



reviewed 1/9/92  
SOS

December 15, 1991

Scott O. Seery  
Alameda County Department of  
Environmental Health  
Hazardous Materials Program  
80 Swan Way, Room 200  
Oakland, CA 94621

Re: Addendum to Workplan  
Shell Service Station

WA Job #81-423-00

Dear Mr. Seery:

As you requested in your November 18, 1991 letter,<sup>1</sup> clarifications to Weiss Associates' (WA) September 23, 1991<sup>2</sup> workplan are presented below. The item numbers and italicized text below correspond to the item numbers in your November 18 letter.

- 1) *Site safety plan.* A site-specific plan is enclosed.
- 2) *Well construction diagram.* A generalized diagram is presented in Figure 1.
- 3) *Well drilling and construction.* WA will drill each soil boring using hollow-stem augers. Drilling equipment will be steam-cleaned prior to use and between borings. Sample equipment will be washed with Alconox detergent and rinsed with potable water between samples. Steam clean rinsate will be contained in Department of Transportation-approved 55-gallon drums until properly disposed offsite. The wells will be constructed inside the augers as the augers are removed.
- 4) *Type, diameter, screen interval, sand and slot size, and seal type and depth.* The wells will be constructed with 4-inch diameter, flush-threaded Schedule 40 PVC blank casing and 0.010-inch slotted screen. The well screens will extend about 5 ft above and 15 ft below the water table. Ground water is about 45 ft depth beneath the site.

<sup>1</sup> Alameda County Department of Environmental Health (ACDEH), November 18, 1991, Letter to WA requesting a workplan addendum for the Shell service station at 1285 Bancroft Avenue in San Leandro, California, 2 pages.

<sup>2</sup> WA, September 23, 1991, Letter-workplan submitted to the ACDEH for the Shell service station at 1285 Bancroft Avenue in San Leandro, California, 4 pages.



Lonestar #1/20 Monterey sand will fill the annular space to about 1 ft above each well screen. A one-ft thick hydrated bentonite seal will separate the sand in each well from the overlying surface seal of Portland Type I-II cement mixed with 3 to 5% bentonite by volume. The depth of each sanitary seal will be at least 35 ft.

- 5) *Well development.* The wells will be developed using surge block agitation and airlift evacuation. Development will continue until at least ten well-casing volumes of water are removed from each well and until the amount of sediment in the purge water is negligible.
- 6) *Water level measurements.* Water levels will be measured in the wells with an electric sounder to the nearest 0.01 ft. The sounder will be rinsed between measurements to prevent cross-contamination.
- 7) *Measurement of floating hydrocarbons.* WA will check the wells for floating hydrocarbons using an electric oil/water interface probe and a clear acrylic bailer. We will measure the floating hydrocarbon thickness, if any, with the interface probe to the nearest 0.01 ft. Well purge water will also be observed for hydrocarbon sheen and odor.
- 8) *Well purging.* WA will purge at least four well-casing volumes from each well using new PVC bailers that will be dedicated to each well.
- 9) *Sample collection.* Soil samples will be surveyed in the field with a portable photoionization detector (PID) to assess whether volatile hydrocarbon vapors emanate from the soil. WA will collect samples at least every five ft depth, at significant lithology changes and from any zones where we observe hydrocarbons. The samples will be collected with a split-barrel drive sampler lined with steam-cleaned brass tubes. After removal from the sampler, the tubes will be immediately trimmed, capped with Teflon sheeting and plastic caps, labeled and refrigerated for delivery under chain-of-custody to a California-certified analytical laboratory.

side of: PH, conductance, temp, before sampling

Water samples will be drawn from the sampling ports on the sides of the dedicated PVC bailers into the appropriate clean sample containers and delivered to a California-certified laboratory following proper sample preservation and chain-of-custody procedures. A trip blank will accompany the water samples from the site to the laboratory.

- 10) *Sample analysis.* Soil and ground water samples will be analyzed for total petroleum hydrocarbons as gasoline and diesel by modified EPA Method 8015, benzene, ethylbenzene, toluene and xylenes by EPA Method 602 or 8020 and halogenated volatile organic compounds by EPA Method 601 or 8010.

We will schedule the field work at this site concurrent with the work proposed for the Shell service station at 1784 150th Avenue in San Leandro. The work at the 150th Avenue site

Scott O. Seery  
December 10, 1991

3

Weiss Associates



is on hold pending your approval of WA's September 23, 1991 work plan.<sup>3</sup> Please call if you have any questions.

Sincerely,  
Weiss Associates

Thomas Fojut  
Staff Geologist

N. Scott MacLeod  
Senior Staff Geologist

TF/NSM:fc

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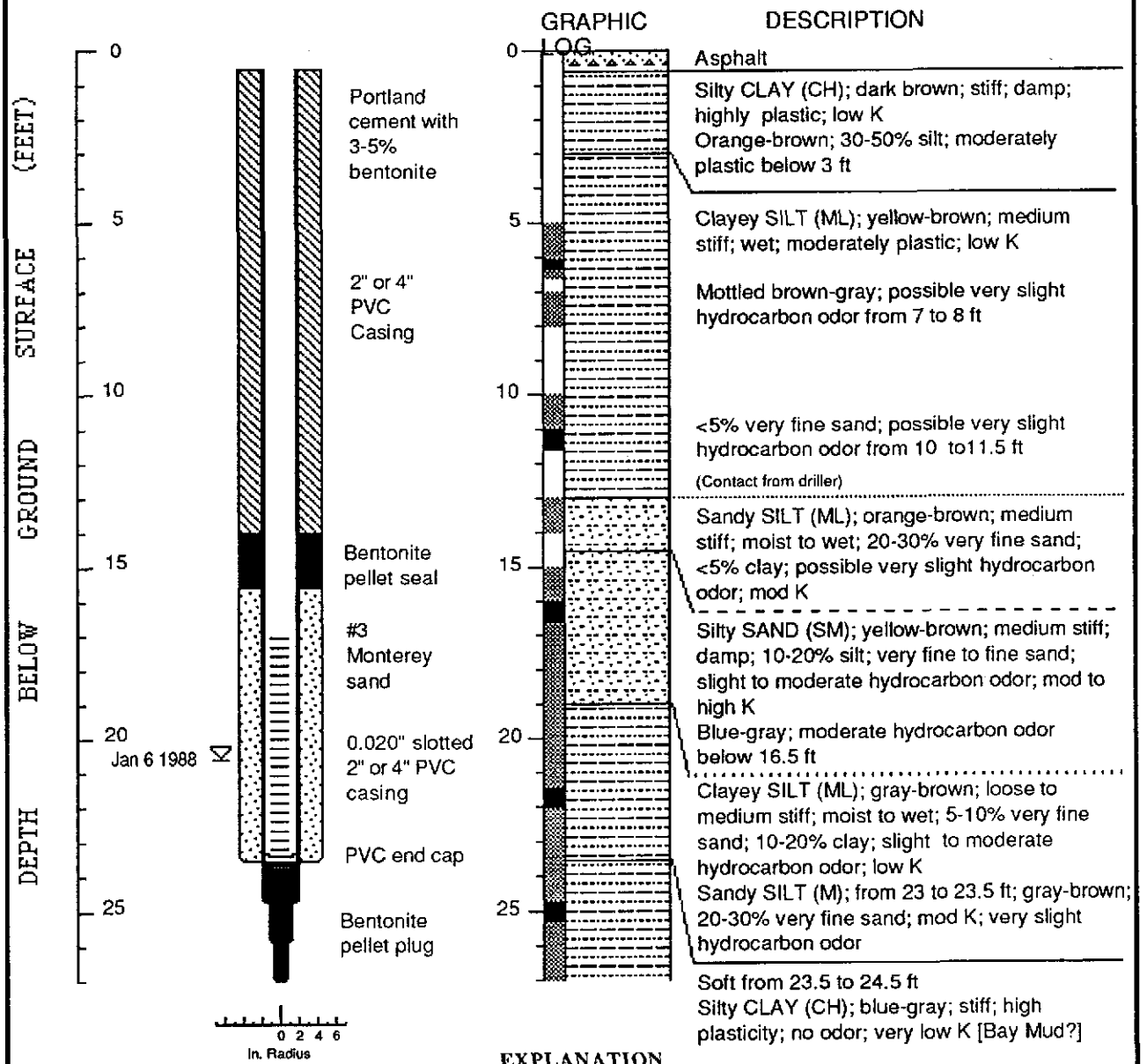
Enclosures: Figure 1 - Generalized Well Construction Diagram  
Site Safety Plan

cc: w/o enclosures: Kurt Miller, Shell Oil Company, P.O. Box 5278, Concord, CA 94520-9998  
Lester Feldman, Regional Water Quality Control Board - San Francisco  
Bay, 2101 Webster Street, Suite 500, Oakland, California 94612

<sup>3</sup>

WA, September 23, 1991, Letter-workplan submitted to the ACDEH for the Shell service station at 1784 150th Avenue in San Leandro, California, 4 pages.

### Generalized Monitoring Well Construction Detail



- ▼ Water level during drilling (date)
- ▽ Water Level (date)
- Contact (dashed where approx.)
- - - Uncertain Contact
- ..... Gradational Contact
- ▨ Location of recovered drive sample
- Location of drive sample collected for chemical analysis
- ⊗ Grab sample
- K = Estimated hydraulic conductivity

- Logged by:
- Supervisor:
- Drilling Company:
- Driller:
- Drilling Method:
- Dates Drilled:
- Well Head Completion:
- Type of sampler:

Boring Log and Well Construction Details

Date 12-5-91  
 Job # 81-423-

A. Site Description

Client: SHELL OIL COMPANY  
 Location: 1285 BANCROFT AVENUE SAN LEANDRO, CA  
 Area affected [ ] yd x [ ] yd [ ] acres  
 Surrounding land use  Residential [ ] Agricultural [ ] Industrial  Commercial  
 Topography  Flat [ ] Hilly [ ] Open Excavation [ ] Paved [ ] Unpaved  
 Weather conditions SUNNY - CLOUDY ~ 65°F

B. Work to be Performed INSTALL TWO GROUND WATER MONITORING WELLS

C. On Site Control  A safe perimeter has been established. Its boundaries are defined by

tape  traffic cones  other DRILL RIG

[ ] The contamination reduction zone is designated as follows: \_\_\_\_\_

[ ] The support zone is designated as follows: \_\_\_\_\_

D. Hazard Evaluation

- The following substances are known or suspected to be on site.  
 Concentration range in water (mg/l) and soils (mg/kg) are as shown.

Substance	Free-Phase	(PPM)	
		In Ground Water	In Soil
<u>TPH-G</u>	<u>---</u>	<u>UP TO 0.5</u>	<u>UP TO 35</u>
<u>Σ BETX</u>	<u>---</u>	<u>UP TO 0.04</u>	<u>UP TO 1</u>
<u>TPH-D</u>	<u>---</u>	<u>UP TO 1.3</u>	<u>---</u>
<u>PCE/CHLOROFORM</u>	<u>---</u>	<u>UP TO 0.04</u>	<u>NONE</u>

- CHRIS Material Safety Data Sheets (MSDS) for the substances at the site are attached.  
 Air concentrations may exceed 10% of the Lower Explosive Limit (LEL).  
 Air concentrations may exceed OSHA Permissible Exposure Levels (PEL) 8 hour Time Weighted Average (TWA) for the following substances: \_\_\_\_\_

General Safety Hazards:

- Underground utilities and/or process lines have been identified. A line detector survey is ~~not~~ required.  
 Nitrogen cylinders or tanks will be used. Safety and operating instructions have been reviewed.  
 Personnel are aware of safety hazards associated with lifting heavy items, moving machinery parts, slipping, falling and operating or working near electrical equipment.  
 Confined space entry is required. All personnel have reviewed confined space entry procedures. A confined space entry checklist has been completed and it is attached to this plan.

E. Air Monitoring

The following air monitoring instruments shall be used on site at the specified intervals:

- [ ] Combustible Gas Indicator \_\_\_\_\_  
 Oxygen Indicator \_\_\_\_\_  
 Organic Vapor Meter AS NEEDED  
 Color Tubes (Refer to Attached Flow Chart): \_\_\_\_\_

Substance	Concentration Range	Pump Strokes
_____	_____	_____
_____	_____	_____

F. Personal Protective Equipment

The required personal protection level is: D. Specific protective equipment to be worn is as follows:

Protective clothing materials for the involved substances are HARD HAT, GLOVES, STEEL-TOED BOOTS, GOGGLES,  
 Respiratory protection shall consist of 1/4-FACE RESPIRATOR Protection Factor = 10.

The required respiratory cartridge is ORGANIC VAPORS  
 This cartridge is expected to provide adequate protection for 8 hours.

- All personnel at the site have been trained in the proper use and care of protective equipment.

G. Decontamination Procedures

Personnel and equipment leaving the site shall be decontaminated as follows:

PERSONNEL - WASH HANDS WITH SOAP AND WATER  
EQUIPMENT - STEAM CLEAN

H. Heat Stress Monitoring

The expected air temperature will be 65 F. Adjusted air temperature [Tadj = Tair( F) + (13 x % sunshine)] is not expected to exceed 78 F.

- A Health Alert Warning (air temperatures likely to exceed 95 F) has [not] been issued by the weather service.
- Workers are trained to recognize heat stress symptoms.
- The Site Safety Officer will monitor pulse rate and temperature of workers showing signs of heat stress and modify the work schedule accordingly. A disposable oral thermometer is part of the field kit. No team member will work if his/her oral temperature exceeds 100.6 F.
- Drinking water and disposable cups are available during work.

I. Emergency Procedures

Personnel Injury: The Site Safety Officer and Project Team Leader should evaluate the nature of the injury and contact should be made for an ambulance and with the designated medical facility (if required). An incident report form should be filed.

Fire/Explosion: The fire department shall be alerted if necessary. All personnel shall be moved to a safe distance from the involved area. There is [not] an alarm system at the facility.  The client has explained to us the procedures to be followed if their alarm is activated.

Oral communications are  possible at all times.  A [horn] [megaphone] will be used to issue emergency signals.

Emergency escape routes have been identified as follows:

AGAINST PREVAILING WIND DIRECTION

J. Emergency Medical Care

Hospital HUMANA, at 13855 E 14TH ST AT 136TH DR  
phone 357-6500 is located 5 minutes from this location. A map of alternative routes to this facility is attached. First-aid equipment is available on site at the following locations:

- First-aid kit
- Emergency eye wash
- Other

WA TRUCK

List of emergency phone numbers:

Agency/Facility	Phone #	Contact (if applicable)
Police <u>SAN LEANDRO PD</u>	<u>911</u>	
Fire <u>SAN LEANDRO FD</u>	<u>911</u>	
Client <u>SHELL OIL -</u>	<u>510-685-3853</u>	<u>KURT MILLER</u>
<u>KURT MILLER</u>		

Any injuries sustained while working are covered under Worker's Compensation insurance. Any injured WA employee should inform the medical care facility that this is a worker's comp claim and that our policy is Firemans' Fund #8 09 WP 8033 32 19. Copies of the Doctor's report on injury should be forwarded to our carrier (Debbie Bennett, Dealey Renton & Associates, P.O. Box 12675, Oakland, CA 94604.) WA employees must also notify Beth Springston at WA the same day so that this claim can be filed properly.

Any injured sub-contractor employee will be covered under their employer's policy. If they do not know their information, call Beth Springston at WA. She has certificates of the insurance policy for all approved sub-contractors.

Emergency medical information is presented in the attached MSDS.

All site personnel have read the plan and are familiar with its provisions. The following personnel are designated to carry out job functions at the site:

	Name	Signature
Project Team Leader	<u>SCOTT MACLEOD</u>	_____
Site Safety Officer	_____	_____
Field Team Leader	<u>TOM FOJUT</u>	_____
Field Team Member	_____	_____
Field Team Member	_____	_____
Field Team Member	_____	_____
WA Office Advisor	_____	_____

# GASOLINES: AUTOMOTIVE (<4.23g lead/gal)

GAT

<p><b>Common Synonyms</b> Motor spirit Petrol</p>	<p>Watery liquid</p> <p>Colorless to pale brown or pink</p> <p>Gasoline odor</p> <p>Floats on water. Flammable, irritating vapor is produced.</p>		
<p>Stop discharge if possible. Keep people away. Shut off ignition sources and call fire department. Stay upwind and use water spray to "knock down" vapor. Isolate and remove discharged material. Notify local health and pollution control agencies.</p>			
<p><b>Fire</b></p>	<p><b>FLAMMABLE.</b> Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. Extinguish with dry chemical, foam, or carbon dioxide. Water may be ineffective on fire. Cool exposed containers with water.</p>		
<p><b>Exposure</b></p>	<p><b>CALL FOR MEDICAL AID.</b></p> <p><b>VAPOR</b> Irritating to eyes, nose and throat. If inhaled, will cause dizziness, headache, difficult breathing or loss of consciousness. Move to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.</p> <p><b>LIQUID</b> Irritating to skin and eyes. If swallowed, will cause nausea or vomiting. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk. <b>DO NOT INDUCE VOMITING.</b></p>		
<p><b>Water Pollution</b></p>	<p><b>HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS.</b> Fouling to shoreline. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.</p>		
<p><b>1. RESPONSE TO DISCHARGE</b> (See Response Methods Handbook) Issue warning-high flammability Evacuate area Disperse and flush</p>		<p><b>2. LABEL</b> 2.1 <b>Category:</b> Flammable liquid 2.2 <b>Class:</b> 3</p>	
<p><b>3. CHEMICAL DESIGNATIONS</b> 3.1 <b>CG Compatibility Class:</b> Miscellaneous Hydrocarbon Mixtures 3.2 <b>Formula:</b> (Mixture of hydrocarbons) 3.3 <b>IMO/UN Designation:</b> 3.1/1203 3.4 <b>DOT ID No.:</b> 1203 3.5 <b>CAS Registry No.:</b> Data not available</p>		<p><b>4. OBSERVABLE CHARACTERISTICS</b> 4.1 <b>Physical State (as shipped):</b> Liquid 4.2 <b>Color:</b> Colorless to brown 4.3 <b>Odor:</b> Gasoline</p>	
<p><b>5. HEALTH HAZARDS</b></p> <p>5.1 <b>Personal Protective Equipment:</b> Protective goggles, gloves. 5.2 <b>Symptoms Following Exposure:</b> Irritation of mucous membranes and stimulation followed by depression of central nervous system. Breathing of vapor may also cause dizziness, headache, and incoordination or, in more severe cases, anesthesia, coma, and respiratory arrest. If liquid enters lungs, it will cause severe irritation, coughing, gagging, pulmonary edema, and, later, signs of bronchopneumonia and pneumonitis. Swallowing may cause irregular heartbeat. 5.3 <b>Treatment of Exposure:</b> INHALATION: maintain respiration and administer oxygen; enforce bed rest if liquid is in lungs. INGESTION: do NOT induce vomiting; stomach should be lavaged (by doctor) if appreciable quantity is swallowed. EYES: wash with copious quantity of water. SKIN: wipe off and wash with soap and water. 5.4 <b>Threshold Limit Value:</b> 300 ppm 5.5 <b>Short Term Inhalation Limits:</b> 500 ppm for 30 min. 5.6 <b>Toxicity by Ingestion:</b> Grade 2; LD<sub>50</sub> = 0.5 to 5 g/kg. 5.7 <b>Late Toxicity:</b> None 5.8 <b>Vapor (Gas) Irritant Characteristics:</b> Vapors cause a slight smarting of the eyes or respiratory system if present in high concentrations. The effect is temporary. 5.9 <b>Liquid or Solid Irritant Characteristics:</b> Minimum hazard. If spilled on clothing and allowed to remain, may cause smarting and reddening of the skin. 5.10 <b>Odor Threshold:</b> 0.25 ppm 5.11 <b>IDLH Value:</b> Data not available</p>			

<p><b>6. FIRE HAZARDS</b></p> <p>6.1 <b>Flash Point:</b> -36°F C.C. 6.2 <b>Flammable Limits in Air:</b> 1.4%-7.4% 6.3 <b>Fire Extinguishing Agents:</b> Foam, carbon dioxide, dry chemical 6.4 <b>Fire Extinguishing Agents Not to be Used:</b> Water may be ineffective 6.5 <b>Special Hazards of Combustion Products:</b> None 6.6 <b>Behavior in Fire:</b> Vapor is heavier than air and may travel considerable distance to a source of ignition and flash back. 6.7 <b>Ignition Temperature:</b> 853°F 6.8 <b>Electrical Hazard:</b> Class I, Group D 6.9 <b>Burning Rate:</b> 4 mm/min. 6.10 <b>Adiabatic Flame Temperature:</b> Data not available 6.11 <b>Stoichiometric Air to Fuel Ratio:</b> Data not available 6.12 <b>Flame Temperature:</b> Data not available</p> <p><b>7. CHEMICAL REACTIVITY</b></p> <p>7.1 <b>Reactivity With Water:</b> No reaction 7.2 <b>Reactivity With Common Materials:</b> No reaction 7.3 <b>Stability During Transport:</b> Stable 7.4 <b>Neutralizing Agents for Acids and Caustics:</b> Not pertinent 7.5 <b>Polymerization:</b> Not pertinent 7.6 <b>Inhibitor of Polymerization:</b> Not pertinent 7.7 <b>Molar Ratio (Reactant to Product):</b> Data not available 7.8 <b>Reactivity Group:</b> 33</p> <p><b>8. WATER POLLUTION</b></p> <p>8.1 <b>Aquatic Toxicity:</b> 90 ppm/24 hr/juvenile American shad/TL<sub>50</sub>/fresh water 91 mg/l/24 hr/juvenile American shad/TL<sub>50</sub>/salt water 8.2 <b>Waterway Toxicity:</b> Data not available 8.3 <b>Biological Oxygen Demand (BOD):</b> 8%, 5 days 8.4 <b>Food Chain Concentration Potential:</b> None</p> <p><b>9. SHIPPING INFORMATION</b></p> <p>9.1 <b>Grades of Purity:</b> Various octane ratings; military specifications 9.2 <b>Storage Temperature:</b> Ambient 9.3 <b>Inert Atmosphere:</b> No requirement 9.4 <b>Venting:</b> Open (flame arrester) or pressure-vacuum</p>	<p><b>10. HAZARD ASSESSMENT CODE</b> (See Hazard Assessment Handbook) <b>A-T-U-V-W</b></p> <p><b>11. HAZARD CLASSIFICATIONS</b></p> <p>11.1 <b>Code of Federal Regulations:</b> Flammable liquid 11.2 <b>NAS Hazard Rating for Bulk Water Transportation:</b></p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Category</th> <th style="text-align: right;">Rating</th> </tr> </thead> <tbody> <tr> <td>Fire.....</td> <td style="text-align: right;">3</td> </tr> <tr> <td>Health.....</td> <td></td> </tr> <tr> <td>Vapor Irritant.....</td> <td style="text-align: right;">1</td> </tr> <tr> <td>Liquid or Solid Irritant.....</td> <td style="text-align: right;">1</td> </tr> <tr> <td>Poisons.....</td> <td style="text-align: right;">2</td> </tr> <tr> <td>Water Pollution.....</td> <td></td> </tr> <tr> <td>Human Toxicity.....</td> <td style="text-align: right;">1</td> </tr> <tr> <td>Aquatic Toxicity.....</td> <td style="text-align: right;">2</td> </tr> <tr> <td>Aesthetic Effect.....</td> <td style="text-align: right;">2</td> </tr> <tr> <td>Reactivity.....</td> <td></td> </tr> <tr> <td>Other Chemicals.....</td> <td style="text-align: right;">0</td> </tr> <tr> <td>Water.....</td> <td style="text-align: right;">0</td> </tr> <tr> <td>Self Reaction.....</td> <td style="text-align: right;">0</td> </tr> </tbody> </table> <p>11.3 <b>NFPA Hazard Classification:</b></p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Category</th> <th style="text-align: right;">Classification</th> </tr> </thead> <tbody> <tr> <td>Health Hazard (Blue).....</td> <td style="text-align: right;">1</td> </tr> <tr> <td>Flammability (Red).....</td> <td style="text-align: right;">3</td> </tr> <tr> <td>Reactivity (Yellow).....</td> <td style="text-align: right;">0</td> </tr> </tbody> </table> <p><b>12. PHYSICAL AND CHEMICAL PROPERTIES</b></p> <p>12.1 <b>Physical State at 15°C and 1 atm:</b> Liquid 12.2 <b>Molecular Weight:</b> Not pertinent 12.3 <b>Boiling Point at 1 atm:</b> 140-390°F = 60-199°C = 333-472°K 12.4 <b>Freezing Point:</b> Not pertinent 12.5 <b>Critical Temperature:</b> Not pertinent 12.6 <b>Critical Pressure:</b> Not pertinent 12.7 <b>Specific Gravity:</b> 0.7321 at 20°C (liquid) 12.8 <b>Liquid Surface Tension:</b> 19-23 dynes/cm = 0.019-0.023 N/m at 20°C 12.9 <b>Liquid Water Interfacial Tension:</b> 49-51 dynes/cm = 0.049-0.051 N/m at 20°C 12.10 <b>Vapor (Gas) Specific Gravity:</b> 3.4 12.11 <b>Ratio of Specific Heats of Vapor (Gas):</b> (est.) 1.054 12.12 <b>Latent Heat of Vaporization:</b> 130-150 Btu/lb = 71-81 cal/g = 3.0 - 3.4 X 10<sup>4</sup> J/kg 12.13 <b>Heat of Combustion:</b> -18,720 Btu/lb = -10,400 cal/g = 435.1 X 10<sup>3</sup> J/kg 12.14 <b>Heat of Decomposition:</b> Not pertinent 12.15 <b>Heat of Solution:</b> Not pertinent 12.16 <b>Heat of Polymerization:</b> Not pertinent 12.25 <b>Heat of Fusion:</b> Data not available 12.26 <b>Limiting Value:</b> Data not available 12.27 <b>Reid Vapor Pressure:</b> 7.4 psia</p> <p style="text-align: center;"><b>NOTES</b></p>	Category	Rating	Fire.....	3	Health.....		Vapor Irritant.....	1	Liquid or Solid Irritant.....	1	Poisons.....	2	Water Pollution.....		Human Toxicity.....	1	Aquatic Toxicity.....	2	Aesthetic Effect.....	2	Reactivity.....		Other Chemicals.....	0	Water.....	0	Self Reaction.....	0	Category	Classification	Health Hazard (Blue).....	1	Flammability (Red).....	3	Reactivity (Yellow).....	0
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# GASOLINES: AUTOMOTIVE (<4.23g lead/gal)

12.17 SATURATED LIQUID DENSITY		12.18 LIQUID HEAT CAPACITY		12.19 LIQUID THERMAL CONDUCTIVITY		12.20 LIQUID VISCOSITY	
Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F	Temperature (degrees F)	British thermal unit-inch per hour- square foot-F (estimate)	Temperature (degrees F)	Centipoise
45	46.270	10	.459	40	.909	46	.521
50	46.130	15	.462	50	.900	48	.514
55	46.000	20	.464	60	.891	50	.507
60	45.850	25	.467	70	.883	52	.500
65	45.710	30	.470	80	.874	54	.494
70	45.560	35	.472	90	.865	56	.487
75	45.400	40	.475	100	.856	58	.481
80	45.240	45	.478	110	.847	60	.475
85	45.080	50	.480	120	.838	62	.469
90	44.910	55	.483	130	.829	64	.463
95	44.750	60	.486	140	.821	66	.457
100	44.570	65	.488	150	.812	68	.451
105	44.390	70	.491	160	.803	70	.446
110	44.210	75	.494	170	.794	72	.440
115	44.030	80	.496	180	.785	74	.435
		85	.499	190	.776	76	.430
		90	.502			78	.424
		95	.504			80	.419
		100	.507			82	.414
		105	.510			84	.410
						86	.405
						88	.400
						90	.396
						92	.391
						94	.387
						96	.382

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



# OILS, MISCELLANEOUS: MOTOR

OMT

<b>Common Synonyms</b> Crankcase oil Lubricating oil Transmission oil	Oily liquid	Yellow-brown	Lube oil odor
Floats on water.			
<p>Stop discharge if possible. Call fire department. Avoid contact with liquid. Isolate and remove discharged material. Notify local health and pollution control agencies.</p>			
<b>Fire</b>	<p>Combustible. Extinguish with dry chemical, foam or carbon dioxide. Water may be ineffective on fire. Cool exposed containers with water.</p>		
<b>Exposure</b>	<p>CALL FOR MEDICAL AID.</p> <p><b>LIQUID</b> Irritating to skin and eyes. Harmful if swallowed. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk. DO NOT INDUCE VOMITING.</p>		
<b>Water Pollution</b>	<p>Effect of low concentrations on aquatic life is unknown. Floating to shoreline. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.</p>		
<b>1. RESPONSE TO DISCHARGE</b> (See Response Methods Handbook) Mechanical containment Should be removed Chemical and physical treatment		<b>2. LABEL</b> 2.1 Category: None 2.2 Class: Not pertinent	
<b>3. CHEMICAL DESIGNATIONS</b> 3.1 CG Compatibility Class: Miscellaneous Hydrocarbon Mixtures 3.2 Formula: Not applicable 3.3 IMO/UN Designation: 3.3/1270 3.4 DOT ID No.: 1270 3.5 CAS Registry No.: Data not available		<b>4. OBSERVABLE CHARACTERISTICS</b> 4.1 Physical State (as shipped): Liquid 4.2 Color: Yellow fluorescent 4.3 Odor: Characteristic	
<b>5. HEALTH HAZARDS</b>			
<p>5.1 <b>Personal Protective Equipment:</b> Protective gloves; goggles or face shield. 5.2 <b>Symptoms Following Exposure:</b> INGESTION: minimal gastrointestinal irritation; increased frequency of bowel passage may occur. ASPIRATION: pulmonary irritation is normally minimal but may become more severe several hours after exposure. 5.3 <b>Treatment of Exposure:</b> INGESTION: do NOT lavage or induce vomiting. ASPIRATION: treatment probably not required; delayed development of pulmonary irritation can be detected by serial chest x-rays. EYES: wash with copious amounts of water. SKIN: wipe off oil and wash with soap and water. 5.4 <b>Threshold Limit Value:</b> Data not available 5.5 <b>Short Term Inhalation Limits:</b> Data not available 5.6 <b>Toxicity by Ingestion:</b> Grade 1; LD<sub>50</sub> = 5 to 15 g/kg 5.7 <b>Late Toxicity:</b> Data not available 5.8 <b>Vapor (Gas) Irritant Characteristics:</b> Vapors cause a slight smarting of the eyes or respiratory system if present in high concentrations. The effect is temporary. 5.9 <b>Liquid or Solid Irritant Characteristics:</b> Minimum hazard. If spilled on clothing and allowed to remain, may cause smarting and reddening of the skin. 5.10 <b>Odor Threshold:</b> Data not available 5.11 <b>IDLH Value:</b> Data not available</p>			

<p style="text-align: center;"><b>6. FIRE HAZARDS</b></p> <p>6.1 <b>Flash Point:</b> 275—600°F C.C. 6.2 <b>Flammable Limits in Air:</b> Data not available 6.3 <b>Fire Extinguishing Agents:</b> Dry chemical, foam, or carbon dioxide 6.4 <b>Fire Extinguishing Agents Not to be Used:</b> Water may be ineffective 6.5 <b>Special Hazards of Combustion Products:</b> Not pertinent 6.6 <b>Behavior in Fire:</b> Not pertinent 6.7 <b>Ignition Temperature:</b> 325—625°F 6.8 <b>Electrical Hazard:</b> Not pertinent 6.9 <b>Burning Rate:</b> 4 mm/min. 6.10 <b>Adiabatic Flame Temperature:</b> Data not available 6.11 <b>Stoichiometric Air to Fuel Ratio:</b> Data not available 6.12 <b>Flame Temperature:</b> Data not available</p> <p style="text-align: center;"><b>7. CHEMICAL REACTIVITY</b></p> <p>7.1 <b>Reactivity With Water:</b> No reaction 7.2 <b>Reactivity with Common Materials:</b> No reaction 7.3 <b>Stability During Transport:</b> Stable 7.4 <b>Neutralizing Agents for Acids and Caustics:</b> Not pertinent 7.5 <b>Polymerization:</b> Not pertinent 7.6 <b>Inhibitor of Polymerization:</b> Not pertinent 7.7 <b>Molar Ratio (Reactant to Product):</b> Data not available 7.8 <b>Reactivity Group:</b> 33</p> <p style="text-align: center;"><b>8. WATER POLLUTION</b></p> <p>8.1 <b>Aquatic Toxicity:</b> Data not available 8.2 <b>Waterfowl Toxicity:</b> Data not available 8.3 <b>Biological Oxygen Demand (BOD):</b> Data not available 8.4 <b>Food Chain Concentration Potential:</b> None</p> <p style="text-align: center;"><b>9. SHIPPING INFORMATION</b></p> <p>9.1 <b>Grades of Purity:</b> Various viscosities 9.2 <b>Storage Temperature:</b> Ambient 9.3 <b>Inert Atmosphere:</b> No requirement 9.4 <b>Venting:</b> Open (flame arrester)</p>	<p style="text-align: center;"><b>10. HAZARD ASSESSMENT CODE</b> (See Hazard Assessment Handbook) A-T-U</p> <p style="text-align: center;"><b>11. HAZARD CLASSIFICATIONS</b></p> <p>11.1 <b>Code of Federal Regulations:</b> Not listed 11.2 <b>NAS Hazard Rating for Bulk Water Transportation:</b> Not listed 11.3 <b>NFPA Hazard Classification:</b> Not listed</p> <p style="text-align: center;"><b>12. PHYSICAL AND CHEMICAL PROPERTIES</b></p> <p>12.1 <b>Physical State at 15°C and 1 atm:</b> Liquid 12.2 <b>Molecular Weight:</b> Not pertinent 12.3 <b>Boiling Point at 1 atm:</b> Very high 12.4 <b>Freezing Point:</b> —29.9°F = —34.4°C = 238.8°K 12.5 <b>Critical Temperature:</b> Not pertinent 12.6 <b>Critical Pressure:</b> Not pertinent 12.7 <b>Specific Gravity:</b> 0.84—0.96 at 15°C (liquid) 12.8 <b>Liquid Surface Tension:</b> 36-37.5 dynes/cm = 0.036—0.0375 N/m at 20°C 12.9 <b>Liquid Water Interfacial Tension:</b> 33—54 dynes/cm = 0.033—0.054 N/m at 20°C 12.10 <b>Vapor (Gas) Specific Gravity:</b> Not pertinent 12.11 <b>Ratio of Specific Heats of Vapor (Gas):</b> Not pertinent 12.12 <b>Latent Heat of Vaporization:</b> Not pertinent 12.13 <b>Heat of Combustion:</b> —18,486 Btu/lb = —10,270 cal/g = —428.98 X 10<sup>3</sup> J/kg 12.14 <b>Heat of Decomposition:</b> Not pertinent 12.15 <b>Heat of Solution:</b> Not pertinent 12.16 <b>Heat of Polymerization:</b> Not pertinent 12.25 <b>Heat of Fusion:</b> Data not available 12.26 <b>Limiting Value:</b> Data not available 12.27 <b>Reid Vapor Pressure:</b> Data not available</p> <p style="text-align: center;"><b>NOTES</b></p>
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OMT

# OILS, MISCELLANEOUS: MOTOR

12.17 SATURATED LIQUID DENSITY		12.18 LIQUID HEAT CAPACITY		12.19 LIQUID THERMAL CONDUCTIVITY		12.20 LIQUID VISCOSITY	
Temperature (degrees F)	Pounds per cubic foot (estimate)	Temperature (degrees F)	British thermal unit per pound-F (estimate)	Temperature (degrees F)	British thermal unit-inch per hour-square foot-F (estimate)	Temperature (degrees F)	Centipoise
50	52.430	50	.460	35	.920	100.42	275.000
52	52.430	52	.461	40	.919		
54	52.430	54	.462	45	.918		
56	52.430	56	.463	50	.917		
58	52.430	58	.464	55	.916		
60	52.430	60	.465	60	.915		
62	52.430	62	.466	65	.914		
64	52.430	64	.467	70	.913		
66	52.430	66	.468	75	.912		
68	52.430	68	.469	80	.911		
70	52.430	70	.470	85	.910		
72	52.430	72	.471	90	.909		
74	52.430	74	.472	95	.908		
76	52.430	76	.473	100	.907		
78	52.430	78	.474	105	.906		
80	52.430	80	.475	110	.905		
82	52.430	82	.476	115	.904		
84	52.430	84	.477	120	.903		
		86	.478				
		88	.479				
		90	.480				
		92	.481				
		94	.482				
		96	.483				
		98	.484				
		100	.485				

12.21 SOLUBILITY IN WATER		12.22 SATURATED VAPOR PRESSURE		12.23 SATURATED VAPOR DENSITY		12.24 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	Pounds per 100 pounds of water	Temperature (degrees F)	Pounds per square inch (estimate)	Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F
	I N S O L U B I L I T Y	70	.042		N O T  P E R T I N E N T		N O T  P E R T I N E N T
		75	.049				
		80	.057				
		85	.065				
		90	.076				
		95	.087				
		100	.100				
		105	.114				
		110	.131				
		115	.149				
		120	.170				
		125	.193				
		130	.218				
		135	.247				
		140	.279				
		145	.314				
		150	.352				
		155	.395				
		160	.443				
		165	.495				
	170	.552					
	175	.615					
	180	.683					
	185	.758					
	190	.841					
	195	.930					

# BENZENE

BNZ

Common Synonyms Benzol Benzole		Watery liquid	Colorless	Gasoline-like odor
Floats on water. Flammable, irritating vapor is produced. Freezing point is 42°F.				
Avoid contact with liquid and vapor. Keep people away. Wear goggles and self-contained breathing apparatus. Shut off ignition sources and call fire department. Stop discharge if possible. Stay upwind and use water spray to "knock down" vapor. Isolate and remove discharged material. Notify local health and pollution control agencies.				
Fire	<p><b>FLAMMABLE.</b> Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area.</p> <p>Wear goggles and self-contained breathing apparatus. Extinguish with dry chemical, foam, or carbon dioxide. Water may be ineffective on fire. Cool exposed containers with water.</p>			
	<p>CALL FOR MEDICAL AID. <b>VAPOR</b> Irritating to eyes, nose and throat. If inhaled, will cause headache, difficult breathing, or loss of consciousness.</p> <p>Move to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.</p> <p><b>LIQUID</b> Irritating to skin and eyes. Harmful if swallowed.</p> <p>Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk.</p>			
Exposure	<p><b>HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS.</b> May be dangerous if it enters water intakes.</p> <p>Notify local health and wildlife officials. Notify operators of nearby water intakes.</p>			
	<p><b>1. RESPONSE TO DISCHARGE</b> (See Response Methods Handbook) Issue warning-high flammability Restrict access</p>			
Water Pollution	<p><b>2. LABEL</b> 2.1 Category: Flammable liquid 2.2 Class: 3</p>			
	<p><b>3. CHEMICAL DESIGNATIONS</b> 3.1 CG Compatibility Class: Aromatic Hydrocarbon 3.2 Formula: C<sub>6</sub>H<sub>6</sub> 3.3 IMO/UN Designation: 3.2/1114 3.4 DOT ID No.: 1114 3.5 CAS Registry No.: 71-43-2</p>			
<p><b>4. OBSERVABLE CHARACTERISTICS</b> 4.1 Physical State (as shipped): Liquid 4.2 Color: Colorless 4.3 Odor: Aromatic; rather pleasant aromatic odor; characteristic odor</p>				
<p><b>5. HEALTH HAZARDS</b></p> <p>5.1 Personal Protective Equipment: Hydrocarbon vapor canister, supplied air or a hose mask; hydrocarbon-insoluble rubber or plastic gloves; chemical goggles or face splash shield; hydrocarbon-insoluble apron such as neoprene.</p> <p>5.2 Symptoms Following Exposure: Dizziness, excitation, pallor, followed by flushing, weakness, headache, breathlessness, chest constriction. Coma and possible death.</p> <p>5.3 Treatment of Exposure: SKIN: flush with water followed by soap and water; remove contaminated clothing and wash skin. EYES: flush with plenty of water until irritation subsides. INHALATION: remove from exposure immediately. Call a physician. IF breathing is irregular or stopped, start resuscitation, administer oxygen.</p> <p>5.4 Threshold Limit Value: 10 ppm 5.5 Short Term Inhalation Limit: 75 ppm for 30 min. 5.6 Toxicity by Ingestion: Grade 3; LD<sub>50</sub> = 50 to 500 mg/kg 5.7 Late Toxicity: Leukemia 5.8 Vapor (Gas) Irritant Characteristics: If present in high concentrations, vapors may cause irritation of eyes or respiratory system. The effect is temporary. 5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, may cause smarting and reddening of the skin. 5.10 Odor Threshold: 4.68 ppm 5.11 IDLH Value: 2,000 ppm</p>				

<p><b>6. FIRE HAZARDS</b></p> <p>6.1 Flash Point: 12°F C.C. 6.2 Flammable Limits in Air: 1.3%-7.9% 6.3 Fire Extinguishing Agents: Dry chemical, foam, or carbon dioxide 6.4 Fire Extinguishing Agents Not to be Used: Water may be ineffective 6.5 Special Hazards of Combustion Products: Not pertinent 6.6 Behavior in Fire: Vapor is heavier than air and may travel considerable distance to a source of ignition and flash back 6.7 Ignition Temperature: 1097°F 6.8 Electrical Hazard: Class I, Group D 6.9 Burning Rate: 6.0 mm/min. 6.10 Adiabatic Flame Temperature: Data not available 6.11 Stoichiometric Air to Fuel Ratio: Data not available 6.12 Flame Temperature: Data not available</p>	
<p><b>7. CHEMICAL REACTIVITY</b></p> <p>7.1 Reactivity With Water: No reaction 7.2 Reactivity with Common Materials: No reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerization: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Molar Ratio (Reactant to Product): Data not available 7.8 Reactivity Group: 32</p>	
<p><b>8. WATER POLLUTION</b></p> <p>8.1 Aquatic Toxicity: 5 ppm/6 hr/minnow/lethal/distilled water 20 ppm/24 hr/sunfish/TL<sub>50</sub>/tap water 8.2 Waterfowl Toxicity: Data not available 8.3 Biological Oxygen Demand (BOD): 1.2 lb/lb, 10 days 8.4 Food Chain Concentration Potential: None</p>	
<p><b>9. SHIPPING INFORMATION</b></p> <p>9.1 Grades of Purity: Industrial pure .....99+ % Thiophene-free .....99+ % Nitration .....99+ % Industrial 90% .....85+ % Reagent .....99+ % 9.2 Storage Temperature: Open 9.3 Inert Atmosphere: No requirement 9.4 Venting: Pressure-vacuum</p>	

<p><b>10. HAZARD ASSESSMENT CODE</b> (See Hazard Assessment Handbook) A-T-U-V-W</p>																																					
<p><b>11. HAZARD CLASSIFICATIONS</b></p> <p>11.1 Code of Federal Regulations: Flammable liquid</p> <p>11.2 NAS Hazard Rating for Bulk Water Transportation:</p> <table border="1"> <thead> <tr> <th>Category</th> <th>Rating</th> </tr> </thead> <tbody> <tr> <td>Fire</td> <td>3</td> </tr> <tr> <td>Health</td> <td></td> </tr> <tr> <td>Vapor Irritant</td> <td>1</td> </tr> <tr> <td>Liquid or Solid Irritant</td> <td>1</td> </tr> <tr> <td>Poisons</td> <td>3</td> </tr> <tr> <td>Water Pollution</td> <td></td> </tr> <tr> <td>Human Toxicity</td> <td>3</td> </tr> <tr> <td>Aquatic Toxicity</td> <td>1</td> </tr> <tr> <td>Aesthetic Effect</td> <td>3</td> </tr> <tr> <td>Reactivity</td> <td></td> </tr> <tr> <td>Other Chemicals</td> <td>2</td> </tr> <tr> <td>Water</td> <td>1</td> </tr> <tr> <td>Self Reaction</td> <td>0</td> </tr> </tbody> </table> <p>11.3 NFPA Hazard Classification:</p> <table border="1"> <thead> <tr> <th>Category</th> <th>Classification</th> </tr> </thead> <tbody> <tr> <td>Health Hazard (Blue)</td> <td>2</td> </tr> <tr> <td>Flammability (Red)</td> <td>3</td> </tr> <tr> <td>Reactivity (Yellow)</td> <td>0</td> </tr> </tbody> </table>		Category	Rating	Fire	3	Health		Vapor Irritant	1	Liquid or Solid Irritant	1	Poisons	3	Water Pollution		Human Toxicity	3	Aquatic Toxicity	1	Aesthetic Effect	3	Reactivity		Other Chemicals	2	Water	1	Self Reaction	0	Category	Classification	Health Hazard (Blue)	2	Flammability (Red)	3	Reactivity (Yellow)	0
Category	Rating																																				
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Flammability (Red)	3																																				
Reactivity (Yellow)	0																																				
<p><b>12. PHYSICAL AND CHEMICAL PROPERTIES</b></p> <p>12.1 Physical State at 15°C and 1 atm: Liquid 12.2 Molecular Weight: 78.11 12.3 Boiling Point at 1 atm: 176°F = 80.1°C = 353.3°K 12.4 Freezing Point: 42.0°F = 5.5°C = 278.7°K 12.5 Critical Temperature: 552.0°F = 288.9°C = 562.1°K 12.6 Critical Pressure: 710 psia = 48.3 atm = 4.89 MN/m<sup>2</sup> 12.7 Specific Gravity: 0.879 at 20°C (liquid) 12.8 Liquid Surface Tension: 28.9 dynes/cm = 0.0289 N/m at 20°C 12.9 Liquid Water Interfacial Tension: 35.0 dynes/cm = 0.035 N/m at 20°C 12.10 Vapor (Gas) Specific Gravity: 2.7 12.11 Ratio of Specific Heats of Vapor (Gas): 1.061 12.12 Latent Heat of Vaporization: 169 Btu/lb = 94.1 cal/g = 3.94 X 10<sup>5</sup> J/kg 12.13 Heat of Combustion: -17,460 Btu/lb = -9698 cal/g = -406.0 X 10<sup>3</sup> J/kg 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.25 Heat of Fusion: 30.45 cal/g 12.26 Limiting Value: Data not available 12.27 Reid Vapor Pressure: 3.22 psia</p>																																					
<p>NOTES</p>																																					

BNZ

## BENZENE

12.17 SATURATED LIQUID DENSITY		12.18 LIQUID HEAT CAPACITY		12.19 LIQUID THERMAL CONDUCTIVITY		12.20 LIQUID VISCOSITY	
Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F	Temperature (degrees F)	British thermal unit-inch per hour- square foot-F	Temperature (degrees F)	Centipoise
55	55.330	45	.394	75	.988	55	.724
60	55.140	50	.396	80	.981	60	.693
65	54.960	55	.398	85	.975	65	.665
70	54.770	60	.400	90	.969	70	.638
75	54.580	65	.403	95	.962	75	.612
80	54.400	70	.405	100	.956	80	.588
85	54.210	75	.407	105	.950	85	.566
90	54.030	80	.409	110	.944	90	.544
95	53.840	85	.411	115	.937	95	.524
100	53.660	90	.414	120	.931	100	.505
105	53.470	95	.416	125	.925	105	.487
110	53.290	100	.418	130	.919	110	.470
115	53.100			135	.912	115	.453
120	52.920			140	.906	120	.438
125	52.730			145	.900		
130	52.540			150	.893		
135	52.360			155	.887		
140	52.170			160	.881		
145	51.990			165	.875		
150	51.800			170	.868		
155	51.620						
160	51.430						
165	51.250						
170	51.060						
175	50.870						

12.21 SOLUBILITY IN WATER		12.22 SATURATED VAPOR PRESSURE		12.23 SATURATED VAPOR DENSITY		12.24 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	Pounds per 100 pounds of water	Temperature (degrees F)	Pounds per square inch	Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F
77.02	.180	50	.881	50	.01258	0	.204
		60	1.171	60	.01639	25	.219
		70	1.535	70	.02109	50	.234
		80	1.989	80	.02681	75	.248
		90	2.547	90	.03371	100	.261
		100	3.227	100	.04196	125	.275
		110	4.049	110	.05172	150	.288
		120	5.033	120	.06317	175	.301
		130	6.201	130	.07652	200	.313
		140	7.577	140	.09194	225	.325
		150	9.187	150	.10960	250	.337
		160	11.060	160	.12980	275	.349
		170	13.220	170	.15270	300	.360
		180	15.700	180	.17850	325	.371
		190	18.520	190	.20750	350	.381
		200	21.740	200	.23970	375	.392
		210	25.360	210	.27560	400	.402
						425	.412
						450	.421
						475	.431
						500	.440
						525	.449
						550	.457
						575	.465
						600	.474

# ETHYLBENZENE

ETB

<b>Common Synonyms</b> Phenyloethane EB		Liquid Colorless Sweet, gasoline-like odor
Flights on water. Flammable, irritating vapor is produced.		
Avoid contact with liquid and vapor. Keep people away. Wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves). Shut off ignition sources and call fire department. Stop discharge if possible. Stay upwind and use water spray to "knock down" vapor. Isolate and remove discharged material. Notify local health and pollution control agencies.		
<b>Fire</b>	<b>FLAMMABLE.</b> Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. Wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves). Extinguish with dry chemical, foam, or carbon dioxide. Water may be ineffective on fire. Cool exposed containers with water.	
<b>Exposure</b>	CALL FOR MEDICAL AID. <b>VAPOR</b> Irritating to eyes, nose and throat. If inhaled, will cause dizziness or difficult breathing. Move to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen. <b>LIQUID</b> Will burn skin and eyes. Harmful if swallowed. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk. DO NOT INDUCE VOMITING.	
<b>Water Pollution</b>	HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. Fouling to shoreline. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.	
<b>1. RESPONSE TO DISCHARGE</b> (See Response Methods Handbook) Mechanical containment Should be removed Chemical and physical treatment		<b>2. LABEL</b> 2.1 Category: Flammable liquid 2.2 Class: 3
<b>3. CHEMICAL DESIGNATIONS</b> 3.1 CG Compatibility Class: Aromatic hydrocarbon 3.2 Formula: C <sub>8</sub> H <sub>10</sub> 3.3 IMO/UN Designation: 3.3/1175 3.4 DOT ID No.: 1175 3.5 CAS Registry No.: 100-41-4		<b>4. OBSERVABLE CHARACTERISTICS</b> 4.1 Physical State (as shipped): Liquid 4.2 Color: Colorless 4.3 Odor: Aromatic
<b>5. HEALTH HAZARDS</b> 5.1 Personal Protective Equipment: Self-contained breathing apparatus; safety goggles. 5.2 Symptoms Following Exposure: Inhalation may cause irritation of nose, dizziness, depression. Moderate irritation of eye with corneal injury possible. Irritates skin and may cause blisters. 5.3 Treatment of Exposure: INHALATION: if it effects occur, remove victim to fresh air, keep him warm and quiet, and get medical help promptly; if breathing stops, give artificial respiration. INGESTION: induce vomiting only upon physician's approval; material in lung may cause chemical pneumonitis. SKIN AND EYES: promptly flush with plenty of water (15 min. for eyes) and get medical attention; remove and wash contaminated clothing before reuse. 5.4 Threshold Limit Value: 100 ppm 5.5 Short Term Inhalation Limits: 200 ppm for 30 min. 5.6 Toxicity by Ingestion: Grade 2; LD <sub>50</sub> = 0.5 to 5 g/kg (rat) 5.7 Late Toxicity: Data not available 5.8 Vapor (Gas) Irritant Characteristics: Vapors cause moderate irritation such that personnel will find high concentrations unpleasant. The effect is temporary 5.9 Liquid or Solid Irritant Characteristics: Causes smarting of the skin and first-degree burns on short exposure; may cause secondary burns on long exposure. 5.10 Odor Threshold: 140 ppm 5.11 IDLH Value: 2,000 ppm		

<b>6. FIRE HAZARDS</b> 6.1 Flash Point: 80°F O.C.; 59°F C.C. 6.2 Flammable Limits in Air: 1.0%-6.7% 6.3 Fire Extinguishing Agents: Foam (most effective), water fog, carbon dioxide or dry chemical. 6.4 Fire Extinguishing Agents Not to be Used: Not pertinent 6.5 Special Hazards of Combustion Products: Irritating vapors are generated when heated. 6.6 Behavior in Fire: Vapor is heavier than air and may travel considerable distance to the source of ignition and flash back. 6.7 Ignition Temperature: 860°F 6.8 Electrical Hazard: Not pertinent 6.9 Burning Rate: 5.8 mm/min. 6.10 Adiabatic Flame Temperature: Data Not Available (Continued)	<b>10. HAZARD ASSESSMENT CODE</b> (See Hazard Assessment Handbook) A-T-U																																				
<b>7. CHEMICAL REACTIVITY</b> 7.1 Reactivity With Water: No reaction 7.2 Reactivity with Common Materials: No reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerization: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Molar Ratio (Reactant to Product): Data Not Available 7.8 Reactivity Group: 32	<b>11. HAZARD CLASSIFICATIONS</b> 11.1 Code of Federal Regulations: Flammable liquid 11.2 NAS Hazard Rating for Bulk Water Transportation: <table border="1"> <thead> <tr> <th>Category</th> <th>Rating</th> </tr> </thead> <tbody> <tr> <td>Fire.....</td> <td>3</td> </tr> <tr> <td>Health</td> <td></td> </tr> <tr> <td>Vapor Irritant.....</td> <td>2</td> </tr> <tr> <td>Liquid or Solid Irritant.....</td> <td>2</td> </tr> <tr> <td>Poisons.....</td> <td>2</td> </tr> <tr> <td>Water Pollution</td> <td></td> </tr> <tr> <td>Human Toxicity.....</td> <td>1</td> </tr> <tr> <td>Aquatic Toxicity.....</td> <td>3</td> </tr> <tr> <td>Aesthetic Effect.....</td> <td>2</td> </tr> <tr> <td>Reactivity</td> <td></td> </tr> <tr> <td>Other Chemicals.....</td> <td>1</td> </tr> <tr> <td>Water.....</td> <td>0</td> </tr> <tr> <td>Self Reaction.....</td> <td>0</td> </tr> </tbody> </table> 11.3 NFPA Hazard Classification: <table border="1"> <thead> <tr> <th>Category</th> <th>Classification</th> </tr> </thead> <tbody> <tr> <td>Health Hazard (Blue).....</td> <td>2</td> </tr> <tr> <td>Flammability (Red).....</td> <td>3</td> </tr> <tr> <td>Reactivity (Yellow).....</td> <td>0</td> </tr> </tbody> </table>	Category	Rating	Fire.....	3	Health		Vapor Irritant.....	2	Liquid or Solid Irritant.....	2	Poisons.....	2	Water Pollution		Human Toxicity.....	1	Aquatic Toxicity.....	3	Aesthetic Effect.....	2	Reactivity		Other Chemicals.....	1	Water.....	0	Self Reaction.....	0	Category	Classification	Health Hazard (Blue).....	2	Flammability (Red).....	3	Reactivity (Yellow).....	0
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Reactivity (Yellow).....	0																																				
<b>8. WATER POLLUTION</b> 8.1 Aquatic Toxicity: 29 ppm/96 hr/bluegill/TL <sub>50</sub> /fresh water 8.2 Waterfowl Toxicity: Data not available 8.3 Biological Oxygen Demand (BOD): 2.8% (theor.), 5 days 8.4 Food Chain Concentration Potential: None	<b>12. PHYSICAL AND CHEMICAL PROPERTIES</b> 12.1 Physical State at 15°C and 1 atm: Liquid 12.2 Molecular Weight: 106.17 12.3 Boiling Point at 1 atm: 277.2°F = 136.2°C = 409.4°K 12.4 Freezing Point: -139°F = -95°C = 178°K 12.5 Critical Temperature: 651.0°F = 343.9°C = 617.1°K 12.6 Critical Pressure: 523 psia = 35.6 atm = 3.61 MN/m <sup>2</sup> 12.7 Specific Gravity: 0.867 at 20°C (liquid) 12.8 Liquid Surface Tension: 29.2 dynes/cm = 0.0292 N/m at 20°C 12.9 Liquid Water Interfacial Tension: 35.48 dynes/cm = 0.03548 N/m at 20°C 12.10 Vapor (Gas) Specific Gravity: Not pertinent 12.11 Ratio of Specific Heats of Vapor (Gas): 1.071 12.12 Latent Heat of Vaporization: 144 Btu/lb = 80.1 cal/g = 3.35 X 10 <sup>4</sup> J/kg 12.13 Heat of Combustion: -17,780 Btu/lb = -9877 cal/g = -413.5 X 10 <sup>4</sup> J/kg 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.25 Heat of Fusion: Data Not Available 12.26 Limiting Value: Data Not Available 12.27 Reid Vapor Pressure: 0.4 psia																																				
<b>9. SHIPPING INFORMATION</b> 9.1 Grades of Purity: Research grade: 99.98%; pure grade: 99.5%; technical grade: 99.0% 9.2 Storage Temperature: Ambient 9.3 Inert Atmosphere: No requirement 9.4 Venting: Upon (flame arrester) or pressure-vacuum																																					
<b>6. FIRE HAZARDS (Continued)</b> 6.11 Stoichiometric Air to Fuel Ratio: Data Not Available 6.12 Flame Temperature: Data Not Available																																					

ETB

## ETHYLBENZENE

12.17 SATURATED LIQUID DENSITY		12.18 LIQUID HEAT CAPACITY		12.19 LIQUID THERMAL CONDUCTIVITY		12.20 LIQUID VISCOSITY	
Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F	Temperature (degrees F)	British thermal unit-inch per hour- square foot-F	Temperature (degrees F)	Centipoise
40	54.990	40	.402	-90	1.065	40	.835
50	54.680	50	.404	-80	1.056	50	.774
60	54.370	60	.407	-70	1.047	60	.719
70	54.060	70	.409	-60	1.037	70	.670
80	53.750	80	.412	-50	1.028	80	.626
90	53.430	90	.414	-40	1.018	90	.586
100	53.120	100	.417	-30	1.009	100	.550
110	52.810	110	.419	-20	1.000	110	.518
120	52.500	120	.421	-10	.990	120	.488
130	52.190	130	.424	0	.981	130	.461
140	51.870	140	.426	10	.971	140	.436
150	51.560	150	.429	20	.962	150	.414
160	51.250	160	.431	30	.953	160	.393
170	50.940	170	.434	40	.943	170	.374
180	50.620	180	.436	50	.934	180	.356
190	50.310	190	.439	60	.924	190	.340
200	50.000	200	.441	70	.915	200	.325
210	49.690	210	.443	80	.906	210	.311
				90	.896		
				100	.887		
				110	.877		
				120	.868		
				130	.859		
				140	.849		
				150	.840		
				160	.830		

12.21 SOLUBILITY IN WATER		12.22 SATURATED VAPOR PRESSURE		12.23 SATURATED VAPOR DENSITY		12.24 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	Pounds per 100 pounds of water	Temperature (degrees F)	Pounds per square inch	Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F
68.02	.020	80	.202	80	.00370	-400	-.007
		100	.370	100	.00654	-350	.026
		120	.644	120	.01099	-300	.060
		140	1.071	140	.01767	-250	.093
		160	1.713	160	.02734	-200	.125
		180	2.643	180	.04087	-150	.157
		200	3.953	200	.05926	-100	.187
		220	5.747	220	.08363	-50	.217
		240	8.147	240	.11520	0	.246
		260	11.290	260	.15510	50	.274
		280	15.320	280	.20490	100	.301
		300	20.410	300	.26570	150	.327
		320	26.730	320	.33910	200	.359
		340	34.460	340	.42620	250	.377
		360	43.800	360	.52850	300	.401
		380	54.950	380	.64720	350	.424
						400	.446
						450	.467
						500	.487
						550	.507
						600	.525

# ETHYLENE DICHLORIDE

EDC

<b>Common Synonyms</b> 1, 2-Dichloroethane Ethylene chloride EDC Brocide Dutch liquid Glycol dichloride		Liquid Colorless Sweet odor Sinks in water. Flammable, irritating vapor is produced.
Avoid contact with liquid and vapor. Keep people away. Wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves). Shut off ignition sources and call fire department. Stop discharge if possible. Stay upwind and use water spray to "knock down" vapor. Isolate and remove discharged material. Notify local health and pollution control agencies.		
<b>Fire</b>	<b>FLAMMABLE. POISONOUS GASES ARE PRODUCED IN FIRE.</b> Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. Wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves). Extinguish with dry chemical, foam, or carbon dioxide. Water may be ineffective on fire. Cool exposed containers with water.	
<b>Exposure</b>	<b>CALL FOR MEDICAL AID.</b> <b>VAPOR</b> Irritating to eyes, nose and throat. If inhaled, will cause nausea, dizziness or difficult breathing. Move to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen. <b>LIQUID</b> Will burn skin and eyes. Harmful if swallowed. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk and have victim induce vomiting. IF SWALLOWED and victim is UNCONSCIOUS OR HAVING CONVULSIONS, do nothing except keep victim warm.	
<b>Water Pollution</b>	Dangerous to aquatic life in high concentrations. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.	
<b>1. RESPONSE TO DISCHARGE</b> (See Response Methods Handbook) Issue warning-high flammability Disperse and flush		<b>2. LABEL</b> 2.1 Category: Flammable liquid 2.2 Class: 3
<b>3. CHEMICAL DESIGNATIONS</b> 3.1 CG Compatibility Class: Halogenated hydrocarbon 3.2 Formula: $C_2H_2Cl_2$ 3.3 IMO/UN Designation: 3.2/1184 3.4 DOT ID No.: 1184 3.5 CAS Registry No.: 107-06-2		<b>4. OBSERVABLE CHARACTERISTICS</b> 4.1 Physical State (as shipped): Liquid 4.2 Color: Colorless 4.3 Odor: Ethereal, chloroform-like; ether-like
<b>5. HEALTH HAZARDS</b> 5.1 <b>Personal Protective Equipment:</b> Clean, body-covering clothing and safety glasses with side shields. Respiratory protection: up to 50 ppm, none; 50 ppm to 2%, 1/2 hr or less, full face mask and canister; greater than 2%, self-contained breathing apparatus. 5.2 <b>Symptoms Following Exposure:</b> Inhalation of vapors causes nausea, drunkenness, depression. Contact of liquid with eyes may produce corneal injury. Prolonged contact with skin may cause a burn. 5.3 <b>Treatment of Exposure:</b> INHALATION: if victim is overcome, remove him to fresh air, keep him quiet and warm, and get medical attention immediately; if breathing stops, give artificial respiration. INGESTION: induce vomiting; call a physician; treat the symptoms. EYES: flush immediately with copious amounts of flowing water for at least 15 min. SKIN: remove clothing and wash skin thoroughly with soap and water; wash contaminated clothing before reuse. 5.4 <b>Threshold Limit Value:</b> 10 ppm 5.5 <b>Short Term Inhalation Limits:</b> 200 ppm for 5 min. during any 3-hour period. 5.6 <b>Toxicity by Ingestion:</b> Grade 2; $LD_{50} = 0.5$ to $5$ g/kg (rat) 5.7 <b>Late Toxicity:</b> Data not available 5.8 <b>Vapor (Gas) Irritant Characteristics:</b> Vapors cause moderate irritation such that personnel will find high concentrations unpleasant. The effect is temporary. 5.9 <b>Liquid or Solid Irritant Characteristics:</b> Causes smarting of the skin and first-degree burns on short exposure; may cause secondary burns on long exposure. 5.10 <b>Odor Threshold:</b> 100 ppm 5.11 <b>IDLH Value:</b> 1,000 ppm		

<b>6. FIRE HAZARDS</b> 6.1 Flash Point: 60°F O.C.; 55°F C.C. 6.2 Flammable Limits in Air: 6.2%-15.6% 6.3 Fire Extinguishing Agents: Foam, carbon dioxide, dry chemical 6.4 Fire Extinguishing Agents Not to be Used: Water may be ineffective. 6.5 Special Hazards of Combustion Products: Toxic and irritating gases (hydrogen chloride, phosgene) are generated. 6.6 Behavior in Fire: Vapor is heavier than air and may travel considerable distance to a source of ignition and flash back. 6.7 Ignition Temperature: 775°F 6.8 Electrical Hazard: Class 1, group D 6.9 Burning Rate: 1.6 mm/min 6.10 Adiabatic Flame Temperature: Data Not Available (Continued)	<b>10. HAZARD ASSESSMENT CODE</b> (See Hazard Assessment Handbook) A-X <b>11. HAZARD CLASSIFICATIONS</b> 11.1 Code of Federal Regulations: Flammable liquid 11.2 NAS Hazard Rating for Bulk Water Transportation: <table border="1"> <thead> <tr> <th>Category</th> <th>Rating</th> </tr> </thead> <tbody> <tr> <td>Fire.....</td> <td>3</td> </tr> <tr> <td>Health.....</td> <td></td> </tr> <tr> <td>Vapor Irritant.....</td> <td>2</td> </tr> <tr> <td>Liquid or Solid Irritant.....</td> <td>2</td> </tr> <tr> <td>Poisons.....</td> <td>3</td> </tr> <tr> <td>Water Pollution.....</td> <td></td> </tr> <tr> <td>Human Toxicity.....</td> <td>3</td> </tr> <tr> <td>Aquatic Toxicity.....</td> <td>2</td> </tr> <tr> <td>Aesthetic Effect.....</td> <td>2</td> </tr> <tr> <td>Reactivity.....</td> <td></td> </tr> <tr> <td>Other Chemicals.....</td> <td>1</td> </tr> <tr> <td>Water.....</td> <td>0</td> </tr> <tr> <td>Self Reaction.....</td> <td>0</td> </tr> </tbody> </table> 11.3 NFPA Hazard Classification: <table border="1"> <thead> <tr> <th>Category</th> <th>Classification</th> </tr> </thead> <tbody> <tr> <td>Health Hazard (Blue).....</td> <td>2</td> </tr> <tr> <td>Flammability (Red).....</td> <td>3</td> </tr> <tr> <td>Reactivity (Yellow).....</td> <td>1</td> </tr> </tbody> </table>	Category	Rating	Fire.....	3	Health.....		Vapor Irritant.....	2	Liquid or Solid Irritant.....	2	Poisons.....	3	Water Pollution.....		Human Toxicity.....	3	Aquatic Toxicity.....	2	Aesthetic Effect.....	2	Reactivity.....		Other Chemicals.....	1	Water.....	0	Self Reaction.....	0	Category	Classification	Health Hazard (Blue).....	2	Flammability (Red).....	3	Reactivity (Yellow).....	1
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<b>7. CHEMICAL REACTIVITY</b> 7.1 Reactivity With Water: No reaction 7.2 Reactivity with Common Materials: No reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerization: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Molar Ratio (Reactant to Product): Data Not Available 7.8 Reactivity Group: 36	<b>12. PHYSICAL AND CHEMICAL PROPERTIES</b> 12.1 Physical State at 15°C and 1 atm: Liquid 12.2 Molecular Weight: 98.96 12.3 Boiling Point at 1 atm: 182.3°F = 83.5°C = 356.7°K 12.4 Freezing Point: -32.3°F = -35.7°C = 237.5°K 12.5 Critical Temperature: 550°F = 288°C = 561°K 12.6 Critical Pressure: 735 psia = 50 atm = 5.1 MN/m <sup>2</sup> 12.7 Specific Gravity: 1.253 at 20°C (liquid) 12.8 Liquid Surface Tension: 32.2 dynes/cm = 0.0322 N/m at 20°C 12.9 Liquid Water Interfacial Tension: (est.) 30 dynes/cm = 0.03 N/m at 25°C 12.10 Vapor (Gas) Specific Gravity: 3.4 12.11 Ratio of Specific Heats of Vapor (Gas): 1.118 12.12 Latent Heat of Vaporization: 138 Btu/lb = 76.4 cal/g = $3.2 \times 10^4$ J/kg 12.13 Heat of Combustion: (est.) 3400 Btu/lb 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.25 Heat of Fusion: 21.12 cal/g 12.26 Limiting Value: Data Not Available 12.27 Reid Vapor Pressure: 2.7 psia																																				
<b>8. WATER POLLUTION</b> 8.1 Aquatic Toxicity: 150 ppm*/pin perch/TL <sub>50</sub> /salt water *Time period not specified. 8.2 Waterfowl Toxicity: Data not available 8.3 Biological Oxygen Demand (BOD): 0.002 lb/lb, 5 days 8.4 Food Chain Concentration Potential: None																																					
<b>9. SHIPPING INFORMATION</b> 9.1 Grades of Purity: Commercial 9.2 Storage Temperature: Ambient 9.3 Inert Atmosphere: No requirement 9.4 Venting: Pressure-vacuum																																					
<b>6. FIRE HAZARDS (Continued)</b> 6.11 Stoichiometric Air to Fuel Ratio: Data Not Available 6.12 Flame Temperature: Data Not Available																																					

EDC

## ETHYLENE DICHLORIDE

12.17 SATURATED LIQUID DENSITY		12.18 LIQUID HEAT CAPACITY		12.19 LIQUID THERMAL CONDUCTIVITY		12.20 LIQUID VISCOSITY	
Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F	Temperature (degrees F)	British thermal unit-inch per hour- square foot-F	Temperature (degrees F)	Centipoise
35	79.879	0	.283	0	.990	35	1.098
40	79.629	10	.285	10	.982	40	1.054
45	79.379	20	.288	20	.974	45	1.013
50	79.129	30	.290	30	.965	50	.975
55	78.879	40	.293	40	.957	55	.938
60	78.620	50	.296	50	.949	60	.904
65	78.370	60	.298	60	.941	65	.871
70	78.120	70	.301	70	.933	70	.840
75	77.860	80	.303	80	.924	75	.811
80	77.599	90	.306	90	.916	80	.784
85	77.349	100	.309	100	.908	85	.758
90	77.089	110	.311	110	.900	90	.733
95	76.830	120	.314	120	.892	95	.709
100	76.570	130	.317	130	.883	100	.687
105	76.309	140	.319	140	.875	105	.665
110	76.049	150	.322	150	.867	110	.645
115	75.790	160	.324	160	.859	115	.625
120	75.520	170	.327	170	.850	120	.607
125	75.259					125	.589
130	74.990					130	.573
135	74.730					135	.556
140	74.459					140	.541
145	74.190					145	.526
150	73.919					150	.512
155	73.660					155	.499
160	73.379					160	.486

12.21 SOLUBILITY IN WATER		12.22 SATURATED VAPOR PRESSURE		12.23 SATURATED VAPOR DENSITY		12.24 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	Pounds per 100 pounds of water	Temperature (degrees F)	Pounds per square inch	Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F
68.02	.800	15	.231	15	.00449	0	.177
		20	.274	20	.00526	25	.182
		25	.323	25	.00614	50	.187
		30	.380	30	.00715	75	.191
		35	.445	35	.00830	100	.195
		40	.520	40	.00960	125	.200
		45	.606	45	.01108	150	.204
		50	.704	50	.01274	175	.208
		55	.816	55	.01461	200	.212
		60	.942	60	.01671	225	.217
		65	1.085	65	.01907	250	.221
		70	1.246	70	.02169	275	.225
		75	1.428	75	.02462	300	.229
		80	1.632	80	.02788	325	.232
		85	1.860	85	.03149	350	.236
		90	2.116	90	.03548	375	.240
		95	2.401	95	.03990	400	.244
		100	2.718	100	.04477	425	.247
						450	.251
						475	.254
						500	.258
						525	.261
						550	.265
						575	.268
						600	.271



# TOLUENE

TOL

<p><b>Common Synonyms</b></p> <p>Toluol Methylbenzene Methylbenzol</p>	<p>Watery liquid      Colorless      Pleasant odor</p> <p>Floats on water. Flammable, irritating vapor is produced.</p>
<p>Stop discharge if possible. Keep people away. Shut off ignition sources and call fire department. Stay upwind and use water spray to "knock down" vapor. Avoid contact with liquid and vapor. Isolate and remove discharged material. Notify local health and pollution control agencies.</p>	
<p><b>Fire</b></p>	<p><b>FLAMMABLE.</b> Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. Wear goggles and self-contained breathing apparatus. Extinguish with dry chemical, foam, or carbon dioxide. Water may be ineffective on fire. Cool exposed containers with water.</p>
<p><b>Exposure</b></p>	<p><b>CALL FOR MEDICAL AID.</b></p> <p><b>VAPOR</b> Irritating to eyes, nose and throat. If inhaled, will cause nausea, vomiting, headache, dizziness, difficult breathing, or loss of consciousness. Move to fresh air. If breathing has stopped, give artificial respiration. If breathing difficult, give oxygen.</p> <p><b>LIQUID</b> Irritating to skin and eyes. If swallowed, will cause nausea, vomiting or loss of consciousness. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk. <b>DO NOT INDUCE VOMITING.</b></p>
<p><b>Water Pollution</b></p>	<p>Dangerous to aquatic life in high concentrations. Fouling to shoreline. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.</p>
<p><b>1. RESPONSE TO DISCHARGE</b> (See Response Methods Handbook) Issue warning-high flammability Evacuate area</p>	<p><b>2. LABEL</b></p> <p>2.1 Category: Flammable liquid 2.2 Class: 3</p>
<p><b>3. CHEMICAL DESIGNATIONS</b></p> <p>3.1 CG Compatibility Class: Aromatic Hydrocarbon 3.2 Formula: C<sub>6</sub>H<sub>5</sub>CH<sub>3</sub> 3.3 IMO/UN Designation: 3.2/1294 3.4 DOT ID No.: 1294 3.5 CAS Registry No.: 108-88-3</p>	<p><b>4. OBSERVABLE CHARACTERISTICS</b></p> <p>4.1 Physical State (as shipped): Liquid 4.2 Color: Colorless 4.3 Odor: Pungent; aromatic, benzene-like; distinct, pleasant</p>
<p><b>5. HEALTH HAZARDS</b></p> <p>5.1 Personal Protective Equipment: Air-supplied mask; goggles or face shield; plastic gloves. 5.2 Symptoms Following Exposure: Vapors irritate eyes and upper respiratory tract; cause dizziness, headache, anesthesia, respiratory arrest. Liquid irritates eyes and causes drying of skin. If aspirated, causes coughing, gagging, distress, and rapidly developing pulmonary edema. If ingested causes vomiting, griping, diarrhea, depressed respiration. 5.3 Treatment of Exposure: INHALATION: remove to fresh air, give artificial respiration and oxygen if needed; call a doctor. INGESTION: do NOT induce vomiting; call a doctor. EYES: flush with water for at least 15 min. SKIN: wipe off, wash with soap and water. 5.4 Threshold Limit Value: 100 ppm 5.5 Short Term Inhalation Limits: 600 ppm for 30 min. 5.6 Toxicity by Ingestion: Grade 2; LD<sub>50</sub> = 0.5 to 5 g/kg 5.7 Late Toxicity: Kidney and liver damage may follow ingestion. 5.8 Vapor (Gas) Irritant Characteristics: Vapors cause a slight smarting of the eyes or respiratory system if present in high concentrations. The effect is temporary. 5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, may cause smarting and reddening of the skin. 5.10 Odor Threshold: 0.17 ppm 5.11 IDLH Value: 2,000 ppm</p>	

<p><b>6. FIRE HAZARDS</b></p> <p>6.1 Flash Point: 40°F C.C.; 55°F O.C. 6.2 Flammable Limits in Air: 1.27%-7% 6.3 Fire Extinguishing Agents: Carbon dioxide or dry chemical for small fires, ordinary foam for large fires. 6.4 Fire Extinguishing Agents Not to be Used: Water may be ineffective 6.5 Special Hazards of Combustion Products: Not pertinent 6.6 Behavior in Fire: Vapor is heavier than air and may travel a considerable distance to a source of ignition and flash back. 6.7 Ignition Temperature: 997°F 6.8 Electrical Hazard: Class I, Group D 6.9 Burning Rate: 5.7 mm/min. 6.10 Adiabatic Flame Temperature: Data not available</p> <p style="text-align: right;">(Continued)</p>	<p><b>10. HAZARD ASSESSMENT CODE</b> (See Hazard Assessment Handbook) A-T-U</p> <p><b>11. HAZARD CLASSIFICATIONS</b></p> <p>11.1 Code of Federal Regulations: Flammable liquid 11.2 NAS Hazard Rating for Bulk Water Transportation:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Category</th> <th style="text-align: left;">Rating</th> </tr> </thead> <tbody> <tr> <td>Fire.....</td> <td>3</td> </tr> <tr> <td>Health.....</td> <td></td> </tr> <tr> <td>Vapor Irritant.....</td> <td>1</td> </tr> <tr> <td>Liquid or Solid Irritant.....</td> <td>1</td> </tr> <tr> <td>Poisons.....</td> <td>2</td> </tr> <tr> <td>Water Pollution.....</td> <td></td> </tr> <tr> <td>Human Toxicity.....</td> <td>1</td> </tr> <tr> <td>Aquatic Toxicity.....</td> <td>3</td> </tr> <tr> <td>Aesthetic Effect.....</td> <td>2</td> </tr> <tr> <td>Reactivity.....</td> <td></td> </tr> <tr> <td>Other Chemicals.....</td> <td>1</td> </tr> <tr> <td>Water.....</td> <td>0</td> </tr> <tr> <td>Self Reaction.....</td> <td>0</td> </tr> </tbody> </table> <p>11.3 NFPA Hazard Classification:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Category</th> <th style="text-align: left;">Classification</th> </tr> </thead> <tbody> <tr> <td>Health Hazard (Blue).....</td> <td>2</td> </tr> <tr> <td>Flammability (Red).....</td> <td>3</td> </tr> <tr> <td>Reactivity (Yellow).....</td> <td>0</td> </tr> </tbody> </table>	Category	Rating	Fire.....	3	Health.....		Vapor Irritant.....	1	Liquid or Solid Irritant.....	1	Poisons.....	2	Water Pollution.....		Human Toxicity.....	1	Aquatic Toxicity.....	3	Aesthetic Effect.....	2	Reactivity.....		Other Chemicals.....	1	Water.....	0	Self Reaction.....	0	Category	Classification	Health Hazard (Blue).....	2	Flammability (Red).....	3	Reactivity (Yellow).....	0
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<p><b>7. CHEMICAL REACTIVITY</b></p> <p>7.1 Reactivity With Water: No reaction 7.2 Reactivity with Common Materials: No reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerization: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Molar Ratio (Reactant to Product): Data not available 7.8 Reactivity Group: 32</p>	<p><b>12. PHYSICAL AND CHEMICAL PROPERTIES</b></p> <p>12.1 Physical State at 15°C and 1 atm: Liquid 12.2 Molecular Weight: 92.14 12.3 Boiling Point at 1 atm: 231.1°F = 110.6°C = 383.6°K 12.4 Freezing Point: -139°F = -95.0°C = 178.2°K 12.5 Critical Temperature: 605.4°F = 318.6°C = 591.8°K 12.6 Critical Pressure: 596.1 psia = 40.55 atm = 4.108 MN/m<sup>2</sup> 12.7 Specific Gravity: 0.867 at 20°C (liquid) 12.8 Liquid Surface Tension: 29.0 dynes/cm = 0.0290 N/m at 20°C 12.9 Liquid Water Interfacial Tension: 36.1 dynes/cm = 0.0361 N/m at 25°C 12.10 Vapor (Gas) Specific Gravity: Not pertinent 12.11 Ratio of Specific Heats of Vapor (Gas): 1.089 12.12 Latent Heat of Vaporization: 155 Btu/lb = 86.1 cal/g = 3.61 X 10<sup>4</sup> J/kg 12.13 Heat of Combustion: -17,430 Btu/lb = -9886 cal/g = -405.5 X 10<sup>3</sup> J/kg 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.25 Heat of Fusion: 17.17 cal/g 12.26 Limiting Value: Data not available 12.27 Reid Vapor Pressure: 1.1 psia</p>																																				
<p><b>8. WATER POLLUTION</b></p> <p>8.1 Aquatic Toxicity: 1180 mg/l/96 hr/sunfish/TL<sub>50</sub>/fresh water 8.2 Waterfowl Toxicity: Data not available 8.3 Biological Oxygen Demand (BOD): 0%, 5 days; 38% (theor), 8 days 8.4 Food Chain Concentration Potential: None</p>	<p><b>9. SHIPPING INFORMATION</b></p> <p>9.1 Grades of Purity: Research, reagent, nitration-99.8 + %; industrial: contains 94 + %, with 5% xylene and small amounts of benzene and nonaromatic hydrocarbons; 90/120: less pure than industrial. 9.2 Storage Temperature: Ambient 9.3 Inert Atmosphere: No requirement 9.4 Venting: Open (flame arrester) or pressure-vacuum</p>																																				
<p><b>6. FIRE HAZARDS (Continued)</b></p> <p>6.11 Stoichiometric Air to Fuel Ratio: Data not available 6.12 Flame Temperature: Data not available</p>																																					

TOL

## TOLUENE

12.17 SATURATED LIQUID DENSITY		12.18 LIQUID HEAT CAPACITY		12.19 LIQUID THERMAL CONDUCTIVITY		12.20 LIQUID VISCOSITY	
Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F	Temperature (degrees F)	British thermal unit-inch per hour- square foot-F	Temperature (degrees F)	Centipoise
-30	57.180	0	.396	0	1.026	0	1.024
-20	56.870	5	.397	10	1.015	5	.978
-10	56.550	10	.399	20	1.005	10	.935
0	56.240	15	.400	30	.994	15	.894
10	55.930	20	.402	40	.983	20	.857
20	55.620	25	.403	50	.972	25	.821
30	55.310	30	.404	60	.962	30	.788
40	54.990	35	.406	70	.951	35	.757
50	54.680	40	.407	80	.940	40	.727
60	54.370	45	.409	90	.929	45	.700
70	54.060	50	.410	100	.919	50	.673
80	53.750	55	.411	110	.908	55	.649
90	53.430	60	.413	120	.897	60	.625
100	53.120	65	.414	130	.886	65	.603
110	52.810	70	.415	140	.876	70	.582
120	52.500	75	.417	150	.865	75	.562
		80	.418	160	.854	80	.544
		85	.420	170	.843	85	.526
		90	.421	180	.833	90	.509
		95	.422	190	.822	95	.493
		100	.424	200	.811	100	.477
		105	.425	210	.800		
		110	.427				
		115	.428				
		120	.429				
		125	.431				

12.21 SOLUBILITY IN WATER		12.22 SATURATED VAPOR PRESSURE		12.23 SATURATED VAPOR DENSITY		12.24 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	Pounds per 100 pounds of water	Temperature (degrees F)	Pounds per square inch	Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F
68.02	.050	0	.038	0	.00070	0	.228
		10	.057	10	.00103	25	.241
		20	.084	20	.00150	50	.255
		30	.121	30	.00212	75	.268
		40	.172	40	.00296	100	.281
		50	.241	50	.00405	125	.294
		60	.331	60	.00547	150	.306
		70	.449	70	.00727	175	.319
		80	.600	80	.00954	200	.331
		90	.792	90	.01237	225	.343
		100	1.033	100	.01584	250	.355
		110	1.332	110	.02007	275	.367
		120	1.700	120	.02518	300	.378
		130	2.148	130	.03127	325	.389
		140	2.690	140	.03850	350	.400
		150	3.338	150	.04700	375	.411
		160	4.109	160	.05691	400	.422
		170	5.018	170	.06840	425	.432
		180	6.083	180	.08162	450	.443
		190	7.323	190	.09675	475	.453
		200	8.758	200	.11400	500	.462
		210	10.410	210	.13340	525	.472
						550	.482
						575	.491
						600	.500

# m-XYLENE

XLM

<p><b>Common Synonyms</b> 1, 3-Dimethylbenzene Xytol</p>	<p>Watery liquid      Colorless      Sweet odor</p> <p>Floats on water. Flammable, irritating vapor is produced.</p>
<p>Stop discharge if possible. Keep people away. Call fire department. Avoid contact with liquid and vapor. Isolate and remove discharged material. Notify local health and pollution control agencies.</p>	
<b>Fire</b>	<p><b>FLAMMABLE</b> Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. Wear self-contained breathing apparatus. Extinguish with foam, dry chemical, or carbon dioxide. Water may be ineffective on fire. Cool exposed containers with water.</p>
<b>Exposure</b>	<p>CALL FOR MEDICAL AID.</p> <p><b>VAPOR</b> Irritating to eyes, nose, and throat. If inhaled, will cause headache, difficult breathing, or loss of consciousness. Move to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.</p> <p><b>LIQUID</b> Irritating to skin and eyes. If swallowed, will cause nausea, vomiting, or loss of consciousness. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk. DO NOT INDUCE VOMITING.</p>
<b>Water Pollution</b>	<p>HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. Floating to shoreline. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.</p>
<p><b>1. RESPONSE TO DISCHARGE</b> (See Response Methods Handbook)</p> <p>Issue warning-high flammability Evacuate area Should be removed Chemical and physical treatment</p>	<p><b>2. LABEL</b></p> <p>2.1 Category: Flammable liquid 2.2 Class: 3</p>
<p><b>3. CHEMICAL DESIGNATIONS</b></p> <p>3.1 CG Compatibility Class: Aromatic Hydrocarbon 3.2 Formula: m-C<sub>8</sub>H<sub>10</sub>(CH<sub>3</sub>)<sub>2</sub> 3.3 IMO/UN Designation: 3.2/1307 3.4 DOT ID No.: 1307 3.5 CAS Registry No.: 106-38-3</p>	<p><b>4. OBSERVABLE CHARACTERISTICS</b></p> <p>4.1 Physical State (as shipped): Liquid 4.2 Color: Colorless 4.3 Odor: Like benzene; characteristic aromatic</p>
<p><b>5. HEALTH HAZARDS</b></p> <p>5.1 Personal Protective Equipment: Approved canister or air-supplied mask; goggles or face shield; plastic gloves and boots. 5.2 Symptoms Following Exposure: Vapors cause headache and dizziness. Liquid irritates eyes and skin. If taken into lungs, causes severe coughing, distress, and rapidly developing pulmonary edema. If ingested, causes nausea, vomiting, cramps, headache, and coma; can be fatal. Kidney and liver damage can occur. 5.3 Treatment of Exposure: INHALATION: remove to fresh air; administer artificial respiration and oxygen if required; call a doctor. INGESTION: do NOT induce vomiting; call a doctor. EYES: flush with water for at least 15 min. SKIN: wipe off, wash with soap and water. 5.4 Threshold Limit Value: 100 ppm 5.5 Short Term Inhalation Limits: 300 ppm for 30 min. 5.6 Toxicity by Ingestion: Grade 3; LD<sub>50</sub> = 50 to 500 g/kg 5.7 Late Toxicity: Kidney and liver damage. 5.8 Vapor (Gas) Irritant Characteristics: Vapors cause a slight smarting of the eyes or respiratory system if present in high concentrations. The effect is temporary. 5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, may cause smarting and reddening of the skin. 5.10 Odor Threshold: 0.05 ppm 5.11 IDLH Value: 10,000 ppm</p>	

<p><b>6. FIRE HAZARDS</b></p> <p>6.1 Flash Point: 84°F C.C. 6.2 Flammable Limits in Air: 1.1%-6.4% 6.3 Fire Extinguishing Agents: Foam, dry chemical, or carbon dioxide 6.4 Fire Extinguishing Agents Not to be Used: Water may be ineffective. 6.5 Special Hazards of Combustion Products: Not pertinent 6.6 Behavior In Fire: Vapor is heavier than air and may travel considerable distance to a source of ignition and flash back. 6.7 Ignition Temperature: 986°F 6.8 Electrical Hazard: Class I, Group D 6.9 Burning Rate: 5.8 mm/min. 6.10 Adiabatic Flame Temperature: Data not available 6.11 Stoichiometric Air to Fuel Ratio: Data not available 6.12 Flame Temperature: Data not available</p>	<p><b>7. CHEMICAL REACTIVITY</b></p> <p>7.1 Reactivity With Water: No reaction 7.2 Reactivity with Common Materials: No reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerization: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Molar Ratio (Reactant to Product): Data not available 7.8 Reactivity Group: 32</p>
<p><b>8. WATER POLLUTION</b></p> <p>8.1 Aquatic Toxicity: 22 ppm/96 hr/bluegill/TL<sub>50</sub>/fresh water 8.2 Waterfowl Toxicity: Data not available 8.3 Biological Oxygen Demand (BOD): 0 lb/lb, 5 days; 0% (theor.), 8 days 8.4 Food Chain Concentration Potential: Data not available</p>	<p><b>9. SHIPPING INFORMATION</b></p> <p>9.1 Grades of Purity: Research: 99.99%; Pure: 99.9%; Technical: 89.2% 9.2 Storage Temperature: Ambient 9.3 Inert Atmosphere: No requirement 9.4 Venting: Open (flame arrester) or pressure-vacuum</p>
<p>NOTES</p>	

<p><b>10. HAZARD ASSESSMENT CODE</b> (See Hazard Assessment Handbook) A-T-U</p>	<p><b>11. HAZARD CLASSIFICATIONS</b></p> <p>11.1 Code of Federal Regulations: Flammable liquid</p> <p>11.2 MAS Hazard Rating for Bulk Water Transportation:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Category</th> <th style="text-align: left;">Rating</th> </tr> </thead> <tbody> <tr> <td>Fire.....</td> <td>3</td> </tr> <tr> <td>Health</td> <td></td> </tr> <tr> <td>Vapor Irritant.....</td> <td>1</td> </tr> <tr> <td>Liquid or Solid Irritant.....</td> <td>1</td> </tr> <tr> <td>Poisons.....</td> <td>2</td> </tr> <tr> <td>Water Pollution</td> <td></td> </tr> <tr> <td>Human Toxicity.....</td> <td>1</td> </tr> <tr> <td>Aquatic Toxicity.....</td> <td>3</td> </tr> <tr> <td>Aesthetic Effect.....</td> <td>2</td> </tr> <tr> <td>Reactivity</td> <td></td> </tr> <tr> <td>Other Chemicals.....</td> <td>1</td> </tr> <tr> <td>Water.....</td> <td>0</td> </tr> <tr> <td>Self Reaction.....</td> <td>0</td> </tr> </tbody> </table> <p>11.3 NFPA Hazard Classification:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Category</th> <th style="text-align: left;">Classification</th> </tr> </thead> <tbody> <tr> <td>Health Hazard (Blue).....</td> <td>2</td> </tr> <tr> <td>Flammability (Red).....</td> <td>3</td> </tr> <tr> <td>Reactivity (Yellow).....</td> <td>0</td> </tr> </tbody> </table>	Category	Rating	Fire.....	3	Health		Vapor Irritant.....	1	Liquid or Solid Irritant.....	1	Poisons.....	2	Water Pollution		Human Toxicity.....	1	Aquatic Toxicity.....	3	Aesthetic Effect.....	2	Reactivity		Other Chemicals.....	1	Water.....	0	Self Reaction.....	0	Category	Classification	Health Hazard (Blue).....	2	Flammability (Red).....	3	Reactivity (Yellow).....	0
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Reactivity (Yellow).....	0																																				
<p><b>12. PHYSICAL AND CHEMICAL PROPERTIES</b></p> <p>12.1 Physical State at 15°C and 1 atm: Liquid</p> <p>12.2 Molecular Weight: 106.16</p> <p>12.3 Boiling Point at 1 atm: 269.4°F = 131.9°C = 405.1°K</p> <p>12.4 Freezing Point: -54.2°F = -47.9°C = 225.3°K</p> <p>12.5 Critical Temperature: 650.8°F = 343.8°C = 617.0°K</p> <p>12.6 Critical Pressure: 513.8 atm = 34.95 psia = 3.540 MN/m<sup>2</sup></p> <p>12.7 Specific Gravity: 0.864 at 20°C (liquid)</p> <p>12.8 Liquid Surface Tension: 28.8 dynes/cm = 0.0286 N/m at 20°C</p> <p>12.9 Liquid Water Interfacial Tension: 36.4 dynes/cm = 0.0364 N/m at 30°C</p> <p>12.10 Vapor (Gas) Specific Gravity: Not pertinent</p> <p>12.11 Ratio of Specific Heats of Vapor (Gas): 1.071</p> <p>12.12 Latent Heat of Vaporization: 147 Btu/lb = 81.9 cal/g = 3.43 X 10<sup>5</sup> J/kg</p> <p>12.13 Heat of Combustion: -17,554 Btu/lb = -9752.4 cal/g = -406.31 X 10<sup>3</sup> J/kg</p> <p>12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.25 Heat of Fusion: 26.01 cal/g 12.26 Limiting Value: Data not available 12.27 Reid Vapor Pressure: 0.34 psia</p>																																					

XLM

## m-XYLENE

12.17 SATURATED LIQUID DENSITY		12.18 LIQUID HEAT CAPACITY		12.19 LIQUID THERMAL CONDUCTIVITY		12.20 LIQUID VISCOSITY	
Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F	Temperature (degrees F)	British thermal unit-inch per hour- square foot-F	Temperature (degrees F)	Centipoise
15	55.400	40	.387	35	.962	15	.938
20	55.260	50	.393	40	.953	20	.898
25	55.130	60	.398	45	.944	25	.862
30	54.990	70	.404	50	.935	30	.827
35	54.850	80	.410	55	.926	35	.794
40	54.710	90	.415	60	.917	40	.764
45	54.570	100	.421	65	.908	45	.735
50	54.430	110	.426	70	.899	50	.708
55	54.290	120	.432	75	.890	55	.682
60	54.160	130	.437	80	.881	60	.658
65	54.020	140	.443	85	.873	65	.635
70	53.880	150	.448	90	.864	70	.613
75	53.740	160	.454	95	.855	75	.592
80	53.600	170	.460	100	.846	80	.572
85	53.460	180	.465			85	.554
90	53.320	190	.471				
95	53.180	200	.476				
100	53.050	210	.482				

12.21 SOLUBILITY IN WATER		12.22 SATURATED VAPOR PRESSURE		12.23 SATURATED VAPOR DENSITY		12.24 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	Pounds per 100 pounds of water	Temperature (degrees F)	Pounds per square inch	Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F
	I	60	.090	60	.00172	0	.247
	N	70	.127	70	.00238	25	.260
	S	80	.177	80	.00324	50	.273
	O	90	.242	90	.00435	75	.286
	L	100	.326	100	.00577	100	.299
	U	110	.434	110	.00754	125	.311
	B	120	.571	120	.00975	150	.324
	L	130	.743	130	.01247	175	.336
	E	140	.956	140	.01577	200	.348
		150	1.219	150	.01977	225	.360
		160	1.538	160	.02455	250	.371
		170	1.924	170	.03023	275	.383
		180	2.388	180	.03691	300	.394
		190	2.939	190	.04473	325	.406
		200	3.590	200	.05382	350	.417
		210	4.355	210	.06431	375	.427
		220	5.247	220	.07635	400	.438
		230	6.282	230	.09009	425	.449
		240	7.476	240	.10570	450	.459
		250	8.846	250	.12330	475	.469
		260	10.410	260	.14310	500	.479
						525	.489
						550	.499
						575	.508
						600	.517

# o-XYLENE

XLO

<b>Common Synonyms</b> 1, 2-Dimethylbenzene Xylol	Watery liquid	Colorless	Sweet odor
Floats on water. Flammable, irritating vapor is produced.			
Stop discharge if possible. Keep people away. Call fire department. Avoid contact with liquid and vapor. Isolate and remove discharged material. Notify local health and pollution control agencies.			
<b>Fire</b>	<b>FLAMMABLE</b> Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. Wear self-contained breathing apparatus. Extinguish with foam, dry chemical, or carbon dioxide. Water may be ineffective on fire. Cool exposed containers with water.		
<b>Exposure</b>	CALL FOR MEDICAL AID. <b>VAPOR</b> Irritating to eyes, nose and throat. If inhaled, will cause headache, difficult breathing, or loss of consciousness. Move to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen. <b>LIQUID</b> Irritating to skin and eyes. If swallowed, will cause nausea, vomiting, or loss of consciousness. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk. DO NOT INDUCE VOMITING.		
<b>Water Pollution</b>	Dangerous to aquatic life in high concentrations. Fouling to shoreline. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.		
<b>1. RESPONSE TO DISCHARGE</b> (See Response Methods Handbook) Issue warning-high flammability Evacuate area Should be removed Chemical and physical treatment		<b>2. LABEL</b> 2.1 Category: Flammable liquid 2.2 Class: 3	
<b>3. CHEMICAL DESIGNATIONS</b> 3.1 CG Compatibility Class: Aromatic Hydrocarbon 3.2 Formula: $\text{C}_8\text{H}_{10}$ 3.3 IMO/IUN Designation: 3.2/1307 3.4 DOT ID No.: 1307 3.5 CAS Registry No.: 95-47-6		<b>4. OBSERVABLE CHARACTERISTICS</b> 4.1 Physical State (as shipped): Liquid 4.2 Color: Colorless 4.3 Odor: Benzene-like; characteristic aromatic	
<b>5. HEALTH HAZARDS</b>			
5.1 Personal Protective Equipment: Approved canister or air-supplied mask; goggles or face shield; plastic gloves and boots. 5.2 Symptoms Following Exposure: Vapors cause headache and dizziness. Liquid irritates eyes and skin. If taken into lungs, causes severe coughing, distress, and rapidly developing pulmonary edema. If ingested, causes nausea, vomiting, cramps, headache, and coma. Can be fatal. Kidney and liver damage can occur. 5.3 Treatment of Exposure: INHALATION: remove to fresh air; administer artificial respiration and oxygen if required; call a doctor. INGESTION: do NOT induce vomiting; call a doctor. EYES: flush with water for at least 15 min. SKIN: wipe off, wash with soap and water. 5.4 Threshold Limit Value: 100 ppm 5.5 Short Term Inhalation Limits: 300 ppm for 30 min. 5.6 Toxicity by Ingestion: Grade 3; LD <sub>50</sub> = 50 to 500 mg/kg 5.7 Late Toxicity: Kidney and liver damage. 5.8 Vapor (Gas) Irritant Characteristics: Vapors cause a slight smarting of the eyes or respiratory system if present in high concentrations. The effect is temporary. 5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, may cause smarting and reddening of the skin. 5.10 Odor Threshold: 0.05 ppm 5.11 IDLH Value: 10,000 ppm			

<b>6. FIRE HAZARDS</b>																																				
6.1 Flash Point: 63°F C.C.; 75°F O.C. 6.2 Flammable Limits in Air: 1.1%-7.0% 6.3 Fire Extinguishing Agents: Foam, dry chemical, or carbon dioxide 6.4 Fire Extinguishing Agents Not to be Used: Water may be ineffective. 6.5 Special Hazards of Combustion Products: Not pertinent 6.6 Behavior in Fire: Vapor is heavier than air and may travel considerable distance to a source of ignition and flash back. 6.7 Ignition Temperature: 869°F 6.8 Electrical Hazard: Class I, Group D 6.9 Burning Rate: 5.8 mm/min. 6.10 Adiabatic Flame Temperature: Data not available 6.11 Stoichiometric Air to Fuel Ratio: Data not available 6.12 Flame Temperature: Data not available																																				
<b>7. CHEMICAL REACTIVITY</b>																																				
7.1 Reactivity With Water: No reaction 7.2 Reactivity with Common Materials: No reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerization: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Molar Ratio (Reactant to Product): Data not available 7.8 Reactivity Group: 32																																				
<b>8. WATER POLLUTION</b>																																				
8.1 Aquatic Toxicity: >100 mg/l/96 hr/D. magna/TL <sub>50</sub> /fresh water 8.2 Waterfowl Toxicity: Data not available 8.3 Biological Oxygen Demand (BOD): 0 lb/lb, 5 days; 2.5% (theor.), 8 days 8.4 Food Chain Concentration Potential: Data not available																																				
<b>9. SHIPPING INFORMATION</b>																																				
9.1 Grades of Purity: Research: 99.99%; Pure: 99.7%; Commercial: 95 + % 9.2 Storage Temperature: Ambient 9.3 Inert Atmosphere: No reaction 9.4 Venting: Open (flame arrester) or pressure-vacuum																																				
<b>10. HAZARD ASSESSMENT CODE</b> (See Hazard Assessment Handbook) A-T-U																																				
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11.1 Code of Federal Regulations: Flammable liquid 11.2 NAS Hazard Rating for Bulk Water Transportation: <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Category</th> <th style="text-align: right;">Rating</th> </tr> </thead> <tbody> <tr> <td>Fire.....</td> <td style="text-align: right;">3</td> </tr> <tr> <td>Health.....</td> <td></td> </tr> <tr> <td>Vapor Irritant.....</td> <td style="text-align: right;">1</td> </tr> <tr> <td>Liquid or Solid Irritant.....</td> <td style="text-align: right;">1</td> </tr> <tr> <td>Poisons.....</td> <td style="text-align: right;">2</td> </tr> <tr> <td>Water Pollution.....</td> <td></td> </tr> <tr> <td>Human Toxicity.....</td> <td style="text-align: right;">1</td> </tr> <tr> <td>Aquatic Toxicity.....</td> <td style="text-align: right;">3</td> </tr> <tr> <td>Aesthetic Effect.....</td> <td style="text-align: right;">2</td> </tr> <tr> <td>Reactivity.....</td> <td></td> </tr> <tr> <td>Other Chemicals.....</td> <td style="text-align: right;">1</td> </tr> <tr> <td>Water.....</td> <td style="text-align: right;">0</td> </tr> <tr> <td>Self Reaction.....</td> <td style="text-align: right;">0</td> </tr> </tbody> </table> 11.3 NFPA Hazard Classification: <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Category</th> <th style="text-align: right;">Classification</th> </tr> </thead> <tbody> <tr> <td>Health Hazard (Blue).....</td> <td style="text-align: right;">2</td> </tr> <tr> <td>Flammability (Red).....</td> <td style="text-align: right;">3</td> </tr> <tr> <td>Reactivity (Yellow).....</td> <td style="text-align: right;">0</td> </tr> </tbody> </table>	Category	Rating	Fire.....	3	Health.....		Vapor Irritant.....	1	Liquid or Solid Irritant.....	1	Poisons.....	2	Water Pollution.....		Human Toxicity.....	1	Aquatic Toxicity.....	3	Aesthetic Effect.....	2	Reactivity.....		Other Chemicals.....	1	Water.....	0	Self Reaction.....	0	Category	Classification	Health Hazard (Blue).....	2	Flammability (Red).....	3	Reactivity (Yellow).....	0
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<b>12. PHYSICAL AND CHEMICAL PROPERTIES</b>																																				
12.1 Physical State at 15°C and 1 atm: Liquid 12.2 Molecular Weight: 106.16 12.3 Boiling Point at 1 atm: 291.9°F = 144.4°C = 417.6°K 12.4 Freezing Point: -13.3°F = -25.2°C = 248.0°K 12.5 Critical Temperature: 674.8°F = 357.1°C = 630.3°K 12.6 Critical Pressure: 541.5 atm = 36.64 psia = 3.732 MN/m <sup>2</sup> 12.7 Specific Gravity: 0.880 at 20°C (liquid) 12.8 Liquid Surface Tension: 30.53 dynes/cm = 0.03053 N/m at 15.5°C 12.9 Liquid Water Interfacial Tension: 36.05 dynes/cm = 0.03606 N/m at 20°C 12.10 Vapor (Gas) Specific Gravity: Not pertinent 12.11 Ratio of Specific Heats of Vapor (Gas): 1.068 12.12 Latent Heat of Vaporization: 148 Btu/lb = 82.9 cal/g = 3.47 X 10 <sup>4</sup> J/kg 12.13 Heat of Combustion: -17,558 Btu/lb = -8754.7 cal/g = -408.41 X 10 <sup>4</sup> J/kg 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.25 Heat of Fusion: 30.64 cal/g 12.26 Limiting Value: Data not available 12.27 Reid Vapor Pressure: 0.28 psia																																				
NOTES																																				

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## o-XYLENE

12.17 SATURATED LIQUID DENSITY		12.18 LIQUID HEAT CAPACITY		12.19 LIQUID THERMAL CONDUCTIVITY		12.20 LIQUID VISCOSITY	
Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F	Temperature (degrees F)	British thermal unit-inch per hour- square foot-F	Temperature (degrees F)	Centipoise
15	56.460	35	.389	35	1.043	15	1.328
20	56.330	40	.391	40	1.035	20	1.263
25	56.190	45	.394	45	1.027	25	1.202
30	56.050	50	.396	50	1.018	30	1.145
35	55.910	55	.398	55	1.010	35	1.092
40	55.770	60	.400	60	1.002	40	1.042
45	55.630	65	.402	65	.993	45	.995
50	55.490	70	.404	70	.985	50	.952
55	55.360	75	.406	75	.977	55	.911
60	55.220	80	.408	80	.969	60	.873
65	55.080	85	.411	85	.960	65	.836
70	54.940	90	.413	90	.952	70	.802
75	54.800	95	.415	95	.944	75	.770
80	54.660	100	.417	100	.935	80	.740
85	54.520					85	.712
90	54.380						
95	54.250						
100	54.110						

12.21 SOLUBILITY IN WATER		12.22 SATURATED VAPOR PRESSURE		12.23 SATURATED VAPOR DENSITY		12.24 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	Pounds per 100 pounds of water	Temperature (degrees F)	Pounds per square inch	Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F
	I	60	.071	60	.00135	0	.261
	N	70	.101	70	.00188	25	.274
	S	80	.141	80	.00258	50	.287
	O	90	.194	90	.00349	75	.299
	L	100	.263	100	.00464	100	.311
	U	110	.352	110	.00611	125	.323
	B	120	.465	120	.00794	150	.335
	L	130	.609	130	.01021	175	.347
	E	140	.787	140	.01298	200	.358
		150	1.007	150	.01634	225	.370
		160	1.277	160	.02038	250	.381
		170	1.605	170	.02520	275	.392
		180	1.999	180	.03090	300	.403
		190	2.469	190	.03759	325	.414
		200	3.028	200	.04539	350	.424
		210	3.686	210	.05443	375	.435
		220	4.456	220	.06484	400	.445
		230	5.352	230	.07674	425	.455
		240	6.389	240	.09030	450	.465
		250	7.581	250	.10560	475	.475
		260	8.947	260	.12290	500	.485
						525	.494
						550	.504
						575	.513
						600	.522

# p-XYLENE

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<p><b>Common Synonyms</b> 1, 4-Dimethylbenzene Xylol</p>		<p>Watery liquid      Colorless      Sweet odor</p> <p>Floats on water. Flammable, irritating vapor is produced. Freezing point is 56°F.</p>
<p>Stop discharge if possible. Keep people away. Call fire department. Avoid contact with liquid and vapor. Isolate and remove discharged material. Notify local health and pollution control agencies.</p>		
<p><b>Fire</b></p>	<p><b>FLAMMABLE</b> Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. Wear self-contained breathing apparatus. Extinguish with foam, dry chemical, or carbon dioxide. Water may be ineffective on fire. Cool exposed containers with water.</p>	
<p><b>Exposure</b></p>	<p><b>CALL FOR MEDICAL AID.</b></p> <p><b>VAPOR</b> Irritating to eyes, nose and throat. If inhaled, will cause dizziness, difficult breathing, or loss of consciousness. Move to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.</p> <p><b>LIQUID</b> Irritating to skin and eyes. If swallowed, will cause nausea, vomiting, loss of consciousness. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk. <b>DO NOT INDUCE VOMITING.</b></p>	
<p><b>Water Pollution</b></p>	<p>HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. Floating to shoreline. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.</p>	
<p><b>1. RESPONSE TO DISCHARGE</b> (See Response Methods Handbook) Issue warning-high flammability Evacuate area Should be removed Chemical and physical treatment</p>		<p><b>2. LABEL</b> 2.1 Category: Flammable liquid 2.2 Class: 3</p>
<p><b>3. CHEMICAL DESIGNATIONS</b> 3.1 CG Compatibility Class: Aromatic Hydrocarbon 3.2 Formula: p-C<sub>6</sub>H<sub>4</sub>(CH<sub>3</sub>)<sub>2</sub> 3.3 IMO/UN Designation: 3.2/1307 3.4 DOT ID No.: 1307 3.5 CAS Registry No.: 106-42-3</p>		<p><b>4. OBSERVABLE CHARACTERISTICS</b> 4.1 Physical State (as shipped): Liquid 4.2 Color: Colorless 4.3 Odor: Like benzene; characteristic aromatic</p>
<p><b>5. HEALTH HAZARDS</b></p> <p>5.1 Personal Protective Equipment: Approved canister or air-supplied mask; goggles or face shield; plastic gloves and boots.</p> <p>5.2 Symptoms Following Exposure: Vapors cause headache and dizziness. Liquid irritates eyes and skin. If taken into lungs, causes severe coughing, distress, and rapidly developing pulmonary edema. If ingested, causes nausea, vomiting, cramps, headache, and coma. Can be fatal. Kidney and liver damage can occur.</p> <p>5.3 Treatment of Exposure: INHALATION: remove to fresh air; administer artificial respiration and oxygen if required; call a doctor. INGESTION: do NOT induce vomiting; call a doctor. EYES: flush with water for at least 15 min. SKIN: wipe off, wash with soap and water.</p> <p>5.4 Threshold Limit Value: 100 ppm</p> <p>5.5 Short Term Inhalation Limits: 300 ppm for 30 min.</p> <p>5.6 Toxicity by Ingestion: Grade 3; LD<sub>50</sub> = 50 to 500 mg/kg</p> <p>5.7 Late Toxicity: Kidney and liver damage.</p> <p>5.8 Vapor (Gas) Irritant Characteristics: Vapors cause a slight smarting of the eyes or respiratory system if present in high concentrations. The effect is temporary.</p> <p>5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, may cause smarting and reddening of the skin.</p> <p>5.10 Odor Threshold: 0.05 ppm</p> <p>5.11 IDLH Value: 10,000 ppm</p>		

<p><b>6. FIRE HAZARDS</b></p> <p>6.1 Flash Point: 81°F C.C.</p> <p>6.2 Flammable Limits in Air: 1.1%-6.6%</p> <p>6.3 Fire Extinguishing Agents: Foam, dry chemical, or carbon dioxide</p> <p>6.4 Fire Extinguishing Agents Not to be Used: Water may be ineffective.</p> <p>6.5 Special Hazards of Combustion Products: Not pertinent</p> <p>6.6 Behavior in Fire: Vapor is heavier than air and may travel considerable distance to a source of ignition and flash back.</p> <p>6.7 Ignition Temperature: 870°F</p> <p>6.8 Electrical Hazard: Class I, Group D</p> <p>6.9 Burning Rate: 5.8 mm/min.</p> <p>6.10 Adiabatic Flame Temperature: Data not available</p> <p>6.11 Stoichiometric Air to Fuel Ratio: Data not available</p> <p>6.12 Flame Temperature: Data not available</p>	<p><b>10. HAZARD ASSESSMENT CODE</b> (See Hazard Assessment Handbook) A-T-U</p>																																				
<p><b>7. CHEMICAL REACTIVITY</b></p> <p>7.1 Reactivity With Water: No reaction</p> <p>7.2 Reactivity with Common Materials: No reaction</p> <p>7.3 Stability During Transport: Stable</p> <p>7.4 Neutralizing Agents for Acids and Caustics: Not pertinent</p> <p>7.5 Polymerization: Not pertinent</p> <p>7.6 Inhibitor of Polymerization: Not pertinent</p> <p>7.7 Molar Ratio (Reactant to Product): Data not available</p> <p>7.8 Reactivity Group: 32</p>	<p><b>11. HAZARD CLASSIFICATIONS</b></p> <p>11.1 Code of Federal Regulations: Flammable liquid</p> <p>11.2 NAS Hazard Rating for Bulk Water Transportation:</p> <table border="1"> <thead> <tr> <th>Category</th> <th>Rating</th> </tr> </thead> <tbody> <tr> <td>Fire.....</td> <td>3</td> </tr> <tr> <td>Health.....</td> <td>1</td> </tr> <tr> <td>Vapor Irritant.....</td> <td>1</td> </tr> <tr> <td>Liquid or Solid Irritant.....</td> <td>1</td> </tr> <tr> <td>Poisons.....</td> <td>2</td> </tr> <tr> <td>Water Pollution.....</td> <td>1</td> </tr> <tr> <td>Human Toxicity.....</td> <td>1</td> </tr> <tr> <td>Aesthetic Toxicity.....</td> <td>3</td> </tr> <tr> <td>Aesthetic Effect.....</td> <td>2</td> </tr> <tr> <td>Reactivity.....</td> <td>0</td> </tr> <tr> <td>Other Chemicals.....</td> <td>1</td> </tr> <tr> <td>Water.....</td> <td>0</td> </tr> <tr> <td>Self Reaction.....</td> <td>0</td> </tr> </tbody> </table> <p>11.3 NFPA Hazard Classification:</p> <table border="1"> <thead> <tr> <th>Category</th> <th>Classification</th> </tr> </thead> <tbody> <tr> <td>Health Hazard (Blue).....</td> <td>2</td> </tr> <tr> <td>Flammability (Red).....</td> <td>3</td> </tr> <tr> <td>Reactivity (Yellow).....</td> <td>0</td> </tr> </tbody> </table>	Category	Rating	Fire.....	3	Health.....	1	Vapor Irritant.....	1	Liquid or Solid Irritant.....	1	Poisons.....	2	Water Pollution.....	1	Human Toxicity.....	1	Aesthetic Toxicity.....	3	Aesthetic Effect.....	2	Reactivity.....	0	Other Chemicals.....	1	Water.....	0	Self Reaction.....	0	Category	Classification	Health Hazard (Blue).....	2	Flammability (Red).....	3	Reactivity (Yellow).....	0
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<p><b>8. WATER POLLUTION</b></p> <p>8.1 Aquatic Toxicity: 22 ppm/96 hr/bluegill/TL<sub>50</sub>/fresh water</p> <p>8.2 Waterfowl Toxicity: Data not available</p> <p>8.3 Biological Oxygen Demand (BOD): 0 lb/lb in 5 days</p> <p>8.4 Food Chain Concentration Potential: Data not available</p>	<p><b>12. PHYSICAL AND CHEMICAL PROPERTIES</b></p> <p>12.1 Physical State at 15°C and 1 atm: Liquid</p> <p>12.2 Molecular Weight: 106.16</p> <p>12.3 Boiling Point at 1 atm: 260.9°F = 138.3°C = 411.5°K</p> <p>12.4 Freezing Point: 55.9°F = 13.3°C = 286.5°K</p> <p>12.5 Critical Temperature: 649.4°F = 343.0°C = 616.2°K</p> <p>12.6 Critical Pressure: 509.4 atm = 34.65 psia = 3.510 MN/m<sup>2</sup></p> <p>12.7 Specific Gravity: 0.861 at 20°C (liquid)</p> <p>12.8 Liquid Surface Tension: 26.3 dynes/cm = 0.0283 N/m at 20°C</p> <p>12.9 Liquid Water Interfacial Tension: 37.8 dynes/cm = 0.0378 N/m at 20°C</p> <p>12.10 Vapor (Gas) Specific Gravity: Not pertinent</p> <p>12.11 Ratio of Specific Heats of Vapor (Gas): 1.071</p> <p>12.12 Latent Heat of Vaporization: 150 Btu/lb = 81 cal/g = 3.4 X 10<sup>5</sup> J/kg</p> <p>12.13 Heat of Combustion: -17,559 Btu/lb = -9754.7 cal/g = -408.41 X 10<sup>3</sup> J/kg</p> <p>12.14 Heat of Decomposition: Not pertinent</p> <p>12.15 Heat of Solution: Not pertinent</p> <p>12.16 Heat of Polymerization: Not pertinent</p> <p>12.25 Heat of Fusion: 37.83 cal/g</p> <p>12.26 Limiting Value: Data not available</p> <p>12.27 Reid Vapor Pressure: 0.34 psia</p>																																				
<p><b>9. SHIPPING INFORMATION</b></p> <p>9.1 Grades of Purity: Research: 99.99%; Pure: 99.8%; Technical: 99.0%</p> <p>9.2 Storage Temperature: Ambient</p> <p>9.3 Inert Atmosphere: No requirement</p> <p>9.4 Venting: Open (flame arrester) or pressure-vacuum</p>	<p><b>NOTES</b></p>																																				

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12.17 SATURATED LIQUID DENSITY		12.18 LIQUID HEAT CAPACITY		12.19 LIQUID THERMAL CONDUCTIVITY		12.20 LIQUID VISCOSITY	
Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F	Temperature (degrees F)	British thermal unit-inch per hour- square foot-F	Temperature (degrees F)	Centipoise
60	53.970	60	.412	60	.935	60	.678
65	53.830	70	.418	65	.928	65	.654
70	53.690	80	.424	70	.921	70	.631
75	53.550	90	.429	75	.914	75	.610
80	53.410	100	.435	80	.907	80	.590
85	53.270	110	.440	85	.900	85	.571
90	53.140	120	.446	90	.892	90	.552
95	53.000	130	.451	95	.885	95	.535
100	52.860	140	.457	100	.878	100	.519
105	52.720	150	.462			105	.503
110	52.580	160	.468			110	.488
115	52.440	170	.474			115	.474
120	52.300	180	.479			120	.460
		190	.485				
		200	.490				
		210	.496				
		220	.501				
		230	.507				
		240	.512				
		250	.518				
		260	.524				
		270	.529				
		280	.535				

12.21 SOLUBILITY IN WATER		12.22 SATURATED VAPOR PRESSURE		12.23 SATURATED VAPOR DENSITY		12.24 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	Pounds per 100 pounds of water	Temperature (degrees F)	Pounds per square inch	Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F
	I N S O L U B L E	60	.096	60	.00183	0	.246
		70	.135	70	.00252	25	.259
		80	.187	80	.00343	50	.272
		90	.255	90	.00459	75	.285
		100	.343	100	.00607	100	.297
		110	.456	110	.00792	125	.309
		120	.599	120	.01022	150	.321
		130	.777	130	.01303	175	.333
		140	.998	140	.01646	200	.345
		150	1.270	150	.02059	225	.357
		160	1.600	160	.02553	250	.368
		170	1.998	170	.03138	275	.380
		180	2.475	180	.03826	300	.391
		190	3.041	190	.04629	325	.402
		200	3.710	200	.05561	350	.413
		210	4.493	210	.06636	375	.424
		220	5.407	220	.07867	400	.435
		230	6.465	230	.09270	425	.445
		240	7.683	240	.10860	450	.456
		250	9.080	250	.12650	475	.466
	260	10.670	260	.14670	500	.476	
					525	.486	
					550	.496	
					575	.505	
					600	.515	



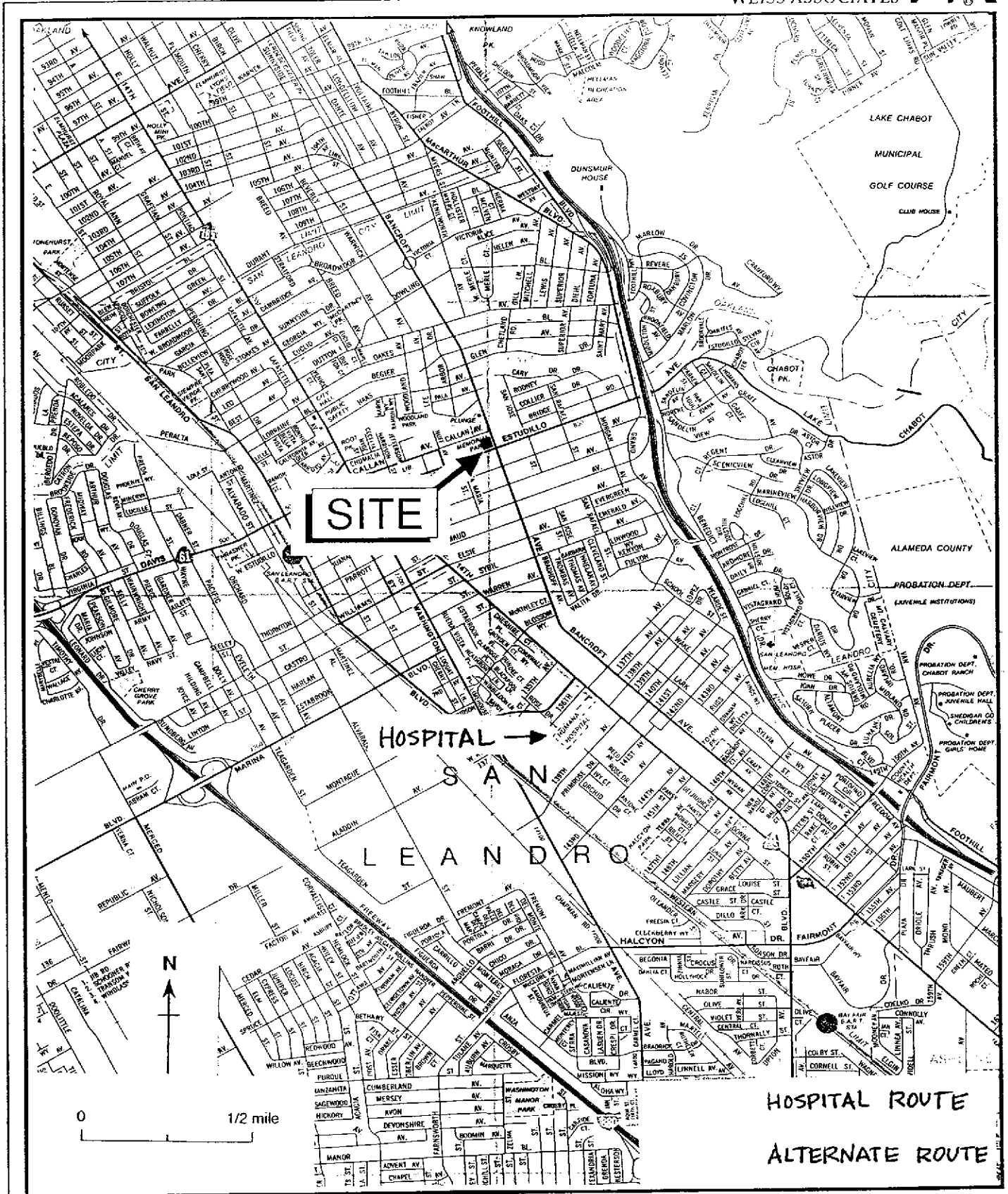


Figure 1. Site Location Map - Shell Service Station WIC #204-6852-0703, 1285 Bancroft Avenue, San Leandro, California