Vertical Pump Turbine Oil Environmental Evaluation

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by

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DISCLAIMER

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VERTICAL PUMP TURBINE OIL ENVIRONMENTAL EVALUATION

Problem Statement

In Oregon low-temperature geothermal (defined as less than 250°F) injection well construction, siting and receiving formations requires approval by the Water Resources Department (OWRD). In addition, the Oregon Department of Environmental Quality (ODEQ) has regulations concerning injection. It reviews proposed injection plans to assure that there will be no contamination of underground drinking water as defined by the U.S. Environmental Protection Agency (USEPA).

A Klamath Falls city ordinance prohibits surface disposal of geothermal fluids after July 1, 1990, and as a result, a considerable number of injection wells needed to be drilled. In order to facilitate the well planning and approval process, representatives of both OWRD and ODEQ regularly visited Klamath Falls for several months before the July 1 deadline.

Conversations with the OWRD and ODEQ representatives indicated they were very concerned about the potential for contamination of the geothermal (and cooler but hydraulically connected) aquifers by oils and grease. Their primary concern was over the practice of putting paraffin, motor oils and other hydrocarbons in downhole heat exchanger (DHE) wells to prevent corrosion. They also expressed considerable concern about the use of oil in production well pumps since the fluids pumped would be injected. Oregon (and Idaho) prohibit the use of oil-lubricated pumps for public water supplies except in certain situations where non-toxic food-grade lubricants are used. Although most geothermal systems would not usually be classed as a public water supply, sometimes the fluids are used for domestic hot water. Most direct use aquifers contain less than 10,000 ppm TDS and therefore, meet USEPA classification as drinking water aquifers (Safe Drinking Water Act, 1974).

Since enclosed-lineshaft oil-lubricated pumps are the mainstay of direct-use pumping equipment, the potential for restricting their use became a concern to the Geo-Heat Center staff. An investigation into alternative pump lubrication schemes and development of rebuttals to potential restrictions was proposed and approved as a contract task.

Background

The enclosed-lineshaft oil-lubricated vertical turbine pump has the best service record in pumping geothermal fluids. This type of pump is used almost universally in direct use systems that employ well pumps. There are about 15 of these in use in Klamath Falls. The oil used in these pumps is generally known as "turbine oil." It is a petroleum-based oil and may contain certain proprietary additives for lubrication enhancement, anti-foaming, anti-rust, etc. In general, the turbine oils have a USDA classification of H-2 which means there must be no contact with food (USFDA - 21 CFR 178.3620B).

In an oil-lubricated turbine pump, the oil is introduced at the top of the pump column at a rate of several drops per minute. It flows down inside the shaft enclosing tube lubricating successively lower

bearings and exits to the annular space between the column and well casing. The oil outlet is near the bottom of the pump column just above the pump itself. Over a year's time, the amount of oil used in a typical direct use pump is between 30 and 50 gallons. Ultimately, the accumulation of oil in the annulus may increase to the point where it displaces most of the water in the annulus and some oil is pumped--as much as is introduced or a few drops per 300-500 gallons. If for some reason the pumping water level lowers to the point where the pump would break suction, it could pump a considerable amount of oil for a short time.

There are about 500 geothermal wells in Klamath Falls with downhole heat exchangers (DHEs). About the only problem experienced by most well owners is corrosion of the DHE pipes at the air-water interface. For many years, paraffin has been put down wells in an attempt to reduce the corrosion rate. In a few cases, other materials have been used--such as motor oil, grease and reportedly even used motor oil. This has been a significant concern of OWRD for sometime, especially the motor oil and grease. This practice is prohibited by state and federal laws. Since, in a DHE well, no geothermal water is removed and most wells have two DHEs--one for space heat and one for domestic water, the use of a thief sampler is difficult if not impossible. Therefore while there had been concern, no actions were taken except the occasional writing of letters and memorandums expressing the concern.

Starting in spring of 1990, OWRD and ODEQ began taking samples from pumped wells and analyzing the samples for oils and grease. All new injection wells were required to have pump tests. Water samples are analyzed for oils and grease, and key geothermal chemical species to determine injection compatibility. In addition, a letter was sent to each well owner concerning the placement of foreign materials into wells and warning that anyone doing so would be held liable for clean-up costs--which could be very substantial.

Because of the increased concerns and activities relating to possible oil contamination on the part of OWRD and ODEQ and the potential for banning use of turbine oils in geothermal production well pumps, a project was initiated to evaluate the problem and seek solutions. The project had three main objectives. These were:

1. Obtain information about the currently used oils and evaluate the potential for health hazards.

2. Determine what concerns there were in other states agencies.

3. Find suitable substitutes for the currently used products in case of a ban on their use.

<u>Objective 1</u> - Obtain information and evaluate health hazards.

Basic health and safety data for petroleum products is very easy to obtain. Every distributor has materials safety data sheets. Several examples are included in the Appendix. These include both oils which are and oils which are not FDA and USDA approved for incidental contact with food. Note that despite the fact that some are approved and some are not, the first-aid procedures and health hazards for oral ingestion (swallowing) are quite similar.

The Unocal and Chevron oils are all petroleum hydrocarbon based and all have the same percentage (99%) of paraffins--the difference is the additives that make up the remaining 1%. Some are USDA and FDA approved for incidental contact, others are not. Telephone discussions with Unocal lubrication laboratory scientists revealed that some of the non-approved oils may contain organo-metallics that are not approved. These additives increase the oiliness or lubrication properties, and the approved oils are not as good a lubricant in most applications.

The oils used in turbine pumps appear to have very low toxicity particularly in the amount likely to be ingested. These oils are in fact approved for and being used in municipal water supply wells in California and Nevada.

Objective 2 - Determine what concerns there were in other states agencies.

As noted above, it was learned that oil-lubricated turbine pumps are used in municipal water supply wells in California and Nevada, and that the oil is turbine oil. Oregon and Idaho do not permit the use of oil-lubricated pumps except in exceptional cases where water-lubricated pumps will not operate and then only when FDA approved oils are used.

Telephone conversations with health department engineers in both California and Nevada indicated that there are more oil-lubricated pumps than water-lubricated pumps used in municipal supply wells, and that most are lubricated with turbine oil which does not have the USDA H-1 classification.

In both states, health department engineers are recommending switching from oil-lubricated to water-lubricated if possible and if not to use H-1 oil. Concern is not for health reasons since the amount carried over in normal operation is so small. The concern is that due to drought conditions, well water levels will be drawn down to the point where the pumps break water suction and start pumping larger amounts of the oil that has accumulated in the annulus. Even then, concern is not for health reasons as much as cosmetic ones.

People, of course, don't like oily water and a very small amount causes complaints about appearance and odor. There have been several cases of oil pumping in California and once oil gets in a municipal system it persists as a film in piping which very slowly dissipates. Cleaning is difficult and expensive. The reason for switching to H-1 oil is that if it does get in a system they can at least say it is FDA approved.

The potential for oil contamination of direct-use geothermal injection has not been addressed in California or Nevada. Although injection is into water classed as potential drinking water by USEPA, i.e., less than 10,000 ppm TDS, the accepting aquifers are not used for domestic water supplies. Utah, New Mexico and Arizona have not been concerned about low-temperature geothermal injection. Replies to telephone inquires were essentially the same: 1) there is very little injection taking place, so it was not considered a problem, and 2) where injection is or was likely to occur, it would be into aquifers not used for drinking water.

It appears that, at the present time at least, Oregon is the only place where concerns have been voiced.

Legally, any oil--petroleum-based or synthetic including H-1 approved oils--is considered a contaminant if discharged on the soil, into surface water or into any USEPA classed underground source of drinking water. These include all aquifers with less than 10,000 ppm total dissolved solids. Not all manufacturers of turbine oils were contacted; but, it is believed that in general turbine oils do not contain materials in USEPA's Priority Toxic Pollutants list. EPA, therefore, is not terribly concerned about using these oils in the normal amount. Abnormal amounts or a spill would be a concern.

Some of the oils currently reported to be in use, the industrial oils and some hydraulic oils may contain zinc di alkyl di phio phosphate. Zinc is on EPA priority list; therefore, oils would be less desirable than the turbine oils which do not contain this metalorganic.

Objective 3 - Find suitable substitutes for currently used products in case of a ban on their use.

Bearing loads should be relatively low in a turbine pump installed in a straight well and not run at a critical shaft speed. The extreme pressure and anti-friction additives required for point or line contact bearings are probably of little value--especially since there is a continually replenished supply of oil. In most situations, the turbine oils which do not contain the zinc metalorganic compounds should perform satisfactorily and be "tolerable" by OSEPA and state environmental quality agencies.

Most major oil companies manufacture white mineral oils that have H-1 approval. They are available with viscosities the same as turbine oils and in journal bearings should have similar lubricating properties. These oils are about twice as expensive as turbine oils, and at least locally, are in short supply. They are used as a remedy for bloat in cattle and veterinarians report difficulty in obtaining supplies in large (55 gallon drums) containers.

In addition to the turbine oils and petroleum-based, food-grade, H-1 oils, there are synthetic oils that have H-1 approval. Centrilift Hughes uses these oils in their submersible pumps. CL-5 which is a synthetic polyalpholefin has been in service in at least one geothermal pump for two years at a downhole temperature of 234°F. CL-5 is expensive--$27.30 per gallon compared to turbine oils at about $3.30 per gallon.

Conclusions

Strict interpretation of codes would prohibit use of oil-lubricated turbine pumps in most, if not all, direct use applications and in irrigation and municipal water supply wells. As a practical matter, the use is tolerated since the amount of oil carried over into the produced water is very small and does not contain chemicals that are a serious concern.

There are some lubricants reportedly in use that contain metalorganic additives. Environmentally, these are less desirable than other lubricants which do not. Lubricants which do not contain the additives should prove adequate in most applications.

The concern in Oregon over oils used in turbine pumps appears to have been related to other materials used locally in Klamath Falls in downhole heat exchanger wells. Education of owners of downhole heat exchanger wells concerning the use of those materials, and of the concerned officials about the health hazards of turbine oil seems to have alleviated concerns. A contributing factor is that continuing testing has not detected any oils or grease in the aquifer.

APPENDIX

Materials Safety Data Sheets
for Lubricating Oils

Chevron FM Lubricating Oils 32X, 100X, 105X, 460X

Chevron

Features

Chevron FM Lubricating Oils are tasteless, odorless, high viscosity index, paraffinic lubricating oils combined with additives that provide oxidation stability and rust protection.

All grades are composed entirely of materials approved by the Food and Drug Administration for incidental or accidental contact with food under Statute 178.3570. All grades also comply with USDA Classification "H1" (formerly AA) for lubricants with incidental contact with food.

These products provide performance well above that found in typical white mineral oils often used in the food industry. All grades contain a special fungicide to prevent growth of molds when product comes in contact with food or water.

Functions

Chevron FM Lubricating Oils are designed to meet the critical needs of the machinery used in the food processing industry without having any of the additive systems that are banned from this service by the Food and Drug Administration. In order to receive an "H1" classification by the U.S. Department of Agriculture, this lubricant must be of such purity that it could contaminate food up to 10 ppm with no harmful effects. Chevron FM Lubricating Oils meet these stringent standards of purity and are still able to perform exceptionally well in high pressure hydraulic applications, airline lubrication, high temperature gears, and gearhead motors and as excellent equipment preservatives and rust preventives.

When equipment has been laid up for a season and preserved with Grade 100X, a washdown with steam or hot water will remove the oil completely and the equipment is ready for service.

Chevron FM Lubricating Oils are of a high degree of purity and yet diversified enough to meet all the requirements of the food processing industry.

Applications

Chevron FM Lubricating Oil 32X is recommended for high pressure hydraulic systems as well as airline lubricators and bearing lubrication.

Chevron FM Lubricating Oil 100X contains an emulsifier and provides excellent rust protection. It is designed for use where water and food juices are likely to wash off the lubricant and for once-through applications.

Chevron FM Lubricating Oil 105X is designed for high pressure hydraulic systems, including those operating above 1000 psi. It is approved for this application by Rexnord Hydraulic Components Division (Racine) for use in their vane-type high pressure pumps.

Chevron FM Lubricating Oil 460X is a mild-duty gear oil containing antiwear and oiliness additives as well as the antioxidant, rust preventive, and antifoam additives. This product is recommended for use in gear sets which are sensitively located in a food processing operation. It is also for use in rotary steamers and valves up to 175°C (350°F).

HAZARD WARNINGS ARE NOT REQUIRED FOR THESE PRODUCTS UNDER OSHA HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200)

Chevron FM Lubricating Oils 32X, 100X, 105X, 460X

Chevron

Customer Benefits

HIGH QUALITY CONTROL. Enable customer to use lubricants almost as pure as the food being processed.

HIGH PERFORMANCE. Provide lubrication better than that given by the white mineral oils generally used.

OXIDATION-INHIBITED. Give long life without forming gummy and sticky deposits.

CONTAINER SELECTION. Packaged in new returnable drums and 5-gal. NR pails.

MULTI-PURPOSE PRODUCTS. Enable customer to reduce inventory.

ODORLESS AND TASTELESS. Products are odorless and tasteless, so food processor can be sure his product will not be adulterated if food contact should occur.

Typical Test Data

Chevron FM Lubricating Oil	32X	100X	105X	460X
CPS No.	232109	232102	232110	232118
ISO Grade	32	100	-	460
AGMA Grade	-	3	3	7 Comp.
API Gravity	32.7	29.9	30.4	28.4
Viscosity, Kinematic				
cSt at 40°C	30.4	95.0	95.0	437
cSt at 100°C	5.2	10.7	10.5	29.5
Viscosity, Saybolt				
SUS at 100°F	152	475	469	2357
SUS at 210°F	44	63	62	144
Viscosity Index	96	100	91	118
Flash Point, °C (°F)	204 (399)	238 (460)	240 (464)	243 (469)
Pour Point, °C (°F)	-9 (+16)	-15 (+5)	-15 (+5)	-15 (+5)

Typical test data are average values only. Minor variations which do not affect product performance are to be expected in normal manufacturing.

Chevron U.S.A. Inc.

Typical Test Data
Industrial Oils

Chevron

Industrial Oils

Product	CPS No.	ISO Grade	AGMA Grade	API Gravity	Kinematic Viscosity, cSt 40°C	Kinematic Viscosity, cSt 100°C	Saybolt Viscosity, SUS 100°F	Saybolt Viscosity, SUS 210°F	Vis-cosity Index	Flash, COC °C(°F)	Pour Point °C(°F)
Chevron All Year Car Oil	233804	-	-	31.8	62	8.7	320	55	110+	232(450)	-
Chevron Aviation Hydraulic Fluid											
A	247707	-	-	30.9	493.9	5.3	74	43	300+	102(216)	-63(-81)
E	247770	-	-	30.9	493.9	5.3	74	43	300+	102(216)	-63(-81)
Chevron AW Hydraulic Oil											
10	232942	10	-	27.7	10.3	2.5	63	35	46	154(309)	-39(-38)
22	232943	22	-	33.9	20.9	4.2	110	40	99	177(351)	-33(-27)
32	234225	32	-	32.8	30.4	5.2	157	44	99	204(399)	-33(-27)
46	234306	46	1	31.9	43.7	6.5	226	48	98	218(424)	-30(-22)
68	234228	68	2	31.6	64.6	8.4	335	55	100	235(455)	-30(-22)
MV	234310	32	-	32.9	30.4	5.9	156	46	145	152(306)	-45(-49)
MV46	234407	46	-	31.8	43.7	7.8	223	52	150	192(378)	-39(-38)
Chevron AW Machine Oil											
100	232923	100	3	31.3	95	11.0	495	64	100	250(482)	-15(+5)
150	232924	150	4	29.6	143	14.2	751	76	96	260(500)	-12(+10)
220	232925	220	5	28.0	209	18.2	1105	93	96	271(520)	-12(+10)
320	232926	320	6	26.5	304	23.4	1617	116	96	277(531)	-12(+10)
Chevron CP Oil											
22X	232605	22	-	27.5	20.9	3.8	112	38.8	33	166(331)	-51(-60)
46X	232607	46	-	24.3	43.7	5.6	227	44.9	47	179(354)	-45(-49)
Chevron Cylinder Oil											
460	230333	-	-	25.4	437	26.4	2375	130	-	299(570)	-18(0)
680	230245	-	-	24.2	646	33.2	3550	160	-	302(576)	-12(+10)
460X	230334	-	7 Cmp	25.1	437	26.4	2375	130	-	299(570)	-18(0)
680X	230335	-	8 Cmp	23.9	646	33.2	3550	160	-	302(576)	-12(+10)
1000X	230336	-	8A Cmp	22.7	950	39.4	5240	190	-	343(649)	-12(+10)
Chevron Edger Arbor Oil X	232901	-	-	25.6	35.0	5.2	185	44	66	192(378)	-36(-33)
Chevron EP Industrial Oil											
46X	231734	-	-	30.1	43.7	6.5	225	48	105	230(446)	-39(-38)
100X	231735	-	3 EP	29.1	95.0	10.7	495	63	100	238(460)	-24(-11)
150X	231737	-	4 EP	28.3	143	13.9	735	75	98	246(475)	-18(0)
220X	231738	-	5 EP	27.3	209	18.2	1100	93	96	254(489)	-15(+5)
320X	231733	-	6 EP	26.4	304	23.2	1919	115	95	276(529)	-12(+10)
460X	231739	-	7 EP	24.8	437	28.5	2360	140	94	270(578)	-15(+5)
Chevron FM Lubricating Oil											
32X	232109	32	-	32.7	30.4	5.2	152	44	96	204(399)	-9(+16)
100X	232102	100	3	29.9	95.0	10.7	475	63	100	238(460)	-15(+5)
105X	232110	-	3	30.4	95.0	10.5	469	62	91	240(464)	-15(+5)
460X	232118	460	7 Cmp	28.4	437	29.5	2357	144	118	243(469)	-15(+5)
Chevron GST Oil											
32	234229	32	-	33.1	30.4	5.2	157	44	100	222(432)	-33(-27)
46	234230	46	1	32.2	43.7	6.6	225	48	101	224(435)	-24(-11)
68	234231	68	2	31.8	64.6	8.5	335	55	101	245(473)	-21(-6)
100	234232	100	3	31.6	95.0	11.0	495	64	101	262(504)	-21(-6)
Chevron Handy Oil 15	226806	15	-	30.3	14.3	3.2	78	37	67	174(345)	-51(-60)

Typical test data are average values only. Minor variations which do not affect product performance are to be expected in normal manufacturing.

Chevron U.S.A. Inc.

Emergency Phone Number(800) 457-2022

Material Safety Data Sheet

CLOUGH OIL COMPANY
P O BOX 338
KLAMATH FALLS, OR 97601
Print Date: November 21, 1989

MATERIAL ORDERED FOR:
PACKAGE PICK-UP RICHMOND
RICHMOND, CA 94801

This Material Safety Data Sheet contains environmental, health and toxicology information for your employees. Please make sure this information is given to them. It also contains information to help you meet community right-to-know/emergency response reporting requirements under SARA Title III and many other laws. If you resell this product, this MSDS must be given to the buyer or the information incorporated in your MSDS. Discard any previous edition of this MSDS.

The Chevron MSDSs have been reformatted and expanded to provide you with useful hazard warnings and health evaluations and to facilitate your compliance with local, State and Federal regulations.

1. PRODUCT IDENTIFICATION

CHEVRON FM Lubricating Oil 32X

- A HAZARD WARNING IS NOT REQUIRED FOR THIS PRODUCT UNDER OSHA HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200)

CHEVRON PRODUCT NUMBER(S): CPS232109
PRODUCT INFORMATION: (800)582-3835

Prepared According to the OSHA Hazard Communication Standard (29 CFR 1910.1200) by the Chevron Environmental Health Center, Inc., P.O. Box 4054, Richmond, CA 94804.

2. FIRST AID

EYE CONTACT:
No first aid procedures are required. However, as a precaution flush eyes with fresh water for 15 minutes. Remove contact lenses if worn.
SKIN CONTACT:
No first aid procedures are required. As a precaution, wash skin thoroughly with soap and water. Remove and wash contaminated clothing.
INHALATION:
Since this material is not expected to be an immediate inhalation problem, no first aid procedures are required.
INGESTION:
If swallowed, give water or milk to drink and telephone for medical advice. Consult medical personnel before inducing vomiting. If medical advice cannot be obtained, then take the person and product container to the nearest medical emergency treatment center or hospital.

3. IMMEDIATE HEALTH EFFECTS

EYE CONTACT:
This substance is not expected to cause prolonged or significant eye irritation. This hazard evaluation is based on the data from similar materials.
SKIN IRRITATION:
This substance is not expected to cause prolonged or significant skin irritation. This hazard evaluation is based on data from similar materials.
DERMAL TOXICITY:
The systemic toxicity of this substance has not been determined. However, it should be practically non-toxic to internal organs if it gets on the skin. This hazard evaluation is based on data from similar materials.
RESPIRATORY/INHALATION:
The systemic toxicity of this substance has not been determined. However, it should be practically non-toxic to internal organs if inhaled. This hazard evaluation is based on data from similar materials.
INGESTION:
The systemic toxicity of this substance has not been determined. However, it should be practically non-toxic to internal organs if swallowed. This hazard evaluation is based on data from similar materials.

4. PROTECTIVE EQUIPMENT

EYE PROTECTION:
No special eye protection is usually necessary.
SKIN PROTECTION:
No special skin protection is usually necessary. Avoid prolonged or frequently repeated skin contact with this material. Skin contact can be

minimized by wearing protective clothing.

RESPIRATORY PROTECTION:

No special respiratory protection is normally required. However, if operating conditions create high airborne concentrations, the use of an approved respirator is recommended.

VENTILATION:

Use adequate ventilation to keep the airborne concentrations of this material below the recommended exposure standard.

5. FIRE PROTECTION

FLASH POINT: (COC) 356F (180C) (Min.)
AUTOIGNITION: NDA
FLAMMABILITY: NA
EXTINGUISHING MEDIA:
CO2, Dry Chemical, Foam, Water Fog

NFPA RATINGS: Health 0; Flammability 1; Reactivity 0; Special NDA;
HMIS RATINGS: Health 0; Flammability 1; Reactivity 0; Other NDA;
(Least-0, Slight-1, Moderate-2, High-3, Extreme-4). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association or, if applicable, the National Paint and Coating Association, and do not necessarily reflect the hazard evaluation of the Chevron Environmental Health Center. Read the entire document and label before using this product.

FIRE FIGHTING PROCEDURES:

For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.

COMBUSTION PRODUCTS:

Normal combustion forms carbon dioxide and water vapor; incomplete combustion can produce carbon monoxide. Incomplete combustion can produce carbon monoxide.

6. STORAGE, HANDLING, AND REACTIVITY

HAZARDOUS DECOMPOSITION PRODUCTS:

NDA

STABILITY:

Stable.

HAZARDOUS POLYMERIZATION:

Polymerization will not occur.

INCOMPATIBILITY:

May react with strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.

SPECIAL PRECAUTIONS:

DO NOT weld, heat or drill container. Residue may ignite with explosive violence if heated sufficiently. CAUTION! Do not use pressure to empty drum or explosion may result.

7. PHYSICAL PROPERTIES

SOLUBILITY: Soluble in hydrocarbon solvents; insoluble in water.
APPEARANCE: Colorless liquid.
BOILING POINT: NA
MELTING POINT: NA
EVAPORATION: NA
SPECIFIC GRAVITY: 0.86 @ 15.6/15.6C
VAPOR PRESSURE: NA
PERCENT VOLATILE (VOLUME %): NA
VAPOR DENSITY (AIR=1): NA
VISCOSITY: 28.8 cSt @ 40C (Min.)

8. SPILL RESPONSE AND DISPOSAL

CHEMTREC EMERGENCY PHONE NUMBER: (800) 424-9300 (24 hour).
SPILL/LEAK PRECAUTIONS:
This material is not expected to present any environmental problems other than those associated with oil spills.

Stop the source of the leak or release. Clean up releases as soon as possible. Contain liquid to prevent further contamination of soil, surface water or groundwater. Clean up small spills using appropriate techniques such as sorbent materials or pumping. Where feasible and appropriate, remove contaminated soil. Follow prescribed procedures for reporting and responding to larger releases.
DISPOSAL METHODS:
Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations. Contact local environmental or health authorities for approved disposal of this material.

9. EXPOSURE STANDARDS, REGULATORY LIMITS AND COMPOSITION

COMPOSITION COMMENT:
All the components of this material are on the Toxic Substances Control Act Chemical Substances Inventory.

Based upon information reviewed to date, this product fits the ACGIH definition for mineral oil mist. The ACGIH TLV is 5mg/m3, the OSHA PEL is 5mg/m3.

This material complies with Food and Drug Administration regulation 172.886 and 178.3710 code of Federal Regulations, Title 21.

The percent compositions are given to allow for the various ranges of

the components present in the whole product and may not equal 100%.

PERCENT/CAS#	COMPONENT/REGULATORY LIMITS
100.0 %	CHEVRON FM Lubricating Oil 32X
CONTAINING	
> 99.0 % CAS8042475	WHITE MINERAL OIL
< 1.0 %	ADDITIVES

TLV - Threshold Limit Value
STEL - Short-term Exposure Limit
RQ - Reportable Quantity
CC - Chevron Chemical Company
PEL - Permissible Exposure Limit
TPQ - Threshold Planning Quantity
CPS - CUSA Product Code
CAS - Chemical Abstract Service Number

10. REGULATORY INFORMATION

DOT SHIPPING NAME: NOT DESIGNATED AS A HAZARDOUS MATERIAL BY THE FEDERAL DOT
DOT HAZARD CLASS: NOT APPLICABLE
DOT IDENTIFICATION NUMBER: NOT APPLICABLE

SARA 311 CATEGORIES:
1. Immediate (Acute) Health Effects; NO
2. Delayed (Chronic) Health Effects; NO
3. Fire Hazard; NO
4. Sudden Release of Pressure Hazard; NO
5. Reactivity Hazard; NO

WHEN A COMPONENT OF THIS MATERIAL IS SHOWN IN THIS SECTION, THE REGULATORY LIST ON WHICH IT APPEARS IS INDICATED.

REGULATORY LISTS:

01=SARA 313	02=MASS RTK	03=NTP Carcinogen
04=CA Prop. 65	05=MI 406	06=IARC Group 1
07=IARC Group 2A	08=IARC Group 2B	09=SARA 302/304
10=PA RTK	11=NJ RTK	12=CERCLA 302.4
13=MN RTK	14=ACGIH TLV	15=ACGIH STEL
16=ACGIH Calculated TLV	17=OSHA PEL	18=OSHA STEL
19=Chevron TLV	20=EPA Carcinogen	21=TSCA SECT 4
22=TSCA SECT 5 SNUR	23=TSCA SECT 6 RULE	24=TSCA SECT 12 EXPORT
25=TSCA SECT 8A CAIR	26=TSCA SECT 8D REPORT	27=TSCA SECT 8E
28=Canadian WHMIS		

11. PRODUCT TOXICOLOGY DATA

EYE IRRITATION:

NDA. The hazard evaluation was based on data from similar materials.

SKIN IRRITATION:

NDA. The hazard evaluation was based on data from similar materials.

DERMAL TOXICITY:

NDA. The hazard evaluation was based on data from similar materials.

RESPIRATORY/INHALATION:

NDA. The hazard evaluation was based on data from similar materials.

INGESTION:

NDA. The hazard evaluation was based on data from similar materials.

12. ADDITIONAL HEALTH DATA

ADDITIONAL HEALTH DATA COMMENT:

This product contains petroleum base oils which may be refined by various processes including severe solvent extraction, severe hydrocracking, or severe hydrotreating. None of the oils require a cancer warning under the OSHA Hazard Communication Standard (29 CFR 1910.1200). These oils have not been listed in the National Toxicology Program (NTP) Annual Report nor have they been classified by the International Agency for Research on Cancer (IARC) as; carcinogenic to humans (Group 1), probably carcinogenic to humans (Group 2A), or possibly carcinogenic to humans (Group 2B).

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The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since the information contained herein may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modification of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

Emergency Phone Number(800) 457-2022

Material Safety Data Sheet

CHEVRON GST Oil 32 CPS234229

CLOUGH OIL COMPANY
P O BOX 338
KLAMATH FALLS, OR 97601
Print Date: November 21, 1989

MATERIAL ORDERED FOR:
PACKAGE PICK-UP WILLBRDG
PORTLAND, OR 97210

This Material Safety Data Sheet contains environmental, health and toxicology information for your employees. Please make sure this information is given to them. It also contains information to help you meet community right-to-know/emergency response reporting requirements under SARA Title III and many other laws. If you resell this product, this MSDS must be given to the buyer or the information incorporated in your MSDS. Discard any previous edition of this MSDS.

Update viscosity.

1. PRODUCT IDENTIFICATION

CHEVRON GST Oil 32

- **A HAZARD WARNING IS NOT REQUIRED FOR THIS PRODUCT UNDER OSHA HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200)**

CHEVRON PRODUCT NUMBER(S): CPS234229
PRODUCT INFORMATION: (800)582-3835

Prepared According to the OSHA Hazard Communication Standard (29 CFR 1910.1200) by the Chevron Environmental Health Center, Inc., P.O. Box 4054, Richmond, CA 94804.

2. FIRST AID

EYE CONTACT:
No first aid procedures are required. However, as a precaution flush eyes with fresh water for 15 minutes. Remove contact lenses if worn.
SKIN CONTACT:
No first aid procedures are required. As a precaution, wash skin thoroughly with soap and water. Remove and wash contaminated clothing.
INHALATION:
Since this material is not expected to be an immediate inhalation problem, no first aid procedures are required.
INGESTION:
If swallowed, give water or milk to drink and telephone for medical advice. Consult medical personnel before inducing vomiting. If medical advice cannot be obtained, then take the person and product container to the nearest medical emergency treatment center or hospital.

3. IMMEDIATE HEALTH EFFECTS

EYE CONTACT:
This substance is not expected to cause prolonged or significant eye irritation. This hazard evaluation is based on the data from similar materials.
SKIN IRRITATION:
This substance is not expected to cause prolonged or significant skin irritation. This hazard evaluation is based on data from similar materials.
DERMAL TOXICITY:
If absorbed through the skin, this substance is considered practically non-toxic to internal organs. This hazard evaluation is based on data from similar materials.
RESPIRATORY/INHALATION:
If inhaled, this substance is considered practically non-toxic to internal organs. This hazard evaluation is based on data from similar materials.
INGESTION:
If swallowed, this substance is considered practically non-toxic to internal organs. This hazard evaluation is based on data from similar materials.

4. PROTECTIVE EQUIPMENT

EYE PROTECTION:
No special eye protection is usually necessary.
SKIN PROTECTION:
No special skin protection is usually necessary. Avoid prolonged or frequently repeated skin contact with this material. Skin contact can be minimized by wearing protective clothing.

RESPIRATORY PROTECTION:
No special respiratory protection is normally required. However, if operating conditions create airborne concentrations which exceed the recommended exposure standards, the use of an approved respirator is required.
VENTILATION:
Use adequate ventilation to keep the airborne concentrations of this material below the recommended exposure standard.

5. FIRE PROTECTION

FLASH POINT: (COC) 374F (190C) Min.
AUTOIGNITION: NDA
FLAMMABILITY: NA
EXTINGUISHING MEDIA:
CO_2, dry chemical, foam and water fog.
NFPA RATINGS: Health 0; Flammability 1; Reactivity 0; Special NDA;
HMIS RATINGS: Health 0; Flammability 1; Reactivity 0; Other NDA;
(Least-0, Slight-1, Moderate-2, High-3, Extreme-4). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association or, if applicable, the National Paint and Coating Association, and do not necessarily reflect the hazard evaluation of the Chevron Environmental Health Center. Read the entire document and label before using this product.
FIRE FIGHTING PROCEDURES:
For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.
COMBUSTION PRODUCTS:
Normal combustion forms carbon dioxide and water vapor; incomplete combustion can produce carbon monoxide.

6. STORAGE, HANDLING, AND REACTIVITY

HAZARDOUS DECOMPOSITION PRODUCTS:
NDA
STABILITY:
Stable.
HAZARDOUS POLYMERIZATION:
Polymerization will not occur.
INCOMPATIBILITY:
May react with strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.
SPECIAL PRECAUTIONS:
DO NOT weld, heat or drill container. Residue may ignite with explosive violence if heated sufficiently.

CAUTION! Do not use pressure to empty drum or explosion may result.

7. PHYSICAL PROPERTIES

SOLUBILITY: Soluble in hydrocarbon solvents; insoluble in water.
APPEARANCE: Yellow liquid.
BOILING POINT: NDA
MELTING POINT: NA
EVAPORATION: NA
SPECIFIC GRAVITY: 0.87 @ 15.6/15.6C
VAPOR PRESSURE: NA
PERCENT VOLATILE (VOLUME %): NA
VAPOR DENSITY (AIR=1): NA
VISCOSITY: 32.0 cSt @ 40C (Min.)

8. SPILL RESPONSE AND DISPOSAL

CHEMTREC EMERGENCY PHONE NUMBER: (800) 424-9300 (24 hour).
SPILL/LEAK PRECAUTIONS:
This material is not expected to present any environmental problems other than those associated with oil spills.

Stop the source of the leak or release. Clean up releases as soon as possible. Contain liquid to prevent further contamination of soil, surface water or groundwater. Clean up small spills using appropriate techniques such as sorbent materials or pumping. Where feasible and appropriate, remove contaminated soil. Follow prescribed procedures for reporting and responding to larger releases.
DISPOSAL METHODS:
Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations. Contact local environmental or health authorities for approved disposal of this material.

9. EXPOSURE STANDARDS, REGULATORY LIMITS AND COMPOSITION

COMPOSITION COMMENT:
All the components of this material are on the Toxic Substances Control Act Chemical Substances Inventory.

This substance is subject to the provisions of the Pennsylvania Worker and Community Right-to-Know Act. Specific chemical identities are trade secret under the provisions of 35 Pennsylvania Statute Section 7311.

Based upon information reviewed to date, this product fits the ACGIH definition for mineral oil mist. The ACGIH TLV is 5mg/m3, the OSHA PEL is 5mg/m3.

The percent compositions are given to allow for the various ranges of

the components present in the whole product and may not equal 100%.

PERCENT/CAS#	COMPONENT/REGULATORY LIMITS
100.0 %	CHEVRON GST Oil 32
CONTAINING	
> 99.0 %	LUBRICATING BASE OIL

The BASE OIL may be a mixture of any of the following: CAS 64741884, CAS 64741895,CAS 64741964,CAS 64741975,CAS 64742014,CAS 64742525, CAS 64742536,CAS 64742547,CAS 64742627,CAS 64742650,CAS 72623837.

< 1.0 % ADDITIVES

TLV - Threshold Limit Value
STEL - Short-term Exposure Limit
RQ - Reportable Quantity
CC - Chevron Chemical Company
PEL - Permissible Exposure Limit
TPQ - Threshold Planning Quantity
CPS - CUSA Product Code
CAS - Chemical Abstract Service Number

10. REGULATORY INFORMATION

DOT SHIPPING NAME: NOT DESIGNATED AS A HAZARDOUS MATERIAL BY THE FEDERAL DOT
DOT HAZARD CLASS: NOT APPLICABLE
DOT IDENTIFICATION NUMBER: NOT APPLICABLE

SARA 311 CATEGORIES:
1. Immediate (Acute) Health Effects; NO
2. Delayed (Chronic) Health Effects; NO
3. Fire Hazard; NO
4. Sudden Release of Pressure Hazard; NO
5. Reactivity Hazard; NO

WHEN A COMPONENT OF THIS MATERIAL IS SHOWN IN THIS SECTION, THE REGULATORY LIST ON WHICH IT APPEARS IS INDICATED.

REGULATORY LISTS:

01=SARA 313	02=MASS RTK	03=NTP Carcinogen
04=CA Prop. 65	05=MI 406	06=IARC Group 1
07=IARC Group 2A	08=IARC Group 2B	09=SARA 302/304
10=PA RTK	11=NJ RTK	12=CERCLA 302.4
13=MN RTK	14=ACGIH TLV	15=ACGIH STEL
16=ACGIH Calculated TLV	17=OSHA PEL	18=OSHA STEL
19=Chevron TLV	20=EPA Carcinogen	21=TSCA SECT 4
22=TSCA SECT 5 SNUR	23=TSCA SECT 6 RULE	24=TSCA SECT 12 EXPORT
25=TSCA SECT 8A CAIR	26=TSCA SECT 8D REPORT	27=TSCA SECT 8E
28=Canadian WHMIS		

11. PRODUCT TOXICOLOGY DATA

EYE IRRITATION:
NDA. The hazard evaluation was based on data from similar materials.
SKIN IRRITATION:
NDA. The hazard evaluation was based on data from similar materials.
DERMAL TOXICITY:
NDA. The hazard evaluation was based on data from similar materials.
RESPIRATORY/INHALATION:
NDA. The hazard evaluation was based on data from similar materials.
INGESTION:
NDA. The hazard evaluation was based on data from similar materials.

12. ADDITIONAL HEALTH DATA

ADDITIONAL HEALTH DATA COMMENT:
This product contains petroleum base oils which may be refined by various processes including severe solvent extraction, severe hydrocracking, or severe hydrotreating. None of the oils require a cancer warning under the OSHA Hazard Communication Standard (29 CFR 1910.1200). These oils have not been listed in the National Toxicology Program (NTP) Annual Report nor have they been classified by the International Agency for Research on Cancer (IARC) as; carcinogenic to humans (Group 1), probably carcinogenic to humans (Group 2A), or possibly carcinogenic to humans (Group 2B).

This product contains petroleum base oils refined by a combination of severe hydrocracking and hydrotreating. The potential of paraffinic base oil prepared by this process to cause cancer has not been specifically addressed by the OSHA Hazard Communication Standard (29 CFR 1910.1200), the International Agency for Research on Cancer (IARC), nor the National Toxicology Program (NTP) Annual Report. However, the process conditions, chemical analyses, and the results of mutagenicity tests all support our opinion that this oil should not cause skin cancer.

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The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since the information contained herein may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modification of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

MATERIAL SAFETY DATA SHEET

UNOCAL 76

1201 West 5th Street
Los Angeles, California 90017

Product Name: UNOCAL UNAX AW 32
Product Code No: 04641

Issue Date: 06/01/90
Status: FINAL

Responsible Party:

UNOCAL REFINING & MARKETING DIVISION
UNION OIL COMPANY OF CALIFORNIA
1201 WEST 5TH STREET
LOS ANGELES, CALIFORNIA 90017

CONTACT FOR FURTHER INFORMATION:
MSDS COORDINATOR 213-977-7589

Transportation Emergencies:
CHEMTREC
(800) 424-9300 Cont. U.S.
(202) 483-7616 (Collect)
from Alaska & Hawaii
Health Emergencies:
LOS ANGELES POISON
CONTROL CENTER (24 hrs)
(800) 356-3129

PRODUCT IDENTIFICATION

PRODUCT NAME: UNOCAL UNAX AW 32

SYNONYMS: UNION UNAX AW 32

GENERIC NAME: INDUSTRIAL OIL

CHEMICAL FAMILY: PETROLEUM HYDROCARBON

DOT PROPER SHIPPING NAME: NOT APPLICABLE

ID NUMBER: NONE

DOT HAZARD CLASSIFICATION: NOT REGULATED

PRECAUTIONARY WARNING

DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, GRIND OR DRILL ON OR NEAR CONTAINER OR EXPOSE TO ANY SOURCE OF IGNITION. "EMPTY" CONTAINER RETAINS RESIDUE (LIQUID AND/OR VAPOR) AND MAY EXPLODE IN HEAT OF A FIRE.

SECTION I - COMPONENTS	PERCENT	EXPOSURE LIMIT	UNITS	AGENCY	TYPE
HAZARDOUS COMPONENTS					
SOLVENT DEWAXED DISTILLATE, HEAVY PARAFFIN					
CAS #: 64742-65-0	99	5.000	mg/m3	ACGIH	TWA
		10.000	mg/m3	ACGIH	STEL
		5.000	mg/m3	MSHA	TWA
		5.000	mg/m3	OSHA	TWA
		5.000	mg/m3	CAL OSHA	TWA
OTHER COMPONENTS					
TRADE SECRET		NOT ESTABLISHED			
CAS #: PROPRIETARY	1				

THIS PRODUCT CONTAINS THE FOLLOWING CHEMICALS SUBJECT TO THE REPORTING REQUIREMENTS OF SARA 313 AND 40 CFR 372:

	CAS NUMBER	WEIGHT %
--NONE--		

SECTION I

NOTE: SOLVENT DEWAXED DISTILLATE, HEAVY PARAFFIN COMPARABLE TO OIL MIST, IF GENERATED.

SECTION II - EMERGENCY AND FIRST AID PROCEDURES

EMERGENCY
Have physician call LOS ANGELES POISON CONTROL CENTER (24 hrs) (800) 356-3129

EYE CONTACT:

IF IRRITATION OR REDNESS DEVELOPS, MOVE VICTIM AWAY FROM EXPOSURE AND INTO FRESH AIR. FLUSH EYES WITH CLEAN WATER. IF SYMPTOMS PERSIST, SEEK MEDICAL ATTENTION.

SKIN CONTACT:

WIPE MATERIAL FROM SKIN AND REMOVE CONTAMINATED SHOES AND CLOTHING. CLEANSE AFFECTED AREA(S) THOROUGHLY BY WASHING WITH MILD SOAP AND WATER AND, IF NECESSARY, A WATERLESS SKIN CLEANSER. IF IRRITATION OR REDNESS DEVELOPS AND PERSISTS, SEEK MEDICAL ATTENTION.

INHALATION (BREATHING):

IF RESPIRATORY SYMPTOMS DEVELOP, MOVE VICTIM AWAY FROM SOURCE OF EXPOSURE AND INTO FRESH AIR. IF SYMPTOMS PERSIST, SEEK MEDICAL ATTENTION. IF VICTIM IS NOT BREATHING, IMMEDIATELY BEGIN ARTIFICIAL RESPIRATION. IF BREATHING DIFFICULTIES DEVELOP, OXYGEN SHOULD BE ADMINISTERED BY QUALIFIED PERSONNEL. SEEK IMMEDIATE MEDICAL ATTENTION.

INGESTION (SWALLOWING):

NO FIRST AID IS NORMALLY REQUIRED; HOWEVER, IF SWALLOWED, AND SYMPTOMS DEVELOP, SEEK MEDICAL ATTENTION.

COMMENTS:

NOTE TO PHYSICIANS: ACUTE ASPIRATION OF LARGE AMOUNTS OF OIL LADEN MATERIAL MAY PRODUCE A SERIOUS ASPIRATION PNEUMONIA. PATIENTS WHO ASPIRATE THESE OILS SHOULD BE FOLLOWED FOR THE DEVELOPMENT OF LONG-TERM SEQUELAE. REPEATED ASPIRATION OF SMALL QUANTITIES OF MINERAL OIL CAN PRODUCE CHRONIC INFLAMMATION OF THE LUNGS (i.e. LIPOID PNEUMONIA) THAT MAY PROGRESS TO PULMONARY FIBROSIS. SYMPTOMS OFTEN ARE SUBTLE AND RADIOLOGICAL CHANGES APPEAR WORSE THAN CLINICAL ABNORMALITIES. OCCASIONALLY, PERSISTENT COUGH, IRRITATION OF THE UPPER RESPIRATORY TRACT, SHORTNESS OF BREATH WITH EXERTION, FEVER AND BLOODY SPUTUM OCCUR. INHALATION EXPOSURE TO OIL MISTS BELOW CURRENT WORKPLACE EXPOSURE LIMITS IS UNLIKELY TO CAUSE PULMONARY ABNORMALITIES.

SECTION III - HEALTH HAZARDS/ROUTES OF ENTRY

EYE CONTACT:

THIS MATERIAL MAY CAUSE MILD EYE IRRITATION. DIRECT CONTACT WITH THE LIQUID OR EXPOSURE TO VAPORS OR MISTS MAY CAUSE STINGING, TEARING AND REDNESS.

SKIN CONTACT:

THIS MATERIAL MAY CAUSE MILD SKIN IRRITATION. PROLONGED OR REPEATED CONTACT MAY CAUSE REDNESS, BURNING, AND DRYING AND CRACKING OF THE SKIN. NO HARMFUL EFFECTS ARE EXPECTED FROM SKIN ABSORPTION OF THIS MATERIAL. PERSONS WITH PRE-EXISTING SKIN DISORDERS MAY BE MORE SUSCEPTIBLE TO THE EFFECTS OF THIS MATERIAL.

INHALATION (BREATHING):

WHILE THIS MATERIAL HAS A LOW DEGREE OF TOXICITY, BREATHING HIGH CONCENTRATIONS OF VAPORS OR MISTS MAY CAUSE IRRITATION OF THE NOSE AND THROAT.

SECTION III - HEALTH HAZARDS/ROUTES OF ENTRY

INGESTION (SWALLOWING):

WHILE THIS MATERIAL HAS A LOW DEGREE OF TOXICITY, INGESTION OF EXCESSIVE QUANTITIES MAY CAUSE IRRITATION OF THE DIGESTIVE TRACT.

COMMENTS:

THIS MATERIAL HAS NOT BEEN IDENTIFIED AS A CARCINOGEN BY NTP, IARC OR OSHA.

SECTION IV - SPECIAL PROTECTION INFORMATION

VENTILATION:

IF CURRENT VENTILATION PRACTICES ARE NOT ADEQUATE TO MAINTAIN AIRBORNE CONCENTRATIONS BELOW THE ESTABLISHED EXPOSURE LIMITS (SEE SECTION I), ADDITIONAL VENTILATION OR EXHAUST SYSTEMS MAY BE REQUIRED. WHERE EXPLOSIVE MIXTURES MAY BE PRESENT, ELECTRICAL SYSTEMS SAFE FOR SUCH LOCATIONS MUST BE USED.

RESPIRATORY PROTECTION:

THE USE OF RESPIRATORY PROTECTION IS ADVISED WHEN CONCENTRATIONS EXCEED THE ESTABLISHED EXPOSURE LIMITS (SEE SECTION I). DEPENDING ON THE AIRBORNE CONCENTRATION, USE A RESPIRATOR OR GAS MASK WITH APPROPRIATE CARTRIDGES AND CANNISTERS (NIOSH APPROVED, IF AVAILABLE) OR SUPPLIED AIR EQUIPMENT.

PROTECTIVE GLOVES:

THE USE OF GLOVES IMPERMEABLE TO THE SPECIFIC MATERIAL HANDLED IS ADVISED TO PREVENT SKIN CONTACT AND POSSIBLE IRRITATION.

EYE PROTECTION:

APPROVED EYE PROTECTION TO SAFEGUARD AGAINST POTENTIAL EYE CONTACT, IRRITATION OR INJURY IS RECOMMENDED.

OTHER PROTECTIVE EQUIPMENT:

IT IS SUGGESTED THAT A SOURCE OF CLEAN WATER BE AVAILABLE IN THE WORK AREA FOR FLUSHING EYES AND SKIN. IMPERVIOUS CLOTHING SHOULD BE WORN AS NEEDED.

SECTION V - REACTIVITY DATA

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS OF STORAGE AND HANDLING.

CONDITIONS AFFECTING REACTIVITY:

EXTENDED EXPOSURE TO HIGH TEMPERATURES MAY CAUSE DECOMPOSITION.

INCOMPATIBLE MATERIALS:

AVOID CONTACT WITH STRONG OXIDIZING AGENTS.

HAZARDOUS DECOMPOSITION PRODUCTS:

COMBUSTION MAY YIELD MAJOR AMOUNTS OF OXIDES OF CARBON AND MINOR AMOUNTS OF OXIDES OF SULFUR AND NITROGEN.

HAZARDOUS POLYMERIZATION:

WILL NOT OCCUR

SECTION V - REACTIVITY DATA

POLYMERIZATION CONDITIONS TO AVOID:

NONE KNOWN

SECTION VI - SPILL AND LEAK PROCEDURES

HIGHWAY OR RAILWAY SPILLS
Call CHEMTREC (800) 424-9300 Cont. U.S.
(Collect) (202) 483-7616 from Alaska & Hawaii

PRECAUTIONS IN CASE OF RELEASE OR SPILL:

MAY IGNITE. KEEP ALL SOURCES OF IGNITION AWAY FROM SPILL/RELEASE. STAY UPWIND AND AWAY FROM SPILL/RELEASE. ISOLATE HAZARD AREA AND LIMIT ENTRY TO AUTHORIZED PERSONNEL. STOP SPILL/RELEASE IF IT CAN BE DONE WITHOUT RISK. WEAR APPROPRIATE PROTECTIVE EQUIPMENT INCLUDING RESPIRATORY PROTECTION AS CONDITIONS WARRANT (SEE SECTION IV). 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. SPILLED MATERIAL MAY BE ABSORBED INTO AN APPROPRIATE ABSORBENT MATERIAL. NOTIFY FIRE AUTHORITIES AND APPROPRIATE FEDERAL, STATE AND LOCAL AGENCIES. IMMEDIATE CLEANUP OF ANY SPILL IS RECOMMENDED. IF SPILL OF ANY AMOUNT IS MADE INTO OR UPON U.S. NAVIGABLE WATERS, THE CONTIGUOUS ZONE, OR ADJOINING SHORELINES, NOTIFY THE NATIONAL RESPONSE CENTER (PHONE NUMBER 800-424-8802).

WASTE DISPOSAL METHOD:

DISPOSE OF PRODUCT IN ACCORDANCE WITH LOCAL, COUNTY, STATE, AND FEDERAL REGULATIONS.

SECTION VII - STORAGE AND SPECIAL PRECAUTIONS

HANDLING AND STORAGE PRECAUTIONS:

USE AND STORE THIS MATERIAL IN COOL, DRY, WELL VENTILATED AREAS AWAY FROM HEAT AND ALL SOURCES OF IGNITION. KEEP CONTAINER(S) CLOSED. STORE ONLY IN APPROVED CONTAINERS. KEEP AWAY FROM ANY INCOMPATIBLE MATERIALS (SEE SECTION V). PROTECT CONTAINER(S) AGAINST PHYSICAL DAMAGE. DO NOT ENTER CONFINED SPACES SUCH AS TANKS OR PITS WITHOUT FOLLOWING PROPER ENTRY PROCEDURES SUCH AS ASTM D-4276. THE USE OF RESPIRATORY PROTECTION IS ADVISED WHEN CONCENTRATIONS EXCEED ANY ESTABLISHED EXPOSURE LIMITS (SEE SECTIONS I AND IV). WASH THOROUGHLY AFTER HANDLING. DO NOT WEAR CONTAMINATED CLOTHING OR SHOES. USE GOOD PERSONAL HYGIENE PRACTICE. "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. "EMPTY" DRUMS SHOULD BE COMPLETELY DRAINED, PROPERLY BUNGED AND PROMPTLY SHIPPED TO THE SUPPLIER OR A DRUM RECONDITIONER. ALL OTHER 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 PRODUCT, REFER TO OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION REGULATIONS, ANSI Z49.1, AND OTHER GOVERNMENTAL AND INDUSTRIAL REFERENCES PERTAINING TO CLEANING, REPAIRING, WELDING, OR OTHER CONTEMPLATED OPERATIONS.

SECTION VIII - FIRE AND EXPLOSION HAZARD DATA

			HAZARD RANKING	
NFPA HAZARD CLASS	HEALTH HAZARD:	0	0 = LEAST	FLASH POINT
	FLAMMABILITY:	1	1 = SLIGHT	
	REACTIVITY:	0	2 = MODERATE	410 F COC
	OTHER:		3 = HIGH	210 C
			4 = EXTREME	

SECTION VIII - FIRE AND EXPLOSION HAZARD DATA

EXTINGUISHING MEDIA:

DRY CHEMICAL, CARBON DIOXIDE, HALON, FOAM OR WATER SPRAY IS RECOMMENDED.

UNUSUAL FIRE & EXPLOSION HAZARDS:

THIS MATERIAL MAY BURN, BUT WILL NOT IGNITE READILY. IF CONTAINER IS NOT PROPERLY COOLED, IT MAY EXPLODE IN THE HEAT OF A FIRE. VAPORS ARE HEAVIER THAN AIR AND MAY ACCUMULATE IN LOW AREAS.

SPECIAL FIRE FIGHTING PROCEDURES:

WEAR APPROPRIATE PROTECTIVE EQUIPMENT INCLUDING RESPIRATORY PROTECTION AS CONDITIONS WARRANT (SEE SECTION IV). STOP SPILL/RELEASE IF IT CAN BE DONE WITHOUT RISK. MOVE UNDAMAGED CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. WATER SPRAY MAY BE USEFUL IN MINIMIZING OR DISPERSING VAPORS AND COOLING EQUIPMENT EXPOSED TO HEAT AND FLAME. AVOID SPREADING BURNING LIQUID WITH WATER USED FOR COOLING PURPOSES.

SECTION IX - PHYSICAL DATA

***UNLESS OTHERWISE NOTED, VALUES ARE AT 20 C/68 F AND 760 mm Hg/1 atm.

APPROX BOILING POINT	(AIR = 1) VAPOR DENSITY	(N-BUTYL ACETATE = 1) EVAPORATION RATE	% VOLATILE
>600 F / 316 C	>1	<1	NEGLIGIBLE

% SOLUBILITY IN WATER

NEGLIGIBLE

SPECIFIC GRAVITY

0.88-0.89

APPEARANCE

CLEAR, YELLOW LIQUID

ODOR

CHARACTERISTIC PETROLEUM

SECTION X - DOCUMENTARY INFORMATION

ISSUE DATE: 06/01/90 PRODUCT CODE NO. 04641

PREV. DATE: 05/15/89 PREV. PROD. CODE NO. NONE

MSDS NO: NONE PREV. MSDS NO: NONE

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

The information in this document is believed to be correct as of the date issued. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THIS INFORMATION, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE.
This information and product are furnished on the condition that the person receiving them shall make his own determination as to the suitability of the product for his particular purpose and on the condition that he assume the risk of his use thereof.

MATERIAL SAFETY DATA SHEET

UNOCAL 76

1201 West 5th Street
Los Angeles, California 90017

Product Name: UNOCAL TURBINE OIL 32
Product Code No: 04621

Issue Date: 05/25/90
Status: FINAL

Responsible Party:

UNOCAL REFINING & MARKETING DIVISION
UNION OIL COMPANY OF CALIFORNIA
1201 WEST 5TH STREET
LOS ANGELES, CALIFORNIA 90017

CONTACT FOR FURTHER INFORMATION:
MSDS COORDINATOR 213-977-7589

Transportation Emergencies:
CHEMTREC
(800) 424-9300 Cont. U.S.
(202) 483-7616 (Collect)
from Alaska & Hawaii
Health Emergencies:
LOS ANGELES POISON
CONTROL CENTER (24 hrs)
(800) 356-3129

PRODUCT IDENTIFICATION

PRODUCT NAME: UNOCAL TURBINE OIL 32

SYNONYMS: UNION TURBINE OIL 32

GENERIC NAME: INDUSTRIAL OIL

CHEMICAL FAMILY: PETROLEUM HYDROCARBON

DOT PROPER SHIPPING NAME: NOT APPLICABLE

ID NUMBER: NONE

DOT HAZARD CLASSIFICATION: NOT REGULATED

PRECAUTIONARY WARNING

DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, GRIND OR DRILL ON OR NEAR CONTAINER OR EXPOSE TO ANY SOURCE OF IGNITION. "EMPTY" CONTAINER RETAINS RESIDUE (LIQUID AND/OR VAPOR) AND MAY EXPLODE IN HEAT OF A FIRE.

SECTION I - COMPONENTS	PERCENT	EXPOSURE LIMIT	UNITS	AGENCY	TYPE
HAZARDOUS COMPONENTS					
SOLVENT DEWAXED DISTILLATE, HEAVY PARAFFIN					
CAS #: 64742-65-0	99	5.000	mg/m3	ACGIH	TWA
		10.000	mg/m3	ACGIH	STEL
		5.000	mg/m3	MSHA	TWA
		5.000	mg/m3	OSHA	TWA
		5.000	mg/m3	CAL OSHA	TWA
OTHER COMPONENTS					
TRADE SECRET		NOT ESTABLISHED			
CAS #: PROPRIETARY	1				

THIS PRODUCT CONTAINS THE FOLLOWING CHEMICALS SUBJECT TO THE REPORTING REQUIREMENTS OF SARA 313 AND 40 CFR 372:

	CAS NUMBER	WEIGHT %
--NONE--		

SECTION I

NOTE: SOLVENT DEWAXED DISTILLATE, HEAVY PARAFFIN COMPARABLE TO OIL MIST, IF GENERATED.

SECTION II - EMERGENCY AND FIRST AID PROCEDURES

EMERGENCY
Have physician call LOS ANGELES POISON CONTROL CENTER (24 hrs) (800) 356-3129

EYE CONTACT:

IF IRRITATION OR REDNESS DEVELOPS, MOVE VICTIM AWAY FROM EXPOSURE AND INTO FRESH AIR. FLUSH EYES WITH CLEAN WATER. IF SYMPTOMS PERSIST, SEEK MEDICAL ATTENTION.

SKIN CONTACT:

WIPE MATERIAL FROM SKIN AND REMOVE CONTAMINATED SHOES AND CLOTHING. CLEANSE AFFECTED AREA(S) THOROUGHLY BY WASHING WITH MILD SOAP AND WATER AND, IF NECESSARY, A WATERLESS SKIN CLEANSER. IF IRRITATION OR REDNESS DEVELOPS AND PERSISTS, SEEK MEDICAL ATTENTION.

INHALATION (BREATHING):

IF RESPIRATORY SYMPTOMS DEVELOP, MOVE VICTIM AWAY FROM SOURCE OF EXPOSURE AND INTO FRESH AIR. IF SYMPTOMS PERSIST, SEEK MEDICAL ATTENTION. IF VICTIM IS NOT BREATHING, IMMEDIATELY BEGIN ARTIFICIAL RESPIRATION. IF BREATHING DIFFICULTIES DEVELOP, OXYGEN SHOULD BE ADMINISTERED BY QUALIFIED PERSONNEL. SEEK IMMEDIATE MEDICAL ATTENTION.

INGESTION (SWALLOWING):

NO FIRST AID IS NORMALLY REQUIRED; HOWEVER, IF SWALLOWED, AND SYMPTOMS DEVELOP, SEEK MEDICAL ATTENTION.

COMMENTS:

NOTE TO PHYSICIANS: ACUTE ASPIRATION OF LARGE AMOUNTS OF OIL LADEN MATERIAL MAY PRODUCE A SERIOUS ASPIRATION PNEUMONIA. PATIENTS WHO ASPIRATE THESE OILS SHOULD BE FOLLOWED FOR THE DEVELOPMENT OF LONG-TERM SEQUELAE. REPEATED ASPIRATION OF SMALL QUANTITIES OF MINERAL OIL CAN PRODUCE CHRONIC INFLAMMATION OF THE LUNGS (i.e. LIPOID PNEUMONIA) THAT MAY PROGRESS TO PULMONARY FIBROSIS. SYMPTOMS OFTEN ARE SUBTLE AND RADIOLOGICAL CHANGES APPEAR WORSE THAN CLINICAL ABNORMALITIES. OCCASIONALLY, PERSISTENT COUGH, IRRITATION OF THE UPPER RESPIRATORY TRACT, SHORTNESS OF BREATH WITH EXERTION, FEVER AND BLOODY SPUTUM OCCUR. INHALATION EXPOSURE TO OIL MISTS BELOW CURRENT WORKPLACE EXPOSURE LIMITS IS UNLIKELY TO CAUSE PULMONARY ABNORMALITIES.

SECTION III - HEALTH HAZARDS/ROUTES OF ENTRY

EYE CONTACT:

THIS MATERIAL MAY CAUSE MILD EYE IRRITATION. DIRECT CONTACT WITH THE LIQUID OR EXPOSURE TO VAPORS OR MISTS MAY CAUSE STINGING, TEARING AND REDNESS.

SKIN CONTACT:

THIS MATERIAL MAY CAUSE MILD SKIN IRRITATION. PROLONGED OR REPEATED CONTACT MAY CAUSE REDNESS, BURNING, AND DRYING AND CRACKING OF THE SKIN. NO HARMFUL EFFECTS ARE EXPECTED FROM SKIN ABSORPTION OF THIS MATERIAL. PERSONS WITH PRE-EXISTING SKIN DISORDERS MAY BE MORE SUSCEPTIBLE TO THE EFFECTS OF THIS MATERIAL.

INHALATION (BREATHING):

WHILE THIS MATERIAL HAS A LOW DEGREE OF TOXICITY, BREATHING HIGH CONCENTRATIONS OF VAPORS OR MISTS MAY CAUSE IRRITATION OF THE NOSE AND THROAT.

SECTION III - HEALTH HAZARDS/ROUTES OF ENTRY

INGESTION (SWALLOWING):

WHILE THIS MATERIAL HAS A LOW DEGREE OF TOXICITY, INGESTION OF EXCESSIVE QUANTITIES MAY CAUSE IRRITATION OF THE DIGESTIVE TRACT.

COMMENTS:

THIS MATERIAL HAS NOT BEEN IDENTIFIED AS A CARCINOGEN BY NTP, IARC OR OSHA.

SECTION IV - SPECIAL PROTECTION INFORMATION

VENTILATION:

IF CURRENT VENTILATION PRACTICES ARE NOT ADEQUATE TO MAINTAIN AIRBORNE CONCENTRATIONS BELOW THE ESTABLISHED EXPOSURE LIMITS (SEE SECTION I), ADDITIONAL VENTILATION OR EXHAUST SYSTEMS MAY BE REQUIRED. WHERE EXPLOSIVE MIXTURES MAY BE PRESENT, ELECTRICAL SYSTEMS SAFE FOR SUCH LOCATIONS MUST BE USED.

RESPIRATORY PROTECTION:

THE USE OF RESPIRATORY PROTECTION IS ADVISED WHEN CONCENTRATIONS EXCEED THE ESTABLISHED EXPOSURE LIMITS (SEE SECTION I). DEPENDING ON THE AIRBORNE CONCENTRATION, USE A RESPIRATOR OR GAS MASK WITH APPROPRIATE CARTRIDGES AND CANNISTERS (NIOSH APPROVED, IF AVAILABLE) OR SUPPLIED AIR EQUIPMENT.

PROTECTIVE GLOVES:

THE USE OF GLOVES IMPERMEABLE TO THE SPECIFIC MATERIAL HANDLED IS ADVISED TO PREVENT SKIN CONTACT AND POSSIBLE IRRITATION.

EYE PROTECTION:

APPROVED EYE PROTECTION TO SAFEGUARD AGAINST POTENTIAL EYE CONTACT, IRRITATION OR INJURY IS RECOMMENDED.

OTHER PROTECTIVE EQUIPMENT:

IT IS SUGGESTED THAT A SOURCE OF CLEAN WATER BE AVAILABLE IN THE WORK AREA FOR FLUSHING EYES AND SKIN. IMPERVIOUS CLOTHING SHOULD BE WORN AS NEEDED.

SECTION V - REACTIVITY DATA

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS OF STORAGE AND HANDLING.

CONDITIONS AFFECTING REACTIVITY:

EXTENDED EXPOSURE TO HIGH TEMPERATURES MAY CAUSE DECOMPOSITION.

INCOMPATIBLE MATERIALS:

AVOID CONTACT WITH STRONG OXIDIZING AGENTS.

HAZARDOUS DECOMPOSITION PRODUCTS:

COMBUSTION MAY YIELD MAJOR AMOUNTS OF OXIDES OF CARBON AND MINOR AMOUNTS OF OXIDES OF SULFUR AND NITROGEN.

HAZARDOUS POLYMERIZATION:

WILL NOT OCCUR

SECTION V - REACTIVITY DATA

POLYMERIZATION CONDITIONS TO AVOID:

NONE KNOWN

SECTION VI - SPILL AND LEAK PROCEDURES

HIGHWAY OR RAILWAY SPILLS
Call CHEMTREC (800) 424-9300 Cont. U.S.
(Collect) (202) 483-7616 from Alaska & Hawaii

PRECAUTIONS IN CASE OF RELEASE OR SPILL:

MAY IGNITE. KEEP ALL SOURCES OF IGNITION AWAY FROM SPILL/RELEASE. STAY UPWIND AND AWAY FROM SPILL/RELEASE. ISOLATE HAZARD AREA AND LIMIT ENTRY TO AUTHORIZED PERSONNEL. STOP SPILL/RELEASE IF IT CAN BE DONE WITHOUT RISK. WEAR APPROPRIATE PROTECTIVE EQUIPMENT INCLUDING RESPIRATORY PROTECTION AS CONDITIONS WARRANT (SEE SECTION IV). 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. SPILLED MATERIAL MAY BE ABSORBED INTO AN APPROPRIATE ABSORBENT MATERIAL. NOTIFY FIRE AUTHORITIES AND APPROPRIATE FEDERAL, STATE AND LOCAL AGENCIES. IMMEDIATE CLEANUP OF ANY SPILL IS RECOMMENDED. IF SPILL OF ANY AMOUNT IS MADE INTO OR UPON U.S. NAVIGABLE WATERS, THE CONTIGUOUS ZONE, OR ADJOINING SHORELINES, NOTIFY THE NATIONAL RESPONSE CENTER (PHONE NUMBER 800-424-8802).

WASTE DISPOSAL METHOD:

DISPOSE OF PRODUCT IN ACCORDANCE WITH LOCAL, COUNTY, STATE, AND FEDERAL REGULATIONS.

SECTION VII - STORAGE AND SPECIAL PRECAUTIONS

HANDLING AND STORAGE PRECAUTIONS:

USE AND STORE THIS MATERIAL IN COOL, DRY, WELL VENTILATED AREAS AWAY FROM HEAT AND ALL SOURCES OF IGNITION. KEEP CONTAINER(S) CLOSED. STORE ONLY IN APPROVED CONTAINERS. KEEP AWAY FROM ANY INCOMPATIBLE MATERIALS (SEE SECTION V). PROTECT CONTAINER(S) AGAINST PHYSICAL DAMAGE. DO NOT ENTER CONFINED SPACES SUCH AS TANKS OR PITS WITHOUT FOLLOWING PROPER ENTRY PROCEDURES SUCH AS ASTM D-4276. THE USE OF RESPIRATORY PROTECTION IS ADVISED WHEN CONCENTRATIONS EXCEED ANY ESTABLISHED EXPOSURE LIMITS (SEE SECTIONS I AND IV). WASH THOROUGHLY AFTER HANDLING. DO NOT WEAR CONTAMINATED CLOTHING OR SHOES. USE GOOD PERSONAL HYGIENE PRACTICE. "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. "EMPTY" DRUMS SHOULD BE COMPLETELY DRAINED, PROPERLY BUNGED AND PROMPTLY SHIPPED TO THE SUPPLIER OR A DRUM RECONDITIONER. ALL OTHER 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 PRODUCT, REFER TO OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION REGULATIONS, ANSI Z49.1, AND OTHER GOVERNMENTAL AND INDUSTRIAL REFERENCES PERTAINING TO CLEANING, REPAIRING, WELDING, OR OTHER CONTEMPLATED OPERATIONS.

SECTION VIII - FIRE AND EXPLOSION HAZARD DATA

			HAZARD RANKING	FLASH POINT
NFPA HAZARD CLASS	HEALTH HAZARD:	0	0 = LEAST	
	FLAMMABILITY:	1	1 = SLIGHT	
	REACTIVITY:	0	2 = MODERATE	388 F COC
	OTHER:		3 = HIGH	198 C
			4 = EXTREME	

SECTION VIII - FIRE AND EXPLOSION HAZARD DATA

EXTINGUISHING MEDIA:

DRY CHEMICAL, CARBON DIOXIDE, HALON, FOAM OR WATER SPRAY IS RECOMMENDED.

UNUSUAL FIRE & EXPLOSION HAZARDS:

THIS MATERIAL MAY BURN, BUT WILL NOT IGNITE READILY. IF CONTAINER IS NOT PROPERLY COOLED, IT MAY EXPLODE IN THE HEAT OF A FIRE. VAPORS ARE HEAVIER THAN AIR AND MAY ACCUMULATE IN LOW AREAS.

SPECIAL FIRE FIGHTING PROCEDURES:

WEAR APPROPRIATE PROTECTIVE EQUIPMENT INCLUDING RESPIRATORY PROTECTION AS CONDITIONS WARRANT (SEE SECTION IV). STOP SPILL/RELEASE IF IT CAN BE DONE WITHOUT RISK. MOVE UNDAMAGED CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. WATER SPRAY MAY BE USEFUL IN MINIMIZING OR DISPERSING VAPORS AND COOLING EQUIPMENT EXPOSED TO HEAT AND FLAME. AVOID SPREADING BURNING LIQUID WITH WATER USED FOR COOLING PURPOSES.

SECTION IX - PHYSICAL DATA

***UNLESS OTHERWISE NOTED, VALUES ARE AT 20 C/68 F AND 760 mm Hg/1 atm.

APPROX BOILING POINT	(AIR = 1) VAPOR DENSITY	(N-BUTYL ACETATE = 1) EVAPORATION RATE	% VOLATILE
>600 F / 316 C	>1	<1	NEGLIGIBLE

% SOLUBILITY IN WATER

NEGLIGIBLE

SPECIFIC GRAVITY

0.88

APPEARANCE

CLEAR, YELLOW LIQUID

ODOR

CHARACTERISTIC PETROLEUM

SECTION X - DOCUMENTARY INFORMATION

ISSUE DATE: 05/25/90 PRODUCT CODE NO. 04621

PREV. DATE: 05/15/89 PREV. PROD. CODE NO. NONE

MSDS NO: NONE PREV. MSDS NO: NONE

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

The information in this document is believed to be correct as of the date issued. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THIS INFORMATION, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE. This information and product are furnished on the condition that the person receiving them shall make his own determination as to the suitability of the product for his particular purpose and on the condition that he assume the risk of his use thereof.

INDUSTRIAL
OILS UNLIMITED, INC.

P.O. BOX 3066 • TULSA, OKLAHOMA 74101
FAX 918/583-OILS 918/583-1155

TO: Dan Baker
Centrilift
4664 American Avenue
Bakersfield, CA 93309

FROM: Sonny Cline

DATE: February 4, 1991

SUBJECT: CL-4 and CL-5

CL-4 and CL-5 meet the FDA requirement for 21 CFR 178.3620B and may be described as Synthetic Technical White Mineral Oils. Consequently, CL-4 and CL-5 may replace the mineral oil used as a component of non-food articles intended for use in contact with food.

In meeting the requirements of 21 CFR 178.3620B, this fluid may be used wherever mineral oil is permitted in the following FDA regulated applications:

175.105	Adhesives
176.200	Defoamers in Coatings
176.210	Defoamers in Paper
177.2260	Filters, Resin Bonded
177.2600	Rubber Articles
177.2800	Textiles and Fibers
*178.3570	Lubricants with Incidental Contact
178.3910	Surface Lubes used in Manufacturing Metallic Articles

* Lubricants with incidental food contact may be safely used for producing, manufacturing, packing, processing, preparing, treating, packaging, transporting, or holding food, subject to the provisions of this section, etc.

If you have any additional questions, please contact me.

Sincerely,

Sonny

Sonny Cline

NOTE: Dan, at the present time CL-3 does not meet this FDA requirement.

SC:rk:cent.mem

National Distillers & Chemical Corporation

Material Safety Data Sheet

DATE: February 12, 1985

SECTION I

MANUFACTURER'S NAME: Emery Chemicals, Division of National Distillers & Chemical Corp.
ADDRESS: 11501 Northlake Drive, Cincinnati, Ohio 45249
EMERGENCY TELEPHONE NUMBER: (513) 482-2297
CHEMICAL NAME AND SYNONYMS: Polyalphaolefin
TRADE NAME AND SYNONYMS: Emery 3006 Polyalphaolefin Base Stock
CHEMICAL FAMILY: Synthetic Aliphatic Hydrocarbon

SECTION II - COMPOSITION

INGREDIENTS/IMPURITIES	%	TLV(mg/M^3)	HAZARD
Product is a mixture of polymerized hydrogenated decene; carbon number C_{30} and higher			See Section V

SECTION III - PHYSICAL DATA

BOILING POINT : 781°F (416°C) - ASTM D-86
VAPOR PRESSURE (mm Hg.): Nil at normal temperatures
VAPOR DENSITY (AIR=1): No data
SOLUBILITY IN WATER: Insoluble
APPEARANCE & ODOR: Colorless, odorless fluid
SPECIFIC GRAVITY (H_2O=1) 0.828
PERCENT, VOLATILE BY VOLUME (%): No data
EVAPORATION RATE: No data
VISCOSITY: 5.8 centistokes at 100°C (typical)

SECTION IV - FIRE & EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED): 473°F (245°C)(ASTM D92)
FLAMMABLE LIMITS: Not determined Lel: Uel:
EXTINGUISHING MEDIA: Carbon Dioxide, Dry Chemicals, Water Spray (Fog) Foam
UNUSUAL FIRE AND EXPLOSION HAZARDS: Fire and explosion hazard considered slight when exposed to heat or flame.

SPECIAL FIRE FIGHTING PROCEDURES: Use foam and water spray carefully to prevent excessive frothing. Firefighters should wear self-contained breathing apparatus in the positive pressure mode when there is a possibility of exposure to smoke and fumes

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: Observe current ACGIH TLV of 5 mg/M^3 for oil mist.

EFFECTS OF OVEREXPOSURE:

INHALATION: No specific data available. Repeated daily exposures (6 hrs/day) of rats to dearomatized C_{10} -C_{12} hydrocarbon solvent at levels in air greater than 1900 mg/M^3 resulted in mild kidney effects. Fumes from overheating may be mild respiratory irritants.

ORAL: No specific data available. Ingestion may have laxative effects similar to white mineral oils.

SKIN: No specific data available. Prolonged and repeated overexposure may irritate the skin.

EYE: No data available.

EMERGENCY FIRST AID PROCEDURES:

INHALATION OVEREXPOSURE: Immediately remove to fresh air. Give artificial respiration if victim has stopped breathing. Get medical attention.

INGESTION OVEREXPOSURE: Do not induce vomiting. Seek medical aid.

SKIN CONTACT: Wash with soap and water. Wash contaminated clothing before re-use

EYE CONTACT: Flush eyes with large amount of cool water for 15 minutes. Get medical attention.

SECTION VI - REACTIVITY DATA

STABILITY: UNSTABLE: [ ] STABLE : [X]

CONDITIONS TO AVOID: None anticipated.

INCOMPATABILITY (MATERIALS TO AVOID): None anticipated.

HAZARDOUS DECOMPOSITION PRODUCTS: No data available. Overheating may produce CO, CO_2 and other thermal decomposition products typical of hydrocarbons.

HAZARDOUS POLYMERIZATION LIKELY [ ] NOT LIKELY [X]

CONDITIONS TO AVOID:

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Observe ventilation and personal protection information in Section VIII of this MSDS. Contain spilled material. Transfer to secure container.

WASTE DISPOSAL METHOD: Avoid landfilling liquids. All waste material should be packaged, identified, transported, and disposed of in conformance with good engineering practices and applicable laws.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (SPECIFY TYPE): No special protection required when handled at normal ambient temperatures. Where there is potential for generation of mists above 5 mg/M³, respiratory protection against oil mists should be worn. Respirators should be selected based on the concentration in air, and used in accordance with OSHA General Industry Standard 29 CFR 1910.134.

VENTILATION - LOCAL EXHAUST: Not required at normal temperatures.

MECHANICAL (GENERAL): Handle in presence of adequate ventilation

OTHER:

PROTECTIVE GLOVES: Where there may be potential for prolonged skin contact, protective gloves are suggested. Polyvinyl alcohol, butyl rubber, and polyethylene are resistant to product.

EYE PROTECTION: Safety glasses suggested. Chemical goggles meeting specification of ANSI standard Z 87.1, 1979, should be worn where splash hazard exists.

OTHER PROTECTIVE EQUIPMENT: Wear protective clothing such as aprons, coveralls and boots where there is likelihood for prolonged skin contact.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Avoid frequent or prolonged skin contact. Avoid inhalation of mists and vapors if heated.

OTHER PRECAUTIONS:

DISCLAIMER OF LIABILITY: The information presented herein is believed to be factual as it has been derived from the works and opinions of persons believed to be qualified experts; however, nothing contained in this information is to be taken as a warranty or representation for which National Distillers & Chemical Corporation bears legal responsibility. The user should review any recommendations in the specific context of the intended use to determine whether they are appropriate.

CENTRILIFT — HUGHES, Inc.
ONE OF THE HUGHES TOOL COMPANIES

SHEET ___ OF ___
SPECIFICATION NO. ES015
REVISION NO. A

ENGINEERING SPECIFICATION

DESCRIPTION CL-4: GULF SYNFLUID[R] - GRADE 6cs
POLYAPHOLEFIN BASE FLUID

GULF SYNFLUID[R], 6cs

DEVELOPMENTAL BASE FLUID

Viscosity, cs @ °F (D445)	
-40	7,945
0	833
100	33.33
210	5.96
Viscosity Index (D2270)	136
Pour Point, °F (D97)	-90
Flash Point, °F (D92)	465
Fire Point, °F (D92)	520
Autoignition Temp., °F (D2155)	710
Evaporation Loss, Wt.%, 6.5 hrs. @ 400 °F (D972)	4.0
Total Acid Number (D974)	<0.03
Specific Gravity, 60/60 °F (GRM 112)	0.8265
Dielectric Strength 29 KV+	

AUTHOR	DATE	APPR. BY	DATE
D. Copeland	5 AUG 83	[illegible]	8 AUG '83

CENTRILIFT
A BAKER HUGHES COMPANY

SPECIFICATION NO. ES-191
SHEET 1 OF 1
REVISION NO. A PCN 12589

ENGINEERING SPECIFICATION

DESCRIPTION CL-5: EMERY - GRADE 10CS

POLYAPHOLEFIN BASE FLUID

EMERY 10CS

DEVELOPMENTAL BASE FLUID

Viscostiy, cs @ °F (D445)		
	-40	55,000
	0	
	104	62.0
	212	9.5 min
Viscosity Index (D2270)		131
Pour Point, °F (D97)		-58
Flash Point, °F (D92)		482
Fire Point, °F (D92)		518
Autoignition Temp., °F (D2155)		
Evaporation Loss, Wt.%, 6.5 hrs. @ 400 °F (D972)		
Total Acid Number (D974)		0.01 max
Specific Gravity, 60/60 °F (GRM 112)		.825-.845
Dielectric Strength 29 KV+		

AUTHOR:

DATE:

APPROVED BY:

DATE:

CENTRILIFT — HUGHES, Inc.
ONE OF THE HUGHES TOOL COMPANIES

SHEET ___ OF ___
SPECIFICATION NO. ES014
REVISION NO. A

ENGINEERING SPECIFICATION

Send to Brazil any Rev.

DESCRIPTION CL-3

High Temperature Plastics Oil-310

WHITE MINERAL OIL, USP

TYPICAL TESTS OF PLASTICS OIL 300

SSU @ 100 Degrees F	330
SSU @ 150 Degrees F	105
SSU @ 210 Degrees F	54
SSU @ 300 Degrees F	38
Spec Grav. @ 60 Degrees F	0.870
Viscosity Index-Degrees F	104
Pour Point- Degrees F	0
Flash Point-Degrees F	460
Fire Point-Degrees F	515
Color	+30
Dielectric Strength	29 KV+
USP Acid Test	Passes
UV Absorbance ASTM (D2008) FDA Reference-121.114	Passes
Distillation ASTM D1160	2½% @260°C Min.
Water Content	30 PPM (Max)

Suggested Mfg'r Witco Chemical Corporation

AUTHOR	DATE	APPR. BY	DATE
Larry Green	7 April 1983	John Brandon	7 APRIL 83