fires: Use regular foam or flood with fine water spray.

**FIRE FIGHTING:** Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn.

**FLASH POINT:** 174 F (79 C) (CC)

**LOWER FLAMMABLE LIMIT:** 0.9%

**UPPER FLAMMABLE LIMIT:** 5.9%  
**AUTOIGNITION:** 979 F (526 C)

---

## SECTION 6 ACCIDENTAL RELEASE MEASURES

---

### **WATER RELEASE:**

Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Keep out of water supplies and sewers.

### **OCCUPATIONAL RELEASE:**

Avoid heat, flames, sparks and other sources of ignition. Do not touch spilled material. Small spills: Collect spilled material in appropriate container for disposal. Move containers away from spill to a safe area. Large spills: Wet down area with water. Dike for later disposal. Remove sources of ignition. Keep unnecessary people away, isolate hazard area and deny entry. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

---

## SECTION 7 HANDLING AND STORAGE

---

**STORAGE:** Store and handle in accordance with all current regulations and standards. Store in a cool, dry place. Store in a well-ventilated area. Keep separated from incompatible substances. Store under an inert atmosphere. Keep separated from incompatible substances.

---

## SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION

---

### **EXPOSURE LIMITS:**

#### **NAPHTHALENE:**

10 ppm (50 mg/m<sup>3</sup>) OSHA TWA  
15 ppm (79 mg/m<sup>3</sup>) OSHA STEL (vacated by 58 FR 35338, June 30, 1993)  
10 ppm ACGIH TWA (skin)  
15 ppm ACGIH STEL (skin)  
10 ppm (50 mg/m<sup>3</sup>) NIOSH recommended TWA 10 hour(s)  
15 ppm (75 mg/m<sup>3</sup>) NIOSH recommended STEL

**VENTILATION:** Provide local exhaust ventilation system. Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Ensure compliance with applicable exposure limits.

**EYE PROTECTION:** Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

**CLOTHING:** Protective clothing is not required.

**GLOVES:** Wear appropriate chemical resistant gloves.

**RESPIRATOR:** The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.

**100 ppm**

Any chemical cartridge respirator with organic vapor cartridge(s) and dust and mist filter(s).

Any supplied-air respirator.

**250 ppm**

Any supplied-air respirator operated in a continuous-flow mode.

Any chemical cartridge respirator with a full facepiece, organic vapor cartridge(s) and high-efficiency particulate filter(s).

Any powered, air-purifying respirator with organic vapor cartridge(s) and dust and mist filter(s).

Any self-contained breathing apparatus with a full facepiece.

Any supplied-air respirator with a full facepiece.

**Escape -**

Any air-purifying respirator with a full facepiece, an organic vapor canister and high-efficiency particulate filter.

Any appropriate escape-type, self-contained breathing apparatus.

**For Unknown Concentrations or Immediately Dangerous to Life or Health -**

Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.

Any self-contained breathing apparatus with a full facepiece.

---

## SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

---

**PHYSICAL STATE:** solid

**COLOR:** white

**PHYSICAL FORM:** flakes

**ODOR:** mothball odor

**MOLECULAR WEIGHT:** 128.16

**MOLECULAR FORMULA:** C<sub>10</sub>-H<sub>8</sub>

**BOILING POINT:** 424 F (218 C)

**MELTING POINT:** 176 F (80 C)

**VAPOR PRESSURE:** 0.05 mmHg @ 20 C

**VAPOR DENSITY (air=1):** 4.4

**SPECIFIC GRAVITY (water=1):** 1.1

**WATER SOLUBILITY:** insoluble

**PH:** Not applicable

**VOLATILITY:** Not applicable

**ODOR THRESHOLD:** Not available

**EVAPORATION RATE:**

**COEFFICIENT OF WATER/OIL DISTRIBUTION:** Not available

**SOLVENT SOLUBILITY:**

**Soluble:** alcohol, benzene, carbon tetrachloride, fixed & volatile oils

---

## SECTION 10 STABILITY AND REACTIVITY

---

**REACTIVITY:** Stable at normal temperatures and pressure.

**CONDITIONS TO AVOID:** Avoid heat, flames, sparks and other sources of ignition.

**INCOMPATIBILITIES:** oxidizing materials, combustible materials

**HAZARDOUS DECOMPOSITION:**

Thermal decomposition products: oxides of carbon

**POLYMERIZATION:** Will not polymerize.

---

**SECTION 11 TOXICOLOGICAL INFORMATION**

---

**NAPHTHALENE:**

**IRRITATION DATA:**

495 mg open skin-rabbit mild; 100 mg eyes-rabbit mild

**TOXICITY DATA:**

>340 mg/m<sup>3</sup>/1 hour(s) inhalation-rat LC50; >20 gm/kg skin-rabbit LD50; 490 mg/kg oral-rat LD50

**CARCINOGEN STATUS:** IARC: Human Inadequate Evidence, Animal Sufficient Evidence, Group 2B;

ACGIH: A4 -Not Classifiable as a Human Carcinogen

**LOCAL EFFECTS:**

Irritant: inhalation, skin, eye

**ACUTE TOXICITY LEVEL:**

Toxic: ingestion

**TARGET ORGANS:** blood, immune system (sensitizer)

**MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:** metabolic disorders

**TUMORIGENIC DATA:** Available.

**MUTAGENIC DATA:** Available.

**REPRODUCTIVE EFFECTS DATA:** Available.

**ADDITIONAL DATA:** May cross the placenta.

---

**SECTION 12 ECOLOGICAL INFORMATION**

---

**ECOTOXICITY DATA:**

**FISH TOXICITY:** 2600 ug/L 96 hour(s) LC50 (Mortality) Rainbow trout, donaldson trout (Oncorhynchus mykiss)

**INVERTEBRATE TOXICITY:** 2194 ug/L 48 hour(s) EC50 (Immobilization) Water flea (Daphnia magna)

**ALGAL TOXICITY:**

**FATE AND TRANSPORT:**

**BIOCONCENTRATION:** 10844 ug/L 24 hour(s) BCF (Residue) Water flea (Daphnia pulex) 0.45 ug/L

---

**SECTION 13 DISPOSAL CONSIDERATIONS**

---

Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): U165. Dispose in accordance with all applicable regulations.

---

## SECTION 14 TRANSPORT INFORMATION

---

**U.S. DOT 49 CFR 172.101:**

**PROPER SHIPPING NAME:** Naphthalene, crude

**ID NUMBER:** UN1334

**HAZARD CLASS OR DIVISION:** 4.1

**PACKING GROUP:** III

**LABELING REQUIREMENTS:** 4.1

**MARINE POLLUTANT:** NAPHTHALENE



**CANADIAN TRANSPORTATION OF DANGEROUS GOODS:**

**SHIPPING NAME:** NAPHTHALENE, CRUDE

**UN NUMBER:** UN1334

**CLASS:** 4.1

**PACKING GROUP/RISK GROUP:** III

---

## SECTION 15 REGULATORY INFORMATION

---

**U.S. REGULATIONS:**

**CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):**

**NAPHTHALENE:** 100 LBS RQ

**SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30):** Not regulated.

**SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.40):** Not regulated.

**SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):**

**ACUTE:** Yes

**CHRONIC:** Yes

**FIRE:** Yes

**REACTIVE:** No

**SUDDEN RELEASE:** No

**SARA TITLE III SECTION 313 (40 CFR 372.65):**

**NAPHTHALENE**

**OSHA PROCESS SAFETY (29CFR1910.119):** Not regulated.

**STATE REGULATIONS:**

**California Proposition 65:**

Known to the state of California to cause the following:

**NAPHTHALENE**

Cancer (Apr 19, 2002)

**CANADIAN REGULATIONS:**

**WHMIS CLASSIFICATION:** Not determined.

**NATIONAL INVENTORY STATUS:**

**U.S. INVENTORY (TSCA):** Listed on inventory.

**TSCA 12(b) EXPORT NOTIFICATION:** Not listed.

**CANADA INVENTORY (DSL/NDSL):** Not determined.

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**SECTION 16 OTHER INFORMATION**

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# MATERIAL SAFETY DATA SHEET

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## SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

---

**MATHESON TRI-GAS, INC.**  
**959 ROUTE 46 EAST**  
**PARSIPPANY, NEW JERSEY 07054-0624**

**EMERGENCY CONTACT:**  
**CHEMTREC 1-800-424-9300**  
**INFORMATION CONTACT:**  
**973-257-1100**

**SUBSTANCE: O-XYLENE**

**TRADE NAMES/SYNONYMS:**

MTG MSDS 123; BENZENE, 1,2-DIMETHYL-; O-DIMETHYLBENZENE; 1,2-DIMETHYLBENZENE;  
O-METHYLTOLUENE; ORTHO-XYLENE; 1,2-XYLENE; O-XYLLOL; RCRA U239; STCC 4909349; UN  
1307; O-5081; MAT17180; RTECS ZE2450000

**CHEMICAL FAMILY:** hydrocarbons, aromatic

**CREATION DATE:** Jan 24 1989

**REVISION DATE:** Mar 19 2003

---

## SECTION 2 COMPOSITION, INFORMATION ON INGREDIENTS

---

**COMPONENT:** O-XYLENE

**CAS NUMBER:** 95-47-6

**PERCENTAGE:** 100.0

---

## SECTION 3 HAZARDS IDENTIFICATION

---

**NFPA RATINGS (SCALE 0-4):** HEALTH=2 FIRE=3 REACTIVITY=0

**EMERGENCY OVERVIEW:**

**COLOR:** colorless

**PHYSICAL FORM:** liquid

**ODOR:** sweet odor

**MAJOR HEALTH HAZARDS:** respiratory tract irritation, skin irritation, eye irritation, central nervous system depression

**PHYSICAL HAZARDS:** Flammable liquid and vapor. Vapor may cause flash fire.

**POTENTIAL HEALTH EFFECTS:**

**INHALATION:**

**SHORT TERM EXPOSURE:** irritation, low body temperature, ringing in the ears, nausea, vomiting, stomach pain, headache, drowsiness, symptoms of drunkenness, visual disturbances, lung congestion, kidney damage, liver damage, coma



**LONG TERM EXPOSURE:** same as effects reported in short term exposure, tingling sensation, menstrual disorders, infertility, blood disorders, reproductive effects

**SKIN CONTACT:**

**SHORT TERM EXPOSURE:** irritation, blisters

**LONG TERM EXPOSURE:** same as effects reported in short term exposure, rash

**EYE CONTACT:**

**SHORT TERM EXPOSURE:** irritation (possibly severe), tearing

**LONG TERM EXPOSURE:** same as effects reported in short term exposure, blurred vision

**INGESTION:**

**SHORT TERM EXPOSURE:** same as effects reported in short term inhalation, digestive disorders, aspiration hazard

**LONG TERM EXPOSURE:** reproductive effects

---

## SECTION 4 FIRST AID MEASURES

---

**INHALATION:** If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

**SKIN CONTACT:** Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

**EYE CONTACT:** Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

**INGESTION:** If a large amount is swallowed, get medical attention.

---

## SECTION 5 FIRE FIGHTING MEASURES

---

**FIRE AND EXPLOSION HAZARDS:** Severe fire hazard. Vapor/air mixtures are explosive. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back. Electrostatic discharges may be generated by flow or agitation resulting in ignition or explosion.

**EXTINGUISHING MEDIA:** regular dry chemical, carbon dioxide, water, regular foam

Large fires: Use regular foam or flood with fine water spray.

**FIRE FIGHTING:** Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck: Evacuation radius: 800 meters (1/2 mile). Water may be ineffective.

**FLASH POINT:** 63 F (17 C)

**LOWER FLAMMABLE LIMIT:** 0.9%  
**UPPER FLAMMABLE LIMIT:** 6.7%  
**AUTOIGNITION:** 865 F (463 C)  
**FLAMMABILITY CLASS (OSHA):** IB

---

## SECTION 6 ACCIDENTAL RELEASE MEASURES

---

### **AIR RELEASE:**

Reduce vapors with water spray. Stay upwind and keep out of low areas.

### **SOIL RELEASE:**

Trap spilled material at bottom in deep water pockets, excavated holding areas or within sand bag barriers. Dike for later disposal. Absorb with sand or other non-combustible material. Collect with absorbent into suitable container.

### **WATER RELEASE:**

Cover with absorbent sheets, spill-control pads or pillows. Neutralize. Collect with absorbent into suitable container. Absorb with activated carbon. Remove trapped material with suction hoses. Collect spilled material using mechanical equipment.

### **OCCUPATIONAL RELEASE:**

Avoid heat, flames, sparks and other sources of ignition. Stop leak if possible without personal risk. Reduce vapors with water spray. Small spills: Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Large spills: Dike for later disposal. Remove sources of ignition. Keep unnecessary people away, isolate hazard area and deny entry. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

---

## SECTION 7 HANDLING AND STORAGE

---

**STORAGE:** Store and handle in accordance with all current regulations and standards. Store and handle in accordance with all current regulations and standards. Grounding and bonding required. Protect from physical damage. Store outside or in a detached building. Store with flammable liquids. Keep separated from incompatible substances. Keep separated from incompatible substances. Subject to storage regulations: U.S. OSHA 29 CFR 1910.106. Grounding and bonding required. Keep separated from incompatible substances.

---

## SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION

---

### **EXPOSURE LIMITS:**

#### **O-XYLENE:**

#### **XYLENE:**

100 ppm (435 mg/m<sup>3</sup>) OSHA TWA

150 ppm (651 mg/m<sup>3</sup>) OSHA STEL (vacated by 58 FR 35338, June 30, 1993)

100 ppm ACGIH TWA

150 ppm ACGIH STEL

100 ppm (435 mg/m<sup>3</sup>) NIOSH recommended TWA 10 hour(s)  
150 ppm (655 mg/m<sup>3</sup>) NIOSH recommended STEL

**VENTILATION:** Provide local exhaust ventilation system. Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Ensure compliance with applicable exposure limits. Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Provide local exhaust ventilation system.

**EYE PROTECTION:** Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area. Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

**CLOTHING:** Wear appropriate chemical resistant clothing.

**GLOVES:** Wear appropriate chemical resistant gloves. Wear appropriate chemical resistant gloves.

**RESPIRATOR:** The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.

**900 ppm**

Any chemical cartridge respirator with organic vapor cartridge(s).

Any powered, air-purifying respirator with organic vapor cartridge(s).

Any supplied-air respirator.

Any self-contained breathing apparatus with a full facepiece.

**Escape -**

Any air-purifying respirator with a full facepiece and an organic vapor canister.

Any appropriate escape-type, self-contained breathing apparatus.

**For Unknown Concentrations or Immediately Dangerous to Life or Health -**

Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.

Any self-contained breathing apparatus with a full facepiece.

---

## SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

---

**PHYSICAL STATE:** liquid

**APPEARANCE:** clear

**COLOR:** colorless

**ODOR:** sweet odor

**MOLECULAR WEIGHT:** 106.17

**MOLECULAR FORMULA:** C<sub>8</sub>-H<sub>10</sub>

**BOILING POINT:** 291 F (144 C)

**FREEZING POINT:** -13 F (-25 C)

**VAPOR PRESSURE:** 5.2 mmHg @ 25 C

**VAPOR DENSITY (air=1):** 3.7

**SPECIFIC GRAVITY (water=1):** 0.8802

**WATER SOLUBILITY:** 0.0175% @ 20 C

**PH:** Not available

**VOLATILITY:** 100%

**ODOR THRESHOLD:**

**EVAPORATION RATE:** 0.7 (butyl acetate=1)  
**COEFFICIENT OF WATER/OIL DISTRIBUTION:** Not available  
**SOLVENT SOLUBILITY:**  
**Soluble:** alcohol, ether, benzene, acetone, organic solvents

---

## SECTION 10 STABILITY AND REACTIVITY

---

**REACTIVITY:** Stable at normal temperatures and pressure.

**CONDITIONS TO AVOID:** Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat. Keep out of water supplies and sewers.

**INCOMPATIBILITIES:** oxidizing materials

**HAZARDOUS DECOMPOSITION:**  
Thermal decomposition products: oxides of carbon

**POLYMERIZATION:** Will not polymerize.

---

## SECTION 11 TOXICOLOGICAL INFORMATION

---

### **O-XYLENE:**

#### **TOXICITY DATA:**

3617 mg/kg oral-rat LD50 (Phillips)

#### **LOCAL EFFECTS:**

Irritant: inhalation, skin, eye

#### **ACUTE TOXICITY LEVEL:**

Moderately Toxic: ingestion

**TARGET ORGANS:** central nervous system

**REPRODUCTIVE EFFECTS DATA:** Available.

**ADDITIONAL DATA:** Alcohol may enhance the toxic effects. Stimulants such as epinephrine may induce ventricular fibrillation.

---

## SECTION 12 ECOLOGICAL INFORMATION

---

### **ECOTOXICITY DATA:**

**FISH TOXICITY:** 16400 ug/L 96 hour(s) LC50 (Mortality) Fathead minnow (*Pimephales promelas*)

**INVERTEBRATE TOXICITY:** 200 mg/L 24 hour(s) EC100 (Abundance) Water flea (*Daphnia magna*)

**ALGAL TOXICITY:** 4200 ug/L 8 hour(s) EC50 (Growth) Green algae (*Selenastrum capricornutum*)

**OTHER TOXICITY:** 73000 ug/L 48 hour(s) LC50 (Mortality) Clawed toad (*Xenopus laevis*)

---

## SECTION 13 DISPOSAL CONSIDERATIONS

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Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): U239.

---

**SECTION 14 TRANSPORT INFORMATION**

---

**U.S. DOT 49 CFR 172.101:**

**PROPER SHIPPING NAME:** Xylenes

**ID NUMBER:** UN1307

**HAZARD CLASS OR DIVISION:** 3

**PACKING GROUP:** II

**LABELING REQUIREMENTS:** 3



**CANADIAN TRANSPORTATION OF DANGEROUS GOODS:**

**SHIPPING NAME:** Xylenes

**UN NUMBER:** UN1307

**CLASS:** 3

**PACKING GROUP/RISK GROUP:** II

---

**SECTION 15 REGULATORY INFORMATION**

---

**U.S. REGULATIONS:**

**CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):**

**o-Xylene:** 1000 LBS RQ

**SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30):** Not regulated.

**SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.40):** Not regulated.

**SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):**

**ACUTE:** Yes

**CHRONIC:** No

**FIRE:** Yes

**REACTIVE:** No

**SUDDEN RELEASE:** No

**SARA TITLE III SECTION 313 (40 CFR 372.65):**

**o-Xylene**

**OSHA PROCESS SAFETY (29CFR1910.119):** Not regulated.

**STATE REGULATIONS:**

**California Proposition 65:** Not regulated.

**CANADIAN REGULATIONS:**

**WHMIS CLASSIFICATION:** BD2

**NATIONAL INVENTORY STATUS:**

**U.S. INVENTORY (TSCA):** Listed on inventory.

**TSCA 12(b) EXPORT NOTIFICATION:** Not listed.

**CANADA INVENTORY (DSL/NDSL):** Not determined.

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**SECTION 16 OTHER INFORMATION**

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# MATERIAL SAFETY DATA SHEET

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## SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

---

**MATHESON TRI-GAS, INC.**  
**959 ROUTE 46 EAST**  
**PARSIPPANY, NEW JERSEY 07054-0624**

**EMERGENCY CONTACT:**  
**CHEMTREC 1-800-424-9300**  
**INFORMATION CONTACT:**  
**973-257-1100**

**SUBSTANCE: P-XYLENE**

**TRADE NAMES/SYNONYMS:**

MTG MSDS 124; BENZENE, 1,4-DIMETHYL-; P-DIMETHYLBENZENE; 1,4-DIMETHYLBENZENE;  
P-METHYLTOLUENE; 4-METHYLTOLUENE; 1,4-XYLENE; P-XYLOL; RCRA U239; STCC 4909351;  
UN 1307; O-5082; MAT17940; RTECS ZE2625000

**CHEMICAL FAMILY:** hydrocarbons, aromatic

**CREATION DATE:** Jan 24 1989

**REVISION DATE:** Mar 19 2003

---

## SECTION 2 COMPOSITION, INFORMATION ON INGREDIENTS

---

**COMPONENT:** P-XYLENE  
**CAS NUMBER:** 106-42-3  
**PERCENTAGE:** 100.0

---

## SECTION 3 HAZARDS IDENTIFICATION

---

**NFPA RATINGS (SCALE 0-4):** HEALTH=2 FIRE=3 REACTIVITY=0

**EMERGENCY OVERVIEW:**

**COLOR:** colorless

**PHYSICAL FORM:** liquid

**ODOR:** sweet odor

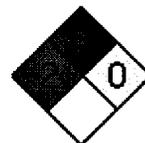
**MAJOR HEALTH HAZARDS:** respiratory tract irritation, skin irritation, eye irritation, central nervous system depression

**PHYSICAL HAZARDS:** Flammable liquid and vapor. Vapor may cause flash fire.

**POTENTIAL HEALTH EFFECTS:**

**INHALATION:**

**SHORT TERM EXPOSURE:** irritation, low body temperature, ringing in the ears, nausea, vomiting, stomach pain, headache, drowsiness, symptoms of drunkenness, visual disturbances, lung congestion, kidney damage, liver damage, coma



**LONG TERM EXPOSURE:** tingling sensation, menstrual disorders, infertility, reproductive effects, convulsions

**SKIN CONTACT:**

**SHORT TERM EXPOSURE:** irritation, blisters

**LONG TERM EXPOSURE:** rash

**EYE CONTACT:**

**SHORT TERM EXPOSURE:** irritation (possibly severe), tearing

**LONG TERM EXPOSURE:** blurred vision

**INGESTION:**

**SHORT TERM EXPOSURE:** digestive disorders, symptoms of drunkenness, lung congestion, kidney damage, liver damage

**LONG TERM EXPOSURE:** reproductive effects

---

## SECTION 4 FIRST AID MEASURES

---

**INHALATION:** If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

**SKIN CONTACT:** Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

**EYE CONTACT:** Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

**INGESTION:** Contact local poison control center or physician immediately. Never make an unconscious person vomit or drink fluids. When vomiting occurs, keep head lower than hips to help prevent aspiration. If person is unconscious, turn head to side. Get medical attention immediately.

**NOTE TO PHYSICIAN:** For inhalation, consider oxygen. For ingestion, consider gastric lavage.

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## SECTION 5 FIRE FIGHTING MEASURES

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**FIRE AND EXPLOSION HAZARDS:** Severe fire hazard. Vapor/air mixtures are explosive above flash point. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back. Electrostatic discharges may be generated by flow or agitation resulting in ignition or explosion.

**EXTINGUISHING MEDIA:** regular dry chemical, carbon dioxide, water, regular foam

Large fires: Use regular foam or flood with fine water spray.

**FIRE FIGHTING:** Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any

discoloration of tanks due to fire. For tank, rail car or tank truck: Evacuation radius: 800 meters (1/2 mile). Water may be ineffective.

**FLASH POINT:** 81 F (27 C) (CC)  
**LOWER FLAMMABLE LIMIT:** 1.1%  
**UPPER FLAMMABLE LIMIT:** 7.0%  
**AUTOIGNITION:** 982 F (528 C)  
**FLAMMABILITY CLASS (OSHA):** IC

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## SECTION 6 ACCIDENTAL RELEASE MEASURES

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### **AIR RELEASE:**

Reduce vapors with water spray. Stay upwind and keep out of low areas.

### **SOIL RELEASE:**

Dig holding area such as lagoon, pond or pit for containment. Dike for later disposal. Absorb with sand or other non-combustible material. Collect with absorbent into suitable container.

### **WATER RELEASE:**

Cover with absorbent sheets, spill-control pads or pillows. Neutralize. Collect with absorbent into suitable container. Absorb with activated carbon. Remove trapped material with suction hoses. Collect spilled material using mechanical equipment.

### **OCCUPATIONAL RELEASE:**

Avoid heat, flames, sparks and other sources of ignition. Stop leak if possible without personal risk. Reduce vapors with water spray. Small spills: Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Large spills: Dike for later disposal. Remove sources of ignition. Keep unnecessary people away, isolate hazard area and deny entry. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

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## SECTION 7 HANDLING AND STORAGE

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**STORAGE:** Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.106. Grounding and bonding required. Protect from physical damage. Store outside or in a detached building. Store with flammable liquids. Keep separated from incompatible substances. Keep separated from incompatible substances.

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## SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION

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### **EXPOSURE LIMITS:**

#### **P-XYLENE:**

#### **XYLENE:**

100 ppm (435 mg/m<sup>3</sup>) OSHA TWA

150 ppm (651 mg/m<sup>3</sup>) OSHA STEL (vacated by 58 FR 35338, June 30, 1993)

100 ppm ACGIH TWA  
150 ppm ACGIH STEL  
100 ppm (435 mg/m<sup>3</sup>) NIOSH recommended TWA 10 hour(s)  
150 ppm (655 mg/m<sup>3</sup>) NIOSH recommended STEL

**VENTILATION:** Provide local exhaust ventilation system. Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Ensure compliance with applicable exposure limits.

**EYE PROTECTION:** Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

**CLOTHING:** Wear appropriate chemical resistant clothing.

**GLOVES:** Wear appropriate chemical resistant gloves.

**RESPIRATOR:** The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.

**900 ppm**

Any chemical cartridge respirator with organic vapor cartridge(s).  
Any powered, air-purifying respirator with organic vapor cartridge(s).  
Any supplied-air respirator.  
Any self-contained breathing apparatus with a full facepiece.

**Escape -**

Any air-purifying respirator with a full facepiece and an organic vapor canister.  
Any appropriate escape-type, self-contained breathing apparatus.

**For Unknown Concentrations or Immediately Dangerous to Life or Health -**

Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.  
Any self-contained breathing apparatus with a full facepiece.

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## SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

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**PHYSICAL STATE:** liquid

**APPEARANCE:** clear

**COLOR:** colorless

**ODOR:** sweet odor

**MOLECULAR WEIGHT:** 106.17

**MOLECULAR FORMULA:** C<sub>8</sub>-H<sub>10</sub>

**BOILING POINT:** 280 F (138 C)

**FREEZING POINT:** 55 F (13 C)

**VAPOR PRESSURE:** 8.6 mmHg @ 25 C

**VAPOR DENSITY (air=1):** 3.7

**SPECIFIC GRAVITY (water=1):** 0.8611

**WATER SOLUBILITY:** insoluble

**PH:** Not available

**VOLATILITY:** Not available

**ODOR THRESHOLD:** 0.47 ppm

**EVAPORATION RATE:** 0.7 (butyl acetate=1)  
**COEFFICIENT OF WATER/OIL DISTRIBUTION:** Not available  
**SOLVENT SOLUBILITY:**  
**Soluble:** alcohol, ether, benzene, acetone, organic solvents

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## SECTION 10 STABILITY AND REACTIVITY

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**REACTIVITY:** Stable at normal temperatures and pressure.

**CONDITIONS TO AVOID:** Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat. Keep out of water supplies and sewers.

**INCOMPATIBILITIES:** acids, combustible materials, oxidizing materials

**HAZARDOUS DECOMPOSITION:**  
Thermal decomposition products: oxides of carbon

**POLYMERIZATION:** Will not polymerize.

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## SECTION 11 TOXICOLOGICAL INFORMATION

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**P-XYLENE:**

**TOXICITY DATA:**

4550 ppm/4 hour(s) inhalation-rat LC50; 5 gm/kg oral-rat LD50

**LOCAL EFFECTS:**

Irritant: inhalation, skin, eye

**ACUTE TOXICITY LEVEL:**

Moderately Toxic: inhalation, ingestion

**TARGET ORGANS:** central nervous system

**REPRODUCTIVE EFFECTS DATA:** Available.

**ADDITIONAL DATA:** Alcohol may enhance the toxic effects. Stimulants such as epinephrine may induce ventricular fibrillation.

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## SECTION 12 ECOLOGICAL INFORMATION

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**ECOTOXICITY DATA:**

**FISH TOXICITY:** 8800 ug/L 96 hour(s) LC50 (Mortality) Guppy (*Poecilia reticulata*)

**INVERTEBRATE TOXICITY:** 3600 ug/L 24 hour(s) EC50 (Immobilization) Water flea (*Daphnia magna*)

**ALGAL TOXICITY:** 4400 ug/L 8 hour(s) EC50 (Growth) Green algae (*Selenastrum capricornutum*)

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## SECTION 13 DISPOSAL CONSIDERATIONS

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Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): U239. Dispose in accordance with all applicable regulations.

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## SECTION 14 TRANSPORT INFORMATION

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**U.S. DOT 49 CFR 172.101:**  
**PROPER SHIPPING NAME:** Xylenes  
**ID NUMBER:** UN1307  
**HAZARD CLASS OR DIVISION:** 3  
**PACKING GROUP:** II  
**LABELING REQUIREMENTS:** 3



**CANADIAN TRANSPORTATION OF DANGEROUS GOODS:**  
**SHIPPING NAME:** Xylenes  
**UN NUMBER:** UN1307  
**CLASS:** 3  
**PACKING GROUP/RISK GROUP:** II

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## SECTION 15 REGULATORY INFORMATION

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**U.S. REGULATIONS:**  
**CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):**  
**p-Xylene:** 100 LBS RQ

**SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30):** Not regulated.

**SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.40):** Not regulated.

**SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):**  
**ACUTE:** Yes  
**CHRONIC:** No  
**FIRE:** Yes  
**REACTIVE:** No  
**SUDDEN RELEASE:** No

**SARA TITLE III SECTION 313 (40 CFR 372.65):**  
**p-Xylene**

**OSHA PROCESS SAFETY (29CFR1910.119):** Not regulated.

**STATE REGULATIONS:**  
**California Proposition 65:** Not regulated.

**CANADIAN REGULATIONS:**  
**WHMIS CLASSIFICATION:** BD2

**NATIONAL INVENTORY STATUS:**

**U.S. INVENTORY (TSCA):** Listed on inventory.

**TSCA 12(b) EXPORT NOTIFICATION:** Not listed.

**CANADA INVENTORY (DSL/NDSL):** Not determined.

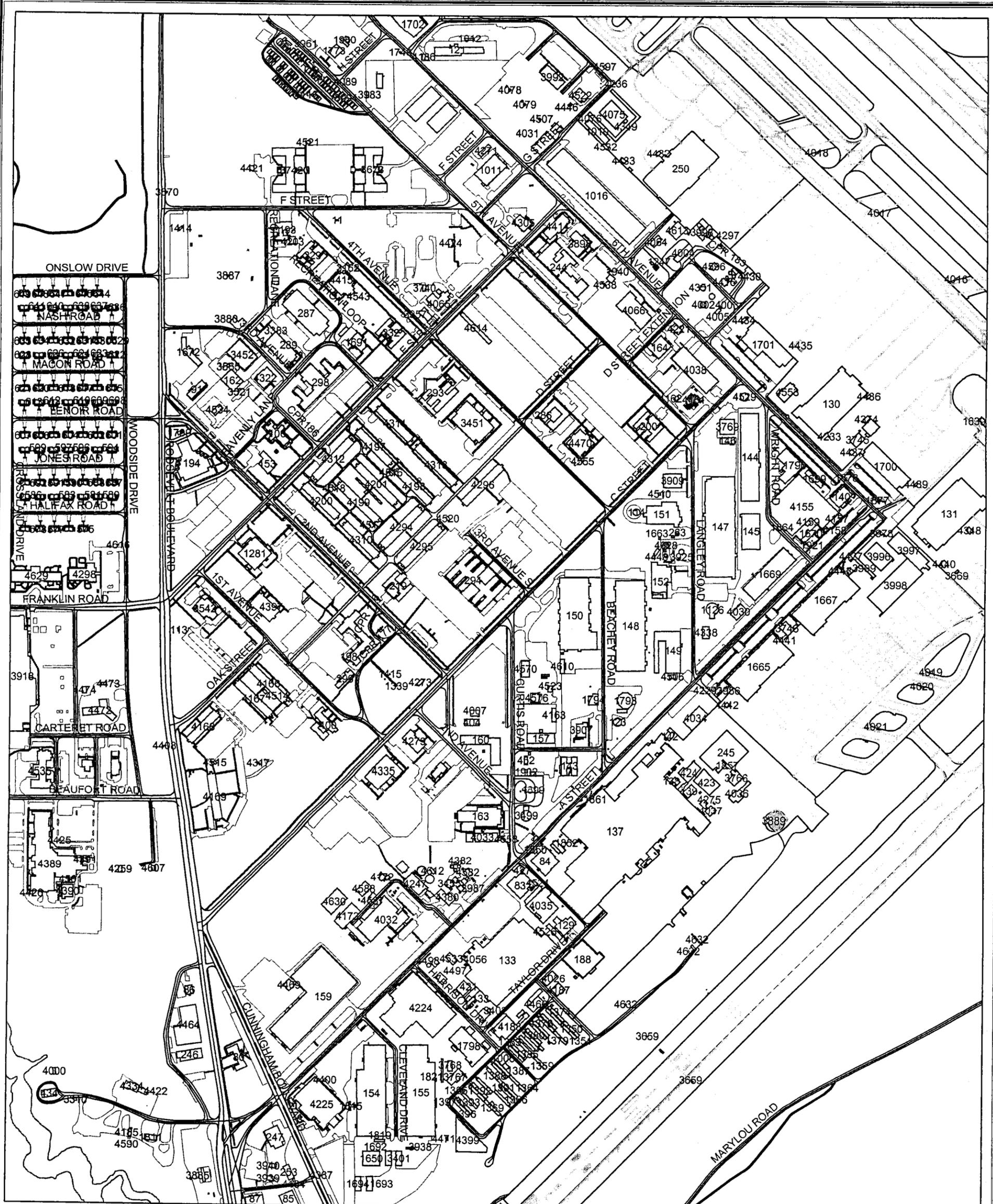
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**SECTION 16 OTHER INFORMATION**

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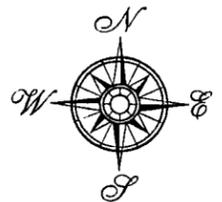
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# MCAS CHERRY POINT CORE AREA

- Legend**
- BUILDINGS/STRUCTURES
  - ROAD AREA**
  - ROAD AREA
  - ROAD C/L
  - ROAD C/L
  - AIRFIELD SURFACE**
  - AIRFIELD SURFACE
  - AIRFIELD MARKINGS
  - WATER BODIES**
  - WATER BODIES
  - DRIVEWAY AREA**
  - DRIVEWAY AREA
  - PARKING AREA**
  - PARKING AREA
  - SIDEWALKS**
  - SIDEWALKS



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TO BE USED FOR REFERENCE ONLY

