Section 5.2 – Wastewater/Stormwater Discharge Permit Applications

WAC 463-60-537
Applications for Permits and Authorizations – Wastewater/stormwater discharge permit applications.

The application for site certification shall include:

(1) A completed National Pollutant Discharge Elimination System (NPDES) permit application, for any proposed discharge to surface waters of the state of Washington, pursuant to the requirements of WAC 463-76-031; or

(2) For any proposed discharge to publicly owned treatment works (POTW) and/or groundwater of the state of Washington, a state waste discharge application;

(3) A notice of intent to be covered under any applicable statewide general permit for storm water discharge.

(04-23-003, recodified as § 463-60-537, filed 11/4/04, effective 11/11/04. Statutory Authority: RCW 80.50.040 (1) and (12). 04-21-013, § 463-42-537, filed 10/11/04, effective 11/11/04.)

Section 5.2 Wastewater Permit Application

City of Vancouver
Industrial Information Form

Business Name:	Tesoro Savage Petroleum Terminal, LLC	
Facility Address:	5501 Northwest Lower River Road	
Mailing Address:	9001 W Legacy Center Way	
(if different)	Midvale, UT 84047	
Name of Contact:	Kelly Flint	
Title:	Authorized Person	
E-mail:	generalcounsel@savageservices.com	
Phone:	(801) 944-6600	Fax: (801) 944-6554

For Office Use Only:

Eng No.: _____

	Y	N
Possible Classified?		
WRP Staff:		
Date IP App sent:		
Date IP App due:		
IP Staff Assigned:		

Comments:

Nature of business: *(Briefly describe your business AND any activities that produce wastewater.)*

See Attached

Please answer each of the following questions:

1.	Yes ☑	No ☐	Is this business or facility connected to the city's sanitary sewers? *(Are there toilets, sinks or drains in the facility connected to the city sewer system?)*
2.	Yes ☑	No ☐	Does this business or facility discharge ANYTHING OTHER THAN domestic - toilet and sink - wastewater to city sanitary sewers? (*Will process industrial or commercial wastewater be sent to floor drains, batch or process drains, and then discharged to the city sanitary sewers?)* ***If yes, please check one of the following estimates.*** *(Shown below in gallons per day.)*
			Estimated process wastewater discharges: ☐ 0-99 ☐ 100-999 ☐ 1000-3999 ☑ >4000 GPD
3	Yes ☑	No ☐	Does this business have shop or facility floor drains, other than those in restrooms?
4.	Yes ☑	No ☐	Does this business store chemicals or petroleum products in containers of more than 5 gallons? ***If yes, provide information below on materials stored.*** *(Attach and use extra page if needed.)*

Chemical or Active Ingredient	Brand Name	Purpose	Container Size, gallons	Estimated Amounts On Site Avg., gallons.	Max., gallons
See Attached					

5.	Yes ☑	No ☐	Does this facility perform on-site vehicle maintenance or vehicle/equipment washing?

Please fax the completed, signed form to (360) 487-7139 or mail to Industrial Pretreatment, City of Vancouver Engineering Services, PO Box 1995, Vancouver, WA 98668. If you have questions or need help completing this form, contact the City of Vancouverôs Industrial Pretreatment or Water Protection divisions at (360)487-7130.

CERTIFICATION STATEMENT:

I certify that the information submitted is, to the best of my knowledge and belief, true and accurate.

Signature _____ Date _____

Kelly Flint — Printed Name

Authorized Person — Title

DEPARTMENT OF ECOLOGY
State of Washington

Application for a State Waste Discharge Permit to Discharge Industrial Wastewater to a Publicly-Owned Treatment Works (POTW)

This application is for a state waste discharge permit for a discharge of industrial wastewater to a publicly-owned treatment works (POTW) as required by Chapter 90.48 RCW and Chapter 173-216 WAC. It is designed to provide Ecology with information on pollutants in the waste stream, materials that may enter the waste stream, and the flow characteristics of the discharge.

Ecology may request additional information to clarify the conditions of this discharge. The applicant should reference information previously submitted to Ecology that applies to this application in the appropriate section.

SECTION A. GENERAL INFORMATION

1. Applicant Name: Tesoro Savage Petroleum Terminal LLC

2. Facility Name: Vancouver Energy
(if different from Applicant)

3. Applicant Mail Address: 9001 West Legacy Center Way
Street

Midvale, UT 84047
City/State Zip

4. Facility Location Address: 5501 NW Lower River Road
(if different from 3 above) Street

Vancouver, WA 98660
City/State Zip

5. UBI No. 603308951

Sometimes called a registration, tax, "C," or resale number, the Unified Business Identifier (UBI) number is a nine-digit number used to identify persons engaging in business activities. The number is assigned when a person completes a Master Business Application to register with or obtain a license from state agencies. The Departments of Revenue, Licensing, Employment Security, Labor and Industries, and the Corporations Division of the Secretary of State are among the state agencies participating in the UBI program.

6. Latitude/longitude of the facility as decimal degrees (NAD83/WGS84):
45.651778 / -122.731131

FOR OFFICE USE ONLY	Check One:	New/Renewal ☐	Modification ☐
Date Application Received _____	Date Fee Paid _____	Application/ Permit No. _____	Date Application Accepted _____

7. Person to contact who is familiar with the information contained in this application:

Kelly Flint	Authorized Person
Name	Title
(801) 944-6600	(801) 944-6554
Telephone number	Fax number

8. Check One:

☐ **Permit Renewal** (including renewal of temporary permits)

Does this application request a greater amount of wastewater discharge, a greater amount of pollutant discharge, or a discharge of different pollutants than specified in the last permit application for this facility? ☐ YES ☐ NO

For permit renewals, the current permit is an attachment, by reference, to this application.

☐ **Permit Modification**

☐ **Existing Unpermitted Discharge**

☒ **Proposed Discharge**

Anticipated date of discharge: _____

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of a fine and/or imprisonment for knowing violations.

		Authorized Person
Signature*	Date	Title

Kelly Flint
Printed Name

*Applications must be signed as follows: corporations, by a principal executive officer of at least the level of vice-president; partnership, by a general partner; sole proprietorship, by the proprietor. If these titles do not apply to your organization, the person who makes budget decisions for this facility must sign the application.

The application signatory may delegate signature authority for submittals required by the permit, such as monthly reports, to a suitable employee. You can delegate this authority to a qualified individual or to a position, which you expect to fill with a qualified individual. If you wish to delegate signature authority, please complete the following:

Signature of delegated employee	Date	Title or function at the facility

Printed name

SECTION B. PRODUCT INFORMATION

1. Briefly describe all manufacturing processes and products, and/or commercial activities, at this facility. Provide the applicable Standard Industrial Category (SIC) and the North American Industry Classification System (NAICS) Code(s) for each activity (see *North American Industrial Classification System,* 2007 ed.). You can find the 1997 NAICS codes and the corresponding 1987 Standard Industry Category (SIC) codes at (http://www.census.gov/epcd/naics/frames3.htm).

Description: Vancouver Energy will transfer crude oil transported to the Facility by rail into storage tanks and onto vessels for shipment to North American west coast refineries. There will be no processing of crude oil at the proposed Facility. Crude oil will be transferred from the rail cars into storage tanks or directly to vessels. A boiler plant may be used to heat incoming rail cars to maintain property viscosity of crude oil while in the Facility. The transfer pipelines and storage tanks will be equipped with electric heating elements to maintain temperature. The City water supply will be treated to provide boiler feed water. The boiler plant wastewater will be pumped and comingled with domestic sewage from the Administration/Support Buildings prior to discharge to the existing sanitary sewer (Waste Stream 1). Process wastewater from the unloading facility, including condensate blowdown, miscellaneous parts wash, facility washdown, maintenance cycling fire pump cooling water, and rail car exterior washing, will be hauled off site for treatment (Waste Stream 2). Fire pump cooling water resulting from the weekly maintenance cycling of the fire pumps will be comingled with future domestic sewage from the Storage Building located at the Storage Area and discharged to the existing sanitary sewer (Waste Stream 3). Fire pump cooling water, air quality treatment bottom drains, and domestic sewage from the Marine Terminal will be hauled off site (Waste Stream No. 4). Industrial SIC and NAICS codes for this Facility are SIC 5171 and NAICS 422710: "Petroleum Bulk Station & Terminal."

2. List raw materials and products used at his facility:

Type	RAW MATERIALS	Quantity
Grapes (Example)		*1,000 tons per year*
Crude Oil		360,000 U.S. barrels per day (maximum)

Type	PRODUCTS	Quantity
Grape Juice(Example)		*300,000 gallons per year*
N/A		N/A

SECTION C. PLANT OPERATIONAL CHARACTERISTICS

1. For each process listed in B.1. that generates wastewater, list the process, assign the waste stream a name and an ID # and describe whether it is a batch or continuous flow.

Process	Waste Stream Name	Waste Stream ID#	Batch (B) or Continuous (C) Process
Boiler and Administrative & Support Buildings	Waste Stream 1	001	C
Rail unloading building, including containment pans, fire pump cooling, and equipment/part washdown	Waste Stream 2	002	B Haul Off
Storage area fire pump cooling and Storage Building	Waste Stream 3	003	B
Marine Terminal fire pump cooling and domestic sewage	Waste Stream 4	004	B Haul Off

2. On a separate sheet, produce a schematic drawing showing production processes, water flow through the facility, wastewater treatment devices and waste streams as named above. The drawing should indicate the source of intake water and show the operations contributing wastewater to the effluent. The treatment units should be labeled. Construct a water balance by showing average flows between intakes, operations, treatment units, and points of discharge to the POTW. (*See the example on page 16 of this application form.)*

3. What is the maximum daily wastewater discharge flow? 29,069 gallons/day

   What is the maximum average monthly wastewater discharge flow (daily flows averaged over a month)? 21,104 gallons/day

4. Describe any planned wastewater treatment improvements or changes in wastewater disposal methods, and the schedule for these improvements. *(Use additional sheets, if necessary and label as attachment C4.)*

Wastewaters from the Facility will be discharged in accordance with all applicable permits and federal, state, and local pretreatment standards as specified in VMC 14.010.000. At this time, the proposed wastewater treatment processes are as follows:

Preliminary design for the boiler plant indicates that a reverse osmosis unit followed by additional water softeners will be used to treat raw water. Anti-scalant will be added to reduce scaling within the boiler and steam systems. A combination of heat exchangers will be used to reduce discharged temperatures to less than 104 degrees Fahrenheit. Process water discharges from the boiler will pass through an oil-water separator prior to comingling with the domestic sewer from the Administration and Support Buildings.

Cooling water from the fire pumps will be supplied from the City's water system. Discharges will be treated through an oil-water separator prior to comingling with domestic sewer from the Storage Building.

Monitoring manholes will be provided at each sanitary sewer connection from the project site to public sewer. Monitoring will be conducted to confirm that the waste streams meet the requirements of the City's pretreatment ordinance and applicable permit conditions.

5. If production processes are subject to seasonal variations, provide the following information. The combined value for each month should equal the estimated total monthly flow. Please indicate the proper flow unit by checking one of the following boxes:

☒ gallons per day ☐ gallons per month ☐ million gallons per month

Waste Stream ID#	MONTHS											
	J	F	M	A	M	J	J	A	S	O	N	D
001	22474	21546	20615	19692	18764	17377	17377	18764	19692	20619	21547	22474
003	257	257	257	257	257	257	257	257	257	257	257	257
Estimated Total Monthly Flow (GPD)	22731	21803	20872	19949	19021	17634	17634	19021	19949	20876	21804	22731

6. How many hours a day does this facility typically operate? 24

How many days a week does this facility typically operate? 7

How many weeks per year does this facility typically operate? 52

7. List all incidental materials, such as oil, paint, grease, solvents, and cleaners, that are used or stored on site (*list only those with quantities greater than 10 gallons for liquids and 50 pounds for solids).* For solvents and solvent-based cleaners, include a copy of the material safety data sheet and estimate the quantity used. (*Use additional sheets, if necessary, and label as attachment C.7.)*

Materials/Quantity Stored: See Attachment C.7

8. Some types of facilities are required to have spill or waste control plans. Does this facility have:

		Yes	No
a.	A spill prevention, control, and countermeasure plan (40 CFR 112)?	☒	☐
b.	An Oil Spill Contingency Plan (chapter 173-182 WAC)?	☒	☐
c.	An emergency response plan (per WAC 173-303-350)?	☒	☐
d.	A runoff, spillage, or leak control plan (per WAC 173-216-110(f))?	☒	☐
e.	Any spill or pollution prevention plan required by local, state or federal authorities? If yes specify: Washington State Energy Facility Site Evaluation Council	☒	☐
f.	A solid waste control plan?	☐	☒
g.	A Slug Discharge Control Plan (40 CFR 403.8(f)(2)(v))?	☐	☒

SECTION D. WATER CONSUMPTION AND WATER LOSS

1. Potable water source(s):

☒ Public System (Specify) City of Vancouver

☐ Private Well ☐ Surface Water

a. Water Right Permit Number: N/A

b. Legal Description of Water Source

N/A ¼S, N/A ¼E, N/A , Section, N/A TWN, N/A R

2. Potable water use

a. Indicate total water use

Gallons per day (average) 59,778

Gallons per day (maximum) 85,305

b. Is water metered?

☒ YES ☐ NO

SECTION E. WASTEWATER INFORMATION

1. How are the water intake and effluent flows measured?

   Intake: Public Water Meter

   Effluent Not Metered

2. Describe the collection method for the samples analyzed below. (*i.e.*, grab, 24-hour composite). Applicants must collect grab samples (not composites) for analysis of pH, temperature, cyanide, total phenols, residual chlorine, oil and grease, fecal coliform (including E. coli), and Enterococci (previously known as fecal streptococcus at § 122.26 (d)(2)(iii)(A)(3)),or volatile organics.

   Effluent sampling, if required by permit, will be collected using the grab sample method for the required analysis, including pH, temperature, cyanide, total phenols, residual chlorine, oil and grease, fecal coliform, enterococci, and volitile organics.

3. Has the effluent been analyzed for any other parameters than those identified in question E.4.? ☒ YES ☐ NO
   If yes, attach results and label as attachment E.4. This data must clearly show the date, method and location of sampling. *(Note: Ecology may require additional testing.)*

4. Provide measurements or range of measurements for treated wastewater prior to discharge to the POTW for the parameters with an "X" in the left column. If you obtain the application from the internet, contact Ecology's regional office to see if testing for a subset of these parameters is permissible. All analyses (except pH) must be conducted by a laboratory registered or accredited by Ecology (WAC 173-216-125). If this is an application for permit renewal, provide data for the last year for those parameters that are routinely measured. For parameters measured only for this application, place the values under "Maximum." Report the values with units as specified in the parameter name or in the detection level.

   The Permittee must use the specified analytical methods, detection limits (DLs) and quantitation levels (QLs) in the following table unless Ecology approves an alternate method or the method used produces measurable results in the sample and EPA has listed it as an EPA approved method in 40 CFR Part 136. If the Permittee uses an alternative method as allowed above, it must report the test method, DL, and QL on the discharge monitoring report or in the required report.

X	Parameter	Measurement Values			Number of Analyses	Analytical Method Std. Methods 19th,20th edition or EPA	Detection Limit/Quantitation Level
		Minimum	Maximum	Average			
	BOD (5 day)					SM 5210 B	/2 mg/l
	COD					SM 5220 D	/10 mg/l
	Total suspended solids					SM 2540 D	/5 mg/l
	Fixed Dissolved Solids					SM 2540 E	
	Total dissolved solids					SM 2540 C	
	Conductivity (micromhos/cm)					SM 2510 B	
	Ammonia-N as N					SM 4500-NH_3 C	/0.3 mg/L
	pH					SM 4500-H	0.1 standard units
	Fecal coliform (organisms/100 mL)					SM 9221 E or 9222 D	
	Total coliform (organisms/100 mL)					SM 9221 B or 9222 B	
	Dissolved oxygen					SM 4500-O C/G	
	Nitrate + nitrite-N as N					SM 4500-NO_3 E	100 µg/L
	Total kjeldahl N as N					SM 4500-N_{org} C/E/FG	300 µg/l
	Ortho-phosphate-P as P					SM 4500-P E/F	10 µg/l
	Total-phosphorous-P as P					SM 4500-P E/P/F	10 µg/l
	Total Oil & grease					EPA 1664A	1.4/5 mg/l
	NWTPH - Dx					Ecology NWTPH Dx	250/250 µg/l
	NWTPH - Gx					Ecology NWTPH Gx	250/250 µg/l
	Calcium					EPA 200.7	10 µg/l
	Chloride					SM 4500-Cl C	0.15 µg/l
	Fluoride					SM 4500-F E	.025/0.1 mg/l
	Magnesium					EPA 200.7	10/50 µg/l
	Potassium					EPA 200.7	700/ µg/l
	Sodium					EPA 200.7	29/ µg/l

X	Parameter	Measurement Values			Number of Analyses	Analytical Method Std. Methods 19th,20th edition or EPA	Detection Limit/Quantitation Level
		Minimum	Maximum	Average			
	Sulfate					SM 4500-SO_4 C/D	/200 µg/l
	Arsenic(total)					EPA 200.8	0.1/0.5 µg/l
	Barium (total)					EPA 200.8	0.5/2 µg/l
	Cadmium (total)					EPA 200.8	.05/.25 µg/l
	Chromium (total)					EPA 200.8	0.2/1 µg/l
	Copper (total)					EPA 200.8	0.4/2 µg/l
	Lead (total)					EPA 200.8	0.1/.5 µg/l
	Mercury (total) pg/L					EPA 1631E	0.2/0.5 pg/l
	Molybdenum(total)					EPA 200.8	0.1/0.5 µg/l
	Nickel(total)					EPA 200.8	0.1/0.5 µg/l
	Selenium (total)					EPA 200.8	1/1 µg/l
	Silver (total)					EPA 200.8	.04/.2 µg/l
	Zinc (total)					EPA 200.8	0.5/2.5 µg/l

6. Does this facility use any of the following chemicals as raw materials or produce them as part of the manufacturing process, or are they present in the wastewater? ☐ YES ☒ NO

(*The number in the column next to the chemical name is the Chemical Abstract Service (CAS) reference number to aid in identifying the compound.*)

If yes, specify how the chemical is used and the quantity used or produced:

METALS, CYANIDE & TOTAL PHENOLS			
Antimony, Total	7440-36-0	Nickel, Total	7440-02-0
Arsenic, Total	7440-38-2	Selenium, Total	7782-49-2
Beryllium, Total	7440-41-7	Silver, Total	7440-22-4
Cadmium, Total	7440-43-9	Thallium, Total	7440-28-0
Chromium (hex) dissolved	18540-29-9	Zinc, Total	7440-66-6
Chromium, Total	7440-47-3		
Copper, Total	7440-50-8	Cyanide, Total	57-12-5
Lead, Total	7439-92-1	Cyanide, Weak Acid Dissociable	
Mercury, Total	7439-97-6)	Phenols, Total	

PESTICIDES			
Aldrin	309-00-2	Endrin	72-20-8
alpha-BHC	319-84-6	Endrin Aldehyde	7421-93-4
beta-BHC	319-85-7	Heptachlor	76-44-8
gamma-BHC	58-89-9	Heptachlor Epoxide	1024-57-3
delta-BHC	319-86-8	PCB-1242	53469-21-9
Chlordane	57-74-9	PCB-1254	11097-69-1
4,4'-DDT	50-29-3	PCB-1221	11104-28-2
4,4'-DDE	72-55-9	PCB-1232	11141-16-5
4,4' DDD	72-54-8	PCB-1248	12672-29-6
Dieldrin	60-57-1	PCB-1260	11096-82-5
alpha-Endosulfan	959-98-8	PCB-1016	12674-11-2
beta-Endosulfan	33213-65-9	Toxaphene	8001-35-2
Endosulfan Sulfate	1031-07-8		

VOLATILE COMPOUNDS			
Acrolein	107-02-8		
Acrylonitrile	107-13-1	1,1-Dichloroethylene	75-35-4
Benzene	71-43-2	1,2-Dichloropropane	78-87-5
Bromoform	75-25-2	1,3-dichloropropene (mixed isomers) (1,2-dichloropropylene)	542-75-6
Carbon tetrachloride	56-23-5	Ethylbenzene	100-41-4
Chlorobenzene	108-90-7	Methyl bromide (Bromomethane)	74-83-9
Chloroethane	75-00-3	Methyl chloride (Chloromethane)	74-87-3
2-Chloroethylvinyl Ether	110-75-8	Methylene chloride)	75-09-2
Chloroform	67-66-3	1,1,2,2-Tetrachloroethane	79-34-5
Dibromochloromethane	124-48-1	Tetrachloroethylene	127-18-4
1,2-Dichlorobenzene	95-50-1	Toluene (108-88-3)	
1,3-Dichlorobenzene	(541-73-1)	1,2-Trans-Dichloroethylene (Ethylene dichloride)	156-60-5
1,4-Dichlorobenzene	106-46-7	1,1,1-Trichloroethane	71-55-6
Dichlorobromomethane	75-27-4	1,1,2-Trichloroethane	79-00-5
1,1-Dichloroethane	75-34-3	Trichloroethylene	79-01-6
1,2-Dichloroethane	107-06-2	Vinyl chloride	75-01-4

ACID COMPOUNDS			
2-Chlorophenol	95-57-8	4-nitrophenol	100-02-7
2,4-Dichlorophenol	120-83-2	Parachlorometa cresol (4-chloro-3-methylphenol)	59-50-7
2,4-Dimethylphenol	105-67-9	Pentachlorophenol	87-86-5
4,6-dinitro-o-cresol (2-methyl-4,6,-dinitrophenol)	534-52-1	Phenol	108-95-2
2,4 dinitrophenol	51-28-5	2,4,6-Trichlorophenol	88-06-2
2-Nitrophenol	88-75-5		

BASE/NEUTRAL COMPOUNDS (compounds in bold are Ecology PBTs)			
Acenaphthene	83-32-9	3,3-Dichlorobenzidine	91-94-1
Acenaphthylene	208-96-8	Diethyl phthalate	84-66-2
Anthracene	120-12-7	Dimethyl phthalate	131-11-3
Benzidine	92-87-5	Di-n-butyl phthalate)	84-74-2
Benzyl butyl phthalate	85-68-7	2,4-dinitrotoluene	121-14-2
Benzo(*a*)anthracene	56-55-3	2,6-dinitrotoluene	606-20-2
Benzo(b)fluoranthene (3,4-benzofluoranthene)	205-99-2	Di-n-octyl phthalate	117-84-0
Benzo(j)fluoranthene	**205-82-3**	1,2-Diphenylhydrazine (*as Azobenzene*)	122-66-7
Benzo(k)fluoranthene (11,12-benzofluoranthene)	207-08-9	Fluoranthene	206-44-0
Benzo(r,s,t)pentaphene	**189-55-9**	Fluorene	86-73-7
Benzo(*a*)pyrene	50-32-8	Hexachlorobenzene	118-74-1
Benzo(*ghi*)Perylene	191-24-2	Hexachlorobutadiene	87-68-3
Bis(*2-chloroethoxy)*methane	111-91-1	Hexachlorocyclopentadiene	77-47-4
Bis(*2-chloroethyl*)ether	111-44-4	Hexachloroethane	67-72-1
Bis(*2-chloroisopropyl*)ether	39638-32-9	Indeno(*1,2,3-cd*)Pyrene	193-39-5
Bis(*2-ethylhexyl*)phthalate	117-81-7	Isophorone	78-59-1
4-Bromophenyl phenyl ether	101-55-3	**3-Methyl cholanthrene**	**56-49-5**
2-Chloronaphthalene	91-58-7	Naphthalene	91-20-3
4-Chlorophenyl phenyl ether	7005-72-3	Nitrobenzene	98-95-3
Chrysene	218-01-9	N-Nitrosodimethylamine	62-75-9
Dibenzo (a,j)acridine	**224-42-0**	N-Nitrosodi-n-propylamine	621-64-7
Dibenzo (a,h)acridine	**226-36-8**	N-Nitrosodiphenylamine	86-30-6
Dibenzo(a-*h*)anthracene (1,2,5,6-dibenzanthracene)	53-70-3	**Perylene**	**198-55-0**
Dibenzo(a,e)pyrene	192-65-4	Phenanthrene	85-01-8
Dibenzo(a,h)pyrene	189-64-0	Pyrene	129-00-0
		1,2,4-Trichlorobenzene	120-82-1

7. Are any other pesticides, herbicides or fungicides used at this facility? ☒ YES ☐ NO

If yes, specify the material and quantity used:

Generic weed control herbicides may be applied on site to control weed growth around the facilities. Herbicides will be applied in accordance with applicable manufacturer's recommendations and state and local regulations.

8 Are there other pollutants that you know of or believe to be present? ☒ YES ☐ NO

If yes, specify the pollutants and their concentration if known
(attach laboratory analyses if available as Attachment E8):

Additional laboratory analysis is included in Attachment E8.

9. Is the wastewater being discharged, or proposed for discharge, to the POTW designated as a dangerous waste according to the procedures in Chapter 173-303 WAC?

☐ YES ☒ NO ☐ DON'T KNOW

10. If the answer to question 9 above is yes, how did the waste designate as a dangerous waste *(check appropriate box)*?

For Listed and TCLP Characteristic Wastes only, also provide the Dangerous Waste Number(s).

Listed Waste ☐ Dangerous Waste Number(s) _____

Characteristic Wastes Dangerous Waste Number(s) _____

Ignitable ☐
Reactive ☐
Corrosive ☐
TCLP ☐

State Only Dangerous Wastes Dangerous Waste Number(s) _____

Toxicity ☐
Persistent ☐

For questions about waste designation under the *Dangerous Waste Regulations*, Chapter 173-303 WAC, contact Ecology's Hazardous Waste and Toxics Program at:

Northwest Regional Office - Bellevue	(425) 649-7000
Southwest Regional Office - Lacey	(360) 407-6300
Central Regional Office - Yakima	(509) 575-2490
Eastern Regional Office - Spokane	(509) 329-3400

SECTION F. SEWER INFORMATION

1. Is an inspection and sampling manhole or similar structure available on-site? ☒ YES ☐ NO
   If yes, attach a map or hand drawing of the facility that shows the location of these structures (Label as attachment F1 or this may be combined with map in H8, if H8 is applicable to your facility.)

SECTION G. OTHER PERMITS

1. List all environmental control permits or approvals needed for this facility; for example, air emission permits.

Vancouver Energy is required to go through the Washington State Energy Site Evaluation Council for approval. A comprehensive list of permits/approvals are provided in Part 2, Section 2.23 Pertinent Federal, State, and Local Requirements of the Application for Site Certification.

SECTION H. STORMWATER

1. Do you have coverage under the Washington State Industrial Stormwater NPDES General Permit? ☐ YES ☒ NO
   If yes, please list the permit number here. _____

   If no, have you applied for a Washington State Stormwater Industrial Stormwater General Permit? ☐ YES ☒ NO

   If you answered no to both questions above, complete the following questions 2 through 5.

2. Does your facility discharge stormwater: *(Check all that apply)*

   ☒ To storm sewer system *(provide name of storm sewer system operator:* Port of Vancouver

   ☒ Directly to any surface waters of Washington State *(e.g., river, lake, creek, estuary, ocean).*

   Specify waterbody name(s) _____

   ☒ Indirectly to surface waters of Washington State *(i.e., flows over adjacent properties first).*

   ☐ To a Sanitary Sewer

   ☐ Directly to ground waters of Washington State via:

   ☐ Dry well

   ☐ Drainfield

   ☐ Other

3. Areas with industrial activities at facility: *(check all that apply)*

   ☐ Manufacturing Building

   ☒ Material Handling

   ☒ Material Storage

   ☐ Hazardous Waste Treatment, Storage, or Disposal *(Refers to RCRA, Subtitle C Facilities Only)*

   ☐ Waste Treatment, Storage, or Disposal

   ☐ Application or Disposal of Wastewaters

   ☒ Storage and Maintenance of Material Handling Equipment

   ☒ Vehicle Maintenance

   ☐ Areas Where Significant Materials Remain

   ☒ Access Roads and Rail Lines for Shipping and Receiving

☐ Other (please specify): _____

4. Material handling/management practices

   a. Types of materials handled and/or stored outdoors: *(check all that apply)*

☐	Solvents	☐	Hazardous Wastes
☐	Scrap Metal	☐	Acids or Alkalies
☐	Petroleum or Petrochemical Products	☐	Paints/Coatings
☐	Plating Products	☐	Woodtreating Products
☐	Pesticides	☐	Other *(please list)*: _____

   b. Identify existing management practices employed to reduce pollutants in industrial stormwater discharges: *(check all that apply)*

☒	Oil/Water Separator	☐	Detention Facilities
☒	Containment	☐	Infiltration Basins
☒	Spill Prevention	☒	Operational BMPs
☐	Surface Leachate Collection	☒	Vegetation Management
☒	Overhead Coverage	☐	Other *(please list)*: _____

5. Attach a facility site map showing stormwater drainage/collection areas, disposal areas and discharge points. This may be a hand-drawn map if no other site map is available *(See example on page 16 of this application)*. *Label this as attachment H.5.*

SECTION I. OTHER INFORMATION

1. Describe liquid wastes or sludges being generated by your facility that are not disposed of in the waste stream(s) and how they are being disposed of. For each type of waste, provide type of waste and the name, address, and phone number of the hauler.

   Liquid wastes from the unloading building and marine terminal (Waste Streams 2 & 4) will be pumped from storage tanks and hauled to licensed treatment and recycling facility such as PPV Inc. Estimated concentrations of contaminates in the liquid wastes have been reviewed by PPV and a treatement plan assembled.

   Sludge accumulated from storage tanks or oil handling areas will be removed and hauled off-site when needed or a maximum of every 10-years per API Standards. Sludge will be removed by a certified oil handling company such as Safety Kleen.

2. Describe storage areas for raw materials, products, and wastes.

   Raw materials (crude oil) for the facility will be stored within fabricated steel tanks with a floating internal roof and a fixed external roof.

   Ancillary stored chemicals used on-site for maintenance operations will be stored within the buildings on-site in designated locations. Products being stored and estimated amounts are listed in Attachment C.7. No waste streams are anticipated to result from the storage of materials.

3. Have you designated the wastes described above according to the applicable procedures of Dangerous Waste Regulations, Chapter 173-303 WAC? ☐ YES ☒ NO

SECTION J. CERTIFICATIONS

1. **Approval by Publicly-Owned Treatment Works [required by WAC 173-216-070(4)(b)]**

I approve of the discharge as described in this application. The applicant is:

(Please check the appropriate box below.)

☐ A Significant Industrial User (see Definitions at the end of this Section)

☐ A Categorical Industrial User

☒ Neither of the above

Name and location of sewer system to which this project will be tributary:

City of Vancouver. Waste Streams #1 will connect to an existing 18" sewer main located immediately north of the site in NW Old Lower River Road. Waste Stream #3 will connect to an existing 18" sewer main located immediately south of the site along the Port's rail corridor.

Treatment Works Owner:	City of Vancouver		
Street:	4500 SE Columbia Way		
City/State:	Vancouver, WA	Zip:	98660

Signature of Treatment Works Authority	Date	Title

Printed Name

2. **Application review by Intermediate Sewer Owner at point of discharge (if applicable)**

I hereby acknowledge that I have reviewed the application for discharge to this sewer system.

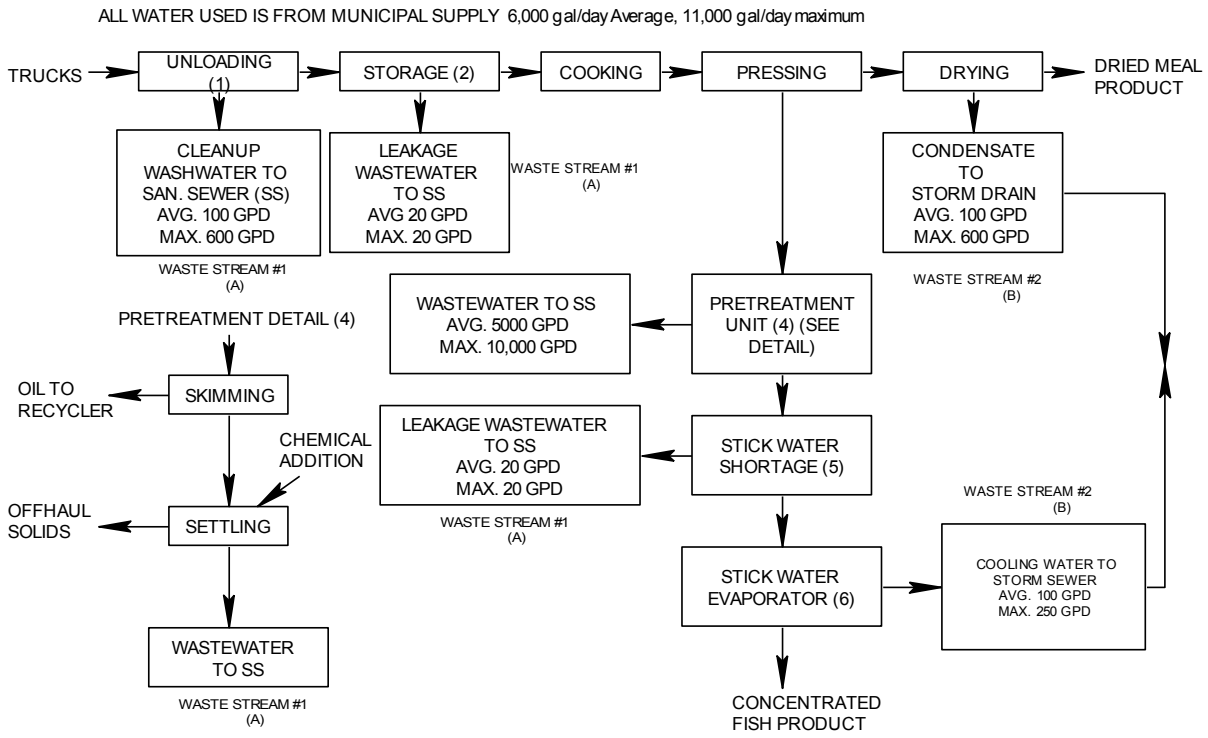
Name and location of sewer system to which this project will be tributary:

Sewer System Owner:			
Street:			
City/State:		Zip:	

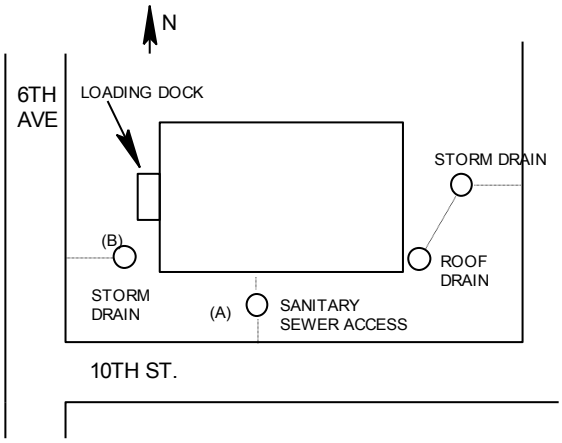
Signature of Sewer System Authority	Date	Title

Printed Name

Example 1 for application section C.2. (SCHEMATIC DIAGRAM)



Example 2 for application section F1 or H8 (FACILITY SITE MAP)



DEFINITIONS

Significant Industrial User (SIU)--

1) All industrial users subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N; and

2) Any other industrial user that: discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling, and boiler blow-down wastewater); contributes a process wastestream that makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement (in accordance with 40 CFR 403.8(f)(6)).

   Upon finding that the industrial user meeting the criteria in paragraph 2, above, has no reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement, the Control Authority may at any time, on its own initiative or in response to a petition received from an industrial user or POTW, and in accordance with 40 CFR 403.8(f)(6), determine that such industrial user is not a significant industrial user.

Control Authority - means the Washington State Department of Ecology in the case of non-delegated POTWs or means the POTW in the case of delegated POTWs.

Categoric Industrial User (CIU): An industrial user subject to national categorical pretreatment standards promulgated by EPA (40 CFR 403.6 and40 CFR parts 405-471).

Summary of Attachments That May be Required for This Application:

(Please check those attachments that are included)

- ☒ C.2. Production schematic flow diagram and water balance
- ☐ C.4. Wastewater treatment improvements
- ☒ C.7. Additional incidental materials
- ☒ E.8. Additional results of effluent testing
- ☒ F.1. Facility site map
- ☒ H.5. Stormwater drainage map

If you need this document in a format for the visually impaired, call the Water Quality Program at 360-407-6600. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

C.2 Production Schematic Flow Diagram and Water Balance

PROCESS SCHEMATIC FOR WASTEWATER DISCHARGES

CITY WATER SUPPLY

CITY WATER SUPPLY

CITY WATER SUPPLY

CITY WATER SUPPLY

AREA 600 BOILER BUILDING

AVG 52,177 GPD
MAX 69,264 GPD

M

RPBA BF

DCDA BF

IRRIGATION CONTROLLER

IRRIGATION
AVG 531 GPD
MAX 799 GPD

BOILER WATER TREATMENT: REVERSE OSMOSIS

HEAT EXCHANGER

AVG 16,922 GPD
MAX 22,464 GPD

BLOWDOWN HEAT EXCHANGER

BLOWDOWN SEPARATOR

CONDENSATE SURGE TANK

DEAERATOR

POLYMER TREATMENT

TREATMENT CONTROLLER

BOILERS (3)

LOSS TO ATMOSPHERE AVG 28,813 GPD MAX 38,848 GPD

AREA 200 RAIL UNLOADING BUILDING

AVG 1,000 GPD
MAX 2,000 GPD

AVG 107 GPD
MAX 900 GPD

M

RPBA BF

FIRE SPRINKLER SYSTEM

FIRE PUMP

MISCELLANEOUS EQUIPMENT, PART WASH, RAIL CAR EXTERIOR WASH
(MAX 5 GPM)

RAIL CARS (30)

CONDENSATE RECOVER

CONDENSATE BLOWDOWN

FLOOR DRAINS

RAIL DRIP PANS

CONTAINMENT TRENCHES

SURGE TANKS (6) 500 GAL

AREA 200 ADMIN & SUPPORT BUILDINGS

AVG 4,291 GPD
MAX 6,566 GPD

M

DCDA BF

TO IRRIGATION CONTROLLER

IRRIGATION
AVG 366 GPD
MAX 1,071 GPD

DCDA BF

CHANGE ROOMS

OIL/WATER SEPARATOR

GRAVITY COLLECTION SYSTEM

DISCHARGE TO CITY SEWER

AVG 20,847 GPD
MAX 27,959 GPD

CONTAINMENT TANKS 500 BBL

CONTAINMENT TANKS 500 BBL

CONTAINMENT TANKS 500 BBL

AVG 7,548 GPD
MAX 10,852 GPD

HAUL OFF FOR RECYCLING OR DISPOSAL

CITY WATER SUPPLY

BF

TO IRRIGATION CONTROLER

IRRIGATION
AVG 998 GPD
MAX 2,921 GPD

AVG 1,148 GPD
MAX 3,131 GPD

M

DCDA BF

STORAGE BUILDING

DISCHARGE TO SANITARY

OIL/WATER SEPARATOR

AVG 257 GPD
MAX 1,110 GPD

FIRE PUMP

AVG 107 GPD
MAX 900 GPD

M

RPBA BF

4-UNHEATED PRODUCT STORAGE TANKS 360,000 BBL EACH

2-HEATED PRODUCT STORAGE TANKS 360,000 BBL EACH

AREA 300 STORAGE

AREA 500 TRANSFER PIPELINES

AVG 107 GPD
MAX 900 GPD

M

RPBA BF

FIRE PUMP

AVG 475 GPD
MAX 665 GPD

M

DCDA BF

YARD HYDRANT

DOMESTIC USE

STORAGE TANK 1,000 GAL

HAUL OFF

AVG 582 GPD
MAX 1,565 GPD

AREA 400 MARINE TERMINAL

VESSEL LOADING FACILITY

LEGEND

TRANSFER PIPELINES	
POTABLE WATER SUPPLY	
PROCESS STEAM	
SANITARY SEWER DISCHARGES	
HAUL OFF DISCHARGES	
WATER METER	M
DOUBLE CHECK DETECTOR ASSEMBLY BACKFLOW	DCDA BF
REDUCED PRESSURE BACKFLOW ASSEMBLY	RPBA BF

C.7 Materials/Quantity Stored On Site

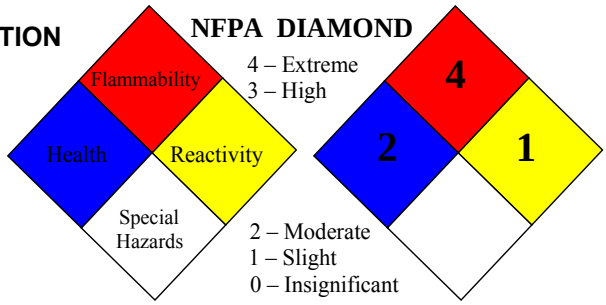
The table below lists the incidental materials that are anticipated to be used and/or stored on site. Note that the manufacturers and trade names may differ after construction, but the types of products and their purposes are expected to be consistent with this list.

Product Trade Name	Manufacturer	MSDS Date	Max Amount On Site
Crude Oil: Bakken	Enbridge	6/8/2011	2.16 million bbl
Crude Oil: Generic	Tesoro	12/7/2012	
Crude Oil: Sour Heavy	Tesoro	2/2/2013	
Crude Oil: Sour Light	Tesoro	2/2/2013	
Crude Oil: Sweet Heavy	Tesoro	2/2/2013	
Crude Oil: Sweet Light	Tesoro	2/2/2013	
Activated Carbon	Siemens	3/18/201	TBD*
Cargill Sodium Chloride (salt)	Cargill	11/1/2012	500 lbs
CTI-220	Corrosion Technology	2/1/2011	110 gals
Diesel Low Sulfur and Ultra Low Sulfur Diesel	Tesoro	12/1/2011	500 gals
Metal Rx Leaf Media	Contech Construction Products	6/4/2010	TBD*
Mobil Actrel 1138L Cleaner	Exxon	11/21/2011	20 gals
Mobil Delvac Elite 15W-40	Exxon	6/1/2013	220 gals
Mobil Delvac Extended Life Antifreeze	Exxon	6/1/2013	275 gals
Mobil Grease CM-P	Exxon	6/1/2013	400 lbs
Mobil Grease XHP 462	Exxon	6/1/2013	120 lbs
Mobil Hydraulic AW 68	Exxon	6/1/2013	275 gals
Mobil Polyrex Eem	Exxon	6/1/2013	120 lbs
Nalco NexGuard 22310	Nalco	1/12/2011	310 gals
Nalco Tri-Act 1820	Nalco	4/5/2005	310 gals
Nalco 1720	Nalco	1/12/2011	310 gals
Nalco 8735	Nalco	1/21/2011	140 gals
PB Blaster	PB Blaster	6/1/2013	5 gals
Perlite	Supreme Perlite Company	4/1/2010	TBD*
Caprinus 40 Wt.	Shell	6/1/2013	275 gals
Mineral Spirits	Sunnyside	5/20/2005	20 gals
Simple Green Cleaner	Sunshine Makers, Inc.	1/1/2011	110 gals
Micro-Blaze CSR	Verde Environmental	1/1/2011	20 gals
WD-40	WD-40 Company	3/11/2010	5 gals
Zeolite	St. Cloud Mining Company	10/1/2006	TBD*

* Amount of material on site will be used solely within water quality treatment vaults.

Material Safety Data Sheet

1 – CHEMICAL PRODUCT AND COMPANY IDENTIFICATION



Manufacturer/Supplier: Enbridge Pipelines Inc.
10201- Jasper Avenue
Edmonton, Alberta T5J 3N7
CANADA
Product Name: Bakken Crude Oil
Synonyms: Hydrocarbons of Petroleum

General Information: 780-420-5306
Emergency Telephone Number (24 hrs): CHEMTREC 800-424-9300 USA
CANUTEC 613-996-6666 Canada
Date Prepared: 06/08/2011

2 – PRODUCT COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS Number	Normal % * by Wt./Vol.	Occupational Exposure Limits (ppm)		
			OSHA	ACGIH	NIOSH
Petroleum Hydrocarbons	68919-39-1	100	N/A	N/A	N/A
1t,2-dimethylcyclopentane	28729-52-4	1.8	None	None	None
2-methylhexane	591-76-4	1.0	None	None	None
2-methylpentane	107-83-5	1.8	None	500	100
3-methylhexane	589-34-4	1.6	None	None	None
3-methylpentane	96-14-0	1.3	None	500	100
2-methylheptane	592-27-8	1.4	None	300	None
Benzene	71-43-2	0.4	1	0.5	0.1
cyclohexane	110-82-7	1.0	300	100	300
i-pentane	109-66-0	1.8	1000	600	120
methylcyclohexane	108-87-2	2.3	500	400	400
methylcyclopentane	96-37-7	2.2	None	None	None
n-butane	106-97-8	1.9	800	1000	800
n-heptane	142-82-5	3.4	500	400	85
n-Hexane	110-54-3	3.4	50	50	50
n-Pentane	109-66-0	3.4	600	600	120
n-octane	111-65-9	3.0	500	300	75

n-nonane	111-84-2	2.2	None	200	200
n-decane	124-18-5	2.0	None	None	None
n-undecane	1120-21-4	1.7	None	None	None
n-dodecane	112-40-3	1.5	None	None	None
n-tridecane	629-50-5	1.3	None	None	None
Toluene	108-88-3	0.9	100	20	100
Hydrogen sulfide	7783-06-4	<0.00001	$20^{Ceiling}$	1	$10^{Ceiling}$
Ethylbenzene	100-41-4	0.6	100	20	100
Xylenes	1330-20-7	0-5	100	100	100

* Values do not reflect absolute minimums and maximums; those values may vary from time to time.
N/A - Not Available

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3 – HAZARDS IDENTIFICATION

Flammability: Flammable liquid and vapor. Keep away from heat, sparks, flames or other sources of ignition (such as static electricity, pilot lights, mechanical/electrical equipment).
HMIS Classification for Flammability: 4

Stability: Stable under normal conditions. Avoid all sources of ignition.
HMIS Classification for Reactivity: 1

Potential Health Effects from Overexposure

Acute Effects:

Ingestion: Ingestion may result in nausea, vomiting, diarrhea and central nervous system depression. Aspiration of liquid into the lungs must be avoided as even small quantities in the lungs can produce chemical pneumonitis, pulmonary edema/hemorrhage and even death.

Skin Contact: Prolonged and repeated contact may cause defattting and drying of the skin and can lead to irritation and/or dermatitis.

Eye Contact: Liquid or vapor contact may cause mild eye irritation, including stinging, watering, redness and swelling. Hydrogen sulfide (H_2S) may cause burning or tearing and visual disturbances at repeated exposures above the TLV.

Inhalation: Prolonged or excessive exposure may cause irritation to the nose, throat, lungs and respiratory tract and may lead to headache, nausea, drowsiness, fatigue, pneumonitis, pulmonary edema, CNS depression, coma and respiratory arrest.

Chronic Health Effects from Overexposures:

Skin and eye irritation. May affect the respiratory and central nervous systems.

Special Toxic Effects:

n-Hexane (CAS 110-54-3)

Target Organs – Excess exposure to n-hexane can result in peripheral neuropathies. The initial symptoms are symmetrical sensory numbness and paresthesia of distal portions of the extremities. Motor weakness is typically observed in muscles of the toes and fingers but may also involve muscles of the arms, thighs and forearms. The onset of these symptoms may be delayed for several months to a year after the beginning of exposure. The neurotoxic properties of n-hexane are potentiated by exposure to methyl ethyl ketone and methyl isobutyl ketone. Prolonged exposure to high concentrations of n-hexane (>1,000 ppm) has resulted in decreased sperm count and degenerative changes in the testes of rats but not those of mice.

Benzene (CAS 71-43-2)

Carcinogenicity: Benzene is a known animal carcinogen and is known to produce leukemia in humans. Benzene has been identified as a human carcinogen by NTP, IARC and OSHA.

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4 – FIRST AID MEASURES

Ingestion: Aspiration hazard. Do not induce vomiting or give anything by mouth because this material can enter the lungs and cause severe damage. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration.

Skin Contact: Wipe material from skin and remove contaminated clothing. Cleanse affected areas thoroughly by washing with mild soap and water and, if necessary, a waterless skin cleanser. If irritation or redness develops, seek medical attention.

Eye Contact: If irritation or redness develops, move victim away from exposure and into fresh air. Flush eyes with clean water for 15 minutes, with eyelids held open. If symptoms persist, seek medical attention.

Inhalation: If respiratory symptoms or other symptoms of exposure develop, move victim away from source of exposure and into fresh air. If symptoms persist, seek immediate medical attention. If victim is not breathing, clear airway and immediately begin artificial respiration. If breathing difficulties develop, qualified personnel should administer oxygen. Seek immediate medical attention.

Notes to Physician: Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in persons exposed to high concentrations of this material (e.g., in enclosed spaces or with deliberate abuse). The use of other drugs with less arrhythmogenic potential should be considered. If sympathomimetic drugs are administered, observe for development of cardiac arrhythmias.

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5 – Exposure Controls/ Personal Protection

Eye Protection: Safety glasses or goggles are recommended when there is a possibility of splashing or spraying.

Skin Protection: The use of gloves (nitrile or neoprene) is advised to prevent skin contact and possible irritation. Depending on conditions, the use of an apron or chemical protective clothing may be necessary.

Respiratory Protection: A NIOSH certified air purifying respirator with an organic vapor cartridge may be used under conditions where airborne concentrations of hydrocarbons are expected to exceed exposure limits. Protection provided by air purifying respirators is limited. Use a positive pressure air supplied respirator if there is a potential for an uncontrolled release, exposure levels are not known or any other circumstances where air purifying respirators

may not provide adequate protection. A respiratory protection program that meets US OSHA's 29 CFR 1910.134, Canadian Labour Code Part II and ANSI Z88.2 requirements must be followed when workplace conditions warrant a respirator's use.

Engineering Controls: If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits, additional ventilation or exhaust systems may be required. Where explosive mixtures may be present, electrical systems safe for such locations must be used (see appropriate electrical codes).

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6 – FIRE FIGHTING MEASURES

Flash Point:	< 40 °C	Lower Explosive Limit:	Not Established
Auto Ignition Temperature:	Not data available	Upper Explosive Limit:	Not Established

Basic Fire Fighting Procedures: Long-duration fires involving diluent stored in tanks may result in a boilover. The contents of the tank may be expelled beyond the containment dikes or ditches. All personnel should be kept back a safe distance when a boilover is anticipated (reference NFPA 11). For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear bunker gear. When the potential chemical hazard is unknown, in enclosed or confined spaces or when explicitly required by DOT, a self-contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant. Isolate immediate hazard area, keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Move undamaged containers from immediate hazard area if it can be done with minimal risk. Water spray may be useful in minimizing or dispersing vapors. Cool equipment exposed to fire with water, if it can be done with minimal risk. Avoid spreading burning liquid with water used for cooling purposes.

Extinguishing Media: Any extinguisher capable of handling Class B fires is recommended, including extinguishing media such as CO_2, dry chemical or foam. Water spray is recommended to cool or protect exposed materials or structures. Water may be ineffective for extinguishment, unless used under favorable conditions by experienced fire fighters. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces. Firefighting should be attempted only by those who are adequately trained and equipped with proper personal protective equipment.

Unusual Fire and Explosion Hazards: This material is flammable and may be ignited by heat, sparks, flames or other sources of ignition (such as static electricity, pilot lights, or mechanical/electrical equipment). Vapors may travel considerable distances to a source of ignition where they can ignite, flashback or explode. May create vapor/air explosion hazard indoors, outdoors or in sewers. Vapors are heavier than air and can accumulate in low areas. If container is not properly cooled, it can rupture in the heat of a fire.

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7 – ACCIDENTAL RELEASE MEASURES

Personal precautions: Keep public away. Isolate and evacuate area. Shut off source if safe to do so. Eliminate all ignition sources.

Spill management: Wear appropriate breathing apparatus (if applicable) and protective clothing. A vapor suppressing foam may be used to reduce vapors. Try to work upwind of spill. Dike and contain land spills; contain water spills by booming. For large spills remove by mechanical means such as vacuuming or pumping and place in containers. All equipment used when

handling the product must be grounded. Recover and return free product to proper containers. Use suitable absorbent materials such as vermiculite, sands, soil, or clay to clean up residual liquids. Do not wash spills into sewers or other public water systems.

Reporting: Report spills to local or federal authorities as appropriate or required.

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8 – HANDLING AND STORAGE

The use of explosion-proof equipment is recommended and may be required (see appropriate fire codes). Do not enter confined spaces such as tanks or pits without following proper entry procedures. The use of appropriate respiratory protection is advised when concentrations exceed any established exposure limits.

Use appropriate grounding and bonding practices. Stores in properly closed containers that are appropriately labeled and in a cool well-ventilated area. Do not expose to hear, open flames, strong oxidizers or other sources of ignition. Do not cut drill, grind or weld on empty containers since they may contain explosive residues.

Harmful concentrations of hydrogen sulfide (H_2S) gas can accumulate in excavations and low-lying areas as well as the vapor space of storage and bulk transport compartments. Stay upwind and vent open hatches before uploading.

Avoid skin contact. Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water.

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9 – PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Clear to brown liquid
Physical Form:	Liquid
Substance type (Pure/Mixture):	Mixture
Boiling Temperature:	94 to 1330 ºF
Melting Temperature:	Not determined
Vapor Pressure:	about 7.47 psi
Vapor Density:	1.0 - 3.9
Evaporation Rate:	(Ethyl ether =1) >1
Specific Gravity:	0.82
Water Solubility:	Negligible
pH:	Not determined
Viscosity:	5.43 mm^2/s
Color:	Clear to brown
Odor:	Rotten egg, petroleum like odor

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10 – STABILITY AND REACTIVITY

CONDITIONS TO AVOID:	Excessive heat, sources of ignition, sparks, open flames, and buildup of static electricity.
CHEMICAL STABILITY:	Stable at 70 °F, 760 mmHg pressure.
HAZARDOUS DECOMPOSITION PRODUCTS:	Combustion produces carbon monoxide, aldehydes, aromatic and other hydrocarbons.
HAZARDOUS POLYMERIZATION:	Will not occur
INCOMPATIBILITY:	Strong oxidizers such as nitrates, chlorates, peroxides.

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11 – TOXICOLOGICAL INFORMATION– CHRONIC AND ACUTE HEALTH HAZARDS

This product contains aliphatic naphatha at a level of >0.1%. Lifetime skin painting studies in mice with similar naphthas have shown wither negative or very weak dermal carcinogenic activity following prolonged and repeated skin contact. Some other petroleum fractions that show carcinogenic activity when tested at nonirritating dose levels did not show any significant carcinogenic activity indicating that this tumorigenic response is likely related to chromic irritation and not dose. Some components of aliphatic naphthas, i.e., paraffins and olefins, have been shown to produce a species specific, sex hormonal dependent kidney damage develops via the formation of alpha-2u-globulin, a mechanism unique to the male rat. Humans do not for alpha-2u-globulin; therefore, the kidney effects resulting from this mechanism are not relevant in humans.

This product contains benzene at a level of 0.1%. Repeated or prolonged exposure to benzene at concentrations in excess of the TLV may cause serious injury to blood-forming organs. Significant chronic exposure to benzene vapor has been reported to produce various blood disorders ranging from anemia to certain forms of leukemia (cancer) in man. Benzene produced tumors in rats and mice in lifetime chronic toxicity studies, but the response has not been consistent across species, strain, sex or route of exposure. Animal studies on benzene have demonstrated immune toxicity, chromosomal aberrations, testicular effects and alterations in reproductive cycles and embryo/fetotoxicity, but not teratogenicity.

Hydrogen sulfide gas (H_2S) is toxic by inhalation. Prolonged breathing of 50-100 ppm H_2S vapors can produce eye and respiratory tract irritation. Higher concentration (250-600 ppm) for 15-30 minutes can produce headache, dizziness, nervousness, nausea and pulmonary edema or bronchial pneumonia. Concentrations of >1000 ppm will cause immediate unconsciousness and death through respiratory paralysis. Rats and mice exposed to 80 ppm H_2S, 6 hrs/day, 5 days/week for 10 weeks, did not produce any toxicity except for irritation of nasal passages. H_2S did not affect reproduction and development (birth defects or neurotoxicity) in rats exposed to concentrations of 75-80 ppm or 150 ppm H_2S, respectively. Over the years a number of acute cases of H_2S poisoning have been reported. Complete and rapid recovery is the general rule. However, if the exposure was sufficiently intense and sustained causing cerebral hypoxia (lack of oxygen to the brain), neurologic effects such as amnesia, intention tremors or brain damage are possible.

This product may contain hexane at a level of >1.0%. Studies in laboratory animals have produced systemic toxicity in blood, spleen and lungs. Fetotoxicity has been observed at hexane concentrations that produced maternal toxicity. Long term exposure to high concentrations of hexane has been shown to cause testicular effects and nervous system damage.

This product may contain xylenes at a level of >1.0%. Gross overexposure or severe poisoning incidents in humans to xylenes has been reported to cause lung, liver, kidney, heart and brain damage as well as neurologic disturbances. Laboratory animals exposed to high dose of xylenes showed evidence of effects in the liver, kidneys, lungs, spleen, heart and adrenals, Exposure of pregnant rats, mice and rabbits during gestation to significant concentrations of xylenes produced maternal, fetal and developmental toxicity (skeletal retardation, cleft palate, and wavy ribs) generally at maternally toxic doses. These types of fetotoxic effects have been associated with maternal toxicity. Repeated inhalation of high xylene concentrations has shown impairment of performance abilities (behavioral tests) in animals and man. Xylenes produced a mild frequency hearing loss in rats subchronically exposed to high concentrations of xylenes.

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12 – DISPOSAL INFORMATION

Container contents should be completely used and containers should be emptied prior to discard. Container could be considered a RCRA hazardous waste and must be disposed of with care and in full compliance with federal, state and local regulations. Larger empty containers, such as drums, should be returned to the distributor or to a drum re-conditioner. To assure proper disposal of smaller empty containers, consult with state and local regulations and disposal authorities. This product, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA RCRA (40 CFR 261), Environment Canada, or other State, Provincial, and local regulations. If this product is classified as a hazardous waste, federal law

requires disposal at a licensed hazardous waste disposal facility. This product could also contain benzene at >0.5 ppm and could exhibit the characteristic of "toxicity" (D018) as determined by the toxicity characteristic leaching procedure (TCLP). This material could become a hazardous waste if mixed or contaminated with a hazardous waste or other substance(s). It is the responsibility of the user to consult federal, state and local waste regulations to determine appropriate disposal options.

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13 – ENVIRONMENTAL INFORMATION

Spill or Release to the Environment: Keep all sources of ignition and hot metal surfaces away from spill/release. The use of explosion-proof equipment is recommended. Stay upwind and away from spill/release. Notify persons downwind of spill/release, isolate immediate hazard area and keep unauthorized personnel out. Product may release large amounts of flammable vapors (e.g., methane, ethane and propane) at or below ambient temperature depending on source and process conditions. Stop spill/release if it can be done with minimal risk. Wear appropriate protective equipment including respiratory equipment as conditions warrant. Prevent spilled material from entering sewers, storm drains, other unauthorized treatment drainage systems and natural waterways. Dike far ahead of spill for later recovery or disposal. Use foam on spills to minimize vapors. Spilled material may be absorbed into an appropriate absorbent material.

Notify fire authorities and appropriate federal, state (provincial) and local agencies. Immediate cleanup of any spill is recommended. If spill of any amount into navigable waters, notify appropriate federal, state (provincial) and local agencies.

Sara Title III Information: This material contains the following chemicals subject to the reporting requirements of SARA 313 and 40 CFR 372:

Toluene	CAS – 108-88-3	Weight % - 0 – 2%
n-Hexane	CAS – 110-54-3	Weight % - up to 11%
Benzene	CAS – 71-43-2	Weight % - 0 – 2%

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14 – REGULATORY INFORMATION

USA: All of the components of this product are on the Toxic Substances Control Act (TSCA) Chemical Inventory.

Canada: All the components of this product are on the Canadian Domestic Substances List (DSL), or have been notified under the New Substances Notification Regulations, but have not yet been published in the Canada Gazette.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Classification:	Class B2 Flammable Liquids Class D2B Other Toxic Effects - Skin Irritant Class D2A Other Toxic Effects – Embryotoxic/Fetotoxic
US EPA Reportable Quantity:	The estimated reportable quantity (RQ) for this material is based on the weight % shown below:
RQ based on benzene –	The RQ for benzene is 10 pounds, which equals 3,333 pounds of natural gas condensate (556 gallons). The RQ is based on 0.3 wt. % benzene.
RQ based on n-Hexane –	The RQ for n-Hexane is 5000 pounds, which equals 50,000 pounds of natural gas condensate (8,333 gallons). The RQ is based on 10 wt. % n-Hexane.
RQ based on toluene –	The RQ for toluene is 1000 pounds, which equals 50,000 pounds of natural gas condensate (8,333 gallons). The RQ is based on 2 wt. % toluene.

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15 – SPECIAL PRECAUTIONS / SUPPLEMENTAL INFORMATION

Keep containers tightly closed. Use and store this material in cool, dry, well-ventilated areas away from heat, direct sunlight, hot metal surfaces and all sources of ignition. Post area “No Smoking or Open Flame”. Store only in approved containers. Keep away from any incompatible material. Protect container(s) against physical damage. Outdoor or detached storage is preferred. Indoor storage should meet US OSHA standards, Canadian Labour Codes and other appropriate fire codes.

Depending on the source of natural gas condensate, there could be some amount of NORM (naturally occurring radioactive materials) in the scale, deposit and sludge associated with this material. Proper measurements should be taken prior to handling this material or any equipment contaminated with this material. If NORM is indicated, refer to API Bulletin E2, “Bulletin on Management of Naturally Occurring Radioactive Materials in Oil and Gas Production,” for additional information.

Empty Containers: “Empty” containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind or expose such containers to heat, flame, sparks or other sources of ignition. They may explode and cause injury or death. “Empty” drums should be completely drained, properly bunged and promptly shipped to the supplier or a drum re-conditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations.

Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSI Z49.1 and other governmental and industrial references pertaining to cleaning, repairing, welding or other contemplated operations.

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16 – TRANSPORTATION REQUIREMENTS

General Transportation Information:

DOT Proper Shipping Name (49 CFR 172.101):	Petroleum Crude Oil
DOT Hazard Classes (49 CFR 172.101):	3
UN/NA Code (49 CFR 172.101):	UN1267
Packing Group (49 CFR 172.101):	II
Bill of Lading Description (49 CFR 172.202):	Petroleum Crude Oil
DOT Labels Required (49 CFR 172.101):	Flammable Liquid

Please note that the actual shipping name and associated data can vary due to the properties of the product. Other acceptable shipping names may include Petroleum Distillate n.o.s. 1268, Gasoline UN1203, Flammable liquids, n.o.s. (pentane) UN1993 or Hydrocarbons, Liquid n.o.s. (condensate) UN3295.

PREPARED BY: Enbridge Pipelines Inc.

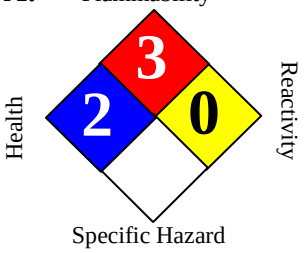
Disclaimer

ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
ASTM	American Society for Testing and Materials
CAS	Chemical Abstract Service
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
HMIS	Hazardous Materials Identification System
IARC	International Agency for Research on Cancer
m^3	Cubic meter
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicology Program
n.o.s.	Not Otherwise Specified
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
REL	Recommended Exposure Limit
SARA	Superfund Amendments and Reauthorization Act
TLV	Threshold Limit Value
TSCA	Toxic Substance Control Act
TWA	Time Weighted Average

Safety Data Sheet
Crude Oil

NFPA:



SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Crude Oil			
Synonyms	:	Sour Crude Oil, Sweet Crude Oil, Light Crude Oil, Heavy Crude Oil, Generic Crude Oil, 888100008800			
SDS Number	:	888100008800	**Version**	:	1.7
Product Use Description	:	Refining feedstock			
Company	:	For: Tesoro Refining & Marketing Co. 19100 Ridgewood Parkway, San Antonio, TX 78259			
Tesoro Call Center	:	(877) 783-7676	**Chemtrec (Emergency Contact)**	:	(800) 424-9300

SECTION 2. HAZARDS IDENTIFICATION

Classifications

Flammable Liquid – Category 2 or 3 depending on variable composition.
Aspiration Hazard – Category 1.
Carcinogenicity – Category 2
Specific Target Organ Toxicity (Repeated Exposure) – Category 2
Specific Target Organ Toxicity (Single Exposure) – Category 3
Eye Irritant – Category 2B
Chronic Aquatic Toxicity – Category 2

Pictograms

Signal Word

Danger

Hazard Statements

Highly flammable liquid and vapor.
May be fatal if swallowed and enters airways – do not siphon gasoline by mouth.
Suspected of causing cancer if repeated over-exposure by inhalation and/or skin contact occurs.
May cause damage to liver, kidneys and nervous system by prolonged and repeated inhalation or skin contact.
Causes eye irritation. Can be absorbed through skin.

Repeated or prolonged skin contact can cause irritation and dermatitis.
May cause drowsiness or dizziness.
Harmful to aquatic life.
May release hydrogen sulfide (H2S) gas, a toxic-by-inhalation material. See Section 11.

Precautionary statements

Prevention

Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat, sparks, open flames, welding and hot surfaces.
No smoking.
Keep container tightly closed.
Ground and/or bond container and receiving equipment.
Use explosion-proof electrical equipment.
Use only non-sparking tools (if tools are used in flammable atmosphere).
Take precautionary measures against static discharge.
Wear gloves, eye protection and face protection (as needed to prevent skin and eye contact with liquid).
Wash hands or liquid-contacted skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Do not breathe vapors.
Use only outdoors or in a well-ventilated area.

Response

In case of fire: Use dry chemical, CO2, water spray or fire-fighting foam to extinguish.
If swallowed: Immediately call a poison center, doctor, hospital emergency room, medical clinic or 911. Do NOT induce vomiting. Rinse mouth.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
If in eye: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If skin or eye irritation persists, get medical attention.
If inhaled: Remove person to fresh air and keep comfortable for breathing.
Get medical attention if you feel unwell.

Storage

Store in a well-ventilated place. Keep cool. Store locked up. Keep container tightly closed . Use only approved containers.

Disposal

Dispose of contents/containers to approved disposal site in accordance with local, regional, national, and/or international regulations.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Weight %
Petroleum; Crude oil	8002-05-9	100%
N-hexane	110-54-3	0 - 1.5%
Hydrogen Sulfide	7783-06-4	Variable

Sulfur	7704-34-9	Trace - 5%
Benzene	71-43-2	0.1 - 3%
Cumene	98-82-8	Variable Trace < 1%
Naphthalene	91-20-3	Variable Trace < 1%
Xylene	1330-20-7	Variable Trace < 1%
Ethylbenzene	100-41-4	Variable Trace < 1%
Polycyclic Aromatic Compounds		Variable
Toluene	108-88-3	Variable Trace < 1%

SECTION 4. FIRST AID MEASURES

Inhalation : Move to fresh air. Administer oxygen or artificial respiration if needed. Seek medical attention immediately.

Skin contact : Take off all contaminated clothing immediately. Wash off immediately with soap and plenty of water. Seek medical attention if irritation or skin thermal burns occur.

Eye contact : In case of eye contact, immediately flush with low pressure, cool water for at least 15 minutes, opening eyelids to ensure flushing. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Seek medical attention immediately.

Ingestion : Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Seek medical attention immediately. If vomiting does occur naturally, keep head below the hips to reduce the risks of aspiration. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, fire fighting foam. LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Specific hazards during fire fighting : Vapors are heavier than air and may travel long distances to a point of ignition and flash back. Do not allow liquid runoff to enter sewers or public waters. Gas may form explosive mixture with air.

Special protective equipment for fire-fighters : Use NIOSH/MSHA approved positive pressure self-contained breathing apparatus and fully protective clothing such as bunker gear if needed to prevent exposure.

Further information : Isolate area, particularly around ends of storage vessels. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions : Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to contain spill areas.

Environmental precautions : Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors.

Methods for cleaning up : Take up with sand or oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

SECTION 7. HANDLING AND STORAGE

Precautions for safe handling : Handle as a combustible liquid. Keep product and empty containers away from fire, sparks and heated surfaces. Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Conditions for safe storage, including incompatibilities : Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose containers to sources of ignition. Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

List	Components	CAS-No.	Type:	Value
OSHA	Benzene	71-43-2	TWA	1 ppm
		71-43-2	STEL	5 ppm
		71-43-2	OSHA_AL	0.5 ppm
	N-hexane	110-54-3	PEL	500 ppm 1,800 mg/m3
	Hydrogen sulfide	7783-06-4	STEL	20 ppm
	Cumene	98-82-8	TWA	50 ppm
	Ethylbenzene	100-4-4	TWA	100 ppm
	Naphthalene	91-20-3	TWA	10 ppm
	Toluene	108-88-3	TWA	200 ppm
	Xylenes	1330-20-7	TWA	100 ppm

			Ceiling	300 ppm
	Polycyclic Aromatic Compound (Benzene Soluble)		TWA	0.2 mg/m3
ACGIH	N-hexane	110-54-3	TWA	50 ppm
	Hydrogen Sulfide	7783-06-4	TWA	1 ppm
		7783-06-4	STEL	5 ppm
	Benzene	71-43-2	TWA	0.5 ppm
		71-43-2	STEL	2.5 ppm
	Cumene	98-82-8	TWA	50 ppm
	Ethylbenzene	100-4-4	TWA	50 ppm
		100-4-4	STEL	125 ppm
	Naphthalene	91-20-3	TWA	10 ppm
		91-20-3	STEL	15 ppm
	Toluene	108-88-3	TWA	20 ppm
	Xylenes	1330-20-7	TWA	100 ppm
		1330-20-7	STEL	150 ppm
	Polycyclic Aromatic Compound (Benzene Soluble)		TWA	0.2 mg/m3

Engineering measures : Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

Eye protection : Ensure that eyewash stations and safety showers are close to the workstation location. Goggles, and face shield or full facepiece pressure-demand supplied air respirator as needed to prevent eye and face contact.

Hand protection : Gloves constructed of nitrile, neoprene, or PVC are recommended. The resistance of specific material may vary from product to product as well as with degree of exposure.

Skin and body protection : Chemical protective clothing such as DuPont TyChem ®, Barricade or equivalent, recommended based on degree of exposure.

Respiratory protection : A NIOSH/ MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection. Use a NIOSH/ MSHA-approved positive-pressure supplied-air respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

Hygiene measures	:	Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. DO NOT use gasoline, kerosene, solvents, or harsh abrasive skin cleaners to clean skin. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Consider the need to discard contaminated leather shoes and gloves. Use good personal hygiene practices.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Typical is a thick, dark yellow to brown or greenish black liquid
Odor		Petroleum asphalt odor. Hydrogen sulfide (H2S) has a characteristic rotten egg odor with an odor threshold as low as 10 parts per billion or even less. However, this odor should not be used as a warning property because H2S can deaden the sense of smell. H2S concentrations can be measured with an H2S meter or colorimetric indicating tubes.
Odor threshold		Odor threshold varies with the composition of the crude oil
pH		Not applicable
Melting point/freezing point		-30° to 30°C has been reported as a pour point
Initial boiling point & range		Distillation is typically not performed above 300°C at atmospheric pressure
Flash point		-7 to 75°C
Evaporation rate		Higher initially and declines if lighter components evaporate
Flammability (solid, gas)		Flammable gas or vapors released by liquid
Upper explosive limit		Varies with composition but typical is approximately 7%
Lower explosive limit		Varies with composition but typical is approximately 0.7%
Vapor pressure		6 to 45 kPa
Vapor density (air = 1)		No data available
Relative density (water = 1)		0.8 to 1.0 g/mL is typical at 15°C
Solubility (in water)		1 to 2% by weight is maximum reported for soluble components of crude oil
Partition coefficient (n-octanol/water)		2 to > 6 as log Pow
Auto-ignition temperature		Varies with composition
Decomposition temperature		Will evaporate or boil and possibly ignite before decomposition occurs
Kinematic viscosity		5 to > 1300 mm^2/s at 38°C

SECTION 10. STABILITY AND REACTIVITY

Reactivity	Vapors may form explosive mixture with air. Hazardous polymerization does not occur.
Chemical stability	Stable under normal conditions.
Possibility of hazardous reactions	Can react with strong oxidizing agents, peroxides, acids and alkalies.

Conditions to avoid	Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Avoid static charge accumulation and discharge (see Section 7).
Hazardous decomposition products	Ignition and burning can release carbon monoxide, carbon dioxide, non-combusted hydrocarbons (smoke) and sulfur dioxide.

SECTION 11. TOXICOLOGICAL INFORMATION

Inhalation : May cause respiratory tract irritation. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death. Irritating and toxic hydrogen sulfide gas may be present. Greater than 15 - 20 ppm continuous exposure can cause mucous membrane and respiratory tract irritation. 50 - 500 ppm can cause headache, nausea, and dizziness. Continued exposure at these levels can lead to loss of reasoning and balance, difficulty in breathing, fluid in the lungs, and possible loss of consciousness. Greater than 500 ppm can cause rapid unconsciousness due to respiratory paralysis and death by suffocation unless the victim is removed from exposure and successfully resuscitated. Greater than 1000 ppm can cause immediate unconsciousness and death if not promptly revived. After-effects from overexposure are not anticipated except what would be expected if the victim was without oxygen for more than 3 to 5 minutes (asphyxiation). The "rotten egg" odor of hydrogen sulfide is not a reliable indicator for warning of exposure, since olfactory fatigue (loss of smell) readily occurs, especially at concentrations above 50 ppm. At high concentrations, the victim may not even recognize the odor before becoming unconscious.

Ingestion Aspiration hazard if liquid is inhaled into lungs, particularly from vomiting after ingestion. Aspiration may result in chemical pneumonia, severe lung damage, respiratory failure and even death. Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest and death may occur.

Skin irritation Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed. Rare, precancerous warts on the forearms, backs of hands and scrotum have been reported from prolonged or repeated skin contact.

Eye irritation Irritating to eyes.

Chronic exposure This material contains polynuclear aromatic hydrocarbons (PNAs), some of which are animal carcinogens. Similar products produced skin cancer and systemic toxicity in laboratory animals following repeated applications. The significance of these results to human exposures has not been determined - see Section 11 Toxicological Information. Contains benzene, which can cause blood disease, including anemia and leukemia. Suspect reproductive hazard - contains material which may injure unborn child.

Target organs Skin, Eyes, Central nervous system, Respiratory system, Kidney, Liver

Component:

Petroleum; Crude oil	8002-05-9	Acute oral toxicity: LD50 rat Dose: 5,001 mg/kg

		Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Skin irritation: Result: Mild skin irritation Eye irritation: Result: Mild eye irritation
Toluene	108-88-3	Acute oral toxicity: LD50 rat Dose: 636 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 12,124 mg/kg Acute inhalation toxicity: LC50 rat Dose: 49 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Prolonged skin contact may defat the skin and produce dermatitis. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Xylene	1330-20-7	Acute oral toxicity: LD50 rat Dose: 2,840 mg/kg Acute dermal toxicity: LD50 rabbit Dose: ca. 4,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 6,350 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Naphthalene	91-20-3	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute dermal toxicity: LD50 rat Dose: 2,501 mg/kg Acute inhalation toxicity: LC50 rat Dose: 101 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Benzene	71-43-2	Acute oral toxicity: LD50 rat Dose: 930 mg/kg Acute inhalation toxicity: LC50 rat Dose: 44 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product.

		Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes.
Pentane	109-66-0	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 364 mg/l Exposure time: 4 h Skin irritation: Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Cyclohexane	110-82-7	Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 14 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Ethylbenzene	100-41-4	Acute oral toxicity: LD50 rat Dose: 3,500 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 15,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 18 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes
Heptane [and isomers]	142-82-5	Acute oral toxicity: LD50 rat Dose: 15,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 103 g/m3 Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
N-hexane	110-54-3	Acute oral toxicity: LD50 rat Dose: 25,000 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 171.6 mg/l Exposure time: 4 h

Skin irritation: Classification: Irritating to skin.
Result: Skin irritation

Eye irritation: Classification: Irritating to eyes.
Result: Mild eye irritation

Teratogenicity: N11.00418960

Carcinogenicity

NTP	:	Naphthalene (CAS-No.: 91-20-3) Benzene (CAS-No.: 71-43-2)
IARC		Gasoline, natural; Low boiling point naphtha (CAS-No.: 8006-61-9) Naphthalene (CAS-No.: 91-20-3) Benzene (CAS-No.: 71-43-2) Ethylbenzene (CAS-No.: 100-41-4)
OSHA		Benzene (CAS-No.: 71-43-2)
CA Prop 65		WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Toluene (CAS-No.: 108-88-3) Benzene (CAS-No.: 71-43-2)

SECTION 12. ECOLOGICAL INFORMATION

Additional ecological information : Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State regulations.

Component:

N-hexane	110-54-3	Toxicity to fish: LC50 Species: Pimephales promelas (fathead minnow) Dose: 2.5 mg/l Exposure time: 96 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 2.1 mg/l Exposure time: 48 h
Sulfur	7704-34-9	Acute and prolonged toxicity for aquatic invertebrates: EC0 Species: Daphnia magna (Water flea) Dose: > 10,000 mg/l Exposure time: 24 h

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal : Consult federal, state and local waste regulations to determine appropriate waste characterization of material and allowable disposal methods.

SECTION 14. TRANSPORT INFORMATION

CFR

	Proper shipping name	: PETROLEUM CRUDE OIL
	UN-No.	: 1267
	Class	: 3
	Packing group	: II

TDG

	Proper shipping name	: PETROLEUM CRUDE OIL
	UN-No.	: UN1267
	Class	: 3
	Packing group	: II

IATA Cargo Transport

	UN UN-No.	: UN1267
	Description of the goods	: PETROLEUM CRUDE OIL
	Class	: 3
	Packaging group	: II
	ICAO-Labels	: 3
	Packing instruction (cargo aircraft)	: 364
	Packing instruction (cargo aircraft)	: Y341

IATA Passenger Transport

	UN UN-No.	: UN1267
	Description of the goods	: PETROLEUM CRUDE OIL
	Class	: 3
	Packaging group	: II
	ICAO-Labels	: 3
	Packing instruction (passenger aircraft)	: 353
	Packing instruction (passenger aircraft)	: Y341

IMDG-Code

	UN-No.	: UN 1267
	Description of the goods	: PETROLEUM CRUDE OIL
	Class	: 3
	Packaging group	: II
	IMDG-Labels	: 3
	EmS Number	: F-E S-E
	Marine pollutant	: No

SECTION 15. REGULATORY INFORMATION

TSCA Status	:	On TSCA Inventory
DSL Status	:	All components of this product are on the Canadian DSL list.
SARA 311/312 Hazards	:	Fire Hazard Acute Health Hazard Chronic Health Hazard

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIROMENT)

The CERCLA definition of hazardous substances contains a “petroleum exclusion” clause which exempts crude oil. Fractions of crude oil, and products (both finished and intermediate) from the crude oil refining process and any indigenous components of such from the CERCLA Section 103 reporting requirements. However, other federal reporting requirements, including SARA Section 304, as well as the Clean Water Act may still apply**.**

MASS RTK — US. Massachusetts Commonwealth's Right-to-Know Law (Appendix A to 105 Code of Massachusetts Regulations Section 670.000)

Components	CAS-No.
Benzene	71-43-2
Hydrogen Sulfide	7783-06-4
Sulfur	7704-34-9
N-hexane	110-54-3
Petroleum; Crude oil	8002-05-9
Toluene	108-88-3
Xylene	1330-20-7

Components	CAS-No.
hydrogen sulfide	7783-06-4

PENN RTK — US. Pennsylvania Worker and Community Right-to-Know Law (34 Pa. Code Chap. 301-323)

Components	CAS-No.
Benzene	71-43-2
Hydrogen Sulfide	7783-06-4
Sulfur	7704-34-9
N-hexane	110-54-3
Petroleum; Crude oil	8002-05-9
Toluene	108-88-3
Xylene	1330-20-7

NJ RTK — US. New Jersey Worker and Community Right-to-Know Act (New Jersey Statute Annotated Section 34:5A-5)

Components	CAS-No.
Benzene	71-43-2
Hydrogen Sulfide	7783-06-4
Sulfur	7704-34-9
N-hexane	110-54-3
Petroleum; Crude oil	8002-05-9
Toluene	
Xylene	

California Prop. 65	:	WARNING! This product contains a chemical known to the State of California to cause cancer. Benzene 71-43-2 WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Benzene 71-43-2 Toluene 108-88-3

SECTION 16. OTHER INFORMATION

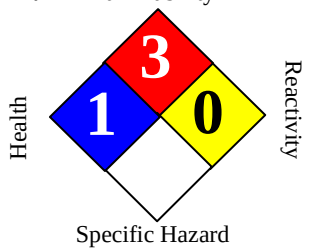
Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Revision Date : 12/07/2012

Safety Data Sheet
Crude oil, sour heavy

NFPA:



SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Crude oil, sour heavy			
Synonyms	:	Sour Crude, Crude Oil Sour, RS294, 0000002670, 888100005182			
SDS Number	:	888100005182	**Version**	:	1.8
Product Use Description	:	Industrial feedstock			
Company	:	For: Tesoro Refining & Marketing Co. 19100 Ridgewood Parkway, San Antonio, TX 78259			
Tesoro Call Center	:	(877) 783-7676	**Chemtrec (Emergency Contact)**	:	(800) 424-9300

SECTION 2. HAZARDS IDENTIFICATION

Classifications : Flammable Liquid – Category 2 or 3 depending on variable composition.
Aspiration Hazard – Category 1.
Carcinogenicity – Category 2
Specific Target Organ Toxicity (Repeated Exposure) – Category 2
Specific Target Organ Toxicity (Single Exposure) – Category 3
Eye Irritant – Category 2B
Chronic Aquatic Toxicity – Category 2

Pictograms

Signal Word : DANGER

Hazard Statements : Highly flammable liquid and vapor.
May be fatal if swallowed and enters airways – do not siphon gasoline by mouth.
Suspected of causing cancer if repeated over-exposure by inhalation and/or skin contact occurs.
May cause damage to liver, kidneys and nervous system by prolonged and repeated inhalation or skin contact.
Causes eye irritation. Can be absorbed through skin.
Repeated or prolonged skin contact can cause irritation and dermatitis.
May cause drowsiness or dizziness.
Harmful to aquatic life.

May release hydrogen sulfide (H2S) gas, a toxic-by-inhalation material. See Section 11.

Precautionary statements

Prevention

Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat, sparks, open flames, welding and hot surfaces.
No smoking.
Keep container tightly closed.
Ground and/or bond container and receiving equipment.
Use explosion-proof electrical equipment.
Use only non-sparking tools (if tools are used in flammable atmosphere).
Take precautionary measures against static discharge.
Wear gloves, eye protection and face protection (as needed to prevent skin and eye contact with liquid).
Wash hands or liquid-contacted skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Do not breathe vapors.
Use only outdoors or in a well-ventilated area.

Response

In case of fire: Use dry chemical, CO2, water spray or fire-fighting foam to extinguish.
If swallowed: Immediately call a poison center, doctor, hospital emergency room, medical clinic or 911. Do NOT induce vomiting. Rinse mouth.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
If in eye: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If skin or eye irritation persists, get medical attention.
If inhaled: Remove person to fresh air and keep comfortable for breathing.
Get medical attention if you feel unwell.

Storage

Store in a well-ventilated place. Keep cool. Store locked up. Keep container tightly closed . Use only approved containers.

Disposal

Dispose of contents/containers to approved disposal site in accordance with local, regional, national, and/or international regulations.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Weight %
Petroleum; Crude oil	8002-05-9	80 - 85%
Benzene	71-43-2	5 - 7%
Toluene	108-88-3	5 - 7%
Ethylbenzene	100-41-4	5 - 7%
Xylene	1330-20-7	5 - 7%

Hydrogen Sulfide	7783-06-4	< 0.5%

SECTION 4. FIRST AID MEASURES

Inhalation : Move to fresh air. If not breathing, give artificial respiration. Administer oxygen or artificial respiration if needed. Seek medical attention immediately.

Skin contact : Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Seek medical advice if symptoms persist or develop. Seek medical attention if irritation or skin thermal burns occur.

Eye contact : In case of eye contact, immediately flush with low pressure, cool water for at least 15 minutes, opening eyelids to ensure flushing. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Seek medical advice if symptoms persist or develop.

Ingestion : Do NOT induce vomiting. Do not give liquids. Seek medical attention immediately. If vomiting does occur naturally, keep head below the hips to reduce the risks of aspiration. Monitor for breathing difficulties. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, or fire-fighting foam. LARGE FIRES: Water spray, fog or fire-fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Specific hazards during fire fighting : Above the flash point, explosive vapor-air mixtures may be formed. Vapors can flow along surfaces to distant ignition source and flash back. Dangerous fire and explosion hazard when exposed to heat, sparks or flame. Do not allow liquid runoff to enter sewers or public waters.

Special protective equipment for fire-fighters : Firefighters should wear self-contained breathing apparatus and full protective clothing as need for protection from heat and airborne combustion products. Withdraw immediately from the area if there is a rising sound from a venting safety device or discoloration of vessels, tanks, or pipelines.

Further information : Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions : Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to contain spill areas.

Environmental precautions : Carefully contain and stop the source of the spill, if safe to do so. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. WASTE DISPOSAL METHOD: Dispose of in accordance with Local, State, and Federal Regulations.

Methods for cleaning up : Take up with sand or oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

Additional advice : Inform the responsible authorities in case of leakage, or of entry into waterways, soil or drains.

SECTION 7. HANDLING AND STORAGE

Precautions for safe handling : Handle as a combustible liquid. Keep product and empty containers away from fire, sparks and heated surfaces. Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Conditions for safe storage, including incompatibilities : Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose containers to sources of ignition. Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks". The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks". Hydrogen sulfide may accumulate in tanks and bulk transport compartments. Consider appropriate respiratory protection (see Section 8). Stand upwind. Avoid vapors when opening hatches and dome covers. Confined spaces should be ventilated and gas tested prior to entry.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

List	Components	CAS-No.	Type:	Value
OSHA	Benzene	71-43-2	TWA	1 ppm
		71-43-2	STEL	5 ppm
		71-43-2	OSHA_ACT	0.5 ppm
OSHA Z1	Ethylbenzene	100-41-4	PEL	100 ppm 435 mg/m3
	Xylene	1330-20-7	PEL	100 ppm 435 mg/m3
	Hydrogen sulfide	7783-06-4	STEL	20 ppm
ACGIH	Benzene	71-43-2	TWA	0.5 ppm
		71-43-2	STEL	2.5 ppm
	Toluene	108-88-3	TWA	50 ppm
	Ethylbenzene	100-41-4	TWA	100 ppm
		100-41-4	STEL	125 ppm
	Xylene	1330-20-7	TWA	100 ppm

		1330-20-7	STEL	150 ppm
	Hydrogen Sulfide	7783-06-4	TWA	1 ppm
		7783-06-4	STEL	5 ppm

Engineering measures : Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

Eye protection : Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

Hand protection : Gloves constructed of nitrile, neoprene, or PVC are recommended.

Skin and body protection : Chemical protective clothing such as DuPont Tyvek QC, TyChem® or equivalent, recommended based on degree of exposure. The resistance of specific material may vary from product to product as well as with degree of exposure.

Respiratory protection : If hydrogen sulfide concentration may exceed permissible exposure limit, a positive-pressure SCBA or Type C supplied air respirator with escape bottle is required as respiratory protection. If hydrogen sulfide concentration is below H2S permissible exposure limit a NIOSH/ MSHA-approved air-purifying respirator with acid gas cartridges may be acceptable for odor control, but continuous air monitoring for H2S is recommended. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection. Use a NIOSH/ MSHA-approved positive-pressure supplied-air respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

Hygiene measures : Emergency eye wash capability should be available in the vicinity of any potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. DO NOT use gasoline, kerosene, solvents, or harsh abrasive skin cleaners to clean skin. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Consider the need to discard contaminated leather shoes and gloves. Consider disposal of contaminated clothing rather than laundering to prevent the formation of flammable vapors which could ignite via washer or dryer.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance Typical is a thick, dark yellow to brown or greenish black liquid

Odor Petroleum asphalt odor. Hydrogen sulfide (H2S) has a characteristic rotten egg odor with an odor threshold as low as 10 parts per billion or even less. However, this odor should not be used as a warning property because H2S can deaden the sense of smell. H2S concentrations can be measured with an H2S meter or colorimetric indicating tubes.

Odor threshold Odor threshold varies with the composition of the crude oil

pH Not applicable

Melting point/freezing point -30° to 30°C has been reported as a pour point

Initial boiling point & range Distillation is typically not performed above 300°C at atmospheric pressure

Flash point	-7 to 75°C
Evaporation rate:	Higher initially and declines if lighter components evaporate
Flammability (solid, gas)	Flammable gas or vapors released by liquid
Upper explosive limit	Varies with composition but typical is approximately 7%
Lower explosive limit	Varies with composition but typical is approximately 0.7%
Vapor pressure	6 to 45 kPa
Vapor density (air = 1)	No data available
Relative density (water = 1)	0.8 to 1.0 g/mL is typical at 15°C
Solubility (in water)	1 to 2% by weight is maximum reported for soluble components of crude oil
Partition coefficient (n-octanol/water)	2 to > 6 as log Pow
Auto-ignition temperature	Varies with composition
Decomposition temperature	Will evaporate or boil and possibly ignite before decomposition occurs.
Kinematic viscosity	5 to > 1300 mm^2/s at 38°C

SECTION 10. STABILITY AND REACTIVITY

Reactivity	Vapors may form explosive mixture with air. Hazardous polymerization does not occur.
Chemical stability	Stable under normal conditions.
Possibility of hazardous reactions	Can react with strong oxidizing agents, peroxides, acids and alkalies.
Conditions to avoid	Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Avoid static charge accumulation and discharge (see Section 7).
Hazardous decomposition products	Ignition and burning can release carbon monoxide, carbon dioxide, non-combusted hydrocarbons (smoke) and sulfur dioxide.

SECTION 11. TOXICOLOGICAL INFORMATION

Inhalation	May cause respiratory tract irritation. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death. Irritating and toxic hydrogen sulfide gas may be present. Greater than 15 - 20 ppm continuous exposure can cause mucous membrane and respiratory tract irritation. 50 - 500 ppm can cause headache, nausea, and dizziness. Continued exposure at these levels can lead to loss of reasoning and balance, difficulty in breathing, fluid in the lungs, and possible loss of consciousness. Greater than 500 ppm can cause rapid unconsciousness due to respiratory paralysis and death by suffocation unless the victim is removed from exposure and successfully resuscitated. Greater than 1000 ppm can cause immediate unconsciousness and death if not promptly revived. After-effects from overexposure are not anticipated except what would be expected if the victim was without oxygen for more than 3 to 5

minutes (asphyxiation). The "rotten egg" odor of hydrogen sulfide is not a reliable indicator for warning of exposure, since olfactory fatigue (loss of smell) readily occurs, especially at concentrations above 50 ppm. At high concentrations, the victim may not even recognize the odor before becoming unconscious.

Ingestion

Aspiration hazard if liquid is inhaled into lungs, particularly from vomiting after ingestion. Aspiration may result in chemical pneumonia, severe lung damage, respiratory failure and even death. Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest and death may occur.

Skin irritation

Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed. Rare, precancerous warts on the forearms, backs of hands and scrotum have been reported from prolonged or repeated skin contact

Eye irritation

Irritating to eyes.

Chronic exposure

This material contains polynuclear aromatic hydrocarbons (PNAs), some of which are animal carcinogens. Similar products produced skin cancer and systemic toxicity in laboratory animals following repeated applications. The significance of these results to human exposures has not been determined - see Section 11 Toxicological Information. Contains benzene, which can cause blood disease, including anemia and leukemia. Suspect reproductive hazard - contains material which may injure unborn child.

Target organs

Skin, Eyes, Central nervous system, Respiratory system, Kidney, Liver

Component

Petroleum; Crude oil	8002-05-9	Acute oral toxicity: LD50 rat Dose: 5,001 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Skin irritation: Result: Mild skin irritation Eye irritation: Result: Mild eye irritation Carcinogenicity: N11.00418605
Toluene	108-88-3	Acute oral toxicity: LD50 rat Dose: 636 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 12,124 mg/kg Acute inhalation toxicity: LC50 rat Dose: 49 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Prolonged skin contact may defat the skin and produce dermatitis. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Xylene	1330-20-7	Acute oral toxicity: LD50 rat Dose: 2,840 mg/kg Acute dermal toxicity: LD50 rabbit Dose: ca. 4,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 6,350 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation

Naphthalene	91-20-3	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute dermal toxicity: LD50 rat Dose: 2,501 mg/kg Acute inhalation toxicity: LC50 rat Dose: 101 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Carcinogenicity: N11.00422130
Benzene	71-43-2	Acute oral toxicity: LD50 rat Dose: 930 mg/kg Acute inhalation toxicity: LC50 rat Dose: 44 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes
Pentane	109-66-0	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 364 mg/l Exposure time: 4 h Skin irritation: Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Cyclohexane	110-82-7	Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 14 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Ethylbenzene	100-41-4	Acute oral toxicity: LD50 rat Dose: 3,500 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 15,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 18 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes.
Heptane [and isomers]	142-82-5	Acute oral toxicity: LD50 rat Dose: 15,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 103 g/m3 Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
N-hexane	110-54-3	Acute oral toxicity: LD50 rat Dose: 25,000 mg/kg Acute dermal toxicity: LD50 rabbit

Dose: 2,001 mg/kg
Acute inhalation toxicity: LC50 rat
Dose: 171.6 mg/l
Exposure time: 4 h
Skin irritation: Classification: Irritating to skin.
Result: Skin irritation
Eye irritation: Classification: Irritating to eyes.
Result: Mild eye irritation
Teratogenicity: N11.00418960

Carcinogenicity :

NTP Naphthalene (CAS-No.: 91-20-3)
Benzene (CAS-No.: 71-43-2)

IARC Gasoline, natural; Low boiling point naphtha (CAS-No.: 8006-61-9)
Naphthalene (CAS-No.: 91-20-3)
Benzene (CAS-No.: 71-43-2)
Ethylbenzene (CAS-No.: 100-41-4)

OSHA Benzene (CAS-No.: 71-43-2)

CA Prop 65 WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.
Toluene (CAS-No.: 108-88-3)
Benzene (CAS-No.: 71-43-2)

SECTION 12. ECOLOGICAL INFORMATION

Additional ecological information : Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State regulations.

Component:

Toluene 108-88-3

Toxicity to fish:
LC50
Species: Carassius auratus (goldfish)
Dose: 13 mg/l
Exposure time: 96 h

Acute and prolonged toxicity for aquatic invertebrates:
EC50
Species: Daphnia magna (Water flea)
Dose: 11.5 mg/l
Exposure time: 48 h

Toxicity to algae:
IC50
Species: Selenastrum capricornutum (green algae)
Dose: 12 mg/l
Exposure time: 72 h

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal : Consult federal, state and local waste regulations to determine appropriate waste characterization of material and allowable disposal methods.

SECTION 14. TRANSPORT INFORMATION

CFR

Proper shipping name	: PETROLEUM CRUDE OIL
UN-No.	: 1267
Class	: 3
Packing group	: II

TDG

Proper shipping name	: PETROLEUM CRUDE OIL
UN-No.	: UN1267
Class	: 3
Packing group	: II

IATA Cargo Transport

UN UN-No.	: UN1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: II
ICAO-Labels	: 3
Packing instruction (cargo aircraft)	: 366
Packing instruction (cargo aircraft)	: Y344

IATA Passenger Transport

UN UN-No.	: UN1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: II
ICAO-Labels	: 3
Packing instruction (passenger aircraft)	: 355
Packing instruction (passenger aircraft)	: Y344

IMDG-Code

UN-No.	: UN 1267
Description of the goods	: PETROLEUM CRUDE OIL
Class	: 3
Packaging group	: II
IMDG-Labels	: 3
EmS Number	: F-E S-E
Marine pollutant	: No

SECTION 15. REGULATORY INFORMATION

TSCA Status	: On TSCA Inventory
DSL Status	: All components of this product are on the Canadian DSL list.
SARA 311/312 Hazards	: Acute Health Hazard Chronic Health Hazard

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIROMENT)
The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil. Fractions of crude oil, and products (both finished and intermediate) from the crude oil refining process and any indigenous components of such from the CERCLA Section 103 reporting requirements. However, other federal reporting requirements, including SARA Section 304, as well as the Clean Water Act may still apply**.**

CERCLA Reportable Quantity : 118 lbs

SARA III — US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required

Components	CAS-No.
Xylene	1330-20-7
Ethylbenzene	100-41-4
Toluene	108-88-3
Benzene	71-43-2

SARA III — US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR355, Appendix A)

Components	CAS-No.

PENN RTK — US. Pennsylvania Worker and Community Right-to-Know Law (34 Pa. Code Chap. 301-323)

Components	CAS-No.
Benzene	71-43-2
Toluene	108-88-3
Ethylbenzene	100-41-4
Xylene	1330-20-7
Petroleum; Crude oil	8002-05-9

MASS RTK — US. Massachusetts Commonwealth's Right-to-Know Law (Appendix A to 105 Code of Massachusetts Regulations Section 670.000)

Components	CAS-No.
Benzene	71-43-2
Toluene	108-88-3
Ethylbenzene	100-41-4
Xylene	1330-20-7
Petroleum; Crude oil	8002-05-9

NJ RTK — US. New Jersey Worker and Community Right-to-Know Act (New Jersey Statute Annotated Section 34:5A-5)

Components	CAS-No.
Benzene	71-43-2
Toluene	108-88-3
Ethylbenzene	100-41-4
Xylene	1330-20-7
Petroleum; Crude oil	8002-05-9

California Prop. 65	:	WARNING! This product contains a chemical known in the State of California to cause cancer.
		Ethylbenzene 100-41-4
		Benzene 71-43-2
		WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.
		Toluene 108-88-3
		Benzene 71-43-2

SECTION 16. OTHER INFORMATION

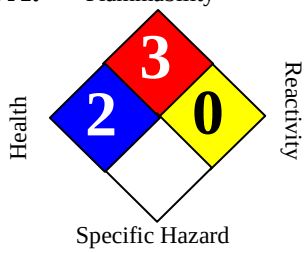
Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Revision Date : 02/02/2013

Safety Data Sheet
Crude oil, sour light

NFPA:



SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Crude oil, sour light			
Synonyms	:	Hydrogen sulfide crude; hydrogen sulfide oil; crude oil; sealed oil; separator crude; sour crude; sour oil, petroleum, RS294, 0000002670, 888100005161			
SDS Number	:	888100005161	**Version**	:	1.3
Product Use Description	:	Refining feedstock			
Company	:	For: Tesoro Refining & Marketing Co. 19100 Ridgewood Parkway, San Antonio, TX 78259			
Tesoro Call Center	:	(877) 783-7676	**Chemtrec (Emergency Contact)**	:	(800) 424-9300

SECTION 2. HAZARDS IDENTIFICATION

Classifications : Flammable Liquid – Category 2 or 3 depending on variable composition.
Aspiration Hazard – Category 1.
Carcinogenicity – Category 2
Specific Target Organ Toxicity (Repeated Exposure) – Category 2
Specific Target Organ Toxicity (Single Exposure) – Category 3
Eye Irritant – Category 2B
Chronic Aquatic Toxicity – Category 2

Pictograms

Signal Word : DANGER

Hazard Statements : Highly flammable liquid and vapor.
May be fatal if swallowed and enters airways – do not siphon gasoline by mouth.
Suspected of causing cancer if repeated over-exposure by inhalation and/or skin contact occurs.
May cause damage to liver, kidneys and nervous system by prolonged and repeated inhalation or skin contact.
Causes eye irritation. Can be absorbed through skin.

Repeated or prolonged skin contact can cause irritation and dermatitis.
May cause drowsiness or dizziness.
Harmful to aquatic life.
May release hydrogen sulfide (H2S) gas, a toxic-by-inhalation material. See Section 11.

Precautionary statements

Prevention

Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat, sparks, open flames, welding and hot surfaces.
No smoking.
Keep container tightly closed.
Ground and/or bond container and receiving equipment.
Use explosion-proof electrical equipment.
Use only non-sparking tools (if tools are used in flammable atmosphere).
Take precautionary measures against static discharge.
Wear gloves, eye protection and face protection (as needed to prevent skin and eye contact with liquid).
Wash hands or liquid-contacted skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Do not breathe vapors.
Use only outdoors or in a well-ventilated area.

Response

In case of fire: Use dry chemical, CO2, water spray or fire-fighting foam to extinguish.
If swallowed: Immediately call a poison center, doctor, hospital emergency room, medical clinic or 911. Do NOT induce vomiting. Rinse mouth.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
If in eye: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If skin or eye irritation persists, get medical attention.
If inhaled: Remove person to fresh air and keep comfortable for breathing.
Get medical attention if you feel unwell.

Storage

Store in a well-ventilated place. Keep cool. Store locked up. Keep container tightly closed . Use only approved containers.

Disposal

Dispose of contents/containers to approved disposal site in accordance with local, regional, national, and/or international regulations.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Weight %
Petroleum; Crude oil	8002-05-9	100%
N-hexane	110-54-3	0 - 1.5%
Hydrogen Sulfide	7783-06-4	Highly Variable

Sulfur	7704-34-9	1 - 1.5%
Benzene	71-43-2	0.1 - 3%

SECTION 4. FIRST AID MEASURES

Inhalation : Move to fresh air. Administer oxygen or artificial respiration if needed. Seek medical attention immediately.

Skin contact : Take off all contaminated clothing immediately. Wash off immediately with soap and plenty of water. Seek medical attention if irritation or skin thermal burns occur.

Eye contact : In case of eye contact, immediately flush with low pressure, cool water for at least 15 minutes, opening eyelids to ensure flushing. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Seek medical attention immediately.

Ingestion : Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Seek medical attention immediately. If vomiting does occur naturally, keep head below the hips to reduce the risks of aspiration. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, or fire-fighting foam. LARGE FIRES: Water spray, fog or fire-fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Specific hazards during fire fighting : Vapors are heavier than air and may travel long distances to a point of ignition and flash back. Do not allow liquid runoff to enter sewers or public waters. Gas may form explosive mixture with air.

Special protective equipment for fire-fighters : Use NIOSH/MSHA approved positive pressure self-contained breathing apparatus and fully protective clothing such as bunker gear if needed to prevent exposure.

Further information : Isolate area, particularly around ends of storage vessels. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions : Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to contain spill areas.

Environmental precautions : Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors.

Methods for cleaning up : Take up with sand or oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

SECTION 7. HANDLING AND STORAGE

Precautions for safe handling : Handle as a combustible liquid. Keep product and empty containers away from fire, sparks and heated surfaces. Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Conditions for safe storage, including incompatibilities : Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose containers to sources of ignition. Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

List	Components	CAS-No.	Type:	Value
OSHA	Benzene	71-43-2	TWA	1 ppm
		71-43-2	STEL	5 ppm
		71-43-2	OSHA_AL	0.5 ppm
OSHA Z1	N-hexane	110-54-3	PEL	500 ppm 1,800 mg/m3
OSHA Z1	Hydrogen sulfide	7783-06-4	STEL	20 ppm
ACGIH	N-hexane	110-54-3	TWA	50 ppm
	Hydrogen Sulfide	7783-06-4	TWA	1ppm
		7783-06-4	STEL	5 ppm
	Benzene	71-43-2	TWA	0.5 ppm
		71-43-2	STEL	2.5 ppm

Engineering measures : Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

Eye protection : Ensure that eyewash stations and safety showers are close to the workstation location. Goggles, and face shield or full facepiece pressure-demand supplied air respirator as needed to prevent eye and face contact.

Hand protection : Gloves constructed of nitrile, neoprene, or PVC are recommended. The resistance of specific material may vary from product to product as well as with degree of exposure.

Skin and body protection	:	Chemical protective clothing such as DuPont TyChem ®, Barricade or equivalent, recommended based on degree of exposure.
Respiratory protection	:	A NIOSH/ MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection. Use a NIOSH/ MSHA-approved positive-pressure supplied-air respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.
Hygiene measures	:	Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. DO NOT use gasoline, kerosene, solvents, or harsh abrasive skin cleaners to clean skin. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Consider the need to discard contaminated leather shoes and gloves. Use good personal hygiene practices.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Typical is a thick, dark yellow to brown or greenish black liquid
Odor	Petroleum asphalt odor. Hydrogen sulfide (H2S) has a characteristic rotten egg odor with an odor threshold as low as 10 parts per billion or even less. However, this odor should not be used as a warning property because H2S can deaden the sense of smell. H2S concentrations can be measured with an H2S meter or colorimetric indicating tubes.
Odor threshold	Odor threshold varies with the composition of the crude oil
pH	Not applicable
Melting point/freezing point	-30° to 30°C has been reported as a pour point
Initial boiling point & range	Distillation is typically not performed above 300°C at atmospheric pressure
Flash point	-7 to 75°C
Evaporation rate:	Higher initially and declines if lighter components evaporate
Flammability (solid, gas)	Flammable gas or vapors released by liquid
Upper explosive limit	Varies with composition but typical is approximately 7%
Lower explosive limit	Varies with composition but typical is approximately 0.7%
Vapor pressure	6 to 45 kPa
Vapor density (air = 1)	No data available
Relative density (water = 1)	0.8 to 1.0 g/mL is typical at 15°C
Solubility (in water)	1 to 2% by weight is maximum reported for soluble components of crude oil
	2 to > 6 as log Pow

Partition coefficient (n-octanol/water)	Varies with composition
Auto-ignition temperature	Will evaporate or boil and possibly ignite before decomposition occurs.
Decomposition temperature	5 to > 1300 mm²/s at 38°C
Kinematic viscosity	

SECTION 10. STABILITY AND REACTIVITY

Reactivity	Vapors may form explosive mixture with air. Hazardous polymerization does not occur.
Chemical stability	Stable under normal conditions.
Possibility of hazardous reactions	Can react with strong oxidizing agents, peroxides, acids and alkalies.
Conditions to avoid	Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Avoid static charge accumulation and discharge (see Section 7).
Hazardous decomposition products	Ignition and burning can release carbon monoxide, carbon dioxide, non-combusted hydrocarbons (smoke) and sulfur dioxide.

SECTION 11. TOXICOLOGICAL INFORMATION

Inhalation	May cause respiratory tract irritation. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death. Irritating and toxic hydrogen sulfide gas may be present. Greater than 15 - 20 ppm continuous exposure can cause mucous membrane and respiratory tract irritation. 50 - 500 ppm can cause headache, nausea, and dizziness. Continued exposure at these levels can lead to loss of reasoning and balance, difficulty in breathing, fluid in the lungs, and possible loss of consciousness. Greater than 500 ppm can cause rapid unconsciousness due to respiratory paralysis and death by suffocation unless the victim is removed from exposure and successfully resuscitated. Greater than 1000 ppm can cause immediate unconsciousness and death if not promptly revived. After-effects from overexposure are not anticipated except what would be expected if the victim was without oxygen for more than 3 to 5 minutes (asphyxiation). The "rotten egg" odor of hydrogen sulfide is not a reliable indicator for warning of exposure, since olfactory fatigue (loss of smell) readily occurs, especially at concentrations above 50 ppm. At high concentrations, the victim may not even recognize the odor before becoming unconscious.
Ingestion	Aspiration hazard if liquid is inhaled into lungs, particularly from vomiting after ingestion. Aspiration may result in chemical pneumonia, severe lung damage, respiratory failure and even death. Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest and death may occur.
Skin irritation	Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed. Rare, precancerous warts on the forearms, backs of hands and scrotum have been

reported from prolonged or repeated skin contact.

Eye irritation Irritating to eyes.

Chronic exposure This material contains polynuclear aromatic hydrocarbons (PNAs), some of which are animal carcinogens. Similar products produced skin cancer and systemic toxicity in laboratory animals following repeated applications. The significance of these results to human exposures has not been determined - see Section 11 Toxicological Information. Contains benzene, which can cause blood disease, including anemia and leukemia. Suspect reproductive hazard - contains material which may injure unborn child.

Target organs Skin, Eyes, Central nervous system, Respiratory system, Kidney, Liver

Component:

Petroleum; Crude oil	8002-05-9	Acute oral toxicity: LD50 rat Dose: 5,001 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Skin irritation: Result: Mild skin irritation Eye irritation: Result: Mild eye irritation Carcinogenicity: N11.00418605
Toluene	108-88-3	Acute oral toxicity: LD50 rat Dose: 636 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 12,124 mg/kg Acute inhalation toxicity: LC50 rat Dose: 49 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Prolonged skin contact may defat the skin and produce dermatitis. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Xylene	1330-20-7	Acute oral toxicity: LD50 rat Dose: 2,840 mg/kg Acute dermal toxicity: LD50 rabbit Dose: ca. 4,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 6,350 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Naphthalene	91-20-3	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute dermal toxicity: LD50 rat Dose: 2,501 mg/kg Acute inhalation toxicity: LC50 rat Dose: 101 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation

		Carcinogenicity: N11.00422130
Benzene	71-43-2	Acute oral toxicity: LD50 rat Dose: 930 mg/kg Acute inhalation toxicity: LC50 rat Dose: 44 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes.
Pentane	109-66-0	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 364 mg/l Exposure time: 4 h Skin irritation: Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Cyclohexane	110-82-7	Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 14 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Ethylbenzene	100-41-4	Acute oral toxicity: LD50 rat Dose: 3,500 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 15,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 18 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes.
Heptane [and isomers]	142-82-5	Acute oral toxicity: LD50 rat Dose: 15,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 103 g/m3 Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
N-hexane	110-54-3	Acute oral toxicity: LD50 rat Dose: 25,000 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 171.6 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Teratogenicity: N11.00418960

Carcinogenicity

NTP	Naphthalene (CAS-No.: 91-20-3) Benzene (CAS-No.: 71-43-2)
IARC	Gasoline, natural; Low boiling point naphtha (CAS-No.: 8006-61-9) Naphthalene (CAS-No.: 91-20-3) Benzene (CAS-No.: 71-43-2) Ethylbenzene (CAS-No.: 100-41-4)
OSHA	Benzene (CAS-No.: 71-43-2)
CA Prop 65	WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Toluene (CAS-No.: 108-88-3) Benzene (CAS-No.: 71-43-2)

SECTION 12. ECOLOGICAL INFORMATION

Additional ecological information : Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State regulations.

Component:

N-hexane	110-54-3	Toxicity to fish: LC50 Species: Pimephales promelas (fathead minnow) Dose: 2.5 mg/l Exposure time: 96 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 2.1 mg/l Exposure time: 48 h
Sulfur	7704-34-9	Acute and prolonged toxicity for aquatic invertebrates: EC0 Species: Daphnia magna (Water flea) Dose: > 10,000 mg/l Exposure time: 24 h

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal : Consult federal, state and local waste regulations to determine appropriate waste characterization of material and allowable disposal methods.

SECTION 14. TRANSPORT INFORMATION

CFR

Proper shipping name	: PETROLEUM CRUDE OIL
UN-No.	: 1267
Class	: 3
Packing group	: II

TDG

Proper shipping name	:	PETROLEUM CRUDE OIL
UN-No.	:	UN1267
Class	:	3
Packing group	:	II

IATA Cargo Transport

UN UN-No.	:	UN1267
Description of the goods	:	PETROLEUM CRUDE OIL
Class	:	3
Packaging group	:	II
ICAO-Labels	:	3
Packing instruction (cargo aircraft)	:	364
Packing instruction (cargo aircraft)	:	Y341

IATA Passenger Transport

UN UN-No.	:	UN1267
Description of the goods	:	PETROLEUM CRUDE OIL
Class	:	3
Packaging group	:	II
ICAO-Labels	:	3
Packing instruction (passenger aircraft)	:	353
Packing instruction (passenger aircraft)	:	Y341

IMDG-Code

UN-No.	:	UN 1267
Description of the goods	:	PETROLEUM CRUDE OIL
Class	:	3
Packaging group	:	II
IMDG-Labels	:	3
EmS Number	:	F-E S-E
Marine pollutant	:	No

SECTION 15. REGULATORY INFORMATION

TSCA Status : On TSCA Inventory

DSL Status : All components of this product are on the Canadian DSL list.

SARA 311/312 Hazards : Fire Hazard
Acute Health Hazard
Chronic Health Hazard

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIROMENT)
The CERCLA definition of hazardous substances contains a “petroleum exclusion” clause which exempts crude oil. Fractions of crude oil, and products (both finished and intermediate) from the crude oil refining process and any indigenous components of such from the CERCLA Section 103 reporting requirements. However, other federal reporting requirements, including SARA Section 304, as well as the Clean Water Act may still apply.

CERCLA Reportable Quantity : 104 lbs

MASS RTK — US. Massachusetts Commonwealth's Right-to-Know Law (Appendix A to 105 Code of Massachusetts Regulations Section 670.000)

Components	CAS-No.
Benzene	71-43-2
Hydrogen Sulfide	7783-06-4
Sulfur	7704-34-9
N-hexane	110-54-3
Petroleum; Crude oil	8002-05-9

SARA III — US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required

Components	CAS-No.
N-hexane	110-54-3
Benzene	71-43-2

SARA III — US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR355, Appendix A)

Components	CAS-No.
hydrogen sulfide	7783-06-4

PENN RTK — US. Pennsylvania Worker and Community Right-to-Know Law (34 Pa. Code Chap. 301-323)

Components	CAS-No.
Benzene	71-43-2
Hydrogen Sulfide	7783-06-4
Sulfur	7704-34-9
N-hexane	110-54-3
Petroleum; Crude oil	8002-05-9

NJ RTK — US. New Jersey Worker and Community Right-to-Know Act (New Jersey Statute Annotated Section 34:5A-5)

Components	CAS-No.
Benzene	71-43-2
Hydrogen Sulfide	7783-06-4
Sulfur	7704-34-9
N-hexane	110-54-3
Petroleum; Crude oil	8002-05-9

California Prop. 65 : WARNING! This product contains a chemical known to the State of California to cause cancer.

Benzene 71-43-2

WARNING! This product contains a chemical known to the State of California to

cause birth defects or other reproductive harm.

Benzene 71-43-2

SECTION 16. OTHER INFORMATION

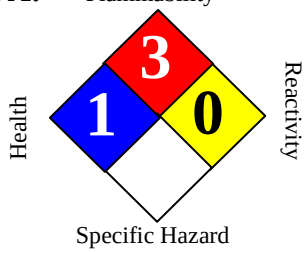
Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Revision Date : 02/02/2013

Safety Data Sheet
Crude Oil, Sweet Heavy

NFPA:



TESORO

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Crude Oil, Sweet Heavy			
Synonyms	:	Sweet Heavy Crude Oil, RS295, 888100005156			
SDS Number	:	888100005156	**Version**	:	1.3
Product Use Description	:	Industrial feedstock			
Company	:	For: Tesoro Refining & Marketing Co. 19100 Ridgewood Parkway Drive, San Antonio, TX 78259			
Tesoro Call Center	:	(877) 783-7676	**Chemtrec (Emergency Contact)**	:	(800) 424-9300

SECTION 2. HAZARDS IDENTIFICATION

Classifications : Flammable Liquid – Category 2 or 3 depending on variable composition.
Aspiration Hazard – Category 1.
Carcinogenicity – Category 2
Specific Target Organ Toxicity (Repeated Exposure) – Category 2
Specific Target Organ Toxicity (Single Exposure) – Category 3
Eye Irritant – Category 2B
Chronic Aquatic Toxicity – Category 2

Pictograms

Signal Word : DANGER

Hazard Statements : Highly flammable liquid and vapor.
May be fatal if swallowed and enters airways – do not siphon gasoline by mouth.
Suspected of causing cancer if repeated over-exposure by inhalation and/or skin contact occurs.
May cause damage to liver, kidneys and nervous system by prolonged and repeated inhalation or skin contact.
Causes eye irritation. Can be absorbed through skin.
Repeated or prolonged skin contact can cause irritation and dermatitis.
May cause drowsiness or dizziness.
Harmful to aquatic life.
May release hydrogen sulfide (H2S) gas, a toxic-by-inhalation material. See

Section 11.

Precautionary statements

Prevention : Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat, sparks, open flames, welding and hot surfaces.
No smoking.
Keep container tightly closed.
Ground and/or bond container and receiving equipment.
Use explosion-proof electrical equipment.
Use only non-sparking tools (if tools are used in flammable atmosphere).
Take precautionary measures against static discharge.
Wear gloves, eye protection and face protection (as needed to prevent skin and eye contact with liquid).
Wash hands or liquid-contacted skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Do not breathe vapors.
Use only outdoors or in a well-ventilated area.

Response In case of fire: Use dry chemical, CO2, water spray or fire-fighting foam to extinguish.
If swallowed: Immediately call a poison center, doctor, hospital emergency room, medical clinic or 911. Do NOT induce vomiting. Rinse mouth.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
If in eye: Rinse cautiously with water for several minutes. Remove contact lenses,
if present and easy to do. Continue rinsing.
If skin or eye irritation persists, get medical attention.
If inhaled: Remove person to fresh air and keep comfortable for breathing.
Get medical attention if you feel unwell.

Storage Store in a well-ventilated place. Keep cool. Store locked up. Keep container tightly closed . Use only approved containers.

Disposal Dispose of contents/containers to approved disposal site in accordance with local, regional, national, and/or international regulations.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Weight %
Petroleum; Crude oil	8002-05-9	100%
Toluene	108-88-3	0 - 7%
N-hexane	110-54-3	0 - 5%
Benzene	71-43-2	0.1 - 3%

SECTION 4. FIRST AID MEASURES

Inhalation : Move to fresh air. Administer oxygen or artificial respiration if needed. Seek medical attention immediately.

Skin contact : Take off all contaminated clothing immediately. Wash off immediately with soap and plenty of water. Seek medical attention if irritation or skin thermal burns occur.

Eye contact : In case of eye contact, immediately flush with low pressure, cool water for at least 15 minutes, opening eyelids to ensure flushing. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. If symptoms persist, seek medical attention immediately.

Ingestion : Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Seek medical attention immediately. If vomiting does occur naturally, keep head below the hips to reduce the risks of aspiration. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, or fire-fighting foam. LARGE FIRES: Water spray, fog or fire-fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers..

Specific hazards during fire fighting : Vapors are heavier than air and may travel long distances to a point of ignition and flash back. Do not allow liquid runoff to enter sewers or public waters. Gas may form explosive mixture with air.

Special protective equipment for fire-fighters : Use NIOSH/MSHA approved positive pressure self-contained breathing apparatus and fully protective clothing such as bunker gear if needed to prevent exposure.

Further information : Isolate area, particularly around ends of storage vessels. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions : Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to contain spill areas.

Environmental precautions : Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors.

Methods for cleaning up : Take up with sand or oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

SECTION 7. HANDLING AND STORAGE

Precautions for safe handling : Handle as a combustible liquid. Keep product and empty containers away from fire, sparks and heated surfaces. Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Conditions for safe storage, including incompatibilities : Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose containers to sources of ignition. Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

List	Components	CAS-No.	Type:	Value
OSHA	Benzene	71-43-2	TWA	1 ppm
		71-43-2	STEL	5 ppm
		71-43-2	OSHA_ACT	0.5 ppm
OSHA Z1	N-hexane	110-54-3	PEL	500 ppm 1,800 mg/m3
	Hydrogen sulfide	7783-06-4	STEL	20 ppm
ACGIH	Toluene	108-88-3	TWA	50 ppm
	N-hexane	110-54-3	TWA	50 ppm
	Benzene	71-43-2	TWA	0.5 ppm
		71-43-2	STEL	2.5 ppm
	Hydrogen Sulfide	7783-06-4	PEL	1 ppm
			STEL	5 ppm

Engineering measures : Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

Eye protection : Ensure that eyewash stations and safety showers are close to the workstation location. Goggles, and face shield or full facepiece pressure-demand supplied air respirator as needed to prevent eye and face contact.

Hand protection : Gloves constructed of nitrile, neoprene, or PVC are recommended. The resistance of specific material may vary from product to product as well as with degree of exposure.

Skin and body protection : Chemical protective clothing such as DuPont TyChem ®, Barricade or equivalent, recommended based on degree of exposure.

Respiratory protection : A NIOSH/ MSHA-approved air-purifying respirator with organic vapor cartridges or

canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection. Use a NIOSH/ MSHA-approved positive-pressure supplied-air respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

Hygiene measures : Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. DO NOT use gasoline, kerosene, solvents, or harsh abrasive skin cleaners to clean skin. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Consider the need to discard contaminated leather shoes and gloves. Use good personal hygiene practices.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Typical is a thick, dark yellow to brown or greenish black liquid
Odor	Petroleum asphalt odor. Hydrogen sulfide (H2S) has a characteristic rotten egg odor with an odor threshold as low as 10 parts per billion or even less. However, this odor should not be used as a warning property because H2S can deaden the sense of smell. H2S concentrations can be measured with an H2S meter or colorimetric indicating tubes.
Odor threshold	Odor threshold varies with the composition of the crude oil
pH	Not applicable
Melting point/freezing point	-30° to 30°C has been reported as a pour point
Initial boiling point & range	Distillation is typically not performed above 300°C at atmospheric pressure
Flash point	-7 to 75°C
Evaporation rate	Higher initially and declines if lighter components evaporate
Flammability (solid, gas)	Flammable gas or vapors released by liquid
Upper explosive limit	Varies with composition but typical is approximately 7%
Lower explosive limit	Varies with composition but typical is approximately 0.7%
Vapor pressure	6 to 45 kPa
Vapor density (air = 1)	No data available
Relative density (water = 1)	0.9 to 1.0 g/mL is typical at 15°C
Solubility (in water)	1 to 2% by weight is maximum reported for soluble components of crude oil
Partition coefficient (n-octanol/water)	2 to > 6 as log Pow
Auto-ignition temperature	Varies with composition
Decomposition temperature	Will evaporate or boil and possibly ignite before decomposition occurs.
Kinematic viscosity	5 to > 1300 mm^2/s at 38°C

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	Vapors may form explosive mixture with air. Hazardous polymerization does not occur.
Chemical stability		Stable under normal conditions.
Possibility of hazardous reactions		Can react with strong oxidizing agents, peroxides, acids and alkalies.
Conditions to avoid		Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Avoid static charge accumulation and discharge (see Section 7).
Hazardous decomposition products		Ignition and burning can release carbon monoxide, carbon dioxide, non-combusted hydrocarbons (smoke) and sulfur dioxide.

SECTION 11. TOXICOLOGICAL INFORMATION

Inhalation	:	May cause respiratory tract irritation. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death. Irritating and toxic hydrogen sulfide gas may be present. Greater than 15 - 20 ppm continuous exposure can cause mucous membrane and respiratory tract irritation. 50 - 500 ppm can cause headache, nausea, and dizziness. Continued exposure at these levels can lead to loss of reasoning and balance, difficulty in breathing, fluid in the lungs, and possible loss of consciousness. Greater than 500 ppm can cause rapid unconsciousness due to respiratory paralysis and death by suffocation unless the victim is removed from exposure and successfully resuscitated. Greater than 1000 ppm can cause immediate unconsciousness and death if not promptly revived. After-effects from overexposure are not anticipated except what would be expected if the victim was without oxygen for more than 3 to 5 minutes (asphyxiation). The "rotten egg" odor of hydrogen sulfide is not a reliable indicator for warning of exposure, since olfactory fatigue (loss of smell) readily occurs, especially at concentrations above 50 ppm. At high concentrations, the victim may not even recognize the odor before becoming unconscious.
Ingestion		Aspiration hazard if liquid is inhaled into lungs, particularly from vomiting after ingestion. Aspiration may result in chemical pneumonia, severe lung damage, respiratory failure and even death. Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest and death may occur.
Skin irritation		Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed. Rare, precancerous warts on the forearms, backs of hands and scrotum have been reported from prolonged or repeated skin contact.
Eye irritation		Irritating to eyes.
Chronic exposure		This material contains polynuclear aromatic hydrocarbons (PNAs), some of which are animal carcinogens. Similar products produced skin cancer and systemic toxicity in laboratory animals following repeated applications. The significance of these results to human exposures has not been determined - see Section 11 Toxicological Information. Contains benzene, which can cause blood disease, including anemia and leukemia. Suspect reproductive hazard - contains material which may injure unborn child.

Target organs Skin, Eyes, Central nervous system, Respiratory system, Kidney, Liver

Component

Petroleum; Crude oil	8002-05-9	Acute oral toxicity: LD50 rat Dose: 5,001 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Skin irritation: Result: Mild skin irritation Eye irritation: Result: Mild eye irritation Carcinogenicity: N11.00418605
Toluene	108-88-3	Acute oral toxicity: LD50 rat Dose: 636 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 12,124 mg/kg Acute inhalation toxicity: LC50 rat Dose: 49 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Prolonged skin contact may defat the skin and produce dermatitis. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Xylene	1330-20-7	Acute oral toxicity: LD50 rat Dose: 2,840 mg/kg Acute dermal toxicity: LD50 rabbit Dose: ca. 4,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 6,350 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Naphthalene	91-20-3	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute dermal toxicity: LD50 rat Dose: 2,501 mg/kg Acute inhalation toxicity: LC50 rat Dose: 101 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Carcinogenicity: N11.00422130
Benzene	71-43-2	Acute oral toxicity: LD50 rat Dose: 930 mg/kg Acute inhalation toxicity: LC50 rat Dose: 44 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes.

Pentane	109-66-0	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 364 mg/l Exposure time: 4 h Skin irritation: Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Cyclohexane	110-82-7	Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 14 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Ethylbenzene	100-41-4	Acute oral toxicity: LD50 rat Dose: 3,500 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 15,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 18 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes
Heptane [and isomers]	142-82-5	Acute oral toxicity: LD50 rat Dose: 15,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 103 g/m3 Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
N-hexane	110-54-3	Acute oral toxicity: LD50 rat Dose: 25,000 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 171.6 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Teratogenicity: N11.00418960

Carcinogenicity :

NTP	Naphthalene (CAS-No.: 91-20-3) Benzene (CAS-No.: 71-43-2)
IARC	Gasoline, natural; Low boiling point naphtha (CAS-No.: 8006-61-9) Naphthalene (CAS-No.: 91-20-3) Benzene (CAS-No.: 71-43-2) Ethylbenzene (CAS-No.: 100-41-4)
OSHA	Benzene (CAS-No.: 71-43-2)
CA Prop 65	WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Toluene (CAS-No.: 108-88-3) Benzene (CAS-No.: 71-43-2)

SECTION 12. ECOLOGICAL INFORMATION

Additional ecological information : Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State regulations.

Component:

Toluene	108-88-3	Toxicity to fish: LC50 Species: Carassius auratus (goldfish) Dose: 13 mg/l Exposure time: 96 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 11.5 mg/l Exposure time: 48 h Toxicity to algae: IC50 Species: Selenastrum capricornutum (green algae) Dose: 12 mg/l Exposure time: 72 h
N-hexane	110-54-3	Toxicity to fish: LC50 Species: Pimephales promelas (fathead minnow) Dose: 2.5 mg/l Exposure time: 96 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 2.1 mg/l Exposure time: 48 h

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal : Consult federal, state and local waste regulations to determine appropriate waste characterization of material and allowable disposal methods.

SECTION 14. TRANSPORT INFORMATION

CFR

Proper shipping name	:	PETROLEUM CRUDE OIL
UN-No.	:	1267
Class	:	3
Packing group	:	III

TDG

Proper shipping name	:	PETROLEUM CRUDE OIL
UN-No.	:	UN1267
Class	:	3
Packing group	:	III

IATA Cargo Transport

UN UN-No.	:	UN1267
Description of the goods	:	PETROLEUM CRUDE OIL
Class	:	3
Packaging group	:	I1I
ICAO-Labels	:	3
Packing instruction (cargo aircraft)	:	366
Packing instruction (cargo aircraft)	:	Y344

IATA Passenger Transport

UN UN-No.	:	UN1267
Description of the goods	:	PETROLEUM CRUDE OIL
Class	:	3
Packaging group	:	III
ICAO-Labels	:	3
Packing instruction (passenger aircraft)	:	355
Packing instruction (passenger aircraft)	:	Y344

IMDG-Code

UN-No.	:	UN 1267
Description of the goods	:	PETROLEUM CRUDE OIL
Class	:	3
Packaging group	:	III
IMDG-Labels	:	3
EmS Number	:	F-E S-E
Marine pollutant	:	No

SECTION 15. REGULATORY INFORMATION

TSCA Status	:	On TSCA Inventory
DSL Status	:	All components of this product are on the Canadian DSL list.
SARA 311/312 Hazards	:	Fire Hazard Acute Health Hazard Chronic Health Hazard

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIROMENT)
The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil. Fractions of crude oil, and products (both finished and intermediate) from the crude oil refining process and any indigenous components of such from the CERCLA Section 103 reporting requirements. However, other federal reporting requirements, including SARA Section 304, as well as the Clean Water Act may still apply**.**

CERCLA Reportable Quantity : 111 lbs

MASS RTK — US. Massachusetts Commonwealth's Right-to-Know Law (Appendix A to 105 Code of Massachusetts Regulations Section 670.000)

Components	CAS-No.
Petroleum; Crude oil	8002-05-9
Toluene	108-88-3
N-hexane	110-54-3
Benzene	71-43-2

SARA III — US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required

Components	CAS-No.
Toluene	108-88-3
N-hexane	110-54-3
Benzene	71-43-2

SARA III — US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR355, Appendix A)

Components	CAS-No.

PENN RTK — US. Pennsylvania Worker and Community Right-to-Know Law (34 Pa. Code Chap. 301-323)

Components	CAS-No.
Petroleum; Crude oil	8002-05-9
Toluene	108-88-3
N-hexane	110-54-3
Benzene	71-43-2

NJ RTK — US. New Jersey Worker and Community Right-to-Know Act (New Jersey Statute Annotated Section 34:5A-5)

Components	CAS-No.
Petroleum; Crude oil	8002-05-9
Toluene	108-88-3
N-hexane	110-54-3
Benzene	71-43-2

California Prop. 65 : WARNING! This product contains a chemical known to the State of California to cause cancer.

benzene 71-43-2

WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

Toluene	108-88-3
Benzene	71-43-2

SECTION 16. OTHER INFORMATION

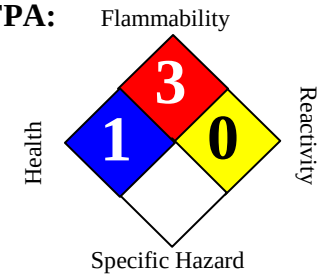
Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Revision Date : 02/02/2013

Safety Data Sheet
Crude oil, light sweet

NFPA:



TESORO

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Crude oil, light sweet			
Synonyms	:	Petroleum Crude Oil, Crude Sweet, 888100005188			
SDS Number	:	888100005188	**Version**	:	1.3
Product Use Description	:	Industrial feedstock			
Company	:	For: Tesoro Refining & Marketing Co. 19100 Ridgewood Parkway, San Antonio, TX 78259			
Tesoro Call Center	:	(877) 783-7676	**Chemtrec (Emergency Contact)**	:	(800) 424-9300

SECTION 2. HAZARDS IDENTIFICATION

Classifications : Flammable Liquid – Category 2 or 3 depending on variable composition.
Aspiration Hazard – Category 1.
Carcinogenicity – Category 2
Specific Target Organ Toxicity (Repeated Exposure) – Category 2
Specific Target Organ Toxicity (Single Exposure) – Category 3
Eye Irritant – Category 2B
Chronic Aquatic Toxicity – Category 2

Pictograms

Signal Word : DANGER

Hazard Statements : Highly flammable liquid and vapor.
May be fatal if swallowed and enters airways – do not siphon gasoline by mouth.
Suspected of causing cancer if repeated over-exposure by inhalation and/or skin contact occurs.
May cause damage to liver, kidneys and nervous system by prolonged and repeated inhalation or skin contact.
Causes eye irritation. Can be absorbed through skin.
Repeated or prolonged skin contact can cause irritation and dermatitis.
May cause drowsiness or dizziness.
Harmful to aquatic life.
May release hydrogen sulfide (H2S) gas, a toxic-by-inhalation material. See

Section 11.

Precautionary statements

Prevention

Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat, sparks, open flames, welding and hot surfaces.
No smoking.
Keep container tightly closed.
Ground and/or bond container and receiving equipment.
Use explosion-proof electrical equipment.
Use only non-sparking tools (if tools are used in flammable atmosphere).
Take precautionary measures against static discharge.
Wear gloves, eye protection and face protection (as needed to prevent skin and eye contact with liquid).
Wash hands or liquid-contacted skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Do not breathe vapors.
Use only outdoors or in a well-ventilated area.

Response

In case of fire: Use dry chemical, CO2, water spray or fire-fighting foam to extinguish.
If swallowed: Immediately call a poison center, doctor, hospital emergency room, medical clinic or 911. Do NOT induce vomiting. Rinse mouth.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
If in eye: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If skin or eye irritation persists, get medical attention.
If inhaled: Remove person to fresh air and keep comfortable for breathing.
Get medical attention if you feel unwell.

Storage

Store in a well-ventilated place. Keep cool. Store locked up. Keep container tightly closed . Use only approved containers.

Disposal

Dispose of contents/containers to approved disposal site in accordance with local, regional, national, and/or international regulations

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Weight %
Petroleum; Crude oil	8002-05-9	80 - 85%
Benzene	71-43-2	5 - 7%
Toluene	108-88-3	5 - 7%
Ethylbenzene	100-41-4	5 - 7%

Xylene	1330-20-7	5 - 7%
Hydrogen Sulfide	7783-06-4	< 0.5%

SECTION 4. FIRST AID MEASURES

Inhalation : Move to fresh air. If not breathing, give artificial respiration. Administer oxygen or artificial respiration if needed. Seek medical attention immediately.

Skin contact : Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Seek medical advice if symptoms persist or develop. Seek medical attention if irritation or skin thermal burns occur.

Eye contact : In case of eye contact, immediately flush with low pressure, cool water for at least 15 minutes, opening eyelids to ensure flushing. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Seek medical advice if symptoms persist or develop.

Ingestion : Do NOT induce vomiting. Do not give liquids. Seek medical attention immediately. If vomiting does occur naturally, keep head below the hips to reduce the risks of aspiration. Monitor for breathing difficulties. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, fire-fighting foam. LARGE FIRES: Water spray, fog or fire-fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Specific hazards during fire fighting : Above the flash point, explosive vapor-air mixtures may be formed. Vapors can flow along surfaces to distant ignition source and flash back. Dangerous fire and explosion hazard when exposed to heat, sparks or flame. Do not allow liquid runoff to enter sewers or public waters.

Special protective equipment for fire-fighters : Firefighters should wear self-contained breathing apparatus and full protective clothing as need for protection from heat and airborne combustion products. Withdraw immediately from the area if there is a rising sound from a venting safety device or discoloration of vessels, tanks, or pipelines.

Further information : Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions : Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to contain spill areas.

Environmental precautions : Carefully contain and stop the source of the spill, if safe to do so. Do not flush down sewer or drainage systems, unless system is designed and permitted to

handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. WASTE DISPOSAL METHOD: Dispose of in accordance with Local, State, and Federal Regulations.

Methods for cleaning up : Take up with sand or oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

Additional advice : Inform the responsible authorities in case of leakage, or of entry into waterways, soil or drains.

SECTION 7. HANDLING AND STORAGE

Precautions for safe handling : Handle as a combustible liquid. Keep product and empty containers away from fire, sparks and heated surfaces. Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Conditions for safe storage, including incompatibilities : Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose containers to sources of ignition. Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks". The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks". Hydrogen sulfide may accumulate in tanks and bulk transport compartments. Consider appropriate respiratory protection (see Section 8). Stand upwind. Avoid vapors when opening hatches and dome covers. Confined spaces should be ventilated and gas tested prior to entry.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

List	Components	CAS-No.	Type:	Value
OSHA	Benzene	71-43-2	TWA	1 ppm
		71-43-2	STEL	5 ppm
		71-43-2	OSHA_ACT	0.5 ppm
OSHA Z1	Ethylbenzene	100-41-4	PEL	100 ppm 435 mg/m3
	Xylene	1330-20-7	PEL	100 ppm 435 mg/m3
	Hydrogen sulfide	7783-06-4	STEL	20 ppm
ACGIH	Benzene	71-43-2	TWA	0.5 ppm
		71-43-2	STEL	2.5 ppm
	Toluene	108-88-3	TWA	50 ppm

	Ethylbenzene	100-41-4	TWA	100 ppm
		100-41-4	STEL	125 ppm
	Xylene	1330-20-7	TWA	100 ppm
		1330-20-7	STEL	150 ppm
	Hydrogen Sulfide	7783-06-4	TWA	1 ppm
		7783-06-4	STEL	5 ppm

Engineering measures : Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

Eye protection : Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

Hand protection : Gloves constructed of nitrile, neoprene, or PVC are recommended.

Skin and body protection : Chemical protective clothing such as DuPont Tyvek QC, TyChem® or equivalent, recommended based on degree of exposure. The resistance of specific material may vary from product to product as well as with degree of exposure.

Respiratory protection : If hydrogen sulfide concentration may exceed permissible exposure limit, a positive-pressure SCBA or Type C supplied air respirator with escape bottle is required as respiratory protection. If hydrogen sulfide concentration is below H2S permissible exposure limit a NIOSH/ MSHA-approved air-purifying respirator with acid gas cartridges may be acceptable for odor control, but continuous air monitoring for H2S is recommended. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection. Use a NIOSH/ MSHA-approved positive-pressure supplied-air respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

Hygiene measures : Emergency eye wash capability should be available in the vicinity of any potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. DO NOT use gasoline, kerosene, solvents, or harsh abrasive skin cleaners to clean skin. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Consider the need to discard contaminated leather shoes and gloves. Consider disposal of contaminated clothing rather than laundering to prevent the formation of flammable vapors which could ignite via washer or dryer.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : Typical is a thick, dark yellow to brown or greenish black liquid

Odor Petroleum asphalt odor. Hydrogen sulfide (H2S) has a characteristic rotten egg odor with an odor threshold as low as 10 parts per billion or even less. However, this odor should not be used as a warning property because H2S can deaden the sense of smell. H2S concentrations can be measured with an H2S meter or colorimetric indicating tubes.

Odor threshold Odor threshold varies with the composition of the crude oil

pH Not applicable

Melting point/freezing point	-30° to 30°C has been reported as a pour point
Initial boiling point & range	Distillation is typically not performed above 300°C at atmospheric pressure
Flash point	-7 to 75°C
Evaporation rate:	Higher initially and declines if lighter components evaporate
Flammability (solid, gas)	Flammable gas or vapors released by liquid
Upper explosive limit	Varies with composition but typical is approximately 7%
Lower explosive limit	Varies with composition but typical is approximately 0.7%
Vapor pressure	6 to 45 kPa
Vapor density (air = 1)	No data available
Relative density (water = 1)	0.8 to 1.0 g/mL is typical at 15°C
Solubility (in water)	1 to 2% by weight is maximum reported for soluble components of crude oil
Partition coefficient (n-octanol/water)	2 to > 6 as log Pow
Auto-ignition temperature	Varies with composition
Decomposition temperature	Will evaporate or boil and possibly ignite before decomposition occurs.
Kinematic viscosity	5 to > 1300 mm^2/s at 38°C

SECTION 10. STABILITY AND REACTIVITY

Reactivity	Vapors may form explosive mixture with air. Hazardous polymerization does not occur.
Chemical stability	Stable under normal conditions.
Possibility of hazardous reactions	Can react with strong oxidizing agents, peroxides, acids and alkalies.
Conditions to avoid	Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Avoid static charge accumulation and discharge (see Section 7).
Hazardous decomposition products	Ignition and burning can release carbon monoxide, carbon dioxide, non-combusted hydrocarbons (smoke) and sulfur dioxide.

SECTION 11. TOXICOLOGICAL INFORMATION

Inhalation	May cause respiratory tract irritation. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death. Irritating and toxic hydrogen sulfide gas may be present. Greater than 15 - 20 ppm continuous exposure can cause mucous membrane and respiratory tract irritation. 50 - 500 ppm can cause headache, nausea, and dizziness. Continued exposure at these levels can lead to loss of

reasoning and balance, difficulty in breathing, fluid in the lungs, and possible loss of consciousness. Greater than 500 ppm can cause rapid unconsciousness due to respiratory paralysis and death by suffocation unless the victim is removed from exposure and successfully resuscitated. Greater than 1000 ppm can cause immediate unconsciousness and death if not promptly revived. After-effects from overexposure are not anticipated except what would be expected if the victim was without oxygen for more than 3 to 5 minutes (asphyxiation). The "rotten egg" odor of hydrogen sulfide is not a reliable indicator for warning of exposure, since olfactory fatigue (loss of smell) readily occurs, especially at concentrations above 50 ppm. At high concentrations, the victim may not even recognize the odor before becoming unconscious.

Ingestion

Aspiration hazard if liquid is inhaled into lungs, particularly from vomiting after ingestion. Aspiration may result in chemical pneumonia, severe lung damage, respiratory failure and even death. Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest and death may occur.

Skin irritation

Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed. Rare, precancerous warts on the forearms, backs of hands and scrotum have been reported from prolonged or repeated skin contact.

Eye irritation

Irritating to eyes.

Chronic exposure

This material contains polynuclear aromatic hydrocarbons (PNAs), some of which are animal carcinogens. Similar products produced skin cancer and systemic toxicity in laboratory animals following repeated applications. The significance of these results to human exposures has not been determined - see Section 11 Toxicological Information. Contains benzene, which can cause blood disease, including anemia and leukemia. Suspect reproductive hazard - contains material which may injure unborn child.

Target organs

Skin, Eyes, Central nervous system, Respiratory system, Kidney, Liver

Component :

Petroleum; Crude oil	8002-05-9	Acute oral toxicity: LD50 rat Dose: 5,001 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Skin irritation: Result: Mild skin irritation Eye irritation: Result: Mild eye irritation Carcinogenicity: N11.00418605
Toluene	108-88-3	Acute oral toxicity: LD50 rat Dose: 636 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 12,124 mg/kg Acute inhalation toxicity: LC50 rat Dose: 49 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation

		Prolonged skin contact may defat the skin and produce dermatitis. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Xylene	1330-20-7	Acute oral toxicity: LD50 rat Dose: 2,840 mg/kg Acute dermal toxicity: LD50 rabbit Dose: ca. 4,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 6,350 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Naphthalene	91-20-3	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute dermal toxicity: LD50 rat Dose: 2,501 mg/kg Acute inhalation toxicity: LC50 rat Dose: 101 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Carcinogenicity: N11.00422130
Benzene	71-43-2	Acute oral toxicity: LD50 rat Dose: 930 mg/kg Acute inhalation toxicity: LC50 rat Dose: 44 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes.
Pentane	109-66-0	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 364 mg/l Exposure time: 4 h Skin irritation: Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation

Cyclohexane	110-82-7	Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 14 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Ethylbenzene	100-41-4	Acute oral toxicity: LD50 rat Dose: 3,500 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 15,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 18 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes.
Heptane [and isomers]	142-82-5	Acute oral toxicity: LD50 rat Dose: 15,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 103 g/m3 Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
N-hexane	110-54-3	Acute oral toxicity: LD50 rat Dose: 25,000 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 171.6 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Teratogenicity: N11.00418960

Carcinogenicity

NTP	Naphthalene (CAS-No.: 91-20-3) Benzene (CAS-No.: 71-43-2)
IARC	Gasoline, natural; Low boiling point naphtha (CAS-No.: 8006-61-9) Naphthalene (CAS-No.: 91-20-3) Benzene (CAS-No.: 71-43-2) Ethylbenzene (CAS-No.: 100-41-4)
OSHA	Benzene (CAS-No.: 71-43-2)
CA Prop 65	WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Toluene (CAS-No.: 108-88-3) Benzene (CAS-No.: 71-43-2)

SECTION 12. ECOLOGICAL INFORMATION

Additional ecological information : Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State regulations.

Component:

Toluene	108-88-3	Toxicity to fish: LC50 Species: Carassius auratus (goldfish) Dose: 13 mg/l Exposure time: 96 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 11.5 mg/l Exposure time: 48 h Toxicity to algae: IC50 Species: Selenastrum capricornutum (green algae) Dose: 12 mg/l Exposure time: 72 h

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal : Consult federal, state and local waste regulations to determine appropriate waste characterization of material and allowable disposal methods.

SECTION 14. TRANSPORT INFORMATION

CFR

Proper shipping name	: PETROLEUM CRUDE OIL
UN-No.	: 1267
Class	: 3
Packing group	: II

TDG

Proper shipping name	:	PETROLEUM CRUDE OIL
UN-No.	:	UN1267
Class	:	3
Packing group	:	II

IATA Cargo Transport

UN UN-No.	:	UN1267
Description of the goods	:	PETROLEUM CRUDE OIL
Class	:	3
Packaging group	:	II
ICAO-Labels	:	3
Packing instruction (cargo aircraft)	:	364
Packing instruction (cargo aircraft)	:	Y341

IATA Passenger Transport

UN UN-No.	:	UN1267
Description of the goods	:	PETROLEUM CRUDE OIL
Class	:	3
Packaging group	:	II
ICAO-Labels	:	3
Packing instruction (passenger aircraft)	:	353
Packing instruction (passenger aircraft)	:	Y341

IMDG-Code

UN-No.	:	UN 1267
Description of the goods	:	PETROLEUM CRUDE OIL
Class	:	3
Packaging group	:	II
IMDG-Labels	:	3
EmS Number	:	F-E S-E
Marine pollutant	:	No

SECTION 15. REGULATORY INFORMATION

TSCA Status	:	On TSCA Inventory
DSL Status	:	All components of this product are on the Canadian DSL list.
SARA 311/312 Hazards	:	Acute Health Hazard Chronic Health Hazard

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIROMENT)

The CERCLA definition of hazardous substances contains a “petroleum exclusion” clause which exempts crude oil. Fractions of crude oil, and products (both finished and intermediate) from the crude oil refining process and any indigenous components of such from the CERCLA Section 103 reporting requirements. However, other federal reporting requirements, including SARA Section 304, as well as the Clean Water Act may still apply.

CERCLA Reportable Quantity : 118 lbs

SARA III US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required

Components	CAS-No.
Xylene	1330-20-7
Ethylbenzene	100-41-4
Toluene	108-88-3
Benzene	71-43-2

SARA III US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR355, Appendix A)

Components	CAS-No.

PENN RTK US. Pennsylvania Worker and Community Right-to-Know Law (34 Pa. Code Chap. 301-323)

Components	CAS-No.
Benzene	71-43-2
Toluene	108-88-3
Ethylbenzene	100-41-4
Xylene	1330-20-7
Petroleum; Crude oil	8002-05-9

MASS RTK US. Massachusetts Commonwealth's Right-to-Know Law (Appendix A to 105 Code of Massachusetts Regulations Section 670.000)

Components	CAS-No.
Benzene	71-43-2
Toluene	108-88-3
Ethylbenzene	100-41-4
Xylene	1330-20-7
Petroleum; Crude oil	8002-05-9

NJ RTK US. New Jersey Worker and Community Right-to-Know Act (New Jersey Statute Annotated Section 34:5A-5)

Components	CAS-No.
Benzene	71-43-2
Toluene	108-88-3
Ethylbenzene	100-41-4
Xylene	1330-20-7
Petroleum; Crude oil	8002-05-9

California Prop. 65 : WARNING! This product contains a chemical known in the State of California to cause cancer.

Ethylbenzene 100-41-4

Benzene	71-43-2

WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

Toluene	108-88-3
Benzene	71-43-2

SECTION 16. OTHER INFORMATION

Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Revision Date : 02/02/2013

SIEMENS

Water Technologies

Material Safety Data Sheet

SECTION 1 – CHEMICAL PRODUCT AND COMPANY INFORMATION

Product Type: Activated Carbon
Product Names: AquaCarb ® Series (except the NoRise family), VOCarb ® Series (except the 410 family and the HgFree family), AC Series, VC Series, BevCarb ® Series, and UltraCarb ® Series

Manufacturer's Name: Siemens Water Technologies Corp.
Address: 14250 Gannet Street, La Mirada, CA 90638
Product/Technical Information Phone Number: (714) 228 - 8800
Medical/Handling Emergency Phone Number: CHEMTREC (800) 424–9300
24 hours / day everyday
Transportation Emergency Phone Number: CHEMTREC (800) 424-9300
24 hours / day everyday
Issue Date/Revision Number: 18 March 2010 / Rev 3

SECTION 2– COMPOSITION INFORMATION

Chemical Name	Percent by Weight	CAS#
Activated Carbon	100	7440-44-0

SECTION 3– HAZARDS IDENTIFICATION

Appearance & Odor: black particles without taste or odor

Emergency Overview:
Activated carbon particles on the floor make the floor slippery. Particles may irritate the eyes and cause mechanical injury.
Warning: Wet activated carbon depletes oxygen from the air and therefore dangerously low levels of oxygen may be encountered in enclosed spaces. Whenever workers enter a vessel containing activated carbon, the vessel's oxygen content should be determined and work procedures for potentially low oxygen areas should be followed.

Fire & Explosion Hazards: The adsorption of organic compounds onto activated carbon generates heat. In rare instances, adsorbed compounds may also react on the carbon surface to generate additional heat. If these heat sources are not properly dissipated, particularly in vapor-phase carbon applications, the carbon bed temperature may rise to the point where the carbon can ignite, leading to a fire or other hazardous condition.

Primary Route(s) of Exposure: Eye contact, skin contact, and inhalation.

Inhalation – Acute Effects: May be irritating to the respiratory tract and cause coughing or sneezing.

Skin Contact – Acute Effects: May cause slight skin irritation.

Eye Contact – Acute Effects: May irritate eyes or cause mechanical injury.

Ingestion – Acute Effects: May irritate the gastrointestinal tract.

SECTION 4– FIRST AID MEASURES

Inhalation First Aid: Remove affected person to fresh air. Give artificial respiration ONLY if breathing has stopped and give CPR ONLY if there is no breathing and no pulse. Obtain medical attention immediately.

Skin Contact First Aid: Wash skin for 5 minutes with flowing water and soap. Clothing should be washed before reuse. Obtain medical assistance if irritation develops.

Eye Contact First Aid: Immediately irrigate eyes with flowing water continuously for 15 minutes while holding eyelids open. Contacts should be removed before or during flushing. Get medical assistance if irritation develops.

Ingestion First Aid: Do not induce vomiting. Obtain medical attention immediately.

Medical Conditions Aggravated: Respiratory ailments may be aggravated by exposure to dusts of this material.

Note to Physician: No specific antidote. Treat symptomatically.

SECTION 5– FIRE FIGHTING MEASURES

Flash Point/Method: Nonflammable **Auto Ignition Temperature**: 840℃ (1,710℉)

Upper/Lower Explosion Limits: Not applicable.

Extinguishing Media: Water spray, carbon dioxide, foam or dry chemical

Fire Fighting Procedures: In the event of a fire, wear full protective clothing and NIOSH approved self-contained breathing apparatus with full face piece, operated in positive pressure mode.

Unusual Fire & Explosion Hazards: Avoid producing suspensions of dust during handling and avoid exposure of suspensions to sources of ignition. Suspensions of – 40 mesh particles may explode if exposed to strong ignition sources.

Hazardous Products of Decomposition and/or Combustion: Carbon oxides.

NFPA Ratings:

HEALTH- 1 FLAMMABILITY- 0 REACTIVITY- 0

SECTION 6– ACCIDENTAL RELEASE MEASURES

Spill/Leak Procedures: Clean up spills in a manner that does not disperse dust into the air.

Cleanup: Handle in accordance with good industrial hygiene and safety practices. These practices include avoiding unnecessary exposure and removal of a material from eyes, skin, and clothing.

Regulatory Requirements: Spent (used) carbon should be disposed of in accordance with applicable laws. All disposal methods must be in compliance with all Federal, State, Local and Provincial laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator.

Disposal: Dispose of virgin (unused) carbon (waste or spillage) in a facility permitted for non-hazardous wastes. Spent (used) carbon should be disposed of in accordance with applicable laws. Do not reuse empty bags. Dispose of in facility permitted for non-hazardous wastes. DO NOT DUMP INTO ANY SEWERS, ON THE GROUND OR INTO ANY BODY OF WATER. All disposal methods must be in compliance with all Federal, State, Local and Provincial laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator.

SECTION 7– HANDLING AND STORAGE

Handling: Avoid dispersion into air. Keep containers dry and closed. Follow good handling and housekeeping practices to minimize spills, generation of airborne dusts, and accumulation of dusts on exposed surfaces. Use with adequate exhaust ventilation to draw dust away from workers' breathing zones. Prevent or minimize exposures to dusts by using appropriate respirators, gloves and eye protection. Wash exposed skin areas thoroughly with soap and water. Use caution when pouring, using pneumatic transport, swirling, etc. as this material can become electrostatically charged and present a dust explosion hazard.

Storage: Avoid spilling material so as to avoid creating a dust suspension. Store at ambient atmospheric conditions. Product should be stored in a closed dry container. Maintain good housekeeping procedures. Store away from strong oxidizers such as ozone, liquid oxygen, chlorine, permanganate, etc.

Empty Containers: Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

SECTION 8–PERSONAL PROTECTION/ EXPOSURE CONTROL

Respiratory Protection: If use conditions generate dust levels above the TLV / PEL, wear a NIOSH-approved particulate respirator or a NIOSH-approved cartridge respirator fitted with dust filters.

Skin Protection: Wear appropriate dust resistant clothing and gloves.

Eye Protection: Safety glasses with side shields. If eye contact or dusty conditions are likely, wear dust tight goggles.

Ventilation Protection: Provide ventilation if necessary to minimize exposure. General ventilation is usually acceptable, but local mechanical exhaust ventilation is preferred at sources of air contamination such as open process equipment.

Other Protection: Safety showers, with quick opening valves which stay open, and eye wash fountains, or other means of washing the eyes with a gentle flow of cool to tepid tap water,

should be readily available in all areas where this material is handled or stored. Water should be supplied through insulated and heat-traced lines to prevent freeze-ups in cold weather.

Exposure Limits:
Exposure limits have not been established for this material. However, the following are widely accepted limits for exposure to otherwise nontoxic particulates:

	OSHAPEL, 8 hr TWA mg/m^3	ACGIH TLV, 8 hr TWA mg/m^3
Particulates Not Otherwise Regulated (PNOR)	15 (total) 5 (respirable)	- - - - - -
Particulates Not Otherwise Classified (PNOC)	- - - - - -	10 (inhalable) 3 (respirable)

SECTION 9– PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point: Not applicable **Melting Point**: Not applicable

Specific Gravity: 1.8 – 2.1 **Solubility in Water**: Insoluble

Volatile Percentage: Nil **pH**: Not determined

SECTION 10– STABILITY AND REACTIVITY

Stability: This product is considered stable under the specified conditions of storage, shipment and use.

Incompatibilities: Contact with strong oxidizers such as ozone, liquid oxygen, chlorine, permanganate, etc. may result in rapid combustion. Avoid contact with strong acids.

Hazardous Polymerization: Will not occur.

Hazardous Decomposition Products: Hazardous decomposition will produce carbon oxides.

Conditions to Avoid: Store away from strong oxidizers such as ozone, liquid oxygen, chlorine, permanganate, etc. Moist air will reduce the operating life.

SECTION 11 – TOXICOLOGICAL INFORMATION

Inhalation – Acute: Inhalation of carbon dust is mildly irritating to the lungs and can immediately give rise to an increased mucociliary transport and airway resistance mediated by the vagus.

Inhalation LC50 (Rat)> 64.4 mg / l.

Inhalation – Chronic: There are no known chronic inhalation effects.

Skin Contact – Acute: Skin contact is expected to be slightly irritating. The primary skin irritation index (rabbit) is 0.

Skin Contact – Chronic: There are no known chronic dermal effects.

Eye Contact – Acute: Eye contact can cause conjunctivitis, epithelial hyperplasia of the cornea, as well as eczematous inflammation of the eyelids.

Ingestion – Acute: Activated carbon is practically nontoxic. The probable oral lethal dose (human) is greater than 1 5g/kg; more than one quart (2.2 lbs) for a 150 lb person.

Ingestion – Chronic: There are no known chronic ingestion effects.

Carcinogen icity/Mutagenicity: There are no known carcinogenic/mutagenic effects.

Reproductive Effects: There are no known reproductive effects.

Neurotoxicity: There are no known neurotoxic effects.

Other Effects: No other effects of carbon are known.

Target Organs: Target organs include the respiratory system and the cardiovascular system.

SECTION 12– ECOLOGICAL INFORMATION

The material, in its original state, is not harmful to the environment.

SECTION 13– DISPOSAL CONSIDERATIONS

Spill/Leak Procedures: Clean spills in a manner that does not disperse dust into the air, preferably a wet-down procedure or vacuum.

Cleanup: If material is not contaminated, spilled media can be re-bagged. Material that cannot be used or chemically reprocessed and empty containers should be disposed of in accordance with all applicable regulations. Product containers should be thoroughly emptied before disposal.

Regulatory Requirements: Generators of waste material are required to evaluate all waste for compliance with RCRA and any local disposal procedures and regulations. NOTE: State and local regulations may be more stringent than federal regulations.

Disposal: Material that cannot be used or chemically reprocessed and empty containers should be disposed of in accordance with all applicable regulations. Product containers should be thoroughly emptied before disposal. Warning: Wet activated carbon depletes oxygen from the air and therefore dangerously low levels of oxygen may be encountered. Whenever workers enter a vessel containing activated carbon, the vessel's oxygen content should be determined and work procedures for potentially low oxygen areas should be followed.

SECTION 14– TRANSPORTATION INFORMATION

Domestic Transportation: This material is not a hazardous material for domestic transportation purposes.

International Transportation: This material is not a dangerous good for international transportation purposes.

SECTION 15– REGULATORY INFORMATION

OSHA Hazard Communication Standard: Irritant
CERCLA Section 103: No RQ: None
SARA Section 302: No SARA Section 304: No SARA Section 313: No SARA Hazard Categories, Sections 311/312:

- Acute: Yes
- Chronic: No
- Fire: No
- Reactive: No
- Sudden Pressure Release: No

OSHA Process Safety Standard: No
California Proposition 65: Not listed
TSCA: The ingredients of this product are on the TSCA Inventory List.

SECTION 16–OTHER INFORMATION

Disclaimer: The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the user thereof. It is the buyer's responsibility to ensure that its activities comply with federal, state, provincial and local laws.

Revision Indicator: 18 March 2010, Revised Section 15

Material Safety Data Sheet

1. CHEMICAL PRODUCT AND COMPANY INFORMATION

Chemical Product Name	Sodium Chloride (Salt), Compressed
Chemical Family	Alkali Metal/Halide
Chemical Name	Sodium Chloride
Formula	NaCl
Molecular Weight	58.44
Commercial Name	Diamond Crystal® Bright & Soft™ Salt Pellets

Manufacturer
Cargill Incorporated
Salt Division
P. O. Box 5621
Minneapolis, MN 55440
(800) 377-1017

Emergency Telephone Numbers
CHEMTREC (800) 424-9300

2. COMPOSITION/INFORMATION ON INGREDIENTS

Description
Compressed white pellets.

Ingredient Name / **CAS Number**	**Exposure Limits**	**Concentration (%)**
Sodium Chloride 7647-14-5		99.97%
Sodium Hexametaphosphate 10124-56-8		0.03%

3. HAZARDS INDENTIFICATION

EMERGENCY OVERVIEW

HMIS Health: 1, Flammability: 0, Reactivity: 0, Protective Equipment: A

Potential Health Effects

Route(s) Of Entry: Ingestion, skin/eye contact, inhalation.

Human Effects and Symptoms of Overexposure:

Acute Inhalation: Irritation of the respiratory tract.

Chronic Inhalation: No applicable information found for chronic systemic effects

Acute Skin Contact: Large amounts can cause irritation and if applied to damaged skin, absorption can occur with effects similar to those via ingestion.

Chronic Skin Contact: No applicable information found for chronic systemic effects.

Acute Eye Contact: Irritation with burning and tearing (salt concentrations greater than the normal saline present).

Chronic Eye Contact: No applicable information found for chronic systemic effects.

Acute Ingestion: Intake of large amounts has generally occurred for deliberate reasons: suicide, absorption, and to induce vomiting. The following effects were observed; nausea and vomiting, diarrhea, cramps, restlessness, irritability, dehydration, water retention, nose bleed, gastrointestinal tract damage, fever, sweating, sunken eyes, high blood pressure, muscle weakness, dry mouth and nose, shock, cerebral (fluid on brain) or pulmonary edema (fluid in lungs), blood cell shrinkage, and brain damage (due to dehydration of brain cells). Death is generally due to cardiovascular collapse or CNS damage. Less than a few grams would not be harmful. For larger quantities, drink large amounts of water or milk.

Chronic Ingestion: No applicable information found for chronic systemic effects.

Carcinogenicity

NTP: Not listed as a carcinogen or mutagen.
IARC: Not listed as a carcinogen or mutagen.
OSHA: Not listed as a carcinogen or mutagen.

Medical Conditions Aggravated by Exposure: In some cases of confirmed hypertension, ingestion may result in elevated blood pressure.

4. FIRST AID MEASURES

First Aid For Eyes: For eye contact, flush with water immediately, lifting eyelids occasionally.

First Aid For Skin: Remove clothing from affected area. Wash skin thoroughly. Rinse carefully.

First Aid For Inhalation: If person breathes large quantities, remove to fresh air at once. If breathing stops, apply artificial respiration immediately.

First Aid For Ingestion: Less than a few grams would not be harmful. For larger quantities, drink large amounts of water or milk.

5. FIRE AND MEASURES

Flash Point: N/A

Extinguishing Media: N/A. This product is nonflammable.

Special Fire Fighting Procedures: N/A.

6. ACCIDENTAL RELEASE MEASURES

Spill or Leak Procedures: Contain spills to prevent contamination of water supply or sanitary sewer system. Vacuum or sweep into containers for proper disposal.

7. HANDLING AND STORAGE

Storage Temperature (min./max.): Avoid humid or wet conditions as product will cake and become hard.

Special Sensitivity: Avoid contact with strong acids.

Handling and Storage Precautions: Becomes hygroscopic at 70% Relative Humidity

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Eye Protection Requirements: Eyeglasses or goggles should be worn in dusty areas.

Skin Protection Requirements: Protective clothing may be worn in dusty areas, but is generally not required.

Respiratory/Ventilation Requirements: NIOSH/MSHA approved respirator for particulates.

Exposure Limits: Not listed.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical Form: White crystalline solid with slight halogen odor.

Color: White crystalline solid

Odor: Halogen odor

Boiling Point (760mm Hg) (^{O}C): 760 mm Hg. 1465 degrees C.

Melt Point/Freeze Point (^{O}C): 801 degrees C.

PH: 6.7 - 7.3

Solubility In Water (g/cc, %): 26.4%

Specific Gravity (H_20=1): 2.16 (H_2O)

Bulk Density: 53-83 Lbs/Ft^3

% Volatile By Weight: N/A

Vapor Pressure (mm Hg/747^{O}C): = 2.4

Vapor Density (Air=1): (Air=1) N/A

10. REACTIVITY

Stability: Stable

Incompatibilities: Avoid contact with strong acids. Becomes corrosive to metals when wet.

Decomposition Products: May evolve chlorine gas when in contact with strong acids.

11. TOXICOLOGICAL INFORMATION

Description: Not Listed

12. ECOLOGICAL INFORMATION

Ecotoxicity: Not Listed.

Environmental Degradation: Not Listed.

13. DISPOSAL CONSIDERATIONS

Waste Disposal Method: Follow applicable Federal, state and local regulations.

14. TRANSPORTATION INFORMATION

D.O.T. Shipping Name: Not Listed

Technical Shipping Name: Not Listed

D.O.T Hazard Class: Not Listed

U.N./N.A. Number: Not Listed

Product Rq (lbs.): N/A

D.O.T. Label: Not Listed

D.O.T. Placard: N/A

Freight Class Bulk: N/A

Freight Class Package: N/A

Product Label: N/A

15. REGULATORY INFORMATION

OSHA Status: Not Listed

TSCA Status: Listed as non hazardous.

Cercla reportable Quantity
SARA Title III
Section 302 Extremely
Hazardous Substances: Not Listed

Section 311/312
Hazard categories: Not Listed

Section 313
Toxic Chemicals: Not Listed

RCRA Status: Not Listed

HMIS: 1 0 0 A

State Regulatory Information

Component Name /CAS Number	Concentration	State-Code
N/A		

16. OTHER INFORMATION

Reason For Issue: Regulatory Compliance
Prepared By: Steve Karl
Approved By: Sarah Hubert
Title: Director-Quality Administration
Approval Date: November 2012
Supersedes Date:
MSDS Number: ND14

Disclaimer: All statements, technical information and recommendations contained herein are, the best of our knowledge, reliable and accurate; however no warranty, either expressed or implied is made with respect thereto, nor will any liability be assumed for damages resultant from the use of the material described.

It is the responsibility of the user to comply with all applicable federal, state and local laws and regulations. It is also the responsibility of the user to maintain a safe workplace. The user should consider the health hazards and safety information provided herein as a guide and should take the necessary steps to instruct employees and to develop work practice procedures to ensure a safe work environment.

This information is not intended as a license to operate under, or a recommendation to practice or infringe upon any patent of this Company or others covering any process, composition of matter or use.

Material Safety Data Sheet

IDENTITY	Other Common Names:
CTI - 220	Cleaning Compound

HAZARD RATING SCALE: 4=Extreme; 3=High; 2=Moderate; 1=Insignificant
Toxicity = 1 Fire = 2 Reactivity = 0

Section I

Distributor's name	Emergency Telephone Number: 800-535-5053	
Corrosion Technology, Inc.	Telephone Number for Information: 610-429-1450	
125 Willowbrook Lane	Fax Number: 610-429-1473	
West Chester, PA 19382	Prepared By: James Kent	Date Prepared: FEB 2011

Section II—Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity, Common Name(s))	%	CAS No.	PEL/TLV
Aromatic hydrocarbon	>35	64742-95-6	not established
Naphthalene	<4	91-20-3	TWA of 10 ppm
1,2,4 Trimethylbenzene	<1	95-63-6	TWA of 25 ppm
Potassium Hydroxide	<5	1310-58-3	PEL/TLV 2mg/mg3

Section III—Physical/Chemical Characteristics

Boiling Point (o F)	220 to 400	Specific Gravity (H_20 = 1)	.99
Vapor Pressure (mm Hg)	ND	Melting Point	N/A
Vapor Density (AIR = 1)	N/A	% Volatile	80%

Solubility in Water: emulsifies

Appearance and Odor: clear liquid with aromatic odor

Section IV—Fire and Explosion Hazard Data

Flash Point (Method Used)	160° F TCC	Flammable Limits	LEL ND	UEL ND

Extinguishing Media: Dry chemical, carbon dioxide, halon, foam or water spray is recommended.

Special Fire Fighting Procedures

Wear appropriate protective equipment including respiratory protection as conditions warrant. Water spray may be useful in minimizing vapors and cooling containers exposed to heat and flame.

Unusual Fire and Explosion Hazards

This material is combustible and may be ignited by sparks, flame or other sources of ignition.

Section V—Reactivity Data

Stability	Unstable	☐	Conditions to Avoid N/A
	Stable	☒	

Incompatibility *(Materials to Avoid)*: Strong acids, bases or oxidizing agents.

Hazardous Decomposition or Byproducts: Thermal decomposition may yield carbon monixide and/or carbon dioxide.

Hazardous Polymerization	May Occur	☐	Conditions to Avoid N/A
	Will Not Occur	☒	

Section VI—Health Hazard Data

Acute: Skin & Eye Irritant

Chronic: None Known

Signs and Symptoms of Exposure

INHALATION: Excessive concentration of vapors or mists may cause irritation of nose & throat and signs of nervous system depression (e.g. drowsiness, dizziness, fatigue)

SKIN: Skin irritant; prolonged or repeated contact may cause redness, burning , cracking of the skin

EYES: Eye irritant; contact with the liquid or exposure to vapors or mists may cause burning, tearing, and redness.

INGESTION: May cause irritation of digestive tract, and signs of nervous system depression.

Medical Conditions
Generally Aggravated by Exposure

Respiratory symptoms associated with pre-existing lung disorders (asthma- like conditions) may be aggravated by exposure.

Listed as potential Carcinogen? IARC? No

National Toxicology Program? No

Emergency and First Aid Procedures

INHALATION: If affected, remove person to fresh air. Seek medical assistance if irritation persists.

SKIN: Remove contaminated clothing and flush area with soap & water. Seek medical attention if irritation occurs.

EYES: If irritation from exposure develops, move victim away from exposure into fresh air. For direct contact, flush with water for 15 minutes. Seek medical attention.

INGESTION: Aspiration hazard: Do not induce vomiting or give anything by mouth because this material can enter the lungs and cause severe lung damage. If victim is drowsy or unconscious, place on the left side with the head down. If possible, do not leave victim unattended. Seek medical attention immediately.

Section VII—Precautions for Safe Handling and Use

Steps to Be Taken in Case Material Is Released or Spilled

Flush with water into retaining area or container. Avoid exposure to sparks, fire or hot metal surfaces. Small spills can be absorbed on suitable oil absorbent. Wear appropriate protective equipment. Do not allow to enter sewers or streams.

Waste Disposal Method Dispose of in accordance with all local, state and federal regulations.

Precautions to Be Taken In Handling and Storing Keep away from heat, sparks and open flames. Use with adequate ventilation. Keep out of reach of children. Keep containers tightly closed when not in use. Store in area with good ventilation. Wash thoroughly after use. "Empty containers" contain residue and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind or expose such containers to heat, flame, or sparks.

Section VIII—Control Measures

Respiratory Protection *(Specify Type)*

Self contained breathing apparatus for concentrations above exposure limits.

Ventilation	Local Exhaust ☐	Special
	Mechanical *(General)* ☐	Other If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits, additional ventilation or exhaust systems may be required.

Protective Gloves rubber or neoprene

Eye Protection goggles and /or face shield

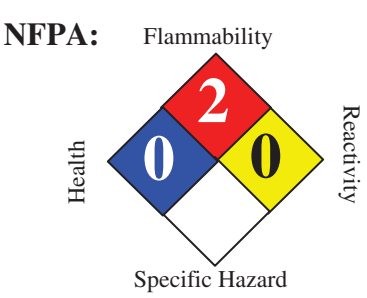
Other Protective Clothing or Equipment rubber apron, eye wash and safety shower.

Work/Hygienic Practices

N/A = Not Applicable **ND = Not Determined** **< = Less Than** **> = Greater Than**

The information provided in this Material Safety Data Sheet has been obtained from sources believed to be reliable and is offered in good faith as accurate, but without guarantee. Conditions of use and suitability of the product for particular uses are beyond our control. All risks of use of the product are therefore assumed by the user and we expressly disclaim all warranties of every kind and nature, including warranties of merchantability and fitness for a particular purpose in respect to the use or suitability of the product.

Material Safety Data Sheet
Diesel Low Sulfur (LSD) and Ultra Low Sulfur Diesel (ULSD)



HMIS III:

HEALTH	1
FLAMMABILITY	2
PHYSICAL	0

0 = Insignificant, 1 = Slight, 2 = Moderate, 3 = High, 4 = Extreme

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Diesel Low Sulfur (LSD) and Ultra Low Sulfur Diesel (ULSD)		
Synonyms	:	CARB Diesel, 888100004478		
MSDS Number	:	888100004478	**Version**	: 2.19
Product Use Description	:	Fuel		
Company	:	For: Tesoro Refining & Marketing Co. 19100 Ridgewood Parkway, San Antonio, TX 78259		
Tesoro Call Center	:	(877) 783-7676	**Chemtrec (Emergency Contact)**	: (800) 424-9300

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview

Regulatory status : This material is considered hazardous by the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard (29 CFR 1910.1200).

Signal Word : WARNING

Hazard Summary : Toxic. Combustible Liquid

Potential Health Effects

Eyes : Eye irritation may result from contact with liquid, mists, and/or vapors.

Inhalation : Vapors or mists from this material can irritate the nose, throat, and lungs, and can cause signs and symptoms of central nervous system depression, depending on the concentration and duration of exposure.

Skin : Skin irritation leading to dermatitis may occur upon prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed. Long-term, repeated skin contact may cause skin cancer

Ingestion : Harmful or fatal if swallowed. Do NOT induce vomiting. This material can irritate the mouth, throat, stomach, and cause nausea, vomiting, diarrhea and restlessness Aspiration hazard if liquid is inhaled into lungs, particularly from vomiting after ingestion. Aspiration may result in chemical pneumonia, severe lung damage, respiratory failure and even death.

Target Organs : Central nervous system, Eyes, Skin, Kidney, Liver

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Weight %
Fuels, diesel, No 2; Gasoil - unspecified	68476-34-6	100%
Nonane	111-84-2	0 - 5%
Naphthalene	91-20-3	0 - 1%
1,2,4-Trimethylbenzene	95-63-6	0 - 2%
Xylene	1330-20-7	0 - 2%
Sulfur	7704-34-9	15 ppm maximum

SECTION 4. FIRST AID MEASURES

Inhalation : Move to fresh air. Give oxygen. If breathing is irregular or stopped, administer artificial respiration. Seek medical attention immediately.

Skin contact : Take off all contaminated clothing immediately. Wash off immediately with soap and plenty of water. Wash contaminated clothing before re-use. If skin irritation persists, seek medical attention immediately.

Eye contact : Remove contact lenses. Rinse thoroughly with plenty of water for at least 15 minutes. If symptoms persist, seek medical attention.

Ingestion : Do not induce vomiting without medical advice. If a person vomits when lying on his back, place him in the recovery position. Seek medical attention immediately.

Notes to physician : Symptoms: Dizziness, Discomfort, Headache, Nausea, Disorder, Vomiting, Lung edema, Aspiration may cause pulmonary edema and pneumonitis, Liver disorders, Kidney disorders.

SECTION 5. FIRE-FIGHTING MEASURES

Form : Liquid

Flash point : 38℃ Minimum for #1 Diesel, 52℃ Minimum for #2 Diesel

Auto Ignition temperature : 257 ℃ (495 ℉)

Lower explosive limit : 0.6 %(V)

Upper explosive limit : 4.7 %(V)

Suitable extinguishing media : Carbon dioxide (CO2), Water spray, Dry chemical, Foam, Keep containers and surroundings cool with water spray.

Specific hazards during fire fighting : Fire Hazard Do not use a solid water stream as it may scatter and spread fire. Cool closed containers exposed to fire with water spray.

Special protective equipment for fire-fighters	:	Wear self-contained breathing apparatus and protective suit. Use personal protective equipment.
Further information	:	Exposure to decomposition products may be a hazard to health. Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions	:	Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to contain spill areas. Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact. Ensure adequate ventilation. Use personal protective equipment.
Environmental precautions	:	Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection. Discharge into the environment must be avoided. If the product contaminates rivers and lakes or drains inform respective authorities.
Methods for cleaning up	:	Take up with sand or oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

SECTION 7. HANDLING AND STORAGE

Handling	:	Keep away from fire, sparks and heated surfaces. No smoking near areas where material is stored or handled. The product should only be stored and handled in areas with intrinsically safe electrical classification.
Advice on protection against fire and explosion	:	Hydrocarbon liquids including this product can act as a non-conductive flammable liquid (or static accumulators), and may form ignitable vapor-air mixtures in storage tanks or other containers. Precautions to prevent static-initated fire or explosion during transfer, storage or handling, include but are not limited to these examples: (1) Ground and bond containers during product transfers. Grounding and bonding may not be adequate protection to prevent ignition or explosion of hydrocarbon liquids and vapors that are static accumulators. (2) Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil or diesel) is loaded into tanks previously containing low flash point products (such gasoline or naphtha). (3) Storage tank level floats must be effectively bonded. For more information on precautions to prevent static-initated fire or explosion, see NFPA 77, Recommended Practice on Static Electricity (2007), and API

Recommended Practice 2003, Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents (2008).

Dust explosion class : Not applicable

Requirements for storage areas and containers : Keep away from flame, sparks, excessive temperatures and open flame. Use approved containers. Keep containers closed and clearly labeled. Empty or partially full product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose containers to sources of ignition. Store in a well-ventilated area. The storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

Other data : Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure.

Advice on common storage Keep away from food, drink and animal feed. Incompatible with oxidizing agents. Incompatible with acids.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

List	Components	CAS-No.	Type:	Value
OSHA Z1	Xylene	1330-20-7	PEL	100 ppm 435 mg/m3
	Naphthalene	91-20-3	PEL	10 ppm 50 mg/m3
ACGIH	Diesel Fuel	68476-30-2	TWA	100 mg/m3
	Xylene	1330-20-7	TWA	100 ppm
		1330-20-7	STEL	150 ppm
	Naphthalene	91-20-3	TWA	10 ppm
		91-20-3	STEL	15 ppm
	Nonane	111-84-2	TWA	200 ppm

Engineering measures : Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces. Use only intrinsically safe electrical equipment approved for use in classified areas.

Eye protection : Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

Hand protection : Gloves constructed of nitrile, neoprene, or PVC are recommended. Consult manufacturer specifications for further information.

Skin and body protection : If needed to prevent skin contact, chemical protective clothing such as of DuPont

		TyChem®, Saranex or equivalent recommended based on degree of exposure. The resistance of specific material may vary from product to product as well as with degree of exposure.
Respiratory protection	:	A NIOSH/ MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection. Use a NIOSH/ MSHA-approved positive-pressure supplied-air respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.
Work / Hygiene practices	:	Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Form	:	Liquid
Appearance	:	Clear, straw colored
Odor	:	Characteristic petroleum (kerosene) odor
Flash point - typical	:	38°C Minimum for #1 Diesel, 52°C Minimum for #2 Diesel
Auto Ignition temperature	:	257 °C (495 °F)
Thermal decomposition	:	No decomposition if stored and applied as directed.
Lower explosive limit	:	0.6 %(V)
Upper explosive limit	:	4.7 %(V)
pH	:	Not applicable
Freezing point	:	No data available
Boiling point	:	154 - 372 °C(310° - 702 °F)
Vapor Pressure	:	< 2 mm Hg at 20 °C
Density	:	**0.86** g/cm3
Water solubility	:	Negligible
Viscosity, dynamic	:	1.7 - 40 mPa.s at 37.8 °C (100.0 °F)

Percent Volatiles	:	100 %
Conductivity (conductivity can be reduced by environmental factors such as a decrease in temperature		Diesel Fuel Oils at terminal load rack: At least 25 pS/m Ultra Low Sulfur Diesel (ULSD) without conductivity additive: 0 pS/m to 5 pS/m ULSD at terminal load rack with conductivity additive: At least 50 pS/m but conductivity may decrease from environmental factors such as temperature drop. JP-8 at terminal load rack: 150 pS/m to 600 pS/m

SECTION 10. STABILITY AND REACTIVITY

Conditions to avoid	:	Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Keep away from strong oxidizers. Viton ® ; Fluorel ®
Materials to avoid	:	Strong oxidizing agents. Peroxides
Hazardous decomposition products	:	Carbon monoxide, carbon dioxide and noncombusted hydrocarbons (smoke). Diesel exhaust particulates may be a lung hazard - see Section 11.
Thermal decomposition	:	No decomposition if stored and applied as directed.
Hazardous reactions	:	Keep away from oxidizing agents, and acidic or alkaline products.

SECTION 11. TOXICOLOGICAL INFORMATION

Carcinogenicity

NTP	:	Naphthalene (CAS-No.: 91-20-3)
IARC	:	Naphthalene (CAS-No.: 91-20-3)
OSHA	:	No component of this product which is present at levels greater than or equal to 0.1 % is identified as a carcinogen or potential carcinogen by OSHA.
CA Prop 65	:	WARNING! This product contains a chemical known to the State of California to cause cancer. naphthalene (CAS-No.: 91-20-3)
Skin irritation	:	Irritating to skin.
Eye irritation	:	Irritating to eyes.
Further information	:	Studies have shown that similar products produce skin cancer or skin tumors in laboratory animals following repeated applications without washing or removal. The significance of this finding to human exposure has not been determined. Other studies with active skin carcinogens have shown that washing the animal's skin with soap and water between applications reduced tumor formation. Positive mutagenicity results have been reported. Repeated over-exposure may cause liver and kidney injury IARC classifies whole diesel fuel exhaust particulates as probably carcinogenic to humans (Group 2A). NIOSH regards whole diesel fuel exhaust particulates as a potential cause of occupational lung cancer based on animal studies and limited evidence in humans.

Component:

Fuels, diesel, No 2; Gasoil - unspecified	68476-34-6	Acute oral toxicity: LD50 rat Dose: 5,001 mg/kg Acute dermal toxicity: LD50 rabbit

		Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 7.64 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Severe skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Nonane	111-84-2	Acute oral toxicity: LD50 mouse Dose: 218 mg/kg Acute inhalation toxicity: LC50 rat Exposure time: 4 h
Naphthalene	91-20-3	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute dermal toxicity: LD50 rat Dose: 2,501 mg/kg Acute inhalation toxicity: LC50 rat Dose: 101 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Carcinogenicity: N11.00422130
1,2,4-Trimethylbenzene	95-63-6	Acute inhalation toxicity: LC50 rat Dose: 18 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Eye irritation
Xylene	1330-20-7	Acute oral toxicity: LD50 rat Dose: 2,840 mg/kg Acute dermal toxicity: LD50 rabbit Dose: ca. 4,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 6,350 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation

SECTION 12. ECOLOGICAL INFORMATION

Additional ecological : Keep out of sewers, drainage areas, and waterways. Report spills and releases, as

information applicable, under Federal and State regulations.

Component:

Naphthalene	91-20-3	Toxicity to algae: EC50 Species: Dose: 33 mg/l Exposure time: 24 h
1,2,4-Trimethylbenzene	95-63-6	Toxicity to fish: LC50 Species: Pimephales promelas (fathead minnow) Dose: 7.72 mg/l Exposure time: 96 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia Dose: 3.6 mg/l Exposure time: 48 h

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal : In accordance with local and national regulations.

SECTION 14. TRANSPORT INFORMATION

CFR

Proper shipping name	: DIESEL FUEL
UN-No.	: UN1202 (NA 1993)
Class	: 3
Packing group	: III

TDG

Proper shipping name	: DIESEL FUEL
UN-No.	: UN1202 (NA 1993)
Class	: 3
Packing group	: III

IATA Cargo Transport

UN UN-No.	: UN1202 (NA 1993)
Description of the goods	: DIESEL FUEL
Class	: 3
Packaging group	: III
ICAO-Labels	: 3
Packing instruction (cargo aircraft)	: 366
Packing instruction (cargo aircraft)	: Y344

IATA Passenger Transport

UN UN-No.	: UN1202 (NA 1993)
Description of the goods	: DIESEL FUEL
Class	: 3
Packaging group	: III

	ICAO-Labels	: 3
	Packing instruction (passenger aircraft)	: 355
	Packing instruction (passenger aircraft)	: Y344
IMDG-Code		
	UN-No.	: UN 1202 (NA 1993)
	Description of the goods	: DIESEL FUEL
	Class	: 3
	Packaging group	: III
	IMDG-Labels	: 3
	EmS Number	: F-E S-E
	Marine pollutant	: No

SECTION 15. REGULATORY INFORMATION

OSHA Hazards : Combustible Liquid
Moderate skin irritant
Moderate eye irritant
Toxic by ingestion
POSSIBLE CANCER HAZARD

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIROMENT)
The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil. Fractions of crude oil, and products (both finished and intermediate) from the crude oil refining process and any indigenous components of such from the CERCLA Section 103 reporting requirements. However, other federal reporting requirements, including SARA Section 304, as well as the Clean Water Act may still apply.

TSCA Status : On TSCA Inventory

DSL Status : All components of this product are on the Canadian DSL list.

SARA 311/312 Hazards : Fire Hazard
Acute Health Hazard
Chronic Health Hazard

SARA III US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required

Components	CAS-No.
Xylene	1330-20-7
1,2,4-Trimethylbenzene	95-63-6
Naphthalene	91-20-3

PENN RTK US. Pennsylvania Worker and Community Right-to-Know Law (34 Pa. Code Chap. 301-323)

Components	CAS-No.
Nonane	111-84-2

Naphthalene	91-20-3
1,2,4-Trimethylbenzene	95-63-6
xylene	1330-20-7
Fuels, diesel, No 2; Gasoil - unspecified	68476-34-6

MASS RTK — US. Massachusetts Commonwealth's Right-to-Know Law (Appendix A to 105 Code of Massachusetts Regulations Section 670.000)

Components	CAS-No.
Xylene	1330-20-7
1,2,4-Trimethylbenzene	95-63-6
Naphthalene	91-20-3
Nonane	111-84-2

NJ RTK — US. New Jersey Worker and Community Right-to-Know Act (New Jersey Statute Annotated Section 34:5A-5)

Components	CAS-No.
Nonane	111-84-2
Naphthalene	91-20-3
1,2,4-Trimethylbenzene	95-63-6
Xylene	1330-20-7
Fuels, diesel, No 2; Gasoil - unspecified	68476-34-6

California Prop. 65 : WARNING! This product contains a chemical known to the State of California to cause cancer.

Naphthalene 91-20-3

SECTION 16. OTHER INFORMATION

Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

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12/01/2011

1153, 1250, 1443, 1454, 1814, 1815, 1866, 1925

MATERIAL SAFETY DATA SHEET — 16 Sections

SECTION 1 — CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Identifier	[WHMIS Classification]
MetalRx Leaf Media	Not controlled

Product Use
Adsorbent, filtration media

Manufacturer's Name	Supplier's Name
Contech Construction Products Inc.	Contech Construction Products Inc.
Street Address	Street Address
9025 Centre Pointe Dr. Suite 400	9025 Centre Pointe Dr. Suite 400

City	State	City	State
West Chester	OH	West Chester	OH

Postal Code	Emergency Telephone	Postal Code	Emergency Telephone
45069	1-800-338-1122	45069	1-800-338-1122

Date MSDS Prepared	MSDS Prepared By	Phone Number
06/04/2010	Jia Ma	503-408-5268

SECTION 2 — COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous Ingredients *(specific)*	%	CAS Number	LD_{50} of Ingredient *(specify species and route*	LC_{50} of Ingredient *(specify species)*
Earth-Wise Certified Compost	100	N/A	Unknown	Unknown

SECTION 3 — HAZARDS IDENTIFICATION

Route of Entry ❒ Skin Contact ❒ Skin Absorption ❒ Eye Contact ☒ Inhalation ❒ Ingestion

Emergency Overview

WHMIS Symbols]: Not controlled

Potential Health Effects

Swallowing is unlikely under normal conditions. If so, it may cause abdominal discomfort and increase the risk of gastro-intestinal infections. The dust may be irritating to the eyes resulting in redness and watering, or eye infection. Skin contact with the product and its dusts may result in skin irritation. Inhalation of dusts may irritate the nose, throat and lungs, and aggravate pre-existing conditions such as asthma and bronchitis. Excessive inhalation over long period may cause harmful coughing and irritation; use mask suitable for nuisance dust.

SECTION 4 — FIRST AID MEASURES

Skin Contact: Wash skin thoroughly with mild soap and water.

Eye Contact: Flush eyes thoroughly with water, taking care to rinse under eyelids. If irritation persists, continue flushing for 15 minutes, rinsing from time to time under eyelids. If discomfort continues, consult a physician. Do not scrub, since the abrasion may cause irritation.

Inhalation: If overcome by high dust concentration, remove to a ventilated area.

Ingestion: Give water to drink. Seek medical attention if any abdominal symptoms.

Please continue on reverse side

SECTION 5 — FIRE FIGHTING MEASURES

Flammable ❒ Yes × No	If yes, under which conditions?	
Means of Extinction Not applicable		
Flashpoint (°C) and Method Not applicable	Upper Flammable Limit (% by volume) Not applicable	Lower Flammable Limit (% by volume) Not applicable
Autoignition Temperature (°C) Not applicable	Explosion Data — Sensitivity to Impact Not applicable	Explosion Data — Sensitivity to Static Discharge Not applicable
Hazardous Combustion Products Not applicable		
[NFPA] Not applicable		

SECTION 6 — ACCIDENTAL RELEASE MEASURES

Leak and Spill Procedures
Sweep up using dust suppressant such as water. Uncontaminated materials may be reused.

SECTION 7 — HANDLING AND STORAGE

Handling Procedures and Equipment

No special transport requirement are necessary. Avoid generating dust during handling. Masks suitable for nuisance dust.

Storage Requirements

A cool and dry area is preferred.

SECTION 8 — EXPOSURE CONTROL / PERSONAL PROTECTION

Exposure Limits × ACGIH TLV × OSHA PEL ❒ Other *(specify)*

Specific Engineering Controls *(such as ventilation, enclosed process)*
Adequate Ventilation.

Maintain dust level below TLV/PEL.

	TLV	PEL
Perlite/ Respirable Dust	10 mg/M3	15 mg/M3

Personal Protective Equipment ❒ Gloves × Respirator × Eye ❒ Footwear × Clothing × Other

If checked, please specify type	MSHA/NIOSH approved respirator.	Protective/safety goggles	Use good housekeeping to avoid transient	Masks suitable for nuisance dust

SECTION 9 — PHYSICAL AND CHEMICAL PROPERTIES

Physical State Granules, pellets	Odor and Appearance Earthy/Brown granules	Odor Threshold (ppm)
Specific Gravity >1 (granules)	Vapor Density (air = 1) N/A	Vapor Pressure (mmHg) N/A
Evaporation Rate N/A	Boiling Point (°C) N/A	Freezing Point (°C) N/A
pH 5-9 (Dissolved in water)	Coefficient of Water/Oil Distribution N/A	[Solubility in Water] Negligible

SECTION 10 — STABILITY AND REACTIVITY

Chemical Stability: ×Yes ❒ No	If no, under which conditions?
Incompatibility with Other Substances ❒ Yes ×No	If yes, which ones?

Reactivity, and under what conditions?
Not available.
Hazardous Decomposition Products
Not available.

SECTION 11 — TOXICOLOGICAL INFORMATION

Effects of Acute Exposure	
None	
Effects of chronic exposure	
Inhalation of high concentrations of inert nuisance particulates could result in mild irritation of the respiratory tract.	
Skin contact and eye contact may cause irritation through mechanical abrasion.	
Irritancy of Product	
Skin sensitization	Respiratory sensitization
Carcinogenicity-IARC: No..	Carcinogenicity - ACGIH
Reproductive toxicity	Teratogenicity
Embrotoxicity	Mutagenicity
Name of synergistic products/effects	

Please continue on reverse side

SECTION 12 — ECOLOGICAL INFORMATION

[Aquatic Toxicity]

No effects are tested from this insoluble product.

SECTION 13 — DISPOSAL CONSIDERATIONS

Waste Disposal

Recycle if possible. This product contains organic leaves and does not require special disposal methods. Dispose of waste in accordance with federal, state, or local regulations.

SECTION 14 — TRANSPORT INFORMATION

Special Shipping Information

	PIN
TDG Not regulated	[DOT] Not regulated
[IMO] Not regulated	[ICAO] Not regulated

SECTION 15 — REGULATORY INFORMATION

[WHMIS Classification] *Not controlled*	[OSHA]
[SERA]	[TSCA] This substance and all the ingredients of this product are on the Chemical Substances Inventory of the Toxic Substances Control Act (USA). The presence on these lists does not require any legal reporting.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by CPR.

SECTION 16 — OTHER INFORMATION

National Fire Protection Agency (NFPA) codes – (health, flammability, reactivity): 1, 0, 0

Hazardous Material Information System (HMIS) – (health, flammability, reactivity): 1, 0, 0

MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: **ACTREL 1138L CLEANER**
Product Description: Dearomatized Hydrocarbons

Intended Use: Cleaner/degreaser

COMPANY IDENTIFICATION

Supplier: **EXXONMOBIL CHEMICAL COMPANY**
P.O. BOX 3272
HOUSTON, TX. 77253-3272 USA

24 Hour Health Emergency	(800) 726-2015
Transportation Emergency Phone	(800) 424-9300 or (703) 527-3887 CHEMTREC
Product Technical Information	(281) 870-6000/Health & Medical (281) 870-6884
Supplier General Contact	(281) 870-6000

SECTION 2 COMPOSITION / INFORMATION ON INGREDIENTS

Reportable Hazardous Substance(s) or Complex Substance(s)

Name	CAS#	Concentration*
DISTILLATES (PETROLEUM), HYDROTREATED LIGHT	64742-47-8	100 %

Hazardous Constituent(s) Contained in Complex Substance(s)

Name	CAS#	Concentration*
NONANE	111-84-2	1 - 5%

* All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume. Concentration values may vary.

SECTION 3 HAZARDS IDENTIFICATION

This material is considered to be hazardous according to regulatory guidelines (see (M)SDS Section 15).

POTENTIAL PHYSICAL / CHEMICAL EFFECTS

Combustible. Material can release vapors that readily form flammable mixtures. Vapor accumulation could flash and/or explode if ignited. Material can accumulate static charges which may cause an ignition.

POTENTIAL HEALTH EFFECTS

Repeated exposure may cause skin dryness or cracking. If swallowed, may be aspirated and cause lung damage. May be irritating to the eyes, nose, throat, and lungs. Vapors may cause drowsiness and dizziness.

NFPA Hazard ID:	Health:	1	Flammability:	2	Reactivity:	0
HMIS Hazard ID:	Health:	1	Flammability:	2	Reactivity:	0

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

SECTION 4 FIRST AID MEASURES

INHALATION

Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

SKIN CONTACT

Wash contact areas with soap and water. Remove contaminated clothing. Launder contaminated clothing before reuse.

EYE CONTACT

Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION

Seek immediate medical attention. Do not induce vomiting.

NOTE TO PHYSICIAN

If ingested, material may be aspirated into the lungs and cause chemical pneumonitis. Treat appropriately.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

Appropriate Extinguishing Media: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

Inappropriate Extinguishing Media: Straight Streams of Water

FIRE FIGHTING

Fire Fighting Instructions: Flammable. Evacuate area. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Firefighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Unusual Fire Hazards: Combustible. Vapors are flammable and heavier than air. Vapors may travel across the ground and reach remote ignition sources causing a flashback fire danger. Hazardous material. Firefighters should consider protective equipment indicated in Section 8.

Hazardous Combustion Products: Smoke, Fume, Incomplete combustion products, Oxides of carbon

FLAMMABILITY PROPERTIES

Flash Point [Method]: >38°C (100°F) [ASTM D-56]
Flammable Limits (Approximate volume % in air): LEL: 0.8 UEL: 5.7
Autoignition Temperature: 258°C (496°F)

SECTION 6 ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry creeks. The National Response Center can be reached at (800)424-8802.

PROTECTIVE MEASURES

Avoid contact with spilled material. Warn or evacuate occupants in surrounding and downwind areas if required due to toxicity or flammability of the material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders. For emergency responders: Respiratory protection: half-face or full-face respirator with filter(s) for organic vapor and, when applicable, H2S, or Self Contained Breathing Apparatus (SCBA) can be used depending on the size of spill and potential level of exposure. If the exposure cannot be completely characterized or an oxygen deficient atmosphere is possible or anticipated, SCBA is recommended. Work gloves that are resistant to aromatic hydrocarbons are recommended. Note: gloves made of polyvinyl acetate (PVA) are not water-resistant and are not suitable for emergency use. Chemical goggles are recommended if splashes or contact with eyes is possible. Small spills: normal antistatic work clothes are usually adequate. Large spills: full body suit of chemical resistant, antistatic material is recommended.

SPILL MANAGEMENT

Land Spill: Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Stop leak if you can do it without risk. All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Prevent entry into waterways, sewer, basements or confined areas. A vapor suppressing foam may be used to reduce vapors. Use clean non-sparking tools to collect absorbed material. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Large Spills: Water spray may reduce vapor; but may not prevent ignition in closed spaces.

Water Spill: Stop leak if you can do it without risk. Eliminate sources of ignition. Warn other shipping. If the Flash Point exceeds the Ambient Temperature by 10 degrees C or more, use containment booms and remove from the surface by skimming or with suitable absorbents when conditions permit. If the Flash Point does not exceed the Ambient Air Temperature by at least 10C, use booms as a barrier to protect shorelines and allow material to evaporate. Seek the advice of a specialist before using dispersants.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Large Spills: Dike far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7 HANDLING AND STORAGE

HANDLING

Avoid contact with skin. Prevent small spills and leakage to avoid slip hazard. Material can accumulate static charges which may cause an electrical spark (ignition source). Use proper bonding and/or ground procedures. However, bonding and grounds may not eliminate the hazard from static accumulation. Consult local applicable standards for guidance. Additional references include American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practice on Static Electricity) or CENELEC CLC/TR 50404 (Electrostatics - Code of practice for the avoidance of hazards due to static electricity).

Loading/Unloading Temperature: [Ambient]

Transport Temperature: [Ambient]
Transport Pressure: [Ambient]

Static Accumulator: This material is a static accumulator. A liquid is typically considered a nonconductive, static accumulator if its conductivity is below 100 pS/m (100x10E-12 Siemens per meter) and is considered a semiconductive, static accumulator if its conductivity is below 10,000 pS/m. Whether a liquid is nonconductive or semiconductive, the precautions are the same. A number of factors, for example liquid temperature, presence of contaminants, anti-static additives and filtration can greatly influence the conductivity of a liquid.

STORAGE

The container choice, for example storage vessel, may effect static accumulation and dissipation. Keep container closed. Handle containers with care. Open slowly in order to control possible pressure release. Store in a cool, well-ventilated area. Storage containers should be grounded and bonded. Fixed storage containers, transfer containers and associated equipment should be grounded and bonded to prevent accumulation of static charge.
Storage Temperature: [Ambient]
Storage Pressure: [Ambient]

Suitable Containers/Packing: Tank Cars; Tank Trucks; Drums
Suitable Materials and Coatings (Chemical Compatibility): Stainless Steel; Carbon Steel; Polypropylene; Polyethylene; Teflon
Unsuitable Materials and Coatings: Natural Rubber; Butyl Rubber; Ethylene-proplyene-diene monomer (EPDM); Polystyrene

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMIT VALUES

Exposure limits/standards (Note: Exposure limits are not additive)

Source	Form	Limit / Standard			NOTE	Source
DISTILLATES (PETROLEUM), HYDROTREATED LIGHT	Vapor.	RCP - TWA	1200 mg/m3	213 ppm	Total Hydrocarbons	ExxonMobil
NONANE		TWA	200 ppm		N/A	ACGIH

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:

Adequate ventilation should be provided so that exposure limits are not exceeded. Use explosion-proof ventilation equipment.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:

Half-face filter respirator

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:

Chemical resistant gloves are recommended.

Eye Protection: If contact is likely, safety glasses with side shields are recommended.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:

Chemical/oil resistant clothing is recommended.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

ENVIRONMENTAL CONTROLS

Comply with applicable environmental regulations limiting discharge to air, water and soil. Protect the environment by applying appropriate control measures to prevent or limit emissions.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Note: Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.

GENERAL INFORMATION

Physical State: Liquid
Form: Clear
Color: Colorless
Odor: Mild Petroleum/Solvent
Odor Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15.6 °C): 0.772
Density (at 15 ºC): 773 kg/m³ (6.45 lbs/gal, 0.77 kg/dm³)
Flash Point [Method]: >38°C (100°F) [ASTM D-56]
Flammable Limits (Approximate volume % in air): LEL: 0.8 UEL: 5.7
Autoignition Temperature: 258°C (496°F)
Boiling Point / Range: 161°C (322°F) - 176°C (349°F)
Vapor Density (Air = 1): 4.7 at 101 kPa
Vapor Pressure: 0.262 kPa (1.97 mm Hg) at 20 °C
Evaporation Rate (n-butyl acetate = 1): 0.26
pH: N/A
Log Pow (n-Octanol/Water Partition Coefficient): N/D
Solubility in Water: Negligible
Viscosity: 1.01 cSt (1.01 mm2/sec) at 40 °C | 1.17 cSt (1.17 mm2/sec) at 25°C
Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION

Freezing Point: -59°C (-74°F)
Melting Point: N/A
Pour Point: < 60°C (140°F)
Molecular Weight: 137
Hygroscopic: No
Coefficient of Thermal Expansion: 0.00078 V/VDEGC

SECTION 10 STABILITY AND REACTIVITY

STABILITY: Material is stable under normal conditions.

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

MATERIALS TO AVOID: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Route of Exposure	Conclusion / Remarks
Inhalation	
Toxicity: Data available.	May cause central nervous system effects.
Irritation: Data available.	Negligible hazard at ambient/normal handling temperatures.
Ingestion	
Toxicity: LD50 > 15000 mg/kg	Minimally Toxic. Based on test data for structurally similar

	materials.
Skin	
Toxicity: LD50 > 3160 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Irritation: Data available.	Mildly irritating to skin with prolonged exposure.
Eye	
Irritation: Data available.	May cause mild, short-lasting discomfort to eyes.

CHRONIC/OTHER EFFECTS

For the product itself:

Vapor/aerosol concentrations above recommended exposure levels are irritating to the eyes and respiratory tract, may cause headaches, dizziness, anesthesia, drowsiness, unconsciousness and other central nervous system effects including death.
Prolonged and/or repeated skin contact with low viscosity materials may defat the skin resulting in possible irritation and dermatitis.
Small amounts of liquid aspirated into the lungs during ingestion or from vomiting may cause chemical pneumonitis or pulmonary edema.

Additional information is available by request.

The following ingredients are cited on the lists below: None.

--REGULATORY LISTS SEARCHED--

1 = NTP CARC	3 = IARC 1	5 = IARC 2B
2 = NTP SUS	4 = IARC 2A	6 = OSHA CARC

SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY

Material -- Not expected to be harmful to aquatic organisms.
Material -- Not expected to demonstrate chronic toxicity to aquatic organisms.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Material -- Expected to be readily biodegradable.

Hydrolysis:

Material -- Transformation due to hydrolysis not expected to be significant.

Photolysis:

Material -- Transformation due to photolysis not expected to be significant.

Atmospheric Oxidation:

Material -- Expected to degrade rapidly in air

OTHER ECOLOGICAL INFORMATION

VOC (EPA Method 24): 6.442 lbs/gal

SECTION 13 DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products.

REGULATORY DISPOSAL INFORMATION

RCRA Information: Disposal of unused product may be subject to RCRA regulations (40 CFR 261). Disposal of the used product may also be regulated due to ignitability, corrosivity, reactivity or toxicity as determined by the Toxicity Characteristic Leaching Procedure (TCLP). Potential RCRA characteristics: IGNITABILITY.

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14 TRANSPORT INFORMATION

LAND (DOT)

Proper Shipping Name: PETROLEUM DISTILLATES, N.O.S.
Hazard Class & Division: 3
ID Number: 1268
Packing Group: III
ERG Number: 128
Label(s): 3
Transport Document Name: UN1268, PETROLEUM DISTILLATES, N.O.S., 3, PG III

Footnote: The flash point of this material is greater than 100 F. Regulatory classification of this material varies. DOT: Flammable liquid or combustible liquid. OSHA: Combustible liquid. IATA/IMO: Flammable liquid.

LAND (TDG)

Proper Shipping Name: PETROLEUM DISTILLATES, N.O.S.
Hazard Class & Division: 3
UN Number: 1268
Packing Group: III

SEA (IMDG)

Proper Shipping Name: PETROLEUM DISTILLATES, N.O.S.
Hazard Class & Division: 3
EMS Number: F-E, S-E
UN Number: 1268

Packing Group: III
Label(s): 3
Transport Document Name: UN1268, PETROLEUM DISTILLATES, N.O.S., 3, PG III, (>38°C c.c.)

AIR (IATA)

Proper Shipping Name: PETROLEUM DISTILLATES, N.O.S.
Hazard Class & Division: 3
UN Number: 1268
Packing Group: III
Label(s) / Mark(s): 3
Transport Document Name: UN1268, PETROLEUM DISTILLATES, N.O.S., 3, PG III

SECTION 15 REGULATORY INFORMATION

OSHA HAZARD COMMUNICATION STANDARD: When used for its intended purpose, this material is classified as hazardous in accordance with OSHA 29CFR 1910.1200.

Complies with the following national/regional chemical inventory requirements:: ENCS, IECSC, DSL, AICS, TSCA, KECI, PICCS

EPCRA: This material contains no extremely hazardous substances.

CERCLA: This material is not subject to any special reporting under the requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). CERCLA petroleum exclusion applies for this product. Contact local authorities to determine if other reporting requirements apply.

CWA / OPA: This product is classified as an oil under Section 311 of the Clean Water Act (40 CFR 110) and the Oil Pollution Act of 1990. Discharge or spills which produce a visible sheen on either surface water, or in waterways/sewers which lead to surface water, must be reported to the National Response Center at 800-424-8802.

SARA (311/312) REPORTABLE HAZARD CATEGORIES: Fire.

SARA (313) TOXIC RELEASE INVENTORY: This material contains no chemicals subject to the supplier notification requirements of the SARA 313 Toxic Release Program.

The following ingredients are cited on the lists below:

Chemical Name	CAS Number	List Citations
DISTILLATES (PETROLEUM), HYDROTREATED LIGHT	64742-47-8	17, 18, 19
NONANE	111-84-2	1, 5, 9, 13, 16, 17, 18, 19

--REGULATORY LISTS SEARCHED--

1 = ACGIH ALL	6 = TSCA 5a2	11 = CA P65 REPRO	16 = MN RTK
2 = ACGIH A1	7 = TSCA 5e	12 = CA RTK	17 = NJ RTK
3 = ACGIH A2	8 = TSCA 6	13 = IL RTK	18 = PA RTK
4 = OSHA Z	9 = TSCA 12b	14 = LA RTK	19 = RI RTK
5 = TSCA 4	10 = CA P65 CARC	15 = MI 293	

Code key: CARC=Carcinogen; REPRO=Reproductive

SECTION 16 OTHER INFORMATION

N/D = Not determined, N/A = Not applicable

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:
Revision Changes:
Section 09: Phys/Chem Properties Note was modified.
Section 09: Boiling Point C(F) was modified.
Section 08: Comply with applicable regulations phrase was modified.
Section 09: Vapor Pressure was modified.
Section 09: Relative Density - Header was modified.
Section 09: Flash Point C(F) was modified.
Section 09: Viscosity was modified.
Section 09: Viscosity was modified.
Section 15: List Citations Table was modified.
Section 15: National Chemical Inventory Listing was modified.
Composition: Concentration Footnote was modified.
Section 08: Exposure Limits Table was modified.
Composition: Primary Ingredient Name was added.
Composition: CAS Number was added.
Composition: Concentration - Header was added.
Composition: Constituents Table - Header was added.
Composition: Component table was added.

PRECAUTIONARY LABEL TEXT:
Contains: DISTILLATES (PETROLEUM), HYDROTREATED LIGHT
CAUTION!
HEALTH HAZARDS
Repeated exposure may cause skin dryness or cracking. If swallowed, may be aspirated and cause lung damage.
PHYSICAL HAZARDS
Combustible. Material can accumulate static charges which may cause an ignition.

PRECAUTIONS
Avoid contact with skin. Use proper bonding and/or ground procedures. However, bonding and grounds may not eliminate the hazard from static accumulation.

FIRST AID
Inhalation: Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

Eye: Flush thoroughly with water. If irritation occurs, get medical assistance.

Oral: Seek immediate medical attention. Do not induce vomiting.

Skin: Wash contact areas with soap and water. Remove contaminated clothing. Launder contaminated clothing before reuse.

FIRE FIGHTING MEDIA

Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

SPILL/LEAK
Land Spill: Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Stop leak if you can do it without risk. Prevent entry into waterways, sewer, basements or confined areas. A vapor suppressing foam may be used to reduce vapors. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.

Water Spill: Stop leak if you can do it without risk. Eliminate sources of ignition. Warn other shipping. Report spills as required to appropriate authorities. If the Flash Point exceeds the Ambient Temperature by 10 degrees C or more, use containment booms and remove from the surface by skimming or with suitable absorbents when conditions permit. If the Flash Point does not exceed the Ambient Air Temperature by at least 10C, use booms as a barrier to protect shorelines and allow material to evaporate. Seek the advice of a specialist before using dispersants.

Internal Use Only
MHC: 1A, 0, 1, 0, 2, 0

DGN: 4400252HUS (1007642)

MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: MOBIL DELVAC ELITE 15W-40
Product Description: Base Oil and Additives
Product Code: 201520508530, 444604-00, 97AJ90
Intended Use: Engine oil

COMPANY IDENTIFICATION

Supplier: **EXXON MOBIL CORPORATION**
3225 GALLOWS RD.
FAIRFAX, VA. 22037 USA

24 Hour Health Emergency	609-737-4411
Transportation Emergency Phone	800-424-9300
ExxonMobil Transportation No.	281-834-3296
Product Technical Information	800-662-4525, 800-947-9147
MSDS Internet Address	http://www.exxon.com, http://www.mobil.com

SECTION 2 COMPOSITION / INFORMATION ON INGREDIENTS

Reportable Hazardous Substance(s) or Complex Substance(s)

Name	CAS#	Concentration*
ZINC DITHIOPHOSPHATE	68649-42-3	< 2.5%

* All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume.

SECTION 3 HAZARDS IDENTIFICATION

This material is not considered to be hazardous according to regulatory guidelines (see (M)SDS Section 15).

POTENTIAL HEALTH EFFECTS

Low order of toxicity. Excessive exposure may result in eye, skin, or respiratory irritation. High-pressure injection under skin may cause serious damage.

NFPA Hazard ID:	Health:	0	Flammability:	1	Reactivity: 0
HMIS Hazard ID:	Health:	0	Flammability:	1	Reactivity: 0

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

SECTION 4 FIRST AID MEASURES

INHALATION

Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

SKIN CONTACT

Wash contact areas with soap and water. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

EYE CONTACT

Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION

First aid is normally not required. Seek medical attention if discomfort occurs.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

Appropriate Extinguishing Media: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

Inappropriate Extinguishing Media: Straight Streams of Water

FIRE FIGHTING

Fire Fighting Instructions: Evacuate area. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Firefighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Hazardous Combustion Products: Smoke, Fume, Aldehydes, Sulfur oxides, Incomplete combustion products, Oxides of carbon

FLAMMABILITY PROPERTIES

Flash Point [Method]: >215°C (419°F) [ASTM D-92]
Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0
Autoignition Temperature: N/D

SECTION 6 ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable

regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry creeks. The National Response Center can be reached at (800)424-8802.

PROTECTIVE MEASURES

Avoid contact with spilled material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders. For emergency responders: Respiratory protection: respiratory protection will be necessary only in special cases, e.g., formation of mists. Half-face or full-face respirator with filter(s) for dust/organic vapor or Self Contained Breathing Apparatus (SCBA) can be used depending on the size of spill and potential level of exposure. If the exposure cannot be completely characterized or an oxygen deficient atmosphere is possible or anticipated, SCBA is recommended. Work gloves that are resistant to hydrocarbons are recommended. Gloves made of polyvinyl acetate (PVA) are not water-resistant and are not suitable for emergency use. Chemical goggles are recommended if splashes or contact with eyes is possible. Small spills: normal antistatic work clothes are usually adequate. Large spills: full body suit of chemical resistant, antistatic material is recommended.

SPILL MANAGEMENT

Land Spill: Stop leak if you can do it without risk. Recover by pumping or with suitable absorbent.

Water Spill: Stop leak if you can do it without risk. Confine the spill immediately with booms. Warn other shipping. Remove from the surface by skimming or with suitable absorbents. Seek the advice of a specialist before using dispersants.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Large Spills: Dike far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7 HANDLING AND STORAGE

HANDLING

Avoid contact with used product. Prevent small spills and leakage to avoid slip hazard. Material can accumulate static charges which may cause an electrical spark (ignition source). When the material is handled in bulk, an electrical spark could ignite any flammable vapors from liquids or residues that may be present (e.g., during switch-loading operations). Use proper bonding and/or ground procedures. However, bonding and grounds may not eliminate the hazard from static accumulation. Consult local applicable standards for guidance. Additional references include American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practice on Static Electricity) or CENELEC CLC/TR 50404 (Electrostatics - Code of practice for the avoidance of hazards due to static electricity).

Static Accumulator: This material is a static accumulator.

STORAGE

The container choice, for example storage vessel, may effect static accumulation and dissipation. Do not store

in open or unlabelled containers.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMIT VALUES

Exposure limits/standards for materials that can be formed when handling this product: When mists/aerosols can occur the following are recommended: 5 mg/m³ - ACGIH TLV (inhalable fraction), 5 mg/m³ - OSHA PEL.

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:

No special requirements under ordinary conditions of use and with adequate ventilation.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:

No special requirements under ordinary conditions of use and with adequate ventilation.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:

No protection is ordinarily required under normal conditions of use.

Eye Protection: If contact is likely, safety glasses with side shields are recommended.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:

No skin protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid skin contact.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective

equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

ENVIRONMENTAL CONTROLS

Comply with applicable environmental regulations limiting discharge to air, water and soil. Protect the environment by applying appropriate control measures to prevent or limit emissions.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Note: Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.

GENERAL INFORMATION

Physical State: Liquid
Color: Amber
Odor: Characteristic
Odor Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15 °C): 0.875
Flash Point [Method]: >215°C (419°F) [ASTM D-92]
Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0
Autoignition Temperature: N/D
Boiling Point / Range: > 316°C (600°F) [Estimated]
Vapor Density (Air = 1): N/D
Vapor Pressure: < 0.013 kPa (0.1 mm Hg) at 20 °C [Estimated]
Evaporation Rate (n-butyl acetate = 1): N/D
pH: N/A
Log Pow (n-Octanol/Water Partition Coefficient): > 3.5 [Estimated]
Solubility in Water: Negligible
Viscosity: 111 cSt (111 mm2/sec) at 40 °C | 15 cSt (15 mm2/sec) at 100°C
Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION

Freezing Point: N/D
Melting Point: N/A
Pour Point: -27°C (-17°F)
DMSO Extract (mineral oil only), IP-346: < 3 %wt
Decomposition Temperature: N/D

SECTION 10 STABILITY AND REACTIVITY

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Excessive heat. High energy sources of ignition.

MATERIALS TO AVOID: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Route of Exposure	Conclusion / Remarks
Inhalation	
Toxicity (Rat): LC50 > 5000 mg/m3	Minimally Toxic. Based on test data for structurally similar materials.
Irritation: No end point data.	Negligible hazard at ambient/normal handling temperatures. Based on assessment of the components.
Ingestion	
Toxicity (Rat): LD50 > 5000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Skin	
Toxicity (Rabbit): LD50 > 5000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Irritation (Rabbit): Data available.	Negligible irritation to skin at ambient temperatures. Based on test data for structurally similar materials.
Eye	
Irritation (Rabbit): Data available.	May cause mild, short-lasting discomfort to eyes. Based on test data for structurally similar materials.

CHRONIC/OTHER EFFECTS

For the product itself:

Diesel engine oils: Not carcinogenic in animals tests. Used and unused diesel engine oils did not produce any carcinogenic effects in chronic mouse skin painting studies.
Oils that are used in gasoline engines may become hazardous and display the following properties: Carcinogenic in animal tests. Caused mutations in vitro. Possible allergen and photoallergen. Contains polycyclic aromatic compounds (PAC) from combustion products of gasoline and/or thermal degradation products.

Contains:

Base oil severely refined: Not carcinogenic in animal studies. Representative material passes IP-346, Modified Ames test, and/or other screening tests. Dermal and inhalation studies showed minimal effects; lung non-specific infiltration of immune cells, oil deposition and minimal granuloma formation. Not sensitizing in test animals.

Additional information is available by request.

The following ingredients are cited on the lists below: None.

--REGULATORY LISTS SEARCHED--

1 = NTP CARC	3 = IARC 1	5 = IARC 2B
2 = NTP SUS	4 = IARC 2A	6 = OSHA CARC

SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY

Material -- Not expected to be harmful to aquatic organisms.

MOBILITY

Base oil component -- Low solubility and floats and is expected to migrate from water to the land. Expected to partition to sediment and wastewater solids.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Base oil component -- Expected to be inherently biodegradable

BIOACCUMULATION POTENTIAL

Base oil component -- Has the potential to bioaccumulate, however metabolism or physical properties may reduce the bioconcentration or limit bioavailability.

SECTION 13 DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products. Protect the environment. Dispose of used oil at designated sites. Minimize skin contact. Do not mix used oils with solvents, brake fluids or coolants.

REGULATORY DISPOSAL INFORMATION

RCRA Information: The unused product, in our opinion, is not specifically listed by the EPA as a hazardous waste (40 CFR, Part 261D), nor is it formulated to contain materials which are listed as hazardous wastes. It does not exhibit the hazardous characteristics of ignitability, corrositivity or reactivity and is not formulated with contaminants as determined by the Toxicity Characteristic Leaching Procedure (TCLP). However, used product may be regulated.

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14 TRANSPORT INFORMATION

LAND (DOT): Not Regulated for Land Transport

LAND (TDG): Not Regulated for Land Transport

SEA (IMDG): Not Regulated for Sea Transport according to IMDG-Code

AIR (IATA): Not Regulated for Air Transport

SECTION 15 REGULATORY INFORMATION

OSHA HAZARD COMMUNICATION STANDARD: When used for its intended purposes, this material is not classified as hazardous in accordance with OSHA 29 CFR 1910.1200.

Complies with the following national/regional chemical inventory requirements:: KECI, TSCA, DSL
Special Cases:

Inventory	Status
AICS	Restrictions Apply
ELINCS	Restrictions Apply
IECSC	Restrictions Apply

EPCRA: This material contains no extremely hazardous substances.

SARA (311/312) REPORTABLE HAZARD CATEGORIES: None.

SARA (313) TOXIC RELEASE INVENTORY:

Chemical Name	CAS Number	Typical Value
ZINC DITHIOPHOSPHATE	68649-42-3	< 2.5%

The following ingredients are cited on the lists below:

Chemical Name	CAS Number	List Citations
ZINC DITHIOPHOSPHATE	68649-42-3	13, 15, 17

--REGULATORY LISTS SEARCHED--

1 = ACGIH ALL	6 = TSCA 5a2	11 = CA P65 REPRO	16 = MN RTK
2 = ACGIH A1	7 = TSCA 5e	12 = CA RTK	17 = NJ RTK
3 = ACGIH A2	8 = TSCA 6	13 = IL RTK	18 = PA RTK
4 = OSHA Z	9 = TSCA 12b	14 = LA RTK	19 = RI RTK
5 = TSCA 4	10 = CA P65 CARC	15 = MI 293	

Code key: CARC=Carcinogen; REPRO=Reproductive

SECTION 16 OTHER INFORMATION

N/D = Not determined, N/A = Not applicable

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:

Revision Changes:
Section 06: Notification Procedures - Header was modified.
Section 13: Disposal Considerations - Disposal Recommendations was modified.
Section 01: Product Code was modified.
Section 10 Stability and Reactivity - Header was modified.
Section 13: Disposal Recommendations - Note was modified.
Section 13: Empty Container Warning was modified.
Section 09: Phys/Chem Properties Note was modified.
Section 09: Boiling Point C(F) was modified.
Section 09: n-Octanol/Water Partition Coefficient was modified.
Section 08: Comply with applicable regulations phrase was modified.
Section 08: Personal Protection was modified.
Section 08: Hand Protection was modified.
Section 09: Vapor Pressure was modified.
Section 07: Handling and Storage - Handling was modified.
Section 07: Handling and Storage - Storage Phrases was modified.
Section 11: Dermal Lethality Test Data was modified.
Section 11: Oral Lethality Test Data was modified.
Section 05: Hazardous Combustion Products was modified.
Section 06: Accidental Release - Spill Management - Water was modified.
Section 09: Relative Density - Header was modified.
Section 09: Flash Point C(F) was modified.
Section 09: Viscosity was modified.
Section 09: Viscosity was modified.
Section 14: Sea (IMDG) - Header was modified.
Section 14: Air (IATA) - Header was modified.
Section 14: LAND (TDG) - Header was modified.
Section 14: LAND (DOT) - Header was modified.
Section 15: List Citations Table was modified.
Section 15: List Citation Table - Header was modified.
Section 14: LAND (DOT) - Default was modified.
Section 14: LAND (TDG) Default was modified.
Section 14: Sea (IMDG) - Default was modified.
Section 14: Air (IATA) - Default was modified.
Section 15: National Chemical Inventory Listing - Header was modified.
Section 15: National Chemical Inventory Listing was modified.
Section 16: Code to MHCs was modified.
Section 08: Exposure limits/standards was modified.
Section 15: Special Cases Table was modified.
Hazard Identification: OSHA - May be Hazardous Statement was modified.
Section 06: Notification Procedures was modified.
Section 09: Oxidizing Properties was modified.
Section 01: Company Contact Methods Sorted by Priority was modified.
Section 06: Protective Measures was added.
Section 06: Accidental Release - Protective Measures - Header was added.
Section 09: Decomposition Temperature was added.
Section 09: Decomposition Temp - Header was added.
Section 09: Vapor Pressure was added.

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Internal Use Only

MHC: 0B, 0B, 0, 0, 0, 0 PPEC: A

DGN: 7082558XUS (1013321)

MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: **MOBIL DELVAC EXTENDED LIFE 50/50 PREDILUTED COOLANT/ANTIFREEZE**
Product Description: Glycol
Product Code: 351010101596, 840439-00, 97AA97
Intended Use: Antifreeze/coolant

COMPANY IDENTIFICATION

Supplier: **EXXON MOBIL CORPORATION**
3225 GALLOWS RD.
FAIRFAX, VA. 22037 USA

24 Hour Health Emergency	609-737-4411
Transportation Emergency Phone	800-424-9300
ExxonMobil Transportation No.	281-834-3296
Product Technical Information	800-662-4525, 800-947-9147
MSDS Internet Address	http://www.exxon.com, http://www.mobil.com

SECTION 2 COMPOSITION / INFORMATION ON INGREDIENTS

Reportable Hazardous Substance(s) or Complex Substance(s)

Name	CAS#	Concentration*
DIETHYLENE GLYCOL	111-46-6	1 - 5%
ETHYLENE GLYCOL	107-21-1	40 - 50%
INORGANIC SALTS AND ORGANIC ACID SALTS		< 2%

* All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume.

SECTION 3 HAZARDS IDENTIFICATION

This material is considered to be hazardous according to regulatory guidelines (see (M)SDS Section 15).

POTENTIAL HEALTH EFFECTS

May cause harm to the unborn child. Harmful or fatal if swallowed. Ingestion may cause serious adverse effects and may be fatal. May cause kidney failure and central nervous system effects. Prolonged exposure to elevated concentrations of mist or liquid may cause irritation of the skin, eyes, and respiratory tract. High-pressure injection under skin may cause serious damage.

Target Organs: Kidney | Reproductive system |

NFPA Hazard ID:	Health:	1	Flammability:	1	Reactivity:	0
HMIS Hazard ID:	Health:	2*	Flammability:	0	Reactivity:	0

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

SECTION 4 FIRST AID MEASURES

INHALATION

Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

SKIN CONTACT

Wash contact areas with soap and water. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

EYE CONTACT

Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION

Seek immediate medical attention.

NOTE TO PHYSICIAN

This product contains ethylene glycol and/or diethylene glycol which, if ingested, are metabolized to toxic metabolites by the enzyme alcohol dehydrogenase, for which ethanol and 4-methylpyrazole {U.S. drug name Fomepizole, trade name Antizol} are antagonists. Administration of oral or intravenous ethanol or intravenous 4-methylpyrazole may arrest further metabolism of this material and thereby ameliorate the toxicity. Use of ethanol or 4-methylpyrazole does not affect toxic metabolites that are already present and is not a substitute for hemodialysis.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

Appropriate Extinguishing Media: Use water fog, alcohol-resistant foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

Inappropriate Extinguishing Media: Straight Streams of Water or Regular Foam

FIRE FIGHTING

Fire Fighting Instructions: Material will not burn. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply.

Unusual Fire Hazards: Hazardous material. Firefighters should consider protective equipment indicated in Section 8.

Hazardous Combustion Products: Smoke, Fume, Aldehydes, Incomplete combustion products, Oxides of carbon

FLAMMABILITY PROPERTIES

Flash Point [Method]: N/A
Flammable Limits (Approximate volume % in air): LEL: N/D UEL: N/D
Autoignition Temperature: >371°C (700°F)

SECTION 6 ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry creeks. The National Response Center can be reached at (800)424-8802.

PROTECTIVE MEASURES

Avoid contact with spilled material. Warn or evacuate occupants in surrounding and downwind areas if required due to toxicity or flammability of the material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders.

SPILL MANAGEMENT

Land Spill: Stop leak if you can do it without risk. Do not touch or walk through spilled material. Small Spills: Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. Recover by pumping or with suitable absorbent.

Water Spill: Stop leak if you can do it without risk. Consult an expert. Warn other shipping. Material will sink. Remove material, as much as possible, using mechanical equipment.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Remove debris in path of spill and remove contaminated debris from shoreline and water surface and dispose of according to local regulations. Large Spills: Dike far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7 HANDLING AND STORAGE

HANDLING

Avoid breathing mists or vapors. Avoid contact with skin. Prevent small spills and leakage to avoid slip hazard.

Static Accumulator: This material is not a static accumulator.

STORAGE

Do not store in open or unlabelled containers.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMIT VALUES

Exposure limits/standards (Note: Exposure limits are not additive)

Source	Form	Limit / Standard			NOTE	Source
DIETHYLENE GLYCOL		TWA	10 mg/m3		N/A	AIHA WEEL
ETHYLENE GLYCOL	Aerosol.	Ceiling	100 mg/m3		N/A	ACGIH

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:

No special requirements under ordinary conditions of use and with adequate ventilation.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:

No protection is ordinarily required under normal conditions of use and with adequate ventilation.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use

conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:

If prolonged or repeated contact is likely, chemical resistant gloves are recommended. If contact with forearms is likely, wear gauntlet style gloves.

Eye Protection: If contact is likely, safety glasses with side shields are recommended.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:

If prolonged or repeated contact is likely, chemical, and oil resistant clothing is recommended.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

ENVIRONMENTAL CONTROLS

See Sections 6, 7, 12, 13.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Typical physical and chemical properties are given below. Consult the Supplier in Section 1 for additional data.

GENERAL INFORMATION

Physical State: Liquid
Color: Orange
Odor: Characteristic
Odor Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15 C): 1.07
Flash Point [Method]: N/A
Flammable Limits (Approximate volume % in air): LEL: N/D UEL: N/D
Autoignition Temperature: >371°C (700°F)
Boiling Point / Range: 106C (223F) - 108C (226F)
Vapor Density (Air = 1): 2.1 at 101 kPa [n-Butyl Acetate]
Vapor Pressure: < 0.013 kPa (0.1 mm Hg) at 20 C
Evaporation Rate (n-butyl acetate = 1): N/D
pH: 8.6
Log Pow (n-Octanol/Water Partition Coefficient): < 2
Solubility in Water: Complete
Viscosity: <15.6 cSt (15.6 mm2/sec) at 40 C
Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION

Freezing Point: -37°C (-35°F)
Melting Point: N/D

SECTION 10 STABILITY AND REACTIVITY

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: High energy sources of ignition.

MATERIALS TO AVOID: Strong oxidizers, Strong Acids

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Route of Exposure	Conclusion / Remarks
Inhalation	
Toxicity (Rat): LC50 > 5000 mg/m3	Minimally Toxic. Based on test data for structurally similar materials.
Irritation: Data available.	Negligible hazard at ambient/normal handling temperatures. Based on test data for structurally similar materials.
Ingestion	
Toxicity (Human): LDLo 100 ml	Moderately toxic. Based on test data for structurally similar materials.
Skin	
Toxicity (Rabbit): LD50 > 2000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Irritation (Rabbit): Data available.	Negligible irritation to skin at ambient temperatures. Based on test data for structurally similar materials.
Eye	
Irritation (Rabbit): Data available.	May cause mild, short-lasting discomfort to eyes. Based on test data for structurally similar materials.

CHRONIC/OTHER EFFECTS

Contains:

DIETHYLENE GLYCOL (DEG): Orally, DEG is more toxic to humans than animal test data indicate. Probable lethal dose for an adult is about 50 ml (2 oz.), or 2 -3 swallows. Smaller amounts may cause kidney degeneration and failure. Benign urinary bladder tumors were observed in rats, no tumors were observed in mice.

ETHYLENE GLYCOL (EG): Repeated high oral exposure has caused kidney damage, neurological effects, degeneration of the liver and changes in blood chemistry and circulating blood cells in laboratory animals. Repeated overexposure has the potential to cause similar toxic effects in humans. EG causes developmental and reproductive effects at high dose levels in laboratory animals. The relevance of these findings to humans is uncertain.

Additional information is available by request.

The following ingredients are cited on the lists below: None.

--REGULATORY LISTS SEARCHED--

1 = NTP CARC 3 = IARC 1 5 = IARC 2B

2 = NTP SUS 4 = IARC 2A 6 = OSHA CARC

SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY

Material -- Not expected to be harmful to aquatic organisms.

MOBILITY

Material -- Expected to remain in water or migrate through soil.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Material -- Expected to be readily biodegradable.

Atmospheric Oxidation:

Material -- Expected to degrade rapidly in air

BIOACCUMULATION POTENTIAL

Material -- Potential to bioaccumulate is low.

SECTION 13 DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS

Even though this product is biodegradable, it must not be indiscriminately discarded into the environment. Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products.

REGULATORY DISPOSAL INFORMATION

RCRA Information: The unused product, in our opinion, is not specifically listed by the EPA as a hazardous waste (40 CFR, Part 261D), nor is it formulated to contain materials which are listed as hazardous wastes. It does not exhibit the hazardous characteristics of ignitability, corrosivity or reactivity and is not formulated with contaminants as determined by the Toxicity Characteristic Leaching Procedure (TCLP). However, used product may be regulated.

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14 TRANSPORT INFORMATION

LAND (DOT)

Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCES, LIQUID, N.O.S. (Ethylene Glycol)

Hazard Class & Division: 9

ID Number: 3082

Packing Group: III

Product RQ: 10638.3 LBS - ETHYLENE GLYCOL

ERG Number: 171

Label(s): 9

Transport Document Name: UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCES, LIQUID, N.O.S. (Ethylene Glycol), 9, PG III, RQ

Footnote: This material is not regulated under 49 CFR when the quantity in a package is less than the Product RQ.

LAND (TDG): Not Regulated for Land Transport

SEA (IMDG): Not Regulated for Sea Transport according to IMDG-Code

AIR (IATA): Not Regulated for Air Transport

SECTION 15 REGULATORY INFORMATION

OSHA HAZARD COMMUNICATION STANDARD: When used for its intended purpose, this material is classified as hazardous in accordance with OSHA 29CFR 1910.1200.

Complies with the following national/regional chemical inventory requirements:: TSCA

EPCRA: This material contains no extremely hazardous substances.

CERCLA:

Chemical Name	CAS Number	Typical Value	Component RQ	Product RQ
ETHYLENE GLYCOL	107-21-1	40 - 50%	5000 LBS	10638.3 LBS

SARA (311/312) REPORTABLE HAZARD CATEGORIES: Immediate Health. Delayed Health.

SARA (313) TOXIC RELEASE INVENTORY:

Chemical Name	CAS Number	Typical Value
ETHYLENE GLYCOL	107-21-1	40 - 50%

The following ingredients are cited on the lists below:

Chemical Name	CAS Number	List Citations
DIETHYLENE GLYCOL	111-46-6	16, 19
ETHYLENE GLYCOL	107-21-1	1, 13, 16, 17, 18, 19

--REGULATORY LISTS SEARCHED--

1 = ACGIH ALL	6 = TSCA 5a2	11 = CA P65 REPRO	16 = MN RTK
2 = ACGIH A1	7 = TSCA 5e	12 = CA RTK	17 = NJ RTK
3 = ACGIH A2	8 = TSCA 6	13 = IL RTK	18 = PA RTK
4 = OSHA Z	9 = TSCA 12b	14 = LA RTK	19 = RI RTK
5 = TSCA 4	10 = CA P65 CARC	15 = MI 293	

Code key: CARC=Carcinogen; REPRO=Reproductive

SECTION 16 OTHER INFORMATION

N/D = Not determined, N/A = Not applicable

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:

Revision Changes:
Section 04: First Aid Inhalation - Header was modified.
Section 04: First Aid Ingestion - Header was modified.
Section 06: Protective Measures was modified.
Section 09: Color was modified.
Section 09: Evaporation Rate - Header was modified.
Hazard Identification: Health Hazards was modified.
Hazard Identification: NFPA Flammability was modified.
Section 11: Inhalation Lethality Test Data was modified.
Section 09: Viscosity was modified.
Section 14: Product RQ was modified.
Hazard Identification: Health Hazards was modified.
Composition: Component table was modified.
Section 15: List Citations Table was modified.
Section 15: CERCLA Table was modified.
Section 15: National Chemical Inventory Listing - Header was modified.
Section 15: SARA (313) TOXIC RELEASE INVENTORY - Table was modified.
Section 16: NA Contains was modified.
Section 08: Exposure Limits Table was modified.

PRECAUTIONARY LABEL TEXT:

Contains: ETHYLENE GLYCOL

DANGER!

HEALTH HAZARDS

May cause harm to the unborn child. Harmful or fatal if swallowed.

Target Organs: Kidney | Reproductive system |

FIRST AID

Inhalation: Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

Eye: Flush thoroughly with water. If irritation occurs, get medical assistance.

Oral: Seek immediate medical attention.

Skin: Wash contact areas with soap and water. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

FIRE FIGHTING MEDIA

Use water fog, alcohol-resistant foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

SPILL/LEAK

Land Spill: Stop leak if you can do it without risk. Small Spills: Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. Recover by pumping or with suitable absorbent. Do not touch or walk through spilled material.

Water Spill: Stop leak if you can do it without risk. Report spills as required to appropriate authorities. Material will sink. This product emulsifies, disperses or is miscible in water. Consult an expert.

Internal Use Only

MHC: 2, 0, 0, 0, 0, 0 PPEC: C

DGN: 7074341XUS (1011503)

MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: **MOBILGREASE CM-P**
Product Description: Base Oil and Additives
Product Code: 2015A0106050, 530147-00
Intended Use: Grease

COMPANY IDENTIFICATION

Supplier: **EXXON MOBIL CORPORATION**
3225 GALLOWS RD.
FAIRFAX, VA. 22037 USA

24 Hour Health Emergency	609-737-4411
Transportation Emergency Phone	800-424-9300
ExxonMobil Transportation No.	281-834-3296
Product Technical Information	800-662-4525, 800-947-9147
MSDS Internet Address	http://www.exxon.com, http://www.mobil.com

SECTION 2 COMPOSITION / INFORMATION ON INGREDIENTS

Reportable Hazardous Substance(s) or Complex Substance(s)

Name	CAS#	Concentration*
MOLYBDENUM (IV) SULFIDE	1317-33-5	1 - 5%
PHOSPHORODITHOIC ACID, O,O-DI C1-14-ALKYL ESTERS, ZINC SALTS (2:1) (ZDDP)	68649-42-3	1 - 2.5%

* All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume.

SECTION 3 HAZARDS IDENTIFICATION

This material is not considered to be hazardous according to regulatory guidelines (see (M)SDS Section 15).

POTENTIAL HEALTH EFFECTS

Low order of toxicity. Excessive exposure may result in eye, skin, or respiratory irritation. High-pressure injection under skin may cause serious damage.

NFPA Hazard ID:	Health:	0	Flammability:	1	Reactivity:	0
HMIS Hazard ID:	Health:	0	Flammability:	1	Reactivity:	0

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

SECTION 4 FIRST AID MEASURES

INHALATION
Under normal conditions of intended use, this material is not expected to be an inhalation hazard.

SKIN CONTACT
Wash contact areas with soap and water. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

EYE CONTACT
Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION
First aid is normally not required. Seek medical attention if discomfort occurs.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA
Appropriate Extinguishing Media: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

Inappropriate Extinguishing Media: Straight Streams of Water

FIRE FIGHTING
Fire Fighting Instructions: Evacuate area. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Firefighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Hazardous Combustion Products: Smoke, Fume, Aldehydes, Sulfur oxides, Incomplete combustion products, Oxides of carbon

FLAMMABILITY PROPERTIES
Flash Point [Method]: >204C (400F) [EST. FOR OIL, ASTM D-92 (COC)]
Flammable Limits (Approximate volume % in air): LEL: N/D UEL: N/D
Autoignition Temperature: N/D

SECTION 6 ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES
In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry creeks. The

National Response Center can be reached at (800)424-8802.

PROTECTIVE MEASURES

Avoid contact with spilled material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders. For emergency responders: Respiratory protection: respiratory protection will be necessary only in special cases, e.g., formation of mists. Half-face or full-face respirator with filter(s) for dust/organic vapor or Self Contained Breathing Apparatus (SCBA) can be used depending on the size of spill and potential level of exposure. If the exposure cannot be completely characterized or an oxygen deficient atmosphere is possible or anticipated, SCBA is recommended. Work gloves that are resistant to hydrocarbons are recommended. Gloves made of polyvinyl acetate (PVA) are not water-resistant and are not suitable for emergency use. Chemical goggles are recommended if splashes or contact with eyes is possible. Small spills: normal antistatic work clothes are usually adequate. Large spills: full body suit of chemical resistant, antistatic material is recommended.

SPILL MANAGEMENT

Land Spill: Scrape up spilled material with shovels into a suitable container for recycle or disposal.

Water Spill: Stop leak if you can do it without risk. Confine the spill immediately with booms. Warn other shipping. Skim from surface.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7 HANDLING AND STORAGE

HANDLING

Prevent small spills and leakage to avoid slip hazard.

Static Accumulator: This material is not a static accumulator.

STORAGE

Do not store in open or unlabelled containers.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMIT VALUES

Exposure limits/standards (Note: Exposure limits are not additive)

Source	Form	Limit / Standard			NOTE	Source
MOLYBDENUM (IV) SULFIDE [as Mo]	Total dust.	TWA	15 mg/m3		N/A	OSHA Z1
MOLYBDENUM (IV) SULFIDE [as Mo]	Inhalable fraction.	TWA	10 mg/m3		N/A	ACGIH
MOLYBDENUM (IV) SULFIDE [as Mo]	Respirable	TWA	3 mg/m3		N/A	ACGIH

	fraction.					

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:
No special requirements under ordinary conditions of use and with adequate ventilation.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:
No protection is ordinarily required under normal conditions of use and with adequate ventilation.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:
No protection is ordinarily required under normal conditions of use.

Eye Protection: If contact is likely, safety glasses with side shields are recommended.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:
No skin protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid skin contact.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

ENVIRONMENTAL CONTROLS

See Sections 6, 7, 12, 13.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Note: Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.

GENERAL INFORMATION

Physical State: Solid
Form: Semi-fluid
Color: Gray
Odor: Characteristic
Odor Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15 C): 0.919
Flash Point [Method]: >204C (400F) [EST. FOR OIL, ASTM D-92 (COC)]
Flammable Limits (Approximate volume % in air): LEL: N/D UEL: N/D
Autoignition Temperature: N/D
Boiling Point / Range: > 316C (600F) [Estimated]
Vapor Density (Air = 1): N/D
Vapor Pressure: < 0.013 kPa (0.1 mm Hg) at 20 C [Estimated]
Evaporation Rate (n-butyl acetate = 1): N/D
pH: N/A
Log Pow (n-Octanol/Water Partition Coefficient): > 3.5 [Estimated]
Solubility in Water: Negligible
Viscosity: 320 cSt (320 mm2/sec) at 40 C
Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION

Freezing Point: N/D
Melting Point: 260°C (500°F)
DMSO Extract (mineral oil only), IP-346: < 3 %wt
Decomposition Temperature: N/D

NOTE: Most physical properties above are for the oil component in the material.

SECTION 10 STABILITY AND REACTIVITY

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Excessive heat. High energy sources of ignition.

MATERIALS TO AVOID: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Route of Exposure	Conclusion / Remarks

Inhalation	
Toxicity: No end point data.	Minimally Toxic. Based on assessment of the components.
Irritation: No end point data.	Negligible hazard at ambient/normal handling temperatures. Based on assessment of the components.
Ingestion	
Toxicity (Rat): LD50 > 5000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Skin	
Toxicity (Rabbit): LD50 > 5000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Irritation (Rabbit): Data available.	Negligible irritation to skin at ambient temperatures. Based on assessment of the components.
Eye	
Irritation (Rabbit): Data available.	May cause mild, short-lasting discomfort to eyes. Based on assessment of the components.

CHRONIC/OTHER EFFECTS

Contains:

Base oil severely refined: Not carcinogenic in animal studies. Representative material passes IP-346, Modified Ames test, and/or other screening tests. Dermal and inhalation studies showed minimal effects; lung non-specific infiltration of immune cells, oil deposition and minimal granuloma formation. Not sensitizing in test animals.

Additional information is available by request.

The following ingredients are cited on the lists below: None.

--REGULATORY LISTS SEARCHED--

1 = NTP CARC	3 = IARC 1	5 = IARC 2B
2 = NTP SUS	4 = IARC 2A	6 = OSHA CARC

SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY

Material -- Not expected to be harmful to aquatic organisms.

MOBILITY

Base oil component -- Low solubility and floats and is expected to migrate from water to the land. Expected to partition to sediment and wastewater solids.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Base oil component -- Expected to be inherently biodegradable

BIOACCUMULATION POTENTIAL

Base oil component -- Has the potential to bioaccumulate, however metabolism or physical properties may reduce the bioconcentration or limit bioavailability.

OTHER ECOLOGICAL INFORMATION

VOC (EPA Method 24): 0.077 lbs/gal

SECTION 13 DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products.

REGULATORY DISPOSAL INFORMATION

RCRA Information: The unused product, in our opinion, is not specifically listed by the EPA as a hazardous waste (40 CFR, Part 261D), nor is it formulated to contain materials which are listed as hazardous wastes. It does not exhibit the hazardous characteristics of ignitability, corrositivity or reactivity and is not formulated with contaminants as determined by the Toxicity Characteristic Leaching Procedure (TCLP). However, used product may be regulated.

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14 TRANSPORT INFORMATION

LAND (DOT): Not Regulated for Land Transport

LAND (TDG): Not Regulated for Land Transport

SEA (IMDG): Not Regulated for Sea Transport according to IMDG-Code

AIR (IATA): Not Regulated for Air Transport

SECTION 15 REGULATORY INFORMATION

OSHA HAZARD COMMUNICATION STANDARD: When used for its intended purposes, this material is not classified as hazardous in accordance with OSHA 29 CFR 1910.1200.

Complies with the following national/regional chemical inventory requirements:: ENCS, AICS, TSCA, EINECS,

IECSC, DSL

EPCRA: This material contains no extremely hazardous substances.

SARA (311/312) REPORTABLE HAZARD CATEGORIES: None.

SARA (313) TOXIC RELEASE INVENTORY:

Chemical Name	CAS Number	Typical Value
PHOSPHORODITHOIC ACID, O,O-DI C1-14-ALKYL ESTERS, ZINC SALTS (2:1) (ZDDP)	68649-42-3	1 - 2.5%

The following ingredients are cited on the lists below:

Chemical Name	CAS Number	List Citations
HYDRO TREATED HEAVY NAPHTHENIC DISTILLATE	64742-52-5	13, 16, 17, 18, 19
HYDROTREATED LIGHT NAPHTHENIC DISTILLATE (PETROLEUM)	64742-53-6	16, 17
MOLYBDENUM (IV) SULFIDE	1317-33-5	1, 4, 13, 16, 19
PHOSPHORODITHOIC ACID, O,O-DI C1-14-ALKYL ESTERS, ZINC SALTS (2:1) (ZDDP)	68649-42-3	13, 15, 17
ZINC DINONYLNAPHTHALENE SULFONATE	28016-00-4	15

--REGULATORY LISTS SEARCHED--

1 = ACGIH ALL	6 = TSCA 5a2	11 = CA P65 REPRO	16 = MN RTK
2 = ACGIH A1	7 = TSCA 5e	12 = CA RTK	17 = NJ RTK
3 = ACGIH A2	8 = TSCA 6	13 = IL RTK	18 = PA RTK
4 = OSHA Z	9 = TSCA 12b	14 = LA RTK	19 = RI RTK
5 = TSCA 4	10 = CA P65 CARC	15 = MI 293	

Code key: CARC=Carcinogen; REPRO=Reproductive

SECTION 16 OTHER INFORMATION

N/D = Not determined, N/A = Not applicable

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:
Revision Changes:
Section 04: First Aid Skin was modified.
Section 04: First Aid Inhalation was modified.
Section 06: Notification Procedures - Header was modified.

Section 01: Product Code was modified.
Section 10 Stability and Reactivity - Header was modified.
Section 13: Disposal Recommendations - Note was modified.
Section 13: Empty Container Warning was modified.
Section 09: Phys/Chem Properties Note was modified.
Section 09: Boiling Point C(F) was modified.
Section 09: n-Octanol/Water Partition Coefficient was modified.
Section 08: Personal Protection was modified.
Section 08: Hand Protection was modified.
Section 09: Vapor Pressure was modified.
Section 07: Handling and Storage - Handling was modified.
Section 11: Dermal Lethality Test Data was modified.
Section 11: Oral Lethality Test Data was modified.
Section 11: Inhalation Lethality Test Data was modified.
Section 05: Hazardous Combustion Products was modified.
Section 06: Accidental Release - Spill Management - Land was modified.
Section 06: Accidental Release - Spill Management - Water was modified.
Section 09: Relative Density - Header was modified.
Section 09: Flash Point C(F) was modified.
Section 09: Viscosity was modified.
Section 14: Sea (IMDG) - Header was modified.
Section 14: Air (IATA) - Header was modified.
Section 14: LAND (TDG) - Header was modified.
Section 14: LAND (DOT) - Header was modified.
Composition: Component table was modified.
Section 15: List Citations Table was modified.
Section 15: List Citation Table - Header was modified.
Section 14: LAND (DOT) - Default was modified.
Section 14: LAND (TDG) Default was modified.
Section 14: Sea (IMDG) - Default was modified.
Section 14: Air (IATA) - Default was modified.
Section 11: Skin Irritation Conclusion was modified.
Section 11: Inhalation Lethality Test Comment was modified.
Section 15: National Chemical Inventory Listing - Header was modified.
Section 15: SARA (313) TOXIC RELEASE INVENTORY - Table was modified.
Section 15: National Chemical Inventory Listing was modified.
Section 16: Code to MHCs was modified.
Section 08: Exposure limits/standards was modified.
Section 15: OSHA Hazard Communication Standard was modified.
Hazard Identification: OSHA - May be Hazardous Statement was modified.
Section 06: Notification Procedures was modified.
Section 08: Exposure Limits Table was modified.
Section 09: Oxidizing Properties was modified.
Section 08: OEL Table - Notation Column - Header was modified.
Section 08: Exposure Limit Values - Header was modified.
Section 01: Company Contact Methods Sorted by Priority was modified.
Section 06: Protective Measures was added.
Section 06: Accidental Release - Protective Measures - Header was added.
Section 09: Decomposition Temperature was added.
Section 09: Decomposition Temp - Header was added.
Section 09: Vapor Pressure was added.
Section 15: TSCA Class 2 Statement was deleted.

The information and recommendations contained herein are, to the best of ExxonMobil's knowledge and belief, accurate and reliable as of the date issued. You can contact ExxonMobil to insure that this document is the most current available from ExxonMobil. The information and recommendations are offered for the user's consideration and examination. It is the user's responsibility to satisfy itself that the product is suitable for the intended use. If buyer repackages this product, it is the user's responsibility to insure proper health, safety and other necessary information is included with and/or on the container. Appropriate warnings and safe-handling procedures should be provided to handlers and users. Alteration of this document is strictly prohibited. Except to the extent required by law, re-publication or retransmission of this document, in whole or in part, is not permitted. The term, "ExxonMobil" is used for convenience, and may include any one or more of ExxonMobil Chemical Company, Exxon Mobil Corporation, or any affiliates in which they directly or indirectly hold any interest.

Internal Use Only

MHC: 0B, 0B, 0, 0, 0, 0 PPEC: A

DGN: 2006083XUS (550247)

MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: **MOBILGREASE XHP 462**
Product Description: Base Oil and Additives
Product Code: 2015A0202527, 642538-00, 97AB14
Intended Use: Grease

COMPANY IDENTIFICATION

Supplier: **EXXON MOBIL CORPORATION**
3225 GALLOWS RD.
FAIRFAX, VA. 22037 USA

24 Hour Health Emergency	609-737-4411
Transportation Emergency Phone	800-424-9300
ExxonMobil Transportation No.	281-834-3296
Product Technical Information	800-662-4525, 800-947-9147
MSDS Internet Address	http://www.exxon.com, http://www.mobil.com

SECTION 2 COMPOSITION / INFORMATION ON INGREDIENTS

Reportable Hazardous Substance(s) or Complex Substance(s)

Name	CAS#	Concentration*
ZINC DITHIOPHOSPHATE	68649-42-3	1 - 2.5%

* All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume.

SECTION 3 HAZARDS IDENTIFICATION

This material is not considered to be hazardous according to regulatory guidelines (see (M)SDS Section 15).

POTENTIAL HEALTH EFFECTS

Low order of toxicity. Excessive exposure may result in eye, skin, or respiratory irritation. High-pressure injection under skin may cause serious damage.

NFPA Hazard ID:	Health:	0	Flammability:	1	Reactivity:	0
HMIS Hazard ID:	Health:	0	Flammability:	1	Reactivity:	0

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary

from person to person.

SECTION 4 FIRST AID MEASURES

INHALATION

Under normal conditions of intended use, this material is not expected to be an inhalation hazard.

SKIN CONTACT

Wash contact areas with soap and water. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

EYE CONTACT

Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION

First aid is normally not required. Seek medical attention if discomfort occurs.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

Appropriate Extinguishing Media: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

Inappropriate Extinguishing Media: Straight Streams of Water

FIRE FIGHTING

Fire Fighting Instructions: Evacuate area. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Firefighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Hazardous Combustion Products: Smoke, Fume, Aldehydes, Sulfur oxides, Incomplete combustion products, Oxides of carbon

FLAMMABILITY PROPERTIES

Flash Point [Method]: >294C (561F) [EST. FOR OIL, ASTM D-92 (COC)]
Flammable Limits (Approximate volume % in air): LEL: N/D UEL: N/D
Autoignition Temperature: N/D

SECTION 6 ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable

regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry creeks. The National Response Center can be reached at (800)424-8802.

PROTECTIVE MEASURES

Avoid contact with spilled material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders. For emergency responders: Respiratory protection: respiratory protection will be necessary only in special cases, e.g., formation of mists. Half-face or full-face respirator with filter(s) for dust/organic vapor or Self Contained Breathing Apparatus (SCBA) can be used depending on the size of spill and potential level of exposure. If the exposure cannot be completely characterized or an oxygen deficient atmosphere is possible or anticipated, SCBA is recommended. Work gloves that are resistant to hydrocarbons are recommended. Gloves made of polyvinyl acetate (PVA) are not water-resistant and are not suitable for emergency use. Chemical goggles are recommended if splashes or contact with eyes is possible. Small spills: normal antistatic work clothes are usually adequate. Large spills: full body suit of chemical resistant, antistatic material is recommended.

SPILL MANAGEMENT

Land Spill: Scrape up spilled material with shovels into a suitable container for recycle or disposal.

Water Spill: Stop leak if you can do it without risk. Confine the spill immediately with booms. Warn other shipping. Skim from surface.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7 HANDLING AND STORAGE

HANDLING

Prevent small spills and leakage to avoid slip hazard.

Static Accumulator: This material is not a static accumulator.

STORAGE

Do not store in open or unlabelled containers.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMIT VALUES

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:

No special requirements under ordinary conditions of use and with adequate ventilation.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:

No protection is ordinarily required under normal conditions of use and with adequate ventilation.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:

No protection is ordinarily required under normal conditions of use.

Eye Protection: If contact is likely, safety glasses with side shields are recommended.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:

No skin protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid skin contact.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

ENVIRONMENTAL CONTROLS

See Sections 6, 7, 12, 13.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Note: Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.

GENERAL INFORMATION

Physical State: Solid
Form: Semi-fluid
Color: Blue
Odor: Characteristic
Odor Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15 C): 0.9
Flash Point [Method]: >294C (561F) [EST. FOR OIL, ASTM D-92 (COC)]
Flammable Limits (Approximate volume % in air): LEL: N/D UEL: N/D
Autoignition Temperature: N/D
Boiling Point / Range: > 316C (600F) [Estimated]
Vapor Density (Air = 1): N/D
Vapor Pressure: < 0.013 kPa (0.1 mm Hg) at 20 C [Estimated]
Evaporation Rate (n-butyl acetate = 1): N/D
pH: N/A
Log Pow (n-Octanol/Water Partition Coefficient): > 3.5 [Estimated]
Solubility in Water: Negligible
Viscosity: 460 cSt (460 mm2/sec) at 40 C
Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION

Freezing Point: N/D
Melting Point: N/D
DMSO Extract (mineral oil only), IP-346: < 3 %wt
Decomposition Temperature: N/D

NOTE: Most physical properties above are for the oil component in the material.

SECTION 10 STABILITY AND REACTIVITY

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Excessive heat. High energy sources of ignition.

MATERIALS TO AVOID: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Route of Exposure	Conclusion / Remarks
Inhalation	
Toxicity: No end point data.	Minimally Toxic. Based on assessment of the components.
Irritation: No end point data.	Negligible hazard at ambient/normal handling temperatures. Based on assessment of the components.
Ingestion	
Toxicity (Rat): LD50 > 5000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Skin	
Toxicity (Rabbit): LD50 > 5000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Irritation (Rabbit): Data available.	Negligible irritation to skin at ambient temperatures. Based on assessment of the components.
Eye	
Irritation (Rabbit): Data available.	May cause mild, short-lasting discomfort to eyes. Based on assessment of the components.

CHRONIC/OTHER EFFECTS

Contains:

Base oil severely refined: Not carcinogenic in animal studies. Representative material passes IP-346, Modified Ames test, and/or other screening tests. Dermal and inhalation studies showed minimal effects; lung non-specific infiltration of immune cells, oil deposition and minimal granuloma formation. Not sensitizing in test animals.

Additional information is available by request.

The following ingredients are cited on the lists below: None.

--REGULATORY LISTS SEARCHED--

1 = NTP CARC	3 = IARC 1	5 = IARC 2B
2 = NTP SUS	4 = IARC 2A	6 = OSHA CARC

SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY

Material -- Not expected to be harmful to aquatic organisms.

MOBILITY

Base oil component -- Low solubility and floats and is expected to migrate from water to the land. Expected to partition to sediment and wastewater solids.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Base oil component -- Expected to be inherently biodegradable

BIOACCUMULATION POTENTIAL

Base oil component -- Has the potential to bioaccumulate, however metabolism or physical properties may reduce the bioconcentration or limit bioavailability.

SECTION 13 DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products.

REGULATORY DISPOSAL INFORMATION

RCRA Information: The unused product, in our opinion, is not specifically listed by the EPA as a hazardous waste (40 CFR, Part 261D), nor is it formulated to contain materials which are listed as hazardous wastes. It does not exhibit the hazardous characteristics of ignitability, corrositivity or reactivity and is not formulated with contaminants as determined by the Toxicity Characteristic Leaching Procedure (TCLP). However, used product may be regulated.

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14 TRANSPORT INFORMATION

LAND (DOT): Not Regulated for Land Transport

LAND (TDG): Not Regulated for Land Transport

SEA (IMDG): Not Regulated for Sea Transport according to IMDG-Code

AIR (IATA): Not Regulated for Air Transport

SECTION 15 REGULATORY INFORMATION

OSHA HAZARD COMMUNICATION STANDARD: When used for its intended purposes, this material is not classified as hazardous in accordance with OSHA 29 CFR 1910.1200.

Complies with the following national/regional chemical inventory requirements:: PICCS, KECI, TSCA, AICS, EINECS, IECSC

Special Cases:

Inventory	Status
ENCS	Restrictions Apply
NDSL	Restrictions Apply

EPCRA: This material contains no extremely hazardous substances.

SARA (311/312) REPORTABLE HAZARD CATEGORIES: None.

SARA (313) TOXIC RELEASE INVENTORY:

Chemical Name	CAS Number	Typical Value
ZINC DITHIOPHOSPHATE	68649-42-3	1 - 2.5%

The following ingredients are cited on the lists below:

Chemical Name	CAS Number	List Citations
NAPHTHENIC ACIDS, ZINC SALTS	12001-85-3	15
ZINC DITHIOPHOSPHATE	68649-42-3	13, 15, 17
ZINC NEODECANOATE	27253-29-8	15

--REGULATORY LISTS SEARCHED--

1 = ACGIH ALL	6 = TSCA 5a2	11 = CA P65 REPRO	16 = MN RTK
2 = ACGIH A1	7 = TSCA 5e	12 = CA RTK	17 = NJ RTK
3 = ACGIH A2	8 = TSCA 6	13 = IL RTK	18 = PA RTK
4 = OSHA Z	9 = TSCA 12b	14 = LA RTK	19 = RI RTK
5 = TSCA 4	10 = CA P65 CARC	15 = MI 293	

Code key: CARC=Carcinogen; REPRO=Reproductive

SECTION 16 OTHER INFORMATION

N/D = Not determined, N/A = Not applicable

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:

Revision Changes:
Section 06: Notification Procedures - Header was modified.
Section 01: Product Code was modified.
Section 10 Stability and Reactivity - Header was modified.
Section 13: Disposal Recommendations - Note was modified.
Section 09: Phys/Chem Properties Note was modified.
Section 09: Boiling Point C(F) was modified.

Section 09: n-Octanol/Water Partition Coefficient was modified.
Section 08: Personal Protection was modified.
Section 07: Handling and Storage - Handling was modified.
Section 11: Dermal Lethality Test Data was modified.
Section 11: Oral Lethality Test Data was modified.
Section 11: Inhalation Lethality Test Data was modified.
Section 05: Hazardous Combustion Products was modified.
Section 06: Accidental Release - Spill Management - Water was modified.
Section 09: Relative Density - Header was modified.
Section 09: Flash Point C(F) was modified.
Section 09: Viscosity was modified.
Section 14: Sea (IMDG) - Header was modified.
Section 14: Air (IATA) - Header was modified.
Section 14: LAND (TDG) - Header was modified.
Section 14: LAND (DOT) - Header was modified.
Composition: Component table was modified.
Section 15: List Citations Table was modified.
Section 15: List Citation Table - Header was modified.
Section 14: LAND (DOT) - Default was modified.
Section 14: LAND (TDG) Default was modified.
Section 14: Sea (IMDG) - Default was modified.
Section 14: Air (IATA) - Default was modified.
Section 15: National Chemical Inventory Listing - Header was modified.
Section 15: SARA (313) TOXIC RELEASE INVENTORY - Table was modified.
Section 15: National Chemical Inventory Listing was modified.
Section 16: Code to MHCs was modified.
Section 08: Exposure limits/standards was modified.
Section 15: OSHA Hazard Communication Standard was modified.
Section 15: Special Cases Table was modified.
Hazard Identification: OSHA - May be Hazardous Statement was modified.
Section 06: Notification Procedures was modified.
Section 09: Oxidizing Properties was modified.
Section 01: Company Contact Methods Sorted by Priority was modified.
Section 06: Protective Measures was added.
Section 06: Accidental Release - Protective Measures - Header was added.
Section 09: Decomposition Temperature was added.
Section 09: Decomposition Temp - Header was added.
Section 09: Vapor Pressure was added.

Internal Use Only

MHC: 0B, 0B, 0, 0, 0, 0 PPEC: A

DGN: 7049658XUS (1009426)

MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: **MOBIL HYDRAULIC AW 68**
Product Description: Base Oil and Additives
Product Code: 201560106520, 583039-49, 970557
Intended Use: Hydraulic fluid

COMPANY IDENTIFICATION

Supplier: **EXXON MOBIL CORPORATION**
3225 GALLOWS RD.
FAIRFAX, VA. 22037 USA

24 Hour Health Emergency	609-737-4411
Transportation Emergency Phone	800-424-9300
ExxonMobil Transportation No.	281-834-3296
Product Technical Information	800-662-4525, 800-947-9147
MSDS Internet Address	http://www.exxon.com, http://www.mobil.com

SECTION 2 COMPOSITION / INFORMATION ON INGREDIENTS

No Reportable Hazardous Substance(s) or Complex Substance(s).

SECTION 3 HAZARDS IDENTIFICATION

This material is not considered to be hazardous according to regulatory guidelines (see (M)SDS Section 15).

POTENTIAL HEALTH EFFECTS

Excessive exposure may result in eye, skin, or respiratory irritation. High-pressure injection under skin may cause serious damage.

NFPA Hazard ID:	Health:	0	Flammability:	1	Reactivity:	0
HMIS Hazard ID:	Health:	0	Flammability:	1	Reactivity:	0

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

SECTION 4 FIRST AID MEASURES

INHALATION

Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use

adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

SKIN CONTACT

Wash contact areas with soap and water. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

EYE CONTACT

Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION

First aid is normally not required. Seek medical attention if discomfort occurs.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

Appropriate Extinguishing Media: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

Inappropriate Extinguishing Media: Straight Streams of Water

FIRE FIGHTING

Fire Fighting Instructions: Evacuate area. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Firefighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Unusual Fire Hazards: Pressurized mists may form a flammable mixture.

Hazardous Combustion Products: Smoke, Fume, Aldehydes, Sulfur oxides, Incomplete combustion products, Oxides of carbon

FLAMMABILITY PROPERTIES

Flash Point [Method]: >218°C (424°F) [ASTM D-92]
Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0
Autoignition Temperature: N/D

SECTION 6 ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry creeks. The

National Response Center can be reached at (800)424-8802.

PROTECTIVE MEASURES

Avoid contact with spilled material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders. For emergency responders: Respiratory protection: respiratory protection will be necessary only in special cases, e.g., formation of mists. Half-face or full-face respirator with filter(s) for dust/organic vapor or Self Contained Breathing Apparatus (SCBA) can be used depending on the size of spill and potential level of exposure. If the exposure cannot be completely characterized or an oxygen deficient atmosphere is possible or anticipated, SCBA is recommended. Work gloves that are resistant to hydrocarbons are recommended. Gloves made of polyvinyl acetate (PVA) are not water-resistant and are not suitable for emergency use. Chemical goggles are recommended if splashes or contact with eyes is possible. Small spills: normal antistatic work clothes are usually adequate. Large spills: full body suit of chemical resistant, antistatic material is recommended.

SPILL MANAGEMENT

Land Spill: Stop leak if you can do it without risk. Recover by pumping or with suitable absorbent.

Water Spill: Stop leak if you can do it without risk. Confine the spill immediately with booms. Warn other shipping. Remove from the surface by skimming or with suitable absorbents. Seek the advice of a specialist before using dispersants.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Large Spills: Dike far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7 HANDLING AND STORAGE

HANDLING

Prevent small spills and leakage to avoid slip hazard. Material can accumulate static charges which may cause an electrical spark (ignition source). When the material is handled in bulk, an electrical spark could ignite any flammable vapors from liquids or residues that may be present (e.g., during switch-loading operations). Use proper bonding and/or ground procedures. However, bonding and grounds may not eliminate the hazard from static accumulation. Consult local applicable standards for guidance. Additional references include American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practice on Static Electricity) or CENELEC CLC/TR 50404 (Electrostatics - Code of practice for the avoidance of hazards due to static electricity).

Static Accumulator: This material is a static accumulator.

STORAGE

The container choice, for example storage vessel, may effect static accumulation and dissipation. Do not store in open or unlabelled containers.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure limits/standards for materials that can be formed when handling this product: When mists/aerosols can occur the following are recommended: 5 mg/m³ - ACGIH TLV (inhalable fraction), 5 mg/m³ - OSHA PEL.

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:
No special requirements under ordinary conditions of use and with adequate ventilation.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:
No special requirements under ordinary conditions of use and with adequate ventilation.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:
No protection is ordinarily required under normal conditions of use.

Eye Protection: If contact is likely, safety glasses with side shields are recommended.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:
No skin protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid skin contact.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

ENVIRONMENTAL CONTROLS

Comply with applicable environmental regulations limiting discharge to air, water and soil. Protect the environment by applying appropriate control measures to prevent or limit emissions.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Note: Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.

GENERAL INFORMATION

Physical State: Liquid
Color: Amber
Odor: Characteristic
Odor Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15 °C): 0.883
Flash Point [Method]: >218°C (424°F) [ASTM D-92]
Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0
Autoignition Temperature: N/D
Boiling Point / Range: > 316°C (600°F)
Vapor Density (Air = 1): > 2 at 101 kPa
Vapor Pressure: < 0.013 kPa (0.1 mm Hg) at 20 °C
Evaporation Rate (n-butyl acetate = 1): N/D
pH: N/A
Log Pow (n-Octanol/Water Partition Coefficient): > 3.5
Solubility in Water: Negligible
Viscosity: 68 cSt (68 mm2/sec) at 40 °C | 8.5 cSt (8.5 mm2/sec) at 100°C
Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION

Freezing Point: N/D
Melting Point: N/A
Pour Point: -12°C (10°F)
DMSO Extract (mineral oil only), IP-346: < 3 %wt

SECTION 10 STABILITY AND REACTIVITY

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Excessive heat. High energy sources of ignition.

MATERIALS TO AVOID: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Route of Exposure	Conclusion / Remarks
Inhalation	
Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Irritation: No end point data for material.	Negligible hazard at ambient/normal handling temperatures. Based on assessment of the components.
Ingestion	
Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Skin	
Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Irritation: No end point data for material.	Negligible irritation to skin at ambient temperatures. Based on assessment of the components.
Eye	
Irritation: No end point data for material.	May cause mild, short-lasting discomfort to eyes. Based on assessment of the components.

CHRONIC/OTHER EFFECTS

Contains:

Base oil severely refined: Not carcinogenic in animal studies. Representative material passes IP-346, Modified Ames test, and/or other screening tests. Dermal and inhalation studies showed minimal effects; lung non-specific infiltration of immune cells, oil deposition and minimal granuloma formation. Not sensitizing in test animals.

Additional information is available by request.

The following ingredients are cited on the lists below: None.

--REGULATORY LISTS SEARCHED--

1 = NTP CARC	3 = IARC 1	5 = IARC 2B
2 = NTP SUS	4 = IARC 2A	6 = OSHA CARC

SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY

Material -- Not expected to be harmful to aquatic organisms.

MOBILITY

Base oil component -- Low solubility and floats and is expected to migrate from water to the land. Expected to partition to sediment and wastewater solids.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Base oil component -- Expected to be inherently biodegradable

BIOACCUMULATION POTENTIAL

Base oil component -- Has the potential to bioaccumulate, however metabolism or physical properties may reduce the bioconcentration or limit bioavailability.

OTHER ECOLOGICAL INFORMATION

VOC: 0 G/L [ASTM E1868-10]

SECTION 13 DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products. Protect the environment. Dispose of used oil at designated sites. Minimize skin contact. Do not mix used oils with solvents, brake fluids or coolants.

REGULATORY DISPOSAL INFORMATION

RCRA Information: The unused product, in our opinion, is not specifically listed by the EPA as a hazardous waste (40 CFR, Part 261D), nor is it formulated to contain materials which are listed as hazardous wastes. It does not exhibit the hazardous characteristics of ignitability, corrositivity or reactivity and is not formulated with contaminants as determined by the Toxicity Characteristic Leaching Procedure (TCLP). However, used product may be regulated.

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14 TRANSPORT INFORMATION

LAND (DOT): Not Regulated for Land Transport

LAND (TDG): Not Regulated for Land Transport

SEA (IMDG): Not Regulated for Sea Transport according to IMDG-Code

AIR (IATA): Not Regulated for Air Transport

SECTION 15 REGULATORY INFORMATION

OSHA HAZARD COMMUNICATION STANDARD: When used for its intended purposes, this material is not classified as hazardous in accordance with OSHA 29 CFR 1910.1200.

Complies with the following national/regional chemical inventory requirements:: AICS, DSL, IECSC, PICCS, TSCA

EPCRA SECTION 302: This material contains no extremely hazardous substances.

SARA (311/312) REPORTABLE HAZARD CATEGORIES: None.

SARA (313) TOXIC RELEASE INVENTORY: This material contains no chemicals subject to the supplier notification requirements of the SARA 313 Toxic Release Program.

The following ingredients are cited on the lists below:

Chemical Name	CAS Number	List Citations
ZINC ALKYLDITHIOPHOSPHATE	68649-42-3	15

--REGULATORY LISTS SEARCHED--

1 = ACGIH ALL	6 = TSCA 5a2	11 = CA P65 REPRO	16 = MN RTK
2 = ACGIH A1	7 = TSCA 5e	12 = CA RTK	17 = NJ RTK
3 = ACGIH A2	8 = TSCA 6	13 = IL RTK	18 = PA RTK
4 = OSHA Z	9 = TSCA 12b	14 = LA RTK	19 = RI RTK
5 = TSCA 4	10 = CA P65 CARC	15 = MI 293	

Code key: CARC=Carcinogen; REPRO=Reproductive

SECTION 16 OTHER INFORMATION

N/D = Not determined, N/A = Not applicable

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:
Revision Changes:
Section 04: First Aid Inhalation - Header was modified.
Section 04: First Aid Ingestion - Header was modified.
Section 13: Disposal Considerations - Disposal Recommendations was modified.
Section 09: Phys/Chem Properties Note was modified.
Section 09: Boiling Point C(F) was modified.
Section 09: Evaporation Rate - Header was modified.
Section 08: Comply with applicable regulations phrase was modified.
Section 09: Vapor Pressure was modified.
Section 07: Handling and Storage - Handling was modified.
Section 07: Handling and Storage - Storage Phrases was modified.
Hazard Identification: Health Hazards was modified.

Section 11: Dermal Lethality Test Data was modified.
Section 11: Dermal Lethality Test Comment was modified.
Section 11: Oral Lethality Test Data was modified.
Section 11: Inhalation Lethality Test Data was modified.
Section 11: Dermal Irritation Test Data was modified.
Section 11: Eye Irritation Test Data was modified.
Section 11: Oral Lethality Test Comment was modified.
Section 11: Inhalation Irritation Test Data was modified.
Section 05: Hazardous Combustion Products was modified.
Section 06: Accidental Release - Spill Management - Water was modified.
Section 09: Relative Density - Header was modified.
Section 09: Flash Point C(F) was modified.
Section 09: Viscosity was modified.
Section 09: Viscosity was modified.
Section 14: Sea (IMDG) - Header was modified.
Section 14: Air (IATA) - Header was modified.
Section 14: LAND (TDG) - Header was modified.
Section 14: LAND (DOT) - Header was modified.
Section 15: List Citation Table - Header was modified.
Section 14: LAND (DOT) - Default was modified.
Section 14: LAND (TDG) Default was modified.
Section 14: Sea (IMDG) - Default was modified.
Section 14: Air (IATA) - Default was modified.
Section 15: National Chemical Inventory Listing - Header was modified.
Section 15: National Chemical Inventory Listing was modified.
Section 09: Relative Density was modified.
Section 15: Community RTK - Header was modified.
Section 16: MSN, MAT ID was modified.
Section 08: Exposure limits/standards was modified.
Section 09: Oxidizing Properties was modified.
Section 06: Protective Measures was added.
Section 06: Accidental Release - Protective Measures - Header was added.
Section 12: Other Ecological Information - Header was added.
Section 15: Chemical Name - Header was added.
Section 15: CAS Number - Header was added.
Section 15: List Citations - Header was added.
Section 15: List Citations Table was added.
Section 12: California VOC was added.
Section 12: California VOC was added.
Section 15: Special Cases - Header was deleted.
Section 15: Special Cases Table was deleted.
Section 15: Inventory - Header was deleted.
Section 15: Status - Header was deleted.

Internal Use Only

MHC: 0B, 0B, 0, 0, 0, 0 PPEC: A

DGN: 2006835XUS (1012737)

MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: **MOBIL POLYREX EM**
Product Description: Base Oil and Additives
Product Code: 2015A020G010, 641688-00, 97Y278
Intended Use: Grease

COMPANY IDENTIFICATION

Supplier: **EXXON MOBIL CORPORATION**
3225 GALLOWS RD.
FAIRFAX, VA. 22037 USA

24 Hour Health Emergency	609-737-4411
Transportation Emergency Phone	800-424-9300
ExxonMobil Transportation No.	281-834-3296
Product Technical Information	800-662-4525, 800-947-9147
MSDS Internet Address	http://www.exxon.com, http://www.mobil.com

SECTION 2 COMPOSITION / INFORMATION ON INGREDIENTS

Reportable Hazardous Substance(s) or Complex Substance(s)

Name	CAS#	Concentration*
AMINES, C12-14-ALKYL, ISOOCTYL PHOSPHATES	68187-67-7	1 - 5%

* All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume.

SECTION 3 HAZARDS IDENTIFICATION

This material is not considered to be hazardous according to regulatory guidelines (see (M)SDS Section 15).

POTENTIAL HEALTH EFFECTS

Excessive exposure may result in eye, skin, or respiratory irritation. High-pressure injection under skin may cause serious damage.

NFPA Hazard ID:	Health:	0	Flammability:	1	Reactivity:	0
HMIS Hazard ID:	Health:	0	Flammability:	1	Reactivity:	0

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

SECTION 4 FIRST AID MEASURES

INHALATION
Under normal conditions of intended use, this material is not expected to be an inhalation hazard.

SKIN CONTACT
Wash contact areas with soap and water. Remove contaminated clothing. Launder contaminated clothing before reuse. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

EYE CONTACT
Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION
First aid is normally not required. Seek medical attention if discomfort occurs.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA
Appropriate Extinguishing Media: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

Inappropriate Extinguishing Media: Straight Streams of Water

FIRE FIGHTING
Fire Fighting Instructions: Evacuate area. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Firefighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Hazardous Combustion Products: Smoke, Fume, Aldehydes, Sulfur oxides, Incomplete combustion products, Oxides of carbon

FLAMMABILITY PROPERTIES
Flash Point [Method]: >204°C (399°F) [EST. FOR OIL, ASTM D-92 (COC)]
Flammable Limits (Approximate volume % in air): LEL: N/D UEL: N/D
Autoignition Temperature: N/D

SECTION 6 ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES
In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry creeks. The National Response Center can be reached at (800)424-8802.

PROTECTIVE MEASURES

Avoid contact with spilled material. Warn or evacuate occupants in surrounding and downwind areas if required due to toxicity or flammability of the material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders.

For emergency responders: Respiratory protection: respiratory protection will be necessary only in special cases, e.g., formation of mists. Half-face or full-face respirator with filter(s) for dust/organic vapor or Self Contained Breathing Apparatus (SCBA) can be used depending on the size of spill and potential level of exposure. If the exposure cannot be completely characterized or an oxygen deficient atmosphere is possible or anticipated, SCBA is recommended. Work gloves that are resistant to hydrocarbons are recommended. Gloves made of polyvinyl acetate (PVA) are not water-resistant and are not suitable for emergency use. Chemical goggles are recommended if splashes or contact with eyes is possible. Small spills: normal antistatic work clothes are usually adequate. Large spills: full body suit of chemical resistant, antistatic material is recommended.

SPILL MANAGEMENT

Land Spill: Scrape up spilled material with shovels into a suitable container for recycle or disposal.

Water Spill: Stop leak if you can do it without risk. Confine the spill immediately with booms. Warn other shipping. Skim from surface.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7 HANDLING AND STORAGE

HANDLING

Avoid contact with skin. Prevent small spills and leakage to avoid slip hazard.

Static Accumulator: This material is not a static accumulator.

STORAGE

Do not store in open or unlabelled containers.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:
No special requirements under ordinary conditions of use and with adequate ventilation.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:
No protection is ordinarily required under normal conditions of use and with adequate ventilation.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:
Chemical resistant gloves are recommended. If contact with forearms is likely wear gauntlet style gloves.

Eye Protection: If contact is likely, safety glasses with side shields are recommended.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:
Chemical/oil resistant clothing is recommended.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

ENVIRONMENTAL CONTROLS

Comply with applicable environmental regulations limiting discharge to air, water and soil. Protect the environment by applying appropriate control measures to prevent or limit emissions.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Note: Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.

GENERAL INFORMATION

Physical State: Solid
Form: Semi-fluid
Color: Blue
Odor: Characteristic
Odor Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15 °C): 0.884
Flash Point [Method]: >204°C (399°F) [EST. FOR OIL, ASTM D-92 (COC)]
Flammable Limits (Approximate volume % in air): LEL: N/D UEL: N/D
Autoignition Temperature: N/D
Boiling Point / Range: > 330°C (626°F) [Estimated]
Vapor Density (Air = 1): N/D
Vapor Pressure: < 0.013 kPa (0.1 mm Hg) at 20 °C [Estimated]
Evaporation Rate (n-butyl acetate = 1): N/D
pH: N/A
Log Pow (n-Octanol/Water Partition Coefficient): > 3.5 [Estimated]
Solubility in Water: Negligible
Viscosity: 95 cSt (95 mm2/sec) at 40 °C
Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION

Freezing Point: N/D
Melting Point: >250°C (482°F)
DMSO Extract (mineral oil only), IP-346: < 3 %wt
Decomposition Temperature: N/D

NOTE: Most physical properties above are for the oil component in the material.

SECTION 10 STABILITY AND REACTIVITY

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Excessive heat. High energy sources of ignition.

MATERIALS TO AVOID: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Route of Exposure	Conclusion / Remarks
Inhalation	
Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Irritation: No end point data for material.	Negligible hazard at ambient/normal handling temperatures. Based

	on assessment of the components.
Ingestion	
Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Skin	
Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Irritation: No end point data for material.	Mildly irritating to skin with prolonged exposure. Based on assessment of the components.
Eye	
Irritation: No end point data for material.	May cause mild, short-lasting discomfort to eyes. Based on assessment of the components.

CHRONIC/OTHER EFFECTS

Contains:

Base oil severely refined: Not carcinogenic in animal studies. Representative material passes IP-346, Modified Ames test, and/or other screening tests. Dermal and inhalation studies showed minimal effects; lung non-specific infiltration of immune cells, oil deposition and minimal granuloma formation. Not sensitizing in test animals.

The following ingredients are cited on the lists below: None.

--REGULATORY LISTS SEARCHED--

1 = NTP CARC	3 = IARC 1	5 = IARC 2B
2 = NTP SUS	4 = IARC 2A	6 = OSHA CARC

SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY

Material -- Not expected to be harmful to aquatic organisms.

MOBILITY

Base oil component -- Low solubility and floats and is expected to migrate from water to the land. Expected to partition to sediment and wastewater solids.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Base oil component -- Expected to be inherently biodegradable

BIOACCUMULATION POTENTIAL

Base oil component -- Has the potential to bioaccumulate, however metabolism or physical properties may reduce the bioconcentration or limit bioavailability.

SECTION 13 DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products.

REGULATORY DISPOSAL INFORMATION

RCRA Information: The unused product, in our opinion, is not specifically listed by the EPA as a hazardous waste (40 CFR, Part 261D), nor is it formulated to contain materials which are listed as hazardous wastes. It does not exhibit the hazardous characteristics of ignitability, corrositivity or reactivity and is not formulated with contaminants as determined by the Toxicity Characteristic Leaching Procedure (TCLP). However, used product may be regulated.

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14 TRANSPORT INFORMATION

LAND (DOT): Not Regulated for Land Transport

LAND (TDG): Not Regulated for Land Transport

SEA (IMDG): Not Regulated for Sea Transport according to IMDG-Code

AIR (IATA): Not Regulated for Air Transport

SECTION 15 REGULATORY INFORMATION

OSHA HAZARD COMMUNICATION STANDARD: When used for its intended purposes, this material is not classified as hazardous in accordance with OSHA 29 CFR 1910.1200.

Complies with the following national/regional chemical inventory requirements: AICS, IECSC, KECI, TSCA

Special Cases:

Inventory	Status
NDSL	Restrictions Apply

EPCRA SECTION 302: This material contains no extremely hazardous substances.

SARA (311/312) REPORTABLE HAZARD CATEGORIES: None.

SARA (313) TOXIC RELEASE INVENTORY: This material contains no chemicals subject to the supplier notification requirements of the SARA 313 Toxic Release Program.

The following ingredients are cited on the lists below:

Chemical Name	CAS Number	List Citations
DIPHENYLAMINE	122-39-4	18

--REGULATORY LISTS SEARCHED--

1 = ACGIH ALL	6 = TSCA 5a2	11 = CA P65 REPRO	16 = MN RTK
2 = ACGIH A1	7 = TSCA 5e	12 = CA RTK	17 = NJ RTK
3 = ACGIH A2	8 = TSCA 6	13 = IL RTK	18 = PA RTK
4 = OSHA Z	9 = TSCA 12b	14 = LA RTK	19 = RI RTK
5 = TSCA 4	10 = CA P65 CARC	15 = MI 293	

Code key: CARC=Carcinogen; REPRO=Reproductive

SECTION 16 OTHER INFORMATION

N/D = Not determined, N/A = Not applicable

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:
Revision Changes:
Section 06: Protective Measures was modified.
Section 09: Phys/Chem Properties Note was modified.
Section 09: Boiling Point C(F) was modified.
Section 09: n-Octanol/Water Partition Coefficient was modified.
Section 08: Comply with applicable regulations phrase was modified.
Section 09: Vapor Pressure was modified.
Hazard Identification: Health Hazards was modified.
Section 11: Dermal Lethality Test Data was modified.
Section 11: Dermal Lethality Test Comment was modified.
Section 11: Oral Lethality Test Data was modified.
Section 11: Inhalation Lethality Test Data was modified.
Section 11: Dermal Irritation Test Data was modified.
Section 11: Eye Irritation Test Data was modified.
Section 11: Oral Lethality Test Comment was modified.
Section 11: Inhalation Irritation Test Data was modified.
Section 09: Relative Density - Header was modified.
Section 09: Flash Point C(F) was modified.
Section 09: Viscosity was modified.
Section 14: LAND (TDG) - Header was modified.

Composition: Component table was modified.
Section 15: List Citations Table was modified.
Section 15: National Chemical Inventory Listing - Header was modified.
Section 15: National Chemical Inventory Listing was modified.
Section 15: Community RTK - Header was modified.
Section 11: Additional Health Information was modified.
Section 09: Melting Point C(F) was modified.
Section 15: Special Cases Table was modified.
Section 01: Company Contact Methods Sorted by Priority was modified.
Section 09: Vapor Pressure was added.

Internal Use Only
MHC: 0B, 0B, 0, 0, 2, 0 PPEC: A

DGN: 2031547XUS (1008419)

SAFETY DATA SHEET

PRODUCT

NALCO® 1720

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **NALCO® 1720**

APPLICATION : OXYGEN SCAVENGER

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 2 / 2* FLAMMABILITY : 0 / 0 INSTABILITY : 0 / 0 OTHER :
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme * = Chronic Health Hazard

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has identified the following chemical substance(s) as hazardous. Consult Section 15 for the nature of the hazard(s).

Hazardous Substance(s)	CAS NO	% (w/w)
Sodium Bisulfite	7631-90-5	10.0 - 30.0
Potassium Bisulfite	7773-03-7	1.0 - 5.0
Cobalt Sulfate	10124-43-3	< 0.1

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

WARNING
Harmful if swallowed. Contains Sulfite. Causes asthmatic signs and symptoms in hyper-reactive individuals. Irritating to respiratory system. May cause cancer by inhalation. Cobalt and cobalt compounds have been classified as possible carcinogens to humans (Group 2B) by IARC. The ACGIH lists cobalt and inorganic compounds as an animal carcinogen (A3). Contact with acids liberates toxic gas.
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of water. Use a mild soap if available. Protect product from freezing.
Wear suitable protective clothing.
Not flammable or combustible. May evolve oxides of sulfur (SOx) under fire conditions.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin, Inhalation

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
May cause irritation with prolonged contact.

SKIN CONTACT :
May cause irritation with prolonged contact.

INGESTION :
Harmful if swallowed. Contains Sulfite. May cause asthmatic-like attack.

INHALATION :
Irritant to respiratory system. Causes asthmatic signs and symptoms in hyper-reactive individuals. May cause cancer by inhalation.

AGGRAVATION OF EXISTING CONDITIONS :
A review of available data does not identify any worsening of existing conditions.

HUMAN HEALTH HAZARDS - CHRONIC :
This product contains cobalt compounds. The International Agency for Research on Cancer (IARC) has evaluated cobalt and cobalt compounds and found it to be a possible human carcinogen.
Ingestion of sulfite can cause a severe allergic reaction in asthmatics and some sulfite sensitive individuals. The resulting symptoms can include difficulty in breathing, flushed skin and a rash. Chronic exposure to sulfites may cause symptoms of upper respiratory disease and affect sense of taste and smell.

4. FIRST AID MEASURES

EYE CONTACT :
Immediately flush with plenty of water for at least 15 minutes. If symptoms develop, seek medical advice.

SKIN CONTACT :
Flush with large amounts of water. Use soap if available. If symptoms develop, seek medical advice.

INGESTION :
Do not induce vomiting without medical advice. If conscious, washout mouth and give water to drink. Get medical attention.

INHALATION :
Remove to fresh air, treat symptomatically. Get medical attention.

NOTE TO PHYSICIAN :
Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : None

EXTINGUISHING MEDIA :
Not expected to burn. Use extinguishing media appropriate for surrounding fire. Keep containers cool by spraying with water.

FIRE AND EXPLOSION HAZARD :
Not flammable or combustible. May evolve oxides of sulfur (SOx) under fire conditions.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection). Stop or reduce any leaks if it is safe to do so. Keep people away from and upwind of spill/leak. Ventilate spill area if possible. Ensure clean-up is conducted by trained personnel only. Do not touch spilled material. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Notify appropriate government, occupational health and safety and environmental authorities.

METHODS FOR CLEANING UP :
SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Clean contaminated surfaces with water or aqueous cleaning agents. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Do not contaminate surface water.

7. HANDLING AND STORAGE

HANDLING :
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. Do not breathe vapors/gases/dust. Keep the containers closed when not in use. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Ensure all containers are labeled.

STORAGE CONDITIONS :
Store the containers tightly closed. Store in suitable labeled containers. Store separately from acids. Store separately from oxidizers. Amine and sulphite products should not be stored within close proximity or resulting vapors may form visible airborne particles. Protect product from freezing.

SUITABLE CONSTRUCTION MATERIAL :
Polypropylene, Buna-N, EPDM, Polyethylene, Polyurethane, PVC, Neoprene, Chlorosulfonated polyethylene rubber, Fluoroelastomer Compatibility with Plastic Materials can vary; we therefore recommend that compatibility is tested prior to use.

UNSUITABLE CONSTRUCTION MATERIAL :
Brass, Mild steel, Stainless Steel 304, Stainless Steel 316L, 100% phenolic resin liner, Epoxy phenolic resin

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
Exposure guidelines have not been established for this product. Available exposure limits for the substance(s) are shown below. Exposure limits are listed for sulfur dioxide (SO2) since this product evolves SO2 when open to the atmosphere.

Substance(s)	Category:	ppm	mg/m3	Non-Standard Unit
Sodium Bisulfite	ACGIH/TWA		5	
Sulfur Dioxide	ACGIH/STEL	0.25		
	OSHA Z1/PEL	5	13	

ENGINEERING MEASURES :
General ventilation is recommended. Use local exhaust ventilation if necessary to control airborne mist and vapor.

RESPIRATORY PROTECTION :
Where concentrations in air may exceed the limits given in this section or when significant mists, vapors, aerosols, or dusts are generated, an approved air purifying respirator equipped with suitable filter cartridges is recommended. Consult the respirator / cartridge manufacturer data to verify the suitability of specific devices. In event of emergency or planned entry into unknown concentrations a positive pressure, full-facepiece SCBA should be used. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection.

HAND PROTECTION :
When handling this product, the use of chemical gloves is recommended. The choice of work glove depends on work conditions and what chemicals are handled. Please contact the PPE manufacturer for advice on what type of glove material may be suitable. Gloves should be replaced immediately if signs of degradation are observed.

SKIN PROTECTION :
Wear standard protective clothing.

EYE PROTECTION :
Wear chemical splash goggles.

HYGIENE RECOMMENDATIONS :
Use good work and personal hygiene practices to avoid exposure. Keep an eye wash fountain available. Keep a safety shower available. If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse. Always wash thoroughly after handling chemicals. When handling this product never eat, drink or smoke.

HUMAN EXPOSURE CHARACTERIZATION :
Based on our recommended product application and personal protective equipment, the potential human exposure is:
Low

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Pink Clear
ODOR	Pungent

SPECIFIC GRAVITY	1.22 - 1.28 @ 60 °F / 15.6 °C
DENSITY	10.1 - 10.7 lb/gal
SOLUBILITY IN WATER	Complete
pH (100 %)	3.3 - 4.1
VISCOSITY	5 cps @ 60 °F / 15 °C
FREEZING POINT	11 °F / -11 °C
BOILING POINT	205 °F / 96 °C
VOC CONTENT	0 % Calculated

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Freezing temperatures.

MATERIALS TO AVOID :
Contact with strong oxidizers (e.g. chlorine, peroxides, chromates, nitric acid, perchlorate, concentrated oxygen, permanganate) may generate heat, fires, explosions and/or toxic vapors. Contact with strong acids (e.g. sulfuric, phosphoric, nitric, hydrochloric, chromic, sulfonic) may generate heat, splattering or boiling and toxic vapors. Contains Sulfite. SO2 may react with vapors from neutralizing amines and may produce a visible cloud of amine salt particles.

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: Oxides of sulfur, Hydrogen sulfide (H2S)

11. TOXICOLOGICAL INFORMATION

The following results are for a similar product.

ACUTE ORAL TOXICITY :

Species:	Rat
LD50:	4,112 mg/kg
Test Descriptor:	Similar Product

ACUTE DERMAL TOXICITY :
Species: Rabbit
LD50: > 3,000 mg/kg
Test Descriptor: Similar Product

SENSITIZATION :
Sulfites can cause an allergic reaction in sensitive individuals.

CARCINOGENICITY :
This product contains cobalt compounds. The International Agency for Research on Cancer (IARC) has evaluated cobalt and cobalt compounds and found it to be a possible human carcinogen.

HUMAN HAZARD CHARACTERIZATION :
Based on our hazard characterization, the potential human hazard is: High

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

The following results are for the product.

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Fathead Minnow	96 hrs	382 mg/l	Product
Inland Silverside	96 hrs	> 5,000 mg/l	Product

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	LC50	EC50	Test Descriptor
Daphnia magna	48 hrs	728 mg/l		Product
Mysid Shrimp (Mysidopsis bahia)	96 hrs	> 5,000 mg/l		Product

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.
If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	30 - 50%	50 - 70%

The portion in water is expected to be soluble or dispersible.

BIOACCUMULATION POTENTIAL
The product will not bioaccumulate.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Low
Based on our recommended product application and the product's characteristics, the potential environmental exposure is: High

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it is not a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

Hazardous wastes must be transported by a licensed hazardous waste transporter and disposed of or treated in a properly licensed hazardous waste treatment, storage, disposal or recycling facility. Consult local, state, and federal regulations for specific requirements.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

The presence of an RQ component (Reportable Quantity for U.S. EPA and DOT) in this product causes it to be regulated with an additional description of RQ for road, or as a class 9 for road and air, ONLY when the net weight in the package exceeds the calculated RQ for the product.

LAND TRANSPORT :

Proper Shipping Name :	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
Technical Name(s) :	SODIUM BISULFITE
UN/ID No :	UN 3082
Hazard Class - Primary :	9
Packing Group :	III
Flash Point :	None
Reportable Quantity (per package) :	18,347 lbs
RQ Component :	SODIUM BISULFITE

AIR TRANSPORT (ICAO/IATA) :

The presence of an RQ component (Reportable Quantity for U.S. EPA and DOT) in this product causes it to be regulated with an additional description of RQ for road, or as a class 9 for road and air, ONLY when the net weight in the package exceeds the calculated RQ for the product.

Proper Shipping Name :	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
Technical Name(s) :	SODIUM BISULFITE
UN/ID No :	UN 3082
Hazard Class - Primary :	9
Packing Group :	III
Reportable Quantity (per package) :	18,347 lbs
RQ Component :	SODIUM BISULFITE

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name :	PRODUCT IS NOT REGULATED DURING TRANSPORTATION

15. REGULATORY INFORMATION

This section contains additional information that may have relevance to regulatory compliance. The information in this section is for reference only. It is not exhaustive, and should not be relied upon to take the place of an individualized compliance or hazard assessment. Nalco accepts no liability for the use of this information.

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Based on our hazard evaluation, the following substance(s) in this product is/are hazardous and the reason(s) is/are shown below.

Sodium Bisulfite : Respiratory irritant
Potassium Bisulfite : Irritant
Cobalt Sulfate : Systemic Effect, Irritant, Cancer suspect agent (refer to Section 3)

CERCLA/SUPERFUND, 40 CFR 302 :
This product contains the following Reportable Quantity (RQ) Substance. Also listed is the RQ for the product. If a reportable quantity of product is released, it requires notification to the NATIONAL RESPONSE CENTER, WASHINGTON, D.C. (1-800-424-8802).

RQ Substance	RQ
Sodium Bisulfite	18,347 lbs

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found this product to be hazardous. The product should be reported under the following indicated EPA hazard categories:

X Immediate (Acute) Health Hazard

X	Delayed (Chronic) Health Hazard
-	Fire Hazard
-	Sudden Release of Pressure Hazard
-	Reactive Hazard

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product does not contain substances on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

FOOD AND DRUG ADMINISTRATION (FDA) Federal Food, Drug and Cosmetic Act :
When use situations necessitate compliance with FDA regulations, this product is acceptable under : 21 CFR 173.310 Boiler Water Additives

Limitations: no more than required to produce intended technical effect.

NSF NON-FOOD COMPOUNDS REGISTRATION PROGRAM (former USDA List of Proprietary Substances & Non-Food Compounds) :
NSF Registration number for this product is : 141556
This product is acceptable for treating boilers or steam lines where steam produced may contact edible products and/or cooling systems where the treated water may not contact edible products in and around food processing areas, excluding such use in areas where meat and poultry are processed (G9).

This product has been certified as KOSHER/PAREVE for year-round use INCLUDING THE PASSOVER SEASON by the CHICAGO RABBINICAL COUNCIL.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
This product contains the following substances listed in the regulation. Additional components may be unintentionally present at trace levels.

Substance(s)	Citations
• Sodium Bisulfite	Sec. 311

CLEAN AIR ACT, Sec. 112 (Hazardous Air Pollutants, as amended by 40 CFR 63), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
This product may contain trace levels (<0.1% for carcinogens, <1% all other substances) of the following substance(s) listed under the regulation. Additional components may be unintentionally present at trace levels.

Substance(s)	Citations
• Cobalt Sulfate	Sec. 112

CALIFORNIA PROPOSITION 65 :
This material contains trace amounts of chemicals known to the State of California to cause cancer.

Substance(s)	Concentration	EFFECTS
• Cobalt Sulfate	< .1 %	Causes Cancer

MICHIGAN CRITICAL MATERIALS :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

STATE RIGHT TO KNOW LAWS :
The following substances are disclosed for compliance with State Right to Know Laws:

Sodium Bisulfite 7631-90-5

INTERNATIONAL CHEMICAL CONTROL LAWS :

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substance(s) in this preparation are included in or exempted from the Domestic Substance List (DSL).

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

CHINA
All substances in this product comply with the Provisions on the Environmental Administration of New Chemical Substances and are listed on the Inventory of Existing Chemical Substances China (IECSC).

EUROPE
The substances in this preparation have been reviewed for compliance with the EINECS or ELINCS inventories.

JAPAN
All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Existing and New Chemical Substances list (ENCS).

KOREA
All substances in this product comply with the Toxic Chemical Control Law (TCCL) and are listed on the Existing Chemicals List (ECL)

NEW ZEALAND
All substances in this product comply with the Hazardous Substances and New Organisms (HSNO) Act 1996,and are listed on or are exempt from the New Zealand Inventory of Chemicals.

PHILIPPINES
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippines Inventory of Chemicals & Chemical Substances (PICCS).

16. OTHER INFORMATION

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Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: Low

* The environmental risk is: Low

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS™ CD-ROM Version),
Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH,
(TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight™ (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Prepared By : Product Safety Department
Date issued : 01/12/2011
Version Number : 6.7

SAFETY DATA SHEET

PRODUCT

NALCO® 8735

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **NALCO® 8735**

APPLICATION : pH STABILIZER

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 3 / 3 FLAMMABILITY : 0 / 0 INSTABILITY : 1 / 1 OTHER :
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme * = Chronic Health Hazard

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has identified the following chemical substance(s) as hazardous. Consult Section 15 for the nature of the hazard(s).

Hazardous Substance(s)	CAS NO	% (w/w)
Sodium Hydroxide	1310-73-2	30.0 - 60.0
Potassium Hydroxide	1310-58-3	10.0 - 30.0

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

DANGER
Corrosive. May cause tissue damage.
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of water.
Wear a face shield. Wear chemical resistant apron, chemical splash goggles, impervious gloves and boots.
Not flammable or combustible. Contact with reactive metals (e.g. aluminum) may result in the generation of flammable hydrogen gas.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
Corrosive. Will cause eye burns and permanent tissue damage.

SKIN CONTACT :
Corrosive; causes permanent skin damage.

INGESTION :
Corrosive; causes chemical burns to the mouth, throat and stomach.

INHALATION :
Elevated temperatures or mechanical action may form vapors, mists or fumes which may be irritating to the eyes, nose, throat and lungs.

AGGRAVATION OF EXISTING CONDITIONS :
A review of available data does not identify any worsening of existing conditions.

HUMAN HEALTH HAZARDS - CHRONIC :
No adverse effects expected other than those mentioned above.

4. FIRST AID MEASURES

EYE CONTACT :
Immediately flush eye with water for at least 15 minutes while holding eyelids open. PROMPT ACTION IS ESSENTIAL IN CASE OF CONTACT. Get immediate medical attention.

SKIN CONTACT :
Immediately flush with plenty of water for at least 15 minutes. Use a mild soap if available. For a large splash, flood body under a shower. Get immediate medical attention. Contaminated clothing, shoes, and leather goods must be discarded or cleaned before re-use.

INGESTION :
Get immediate medical attention. DO NOT INDUCE VOMITING. If conscious, washout mouth and give water to drink.

INHALATION :
Remove to fresh air, treat symptomatically. Get immediate medical attention.

NOTE TO PHYSICIAN :
Probable mucosal damage may contraindicate the use of gastric lavage. Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : None

EXTINGUISHING MEDIA :
Not expected to burn. Use extinguishing media appropriate for surrounding fire.

FIRE AND EXPLOSION HAZARD :
Not flammable or combustible. Contact with reactive metals (e.g. aluminum) may result in the generation of flammable hydrogen gas.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection). Stop or reduce any leaks if it is safe to do so. Keep people away from and upwind of spill/leak. Ventilate spill area if possible. Ensure clean-up is conducted by trained personnel only. Do not touch spilled material. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Notify appropriate government, occupational health and safety and environmental authorities.

METHODS FOR CLEANING UP :
SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Clean contaminated surfaces with water or aqueous cleaning agents. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Do not contaminate surface water.

7. HANDLING AND STORAGE

HANDLING :
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. Do not breathe vapors/gases/dust. Keep the containers closed when not in use. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Ensure all containers are labeled. Do not mix with acids.

STORAGE CONDITIONS :
Store the containers tightly closed. Store separately from acids. Store in suitable labeled containers.

SUITABLE CONSTRUCTION MATERIAL :
Stainless Steel 304, Stainless Steel 316L, Hastelloy C-276, Buna-N, Nylon, Polyethylene, Polypropylene, PVC, HDPE (high density polyethylene), Plexiglass, PTFE, Perfluoroelastomer, Polytetrafluoroethylene/polypropylene copolymer, Chlorosulfonated polyethylene rubber, Compatibility with Plastic Materials can vary; we therefore recommend that compatibility is tested prior to use.

UNSUITABLE CONSTRUCTION MATERIAL :
Aluminum, Mild steel, Natural rubber, Brass, Copper, Ethylene propylene, Neoprene, Polyurethane, Fluoroelastomer

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
Exposure guidelines have not been established for this product. Available exposure limits for the substance(s) are shown below.

Sodium Hydroxide	ACGIH/Ceiling	2

	OSHA Z1/PEL	2
Potassium Hydroxide	ACGIH/Ceiling	2

ENGINEERING MEASURES :
General ventilation is recommended. Use local exhaust ventilation if necessary to control airborne mist and vapor.

RESPIRATORY PROTECTION :
Where concentrations in air may exceed the limits given in this section or when significant mists, vapors, aerosols, or dusts are generated, an approved air purifying respirator equipped with suitable filter cartridges is recommended. Consult the respirator / cartridge manufacturer data to verify the suitability of specific devices. In event of emergency or planned entry into unknown concentrations a positive pressure, full-facepiece SCBA should be used. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection.

HAND PROTECTION :
When handling this product, the use of chemical gauntlets is recommended. The choice of work glove depends on work conditions and what chemicals are handled. Please contact the PPE manufacturer for advice on what type of glove material may be suitable. Gloves should be replaced immediately if signs of degradation are observed.

SKIN PROTECTION :
Wear chemical resistant apron, chemical splash goggles, impervious gloves and boots. A full slicker suit is recommended if gross exposure is possible.

EYE PROTECTION :
Wear a face shield with chemical splash goggles.

HYGIENE RECOMMENDATIONS :
Use good work and personal hygiene practices to avoid exposure. Eye wash station and safety shower are necessary. If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse. Always wash thoroughly after handling chemicals. When handling this product never eat, drink or smoke.

HUMAN EXPOSURE CHARACTERIZATION :
Based on our recommended product application and personal protective equipment, the potential human exposure is:
Low

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Colorless
ODOR	None

SPECIFIC GRAVITY	1.50 - 1.53 @ 60 °F / 15.6 °C
DENSITY	12.5 - 12.7 lb/gal
SOLUBILITY IN WATER	Complete

pH (5 %)	14
FREEZING POINT	-10 °F / -23 °C
BOILING POINT	293 °F / 145 °C
VAPOR PRESSURE	0.5 mm Hg @ 100 °F / 37.7 °C
VOC CONTENT	0 % Calculated

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Extremes of temperature

MATERIALS TO AVOID :
Contact with strong acids (e.g. sulfuric, phosphoric, nitric, hydrochloric, chromic, sulfonic) may generate heat, splattering or boiling and toxic vapors. Gives off hydrogen by reaction with metals.

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: None known

11. TOXICOLOGICAL INFORMATION

The following results are for the hazardous components.

ACUTE ORAL TOXICITY :
Species: Rat
LD50: 205 mg/kg
Test Descriptor: Potassium Hydroxide

ACUTE DERMAL TOXICITY :
Species: Rabbit
LD50: 1,260 mg/kg
Test Descriptor: Potassium Hydroxide

SENSITIZATION :
This product is not expected to be a sensitizer.

CARCINOGENICITY :
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HUMAN HAZARD CHARACTERIZATION :
Based on our hazard characterization, the potential human hazard is: High

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

The following results are for the product, unless otherwise indicated.

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Fathead Minnow	96 hrs	102 mg/l	Similar Product
Mosquito Fish (Gambusia spp.)	96 hrs	125 mg/l	Active Substance

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	LC50	EC50	Test Descriptor
Daphnia magna	48 hrs	180 mg/l		Similar Product
Daphnia magna	48 hrs	156 mg/l		Active Substance

PERSISTENCY AND DEGRADATION :

Biological Oxygen Demand (BOD) :

Incubation Period	Value	Test Descriptor
5 d	0 mg/l	Product

The product does not contain any organic substances.

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.
If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	30 - 50%	50 - 70%

The portion in water is expected to be soluble or dispersible.

BIOACCUMULATION POTENTIAL
This preparation or material is not expected to bioaccumulate.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Low
Based on our recommended product application and the product's characteristics, the potential environmental exposure is: High

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it could meet the criteria of a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261. Before disposal, it should be determined if the waste meets the criteria of a hazardous waste.

Hazardous Waste: D002

Hazardous wastes must be transported by a licensed hazardous waste transporter and disposed of or treated in a properly licensed hazardous waste treatment, storage, disposal or recycling facility. Consult local, state, and federal regulations for specific requirements.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

The presence of an RQ component (Reportable Quantity for U.S. EPA and DOT) in this product causes it to be regulated with an additional description of RQ for road, or as a class 9 for road and air, ONLY when the net weight in the package exceeds the calculated RQ for the product.

LAND TRANSPORT :

Proper Shipping Name :	CAUSTIC ALKALI LIQUID, N.O.S.
Technical Name(s) :	SODIUM HYDROXIDE, POTASSIUM HYDROXIDE
UN/ID No :	UN 1719
Hazard Class - Primary :	8
Packing Group :	II
Flash Point :	None
Reportable Quantity (per package) :	3,000 lbs
RQ Component :	SODIUM HYDROXIDE

AIR TRANSPORT (ICAO/IATA) :

The presence of an RQ component (Reportable Quantity for U.S. EPA and DOT) in this product causes it to be regulated with an additional description of RQ for road, or as a class 9 for road and air, ONLY when the net weight in the package exceeds the calculated RQ for the product.

Proper Shipping Name :	CAUSTIC ALKALI LIQUID, N.O.S.
Technical Name(s) :	SODIUM HYDROXIDE, POTASSIUM HYDROXIDE
UN/ID No :	UN 1719
Hazard Class - Primary :	8
Packing Group :	II
Reportable Quantity (per package) :	3,000 lbs
RQ Component :	SODIUM HYDROXIDE

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name :	CAUSTIC ALKALI LIQUID, N.O.S.
Technical Name(s) :	SODIUM HYDROXIDE, POTASSIUM HYDROXIDE
UN/ID No :	UN 1719
Hazard Class - Primary :	8
Packing Group :	II

15. REGULATORY INFORMATION

This section contains additional information that may have relevance to regulatory compliance. The information in this section is for reference only. It is not exhaustive, and should not be relied upon to take the place of an individualized compliance or hazard assessment. Nalco accepts no liability for the use of this information.

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Based on our hazard evaluation, the following substance(s) in this product is/are hazardous and the reason(s) is/are shown below.

Sodium Hydroxide : Corrosive
Potassium Hydroxide : Corrosive, HARMFUL

CERCLA/SUPERFUND, 40 CFR 302 :
This product contains the following Reportable Quantity (RQ) Substance. Also listed is the RQ for the product. If a reportable quantity of product is released, it requires notification to the NATIONAL RESPONSE CENTER, WASHINGTON, D.C. (1-800-424-8802).

RQ Substance	RQ
Sodium Hydroxide	3,000 lbs

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found this product to be hazardous. The product should be reported under the following indicated EPA hazard categories:

X	Immediate (Acute) Health Hazard
-	Delayed (Chronic) Health Hazard
-	Fire Hazard
-	Sudden Release of Pressure Hazard
-	Reactive Hazard

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product does not contain substances on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

FOOD AND DRUG ADMINISTRATION (FDA) Federal Food, Drug and Cosmetic Act :
When use situations necessitate compliance with FDA regulations, this product is acceptable under : 21 CFR 173.310 Boiler Water Additives

Limitations: no more than required to produce intended technical effect.

NSF NON-FOOD COMPOUNDS REGISTRATION PROGRAM (former USDA List of Proprietary Substances & Non-Food Compounds) :
NSF Registration number for this product is : 062440
This product is acceptable as a compound for the treatment of entire potable water systems (G1) in official establishments in and around food processing areas. This product is acceptable for treatment of cooling and retort water (G5) in and around food processing areas. This product is acceptable for use in meat, poultry, and other food processing areas as a Boiler Treatment Product (G6), for treating boiler and steam lines where the steam produced may contact edible products. Acceptable usage shall be in accordance with the dosage limitations specified on the product label.

This product has been certified as KOSHER/PAREVE for year-round use INCLUDING THE PASSOVER SEASON by the CHICAGO RABBINICAL COUNCIL.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
This product contains the following substances listed in the regulation. Additional components may be unintentionally present at trace levels.

Substance(s)	Citations
• Sodium Hydroxide • Potassium Hydroxide	Sec. 311

CLEAN AIR ACT, Sec. 112 (Hazardous Air Pollutants, as amended by 40 CFR 63), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

CALIFORNIA PROPOSITION 65 :
Substances listed under California Proposition 65 are not intentionally added or expected to be present in this product.

MICHIGAN CRITICAL MATERIALS :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

STATE RIGHT TO KNOW LAWS :
The following substances are disclosed for compliance with State Right to Know Laws:

Potassium Hydroxide	1310-58-3
Sodium Hydroxide	1310-73-2

INTERNATIONAL CHEMICAL CONTROL LAWS :

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substance(s) in this preparation are included in or exempted from the Domestic Substance List (DSL).

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

CHINA
All substances in this product comply with the Provisions on the Environmental Administration of New Chemical Substances and are listed on the Inventory of Existing Chemical Substances China (IECSC).

EUROPE
The substance(s) in this preparation are included in or exempted from the EINECS or ELINCS inventories

JAPAN
All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Existing and New Chemical Substances list (ENCS).

KOREA
All substances in this product comply with the Toxic Chemical Control Law (TCCL) and are listed on the Existing Chemicals List (ECL)

NEW ZEALAND
All substances in this product comply with the Hazardous Substances and New Organisms (HSNO) Act 1996,and are listed on or are exempt from the New Zealand Inventory of Chemicals.

PHILIPPINES
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippines Inventory of Chemicals & Chemical Substances (PICCS).

16. OTHER INFORMATION

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: Low

* The environmental risk is: Low

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS™ CD-ROM Version),
Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH,
(TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight™ (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Prepared By : Product Safety Department
Date issued : 01/21/2011
Version Number : 1.16

MATERIAL SAFETY DATA SHEET

PRODUCT

NexGuard 22310

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **NexGuard 22310**

APPLICATION : BOILER WATER INTERNAL TREATMENT

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 0 / 1 FLAMMABILITY : 1 / 1 INSTABILITY : 0 / 0 OTHER :
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has found that this product is not hazardous under 29 CFR 1910.1200.

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

CAUTION
May cause irritation with prolonged contact.
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of water.
Wear suitable protective clothing.
May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of sulfur (SOx) under fire conditions.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
May cause irritation with prolonged contact.

SKIN CONTACT :
May cause irritation with prolonged contact.

INGESTION :
Not a likely route of exposure. No adverse effects expected.

INHALATION :
Not a likely route of exposure. No adverse effects expected.

SYMPTOMS OF EXPOSURE :
Acute :
A review of available data does not identify any symptoms from exposure not previously mentioned.
Chronic :
A review of available data does not identify any symptoms from exposure not previously mentioned.

AGGRAVATION OF EXISTING CONDITIONS :
A review of available data does not identify any worsening of existing conditions.

4. FIRST AID MEASURES

EYE CONTACT :
Flush affected area with water. If symptoms develop, seek medical advice.

SKIN CONTACT :
Flush affected area with water. If symptoms develop, seek medical advice.

INGESTION :
Do not induce vomiting without medical advice. If conscious, washout mouth and give water to drink. If symptoms develop, seek medical advice.

INHALATION :
Remove to fresh air, treat symptomatically. If symptoms develop, seek medical advice.

NOTE TO PHYSICIAN :
Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : None

EXTINGUISHING MEDIA :
This product would not be expected to burn unless all the water is boiled away. The remaining organics may be ignitable. Use extinguishing media appropriate for surrounding fire.

FIRE AND EXPLOSION HAZARD :
May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of sulfur (SOx) under fire conditions.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Stop or reduce any leaks if it is safe to do so. Do not touch spilled material. Ventilate spill area if possible. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection).

METHODS FOR CLEANING UP :
SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Do not contaminate surface water.

7. HANDLING AND STORAGE

HANDLING :
Avoid eye and skin contact. Do not take internally. Ensure all containers are labelled. Keep the containers closed when not in use.

STORAGE CONDITIONS :
Protect product from freezing. Store the containers tightly closed.

SUITABLE CONSTRUCTION MATERIAL :
PVC, Stainless Steel 304, EPDM, Buna-N, HDPE (high density polyethylene), Polyurethane, Hypalon, Viton, Neoprene, Polypropylene, Polyethylene, Stainless Steel 316L, 100% phenolic resin liner

UNSUITABLE CONSTRUCTION MATERIAL :
Brass, Mild steel, Epoxy phenolic resin

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
This product does not contain any substance that has an established exposure limit.

ENGINEERING MEASURES :
General ventilation is recommended.

RESPIRATORY PROTECTION :
Respiratory protection is not normally needed.

HAND PROTECTION :
Neoprene gloves, Nitrile gloves, Butyl gloves, PVC gloves

SKIN PROTECTION :
Wear standard protective clothing.

EYE PROTECTION :
Wear chemical splash goggles.

HYGIENE RECOMMENDATIONS :
Keep an eye wash fountain available. Keep a safety shower available. If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse.

HUMAN EXPOSURE CHARACTERIZATION :
Based on our recommended product application and personal protective equipment, the potential human exposure is: Moderate

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Fluorescent Orange Yellow
ODOR	Normally None, however residual ammonia may be present in headspace of newly opened containers

SPECIFIC GRAVITY	1.19 @ 77 °F / 25 °C
DENSITY	9.9 lb/gal
SOLUBILITY IN WATER	Complete
pH (100 %)	10.5
FREEZING POINT	22 °F / -6 °C
VAPOR PRESSURE	Same as water
VOC CONTENT	0 % Calculated

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Freezing temperatures.

MATERIALS TO AVOID :
Contact with strong oxidizers (e.g. chlorine, peroxides, chromates, nitric acid, perchlorate, concentrated oxygen, permanganate) may generate heat, fires, explosions and/or toxic vapors.

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: Oxides of carbon, Oxides of sulfur

11. TOXICOLOGICAL INFORMATION

No toxicity studies have been conducted on this product.

SENSITIZATION :
This product is not expected to be a sensitizer.

CARCINOGENICITY :
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HUMAN HAZARD CHARACTERIZATION :
Based on our hazard characterization, the potential human hazard is: Low

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

The following results are for the product.

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Rainbow Trout	96 hrs	7,070 mg/l	Product
Fathead Minnow	96 hrs	1,086 mg/l	Product
Inland Silverside	96 hrs	> 5,000 mg/l	Product

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	LC50	EC50	Test Descriptor
Daphnia magna	48 hrs	1,650 mg/l		Product
Mysid Shrimp (Mysidopsis bahia)	96 hrs	> 5,000 mg/l		Product

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM , provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models. If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	30 - 50%	50 - 70%

The portion in water is expected to be soluble or dispersible.

BIOACCUMULATION POTENTIAL
This preparation or material is not expected to bioaccumulate.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Low
Based on our recommended product application and the product's characteristics, the potential environmental exposure is: Moderate

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it is not a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

As a non-hazardous waste, it is not subject to federal regulation. Consult state or local regulation for any additional handling, treatment or disposal requirements. For disposal, contact a properly licensed waste treatment, storage, disposal or recycling facility.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

LAND TRANSPORT :

Proper Shipping Name :	PRODUCT IS NOT REGULATED DURING TRANSPORTATION

AIR TRANSPORT (ICAO/IATA) :

Proper Shipping Name :	PRODUCT IS NOT REGULATED DURING TRANSPORTATION

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name :	PRODUCT IS NOT REGULATED DURING TRANSPORTATION

15. REGULATORY INFORMATION

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Our hazard evaluation has found that this product is not hazardous under 29 CFR 1910.1200.

CERCLA/SUPERFUND, 40 CFR 117, 302 :
Notification of spills of this product is not required.

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found that this product is not hazardous under 29 CFR 1910.1200.

- Immediate (Acute) Health Hazard
- Delayed (Chronic) Health Hazard
- Fire Hazard
- Sudden Release of Pressure Hazard
- Reactive Hazard

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product does not contain substances on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

FOOD AND DRUG ADMINISTRATION (FDA) Federal Food, Drug and Cosmetic Act :
When use situations necessitate compliance with FDA regulations, this product is acceptable under : This product is in full compliance with the applicable Federal laws and regulations pertaining to food additives and may be used for applications covered under 21 CFR 173.310 Boiler Water Additives (steam from treated boilers may contact food). A copy of FDA's acknowledgement of Nalco's effective notification is available on the FDA website at: http://vm.cfsan.fda.gov/~dms/opa-fcn.html, FCN000105 and FCN000031.

The following limitations apply:

Maximum dosage	Limitation
93 PPM	in the boiler feedwater

The polymer must not be used at pressures above 1,000 PSIG (147 kPa).

NSF NON-FOOD COMPOUNDS REGISTRATION PROGRAM (former USDA List of Proprietary Substances & Non-Food Compounds) :
NSF Registration number for this product is : 121221
This product is acceptable for use in meat, poultry, and other food processing areas as a Boiler Treatment Product (G6), for treating boiler and steam lines where the steam produced may contact edible products. Acceptable usage shall be in accordance with the dosage limitations specified on the product label.

This product has been certified as KOSHER/PAREVE for year-round use INCLUDING THE PASSOVER SEASON by the CHICAGO RABBINICAL COUNCIL.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
None of the substances are specifically listed in the regulation.

CLEAN AIR ACT, Sec. 111 (40 CFR 60, Volatile Organic Compounds), Sec. 112 (40 CFR 61, Hazardous Air Pollutants), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
None of the substances are specifically listed in the regulation.

CALIFORNIA PROPOSITION 65 :
This product does not contain substances which require warning under California Proposition 65.

MICHIGAN CRITICAL MATERIALS :
None of the substances are specifically listed in the regulation.

STATE RIGHT TO KNOW LAWS :
The following substances are disclosed for compliance with State Right to Know Laws:

Sodium Sulfate	7757-82-6
Inorganic Solvent	Proprietary

NATIONAL REGULATIONS, CANADA :

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) :
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS CLASSIFICATION :
Not considered a WHMIS controlled product.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substances in this preparation are listed on the Domestic Substances List (DSL), are exempt, or have been reported in accordance with the New Substances Notification Regulations.

INTERNATIONAL CHEMICAL CONTROL LAWS

EUROPE
The substance(s) in this preparation are included in or exempted from the EINECS or ELINCS inventories

16. OTHER INFORMATION

Nalco Internal Number F105654

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: Low

* The environmental risk is: Low

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH, (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight# (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

PRODUCT

NexGuard 22310

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

Prepared By : Product Safety Department
Date issued : 01/13/2006
Version Number : 1.19

MATERIAL SAFETY DATA SHEET

PRODUCT

TRI-ACT® 1820

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **TRI-ACT® 1820**

APPLICATION : CORROSION INHIBITOR

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 3 / 3 FLAMMABILITY : 2 / 2 INSTABILITY : 0 / 0 OTHER :
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has identified the following chemical substance(s) as hazardous. Consult Section 15 for the nature of the hazard(s).

Hazardous Substance(s)	CAS NO	% (w/w)
Cyclohexylamine	108-91-8	10.0 - 30.0
Diethylethanolamine	100-37-8	5.0 - 10.0
Morpholine	110-91-8	5.0 - 10.0

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

DANGER
Corrosive. Combustible. May cause tissue damage. Harmful if absorbed through skin. Vapors may have a strong offensive odor which may cause sensory response including headache, nausea and vomiting.
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. Keep away from sources of ignition - No smoking. Keep away from heat. Keep container tightly closed and in a well-ventilated place. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of water. Protect product from freezing.
Wear a face shield. Wear chemical resistant apron, chemical splash goggles, impervious gloves and boots.
Combustible Liquid; may form combustible mixtures at or above the flash point. May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of nitrogen (NOx) under fire conditions. Empty product containers may contain product residue. Do not pressurize, cut, heat, weld, or expose containers to flame or other sources of ignition.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin, Inhalation

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
Corrosive. Will cause eye burns and permanent tissue damage. Exposure to low vapor concentrations can result in foggy or blurred vision, objects appearing bluish and appearance of a halo around lights. These symptoms are temporary.

SKIN CONTACT :
May cause severe irritation or tissue damage depending on the length of exposure and the type of first aid administered. Harmful if absorbed through skin.

INGESTION :
Not a likely route of exposure. Corrosive; causes chemical burns to the mouth, throat and stomach.

INHALATION :
Irritating, in high concentrations, to the eyes, nose, throat and lungs. Vapors may have a strong offensive odor which may cause sensory response including headache, nausea and vomiting.

SYMPTOMS OF EXPOSURE :
Acute :
A review of available data does not identify any symptoms from exposure not previously mentioned.
Chronic :
A review of available data does not identify any symptoms from exposure not previously mentioned.

AGGRAVATION OF EXISTING CONDITIONS :
A review of available data does not identify any worsening of existing conditions.

4. FIRST AID MEASURES

EYE CONTACT :
PROMPT ACTION IS ESSENTIAL IN CASE OF CONTACT. Immediately flush eye with water for at least 15 minutes while holding eyelids open. Get immediate medical attention.

SKIN CONTACT :
Immediately flush with plenty of water for at least 15 minutes. For a large splash, flood body under a shower. Remove contaminated clothing. Wash off affected area immediately with plenty of water. Get immediate medical attention. Contaminated clothing, shoes, and leather goods must be discarded or cleaned before re-use.

INGESTION :
DO NOT INDUCE VOMITING. If conscious, washout mouth and give water to drink. Get immediate medical attention.

INHALATION :
Remove to fresh air, treat symptomatically. Get medical attention.

NOTE TO PHYSICIAN :
Probable mucosal damage may contraindicate the use of gastric lavage. Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : 131 °F / 55 °C (PMCC)

EXTINGUISHING MEDIA :
Dry powder, Carbon dioxide, Foam, Other extinguishing agent suitable for Class B fires, For large fires, use water spray or fog, thoroughly drenching the burning material.
Keep containers cool by spraying with water.

FIRE AND EXPLOSION HAZARD :
Combustible Liquid; may form combustible mixtures at or above the flash point. May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of nitrogen (NOx) under fire conditions. Empty product containers may contain product residue. Do not pressurize, cut, heat, weld, or expose containers to flame or other sources of ignition.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Ensure clean-up is conducted by trained personnel only. Ventilate spill area if possible. Do not touch spilled material. Stop or reduce any leaks if it is safe to do so. Remove sources of ignition. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection). Notify appropriate government, occupational health and safety and environmental authorities.

METHODS FOR CLEANING UP :
SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Wash site of spillage thoroughly with water. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Do not contaminate surface water.

7. HANDLING AND STORAGE

HANDLING :
Do not get in eyes, on skin, on clothing. Do not take internally. Do not breathe vapors/gases/dust. Use with adequate ventilation. Avoid generating aerosols and mists. Keep away from acids and oxidizing agents. Do not use, store, spill or pour near heat, sparks or open flame. Keep the containers closed when not in use. Have emergency equipment (for fires, spills, leaks, etc.) readily available.

STORAGE CONDITIONS :
Store the containers tightly closed. Store away from heat and sources of ignition. Use proper grounding procedures. Store separately from acids. Store separately from oxidizers. Amine and sulphite products should not be stored within close proximity or resulting vapors may form visible airborne particles.

SUITABLE CONSTRUCTION MATERIAL :
HDPE (high density polyethylene), Natural rubber, Viton, Polypropylene, Stainless Steel 304, Stainless Steel 316L, Surface-modified HDPE (high density polyethylene), Kalrez, PTFE

UNSUITABLE CONSTRUCTION MATERIAL :
Carbon Steel C1018, Epoxyresin coating

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
Exposure guidelines have not been established for this product. Available exposure limits for the substance(s) are shown below.

ACGIH/TLV :
Substance(s)

Cyclohexylamine	TWA: 10 ppm , 41 mg/m3
Diethylethanolamine	TWA: 2 ppm , 9.6 mg/m3 (Skin)
Morpholine	TWA: 20 ppm , 71 mg/m3 (Skin)

OSHA/PEL :
Substance(s)

Cyclohexylamine	TWA: 10 ppm , 40 mg/m3
Diethylethanolamine	TWA: 10 ppm , 50 mg/m3 (Skin)
Morpholine	TWA: 20 ppm , 70 mg/m3 (Skin) STEL: 30 ppm , 105 mg/m3 (Skin)

* A skin notation refers to the potential significant contribution to overall exposure by the cutaneous route, including mucous membranes and the eyes.

ENGINEERING MEASURES :
General ventilation is recommended. Use local exhaust ventilation if necessary to control airborne mist and vapor.

RESPIRATORY PROTECTION :
Where concentrations in air may exceed the limits given in this section, the use of a half face filter mask or air supplied breathing apparatus is recommended. A suitable filter material depends on the amount and type of chemicals being handled. Consider the use of filter type: Multi-contaminant cartridge. with a Particulate pre-filter. In event of emergency or planned entry into unknown concentrations a positive pressure, full-facepiece SCBA should be used. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection.

HAND PROTECTION :
Butyl gloves, Most glove materials are of low chemical resistance. Replace gloves regularly.

SKIN PROTECTION :
Wear chemical resistant apron, chemical splash goggles, impervious gloves and boots. A full slicker suit is recommended if gross exposure is possible.

EYE PROTECTION :
Wear a face shield with chemical splash goggles.

HYGIENE RECOMMENDATIONS :
Eye wash station and safety shower are necessary. If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse.

HUMAN EXPOSURE CHARACTERIZATION :
Based on our recommended product application and personal protective equipment, the potential human exposure is: Low

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Light yellow
ODOR	Amine

SPECIFIC GRAVITY	0.98 - 0.99 @ 77 °F / 25 °C
DENSITY	8.1 - 8.2 lb/gal
SOLUBILITY IN WATER	Complete
pH (100 %)	12.0 - 13.0
VISCOSITY	5 cps @ 77 °F / 25 °C
FREEZING POINT	27 °F / -3 °C
VAPOR PRESSURE	6 mm Hg @ 68 °F / 20 °C
VOC CONTENT	40 %

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Heat and sources of ignition including static discharges.

MATERIALS TO AVOID :
Contact with strong acids (e.g. sulfuric, phosphoric, nitric, hydrochloric, chromic, sulfonic) may generate heat, splattering or boiling and toxic vapors. Contact with strong oxidizers (e.g. chlorine, peroxides, chromates, nitric acid, perchlorate, concentrated oxygen, permanganate) may generate heat, fires, explosions and/or toxic vapors. Avoid contact with SO2 or acidic bisulfite products, which may react to form visible airborne amine salt particles. Certain amines in contact with nitrous acid, organic or inorganic nitrites or atmospheres with high nitrous oxide concentrations may produce N-nitrosamines, many of which are cancer-causing agents to laboratory animals.

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: Oxides of carbon, Oxides of nitrogen

11. TOXICOLOGICAL INFORMATION

The following results are for a similar product.

ACUTE ORAL TOXICITY :

Species	LD50	Test Descriptor
Rat	779 mg/kg	Similar Product

Rating : Non-Hazardous

ACUTE DERMAL TOXICITY :

Species	LD50	Test Descriptor
Rabbit	2,055 mg/kg	Similar Product

Rating : Non-Hazardous

ACUTE INHALATION TOXICITY :

Species	LC50	Test Descriptor
Rat	> 12000 PPM (8 hrs)	Similar Product

Rating : Non-Hazardous

PRIMARY SKIN IRRITATION :

Draize Score	Test Descriptor
8.0 / 8.0	Similar Product

Rating : Extremely irritating (Corrosive)

PRIMARY EYE IRRITATION :

Draize Score	Test Descriptor
110.0 / 110.0	Similar Product

Rating : Extremely irritating (Corrosive)

SENSITIZATION :
This product is not expected to be a sensitizer.

CARCINOGENICITY :
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HUMAN HAZARD CHARACTERIZATION :
Based on our hazard characterization, the potential human hazard is: High

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

The following results are for the product.

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Rainbow Trout	96 hrs	130 mg/l	Product
Fathead Minnow	96 hrs	75 mg/l	Product
Sheepshead Minnow	96 hrs	454 mg/l	Product
Fish		650 mg/l	Product
Inland Silverside	96 hrs	500.0 mg/l	Product

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	LC50	EC50	Test Descriptor
Daphnia magna	48 hrs	190 mg/l		Product
Mysid Shrimp (Mysidopsis bahia)	96 hrs	131 mg/l		Product

AQUATIC PLANT RESULTS :

Species	Exposure	EC50/LC50	Test Descriptor
Algae		5,000 mg/l	Product

AQUATIC MICROORGANISM RESULTS :

Species	Exposure	EC50/LC50	Test Descriptor
Pseudomonas putida		7,500 mg/l	Product

PERSISTENCY AND DEGRADATION :

Chemical Oxygen Demand (COD) : 563,000 mg/l

The organic portion of this preparation is expected to be readily biodegradable.

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM , provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models. If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	30 - 50%	50 - 70%

The portion in water is expected to be soluble or dispersible.

BIOACCUMULATION POTENTIAL
This preparation or material is not expected to bioaccumulate.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Moderate
Based on our recommended product application and the product's characteristics, the potential environmental exposure is: High

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it could meet the criteria of a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261. Before disposal, it should be determined if the waste meets the criteria of a hazardous waste.

Hazardous Waste: D001, D002

Hazardous wastes must be transported by a licensed hazardous waste transporter and disposed of or treated in a properly licensed hazardous waste treatment, storage, disposal or recycling facility. Consult local, state, and federal regulations for specific requirements.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

LAND TRANSPORT :

Proper Shipping Name :	CORROSIVE LIQUID, FLAMMABLE, N.O.S.
Technical Name(s) :	CYCLOHEXYLAMINE, DIETHYLAMINOETHANOL, MORPHOLINE
UN/ID No :	UN 2920
Hazard Class - Primary :	8
Hazard Class - Secondary :	3
Packing Group :	II
Flash Point :	55 °C / 131 °F

AIR TRANSPORT (ICAO/IATA) :

Proper Shipping Name :	CORROSIVE LIQUID, FLAMMABLE, N.O.S.
Technical Name(s) :	CYCLOHEXYLAMINE, DIETHYLAMINOETHANOL, MORPHOLINE
UN/ID No :	UN 2920

Hazard Class - Primary :	8
Hazard Class - Secondary :	3
Packing Group :	II
IATA Cargo Packing Instructions :	812
IATA Cargo Aircraft Limit :	30 L (Max net quantity per package)

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name :	CORROSIVE LIQUID, FLAMMABLE, N.O.S.
Technical Name(s) :	CYCLOHEXYLAMINE, MORPHOLINE
UN/ID No :	UN 2920
Hazard Class - Primary :	8
Hazard Class - Secondary :	3
Packing Group :	II

15. REGULATORY INFORMATION

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Based on our hazard evaluation, the following substance(s) in this product is/are hazardous and the reason(s) is/are shown below.

Cyclohexylamine : Corrosive, Flammable
Diethylethanolamine : Combustible., Corrosive
Morpholine : Corrosive, Flammable

CERCLA/SUPERFUND, 40 CFR 117, 302 :
Notification of spills of this product is not required. Notification of spills of this product is not required.

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product contains the following substance(s) which is listed in Appendix A and B as an Extremely Hazardous Substance. Listed below are the statutory Threshold Planning Quantity (TPQ) for the substance(s) and the Reportable Quantity (RQ) of the product. If a reportable quantity of product is released, it requires notification to your State Emergency Response Commission. You may also be required to notify the National Response Center - See CERCLA/SUPERFUND, above.

Extremely Hazardous Substance	TPQ	RQ
Cyclohexylamine	10,000 lbs	40,000 lbs

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found this product to be hazardous. The product should be reported under the following indicated EPA hazard categories:

X	Immediate (Acute) Health Hazard
-	Delayed (Chronic) Health Hazard

X	Fire Hazard
-	Sudden Release of Pressure Hazard
-	Reactive Hazard

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product does not contain substances on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710) The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

FOOD AND DRUG ADMINISTRATION (FDA) Federal Food, Drug and Cosmetic Act :
When use situations necessitate compliance with FDA regulations, this product is acceptable under : 21 CFR 173.310 Boiler Water Additives

The following limitations apply:

Maximum dosage	Limitation
45 PPM	in the steam.

This product can not be used where the steam produced will contact milk or milk products.

NSF NON-FOOD COMPOUNDS REGISTRATION PROGRAM (former USDA List of Proprietary Substances & Non-Food Compounds) :
NSF Registration number for this product is : 062362
This product is acceptable for use in meat, poultry, and other food processing areas as a Boiler Treatment Product (G6), for treating boiler and steam lines where the steam produced may contact edible products. Acceptable usage shall be in accordance with the dosage limitations specified on the product label.

This product has been certified as KOSHER/PAREVE for year-round use INCLUDING THE PASSOVER SEASON by the CHICAGO RABBINICAL COUNCIL.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
None of the substances are specifically listed in the regulation.

CLEAN AIR ACT, Sec. 111 (40 CFR 60, Volatile Organic Compounds), Sec. 112 (40 CFR 61, Hazardous Air Pollutants), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
This product contains the following substances listed in the regulation:

Substance(s)	Citations
• Morpholine	Sec. 111
• Cyclohexylamine	Sec. 111

CALIFORNIA PROPOSITION 65 :
This product does not contain substances which require warning under California Proposition 65.

MICHIGAN CRITICAL MATERIALS :
None of the substances are specifically listed in the regulation.

STATE RIGHT TO KNOW LAWS :
The following substances are disclosed for compliance with State Right to Know Laws:

Cyclohexylamine	108-91-8
Morpholine	110-91-8
Diethylethanolamine	100-37-8

NATIONAL REGULATIONS, CANADA :

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) :
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS CLASSIFICATION :
B3 - Combustible Liquids, E - Corrosive Material

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substances in this preparation are listed on the Domestic Substances List (DSL), are exempt, or have been reported in accordance with the New Substances Notification Regulations.

INTERNATIONAL CHEMICAL CONTROL LAWS

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

EUROPE
The substances in this preparation have been reviewed for compliance with the EINECS or ELINCS inventories.

JAPAN
All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Ministry of International Trade & industry List (MITI).

KOREA
All substances in this product comply with the Toxic Chemical Control Law (TCCL) and are listed on the Existing Chemicals List (ECL)

THE PHILIPPINES
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippine Inventory of Chemicals & Chemical Substances (PICCS).

16. OTHER INFORMATION

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: Low

* The environmental risk is: Moderate

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH, (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight# (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Prepared By : Product Safety Department
Date issued : 04/05/2005
Version Number : 1.9

PB BLASTER

Product: PB−B

Section 1: PRODUCT INFORMATION

Chemical family: Mixture.

Manufacturer: Truflex/Pang Rubber Products Company, Inc.
200 East Coshocton Street
P.O. Box 486
Johnstown, Ohio 43031.

Manufacturer emergency phone number: Chemtrec 800−424−9300.
International: 703−527−3887.

Information phone number: 740−967−9015.
800−433−8324.

Supplier: Same as manufacturer.

Product name: PB BLASTER (MSDS #113)

Product uses: Penetrating lubricant.

Catalog number(s): PB−B

TDG classification:

AEROSOLS
UN1950
Class 2.1.

May be shipped as Consumer Commodity ORM−D.

Labels required: None

Emergency response guidebook number: 126

EmS number: 2−13

Reportable Quantity (DOT): Not applicable.

Effective date: 2010/9/20

Revision No.: 3

Last review: 2010/9/20

NFPA:

Section 2: HAZARDOUS INGREDIENTS

C.A.S.	Concentration% wgt/wgt	Ingredient Name	ACGIH−TLV TWA	LD/50	LC/50
124−38−9	< 2	CARBON DIOXIDE	5000 PPM	NOT AVAILABLE	NOT AVAILABLE
34590−94−8	> 3	DIPROPYLENE GLYCOL MONOMETHYL ETHER	100 PPM (SKIN)	5400 UL/KG RAT ORAL 5.5 ML/KG RAT ORAL 10 ML/KG RABBIT DERMAL	NOT AVAILABLE
64742−57−0	20 − 30	PETROLEUM OIL	5 MG/M3	NOT AVAILABLE	NOT AVAILABLE

64742−94−5	> 50	NAPHTHA, PETROLEUM		> 2 ML/KG RABBIT DERMAL	> 590 MG/M3/4H RAT INHALATION
84133−50−0	> 2	ALKYLOXYPOLYETHYLENEOXYETHANOL		NOT AVAILABLE	NOT AVAILABLE

Section 3: PHYSICAL DATA

Physical state: Liquid.

Appearance & odor: Amber
Dark brown.
Strong aromatic odour.
Viscous liquid.

Odor threshold (ppm): Not available.

Vapour pressure (mmHg): Not applicable.

Vapour density (air=1): >1

Volatiles (%)

By volume: 69.1

Evaporation rate (butyl acetate = 1): >1

Boiling point (°C): 178 − 215 (352−418°F)

Freezing point (°C): Not available.

pH: Not available.

Specific gravity @ 20 °C: 0.9020 (7.515 lbs/gal)

Solubility in water (%): Not available.

Coefficient of water\oil dist.: Not available.

VOC: 5.194 LBS/GAL (615.8 G/L)

Section 4: FIRE & EXPLOSION DATA

Flammability: Flammable aerosol.

Conditions of flammability: Vapours are heavier than air and may travel along the ground and be ignited by flames, sparks or other ignition sources at locations distant from the material handling point.
Heat, sparks and open flames.

Extinguishing media: Carbon dioxide, dry chemical, foam.

Special procedures: Self−contained breathing apparatus required.
Firefighters should wear the usual protective gear.

Auto−ignition temperature: Not available.

Flash point (°C), method: Tag Closed Cup.
66.7 (152°F)

Lower flammability limit (% vol): Not available.

Upper flammability limit (% vol): Not available.

Explosion Data

Sensitivity to static discharge: Take precautionary measures against static discharge.

Sensitivity to mechanical impact: Contents under pressure.

Hazardous combustion products: Oxides of carbon (CO, CO2).
Various hydrocarbons.

Explosive power: Product (even just residue) can ignite explosively.

Section 5: REACTIVITY DATA

Chemical stability: Product is stable.

Conditions of instability: None known.

Hazardous polymerization: Will not occur.

Incompatible substances: Strong acids.
Strong oxidizing agents.

Hazardous decomposition products: See hazardous combustion products.

Section 6: TOXICOLOGICAL PROPERTIES

Route of entry: Skin contact, eye contact, inhalation and ingestion.

Effects of acute exposure

Eye contact: May cause irritation.
May cause redness and tearing.
May cause stinging.
May cause swelling.

Skin contact: May cause skin burns.
May cause mild irritation.
May cause drying and cracking.
May cause redness or burning sensation.

Inhalation: May cause drowsiness.
May cause kidney and liver damage.
May cause irritation of the respiratory tract.
May cause light headedness.

Ingestion: Can cause irritation to mouth, throat, esophagus and stomach.
Aspiration hazard if swallowed.

Effects of chronic exposure: May affect the central nervous system.

LD50 of product, species & route: Not available for mixture, see the ingredients section.

LC50 of product, species & route: Not available for mixture, see the ingredients section.

Exposure limit of material: Not available for mixture, see the ingredients section.

Sensitization to product: Not available.

Carcinogenic effects: Not listed as a carcinogen.

Reproductive effects: Not available.

Teratogenicity: Not available.

Mutagenicity: Not available.

Synergistic materials: Not available.

Section 7: PREVENTATIVE MEASURES

Precautionary Measures

Gloves/Type:

Chemical resistant gloves.
Polyvinyl alcohol gloves.
Nitrile gloves.

Respiratory/Type:

NIOSH approved respirator, if necessary.
(negative pressure type).

Footwear/Type:

Impervious boots.

Clothing/Type: Impervious clothing.

Other/Type: Eye wash facility should be in close proximity.
Emergency shower should be in close proximity.

Ventilation requirements: Explosion proof ventilation equipment.
Local exhaust and/or general ventilation.

Leak/Spill: Recover using a pump.
Eliminate all sources of ignition.
Dike area to prevent spreading.
Evacuate all non−essential personnel.
Prevent entry into drains, sewers, and other waterways.
Absorb residual material with sand or other absorbent material.
Stop leak if without risk.
Wear appropriate protective equipment.
Ground handling equipment.
Transfer to an approved container for disposal.
Notify the appropriate authorities as required.

Waste disposal: In accordance with municipal, provincial and federal regulations.

Handling procedures and equipment: Maintain a good personal hygiene.
Keep away from heat, sparks, and open flame.
Use adequate ventilation.
Wash thoroughly after using, particularly before eating or smoking.
Wear personal protective equipment appropriate to task.
Empty containers containing residue may cause a hazard.
Do not cut, grind, weld or drill empty container.
Use proper grounding procedures.
Avoid contact with skin, eyes and clothing.
Avoid breathing vapor, fumes or mist.
Launder contaminated clothing prior to reuse.
Do not ingest.

Storage requirements: Store away from all sources of ignition.
Store away from strong acids or oxidizers.

Special shipping information: See transportation information.

Section 8: FIRST AID MEASURES

Skin contact: Remove contaminated clothing.
Wash with mild soap and water.
Consult a physician if irritation persists.

Eye contact: Flush eyes with clear, running water for 20 minutes while holding eyelids open. If irritation persists, consult a physician.

Inhalation: Keep person warm and at rest.
Remove victim to fresh air. If breathing is difficult administer oxygen. If not breathing, have qualified person give artificial respiration. Obtain medical attention.

Ingestion: If victim is drowsy or unconscious, place on left side with head down. Do not leave individual unattended.
Never give anything by mouth to an unconscious person.
Do not induce vomiting, seek immediate medical attention.

Additional information: The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. This company shall not be held liable for any inaccuracies.

Section 9: ADDITIONAL INFORMATION

General note: This material safety data sheet was prepared from information obtained from various sources, including product suppliers and the Canadian Center for Occupational Health and Safety.

Data prepared by: Global Safety Management
3340 Peachtree Road, #1800
Atlanta, GA 30326

Phone: 877−683−7460
Fax: (877) 683−7462

Web: www.globalsafetynet.com
Email: info@globalsafetynet.com.

See www.techtirerepairs.com for the latest MSDSs.

Material Safety Data Sheet – Perlite

----------I. Product Identification ----------

Trade Name (as labeled) Supreme Perlite (Expanded)

Manufacturers Name Supreme Perlite Company

Website & Email: www.perlite.com
info@perlite.com

Address: 4600 N. Suttle Rd.
Portland, OR 97217

Phone Number: 503-286-4333

Date Prepared or Revised: April 1, 2010

----------II. Product Ingredients----------

Ingredient Name	CAS Number	%	PEL	TLV(total)
Perlite	93763-70-3	100	15 mg/M3	10mg/M3

A mineral composed of sodium potassium aluminum silicate of variable composition.

Perlite is considered a nuisance dust (also called "Particulates Not Otherwise Classified (PNOC) by ACGIH).

HMIS Code: Health – 0, Fire – 0, Reactivity – 0, Personal Protection – X.

Alpha-Cristobalite & Tridymite: Less than 0.1%

Alpha Quartz: <0.1% below detectable limits

----------III. Physical Properties----------

Vapor Density (air=1)	N/A	**Melting point or range. ^{0}F**	2000+
Specific Gravity	2.35	**Boiling point or range. ^{0}F**	N/A
Solubility in Water	<1%	**Evaporation rate (butyl acetate = 1)**	N/A
Vapor Pressure (mmHg @ 20^{0}C)	N/A		

Appearance and odor: White to off white granules, no odor.

HOW TO DETECT THIS SUBSTANCE (warning properties of substance as a gas, vapor, dust or mist)

Visual only (dust). No gas, vapors, or mist emitted.

----------IV. Fire and Explosion----------

Flash Point, ^{0}F (give method) Perlite is a fully oxidized, non-flammable mineral. It is noncombustible and non-flammable.

Auto ignition temp., ^{0}F N/A

Flammable limits in air, Vol. % N/A lower (LEL) N/A upper (UEL) N/A

Fire extinguishing materials: N/A

_____water spray _____ carbon dioxide _____other

_____foam _____dry chemical

Special fire fighting procedures: N/A

Usual fire & explosion hazards: N/A

----------V. Health Hazard Information----------

SYMPTOMS OF EXPOSURE for each potential route of exposure

Inhaled: Coughing

Contact with skin or eyes: Possible eye irritation from dust particles; wear eye protection.

Absorbed through skin: N/A

Swallowed: N/A

HEALTH EFFECTS OR RISKS FROM EXPOSURE.

Acute: None

Chronic: Excessive inhalation over long period may cause harmful irritation; use mask suitable for nuisance dust.

Target Organ: None

FIRST AID: EMERGENCY PROCEDURES

Eye Contact: Attempt to wash out with clear water; if unable, have particle removed by doctor.

Skin Contact: None

Inhaled: Remove affected individual from dusty area to area with clean air.

Swallowed: None

SUSPECTED CANCER AGENT?

__X__ No: This product's ingredients are not found in below lists.

YES: ____Federal OSHA _____NTP _____IARC

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

Any respiratory illnesses, which a nuisance dust may aggravate.

----------VI Reactivity Data----------

Stability: **__X__Stable** _____Unstable

Incompatibility: Hydrofluoric Acid

Hazardous Polymerization: _____May occur **__X__Will not occur**

Conditions to avoid: None in designed use.

Hazardous Decomposition Products: May react with hydrofluoric acid form toxic gas.

----------VII. Spill, Leak & Disposal Procedures----------

Spill response procedures (include employee protection measures):

Vacuum clean or sweep material; Use respirators suitable for nuisance dust & eye protection.

Preparing wastes for disposal (container types, neutralization, etc.):

Dispose in bulk or containers according to local dump requirements. No special treatment required.

NOTE: Dispose of all wastes in accordance with federal, state and local regulations.

----------VIII. SPECIAL HANDLING INFORMATION----------

Ventilation and engineering controls:

Maintain dust level below TLV.

Respiratory protection (type):

Masks suitable for nuisance dust.

Eye protection (type):

Protective goggles.

Gloves (specify material):

Not required.

Work practices, hygienic practices:

Use good housekeeping to avoid transient dust.

Other handling and storage requirements:

Use good housekeeping to avoid transient dust.

Protective measures during maintenance of contaminated equipment:

No special equipment, other than respirators and goggles.

As of the date of this document, the foregoing information is believed to be accurate and is provided in good faith to comply with applicable federal and state laws. However, no warranty or representation with respect to such information is intended or given, and it is the responsibility of the user to comply with all applicable federal, state and local laws and regulations

Material Safety Data Sheet

1. MATERIAL AND COMPANY IDENTIFICATION

Material Name : **Shell Caprinus XR 40**
Uses : Engine oil.

Manufacturer/Supplier : **SOPUS Products**
700 Milam
700 Milam
Houston TX 77002-2806
Houston TX 77002-2806
USA
USA

MSDS Request :

Emergency Telephone Number
Spill Information : 877-242-7400
Health Information : 877-242-7400

2. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Identity	CAS No.	Concentration
Distillates (petroleum), hydrotreated light naphthenic	64742-53-6	30.00 - 60.00 %

The highly refined mineral oil contains <3% (w/w) DMSO-extract, according to IP346.
Highly refined mineral oils and additives.

3. HAZARDS IDENTIFICATION

Emergency Overview

Appearance and Odour : Amber. Liquid at room temperature. Slight hydrocarbon.

Health Hazards : Not classified as dangerous for supply or conveyance.
Safety Hazards : Not classified as flammable but will burn.
Environmental Hazards : Not classified as dangerous for the environment.

Health Hazards : Not expected to be a health hazard when used under normal conditions.

Health Hazards
Inhalation : Under normal conditions of use, this is not expected to be a primary route of exposure.
Skin Contact : Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis.
Eye Contact : May cause slight irritation to eyes.
Ingestion : Low toxicity if swallowed.
Other Information : Used oil may contain harmful impurities.
Signs and Symptoms : Oil acne/folliculitis signs and symptoms may include formation of black pustules and spots on the skin of exposed areas.

Ingestion may result in nausea, vomiting and/or diarrhoea.

Aggravated Medical Condition : Pre-existing medical conditions of the following organ(s) or organ system(s) may be aggravated by exposure to this material: Skin.

Environmental Hazards : Not classified as dangerous for the environment.

Additional Information : Under normal conditions of use or in a foreseeable emergency, this product does not meet the definition of a hazardous chemical when evaluated according to the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

4. FIRST AID MEASURES

General Information : Not expected to be a health hazard when used under normal conditions.

Inhalation : No treatment necessary under normal conditions of use. If symptoms persist, obtain medical advice.

Skin Contact : Remove contaminated clothing. Flush exposed area with water and follow by washing with soap if available. If persistent irritation occurs, obtain medical attention.

Eye Contact : Flush eye with copious quantities of water. If persistent irritation occurs, obtain medical attention.

Ingestion : In general no treatment is necessary unless large quantities are swallowed, however, get medical advice.

Advice to Physician : Treat symptomatically.

5. FIRE FIGHTING MEASURES

Clear fire area of all non-emergency personnel.

Flash point : Typical 260 °C / 500 °F (COC)

Upper / lower Flammability or Explosion limits : Typical 1 - 10 %(V)(based on mineral oil)

Auto ignition temperature : > 320 °C / 608 °F

Specific Hazards : Hazardous combustion products may include: A complex mixture of airborne solid and liquid particulates and gases (smoke). Carbon monoxide. Unidentified organic and inorganic compounds.

Suitable Extinguishing Media : Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.

Unsuitable Extinguishing Media : Do not use water in a jet.

Protective Equipment for Firefighters : Proper protective equipment including breathing apparatus must be worn when approaching a fire in a confined space.

6. ACCIDENTAL RELEASE MEASURES

Avoid contact with spilled or released material. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. See Chapter 13 for information on disposal. Observe all relevant local and international regulations.

Protective measures : Avoid contact with skin and eyes. Use appropriate containment

to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers.

Clean Up Methods : Slippery when spilt. Avoid accidents, clean up immediately. Prevent from spreading by making a barrier with sand, earth or other containment material. Reclaim liquid directly or in an absorbent. Soak up residue with an absorbent such as clay, sand or other suitable material and dispose of properly.

Additional Advice : Local authorities should be advised if significant spillages cannot be contained.

7. HANDLING AND STORAGE

General Precautions : Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Properly dispose of any contaminated rags or cleaning materials in order to prevent fires. Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material.

Handling : Avoid prolonged or repeated contact with skin. Avoid inhaling vapour and/or mists. When handling product in drums, safety footwear should be worn and proper handling equipment should be used.

Storage : Keep container tightly closed and in a cool, well-ventilated place. Use properly labelled and closeable containers. Storage Temperature: 0 - 50 °C / 32 - 122 °F

Recommended Materials : For containers or container linings, use mild steel or high density polyethylene.

Unsuitable Materials : PVC.

Additional Information : Polyethylene containers should not be exposed to high temperatures because of possible risk of distortion.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational Exposure Limits

Material	Source	Type	ppm	mg/m3	Notation
Oil mist, mineral	ACGIH	TWA(Mist.)		5 mg/m3	
Oil mist, mineral	ACGIH	STEL(Mist.)		10 mg/m3	
Distillates (petroleum), hydrotreated light naphthenic	ACGIH	TWA(Mist.)		5 mg/m3	

Distillates (petroleum), hydrotreated light naphthenic	ACGIH	STEL(Mist.)		10 mg/m3	
Distillates (petroleum), hydrotreated light naphthenic	OSHA Z1	PEL	500 ppm	2,000 mg/m3	
Distillates (petroleum), hydrotreated light naphthenic	OSHA Z1A	TWA	400 ppm	1,600 mg/m3	

Additional Information : Shell has adopted as Interim Standards the OSHA Z1A values that were established in 1989 and later rescinded.

Exposure Controls : The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. Appropriate measures include: Adequate ventilation to control airborne concentrations. Where material is heated, sprayed or mist formed, there is greater potential for airborne concentrations to be generated.

Personal Protective Equipment : Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.

Respiratory Protection : No respiratory protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid breathing of material. If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation. Check with respiratory protective equipment suppliers. Where air-filtering respirators are suitable, select an appropriate combination of mask and filter. Select a filter suitable for combined particulate/organic gases and vapours [boiling point >65°C(149 °F)].

Hand Protection : Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739) made from the following materials may provide suitable chemical protection: PVC, neoprene or nitrile rubber gloves. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, glove thickness, dexterity. Always seek advice from glove suppliers. Contaminated gloves should

		be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended.
Eye Protection	:	Wear safety glasses or full face shield if splashes are likely to occur.
Protective Clothing	:	Skin protection not ordinarily required beyond standard issue work clothes.
Monitoring Methods	:	Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate.
Environmental Exposure Controls	:	Minimise release to the environment. An environmental assessment must be made to ensure compliance with local environmental legislation.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Amber. Liquid at room temperature.
Odour	:	Slight hydrocarbon.
pH	:	Not applicable.
Initial Boiling Point and Boiling Range	:	> 280 °C / 536 °F estimated value(s)
Pour point	:	Typical -9 °C / 16 °F
Flash point	:	Typical 260 °C / 500 °F (COC)
Upper / lower Flammability or Explosion limits	:	Typical 1 - 10 %(V) (based on mineral oil)
Auto-ignition temperature	:	> 320 °C / 608 °F
Vapour pressure	:	< 0.5 Pa at 20 °C / 68 °F (estimated value(s))
Density	:	Typical 0.908 g/cm3 at 15 °C / 59 °F
Water solubility	:	Negligible.
n-octanol/water partition coefficient (log Pow)	:	> 6 (based on information on similar products)
Kinematic viscosity	:	Typical 150 mm2/s at 40 °C / 104 °F
Vapour density (air=1)	:	> 1 (estimated value(s))
Evaporation rate (nBuAc=1)	:	Data not available

10. STABILITY AND REACTIVITY

Stability	:	Stable.
Conditions to Avoid	:	Extremes of temperature and direct sunlight.
Materials to Avoid	:	Strong oxidising agents.
Hazardous Decomposition Products	:	Hazardous decomposition products are not expected to form during normal storage.

11. TOXICOLOGICAL INFORMATION

Basis for Assessment	:	Information given is based on data on the components and the toxicology of similar products.
Acute Oral Toxicity	:	Expected to be of low toxicity: LD50 > 5000 mg/kg , Rat
Acute Dermal Toxicity	:	Expected to be of low toxicity: LD50 > 5000 mg/kg , Rabbit

Acute Inhalation Toxicity	:	Not considered to be an inhalation hazard under normal conditions of use.
Skin Irritation	:	Expected to be slightly irritating. Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis.
Eye Irritation	:	Expected to be slightly irritating.
Respiratory Irritation	:	Inhalation of vapours or mists may cause irritation.
Sensitisation	:	Not expected to be a skin sensitiser.
Repeated Dose Toxicity	:	Not expected to be a hazard.
Mutagenicity	:	Not considered a mutagenic hazard.
Carcinogenicity	:	Product contains mineral oils of types shown to be non-carcinogenic in animal skin-painting studies. Highly refined mineral oils are not classified as carcinogenic by the International Agency for Research on Cancer (IARC). Other components are not known to be associated with carcinogenic effects.
Reproductive and Developmental Toxicity	:	Not expected to be a hazard.
Additional Information	:	Used oils may contain harmful impurities that have accumulated during use. The concentration of such impurities will depend on use and they may present risks to health and the environment on disposal. ALL used oil should be handled with caution and skin contact avoided as far as possible. Continuous contact with used engine oils has caused skin cancer in animal tests.

12. ECOLOGICAL INFORMATION

Ecotoxicological data have not been determined specifically for this product. Information given is based on a knowledge of the components and the ecotoxicology of similar products.

Acute Toxicity	:	Poorly soluble mixture. May cause physical fouling of aquatic organisms. Expected to be practically non toxic: LL/EL/IL50 > 100 mg/l (to aquatic organisms) (LL/EL50 expressed as the nominal amount of product required to prepare aqueous test extract). Mineral oil is not expected to cause any chronic effects to aquatic organisms at concentrations less than 1 mg/l.
Mobility	:	Liquid under most environmental conditions. Floats on water. If it enters soil, it will adsorb to soil particles and will not be mobile.
Persistence/degradability	:	Expected to be not readily biodegradable. Major constituents are expected to be inherently biodegradable, but the product contains components that may persist in the environment.
Bioaccumulation	:	Contains components with the potential to bioaccumulate.
Other Adverse Effects	:	Product is a mixture of non-volatile components, which are not expected to be released to air in any significant quantities. Not expected to have ozone depletion potential, photochemical ozone creation potential or global warming potential.

13. DISPOSAL CONSIDERATIONS

Material Disposal	:	Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations. Do not dispose into the environment, in drains or in water courses.
Container Disposal	:	Dispose in accordance with prevailing regulations, preferably to a recognised collector or contractor. The competence of the collector or contractor should be established beforehand.
Local Legislation	:	Disposal should be in accordance with applicable regional, national, and local laws and regulations.

14. TRANSPORT INFORMATION

US Department of Transportation Classification (49CFR)
This material is not subject to DOT regulations under 49 CFR Parts 171-180.

IMDG
This material is not classified as dangerous under IMDG regulations.

IATA (Country variations may apply)
This material is not classified as dangerous under IATA regulations.

15. REGULATORY INFORMATION

The regulatory information is not intended to be comprehensive. Other regulations may apply to this material.

Federal Regulatory Status

Notification Status

DSL	All components listed.
EINECS	All components listed or polymer exempt.
TSCA	All components listed.

Shell classifies this material as an "oil" under the CERCLA Petroleum Exclusion, therefore releases to the environment are not reportable under CERCLA.

SARA Hazard Categories (311/312)
No SARA 311/312 Hazards.

State Regulatory Status

California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)

This material does not contain any chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

New Jersey Right-To-Know Chemical List

Distillates (petroleum), hydrotreated light naphthenic (64742-53-6)	Listed.

Pennsylvania Right-To-Know Chemical List

Distillates (petroleum), hydrotreated light naphthenic (64742-53-6)	Listed.

16. OTHER INFORMATION

NFPA Rating (Health, Fire, Reactivity)	:	0, 1, 0
MSDS Version Number	:	6.0
MSDS Effective Date	:	02/18/2010
MSDS Revisions	:	A vertical bar (|) in the left margin indicates an amendment from the previous version.
MSDS Regulation	:	The content and format of this MSDS is in accordance with the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
MSDS Distribution	:	The information in this document should be made available to all who may handle the product.
Disclaimer	:	The information contained herein is based on our current knowledge of the underlying data and is intended to describe the product for the purpose of health, safety and environmental requirements only. No warranty or guarantee is expressed or implied regarding the accuracy of these data or the results to be obtained from the use of the product.

301

MATERIAL SAFETY DATA SHEET

Complies with OSHA Hazard Communication Standard 29 CFR 1910.1200

Date of Prep: 04/25/2011

SECTION 1

SUNNYSIDE CORPORATION
225 CARPENTER AVENUE
WHEELING, ILLINOIS 60090 (847) 541-5700
EMERGENCY TELEPHONE (800) 424-9300

FOR INFORMATION: (847) 541-5700
- SUNNYSIDE CORPORATION
- CHEM TREC

Product Class: Petroleum Hydrocarbon

Manufacturer's Code: 301

Trade Name: ODORLESS MINERAL SPIRITS
CALIFORNIA COMPLIANT

NPCA HMIS: Health: 1
Fire: 1
Reactivity: 0

Product Appearance and Odor: Clear, water-white liquid; mild petroleum odor.

SECTION 2 -- HAZARDOUS INGREDIENTS

OCCUPATIONAL EXPOSURE LIMITS

INGREDIENT	CAS #	PERCENT	ACGIH TLV (TWA)	ACGIH TLV (STEL)	OSHA PEL (TWA)	OSHA PEL (STEL)	VAPOR PRESSURE
Petroleum distillate	64742-47-8		N.E.	N.E.	N.E.	N.E.	0.07 MM Hg @ 20^{O} C.

SECTION 3 -- EMERGENCY AND FIRST AID PROCEDURES

Eye Contact: Flush eyes with plenty of water for 15 minutes while holding eyelids open. Get medical attention.

Skin Contact: Remove contaminated clothing/shoes. Flush skin with water. Follow by washing with soap and water. If irritation occurs, get medical attention. Do not reuse clothing until cleaned.

Inhalation: Remove victim to fresh air and if breathing is difficult, oxygen should be provided by qualified personnel. Give artificial respiration if not breathing. Get medical attention.

Ingestion: Do not induce vomiting. If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into the lungs. Get medical attention.

SECTION 4 -- PHYSICAL DATA

The following data represent approximate or typical values. They do not constitute product specifications.

Boiling Range:	430-520^{O} (F)	Vapor Density:	Heavier than air
Evaporation Rate:	Slower than ether	% Volatile By Volume:	Approx. 100%
Weight Per Gallon:	6.67 lbs.	VOC: California ARB definition:	0.5% (4g/L)
Solubility in Water:	Negligible; less than 0.1%		

SECTION 5 -- FIRE AND EXPLOSION DATA

Flammability Classification: Non-flammable
Flash Point: 205^{O}(F) Tag. Closed cup
Autoignition Temperature: 477^{O}F
Lower Explosive Limit: 0.6%
Extinguishing Media: Carbon dioxide, foam, dry chemical, water spray. Do not use direct water stream; it will spread fire.
Unusual Fire and Explosion Hazards: Do not store or mix with strong oxidants.
Special Fire Fighting Procedures: Use air-supplied rescue equipment for enclosed areas. Cool exposed containers with water.
Prevent run off from entering streams, sewers, or drinking water supply.

SECTION 6 -- HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE:	Not established. 166 ppm exposure recommended by manufacturer.
EFFECTS OF OVEREXPOSURE Acute Eye Contact:	May cause irritation, discomfort, redness and swelling of the eye.
Skin Contact:	Liquid is slightly irritating to the skin. Prolonged or repeated contact can result in defatting and drying of the skin which may result in skin irritation and dermatitis.
Inhalation:	Vapors may cause irritation to nose, throat and respiratory tract. Breathing of high vapor concentrations may result in headaches, dizziness and other signs of nervous system depression. These effects have been observed after misuse or abuse of this product. When used in a reasonable and foreseeable manner, no adverse effects are anticipated from exposure to this product.
Ingestion:	Ingestion may result in vomiting, aspiration (breathing) of vomitus into the lungs must be avoided as even small quantities may result in aspiration pneumonitis.
Chronic:	Repeated skin contact may aggravate an existing dermatitis (skin condition).
Carcinogenicity:	This product has not been identified as a carcinogen by NTP, IARC, or OSHA.
Medical Conditions Aggravated by Exposure:	Conditions aggravated by exposure may include skin disorders and respiratory (asthma-like) disorders.

SECTION 7 -- REACTIVITY DATA

Stability:	Stable
Conditions to Avoid:	Heat, sparks, flame, and high energy ignition sources..
Incompatibility (Materials to Avoid):	Strong oxidizing agents like liquid chlorine or concentrated oxygen.
Hazardous Decomposition Products:	Thermal decomposition may yield carbon dioxide and carbon monoxide.
Hazardous Polymerization:	Will not occur.

SECTION 8 -- SPILL OR LEAK PROCEDURES

Steps to be taken in case material is spilled or released: Remove ignition sources, evacuate area, avoid breathing vapor or contact with liquid. Recover free liquid or stop leak if possible. Dike large spills and use absorbent material for small spills. Keep spilled material out of sewers, ditches and bodies of water.

Waste disposal method: Incinerate under safe conditions; dispose of in accordance with local, state and federal regulations.

SECTION 9 -- SAFE HANDLING AND USE INFORMATION

Respiratory Protection:	Appropriate vapor canister, self-contained breathing apparatus or supplied-air hose mask, if needed.
Ventilation:	Sufficient, in volume and pattern, to keep workroom concentration below current applicable OSHA safety and health requirements. See Section 2. Use explosion-proof equipment. No smoking.
Protective Gloves:	Rubber or neoprene.
Eye Protection:	Chemical safety goggles.
Other Protective Equipment:	Impervious clothing or boots, if needed. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.

SECTION 10 -- SPECIAL PRECAUTIONS

Dept. of Labor Storage Category:	Non-flammable.
Hygienic Practices:	Keep away from heat, sparks and open flame. Keep containers closed when not in use. Avoid eye contact. Avoid prolonged or repeated contact with skin. Wash skin with soap and water after contact.
Additional Precautions:	Ground containers when transferring liquid to prevent static accumulation and discharge. Additional information regarding safe handling of products with static accumulation potential can be ordered by contacting the American Petroleum Institute (API) for API Recommended Practice 2003, entitled "Protection Against Ignitions Arising Out of Static, Lighting, and Stray Currents" (American Petroleum Institute, 1720 L Street Northwest, Washington, DC 20005), or the National Fire Protection Association (NFPA) for NFPA 77 entitled "Static Electricity" (National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101).
Empty Container Warning:	"Empty" containers retain residue (liquid and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind or expose such containers to heat, flame, sparks or other sources of ignition; they may explode and cause injury or death. Do not attempt to clean since residue is difficult to remove. "Empty" drums should be completely drained, properly bunged and promptly returned to supplier or disposed of in an environmentally safe manner and in accordance with governmental regulations.

SECTION 11 -- ADDITIONAL INFORMATION

This product contains the following toxic chemical(s) which are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372:

TOXIC CHEMICAL	CAS #	APPROXIMATE % BY WEIGHT
NONE	NONE	NONE

SARA Title III Hazard Categories:	None.
Common Names:	Solvent Naphtha (Petroleum), Aliphatic Hydrocarbon, Petroleum Distillate
California Proposition 65:	This product may contain trace amounts of Benzene, Ethyl Benzene and Toluene- which are known to the State of California to cause cancer, birth defects or other reproductive harm, and may be subject to the requirements of California Proposition 65.
TRANSPORTATION	Not regulated by U.S. D.O.T. as a hazardous material.

Material Safety Data Sheet
May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910 1200. Standard must be consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

Micro-Blaze® Emergency Liquid Spill Control

Note: Blank spaces are not permitted. If any item is not applicable or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's name	Verde Environmental, Inc.	Emergency Telephone Number	800 / 626-6598
Address	9223 Eastex Freeway	Telephone Number for Information	713 / 691-6468
	Houston, Texas 77093-7001	Date Prepared	01/01/2011
		Signature of Preparer	*William L. Scogin, President*

Section II—Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity, Common Name(s))	CAS Number:	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)

****** NO HAZARDOUS COMPONENTS OR INGREDIENTS ******

Per OSHA –29 CFR 1910.1200 -- All ingredients are organic and completely biodegrable.

Ingredients not precisely identified are proprietary or non-hazardous

Section III—Physical/Chemical Characteristics

Boiling Point	100°C	Specific Gravity (H_20 = 1)	1.0
Vapor Pressure (mm Hg)	Equiv. water	Melting Point	N / A
Vapor Density (AIR = 1)	Equiv. water	Evaporation Rate (Butyl Acetate = 1)	N / A

Solubility in Water 99%

Appearance and Odor Cream to tan, opaque liquid, perfumed

Section IV—Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
N / A	Non-flammable	----	----

Extinguishing Media Non-flammable

Special Fire Fighting Procedures None

Unusual Fire and Explosion Hazards None - **NON-FLAMMABLE**

Section V—Reactivity Data

Stability			Conditions to Avoid
	Unstable		
	Stable XXXX		

Incompatibility *(Materials to Avoid)* Strong acids or alkali compounds may inactivate biological cultures.

Hazardous Decomposition or Byproducts

Hazardous Polymerization			Conditions to Avoid
	May Occur		
	Will Not Occur	XXXX	

Section VI—Health Hazard Data

Route(s) of Entry Inhalation? Skin? Ingestion?

Health Hazards *(Acute and Chronic)* May cause diarrhea if ingested in large amounts. **NON-TOXIC**

Organisms used are non-pathogenic. These organisms are susceptible to commonly use antibiotics.

Carcinogenicity N / A NTP? N / A IARC Monographs? N / A OSHA Regulated? N / A

Signs and Symptoms of Exposure Skin: slight redness on hands and forearms if individual has a history of dermal allergic reaction.

Medical Conditions Generally Aggravated by Exposure Dermal allergic reaction on skin if susceptible person has continual exposure.

Emergency and First Aid Procedures Ingestion: Drink water or milk to dilute. Induce vomiting only if advised by physician or poison control center.

Section VII—Precautions for Safe Handling and Use

Steps to Be Taken in Case Material Is Released or Spilled May mop up spills; may flush down sanitary drain into waste water treatment lines.

Waste Disposal Method Disposal of this product or its residue must be done in accordance with all local, state and federal requirements.

Precautions to Be Taken in Handling and Storing Avoid eye contact.

Other Precautions To maintain shelf life, avoid temperatures under 32°F or over 120°F for long periods of time. Microbes are viable up to 180° F. KEEP FROM PROLONGED FREEZING.

Section VII—Control Measures

Respiratory Protection *(Specify Type)* Avoid breathing mists; mask advised if spraying in enclosed, unventilated space.

Ventilation	Local Exhaust	Special
	Mechanical *(General)*	Other Normal room ventilation.

Protective Gloves None required. Eye Protection Avoid splashing in eyes; may irritate.

Other Protective Clothing or Equipment None required.

Work/Hygienic Practices Minimize exposure in accordance with good hygiene practices.

Material Safety Data Sheet

1 - Chemical Product and Company Identification

Manufacturer: WD-40 Company **Address: 1061 Cudahy Place (92110)** **P.O. Box 80607** **San Diego, California, USA** **92138 –0607** **Telephone:** **Emergency only: 1-888-324-7596 (PROSAR)** **Information: 1-888-324-7596** **Chemical Spills: 1-800-424-9300 (Chemtrec)** **1-703-527-3887 (International Calls)**	**Chemical Name: Organic Mixture** **Trade Name: WD-40 Aerosol** **Product Use: Lubricant, Penetrant, Drives Out Moisture, Removes and Protects Surfaces From Corrosion** **MSDS Date Of Preparation: 6/8/12**

2 – Hazards Identification

Emergency Overview:
DANGER! Flammable aerosol. Contents under pressure. Harmful or fatal if swallowed. If swallowed, may be aspirated and cause lung damage. May cause eye irritation. Avoid eye contact. Use with adequate ventilation. Keep away from heat, sparks and all other sources of ignition.

Symptoms of Overexposure:
Inhalation: High concentrations may cause nasal and respiratory irritation and central nervous system effects such as headache, dizziness and nausea. Intentional abuse may be harmful or fatal.
Skin Contact: Prolonged and/or repeated contact may produce mild irritation and defatting with possible dermatitis.
Eye Contact: Contact may be irritating to eyes. May cause redness and tearing.
Ingestion: This product has low oral toxicity. Swallowing may cause gastrointestinal irritation, nausea, vomiting and diarrhea. This product is an aspiration hazard. If swallowed, can enter the lungs and may cause chemical pneumonitis, severe lung damage and death.
Chronic Effects: None expected.
Medical Conditions Aggravated by Exposure: Preexisting eye, skin and respiratory conditions may be aggravated by exposure.

Suspected Cancer Agent:
Yes No X

3 - Composition/Information on Ingredients

Ingredient	CAS #	Weight Percent
Aliphatic Hydrocarbon	64742-47-8	45-50
Petroleum Base Oil	64742-58-1 64742-53-6 64742-56-9 64742-65-0	<25
LVP Aliphatic Hydrocarbon	64742-47-8	12-18
Carbon Dioxide	124-38-9	2-3
Non-Hazardous Ingredients	Mixture	<10

4 – First Aid Measures

Ingestion (Swallowed): Aspiration Hazard. DO NOT induce vomiting. Call physician, poison control center or the WD-40 Safety Hotline at 1-888-324-7596 immediately.
Eye Contact: Flush thoroughly with water. Remove contact lenses if present after the first 5 minutes and continue flushing for several more minutes. Get medical attention if irritation persists.
Skin Contact: Wash with soap and water. If irritation develops and persists, get medical attention.

Inhalation (Breathing): If irritation is experienced, move to fresh air. Get medical attention if irritation or other symptoms develop and persist.

5 – Fire Fighting Measures

Extinguishing Media: Use water fog, dry chemical, carbon dioxide or foam. Do not use water jet or flooding amounts of water. Burning product will float on the surface and spread fire.
Special Fire Fighting Procedures: Firefighters should always wear positive pressure self-contained breathing apparatus and full protective clothing. Cool fire-exposed containers with water. Use shielding to protect against bursting containers.
Unusual Fire and Explosion Hazards: Contents under pressure. Keep away from ignition sources and open flames. Exposure of containers to extreme heat and flames can cause them to rupture often with violent force. Vapors are heavier than air and may travel along surfaces to remote ignition sources and flash back.

6 – Accidental Release Measures

Wear appropriate protective clothing (see Section 8). Eliminate all sources of ignition and ventilate area. Leaking cans should be placed in a plastic bag or open pail until the pressure has dissipated. Contain and collect liquid with an inert absorbent and place in a container for disposal. Clean spill area thoroughly. Report spills to authorities as required.

7 – Handling and Storage

Handling: Avoid contact with eyes. Avoid prolonged contact with skin. Avoid breathing vapors or aerosols. Use only with adequate ventilation. Keep away from heat, sparks, pilot lights, hot surfaces and open flames. Unplug electrical tools, motors and appliances before spraying or bringing the can near any source of electricity. Electricity can burn a hole in the can and cause contents to burst into flames. To avoid serious burn injury, do not let the can touch battery terminals, electrical connections on motors or appliances or any other source of electricity. Wash thoroughly with soap and water after handling. Keep containers closed when not in use. Keep out of the reach of children. Do not puncture, crush or incinerate containers, even when empty.
Storage: Store in a cool, well-ventilated area, away from incompatible materials. Do not store above 120°F or in direct sunlight. U.F.C (NFPA 30B) Level 3 Aerosol.

8 – Exposure Controls/Personal Protection

Chemical	Occupational Exposure Limits
Aliphatic Hydrocarbon	1200 mg/m3 TWA (manufacturer recommended)
Petroleum Base Oil	5 mg/m3 TWA, 10 mg/m3 STEL ACGIH TLV 5 mg/m3 TWA OSHA PEL
LVP Aliphatic Hydrocarbon	1200 mg/m3 TWA (manufacturer recommended)
Carbon Dioxide	5000 ppm TWA (OSHA/ACGIH), 30,000 ppm STEL (ACGIH)
Non-Hazardous Ingredients	None Established

The Following Controls are Recommended for Normal Consumer Use of this Product
Engineering Controls: Use in a well-ventilated area.
Personal Protection:
Eye Protection: Avoid eye contact. Always spray away from your face.
Skin Protection: Avoid prolonged skin contact. Chemical resistant gloves recommended for operations where skin contact is likely.
Respiratory Protection: None needed for normal use with adequate ventilation.

For Bulk Processing or Workplace Use the Following Controls are Recommended
Engineering Controls: Use adequate general and local exhaust ventilation to maintain exposure levels below that occupational exposure limits.
Personal Protection:
Eye Protection: Safety goggles recommended where eye contact is possible.

Skin Protection: Wear chemical resistant gloves.
Respiratory Protection: None required if ventilation is adequate. If the occupational exposure limits are exceeded, wear a NIOSH approved respirator. Respirator selection and use should be based on contaminant type, form and concentration. Follow OSHA 1910.134, ANSI Z88.2 and good Industrial Hygiene practice.
Work/Hygiene Practices: Wash with soap and water after handling.

9 – Physical and Chemical Properties

Boiling Point:	361 - 369°F (183 - 187°C)	Specific Gravity:	0.8 – 0.82 @ 60°F
Solubility in Water:	Insoluble	pH:	Not Applicable
Vapor Pressure:	95-115 PSI @ 70°F	Vapor Density:	Greater than 1
Percent Volatile:	70-75%	VOC:	412 grams/liter (49.5%)
Coefficient of Water/Oil Distribution:	Not Determined	Appearance/Odor	Light amber liquid/mild odor
Flash Point:	122°F (49°C) Tag Open Cup (concentrate)	Flammable Limits: (Solvent Portion)	LEL: 0.6% UEL: 8.0%
Pour Point:	-63°C (-81.4°F) ASTM D-97	Kinematic Viscosity:	2.79-2.96cSt @ 100°F

10 – Stability and Reactivity

Stability: Stable
Hazardous Polymerization: Will not occur.
Conditions to Avoid: Avoid heat, sparks, flames and other sources of ignition. Do not puncture or incinerate containers.
Incompatibilities: Strong oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide and carbon dioxide.

11 – Toxicological Information

The oral toxicity of this product is estimated to be greater than 5,000 mg/kg based on an assessment of the ingredients. This product is not classified as toxic by established criteria. It is an aspiration hazard.
None of the components of this product is listed as a carcinogen or suspected carcinogen or is considered a reproductive hazard.

12 – Ecological Information

No data is currently available.

13 - Disposal Considerations

If this product becomes a waste, it would be expected to meet the criteria of a RCRA ignitable hazardous waste (D001). However, it is the responsibility of the generator to determine at the time of disposal the proper classification and method of disposal. Dispose in accordance with federal, state, and local regulations.

14 – Transportation Information_

DOT Surface Shipping Description: Consumer Commodity, ORM-D
After 1/1/2014 UN1950, Aerosols, 2.1 Ltd. Qty (Note: Shipping Papers are not required for Limited Quantities unless transported by air or vessel – each package must be marked with the Limited Quantity Mark)
IMDG Shipping Description: UN1950, Aerosols, 2.1, LTD QTY
ICAO Shipping Description: UN1950, Aerosols, flammable, 2.1 NOTE: WD-40 does not test aerosol cans to assure that they meet the pressure and other requirements for transport by air. We do not recommend that our aerosol products be transported by air.

15 – Regulatory Information

U.S. Federal Regulations:
CERCLA 103 Reportable Quantity: This product is not subject to CERCLA reporting requirements, however, oil spills are reportable to the National Response Center under the Clean Water Act and many states have more stringent release reporting requirements. Report spills required under federal, state and local regulations.
SARA TITLE III:
Hazard Category For Section 311/312: Acute Health, Fire Hazard, Sudden Release of Pressure
Section 313 Toxic Chemicals: This product contains the following chemicals subject to SARA Title III Section 313 Reporting requirements: None
Section 302 Extremely Hazardous Substances (TPQ): None
EPA Toxic Substances Control Act (TSCA) Status: All of the components of this product are listed on the TSCA inventory.
California Safe Drinking Water and Toxic Enforcement Act (Proposition 65): This product does not contain chemicals regulated under California Proposition 65.
VOC Regulations: This product complies with the consumer product VOC limits of CARB, the US EPA and states adopting the OTC VOC rules.
Canadian Environmental Protection Act: One of the components is listed on the NDSL. All of the other ingredients are listed on the Canadian Domestic Substances List or exempt from notification.
Canadian WHMIS Classification: Class B-5 (Flammable Aerosol)
This MSDS has been prepared according to the criteria of the Controlled Products Regulation (CPR) and the MSDS contains all of the information required by the CPR.

16 – Other Information:

HMIS Hazard Rating:
Health – 1 (slight hazard), Fire Hazard – 4 (severe hazard), Reactivity – 0 (minimal hazard)

SIGNATURE: _____ TITLE: Adm. Scientific Manager

REVISION DATE: June 2012 SUPERSEDES: March 2010

MATERIAL SAFETY DATA SHEET

An explanation of terms used may be found in OSHA
29 CFR 191.1200 available from OSHA regional or area offices.

October 1, 2006

1. PRODUCT IDENTIFICATION

PRODUCT: St. Cloud Natural Clinoptilolite Zeolite **CAS No. 12173-10-3**

CHEMICAL NAME: Potassium-calcium-magnesium-aluminosilicate **SYNONYMS:** Clinoptilolite

EMPIRICAL FORMULA: (K,Ca,Mg) 2O-AL2O3-10SiO2-6H20

2. COMPANY IDENTIFICATION

COMPANY NAME: ST. CLOUD MINING COMPANY

MAILING ADDRESS: P.O. Box 1670 - Truth or Consequences, New Mexico 87901, U.S.A.

PHYSICAL ADDRESS: Winston Mill Site - Winston, New Mexico 87943, U.S.A.

PHONE NUMBER: 505-743-5215 **FAX NUMBER:** 505-743-3333 **WEBSITE:** www.stcloudmining.com

3. HAZARDOUS INGREDIENTS AND HEALTH HAZARD DATA

HAZARDOUS INGREDIENTS: May Contain 0.07-0.10% Free Silica. **ROUTES OF ENTRY:** Inhalation

HEALTH HAZARDS: Granular powder, airborne dust particles are irritating to respiratory tract. Contact with eyes and skin may cause irritation. May be harmful if inhaled. Clinoptilolite with a particle size in the respirable range was tested for carcinogenicity in rats by intratracheal instillation. No significant increase in the incidence of tumors was found. Hazard Symbols for this product: Xn.

HAZARDOUS COMPONENTS: Clinoptilolite zeolite / potassium, calcium, sodium, aluminosilicate, hydrated (a) **Percent by weight:** 100%

CAS #: 12173-10-3 **EINECS #:** Not found **Hazard Symbol:** Xn **Risk Phrases:** R 20, 36/37/38

CARCINOGENICITY: NTP? No. IARC Monographs? No. OSHA Regulated? No.

SIGNS & SYMPTOMS OF EXPOSURE: Coughing, irritation of respiratory tract.

4. FIRST AID MEASURES

SWALLOWING: If ingested in large quantities, contact physician for permission to induce vomiting.

SKIN CONTACT: Rinse with water if irritation ensues.

INHALATION: Remove the person to fresh air, rinse mouth and nasal passages with fresh water. Seek medical attention if irriation persists.

EYE CONTACT: Check for and remove contact lenses. Flush eyes with water for 15 minutes. Seek medical attention if irritation persists.

NOTES TO PHYSICIAN: St. Cloud Natural Zeolite has no additives or materials that require special treatment. However some products of St. Cloud Natural Zeolite are treated to enhance their use for special applications. Should a specialty product with additives to St. Cloud Natural Zeolite, a separate MSDS is available from the supplier.

5. PHYSICAL & CHEMICAL CHARACTERISTICS

COLOR:	White, to off white with dark specs	**BOILING POINT:**	Not applicable
ODOR:	None	**FREEZING POINT:**	Not applicable
MELTING POINT:	1800 F	**VAPOR PRESSURE:**	Not applicable
VAPOR DENSITY:	Not applicable	**SPECIFIC GRAVITY:**	2.2 - 2.4
SOLUBILITY IN WATER:	0	**EVAPORATION RATE:**	Not applicable

6. FIRE AND EXPLOSION DATA

FLASH POINT:	Not applicable	**FLAMMABLE LIMITS:**	Not applicable
LEL:	Not applicable	**UEL:**	Not applicable

EXTINGUISHING MEDIA: Not applicable

SPECIAL FIRE FIGHTING PROCEDURES: Non combustible

UNUSUAL FIRE AND EXPLOSION HAZARDS: None

7. REACTIVITY DATA

STABILITY: Stable **CONDITIONS TO AVOID:** Not applicable

INCOMPATIBILITY (Materials to avoid): None

HAZARDOUS POLYMERIZATION: Will not occur. **CONDITIONS TO AVOID:** Not applicable

8. SAFE HANDLING AND USE

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Physical clean up is required only to prevent sediment to surface water courses, depending upon the partilce size of the product. St. Cloud Natural Zeolite will not react or release any harmful substance to the environment.

WASTE DISPOSAL METHOD: Spills of St. Cloud Natural Zeolite should be cleaned up in a manner that minimizes the generation of dust as a potential nuisance, or may be dispersed of in any garden areas, lawn or landfill.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Avoid breathing dust, may irritate the respiratory tract

OTHER PRECAUTIONS: None

9. EXPOSURE CONTROL MEASURES

RESPIRATORY PROTECTION:		Wear OSHA approved dust respirators to avoid nuisance dust and possible irritation
VENTILATION	**LOCAL EXHAUST:**	Exhaust ventilation is recommended for operations to avoid nuisance dust and possible irritation.
	MECHANICAL (general):	Not applicable
	SPECIAL:	Not applicable
	OTHER:	Not applicable
EYE PROTECTION:		Safety glasses or goggles should be worn to prevent dust from entering eyes.
PROTECTIVE GLOVES:		Optional. May cause drying of skin with prolonged contact.
OTHER PROTECTIVE CLOTHING OR EQUIPMENT:		Dust Respirator

10. ECOLOGICAL CONSIDERATIONS

WATERFOWL TOXICITY:	Not Applicable
AQUATIC TOXICITY:	Not Applicable
FOOD CHAIN CONCENTRATION POTENTIAL:	Not Applicable
BIOCHEMICAL OXYGEN DEMAND:	Not Applicable
ATMOSPHERIC:	Contain no ozone depleting substances.

11. TRANSPORTATION INFORMATION

Proper Shipping Name:	Non-Hazardous for Transport	IATA Hazard Class/Packaging Group:	Not Regulated
DOT Hazard Class/Packaging Group:	Not Regulated	IMDG Hazard Class:	Not Regulated
Reference:	Not Applicable	RID/ADR Dangerous Goods Code:	Not Regulated
UN/NA Identification Number:	None	UN TDG Class/Packaging Group:	Not Regulated
Label:	None Required	Hazard Identification Number (HIN):	None
Hazard Symbol:	None		

12. REGULATORY INFORMATION

CERCLA: None.

SARA Title III.313 Reportable Ingredients: None

California Prop 65: There are no chemicals present in product known to the state of California to casue cancer or reproductive toxicity.

CPR (Canadian Controlled Products Regulations): This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR. WHMIS Classification: Not Controlled.

IDL (Canadian Ingredient Disclosure List): Components of this product identified by CAS number and listed on the Canadian IDL are shown in Section 3.

DSL / NDSL (Canadian Domestic Substances List / Non-Domestic Substance List): Components of this product identified by CAS number are not listed on the DSL or NDSL, or are otherwise in compliance with the New Substances Notifications (NSN) regulations.

EINECS (European Inventory of Existing Commercial Chemical Substances): Components of this product identified by CAS numbers are on the European inventory of existing Commercial Chemical Substances unless indicated as "not found".

WGK Water Quality Index: nwg **VbK Index:** not applicable

HMIS HAZARD RATINGS	HEALTH	1	Definitions:	* = Chronic Health Hazard	2 = MODERATE
	FLAMMABILITY	0		0 = INSIGNIFICANT	3 = HIGH
	PHYSICAL HAZARD	0		1 = SLIGHT	4 = EXTREME
	PERSONAL PROTECTIVE EQUIPMENT	E		E Safety Glasses, Gloves, Dust Respirator	

It is recommended that all recipients of this MSDS become familiar with and understand any hazards associated with this product. This information should then be made available to employees and customers who may come in contact with this material.

E.4 Additional Results of Effluent Testing

NALCO Water
An Ecolab Company

DMS

Water Treatment System Review

Report

23 May 2016

BergerABAM

Port of Vancouver/Vancouver, WA

Mr. Dan Shafar

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TABLE OF CONTENTS

CONFIDENTIALITY STATEMENT

This report contains information relating to the operations at the proposed west boiler house for the Port of Vancouver, Vancouver, WA. This information is confidential to each party, and as such this report should not be shared without the express written consent of all the parties involved.

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DISCLAIMER: Actual values may be different pending actual conditions. We make no warranty of any kind regarding the accuracy or sufficiency of the information contained herein due to various assumptions including proposed plant configuration and anticipated operating requirements as provided.

SECTION I: EXECUTIVE SUMMARY

Tesoro and Savage have formed a joint venture to build and operate the Vancouver Energy terminal. The proposed facility will receive and ship crude oil that originates in the midcontinent of North America and arrives at the Port of Vancouver USA by rail. The crude oil will be temporarily and safely stored in secure tanks, then transferred to customers' vessels to be shipped to West Coast oil refineries, and converted into transportation fuels and other products for U.S. consumption.

BergerABAM is providing consulting services to Tesoro and Savage on the feasibility of constructing this facility. As part of this project, BergerABAM need to obtain an environmental permit from either the state or city authorities, but require more detailed information on the expected discharge characteristics from the new facility.

Nalco has been requested to supply expertise to support the development of the project. Nalco has been requested to develop the waste water characteristics for a scenario based the following specific operating criteria.

1. **Scenarios:** The following scenario was evaluated.
    a. Average water flows based on two Cleaver Brook boilers running (SCN_000)
    b. City water feeding the boilers treated with a reverse osmosis (RO) unit followed by an off-site regenerated sodium zeolite softener (SCN_002)

RESULTS SUMMARY

- The design & operating parameters result in boiler feed water that meets all the Cleaver Brooks boiler water chemistry specifications.

- The design & operating parameters result in waste water that meets all the chemistry limits for waste water discharge.

WATER CHARACTERISTICS

INITIAL DESIGN WITH REVERSE OSMOSIS/SODIUM ZEOLITE PROCESS

1. Water flow characteristics
    a. Boiler blowdown details can be seen in Table 2 and chemistry Appendix C
        i. Cleaver Brooks specifications are met
        ii. Sulfite levels are present in the blowdown
        iii. Phosphate is present in the blowdown from city water PO_4
    b. Total waste water details can be seen in Table 3 and Table 4 and chemistry Appendix C

SECTION II: ABSTRACT

This engineering study included gathering of information on the conceptual design and extensive use of a proprietary modeling software program that replicates specified expected operating conditions of the facility. This involved computer based holistic modeling of the plant water and process systems.

KEY GOALS

1. Establish reliable water balance for the conceptual design and specified operating parameters
    a. Hydraulic flows
    b. Ionic chemistry
2. Determine the water characteristics of the following flows
    a. Boiler blowdown
    b. Total waste water
    c. Boiler feedwater
    d. Boiler cycle make up
    e. Steam condensate

SECTION III: PROJECT DESCRIPTION

OPERATING CRITERIA

Port of Vancouver, WA		
Scenario_000		
Operational Parameters		
Number of Boilers	3	
Rated Boiler Capacity each	51,750	pph
Boiler Operating	2	
Boilers on Standby	1	
Operating Pressure	125	psig
Steam Production Total	83,830	pph
Condensate Return	67,064	pph
Blowdown %	4.0%	

CLEAVER-BROOKS CHEMISTRY SPECIFICATIONS

TOTAL HARDNESS	1 PPM MAXIMUM
TOTAL ALKALINITY	600 PPM MAXIMUM
TOTAL SILICA	150 PPM MAXIMUM
IRON CONTENT	0.1 PPM MAXIMUM
PH	8.5 – 10.5
TOTAL DISSOLVED SOLIDS	2,200 TO 2,500 PPM
OXYGEN CONTENT	0 PPM
CARBON DIOXIDE	0 PPM

(SOURCE: CLEAVER-BROOKS, INC.)

WATER SOURCES

The water chemistry of the city water source (during the sampling week February 11, 2016) can be classified as slightly hard water with moderate alkalinity concentration. The hardness is primarily temporary hardness which implies lime softening can be effective in reducing hardness, alkalinity, TDS and silica as well. The reactive silica level is very high and is of concern in managing the boiler water chemistry within the OEM's water specifications.

Table 1 summarizes these critical chemistry parameters that drive water processes required to manage the water consumption and waste water discharge volume.

Table 1 City Water Chemistry

KEY WATER CONSTITUENTS	City Water
ALL UNITS IN mg/L (unless otherwise specified)	SCN_000
Ca	33.0000
K	3.3000
Li	ND
Mg	9.7000
Na	6.4000
Sr	0.1220
Zn	0.0200
Cl	6.9000
HCO3	131.4833
NO3	15.0000
PO4	0.3679
SO4	10.0000
pH su	7.7000
SiO2	48.0000

City water chemistry based on sample taken of Vancouver city water at the Nalco manufacturing plant in Vancouver, WA. The sample was analyzed through ICP for metals and IC for anions. Alkalinity was tested with auto-titration and pH with standard lab bench pH meter.

ICP: Inductively Coupled Plasma Spectroscopy

IC: Ion chromatography

See Appendix C for detection limits

Table 2: Boiler Blowdown Chemistry

KEY WATER CONSTITUENTS	Boiler BD
ALL UNITS IN mg/L (unless otherwise specified)	SCN_002
Ca	ND
K	1.0205
Mg	ND
Na	99.2036
Zn	0.0062
Cl	2.1339
HCO3	17.7951
NO3	4.6389
OH	NC
PO4	0.1138
SO3	112.5702
SO4	3.8133
Conductivity µS/cm	339.8661
pH su	10.3037
SiO2	15.3267
TDS	271.8929
Temperature °F	95.0000

Note: Elements and compounds that are not listed were either not tested (NT) or below analytical procedure detection limit (ND). There are also other values that are not applicable (NA) to this process or are calculated values that cannot be calculated (NC) on this water chemistry. A complete list can be found in Appendix D

Table 4 Drain Sump Chemistry & Specification

KEY WATER CONSTITUENTS	Final Waste
ALL UNITS IN mg/L (unless otherwise specified)	SCN_002
Ag	ND
As	ND
Ca	100.8204
Cd	ND
Cr	ND
Cu	ND
Hg	ND
K	10.1931
Mg	29.6351
Mo	ND
Na	32.0165
Ni	ND
Pb	ND
Se	ND
Tl	ND
Zn	0.0618
Cl	21.3128
CN	ND
HCO3	400.3494
NO3	47.1287
OH	ND
PO4	1.1365
SO3	12.2498
SO4	37.9369
BOD5	6.4283
Conductivity µS/cm	869.5330
FOG	7.7139
pH su	8.4188
SiO2	148.3151
TDS	695.6264
Temperature °F	75.7740

All values in mg/L unless other wise specified

Table 4 Drain Sump Chemistry & City of Vancouver Discharge Limit

KEY WATER CONSTITUENTS	City of Vancouver Discharge Limit	SCN_002
ALL UNITS IN mg/L (unless otherwise specified)	Final Waste Water Discharge	Final Waste Water Discharge
Ag	1.130000	ND
As	0.220000	ND
Cd	0.140000	ND
Cr	7.220000	ND
Cu	3.670000	ND
Hg	0.008000	ND
Mo	0.420000	ND
Ni	0.900000	ND
Pb	0.440000	ND
Se	0.310000	ND
Tl	0.530000	ND
Zn	1.640000	0.061776
CN	0.470000	NT
BOD5	500.000000	6.428280
FOG	50.000000	7.713936
pH su	10.000000	8.418850
Temperature °F	104.000000	75.774029

All values meet waste specification base.

Chromium value is for total Cr (Cr^{+3} and Cr^{+6}).
A nominal amount of BOD and FOG was added to the sanitary waste flow. Also additional amount to FOG was added to the condensate that is delivered to the floor drains.

METHODOLOGY

DMS was supplied with the original design diagrams, expected operating parameters and water chemistry analyses from Nalco. DMS then developed a line diagram model of the water balance using Visio and the proprietary DMS-Water™ software system to replicate the proposed operating conditions of the facility.

DMS evaluated the proposed plant configurations regarding water chemistry based on operations feedback and our intimate knowledge of practical industrial water treatment as it pertains to steam plant process operations. The results of these studies were captured in this report.

The scope of the work can be found in Appendix A.

Disclaimer:

The enclosed information is based on an average chemistry for the city water source. DMS-Water™ modeling was matched to a snapshot of chemistry data that indicates that our modeling sufficiently represents the water balance and system. Conditions such as incursion of air borne debris into the cooling tower and plant operational changes can cause actual conditions to differ from our modeling. While actual chemistry conditions and chemical costs most likely will differ from our modeling, the implied improvements and actual costs should be reflected with actual operations.

SECTION IV: EVALUATION

MODELING OBSERVATIONS

- Boiler blowdown chemistry complies with both ASME and Cleaver-Brooks silica, alkalinity and pH specifications
- Waste water chemistry and flow complies with expected discharge permits.

WATER INVENTORY

Table 4 Incoming Water Inventory

Water In (gpm)	SCN_002
City Water	
• City Water to Plant	48.1
Subtotal	48.1
Total Water In	48.1

Table 5 Outgoing Water Inventory

Water Out (gpm)	SCN_002
Evaporation	
• Misc. condensate loss 1	9.1
• Misc. condensate loss 2	17.9
Subtotal	27.0
Final Discharge	
• Final Discharge	15.6
Subtotal	15.6
Tank-Waste Manual	
• Rail car condensate losses	5.5
Subtotal	5.5
Total Water Out	48.1

SCENARIO DESCRIPTION

DMS investigated five (5) alternative designs to address the goals of this engineering study, and following discussion with BergerABAM chose SCN_002 as the design that best meets the objectives of this project.

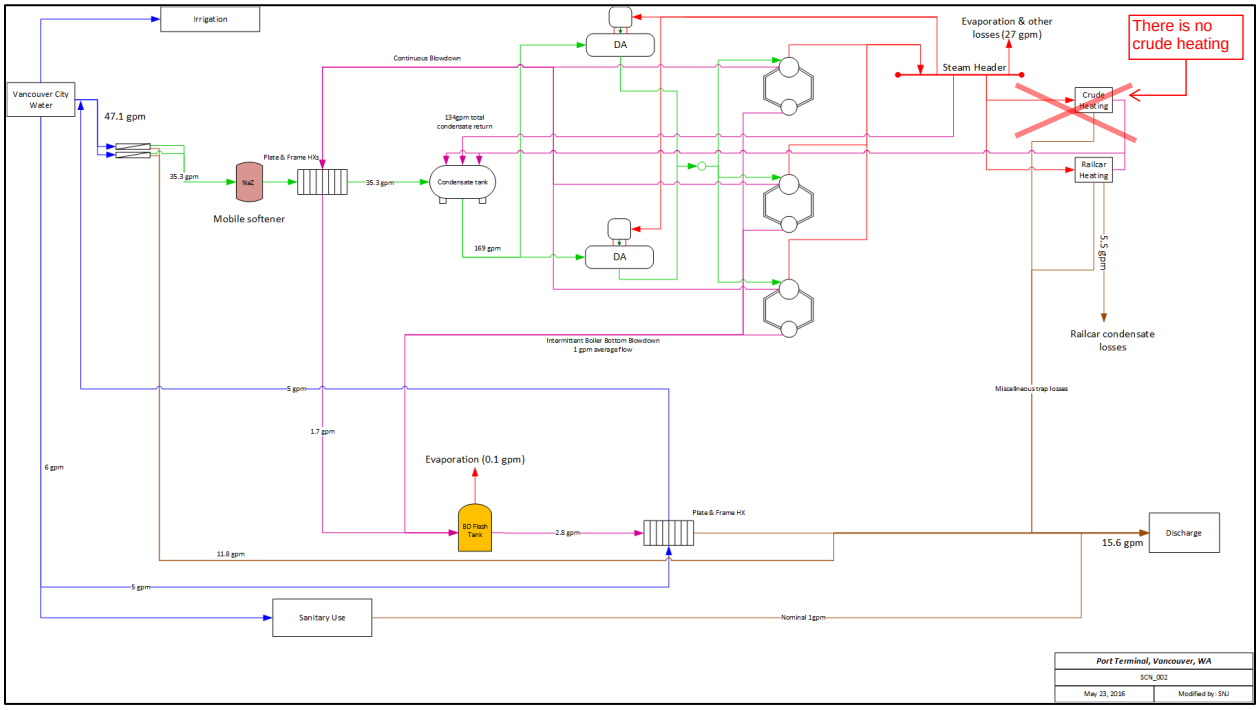
1. Determine the water characteristics
    a. Boiler blowdown
    b. Total waste water
    c. Boiler feedwater
    d. Boiler cycle makeup
    e. Steam condensate
2. Meet the water specifications for boiler water and waste water discharge.

.

SCENARIO EVALUATION

SCN_002 PROPOSED SCENARIO

This is the Base Case of the new facility for the proposed west boiler house. It utilizes the design and operating conditions agreed between Nalco and BergerABAM.



Summary: The incoming city water is treated with a reverse osmosis unit followed by an off-site regenerated (mobile) sodium zeolite softener. Blowdown water from the boilers is cooled by two plate and frame heat exchangers, both using water that will ultimately feed the boilers. The first heat exchanger cools the blowdown with softened water that feeds the deaerator. The second heat exchanger uses fresh city water prior to feeding the reverse osmosis unit.

Results: This case established that the boiler chemistry meets both ASME and Cleaver-Brooks boiler water chemistry specification for silica, pH and other ion concentrations. The boiler blowdown chemistry contains sulfite and phosphate. The sulfite is the results of boiler water oxygen scavenger use and the phosphate is the results of phosphate in the city water make up.

Table 6 SCN_002 Boiler Blowdown Chemistry

KEY WATER CONSTITUENTS	SCN_002	
ALL UNITS IN mg/L (unless otherwise specified)	Boiler BD	Boiler BD Specification
Ca	0.0000	1.0
K	1.0205	
Mg	0.0000	
Na	99.2036	
Zn	0.0062	
Cl	2.1339	
HCO3	17.7951	
NO3	4.6389	
OH	0.0000	
PO4	0.1138	
SO3	112.5702	
SO4	3.8133	
Conductivity µS/cm	339.8661	
pH su	10.3037	8.5-10.5
SiO2	15.3267	150
TDS	271.8929	2,200
Temperature °F	95.0000	

SECTION V: CONCLUSIONS

PROPOSED OPERATIONS

Scenario: The following scenario was evaluated.

a. Average water flows based on two Cleaver Brook boilers running
b. City water feeding the boilers treated with a reverse osmosis (RO) unit followed by an off-site regenerated sodium zeolite softener.

RESULTS SUMMARY

- The design & operating parameters result in boiler feed water that meets all the Cleaver Brooks boiler water chemistry specifications.

- The design & operating parameters result in waste water that meets all the chemistry limits for waste water discharge.

- Detailed chemistry for all key water flows can be found in Appendix C.

APPENDIX A: CITY WATER ANALYSIS

Customer Analytical Services
1601 West Diehl Road Naperville IL60563-1198
Phone: 630-305-1000 Fax: 630-305-2921 Email: customeranalyticalservices@nalco.com

NALCO
An Ecolab Company

Final - Report Number: 1664169
VANCOUVER PLANT - 8510 FRUIT VALLEY RD - VANCOUVER - WA - USA
Representative: PETER KANDA

Sample Number	NW190302
Date Sampled	11-Feb-2016 14:00
Date Received	12-Feb-2016
Date Completed	17-Feb-2016
Date Authorized	17-Feb-2016

Water Analysis

This sample was analyzed as received, the results being as follows.

Sampling point Vancouver City Water

Water

Acid Extractable Metals **Test Method: CW14024**	**Filtered**	**Total**
Aluminum (Al)	<0.03 mg/L	<0.03 mg/L
Barium (Ba)	0.009 mg/L	0.009 mg/L
Boron (B)	<0.02 mg/L	<0.02 mg/L
Cadmium (Cd)	<0.005 mg/L	<0.005 mg/L
Calcium (Ca)	33 mg/L	33 mg/L
Calcium ($CaCO_3$)	82 mg/L	83 mg/L
Chromium (Cr)	<0.015 mg/L	<0.015 mg/L
Copper (Cu)	<0.03 mg/L	0.03 mg/L
Iron (Fe)	<0.02 mg/L	<0.02 mg/L
Lead (Pb)	<0.10 mg/L	<0.10 mg/L
Lithium (Li)	<0.005 mg/L	<0.005 mg/L
Magnesium (Mg)	9.7 mg/L	9.7 mg/L
Magnesium ($CaCO_3$)	40 mg/L	40 mg/L
Manganese (Mn)	<0.005 mg/L	<0.005 mg/L
Molybdenum (Mo)	<0.04 mg/L	<0.04 mg/L
Nickel (Ni)	<0.01 mg/L	<0.01 mg/L
Phosphorus (P)	0.12 mg/L	0.12 mg/L
Potassium (K)	3.3 mg/L	3.3 mg/L
Silicon (Si)	22 mg/L	23 mg/L
Silica (SiO_2)	48 mg/L	48 mg/L
Sodium (Na)	6.4 mg/L	6.4 mg/L
Sodium ($CaCO_3$)	14 mg/L	14 mg/L
Strontium (Sr)	0.122 mg/L	0.123 mg/L
Vanadium (V)	<0.01 mg/L	<0.01 mg/L
Zinc (Zn)	0.02 mg/L	0.02 mg/L
Total Hardness ($CaCO_3$)	120 mg/L	120 mg/L

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QUALITY SYSTEM
CERTIFIED BY DNV
=ISO 9001:2008=

Authorized by Kimberly Jackson
Principal Chemist

Page 1 of 2

Customer Analytical Services
1601 West Diehl Road Naperville IL60563-1198
Phone: 630-305-1000 Fax: 630-305-2921 Email: customeranalyticalservices@nalco.com

NALCO
An Ecolab Company

Final Report Number: 1664169
VANCOUVER PLANT - 8510 FRUIT VALLEY RD - VANCOUVER - WA - USA
Representative: PETER KANDA

Sample Number	NW100302
Date Sampled	11-Feb-2016 14:00
Date Received	12-Feb-2016
Date Completed	17-Feb-2016
Date Authorized	17-Feb-2016

Water Analysis

This sample was analyzed as received, the results being as follows:

Sampling point Vancouver City Water

Anions **Test Method: CW15060**	**Filtered**
Chloride (Cl)	6.9 mg/L
Nitrite (NO2)	<0.20 mg/L
Bromide (Br)	<0.20 mg/L
Nitrate (NO3)	15 mg/L
Sulfate (SO4)	10 mg/L
Chloride (CaCO3)	9.7 mg/L
Nitrate (CaCO3)	12 mg/L
Sulfate (CaCO3)	11 mg/L

Alkalinity **Test Method: CW11059**	**Total**
Total Alkalinity (CaCO3)	120 mg/L
Phenolphthalein Alkalinity (CaCO3)	<10 mg/L
Bicarbonate (CaCO3)	120 mg/L

Other Analytes	**Test Method**	**Total**
Conductivity at 25°C	CW11063	290 µS/cm
pH @ 25°C	CW11059	7.7 pH Units

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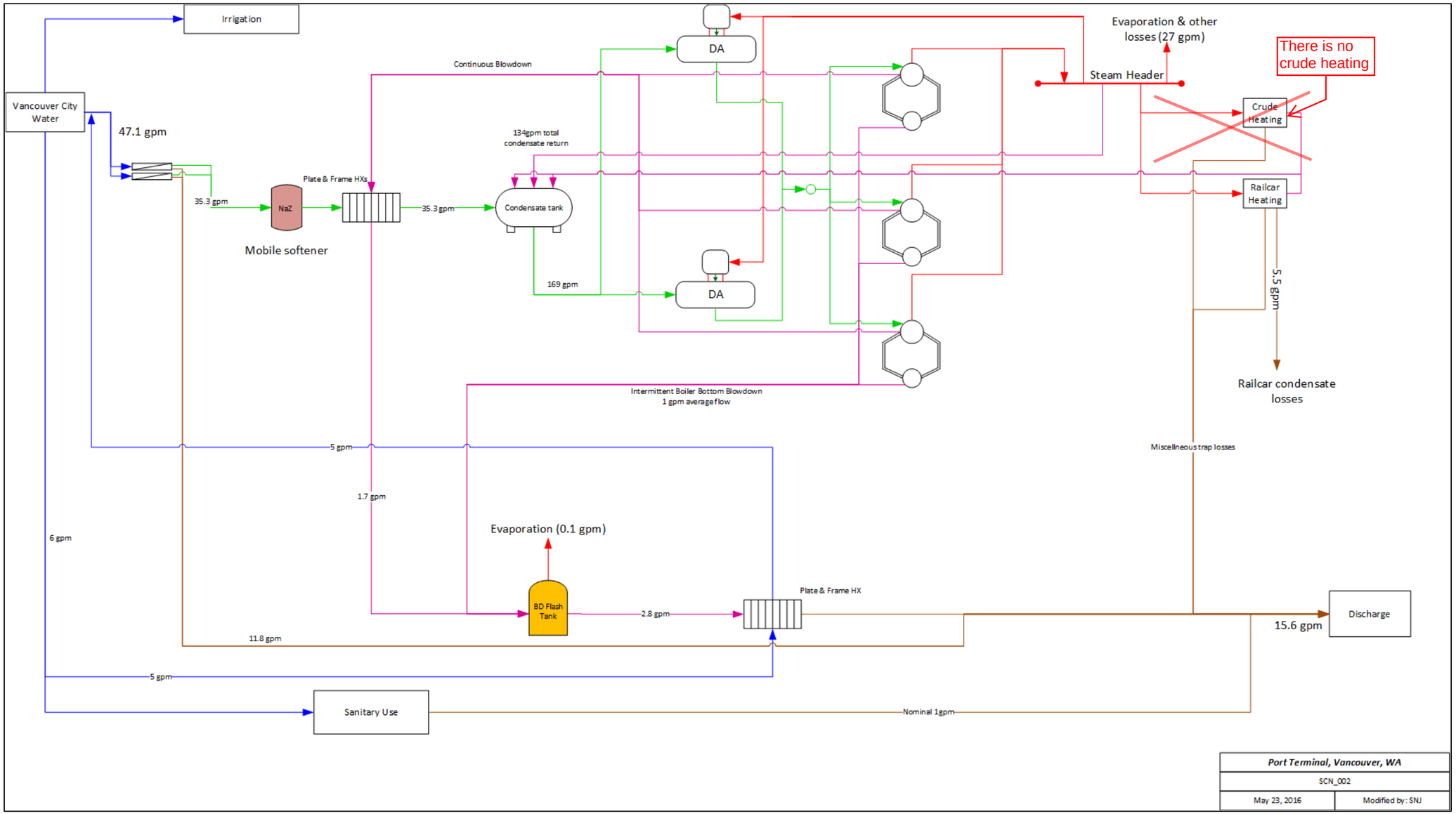
= ISO 9001:2008 =

Authorized by Kimberly Jackson
Principal Chemist

APPENDIX B: WATER BALANCE DIAGRAMS



APPENDIX C: ANALYTICAL DETECTION LIMITS

Test Code Provides the following analyses(mg/l) for Total and Soluble cations and anions:
(Cations by ICP; Anions by IC)
(Alkalinity values by auto-titration)

	Reportable Limits mg/l *		Reportable Limits mg/l *
Aluminum (Al)	0.03	Chloride (Cl)	0.1
Barium (Ba)	0.005	Nitrite (NO2)	0.2
Boron (B)		Bromide (Br)	0.2
Cadmium (Cd)	0.005	Nitrate (NO3)	0.2
Calcium (Ca)	0.05	Sulfate (SO4)	0.2
Calcium (CaCO3)		Chloride (CaCO3)	
Chromium (Cr)	0.015	Nitrate (CaCO3)	
Copper (Cu)	0.03	Sulfate (CaCO3)	
Iron (Fe)	0.02		
Lead (Pb)	0.11	Total Alkalinity (CaCO3)	10
Lithium (Li)	0.005	Phenolphthalein Alkalinity (CaCO3)	10
Magnesium (Mg)	0.15	Bicarbonate (CaCO3)	
Magnesium (CaCO3)		Carbonate (CaCO3)	
Manganese (Mn)	0.005		
Molybdenum (Mo)	0.04	Inorganic Phosphate (PO4)	2
Nickel (Ni)	0.01	Ortho Phosphate (PO4)	2
Phosphorus (P)	0.03	Organic Phosphate (PO4)	2
Potassium (K)	0.12	Polyphosphate (PO4)	2
Silicon (Si)		Total Phosphate (PO4)	2
Silica (SiO2)			
Sodium (Na)		Conductivity at 25°C - meter	1
Sodium (CaCO3)		pH @ 25°C - meter	1
Strontium (Sr)	0.005		
Vanadium (V)	0.01		
Zinc (Zn)	0.01		* Dependent on total dissolved solids concentration and test method.
	* Dependent on total dissolved solids concentration, and test method.		

APPENDIX D: CHEMISTRY

Scenario: Vancouver Terminal SCN_002
Flow Name: City Water
Flow Rate: 48.0563 gpm

Cation			
Symbol	**Name**	**mg/L as $CaCO_3$**	**mg/L as Ion**
Ag	Silver	ND	ND
Al	Aluminum	ND	ND
As	Arsenic	ND	ND
Au	Gold	ND	ND
B	Boron	ND	ND
Ba	Barium	0.0066	0.0090
Be	Beryllium	ND	ND
Ca	Calcium	82.4110	33.0000
Cd	Cadmium	ND	ND
Co	Cobalt	ND	ND
Cr	Chromium	ND	ND
Cu	Copper	ND	ND
Cu I	Copper (cuprous)	ND	ND
Fe	Iron	ND	ND
Fe II	Iron (ferrous)	ND	ND
H+	Hydronium	ND	ND
Hg	Mercury	ND	ND
K	Potassium	4.2238	3.3000
Li	Lithium	ND	ND
Mg	Magnesium	39.9442	9.7000
Mn	Manganese (Manganous)	ND	ND
Mo	Molybdenum	ND	ND
Na	Sodium	13.9313	6.4000
NH4	Ammonia	NT	NT
Ni	Nickel	ND	ND
Pb	Lead	ND	ND
S	Sulfur	NA	NA
Sb	Antimony	ND	ND
Se	Selenium	ND	ND
Si	Silicon	ND	ND
Sm	Samarium	ND	ND
Sn	Tin	ND	ND
Sr	Strontium	0.1394	0.1220
Ti	Titanium	ND	ND
Tl	Thallium (thallic)	ND	ND
U	Uranium (valence 4)	ND	ND
V	Vanadium	ND	ND
Zn	Zinc	0.0275	0.0200

Scenario: Vancouver Terminal SCN_002
Flow Name: City Water
Flow Rate: 48.0563 gpm

Anion			
Symbol	**Name**	**mg/L as $CaCO_3$**	**mg/L as Ion**
B4O7	Borate	ND	ND
Br	Bromide	ND	ND
Cl	Chloride	9.7397	6.9000
CN	Cyanide	ND	ND
CO3	Carbonate	ND	ND
F	Fluoride	NT	NT
HCO3	Bicarbonate	107.8371	131.4834
I	Iodide	ND	ND
MoO4	Molybdate	ND	ND
NO2	Nitrite	ND	ND
NO3	Nitrate	12.1063	15.0000
OH	Hydrate	ND	ND
P	Phosphorous (Valence 3)	ND	ND
PO4	Phosphate (as PO4)	0.5816	0.3679
SiO3	Silicate	ND	ND
SO3	Sulfite	ND	ND
SO4	Sulfate	10.4188	10.0000

Scenario: Vancouver Terminal SCN_002
Flow Name: City Water
Flow Rate: 48.0563 gpm

Other			
Symbol	**Name**	**mg/L as $CaCO_3$**	**mg/L as Ion**
$/1000 gal	Dollar per 1000 gallon	NT	NT
BOD5	5 Day Biochemical Oxygen Demand	NT	NT
CO2	Carbon Dioxide	NT	NT
CO2-gas	Carbon Dioxide Gas (Undissolved)	NT	NT
COD	Chemical Oxygen Demand	NT	NT
Conductivity	Conductivity	270.3779	270.3779
Enthalpy	Enthalpy	NC	NC
FOG	Free Oil and Grease	NT	NT
H2S	Hydrogen Sulfide	NT	NT
Ionic Strength	Ionic Strength	0.0042	0.0042
Langlier Stability Index	Langlier Stability Index	-0.3479	-0.3479
M Alkalinity	Total Alkalinity	107.8371	107.8371
NH3	Ammonia	NC	NC
O2	Oxygen	NT	NT
OCl	Hypoclorite	NT	NT
P Alkalinity	P Alkalinity	ND	ND
pH	pH	7.7000	7.7000
pHeq	pHeq	7.5180	7.5180
pHs	pHs	8.0479	8.0479
psia	Pounds per Square Inch Absolute	14.6960	14.6960
Puckorius Scale Index	Puckorius Scale Index	8.5778	8.5778
Ryznar Index	Ryznar Index	8.3958	8.3958
SAR	Saline Absorption Ratio	0.2511	0.2511
Screenings	Screenings	NA	NA
Silica Sol	Silica Sol	NA	NA
SiO2	Silica	39.9786	48.0000
SiO2-Colloidal	SiO2-Colloidal	0.8329	1.0000
Sulfur	Sulfur	NA	NA
TDS	Total Disolved Solids	216.3023	216.3023
TempF	Temperature Fahrenheit	70.0000	70.0000
TOC	Total Organic Carbon	NT	NT
Total Hardness	Total Hardness	122.3552	122.3552
TSS	Total Suspended Solids	NT	NT

Scenario: Vancouver Terminal SCN_002
Flow Name: Softened Water
Flow Rate: 35.2922 gpm

Cation			
Symbol	**Name**	**mg/L as $CaCO_3$**	**mg/L as Ion**
Ag	Silver	ND	ND
Al	Aluminum	ND	ND
As	Arsenic	ND	ND
Au	Gold	ND	ND
B	Boron	ND	ND
Ba	Barium	0.0001	0.0001
Be	Beryllium	0.0000	0.0000
Ca	Calcium	0.0102	0.0041
Cd	Cadmium	0.0000	0.0000
Co	Cobalt	0.0000	0.0000
Cr	Chromium	0.0000	0.0000
Cu	Copper	0.0000	0.0000
Cu I	Copper (cuprous)	0.0000	0.0000
Fe	Iron	0.0000	0.0000
Fe II	Iron (ferrous)	0.0000	0.0000
H+	Hydronium	0.0000	0.0000
Hg	Mercury	0.0000	0.0000
K	Potassium	0.0634	0.0495
Li	Lithium	0.0000	0.0000
Mg	Magnesium	0.0074	0.0018
Mn	Manganese (Manganous)	0.0000	0.0000
Mo	Molybdenum	0.0000	0.0000
Na	Sodium	2.0372	0.9359
NH4	Ammonia	0.0000	0.0000
Ni	Nickel	0.0000	0.0000
Pb	Lead	0.0000	0.0000
S	Sulfur	0.0000	0.0000
Sb	Antimony	0.0000	0.0000
Se	Selenium	0.0000	0.0000
Si	Silicon	0.0000	0.0000
Sm	Samarium	0.0000	0.0000
Sn	Tin	0.0000	0.0000
Sr	Strontium	0.0021	0.0018
Ti	Titanium	0.0000	0.0000
Tl	Thallium (thallic)	0.0000	0.0000
U	Uranium (valence 4)	0.0000	0.0000
V	Vanadium	0.0000	0.0000
Zn	Zinc	0.0004	0.0003

Scenario: Vancouver Terminal SCN_002
Flow Name: Softened Water
Flow Rate: 35.2922 gpm

Anion			
Symbol	Name	mg/L as $CaCO_3$	mg/L as Ion
B4O7	Borate	ND	ND
Br	Bromide	ND	ND
Cl	Chloride	0.1461	0.1035
CN	Cyanide	ND	ND
CO3	Carbonate	ND	ND
F	Fluoride	NT	NT
HCO3	Bicarbonate	1.5916	1.9406
I	Iodide	ND	ND
MoO4	Molybdate	ND	ND
NO2	Nitrite	ND	ND
NO3	Nitrate	0.1816	0.2250
OH	Hydrate	ND	ND
P	Phosphorous (Valence 3)	ND	ND
PO4	Phosphate (as PO4)	0.0087	0.0055
SiO3	Silicate	ND	ND
SO3	Sulfite	ND	ND
SO4	Sulfate	0.1927	0.1850

Scenario: Vancouver Terminal SCN_002
Flow Name: Softened Water
Flow Rate: 35.2922 gpm

Other			
Symbol	**Name**	**mg/L as $CaCO_3$**	**mg/L as Ion**
$/1000 gal	Dollar per 1000 gallon	0.0000	NC
BOD5	5 Day Biochemical Oxygen Demand	NT	NT
CO2	Carbon Dioxide	0.4103	0.3608
CO2-gas	Carbon Dioxide Gas (Undissolved)	0.8038	0.7069
COD	Chemical Oxygen Demand	NT	NT
Conductivity	Conductivity	4.3164	4.3164
Enthalpy	Enthalpy	NC	NC
FOG	Free Oil and Grease	ND	ND
H2S	Hydrogen Sulfide	NT	NT
Ionic Strength	Ionic Strength	0.0000	0.0000
Langlier Stability Index	Langlier Stability Index	-6.7348	-6.7348
M Alkalinity	Total Alkalinity	1.5916	1.5916
NH3	Ammonia	NT	NT
O2	Oxygen	NT	NT
OCl	Hypoclorite	NT	NT
P Alkalinity	P Alkalinity	ND	ND
pH	pH	6.8153	6.8153
pHeq	pHeq	4.8357	4.8357
pHs	pHs	13.5502	13.5502
psia	Pounds per Square Inch Absolute	44.6959	44.6959
Puckorius Scale Index	Puckorius Scale Index	22.2646	22.2646
Ryznar Index	Ryznar Index	20.2850	20.2850
SAR	Saline Absorption Ratio	3.0620	3.0620
Screenings	Screenings	NA	NA
Silica Sol	Silica Sol	NA	NA
SiO2	Silica	0.5997	0.7200
SiO2-Colloidal	SiO2-Colloidal	0.0125	0.0150
Sulfur	Sulfur	NA	NA
TDS	Total Disolved Solids	3.4531	3.4531
TempF	Temperature Fahrenheit	75.2618	75.2618
TOC	Total Organic Carbon	NT	NT
Total Hardness	Total Hardness	0.0176	0.0176
TSS	Total Suspended Solids	2.8509	2.8509

Scenario: Vancouver Terminal SCN_002
Flow Name: Condensate return
Flow Rate: 133.926 gpm

Cation			
Symbol	**Name**	**mg/L as $CaCO_3$**	**mg/L as Ion**
Ag	Silver	ND	ND
Al	Aluminum	ND	ND
As	Arsenic	ND	ND
Au	Gold	ND	ND
B	Boron	ND	ND
Ba	Barium	ND	ND
Be	Beryllium	ND	ND
Ca	Calcium	ND	ND
Cd	Cadmium	ND	ND
Co	Cobalt	ND	ND
Cr	Chromium	ND	ND
Cu	Copper	ND	ND
Cu I	Copper (cuprous)	ND	ND
Fe	Iron	ND	ND
Fe II	Iron (ferrous)	ND	ND
H+	Hydronium	ND	ND
Hg	Mercury	ND	ND
K	Potassium	0.0008	0.0006
Li	Lithium	ND	ND
Mg	Magnesium	ND	ND
Mn	Manganese (Manganous)	ND	ND
Mo	Molybdenum	ND	ND
Na	Sodium	0.1260	0.0579
NH4	Ammonia	ND	ND
Ni	Nickel	ND	ND
Pb	Lead	ND	ND
S	Sulfur	ND	ND
Sb	Antimony	ND	ND
Se	Selenium	ND	ND
Si	Silicon	ND	ND
Sm	Samarium	ND	ND
Sn	Tin	ND	ND
Sr	Strontium	ND	ND
Ti	Titanium	ND	ND
Tl	Thallium (thallic)	ND	ND
U	Uranium (valence 4)	ND	ND
V	Vanadium	ND	ND
Zn	Zinc	ND	ND

Scenario: Vancouver Terminal SCN_002
Flow Name: Condensate return
Flow Rate: 133.926 gpm

Anion			
Symbol	Name	mg/L as $CaCO_3$	mg/L as Ion
B4O7	Borate	ND	ND
Br	Bromide	ND	ND
Cl	Chloride	0.0018	0.0012
CN	Cyanide	ND	ND
CO3	Carbonate	0.0298	0.0179
F	Fluoride	0.0000	0.0000
HCO3	Bicarbonate	0.0085	0.0104
I	Iodide	ND	ND
MoO4	Molybdate	ND	ND
NO2	Nitrite	ND	ND
NO3	Nitrate	0.0022	0.0027
OH	Hydrate	ND	ND
P	Phosphorous (Valence 3)	ND	ND
PO4	Phosphate (as PO4)	0.0001	0.0001
SiO3	Silicate	NA	NA
SO3	Sulfite	0.0821	0.0657
SO4	Sulfate	0.0023	0.0022

Scenario: Vancouver Terminal SCN_002
Flow Name: Condensate return
Flow Rate: 133.926 gpm

Other			
Symbol	**Name**	**mg/L as $CaCO_3$**	**mg/L as Ion**
$/1000 gal	Dollar per 1000 gallon	NC	NC
BOD5	5 Day Biochemical Oxygen Demand	NT	NT
CO2	Carbon Dioxide	NT	NT
CO2-gas	Carbon Dioxide Gas (Undissolved)	0.2035	0.1790
COD	Chemical Oxygen Demand	NT	NT
Conductivity	Conductivity	0.1984	0.1984
Enthalpy	Enthalpy	NC	NC
FOG	Free Oil and Grease	NT	NT
H2S	Hydrogen Sulfide	NT	NT
Ionic Strength	Ionic Strength	NC	NC
Langlier Stability Index	Langlier Stability Index	NC	NC
M Alkalinity	Total Alkalinity	0.0383	0.0383
NH3	Ammonia	NT	NT
O2	Oxygen	NT	NT
OCl	Hypoclorite	NT	NT
P Alkalinity	P Alkalinity	0.0149	0.0149
pH	pH	7.5337	7.5337
pHeq	pHeq	2.4644	2.4644
pHs	pHs	0.0000	0.0000
psia	Pounds per Square Inch Absolute	19.6960	19.6960
Puckorius Scale Index	Puckorius Scale Index	NC	NC
Ryznar Index	Ryznar Index	NC	NC
SAR	Saline Absorption Ratio	NC	NC
Screenings	Screenings	NA	NA
Silica Sol	Silica Sol	NA	NA
SiO2	Silica	0.0001	0.0001
SiO2-Colloidal	SiO2-Colloidal	ND	ND
Sulfur	Sulfur	NA	NA
TDS	Total Disolved Solids	0.1587	0.1587
TempF	Temperature Fahrenheit	227.1465	227.1465
TOC	Total Organic Carbon	NT	NT
Total Hardness	Total Hardness	NC	NC
TSS	Total Suspended Solids	0.0345	0.0345

Scenario: Vancouver Terminal SCN_002
Flow Name: Boiler Feed Water
Flow Rate: 169.218 gpm

Cation			
Symbol	**Name**	**mg/L as $CaCO_3$**	**mg/L as Ion**
Ag	Silver	ND	ND
Al	Aluminum	ND	ND
As	Arsenic	ND	ND
Au	Gold	ND	ND
B	Boron	ND	ND
Ba	Barium	ND	ND
Be	Beryllium	ND	ND
Ca	Calcium	0.0021	0.0009
Cd	Cadmium	ND	ND
Co	Cobalt	ND	ND
Cr	Chromium	ND	ND
Cu	Copper	ND	ND
Cu I	Copper (cuprous)	ND	ND
Fe	Iron	ND	ND
Fe II	Iron (ferrous)	ND	ND
H+	Hydronium	ND	ND
Hg	Mercury	ND	ND
K	Potassium	0.0138	0.0108
Li	Lithium	ND	ND
Mg	Magnesium	0.0015	0.0004
Mn	Manganese (Manganous)	ND	ND
Mo	Molybdenum	0.0000	0.0000
Na	Sodium	1.5724	0.7224
NH4	Ammonia	ND	ND
Ni	Nickel	ND	ND
Pb	Lead	ND	ND
S	Sulfur	ND	ND
Sb	Antimony	ND	ND
Se	Selenium	ND	ND
Si	Silicon	ND	ND
Sm	Samarium	ND	ND
Sn	Tin	ND	ND
Sr	Strontium	0.0004	0.0004
Ti	Titanium	ND	ND
Tl	Thallium (thallic)	ND	ND
U	Uranium (valence 4)	ND	ND
V	Vanadium	ND	ND
Zn	Zinc	0.0001	0.0001

Scenario: Vancouver Terminal SCN_002
Flow Name: Boiler Feed Water
Flow Rate: 169.218 gpm

Anion			
Symbol	Name	mg/L as $CaCO_3$	mg/L as Ion
B4O7	Borate	ND	ND
Br	Bromide	ND	ND
Cl	Chloride	0.0319	0.0226
CN	Cyanide	ND	ND
CO3	Carbonate	1.3142	0.7879
F	Fluoride	NT	NT
HCO3	Bicarbonate	0.0959	0.1169
I	Iodide	ND	ND
MoO4	Molybdate	ND	ND
NO2	Nitrite	ND	ND
NO3	Nitrate	0.0396	0.0491
OH	Hydrate	ND	ND
P	Phosphorous (Valence 3)	ND	ND
PO4	Phosphate (as PO4)	0.0019	0.0012
SiO3	Silicate	NT	NT
SO3	Sulfite	0.0650	0.0520
SO4	Sulfate	0.0420	0.0403

Scenario: Vancouver Terminal SCN_002
Flow Name: Boiler Feed Water
Flow Rate: 169.218 gpm

Other			
Symbol	**Name**	**mg/L as $CaCO_3$**	**mg/L as Ion**
$/1000 gal	Dollar per 1000 gallon	NC	NC
BOD5	5 Day Biochemical Oxygen Demand	NT	NT
CO2	Carbon Dioxide	NT	NT
CO2-gas	Carbon Dioxide Gas (Undissolved)	NT	NT
COD	Chemical Oxygen Demand	NT	NT
Conductivity	Conductivity	2.2561	2.2561
Enthalpy	Enthalpy	NC	NC
FOG	Free Oil and Grease	ND	ND
H2S	Hydrogen Sulfide	NT	NT
Ionic Strength	Ionic Strength	NC	NC
Langlier Stability Index	Langlier Stability Index	-3.6228	-3.6228
M Alkalinity	Total Alkalinity	1.4101	1.4101
NH3	Ammonia	NT	NT
O2	Oxygen	NT	NT
OCl	Hypoclorite	NT	NT
P Alkalinity	P Alkalinity	0.6571	0.6571
pH	pH	9.1021	9.1021
pHeq	pHeq	4.7586	4.7586
pHs	pHs	12.7249	12.7249
psia	Pounds per Square Inch Absolute	24.6959	24.6959
Puckorius Scale Index	Puckorius Scale Index	20.6912	20.6912
Ryznar Index	Ryznar Index	16.3478	16.3478
SAR	Saline Absorption Ratio	5.1753	5.1753
Screenings	Screenings	NA	NA
Silica Sol	Silica Sol	NA	NA
SiO2	Silica	0.1252	0.1503
SiO2-Colloidal	SiO2-Colloidal	0.0026	0.0031
Sulfur	Sulfur	NA	NA
TDS	Total Disolved Solids	1.8049	1.8049
TempF	Temperature Fahrenheit	240.0000	240.0000
TOC	Total Organic Carbon	NT	NT
Total Hardness	Total Hardness	0.0037	0.0037
TSS	Total Suspended Solids	0.6219	0.6219

Scenario: Vancouver Terminal SCN_002
Flow Name: Boiler BD
Flow Rate: 1.69218 gpm

Cation			
Symbol	**Name**	**mg/L as $CaCO_3$**	**mg/L as Ion**
Ag	Silver	ND	ND
Al	Aluminum	ND	ND
As	Arsenic	ND	ND
Au	Gold	ND	ND
B	Boron	ND	ND
Ba	Barium	ND	ND
Be	Beryllium	ND	ND
Ca	Calcium	ND	ND
Cd	Cadmium	ND	ND
Co	Cobalt	ND	ND
Cr	Chromium	ND	ND
Cu	Copper	ND	ND
Cu I	Copper (cuprous)	ND	ND
Fe	Iron	ND	ND
Fe II	Iron (ferrous)	ND	ND
H+	Hydronium	ND	ND
Hg	Mercury	ND	ND
K	Potassium	1.3062	1.0205
Li	Lithium	ND	ND
Mg	Magnesium	ND	ND
Mn	Manganese (Manganous)	ND	ND
Mo	Molybdenum	ND	ND
Na	Sodium	215.9435	99.2036
NH4	Ammonia	ND	ND
Ni	Nickel	ND	ND
Pb	Lead	ND	ND
S	Sulfur	ND	ND
Sb	Antimony	ND	ND
Se	Selenium	ND	ND
Si	Silicon	ND	ND
Sm	Samarium	ND	ND
Sn	Tin	ND	ND
Sr	Strontium	ND	ND
Ti	Titanium	ND	ND
Tl	Thallium (thallic)	ND	ND
U	Uranium (valence 4)	ND	ND
V	Vanadium	ND	ND
Zn	Zinc	0.0085	0.0062

Scenario: Vancouver Terminal SCN_002
Flow Name: Boiler BD
Flow Rate: 1.69218 gpm

Anion			
Symbol	**Name**	**mg/L as $CaCO_3$**	**mg/L as Ion**
B4O7	Borate	ND	ND
Br	Bromide	ND	ND
Cl	Chloride	3.0121	2.1339
CN	Cyanide	ND	ND
CO3	Carbonate	51.0323	30.5973
F	Fluoride	0.0000	0.0000
HCO3	Bicarbonate	14.5948	17.7951
I	Iodide	ND	ND
MoO4	Molybdate	ND	ND
NO2	Nitrite	ND	ND
NO3	Nitrate	3.7440	4.6389
OH	Hydrate	ND	ND
P	Phosphorous (Valence 3)	ND	ND
PO4	Phosphate (as PO4)	0.1799	0.1138
SiO3	Silicate	NA	NA
SO3	Sulfite	140.7221	112.5702
SO4	Sulfate	3.9730	3.8133

Scenario: Vancouver Terminal SCN_002
Flow Name: Boiler BD
Flow Rate: 1.69218 gpm

Other			
Symbol	**Name**	**mg/L as $CaCO_3$**	**mg/L as Ion**
$/1000 gal	Dollar per 1000 gallon	NC	NC
BOD5	5 Day Biochemical Oxygen Demand	NT	NT
CO2	Carbon Dioxide	NT	NT
CO2-gas	Carbon Dioxide Gas (Undissolved)	NT	NT
COD	Chemical Oxygen Demand	NT	NT
Conductivity	Conductivity	339.8661	339.8661
Enthalpy	Enthalpy	NC	NC
FOG	Free Oil and Grease	ND	ND
H2S	Hydrogen Sulfide	NT	NT
Ionic Strength	Ionic Strength	0.0042	0.0042
Langlier Stability Index	Langlier Stability Index	0.0000	0.0000
M Alkalinity	Total Alkalinity	65.6271	65.6271
NH3	Ammonia	NT	NT
O2	Oxygen	NT	NT
OCl	Hypoclorite	NT	NT
P Alkalinity	P Alkalinity	25.5162	25.5162
pH	pH	10.3037	10.3037
pHeq	pHeq	7.2020	7.2020
pHs	pHs	NC	NC
psia	Pounds per Square Inch Absolute	14.6960	14.6960
Puckorius Scale Index	Puckorius Scale Index	NC	NC
Ryznar Index	Ryznar Index	NC	NC
SAR	Saline Absorption Ratio	NC	NC
Screenings	Screenings	NA	NA
Silica Sol	Silica Sol	NA	NA
SiO2	Silica	12.7654	15.3267
SiO2-Colloidal	SiO2-Colloidal	ND	ND
Sulfur	Sulfur	NA	NA
TDS	Total Disolved Solids	271.8929	271.8929
TempF	Temperature Fahrenheit	95.0000	95.0000
TOC	Total Organic Carbon	NT	NT
Total Hardness	Total Hardness	NC	NC
TSS	Total Suspended Solids	59.1845	59.1845

Scenario: Vancouver Terminal SCN_002
Flow Name: RO Waste Water
Flow Rate: 11.7641 gpm

Cation			
Symbol	**Name**	**mg/L as $CaCO_3$**	**mg/L as Ion**
Ag	Silver	ND	ND
Al	Aluminum	ND	ND
As	Arsenic	ND	ND
Au	Gold	ND	ND
B	Boron	ND	ND
Ba	Barium	0.0259	0.0356
Be	Beryllium	0.0000	0.0000
Ca	Calcium	325.9355	130.5150
Cd	Cadmium	ND	ND
Co	Cobalt	ND	ND
Cr	Chromium	ND	ND
Cu	Copper	ND	ND
Cu I	Copper (cuprous)	ND	ND
Fe	Iron	ND	ND
Fe II	Iron (ferrous)	ND	ND
H+	Hydronium	ND	ND
Hg	Mercury	ND	ND
K	Potassium	16.7051	13.0515
Li	Lithium	ND	ND
Mg	Magnesium	157.9792	38.3635
Mn	Manganese (Manganous)	ND	ND
Mo	Molybdenum	ND	ND
Na	Sodium	59.9000	27.5178
NH4	Ammonia	ND	ND
Ni	Nickel	ND	ND
Pb	Lead	ND	ND
S	Sulfur	ND	ND
Sb	Antimony	ND	ND
Se	Selenium	ND	ND
Si	Silicon	ND	ND
Sm	Samarium	ND	ND
Sn	Tin	ND	ND
Sr	Strontium	0.5512	0.4825
Ti	Titanium	ND	ND
Tl	Thallium (thallic)	ND	ND
U	Uranium (valence 4)	ND	ND
V	Vanadium	ND	ND
Zn	Zinc	0.1086	0.0791

Scenario: Vancouver Terminal SCN_002
Flow Name: RO Waste Water
Flow Rate: 11.7641 gpm

Anion			
Symbol	Name	mg/L as $CaCO_3$	mg/L as Ion
B4O7	Borate	ND	ND
Br	Bromide	ND	ND
Cl	Chloride	38.5206	27.2895
CN	Cyanide	ND	ND
CO3	Carbonate	ND	ND
F	Fluoride	NT	NT
HCO3	Bicarbonate	421.6943	514.1622
I	Iodide	ND	ND
MoO4	Molybdate	ND	ND
NO2	Nitrite	ND	ND
NO3	Nitrate	47.8805	59.3250
OH	Hydrate	ND	ND
P	Phosphorous (Valence 3)	ND	ND
PO4	Phosphate (as PO4)	2.3004	1.4552
SiO3	Silicate	NA	NA
SO3	Sulfite	ND	ND
SO4	Sulfate	50.8097	48.7672

Scenario: Vancouver Terminal SCN_002
Flow Name: RO Waste Water
Flow Rate: 11.7641 gpm

Other			
Symbol	**Name**	**mg/L as $CaCO_3$**	**mg/L as Ion**
$/1000 gal	Dollar per 1000 gallon	NC	NC
BOD5	5 Day Biochemical Oxygen Demand	NT	NT
CO2	Carbon Dioxide	0.4103	0.3608
CO2-gas	Carbon Dioxide Gas (Undissolved)	0.8038	0.7069
COD	Chemical Oxygen Demand	NT	NT
Conductivity	Conductivity	1076.3053	1076.3053
Enthalpy	Enthalpy	NC	NC
FOG	Free Oil and Grease	NT	NT
H2S	Hydrogen Sulfide	NT	NT
Ionic Strength	Ionic Strength	0.0166	0.0166
Langlier Stability Index	Langlier Stability Index	1.3187	1.3187
M Alkalinity	Total Alkalinity	421.6943	421.6943
NH3	Ammonia	NT	NT
O2	Oxygen	NT	NT
OCl	Hypoclorite	NT	NT
P Alkalinity	P Alkalinity	ND	ND
pH	pH	8.1808	8.1808
pHeq	pHeq	8.3856	8.3856
pHs	pHs	6.8621	6.8621
psia	Pounds per Square Inch Absolute	44.6959	44.6959
Puckorius Scale Index	Puckorius Scale Index	5.3387	5.3387
Ryznar Index	Ryznar Index	5.5435	5.5435
SAR	Saline Absorption Ratio	0.5430	0.5430
Screenings	Screenings	NA	NA
Silica Sol	Silica Sol	NA	NA
SiO2	Silica	158.1153	189.8400
SiO2-Colloidal	SiO2-Colloidal	3.2941	3.9550
Sulfur	Sulfur	NA	NA
TDS	Total Disolved Solids	861.0442	861.0442
TempF	Temperature Fahrenheit	75.2618	75.2618
TOC	Total Organic Carbon	NT	NT
Total Hardness	Total Hardness	483.9146	483.9146
TSS	Total Suspended Solids	0.0000	0.0000

Scenario: Vancouver Terminal SCN_002
Flow Name: Final Waste
Flow Rate: 15.5563 gpm

Cation			
Symbol	**Name**	**mg/L as $CaCO_3$**	**mg/L as Ion**
Ag	Silver	ND	ND
Al	Aluminum	ND	ND
As	Arsenic	ND	ND
Au	Gold	ND	ND
B	Boron	ND	ND
Ba	Barium	0.0200	0.0275
Be	Beryllium	0.0000	0.0000
Ca	Calcium	251.7791	100.8204
Cd	Cadmium	ND	ND
Co	Cobalt	ND	ND
Cr	Chromium	ND	ND
Cu	Copper	ND	ND
Cu I	Copper (cuprous)	ND	ND
Fe	Iron	ND	ND
Fe II	Iron (ferrous)	ND	ND
H+	Hydronium	ND	ND
Hg	Mercury	ND	ND
K	Potassium	13.0465	10.1931
Li	Lithium	ND	ND
Mg	Magnesium	122.0360	29.6351
Mn	Manganese (Manganous)	ND	ND
Mo	Molybdenum	ND	ND
Na	Sodium	69.6925	32.0165
NH4	Ammonia	ND	ND
Ni	Nickel	ND	ND
Pb	Lead	ND	ND
S	Sulfur	ND	ND
Sb	Antimony	ND	ND
Se	Selenium	ND	ND
Si	Silicon	ND	ND
Sm	Samarium	ND	ND
Sn	Tin	ND	ND
Sr	Strontium	0.4258	0.3727
Ti	Titanium	ND	ND
Tl	Thallium (thallic)	ND	ND
U	Uranium (valence 4)	ND	ND
V	Vanadium	ND	ND
Zn	Zinc	0.0848	0.0618

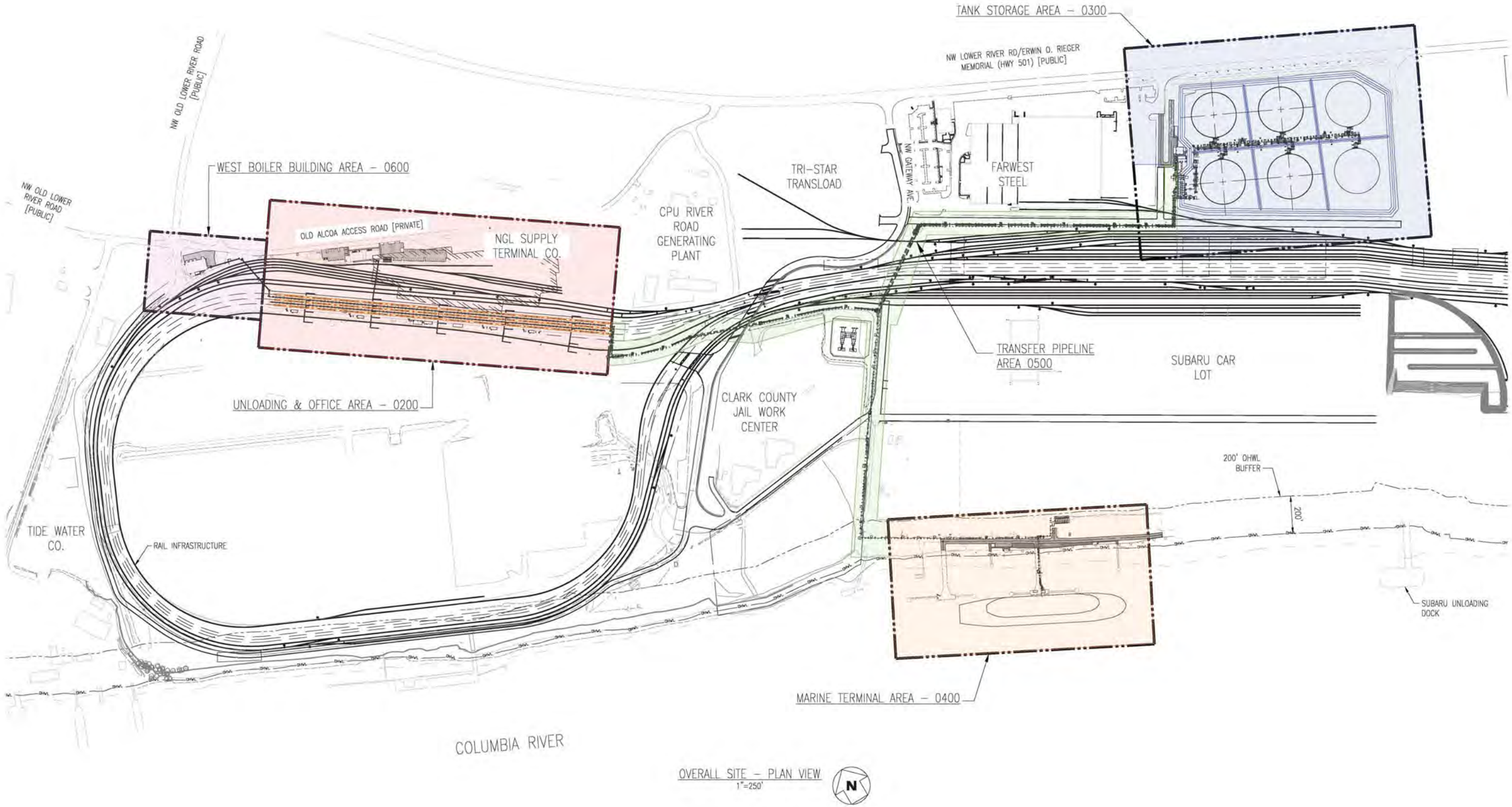
Scenario: Vancouver Terminal SCN_002
Flow Name: Final Waste
Flow Rate: 15.5563 gpm

Anion			
Symbol	**Name**	**mg/L as $CaCO_3$**	**mg/L as Ion**
B4O7	Borate	ND	ND
Br	Bromide	ND	ND
Cl	Chloride	30.0843	21.3128
CN	Cyanide	ND	ND
CO3	Carbonate	3.9780	2.3851
F	Fluoride	NT	NT
HCO3	Bicarbonate	328.3498	400.3494
I	Iodide	ND	ND
MoO4	Molybdate	ND	ND
NO2	Nitrite	ND	ND
NO3	Nitrate	38.0370	47.1287
OH	Hydrate	ND	ND
P	Phosphorous (Valence 3)	ND	ND
PO4	Phosphate (as PO4)	1.7966	1.1365
SiO3	Silicate	NA	NA
SO3	Sulfite	15.3133	12.2498
SO4	Sulfate	39.5258	37.9369

Scenario: Vancouver Terminal SCN_002
Flow Name: Final Waste
Flow Rate: 15.5563 gpm

Other			
Symbol	**Name**	**mg/L as $CaCO_3$**	**mg/L as Ion**
$/1000 gal	Dollar per 1000 gallon	NC	NC
BOD5	5 Day Biochemical Oxygen Demand	6.4283	6.4283
CO2	Carbon Dioxide	NT	NT
CO2-gas	Carbon Dioxide Gas (Undissolved)	NT	NT
COD	Chemical Oxygen Demand	NT	NT
Conductivity	Conductivity	869.5330	869.5330
Enthalpy	Enthalpy	NC	NC
FOG	Free Oil and Grease	7.7139	7.7139
H2S	Hydrogen Sulfide	NT	NT
Ionic Strength	Ionic Strength	0.0133	0.0133
Langlier Stability Index	Langlier Stability Index	1.3559	1.3559
M Alkalinity	Total Alkalinity	332.3278	332.3278
NH3	Ammonia	NT	NT
O2	Oxygen	NT	NT
OCl	Hypoclorite	NT	NT
P Alkalinity	P Alkalinity	1.9890	1.9890
pH	pH	8.4188	8.4188
pHeq	pHeq	8.2341	8.2341
pHs	pHs	7.0630	7.0630
psia	Pounds per Square Inch Absolute	37.3828	37.3828
Puckorius Scale Index	Puckorius Scale Index	5.8918	5.8918
Ryznar Index	Ryznar Index	5.7071	5.7071
SAR	Saline Absorption Ratio	0.7188	0.7188
Screenings	Screenings	NA	NA
Silica Sol	Silica Sol	NA	NA
SiO2	Silica	123.5298	148.3151
SiO2-Colloidal	SiO2-Colloidal	2.5446	3.0552
Sulfur	Sulfur	NA	NA
TDS	Total Disolved Solids	695.6264	695.6264
TempF	Temperature Fahrenheit	75.7740	75.7740
TOC	Total Organic Carbon	NT	NT
Total Hardness	Total Hardness	373.8151	373.8151
TSS	Total Suspended Solids	6.4404	6.4404

F.1 Facility Site Map



OVERALL SITE – PLAN VIEW
1"=250'

N

H.5 Stormwater Drainage Map

LEGEND:

- BUILDING/ROOF
- LANDSCAPE–PERVIOUS
- POLLUTION GENERATING IMPERVIOUS SURFACE
- SIDEWALK
- INDUSTRIAL YARD NOT COLLECTED
- INDUSTRIAL YARD
- LANDSCAPE IMPERVIOUS NON–POLLUTION GENERATING
- MISCELLANEOUS IMPERVIOUS

● DL – DISCHARGE LOCATION ● MP – MONITORING POINT

175 0 175 350
scale feet

N

OFFSITE PARKING/DIRVEWAY (COLLECTED)

PIPELINE & RAIL CORRIDORS TO EXISTING COLLECTION SYSTEMS

MATCHLINE SEE TERMINAL 4 FACILITY DRAINAGE AREAS

DL–1
MP–1

DL–2
MP–2

MP–5

DL–3

24"

SD

24"

24"

36"

30"

30"

48"

RAIL CORRIDOR TO EXISTING COLLECTION SYSTEM

PUMP STATION

TERMINAL 5

TREATMENT LAGOONS

32"

24"

36"

PORT 36" OUTFALL T50

EXISTING OVERFLOW OUTFALL

COLUMBIA RIVER

PERMIT SET
NOT FOR CONSTRUCTION

SAM ADAMS STATE OF WASHINGTON 22330 REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

Tesoro Savage Petroleum Terminal LLC

PROJECT:
VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION:
TERMINAL 5 – FACILITY DRAINAGE SYSTEM & PROPOSED SURFACING

DESIGN:	DRS	START DATE:	2/26/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	10/12/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24x36

DRAWING NUMBER	SHEET	REV.
	1 / 1	

LEGEND:

- BUILDING/ROOF
- LANDSCAPE–PERVIOUS
- POLLUTION GENERATING IMPERVIOUS SURFACE
- SIDEWALK
- INDUSTRIAL YARD NOT COLLECTED
- INDUSTRIAL YARD
- LANDSCAPE IMPERVIOUS NON–POLLUTION GENERATING
- MISCELLANEOUS IMPERVIOUS

● DL – DISCHARGE LOCATION ● MP – MONITORING POINT

NW Lower River Rd

OFFSITE DRIVEWAY COLLECTED INTO FACILITY COLLECTION SYSTEM

PUMP BASIN DISCHARGE TO SANITARY

DISCHARGE LOCATION FOR TANKS 1–4 ROOF

DISCHARGE LOCATION FOR TANKS 5 & 6 ROOF

TANK 1 TANK 2 TANK 3 TANK 4 TANK 5 TANK 6

AREA 300 PARCEL 1A

SD

DL–4 MP–3

DL–5

30" 36" 42" 48" 60"

RAIL & PIPELINE CORRIDORS TO EXISTING COLLECTION SYSTEMS

MATCHLINE SEE TERMINAL 5 EXISTING DRAINAGE AREAS

AREA 500

PIPELINE CORRIDOR TO EXISTING COLLECTION SYSTEMS

TERMINAL 4

WATER QUALITY POND

DL–6 MP–4

AREA 400, MARINE TERMINAL

BERTH 13 CONTAINMENT AREA (DISCHARGES TO DL–6 AFTER TREATMENT)

COLUMBIA RIVER

PORT 60" OUTFALL T40

N

175 0 175 350
scale feet

PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CK'D	APP

BergerABAM
700 NE Multnomah Street, Suite 900
Portland, Oregon 97232-4189
(503) 872-4100 FAX: (503) 872-4101

Tesoro Savage Petroleum Terminal LLC

PROJECT: VANCOUVER ENERGY
PORT OF VANCOUVER, WASHINGTON

DESCRIPTION: TERMINAL 4 – FACILITY DRAINAGE SYSTEMS & PROPOSED SURFACING

DESIGN:	DRS	START DATE:	2/24/2015	SCALE:	AS SHOWN
DRAWN:	TNP	PRINT DATE:	2/26/2015	PROJECT MANAGER:	SAVAGE_PM
CHECKED:	MCH	APPROVED:	SA	SIZE:	24x36
DRAWING NUMBER				SHEET	REV.
				1 / 1	