Appendix S
Material Safety/Equipment

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APPENDIX S **MATERIAL SAFETY/EQUIPMENT**

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BOC GASES

MATERIAL SAFETY /EQUIPMENT

PRODUCT NAME: ACETYLENE

1. Chemical Product and Company Identification

BOC Gases,
Division of
The BOC Group, Inc.
575 Mountain Avenue
Murray Hill, NJ 07974

TELEPHONE NUMBER: (908) 464-8100
24-HOUR EMERGENCY TELEPHONE NUMBER:
CHEMTREC (800) 424-9300

BOC Gases
Division of
BOC Canada Limited
5975 Falbourne Street, Unit 2
Mississauga, Ontario L5R 3W6

TELEPHONE NUMBER: (905) 501-1700
24-HOUR EMERGENCY TELEPHONE NUMBER:
(905) 501-0802
EMERGENCY RESPONSE PLAN NO: 20101

PRODUCT NAME: ACETYLENE
CHEMICAL NAME: Acetylene
COMMON NAMES/SYNONYMS: Ethyne, Acetylen, Ethine
TDG (Canada) CLASSIFICATION: 2.1
WHMIS CLASSIFICATION: A, B1, D2B

PREPARED BY: Loss Control (908)464-8100/(905)501-1700
PREPARATION DATE: 6/1/95
REVIEW DATES: 6/7/96

2. Composition, Information on Ingredients

INGREDIENT	% VOLUME	PEL-OSHA[1]	TLV-ACGIH[2]	LD_{50} or LC_{50} Route/Species
Acetylene FORMULA: C_2H_2 CAS: 74-86-2 RTECS #: AO9600000	95.0 to 99.6	Not Available	Simple Asphyxiant	Not Available
Acetone FORMULA: C3H60 CAS: 67-64-1 RTECS #: AL3150000	Not Available	1000 ppm TWA	750 ppm TWA 1000 ppm STEL	LD_{50} 1297 mg/kg (mouse)

[1] As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)
[2] As stated in the ACGIH 1994-95 Threshold Limit Values for Chemical Substances and Physical Agents

3. Hazards Identification

EMERGENCY OVERVIEW

Simple Asphyxiant. This product does not contain oxygen and may cause asphyxia if released in a confined area. Maintain oxygen levels above 19.5%. May cause anesthetic effects. Highly flammable under pressure. Spontaneously combustible in air at pressures above 15 psig. Acetylene liquid is shock sensitive.

PRODUCT NAME: ACETYLENE

ROUTE OF ENTRY:

Skin Contact	Skin Absorption	Eye Contact	Inhalation	Ingestion
No	No	No	Yes	No

HEALTH EFFECTS:

Exposure Limits	Irritant	Sensitization
Yes	Yes	No
Teratogen	Reproductive Hazard	Mutagen
No	No	No
Synergistic Effects None Reported		

Carcinogenicity: -- NTP: No IARC: No OSHA: No

EYE EFFECTS:
None known since product is a gas at room temperature. Contact of liquid acetylene with the eyes may cause temporary irritation.

SKIN EFFECTS:
Skin effects are not likely. Contact with liquid acetylene may cause irritation and dermatitis upon repeated exposures.

INGESTION EFFECTS:
Ingestion is unlikely, since acetylene is a gas at room temperature.

INHALATION EFFECTS:
Acetylene is an asphyxiant and may cause anesthetic effects at high concentrations. High concentrations may exclude an adequate supply of oxygen to the lungs. Effects of oxygen deficiency resulting from simple asphyxiants may include: rapid breathing, diminished mental alertness, impaired muscular coordination, faulty judgement, depression of all sensations, emotional instability, and fatigue. As asphyxiation progresses, nausea, vomiting, prostration, and loss of consciousness may result, eventually leading to convulsions, coma, and death.

Under normal operating conditions, acetone is not released from the cylinder. However, if the cylinder is overcharged with acetone or acetylene, acetone may occassionally "spit" out. Acetone is primarily a central nervous system toxin causing headache, nausea, dizziness, vomiting and fatigue. Moderate concentrations may cause respiratory irritation.

Oxygen deficiency during pregnancy has produced developmental abnormalities in humans and experimental animals.

NFPA HAZARD CODES	**HMIS HAZARD CODES**	**RATINGS SYSTEM**
Health: 0	Health: 0	0 = No Hazard
Flammability: 4	Flammability: 4	1 = Slight Hazard
Reactivity: 0	Reactivity: 0	2 = Moderate Hazard
		3 = Serious Hazard
		4 = Severe Hazard

4. First Aid Measures

EYES:
None normally required. Consult a physician if direct contact with pressurized material occurs. Immediately flush with low pressure, cool water for at least 15 minutes, opening eyelids to ensure flushing. Get medical attention.

SKIN:
Wash affected areas with soap and warm water. If irritation develops, seek medical attention.

INGESTION:
None normally required.

INHALATION:
PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE. PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Victims should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. If breathing has stopped administer artificial resuscitation and supplemental oxygen. Further treatment should be symptomatic and supportive. Keep victim warm and quiet.

5. Fire Fighting Measures

Conditions of Flammability: Flammable		
Flash point: Not Available	Method: Not Applicable	Autoignition: Temperature: 565°F (296°C)
LEL(%): 2.2	UEL(%): 80 to 85*	
Hazardous combustion products: Carbon Monoxide, Carbon Dioxide		
Sensitivity to mechanical shock: Not Available		
Sensitivity to static discharge: Not Available		

FIRE AND EXPLOSION HAZARDS:
*Pure acetylene can ignite by decomposition above 15 psig; therefore, the UEL is 100% if the ignition source is of sufficient intensity.

GASEOUS ACETYLENE IS SPONTANEOUSLY COMBUSTIBLE IN AIR AT PRESSURE ABOVE 15 PSI (207 kPa.). It requires a very low ignition energy so that fires which have been extinguished without stopping the flow of gas can easily reignite with possible explosive force. Acetylene has a density very similar to that of air so when leaking it does not readily dissipate. Gas may travel to a source of ignition and flash back.

Fires involving acetylene occur occassionally at fusible metal pressure relief plugs at the tops and bottoms of cylinders, commonly due to hot metal or slag being dropped on the fusible plugs. When the fusible plug releases a large volume of acetylene will rush out, creating a "roaring" sound. The flame may extend a foot or two away from the cylinder until the pressure is reduced. In some cases, the other end of the cylinder may develop a coating of frost.

EXTINGUISHING MEDIA:
Carbon dioxide, dry chemical.

FIRE FIGHTING INSTRUCTIONS:
WARNING: ALWAYS EXTINGUISH A FIRE BEFORE CLOSING THE CYLINDER VALVE. If the flame is small from the fusible plug or valve stem, try to put it out. Wear SCBA and fully protective clothing for fire fighting. If the fire is allowed to keep burning it is likely that the fusible plug will melt and result in a large release of acetylene. A glove or heavy cloth or any wet material slapped on the flame will frequently extinguish it.

If the flame is large, burning from a fusible plug, DO NOT try to put it out unless the cylinder is outdoors or in a very well ventilated area free from sources of ignition. Usually it is very difficult to extinguish large fires because the escaping acetylene may be reignited by adjacent ignition sources, thereby possibly creating a confined space explosion. Keep containers cool with water spray.

6. Accidental Release Measures

Evacuate all personnel from affected areas. Isolate the area for over 1/2 mile in all directions in the event of leakage of a tank, rail car or tank truck. Use appropriate protective equipment.

If possible to do safely, shut off ignition sources and stop the leak by closing the valve. For small leaks, cylinders may be moved to an area outdoors and away from any source of ignition. Circumstances which, it is advisable to attempt removal of the cylinder are when cylinders are in close proximity to other compressed gases, when highly flammable materials or hazardous materials are in the vicinity of the acetylene cylinder(s), or where protection of the building is unusually difficult and spreading of a fire may produce a major loss of life or property. When the cylinder is removed, it may be hosed down with water to keep it cool. Open valve slowly to let the acetylene escape. Tag the cylinder with "WARNING - Leaking Flammable Gas". Close valve when empty.

Evacuate all personnel from affected area. Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with inert gas prior to attempting repairs. If leak is in container or container valve, contact the appropriate emergency telephone number listed in Section 1 or call your closest BOC location.

7. Handling and Storage

Electrical Classification:
Class 1, Group A.

Acetylene is shipped in a cylinder packed with a porous mass material, and a liquid solvent, commonly acetone. Acetylene is dissolved in the acetone solution and dispersed throughout the porous medium. When the valve of a charged acetylene cylinder is opened, the acetylene comes out of solution and passes out in the gaseous form.

IT IS CRUCIAL THAT FUSE PLUGS IN THE TOPS AND BOTTOMS OF ALL ACETYLENE CYLINDERS BE THOROUGHLY INSPECTED WHENEVER HANDLED. REMOVE AND QUARANTINE IN A SAFE LOCATION ANY DEFECTIVE CYLINDER.

Post "NO SMOKING OR OPEN FLAMES" signs in the storage area or use area. There should be no sources of ignition in the storage or use area.

Use only in well-ventilated areas. Stationary customer site vessels should be operated in accordance with the manufacturer's and BOC instructions. Do not attempt to repair, adjust or in any other way modify the operation of these vessels. If there is a malfunction or other type of operations problem with the vessel, contact the closest BOC location immediately for assistance.

Protect cylinders from physical damage. Store in cool, dry, well-ventilated area away from heavily trafficked areas and emergency exits. DO NOT allow the temperature where cylinders are stored to exceed 125°F (52°C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders from being stored for excessive periods of time.

Valve protection caps must remain in place unless container is secured with valve outlet piping to use point. Close valve after each use and when the container is empty. Do not drag, slide or roll cylinders on their sides. Use a suitable hand truck for container movement. Use a pressure reducing regulator when connecting container to piping or systems. Do not use gas directly from container. Do not heat container by any means to increase the discharge rate of product from the container.

Never attempt to repair or alter cylinders. Never tamper with pressure relief devices or fusible plugs. Under no circumstances allow a torch flame to contact the fusible plug. While welding, avoid contact of the cylinder welding equipment or electrical circuits.

If rough handling or other occurrences should cause any fusible plug to leak, move the cylinder to an open space well away from an possible source of a sign on the cylinder warning of "Leaking Flammable Gas".

Unless oxygen and acetylene are separated, there should be a non-combustible partition of at least 5 ft high with a fire resistance rating of one-half hour between cylinders. In the U.S. cylinders stored inside a building near user locations must be limited to a total capacity of 2500 ft^3 of gas, exclusive of in-use or attached for use cylinders.

Do not store cylinders on their side. This makes the acetylene less stable and less safe, and increases the likelihood of solvent loss and resultant decomposition.

For additional information, consult the Compressed Gas Association (CGA) pamphlets P-1, G-1, SB-4-1990; NFPA #51-1984, and OSHA 1910 Subpart H & Q.

8. Exposure Controls, Personal Protection

EXPOSURE LIMITS[1]:

INGREDIENT	% VOLUME	PEL-OSHA[2]	TLV-ACGIH[3]	LD_{50} or LC_{50} Route/Species
Acetylene FORMULA: C_2H_2 CAS: 74-86-2 RTECS #: AO9600000	95.0 to 99.6	Not Available	Simple Asphyxiant	Not Available
Acetone FORMULA: C3H60 CAS: 67-64-1 RTECS #: AL3150000	Not Available	1000 ppm TWA	750 ppm TWA 1000 ppm STEL	LD_{50} 1297 mg/kg (mouse)

[1] Refer to individual state of provincial regulations, as applicable, for limits which may be more stringent than those listed here.
[2] As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)
[3] As stated in the ACGIH 1994-1995 Threshold Limit Values for Chemical Substances and Physical Agents.

ENGINEERING CONTROLS:
Provide general room ventilation and local exhaust to prevent accumulation above the exposure limit and to maintain oxygen levels above 19.5%. Mechanical ventilation should be designed in accordance with electrical codes.

EYE/FACE PROTECTION:
Safety goggles or glasses as appropriate for the job.

SKIN PROTECTION:
PVC or rubber in laboratory; as required for cutting and welding.

RESPIRATORY PROTECTION:
Positive pressure air line with full-face mask and escape bottle or self-contained breathing apparatus should be available for emergency use.

OTHER/GENERAL PROTECTION:
Safety shoes.

9. Physical and Chemical Properties

PARAMETER	VALUE	UNITS
Physical state (gas, liquid, solid)	: Gas	
Vapor pressure	: 635	psia
Vapor density (Air = 1)	: Not Available	
Evaporation point	: Not Available	
Boiling point	: -118.8	^{o}F
	: -83.8	^{o}C
Freezing point	: -113	^{o}F
	: -80.6	^{o}C
pH	: Not Available	
Specific gravity	: 0.906	
Oil/water partition coefficient	: Not Available	
Solubility (H20)	: Soluble	
Odor threshold	: Not Available	
Odor and appearance	: Pure acetylene has an etheral odor. Commercial (carbide) acetylene has a distinctive garlic-like odor; A colorless gas.	

10. Stability and Reactivity

STABILITY:
Unstable - shock sensitive in the liquid state. Do not allow free gas (outside of cylinder) to exceed 15 psig. Do not expose cylinders to sudden shock or heat. Acetylene will decompose violently with cylinder failure.

INCOMPATIBLE MATERIALS:
Oxygen and other oxidizers including all halogens and halogen compounds. Forms explosive acetylide compounds with copper, mercury, silver, brasses containing >66% copper and brazing materials containing silver or copper.

HAZARDOUS DECOMPOSITION PRODUCTS:
Acetylene decomposes at high pressure to its constituent elements of carbon and hydrogen. Carbon monoxide may be produced from burning.

Under certain conditions, acetylene forms readily explosive acetylide compounds when in contact with copper, silver, and mercury. Therefore, use of acetylene and these metals, or their salts, compounds, and high concentration alloys should be avoided.

The presence of moisture, certain acids or alkaline materials tends to enhance the formation of copper acetylides.

HAZARDOUS POLYMERIZATION:
Temperatures as low as 250°F (121°C) at high pressure, or at low pressure in the presence of a catalyst are sufficient to initiate a polymerization reaction. The hazard here is that the polymerization normally liberates heat and may, therefore, lead to ignition and decomposition of acetylene if conditions permit.

11. Toxicological Information

Low concentrations (10-20% in air) cause symptoms similar to that of being intoxicated. As a narcotic gas or intoxicant, it causes hypercapnia (an excessive amount of carbon dioxide in the blood). Repeated exposures to tolerable levels has not shown deleterious effects.

TC_{LO} , human - Inhalation of 20 ppb inhaled has been shown to cause headache and dyspnea.

Oxygen deficiency during pregnancy has produced developmental abnormalities in humans and experimental animals.

12. Ecological Information

No data given.

13. Disposal Considerations

Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED, WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to BOC Gases or authorized distributor for proper disposal.

14. Transport Information

PARAMETER	United States DOT	Canada TDG
PROPER SHIPPING NAME:	Acetylene, dissolved	Acetylene, dissolved
HAZARD CLASS:	2.1	2.1
IDENTIFICATION NUMBER:	UN 1001	UN 1001
SHIPPING LABEL:	FLAMMABLE GAS	FLAMMABLE GAS

15. Regulatory Information

U.S. FEDERAL REGULATORY INFORMATION

Acetone is regulated as a Hazardous Substance under CERCLA.

Acetylene is listed under the Clean Air Act (CAA) Section 112(r) with a threshold quantity (TQ) of 10,000 pounds.

SARA TITLE III NOTIFICATIONS AND INFORMATION

Releases of acetone in quantities equal to or greater than the reportable quantity (RQ) of 5,000 pounds are subject to reporting to the National Response Center under CERCLA, Section 304 SARA Title III.

SARA TITLE III - HAZARD CLASSES:
Acute Health Hazard
Fire Hazard
Sudden Release of Pressure Hazard
Reactivity Hazard

SARA TITLE III - SECTION 313 SUPPLIER NOTIFICATION:
This product contains the following toxic chemicals subject to reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372:

CAS NUMBER	INGREDIENT NAME	PERCENT OF VOLUME
67-64-1	Acetone	Unknown

This information must be included on all MSDSs that are copied and distributed for this material.

REGULATED INGREDIENTS
INGREDIENT: Acetone
CAS NUMBER: 67-64-1
REGULATIONS: ILL MAS NJS NJW PAW STC WHM
ILL - Illinois Toxic Substance
MAS - Massachusetts Hazardous Substance
NJS - New Jersey Special Health Hazardous Substance
NJW - New Jersey Workplace Hazardous Substance
PAW - Pennsylvania Workplace Hazardous Substance
STC - SARA Section 313 Toxic Chemical
WHS - WHMIS (Canada)

INGREDIENT: Acetylene
CAS NUMBER: 74-86-2 PERCENT BY VOLUME: 95.0 to 99.6
REGULATIONS: ILL MAS NJS NJW PAW WHM
ILL - Illinois Toxic Substance
MAS - Massachusetts Hazardous Substance
NJS - New Jersey Special Health Hazardous Substance
NJW - New Jersey Workplace Hazardous Substance
PAW - Pennsylvania Workplace Hazardous Substance
STC - SARA Section 313 Toxic Chemical
WHS - WHMIS (Canada)

CANADIAN REGULATORY INFORMATION:
In Canada, regulations limit the capacity of acetylene cylinders stored inside a building at user locations to a total capacity of 2160 ft3 of gas in unsprinklered combustible structures, or 6130 ft3 in sprinklered buildings of combustible or non-combustible structures.

16. Other Information

Compressed gas cylinders shall not be refilled without the express written permission of the owner. Shipment of a compressed gas cylinder which has not been filled by the owner or with his/her (written) consent is a violation of transportation regulations.

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES:
Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).

Prestone® PRODUCTS CORPORATION

PRESTONE EXTENDED LIFE 5/100 ANTIFREEZE

MSDSP383

SECTION 1: IDENTIFICATION

MSDS ID: MSDSP383

PRODUCT NAME: PRESTONE EXTENDED LIFE 5/100 ANTIFREEZE/COOLANT
Formula Number: YA-9398NM

MANUFACTURER: Prestone Products Corporation
39 Old Ridgebury Road
Danbury, CT 06810-5109

INFORMATION PHONE NUMBER: (203) 830-7800

EMERGENCY PHONE NUMBER: CHEMTREC 1-800-424-9300
483-7161 in the District of Columbia

MSDS DATE OF PREPARATION/REVISION: 06/10/96

SECTION 2: PRODUCT COMPONENTS

HAZARDOUS COMPONENTS	CAS#	PERCENT	EXPOSURE LIMITS
Ethylene Glycol (aerosol)	107-21-1	80-96	None Established-OSHA PEL 100 mg/m3 Ceiling ACGIH TLV
Diethylene Glycol	111-46-6	0-8	None Established OSHA PEL, ACGIH TLV
Disodium Sebacate	17265-14-4	1-5	None Established

Non-Hazardous Ingredients >1%
Water 7732-18-5

SECTION 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Eye and upper respiratory irritant. May cause nausea, vomiting, headache, drowsiness, blurred vision, convulsions, coma or death if ingested or inhaled. Prolonged or repeated skin contact may cause dermatitis or skin sensitization.

POTENTIAL HEALTH EFFECTS:

INHALATION: May cause irritation of the nose and throat with headache, particularly from mists. High vapor concentrations caused, for example, by heating the material in an enclosed and poorly ventilated workplace, may produce nausea, vomiting, headache, dizziness and irregular eye movements.

SKIN CONTACT: No evidence of adverse effects from available information.

EYE CONTACT: Liquid, vapors or mist may cause discomfort in the eye with persistant conjunctivitis, seen as slight excess redness or conjunctiva. Serious corneal injury is not anticipated.

INGESTION: May cause abdominal discomfort or pain, nausea, vomiting, dizziness, drowsiness, malaise, blurring of vision, irritability, back pain, decrease in urine output, kidney failure, and central nervous system effects, including irregular eye movements, convulsions and coma. Cardiac failure and pulmonary edema may develop. Severe kidney damage which may be fatal may follow the swallowing of ethylene glycol. A few reports have been published describing the development of weakness of

Information on ingredients that are considered Controlled Products and/or that appear on the WHMIS Ingredient Disclosure List (IDL) is provided as required by the Canadian Hazardous Products Act (HPA, Sections 13 and 14). Ingredients considered hazardous under the OSHA Hazard Communication Standard, 29 CFR 1910.1200, are also listed. See Section 15 for additional regulatory information.

SECTION 3 HAZARDS IDENTIFICATION

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EMERGENCY OVERVIEW

- COMBUSTIBLE LIQUID AND VAPOR
- HARMFUL OR FATAL IF SWALLOWED - MAY CAUSE LUNG DAMAGE IF SWALLOWED
- CAUSES SKIN IRRITATION
- MAY CAUSE CANCER BASED ON ANIMAL DATA
- TOXIC TO AQUATIC ORGANISMS

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IMMEDIATE HEALTH EFFECTS
Eye: Not expected to cause prolonged or significant eye irritation.
Skin: Contact with the skin causes irritation. Skin contact may cause drying or defatting of the skin. Symptoms may include pain, itching, discoloration, swelling, and blistering. Contact with the skin is not expected to cause an allergic skin response. Not expected to be harmful to internal organs if absorbed through the skin.
Ingestion: Because of its low viscosity, this material can directly enter the lungs, if swallowed, or if subsequently vomited. Once in the lungs it is very difficult to remove and can cause severe injury or death. May be irritating to mouth, throat, and stomach. Symptoms may include pain, nausea, vomiting, and diarrhea.
Inhalation: Mists of this material may cause respiratory irritation. Symptoms of respiratory irritation may include coughing and difficulty breathing. Breathing this material at concentrations above the recommended exposure limits may cause central nervous system effects. Central nervous system effects may include headache, dizziness, nausea, vomiting, weakness, loss of coordination, blurred vision, drowsiness, confusion, or disorientation. At extreme exposures, central nervous system effects may include respiratory depression, tremors or convulsions, loss of consciousness, coma or death.

DELAYED OR OTHER HEALTH EFFECTS:
Cancer: Prolonged or repeated exposure to this material may cause cancer. Whole diesel engine exhaust has been classified as a Group 2A carcinogen (probably carcinogenic to humans) by the International Agency for Research on Cancer (IARC). Diesel exhaust particulate has been classified as reasonably anticipated to be a human carcinogen in the National Toxicology Program's Ninth Report on Carcinogens. The National Institute of Occupational Safety and Health (NIOSH) has recommended that whole diesel exhaust be regarded as potentially causing cancer. Diesel engine exhaust is known to the State of California to cause cancer. Contains naphthalene, which has been classified as a Group 2B carcinogen (possibly carcinogenic to humans) by the International Agency for Research on Cancer (IARC).
See Section 11 for additional information. Risk depends on duration and level of exposure.

SECTION 4 FIRST AID MEASURES

Eye: No specific first aid measures are required. As a precaution, remove contact lenses, if worn, and flush eyes with water.
Skin: Wash skin with water immediately and remove contaminated clothing and shoes. Get medical attention if any symptoms develop. To remove the material from skin, use soap and water. Discard contaminated clothing and shoes or thoroughly clean before reuse.
Ingestion: If swallowed, get immediate medical attention. Do not induce vomiting. Never give anything by mouth to an unconscious person.
Inhalation: Move the exposed person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if breathing difficulties continue.
Note to Physicians: Ingestion of this product or subsequent vomiting may result in aspiration of light hydrocarbon liquid, which may cause pneumonitis.

SECTION 5 FIRE FIGHTING MEASURES

See Section 7 for proper handling and storage.

FLAMMABLE PROPERTIES:
Flashpoint: (Pensky-Martens Closed Cup) 52 °C (125 °F) (Min)
Autoignition: 257 °C (494 °F)
Flammability (Explosive) Limits (% by volume in air): Lower: 0.6 Upper: 4.7

EXTINGUISHING MEDIA: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

PROTECTION OF FIRE FIGHTERS:
Fire Fighting Instructions: 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: Highly dependent on combustion conditions. A complex mixture of airborne solids, liquids, and gases including carbon monoxide, carbon dioxide, and unidentified organic compounds will be evolved when this material undergoes combustion.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Protective Measures: Eliminate all sources of ignition in the vicinity of the spill or released vapor. If this material is released into the work area, evacuate the area immediately. Monitor area with combustible gas indicator.
Spill Management: Stop the source of the release if you can do it without risk. Contain release to prevent further contamination of soil, surface water or groundwater. Clean up spill as soon as possible, observing precautions in Exposure Controls/Personal Protection. Use appropriate techniques such as applying non-combustible absorbent materials or pumping. All equipment used when handling the product must be grounded. A vapor suppressing foam may be used to reduce vapors. Use clean non-sparking tools to collect absorbed material. Where feasible and appropriate, remove contaminated soil. Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations.
Reporting: Report spills to local authorities as appropriate or required.

SECTION 7 HANDLING AND STORAGE

Precautionary Measures: Liquid evaporates and forms vapor (fumes) which can catch fire and burn with explosive force. Invisible vapor spreads easily and can be set on fire by many sources such as pilot lights, welding equipment, and electrical motors and switches. Fire hazard is greater as liquid temperature rises above 29C (85F).
Do not get in eyes, on skin, or on clothing. Do not taste or swallow. Do not breathe vapor or fumes. Do not breathe mist. Wash thoroughly after handling. Keep out of the reach of children.
Unusual Handling Hazards: WARNING! Do not use as portable heater or appliance fuel. Toxic fumes may accumulate and cause death.
General Handling Information: Avoid contaminating soil or releasing this material into sewage and drainage systems and bodies of water.
Static Hazard: Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding may be necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating and accumulating an electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. For more information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids', National Fire Protection Association (NFPA 77, 'Recommended Practice on Static Electricity', and/or the American Petroleum Institute (API) Recommended Practice 2003, 'Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents'.
General Storage Information: DO NOT USE OR STORE near heat, sparks, flames, or hot surfaces . USE AND STORE ONLY IN WELL VENTILATED AREA. Keep container closed when not in use.
Container Warnings: Container is not designed to contain pressure. Do not use pressure to empty container or it may rupture with explosive force. Empty containers retain product residue (solid, 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, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty containers should be completely drained, properly closed, and promptly returned to a drum reconditioner or disposed of properly.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

GENERAL CONSIDERATIONS:
Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

ENGINEERING CONTROLS:
Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below the recommended exposure limits.

PERSONAL PROTECTIVE EQUIPMENT
Eye/Face Protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields as a good safety practice.
Skin Protection: Wear protective clothing to prevent skin contact. Selection of protective clothing may include gloves, apron, boots, and complete facial protection depending on operations conducted. Suggested materials for protective gloves include: Chlorinated Polyethylene (or Chlorosulfonated Polyethylene), Nitrile Rubber, Polyurethane, Viton.
Respiratory Protection: Determine if airborne concentrations are below the recommended occupational exposure limits for jurisdiction of use. If airborne concentrations are above the acceptable limits, wear an approved respirator that provides adequate protection from this material, such as: Air-Purifying Respirator for Organic Vapors.
When used as a fuel, this material can produce carbon monoxide in the exhaust. Determine if

airborne concentrations are below the occupational exposure limit for carbon monoxide. If not, wear an approved positive-pressure air-supplying respirator.
Use a positive pressure air-supplying respirator in circumstances where air-purifying respirators may not provide adequate protection.

Occupational Exposure Limits:

Component	Country/ Agency	TWA	STEL	Ceiling	Notation
Diesel Fuel No. 2	ACGIH	100 mg/m3	--	--	Skin A3 total hydrocarbon
Diesel Fuel No. 2	CVX	--	1000 mg/m3	--	--
Kerosine	ACGIH	200 mg/m3	--	--	Skin A3 Total hydrocabon vapor
Kerosine	CVX	--	1000 mg/m3	--	--
Kerosine, hydrodesulfurized	ACGIH	200 mg/m3	--	--	Skin A3 Total hydrocabon vapor
Kerosine, hydrodesulfurized	CVX	--	1000 mg/m3	--	--
Naphthalene	ACGIH	10 ppm (weight)	15 ppm (weight)	--	Skin

NOTE ON OCCUPATIONAL EXPOSURE LIMITS: Consult local authorities for acceptable provincial values in Canada. Consult the Canadian Standards Association Standard 94.4-2002 Selection, Use and Care of Respirators.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Attention: the data below are typical values and do not constitute a specification.

Color: Varies depending on specification
Physical State: Liquid
Odor: Petroleum odor
pH: Not Applicable
Vapor Pressure: 0.04 kPa (Approximate) @ 40 °C (104 °F)
Vapor Density (Air = 1): >1
Boiling Point: 175.6°C (348°F) - 370°C (698°F)
Solubility: Soluble in hydrocarbons; insoluble in water
Freezing Point: Not Applicable
Melting Point: Not Applicable
Specific Gravity: 0.8 - 0.88 @ 15.6°C (60.1°F) (Typical)
Viscosity: 1.9 cSt - 4.1 cSt @ 40°C (104°F)
Odor Threshold: No Data Available
Coefficient of Water/Oil Distribution: No Data Available

SECTION 10 STABILITY AND REACTIVITY

Chemical Stability: This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.
Incompatibility With Other Materials: May react with strong acids or strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.
Hazardous Decomposition Products: None known (None expected)
Hazardous Polymerization: Hazardous polymerization will not occur.
Sensitivity to Mechanical Impact: No.

SECTION 11 TOXICOLOGICAL INFORMATION

IMMEDIATE HEALTH EFFECTS
Eye Irritation: The eye irritation hazard is based on evaluation of data for similar materials or product components.
Skin Irritation: The skin irritation hazard is based on evaluation of data for similar materials or product components.
Skin Sensitization: This material did not cause skin sensitization reactions in a Buehler guinea pig test.
Acute Dermal Toxicity: LD50: >5ml/kg (rabbit).
Acute Oral Toxicity: LD50: > 5 ml/kg (rat)
Acute Inhalation Toxicity: 4 hour(s) LC50: > 5mg/l (rat). For additional information on the acute toxicity of the components, call the technical information center.
ADDITIONAL TOXICOLOGY INFORMATION:
This product contains gas oils.
CONCAWE (product dossier 95/107) has summarized current health, safety and environmental data available for a number of gas oils, typically hydrodesulfurized middle distillates, CAS 64742-80-9, straight-run middle distillates, CAS 64741-44-2, and/or light cat-cracked distillate CAS 64741-59-9. CARCINOGENICITY: All materials tested have caused the development of skin tumors in mice, but all featured severe skin irritation and sometimes a long latency period before tumors developed. Straight-run and cracked gas oil samples were studied to determine the influence of dermal irritation on the carcinogenic activity of middle distillates. At non-irritant doses the straight-run gas oil was not carcinogenic, but at irritant doses, weak activity was demonstrated. Cracked gas oils, when diluted with mineral oil, demonstrated carcinogenic activity irrespective of the occurrence of skin irritation. Gas oils were tested on male mice to study tumor initiating/promoting activity. The results demonstrated that while a straight-run gas oil sample was neither an initiator or promotor, a blend of straight-run and FCC stock was both a tumor initiator and a promoter.
GENOTOXICITY: Hydrotreated & hydrodesulfurized gas oils range in activity from inactive to weakly positive in in-vitro bacterial mutagenicity assays. Mouse lymphoma assays on straight-run gas oils without subsequent hydrodesulphurization gave positive results in the presence of S9 metabolic activation. In-vivo bone marrow cytogenetics and sister chromatic exchange assay exhibited no activity for straight-run components with or without hydrodesulphurization. Thermally or catalytically cracked gas oils tested with in-vitro bacterial mutagenicity assays in the presence of S9 metabolic activation were shown to be mutagenic. In-vitro sister chromatic exchange assays on cracked gas oil gave equivocal results both with and without S9 metabolic activation. In-vivo bone marrow cytogenetics assay was inactive for two cracked gas oil samples. Three hydrocracked gas oils were tested with in-vitro bacterial mutagenicity assays with S9, and one of the three gave positive results. Twelve distillate fuel samples were tested with in-vitro bacterial mutagenicity assays & with S9 metabolic activation and showed negative to weakly positive results. In one series, activity was shown to be related to the PCA content of samples tested. Two in-vivo studies were also conducted. A mouse dominant lethal assay was negative for a sample of diesel fuel. In the other study, 9 samples of No 2 heating oil containing 50% cracked stocks caused a slight increase in the number of chromosomal aberrations in bone marrow cytogenetics assays. DEVELOPMENTAL TOXICITY: Diesel fuel vapor did not cause fetotoxic or teratogenic

effects when pregnant rats were exposed on days 6-15 of pregnancy. Gas oils were applied to the skin of pregnant rats daily on days 0-19 of gestation. All but one (coker light gas oil) caused fetotoxicity (increased resorptions, reduced litter weight, reduced litter size) at dose levels that were also maternally toxic.

This product contains naphthalene. GENERAL TOXICITY: Exposure to naphthalene has been reported to cause methemoglobinemia and/or hemolytic anemia, especially in humans deficient in the enzyme glucose-6-phosphate dehydrogenase. Laboratory animals given repeated oral doses of naphthalene have developed cataracts. REPRODUCTIVE TOXICITY AND BIRTH DEFECTS: Naphthalene did not cause birth defects when administered orally to rabbits, rats, and mice during pregnancy, but slightly reduced litter size in mice at dose levels that were lethal to the pregnant females. Naphthalene has been reported to cross the human placenta. GENETIC TOXICITY: Naphthalene caused chromosome aberrations and sister chromatid exchanges in Chinese hamster ovary cells, but was not a mutagen in several other in-vitro tests.CARCINOGENICITY: In a study conducted by the National Toxicology Program (NTP), mice exposed to 10 or 30 ppm of naphthalene by inhalation daily for two years had chronic inflammation of the nose and lungs and increased incidences of metaplasia in those tissues. The incidence of benign lung tumors (alveolar/bronchiolar adenomas) was significantly increased in the high-dose female group but not in the male groups. In another two-year inhalation study conducted by NTP, exposure of rats to 10, 30, and 60 ppm naphthalene caused increases in the incidences of a variety of nonneoplastic lesions in the nose. Increases in nasal tumors were seen in both sexes, including olfactory neuroblastomas in females at 60 ppm and adenomas of the respiratory epithelium in males at all exposure levels. The relevance of these effects to humans has not been established. No carcinogenic effect was reported in a 2-year feeding study in rats receiving naphthalene at 41 mg/kg/day.

This product may contain significant amounts of Polynuclear Aromatic Hydrocarbons (PAH's) which have been shown to cause skin cancer after prolonged and frequent contact with the skin of test animals. Brief or intermittent skin contact with this product is not expected to have serious effects if it is washed from the skin. While skin cancer is unlikely to occur in human beings following use of this product, skin contact and breathing, of mists, vapors or dusts should be reduced to a minimum.

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY
96 hour(s) LC50: 21-210 mg/l (Salmo gairdneri)
48 hour(s) EC50: 20-210 mg/l (Daphnia magna)
72 hour(s) EC50: 2.6-25 mg/l (Raphidocellus subcapitata)
This material is expected to be toxic to aquatic organisms.

ENVIRONMENTAL FATE
On release to the environment the lighter components of diesel fuel will generally evaporate but depending on local environmental conditions (temperature, wind, mixing or wave action, soil type, etc.) the remainder may become dispersed in the water column or absorbed to soil or sediment. Diesel fuel would not be expected to be readily biodegradable. In a modified Strum test (OECD method 301B) approximately 40% biodegradation was recorded over 28 days. However, it has been shown that most hydrocarbon components of diesel fuel are degraded in soil in the presence of oxygen. Under anaerobic conditions, such as in anoxic sediments, rates of biodegradation are negligible.

SECTION 13 DISPOSAL CONSIDERATIONS

Use material for its intended purpose or recycle if possible. This material, if it must be discarded, may meet the criteria of a hazardous waste as defined by USEPA under RCRA (40CFR261), Environment Canada, or other State, Provincial, and local regulations. Measurement of certain physical properties and analysis for regulated components may be necessary to make a correct determination. If this material is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.

SECTION 14 TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

TC Shipping Description: UN1202, GAS OIL, 3, III

IMO/IMDG Shipping Description: UN1202, GAS OIL, 3, III, FLASH POINT SEE SECTION 5

ICAO/IATA Shipping Description: UN1202, GAS OIL, 3, III

DOT Shipping Description: GAS OIL, COMBUSTIBLE LIQUID, UN1202,III

SECTION 15 REGULATORY INFORMATION

REGULATORY LISTS SEARCHED:

01-1=IARC Group 1
01-2A=IARC Group 2A
01-2B=IARC Group 2B
35=WHMIS IDL

The following components of this material are found on the regulatory lists indicated.

Naphthalene	01-2B, 35

CHEMICAL INVENTORIES:

All components comply with the following chemical inventory requirements: AICS (Australia), DSL (Canada), EINECS (European Union), IECSC (China), KECI (Korea), PICCS (Philippines), TSCA (United States).

WHMIS CLASSIFICATION:

Class B, Division 3: Combustible Liquids
Class D, Division 2, Subdivision A: Very Toxic Material - Carcinogenicity
Class D, Division 2, Subdivision B: Toxic Material - Skin or Eye Irritation

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations. (See Hazardous Products Act (HPA), R.S.C. 1985, c.H-3,s.2).

MSDS PREPARATION:

This Material Safety Data Sheet has been prepared by the Toxicology and Health Risk Assessment Unit, ERTC, P.O. Box 1627, Richmond, CA 94804, (888)676-6183.

Revision Date: July 31, 2006

SECTION 16 OTHER INFORMATION

Additional Product Number(s): CPS203413, CPS203417, CPS220122, CPS225114, CPS225115, CPS225150, CPS266176, CPS270000, CPS270005, CPS270094, CPS270095, CPS270096, CPS271006, CPS272006, CPS272007, CPS272008, CPS272009, CPS272010, CPS272011, CPS272012, CPS272013, CPS272093, CPS272102, CPS272126, CPS272152, CPS272185, CPS272190, CPS272195, CPS272593, CPS272601, CPS272693, CPS272793, CPS273003, CPS273030, CPS273053, CPS275000
REVISION STATEMENT: This revision updates the following sections of this Material Safety Data Sheet: 1,16.

ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:

TLV - Threshold Limit Value	TWA - Time Weighted Average
STEL - Short-term Exposure Limit	PEL - Permissible Exposure Limit
	CAS - Chemical Abstract Service Number
ACGIH - American Conference of Government Industrial Hygienists	IMO/IMDG - International Maritime Dangerous Goods Code
API - American Petroleum Institute	MSDS - Material Safety Data Sheet
CVX - Chevron	NFPA - National Fire Protection Association (USA)
DOT - Department of Transportation (USA)	NTP - National Toxicology Program (USA)
IARC - International Agency for Research on Cancer	OSHA - Occupational Safety and Health Administration

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 this information 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 modifications 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.

Earthbind™ Material Safety Data Sheet

Quick Identifier: Emulsified Dust Suppressant
Address: 2606 N. Newark St. Portland, Oregon 97217
Manufacturers Name: EnviRoad LLC
Other Information Calls: 800-536-2650

Identity - Section I

Trade Name and Synonyms: Earthbind 100
CAS Number: Mixture
Chemical Name: NA

NFPA Hazardous Identification
Health: 1
Fire: 0
Reactivity: 0

0 - Least
1 - Slight
2 - Moderate
3 - High
4 - Extreme

Composition Information on Ingredients - Section II

Ingredients		*%*	*OSHA PEL*	*ACGIH TLV*
Petroleum Resin	64742-16-1	40-60	NE	NE
Stabilizer	Proprietary	5-30	NE	NE
Emulsifier	Proprietary	< 6.0	NE	NE
Water	7732-18-5	Balance	NE	NE

Additional Comments: Though further detail on contents may be confidential, all pertinent hazards are addressed in this MSDS.

Physical & Chemical Characteristics - Section III

Boiling Point	100 C
Vapor Pressure (mm Hg)	NA
Percent Volatile by Volume	NA
Solubility in Water	Complete
Specific Gravity (H20=1.00)	0.9 to 1.02
Vapor Density (air@1)	NA
Evaporation Rate (H20 = 1)	NA
Reactivity in Water	None
Viscosity @ 122F CST	100-800
Appearance and Odor	Dark Brown Liquid; Hydrocarbon and lignosulfonate odor
Additional Comments	Material is a hydrocarbon/water emulsion and will not combust until water is driven off.

Fire And Explosion Hazard Data - Section IV

Flash Point	NA
Flammable Limits in Air	(hydrocarbon/ water emulsion)

NE = None Established
ND = No Data Available
NA = Not Applicable
Revised 09/05/03

% by Volume	
Extinguisher Media	Dry Chemical, CO2, Halon, Water Spray, or standard foam
Fire Fighting Procedures	Move containers from fire area if possible. Cool fire-exposed containers with water from side until well after fire is out. Stay away from storage tank end for massive fire in storage area. Use unmanned hose holder or monitor. Use flooding amounts of water as a fog, as solid streams may be ineffective. Withdraw immediately in case of rising sound from venting safety device or any discoloration of storage vessel due to fire. Extinguish only if flow can be stopped. Water or foam may cause frothing. Avoid breathing toxic vapors and keep upwind.
Additional Comments	Material is a hydrocarbon/water emulsion and will not ignite until water is driven off.

Reactivity Data - Section V

Stability/Conditions to Avoid	Material is stable under normal temperature and pressure. Do not expose to prolong heating above 100C.
Incompatibility/Materials to Avoid	None
Hazardous Polymerization/ Conditionsto Avoid	None
Hazardous Byproducts of Decomposition	Thermal decomposition may release hazardous gases.

Health Hazard Data - Section VI

Route of Entry		*Legend: A: Health Effect; B: Personal Protection; C: Emergency First Aid Procedures*
Inhalation	A.	Avoid prolonged inhalation of vapors or mist. Product has a low vapor pressure and is not expected to present an inhalation hazard at ambient conditions.
	B.	Provide exhaust ventilation system to meet published exposure limits.
	C.	Remove victim from exposure to fresh air immediately. If breathing has stopped, give artificial respiration. Keep victim warm and at rest. Treat symptomatically and supportively. Administration of oxygen should be performed by qualified personnel. Get medical attention immediately.
Skin	A.	Direct contact with hot fumes may cause slight skin irritation. Repeated or prolonged exposure to fumes may cause irritation, dermatitis, and acne-like lesions.
	B.	Employee must wear appropriate protective impervious clothing, gloves, and equipment to prevent repeated or prolonged skin contact.
	C.	If contact is not with hot materials, remove contaminated clothing and shoes immediately. Wash affected area with soap or mild detergent, and large amounts of water until no evidence of material remains (15 to 20 minutes). Burns from contact with hot material should be treated like thermal burns.
Route of Entry		*Legend: A: Health Effect; B: Personal Protection; C: Emergency First Aid Procedures*
Ingestion	A.	May cause nausea, gastro-intestinal irritation, and vomiting.
	B.	Do not induce vomiting.

NE = None Established
ND = No Data Available
NA = Not Applicable
Revised 09/05/03

C. Treat symptomatically and supportively. Get medical attention immediately. If vomiting occurs, lower heat to prevent aspiration.

Eyes

A. Contact with eyes may cause redness and irritation. Repeated or prolonged exposure to fumes may cause conjunctivitis.

B. Employee must wear splash-proof or dust-resistant safety goggles of face shield.

C. Wash eyes immediately with large amounts of water. Lift upper and lower lids until no evidence of material remains (15 to 20 minutes). Cover with sterile bandages. Get medical attention immediately.

Medical Conditions Aggravated by Exposure No adverse reactions expected at concentrations normally encountered.

Safe Usage Information - Section VII

Handling, Storage & Other Precautions	This product is not classified as hazardous under DOT reg. Keep away from heat, sparks, and oxidizing agents. Keep container closed when not in use. Observe all Federal, State and Local regulations when handling, storing or disposing of this material.
Action to be Taken in Case of Spill or Release (Including Disposal)	Shut off area ignition sources. Stop leak if it can be done without risk. Use water spray to reduce vapors. For small spills, use absorbent material and place into container. Dike ahead of large spill for later disposal. Prohibit smoking in affected area. Isolate area and restrict entry.

Control Measures - Section VIII

Ventilation Requirements Provide exhaust ventilation system to meet published exposure limits.

Work Hygiene Practices

Respirator Selection of respiratory protection must be based upon the airborne level of suspected contaminant. Levels found in the work place must not exceed the working limit of the respirator utilized.

Dermal Workers must wear appropriate protective clothing, gloves, and equipment to prevent repeated or prolonged contact with skin.

Eyes Proper eye/face protection must be utilized to protect against splashes and vapors.

Carcinogenicity Not listed as a carcinogen by IARC, TSCA, NTP, OSHA or ACGIH

Transportation - Section IX

D.O.T. Proper Shipping Name (49 CFR 172.101)	Non-hazardous Emulsion
D.O.T. Hazard Class (49 CFR 172.101)	NA
UN / NA Code (49 172.101)	NA
Packaging Group (49 172.101	NA
Bill Of Lading Description (49 172.101)	Non-hazardous Emulsion
D.O.T. Labels Required (49 172.101)	NA
D.O.T. Placards Required (49 172.101	NA

NE = None Established
ND = No Data Available
NA = Not Applicable
Revised 09/05/03

We believe the statements, technical information and recommendations contained herein are reliable, but they are given without warranty or guarantee of any kind, express or implied, and we assume no responsibility for any loss, damage, or expense, direct or consequential, arising out of their use.

NE = None Established
ND = No Data Available
NA = Not Applicable
Revised 09/05/03

Midwest Industrial Supply, Inc.
P.O. Box 8431
Canton, OH 44711

Emergency Phone Number: 330-456-3121

SOIL ~ SEMENT®

ENGINEERED FORMULA

Dust and Erosion Control Agent

MATERIAL SAFETY DATA SHEET

Please replace any other MSDS for this product with the attached MSDS.

PRODUCT: SOIL-SEMENT® ENGINEERED FORMULA dust and erosion control agent

MSDS NUMBER: 2118

UPDATED EFFECTIVE DATE: September 8, 2000

PREVIOUS VERSION MSDS NUMBER: none

PREVIOUS VERSION DATE: N/A

REASON FOR UPDATE: New Product. Modification of SOIL-SEMENT® for highly critical applications of intense use or conditions.

Midwest Industrial Supply, Inc.
P.O. Box 8431
Canton, OH 44711

Emergency Phone Number: 330-456-3121

SOIL ~ SEMENT®

ENGINEERED FORMULA

Dust and Erosion Control Agent

MATERIAL SAFETY DATA SHEET

SECTION I -- IDENTIFICATION OF SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

TRADE NAME:	SOIL-SEMENT® ENGINEERED FORMULA
CHEMICAL NAME:	POLYMER EMULSION
SYNONYMS:	DUST RETARDANT
CHEMICAL FAMILY:	N/A
MOLECULAR WEIGHT:	N/A
FORMULA:	AQUEOUS ACRYLIC VINYL ACETATE POLYMER EMULSION
CAS REGISTRY NO.:	PRODUCT A BLEND - NO NUMBER ASSIGNED

SECTION II -- COMPOSITION/INFORMATION ON INGREDIENTS

NAME	CAS REG NO.	WT. %
Acrylic & Vinyl Acetate Polymer	Non-hazardous	5-50
Water	7732-18-5	95-50

SECTION III -- HAZARDS IDENTIFICATION

Acrylic & Polyvinyl Acetate Polymer	Non-hazardous
Water	Non-hazardous

SECTION IV -- FIRST AID MEASURES

EYES:	Flush eyes with flowing water at least 15 minutes, get medical attention.
INHALATION:	Move subject to fresh air.
SKIN:	Flush with large amount of water or wash with soap and water.
INGESTION:	Give water to drink. Call a physician.

NEVER GIVE FLUIDS OR INDUCE VOMITING.

IF PATIENT IS UNCONSCIOUS OR HAVING CONVULSIONS.

SECTION V -- FIRE FIGHTING MEASURES

FLASH POINT (TEST METHOD): Non-Combustible

AUTOIGNITION TEMPERATURE: N/A

EXTINGUISHING MEDIUM: N/A

SPECIAL FIREFIGHTING PROCEDURES: N/A

UNUSUAL FIRE AND EXPLOSION HAZARDS: Material can splatter above 212°F. Dried polymer film can burn but will not support combustion.

SECTION VI - ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK PROCEDURES:

Dike and control spill. Transfer liquid to containers for recovery or disposal. Keep spills out of sewers and open bodies of water.

SECTION VII -- HANDLING AND STORAGE

STORAGE: Keep in a cool, dry, ventilated storage area and in closed containers. Avoid freezing temperatures. Minimize contact with the air to prevent microorganism contamination and reduce the formation of skins on the surface.

HANDLING: Handle in a well-ventilated workspace.

SECTION VIII -- EXPOSURE CONTROL/PERSONAL PROTECTION

RESPIRATORY PROTECTION: None required if good ventilation is maintained.

VENTILATION: Mechanical exhaust at point of contaminant.

EYE PROTECTION: Chemical splash goggles recommended.

PROTECTIVE CLOTHING: Impervious gloves recommended.

OTHER: Under normal handling conditions, the risk of exposure to residual monomer is negligible.

SECTION IX -- PHYSICAL AND CHEMICAL PROPERTIES

BOILING/MELTING POINT @ 760 mm Hg:	212°F
VAPOR PRESSURE mm Hg @ 20°C:	17
SPECIFIC GRAVITY OR BULK DENSITY:	1.01 to 1.15
SOLUBILITY IN WATER:	Dilutable
APPEARANCE:	Milky White Liquid
ODOR:	Characteristic Acrylic odor
pH:	4.0 to 9.5

SECTION X -- STABILITY AND REACTIVITY

STABILITY:	Stable
CHEMICAL INCOMPATIBILITY:	No hazardous reactions are expected to occur under normal industrial conditions.
HAZARDOUS DECOMPOSITION PRODUCTS:	Thermal decomposition in the presence of air may yield carbon monoxide and/or carbon dioxide and water.
HAZARDOUS POLYMERIZATION:	Does not occur
CONDITIONS TO AVOID:	N/A
CORROSIVE TO METAL:	No
OXIDIZER:	No

SECTION XI -- TOX ICOLOGICAL INFORMATION

EFFECTS OF OVEREXPOSURE

INHALATION: Vapor from stored, undiluted product can cause headache and nausea.

SKIN: Stored, undiluted product is slightly irritating to skin.

EYES: Slightly irritating to eyes.

INGESTION: May be irritating to digestive tract.

	OSHA		ACGIH	
NAME	**TWA**	**STEL**	**TWA**	**STEL**
Acrylic & polyvinyl Acetate Polymer	None	None	None	None
Water	None	None		None

SECTION XII -- ECOLOGICAL INFORMATION

Animal toxicity studies on blended SOIL-SEMENT® ENGINEERED FORMULA have not been carried out because we believe the fish toxicity studies done on the blend demonstrate it is as non-toxic as the individual emulsions which go into the blend. TABLE #1 gives the results of our fish toxicity tests.

In summary, these data show that the LC_{50} of SOIL-SEMENT® ENGINEERED FROMULA on goldfish is somewhere above 12,500 ppm. This is extremely low toxicity, especially in view of the legal requirement that chemicals must be labeled "toxic to fish" only if their LC_{50} is less than 1.0 ppm.

TABLE I

FISH TOXICITY STUDIES			
EMULSION NUMBER	**TYPE OF FISH**	**HOURS**	**LC_{50} PPM**
C	Rainbow Trout	24	10,000
C	Rainbow Trout	96	8,950
C	Bluegill Sunfish	24	10,000
C	Bluegill Sunfish	96	5,640
C	Goldfish	24	4,200
H	Goldfish	24	7,500
G	Goldfish	24	10,000
D	Goldfish	24	13,400
F	Goldfish	24	13,400
SOIL-SEMENT®	Goldfish	24	12.500 - 25,000
SOIL-SEMENT®	Goldfish	48	12,500 - 25,000
SOIL-SEMENT®	Goldfish	72	12,500 - 20,000
B	Goldfish	24	24,000
E	Goldfish	24	24,000

The 48 hour LC_{50} for Daphnia Magna based on nominal test concentrations and mortality at the end of testing was calculated to be 3,482.8 parts per million (ppm).

SECTION XIII -- DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD:

Coagulate the emulsion by the stepwise addition of ferric chloride and lime or the addition of sand or other absorbent material. Remove the clear supernatant liquid and flush to a chemical sewer or landfill. Incinerate solids and the contaminated diking material according to local, state and federal regulations.

CONTAINER DISPOSAL:

Do not re-use containers. Do not weld on metal containers.

SECTION XIV -- TRANSPORTATION INFORMATION

D.O.T. PROPER SHIPPING NAME (49CFR172.101):	None
HAZARDOUS SUBSTANCE (40CFR116):	N/A
REPORTABLE QUANTITY (RQ):	N/A
D.O.T. HAZARD CLASSIFICATION (49CFR172.101):	Non-regulated
D.O.T. PLACARDS REQUIRED:	None
POISON CONSTITUENT (49CFR173.343):	N/A
BILL OF LADING DESCRIPTION:	Liquid plastic, NOS
C NO.:	N/A
UN/NA CODE:	N/A

SECTION XV-- REGULATORY INFORMATION

SOIL-SEMENT® ENGINEERED FROMULA is not a restricted article according to the Department of Transportation and International Air Transport Association regulations.

EPA SARA Title III hazard class:	None
OSHA HCS hazard class:	Non-OSHA hazardous (29CFR1910.1200)
EPA SARA Title III Section 313 (40CFR372) Toxic Chemicals present in quantities greater than the "de minimus" level are:	None

This product is not a "controlled product" under the Canadian Workplace Hazardous Material Information System (WHMIS)

SECTION XVI -- OTHER INFORMATION

ABBREVIATIONS AND SYMBOLS:

N.D. - Not Determined	N.A. - Not Applicable	N.T. - Not Tested
< - LESS THAN	> - MORE THAN	

Material Safety Data Sheet

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

CHEVRON and TEXACO REGULAR UNLEADED GASOLINES

Product Number(s): CPS201000 [See Section 16 for Additional Product Numbers]
Synonyms: Calco Regular Unleaded Gasoline, Chevron Regular Unleaded Gasoline, Texaco Unleaded Gasoline
Company Identification
Chevron Products Company
Marketing, MSDS Coordinator
6001 Bollinger Canyon Road
San Ramon, CA 94583
United States of America

Transportation Emergency Response
CHEMTREC: (800) 424-9300 or (703) 527-3887
Health Emergency
ChevronTexaco Emergency Information Center: Located in the USA. International collect calls accepted. (800) 231-0623 or (510) 231-0623
Product Information
Technical Information: (510) 242-5357

SPECIAL NOTES: This MSDS applies to: all motor gasoline.

SECTION 2 COMPOSITION/ INFORMATION ON INGREDIENTS

COMPONENTS	CAS NUMBER	AMOUNT
Gasoline	86290-81-5	100 %volume
Benzene	71-43-2	0.1 - 4.9 %volume
Toluene (methylbenzene)	108-88-3	1 - 17 %volume
Ethyl benzene	100-41-4	0.1 - 3 %volume
Xylene (contains o-, m-, & p- xylene isomers in varying amounts)	1330-20-7	1 - 15 %volume
Butane	106-97-8	1 - 12 %volume
Heptane	142-82-5	1 - 4 %volume
Hexane	110-54-3	1 - 5 %volume
Cyclohexane	110-82-7	1 - 3 %volume
Methylcyclohexane	108-87-2	1 - 2 %volume

Pentane, 2,2,4-trimethyl- (Isooctane)	540-84-1	1 - 13 %volume
Naphthalene	91-20-3	0.1 - 2 %volume
Ethanol	64-17-5	0 - 10 %volume
Methyl tert-butyl ether (MTBE)	1634-04-4	0 - 15 %volume
Tertiary amyl methyl ether (TAME)	994-05-8	0 - 17 %volume
Ethyl tert-butyl ether (ETBE)	637-92-3	0 - 18 %volume

Motor gasoline is considered a mixture by EPA under the Toxic Substances Control Act (TSCA). The refinery streams used to blend motor gasoline are all on the TSCA Chemical Substances Inventory. The appropriate CAS number for refinery blended motor gasoline is 86290-81-5. The product specifications of motor gasoline sold in your area will depend on applicable Federal and State regulations.

SECTION 3 HAZARDS IDENTIFICATION

****

EMERGENCY OVERVIEW

- EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE
- HARMFUL OR FATAL IF SWALLOWED - MAY CAUSE LUNG DAMAGE IF SWALLOWED
- VAPOR HARMFUL
- CAUSES EYE AND SKIN IRRITATION
- LONG-TERM EXPOSURE TO VAPOR HAS CAUSED CANCER IN LABORATORY ANIMALS
- KEEP OUT OF REACH OF CHILDREN
- TOXIC TO AQUATIC ORGANISMS

****

IMMEDIATE HEALTH EFFECTS

Eye: Contact with the eyes causes irritation. Symptoms may include pain, tearing, reddening, swelling and impaired vision.

Skin: Contact with the skin causes irritation. Skin contact may cause drying or defatting of the skin. Contact with the skin is not expected to cause an allergic skin response. Symptoms may include pain, itching, discoloration, swelling, and blistering. Not expected to be harmful to internal organs if absorbed through the skin.

Ingestion: Because of its low viscosity, this material can directly enter the lungs, if swallowed, or if subsequently vomited. Once in the lungs it is very difficult to remove and can cause severe injury or death.

Inhalation: The vapor or fumes from this material may cause respiratory irritation. Symptoms of respiratory irritation may include coughing and difficulty breathing. Breathing this material at concentrations above the recommended exposure limits may cause central nervous system effects. Central nervous system effects may include headache, dizziness, nausea, vomiting, weakness, loss of coordination, blurred vision, drowsiness, confusion, or disorientation. At extreme exposures, central nervous system effects may include respiratory depression, tremors or convulsions, loss of consciousness, coma or death.

DELAYED OR OTHER HEALTH EFFECTS:

Reproduction and Birth Defects: This material is not expected to cause birth defects or other harm to the developing fetus based on animal data.

Cancer: Prolonged or repeated exposure to this material may cause cancer. Gasoline has been classified as a Group 2B carcinogen (possibly carcinogenic to humans) by the International Agency for Research on Cancer (IARC).

Whole gasoline exhaust has been classified as a Group 2B carcinogen (possibly carcinogenic to humans) by the International Agency for Research on Cancer (IARC).

Contains benzene, which has been classified as a carcinogen by the National Toxicology Program (NTP) and a Group 1 carcinogen (carcinogenic to humans) by the International Agency for Research on Cancer (IARC).
Contains ethylbenzene which has been classified as a Group 2B carcinogen (possibly carcinogenic to humans) by the International Agency for Research on Cancer (IARC).
Contains naphthalene, which has been classified as a Group 2B carcinogen (possibly carcinogenic to humans) by the International Agency for Research on Cancer (IARC).
See Section 11 for additional information. Risk depends on duration and level of exposure.

SECTION 4 FIRST AID MEASURES

Eye: Flush eyes with water immediately while holding the eyelids open. Remove contact lenses, if worn, after initial flushing, and continue flushing for at least 15 minutes. Get medical attention if irritation persists.
Skin: Wash skin with water immediately and remove contaminated clothing and shoes. Get medical attention if any symptoms develop. To remove the material from skin, use soap and water. Discard contaminated clothing and shoes or thoroughly clean before reuse.
Ingestion: If swallowed, get immediate medical attention. Do not induce vomiting. Never give anything by mouth to an unconscious person. If swallowed, get medical attention. Do not induce vomiting. Never give anything by mouth to an unconscious person.
Inhalation: Move the exposed person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if breathing difficulties continue.
Note to Physicians: Ingestion of this product or subsequent vomiting may result in aspiration of light hydrocarbon liquid, which may cause pneumonitis.

SECTION 5 FIRE FIGHTING MEASURES

See Section 7 for proper handling and storage.

FIRE CLASSIFICATION:
OSHA Classification (29 CFR 1910.1200): Flammable liquid.

NFPA RATINGS: Health: 1 Flammability: 3 Reactivity: 0

FLAMMABLE PROPERTIES:
Flashpoint: (Tagliabue Closed Cup ASTM D56) < -45 °C (< -49 °F)
Autoignition: > 280 °C (> 536 °F)
Flammability (Explosive) Limits (% by volume in air): Lower: 1.4 Upper: 7.6 (Typical)

EXTINGUISHING MEDIA: Dry Chemical, CO2, AFFF Foam or alcohol resistant foam if >15% volume polar solvents (oxygenates).

PROTECTION OF FIRE FIGHTERS:
Fire Fighting Instructions: Use water spray to cool fire-exposed containers and to protect

personnel. 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: Highly dependent on combustion conditions. A complex mixture of airborne solids, liquids, and gases including carbon monoxide, carbon dioxide, and unidentified organic compounds will be evolved when this material undergoes combustion.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Protective Measures: Eliminate all sources of ignition in the vicinity of the spill or released vapor. If this material is released into the work area, evacuate the area immediately. Monitor area with combustible gas indicator.
Spill Management: Stop the source of the release if you can do it without risk. Contain release to prevent further contamination of soil, surface water or groundwater. Clean up spill as soon as possible, observing precautions in Exposure Controls/Personal Protection. Use appropriate techniques such as applying non-combustible absorbent materials or pumping. All equipment used when handling the product must be grounded. A vapor suppressing foam may be used to reduce vapors. Use clean non-sparking tools to collect absorbed material. Where feasible and appropriate, remove contaminated soil. Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations.
Reporting: Report spills to local authorities and/or the U.S. Coast Guard's National Response Center at (800) 424-8802 as appropriate or required. This material is covered by EPA's Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Petroleum Exclusion. Therefore, releases to the environment may not be reportable under CERCLA.

SECTION 7 HANDLING AND STORAGE

Precautionary Measures: READ AND OBSERVE ALL PRECAUTIONS ON PRODUCT LABEL. This product presents an extreme fire hazard. Liquid very quickly evaporates, even at low temperatures, and forms vapor (fumes) which can catch fire and burn with explosive violence. Invisible vapor spreads easily and can be set on fire by many sources such as pilot lights, welding equipment, and electrical motors and switches. Do not store in open or unlabeled containers. Use only as a motor fuel. Do not use for cleaning, pressure appliance fuel, or any other such use. Never siphon gasoline by mouth.
Do not get in eyes, on skin, or on clothing. Do not taste or swallow. Do not breathe vapor or fumes. Wash thoroughly after handling. Keep out of the reach of children.
Unusual Handling Hazards: WARNING! Do not use as portable heater or appliance fuel. Toxic fumes may accumulate and cause death.
General Handling Information: Avoid contaminating soil or releasing this material into sewage and drainage systems and bodies of water.
Static Hazard: Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding may be necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating and accumulating an electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. For more information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids', National Fire Protection Association (NFPA 77, 'Recommended Practice on Static Electricity', and/or the American Petroleum Institute (API) Recommended Practice 2003, 'Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents'. Improper filling of portable gasoline containers creates danger of fire. Only dispense gasoline into approved and properly labeled gasoline containers. Always place portable containers on the ground. Be sure pump nozzle is in contact with the container while filling. Do not use a nozzle's lock-open device. Do not fill portable containers that are inside a vehicle or truck/trailer bed.
General Storage Information: DO NOT USE OR STORE near heat, sparks, flames, or hot surfaces . USE AND STORE ONLY IN WELL VENTILATED AREA. Keep container closed when not in use.
Container Warnings: Container is not designed to contain pressure. Do not use pressure to empty container or it may rupture with explosive force. Empty containers retain product residue

(solid, 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, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty containers should be completely drained, properly closed, and promptly returned to a drum reconditioner or disposed of properly.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

GENERAL CONSIDERATIONS:
Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

ENGINEERING CONTROLS:
Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below the recommended exposure limits.

PERSONAL PROTECTIVE EQUIPMENT
Eye/Face Protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields as a good safety practice.
Skin Protection: No special protective clothing is normally required. Where splashing is possible, select protective clothing depending on operations conducted, physical requirements and other substances in the workplace. Suggested materials for protective gloves include: Chlorinated Polyethylene (or Chlorosulfonated Polyethylene), Nitrile Rubber, Polyurethane, Viton.
Respiratory Protection: Determine if airborne concentrations are below the recommended occupational exposure limits for jurisdiction of use. If airborne concentrations are above the acceptable limits, wear an approved respirator that provides adequate protection from this material, such as: Air-Purifying Respirator for Organic Vapors.
When used as a fuel, this material can produce carbon monoxide in the exhaust. Determine if airborne concentrations are below the occupational exposure limit for carbon monoxide. If not, wear an approved positive-pressure air-supplying respirator.
Use a positive pressure air-supplying respirator in circumstances where air-purifying respirators may not provide adequate protection.
Occupational Exposure Limits:

Component	Agency	TWA	STEL	Ceiling	Notation
Benzene	ACGIH	.5 ppm (weight)	2.5 ppm (weight)	--	Skin A1
Benzene	OSHA SRS	1 ppm (weight)	5 ppm (weight)	--	--
Benzene	OSHA Z-2	10 ppm (weight)	--	25 ppm (weight)	--
Butane	ACGIH	800 ppm (weight)	--	--	--
Cyclohexane	ACGIH	100 ppm (weight)	--	--	--
Cyclohexane	OSHA Z-1	1050 mg/m3	--	--	--
Ethanol	ACGIH	1000 ppm (weight)	--	--	A4
Ethanol	OSHA Z-1	1900 mg/m3	--	--	--
Ethyl benzene	ACGIH	100 ppm (weight)	125 ppm (weight)	--	A3
Ethyl benzene	OSHA Z-1	435 mg/m3	--	--	--

Ethyl tert-butyl ether (ETBE)	ACGIH	5 ppm (weight)	--	--	--
Heptane	ACGIH	400 ppm (weight)	500 ppm (weight)	--	--
Heptane	OSHA Z-1	2000 mg/m3	--	--	--
Hexane	ACGIH	50 ppm (weight)	--	--	Skin
Hexane	OSHA Z-1	1800 mg/m3	--	--	--
Methyl tert-butyl ether (MTBE)	ACGIH	50 ppm (weight)	--	--	A3
Methyl tert-butyl ether (MTBE)	CVX	--	50 ppm	--	--
Methylcyclohexane	ACGIH	400 ppm (weight)	--	--	--
Methylcyclohexane	OSHA Z-1	2000 mg/m3	--	--	--
Naphthalene	ACGIH	10 ppm	15 ppm	--	A4 Skin
Naphthalene	OSHA Z-1	50 mg/m3	--	--	--
Pentane, 2,2,4-trimethyl-(Isooctane)	ACGIH	300 ppm (weight)	--	--	--
Pentane, 2,2,4-trimethyl-(Isooctane)	OSHA Z-1	2350 mg/m3	--	--	--
Tertiary amyl methyl ether (TAME)	ACGIH	20 ppm (weight)	--	--	--
Tertiary amyl methyl ether (TAME)	CVX	--	50 ppm	--	--
Toluene (methylbenzene)	ACGIH	50 ppm (weight)	--	--	Skin A4
Toluene (methylbenzene)	OSHA Z-2	200 ppm (weight)	--	300 ppm (weight)	--
Xylene (contains o-, m-, & p-xylene isomers in varying amounts)	ACGIH	100 ppm (weight)	150 ppm (weight)	--	A4
Xylene (contains o-, m-, & p-xylene isomers in varying amounts)	OSHA Z-1	435 mg/m3	--	--	--

Refer to the OSHA Benzene Standard (29 CFR 1910.1028) and Table Z-2 for detailed training, exposure monitoring, respiratory protection and medical surveillance requirements before using this product.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Attention: the data below are typical values and do not constitute a specification.

Color: Colorless to yellow
Physical State: Liquid
Odor: Petroleum odor
pH: Not Applicable
Vapor Pressure: 5 psi - 15 psi (Typical) @ 37.8 °C (100 °F)
Vapor Density (Air = 1): 3 - 4 (Typical)
Boiling Point: 37.8 °C (100°F) - 204.4°C (400°F) (Typical)
Solubility: Insoluble in water; miscible with most organic solvents.
Freezing Point: Not Applicable
Melting Point: Not Applicable
Specific Gravity: 0.7 g/ml - 0.8 g/ml @ 15.6 °C (60.1°F) (Typical)
Viscosity: <1 SUS @ 37.8 °C (100°F)

SECTION 10 STABILITY AND REACTIVITY

Chemical Stability: This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.
Incompatibility With Other Materials: May react with strong acids or strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.
Hazardous Decomposition Products: None known (None expected)
Hazardous Polymerization: Hazardous polymerization will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

IMMEDIATE HEALTH EFFECTS
Eye Irritation: The Draize eye irritation mean score in rabbits for a 24-hour exposure was: 0/110.
Skin Irritation: For a 4-hour exposure, the Primary Irritation Index (PII) in rabbits is: 4.8/8.0.
Skin Sensitization: This material did not cause skin sensitization reactions in a Buehler guinea pig test.
Acute Dermal Toxicity: LD50: >3.75g/kg (rabbit).
Acute Oral Toxicity: LD50: >5 ml/kg (rat)
Acute Inhalation Toxicity: 4 hour(s) LD50: >20000mg/m3 vapor (rat).
Subchronic Effects: Exposure of rats for 13 weeks (6 hr/day for 5 days/week) to the light ends of gasoline (up to 20,000 mg/m3) resulted in minimal responses of toxicity. There were no indications of neurotoxicity based morphological, functional and biochemical indices. There was also no evidence of immunotoxicity in the rats. However, when rats were exposed to gasoline vapor containing ethanol up to 20,000 mg/m3 there was evidence of both humoral immune suppression and mild astrogliosis. **Reproduction and Birth Defects:** Exposure of rats to the light ends of gasoline at up to 20,000 mg/m3 had generally no impact upon reproductive abilities and did not cause birth defects.
Genetic Toxicity: Gasoline was not mutagenic, with or without activation, in the Ames assay (Salmonella typhimurium), Saccharamyces cerevisesae, or mouse lymphoma assays. In addition, point mutations were not induced in human lymphocytes. Gasoline was not mutagenic when tested in the mouse dominant lethal assay. Administration of gasoline to rats did not cause chromosomal aberrations in their bone marrow cells. Inhalation exposure of rats to the light ends of gasoline caused increased sister chromatid exchange in their peripheral white blood cells but did not cause an increase in micronucleated red blood cells in their bone marrow.
ADDITIONAL TOXICOLOGY INFORMATION:
Gasolines are highly volatile and can produce significant concentrations of vapor at ambient temperatures. Gasoline vapor is heavier than air and at high concentrations may accumulate in confined spaces to present both safety and heath hazards. When vapor exposures are low, or short duration and infrequent, such as during refueling and tanker loading/unloading, neither total hydrocarbon nor components such as benzene are likely to result in any adverse health effects. In situations such as accidents or spills where exposure to gasoline vapor is potentially high, attention should be paid to potential toxic effects of specific components. Information about specific components in gasoline can be found in Sections 2, 8 and 15 of this MSDS. More detailed information on the health hazard of specific gasoline components can be obtained calling the ChevronTexaco Emergency Information Center (see Section 1 for phone numbers).
Pathological misuse of solvents and gasoline, involving repeated and prolonged exposure to high concentrations of vapor is a significant exposure on which there are many reports in the medical literature. As with other solvents, persistent abuse involving repeated and prolonged exposures to high concentrations of vapor has been reported to result in central nervous system damage and eventually, death. In a study in which ten human volunteers were exposed for 30 minutes to approximately 200, 500 or 1000 ppm concentrations of gasoline vapor, irritation of the eyes was the only significant effect observed, based on both subjective and objective assessments.
Lifetime inhalation of wholly vaporized unleaded gasoline at 2056 ppm has caused increased liver tumors in female mice and kidney cancer in male rats. In their 1988 review of carcinogenic risk

from gasoline, The International Agency for Research on Cancer (IARC) noted that, because published epidemiology studies did not include any exposure data, only occupations where gasoline exposure may have occurred were reviewed. These included gasoline service station attendants and automobile mechanics. IARC also noted that there was no opportunity to separate effects of combustion products from those of gasoline itself. Although IARC allocated gasoline a final overall classification of Group 2B, i.e. possibly carcinogenic to humans, this was based on limited evidence in experimental animals plus supporting evidence including the presence in gasoline of benzene. The actual evidence for carcinogenicity in humans was considered inadequate.
To explore the health effects of workers potentially exposed to gasoline vapors in the marketing and distribution sectors of the petroleum industry, the American Petroleum Institute sponsored a cohort mortality study (Publication 4555), a nested case-control study (Publication 4551), and an exposure assessment study (Publication 4552). Histories of exposure to gasoline were reconstructed for cohort of more than 18,000 employees from four companies for the time period between 1946 and 1985. The results of the cohort mortality study indicated that there was no increased mortality from either kidney cancer or leukemia among marketing and marine distribution employees who were exposed to gasoline in the petroleum industry, when compared to the general population. More importantly, based on internal comparisons, there was no association between mortality from kidney cancer or leukemia and various indices of gasoline exposure. In particular, neither duration of employment, duration of exposure, age at first exposure, year of first exposure, job category, cumulative exposure, frequency of peak exposure, nor average intensity of exposure had any effect on kidney cancer or leukemia mortality. The results of the nested case-control study confirmed the findings of the original cohort study. That is, exposure to gasoline at the levels experienced by this cohort of distribution workers is not a significant risk factor for leukemia (all cell types), acute myeloid leukemia, kidney cancer or multiple myeloma.

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY
96 hour(s) LC50: 8.3 mg/l (Cyprinodon variegatus)
96 hour(s) LC50: 1.8 mg/l (Mysidopsis bahia)
48 hour(s) LC50: 3.0 mg/l (Daphnia magna)
96 hour(s) LC50: 2.7 mg/l (Oncorhynchus mykiss)
This material is expected to be toxic to aquatic organisms. The bulk of the available literature on gasoline relates to the environmental impact of monoaromatic (BTEX) and diaromatic (naphthalene, methylnaphthalenes) constituents. In general, non-oxygenated gasoline exhibits some short-term toxicity to freshwater and marine organisms, especially under closed vessel or flow-through exposure conditions in the laboratory. The components which are the most prominent in the water soluble fraction and cause aquatic toxicity, are also highly volatile and can be readily biodegraded by microorganisms.

Gasoline studies have been conducted in the laboratory under a variety of test conditions with a range of fish and invertebrate species. An even more extensive database is available on the aquatic toxicity of individual aromatic constituents. The majority of published studies do not identify the type of gasoline evaluated, or even provide distinguishing characteristics such as aromatic content or presence of lead alkyls. As a result, comparison of results among studies using open and closed vessels, different ages and species of test animals and different gasoline types, is difficult.

ENVIRONMENTAL FATE
This material is expected to be readily biodegradable. Following spillage, the more volatile components of gasoline will be rapidly lost, with concurrent dissolution of these and other

constituents into the water. Factors such as local environmental conditions (temperature, wind, mixing or wave action, soil type, etc), photo-oxidation, biodegradation and adsorption onto suspended sediments, can contribute to the weathering of spilled gasoline.

The aqueous solubility of non-oxygenated unleaded gasoline, based on analysis of benzene, toluene, ethylbenzene+xylenes and naphthalene, is reported to be 112 mg/l. Solubility data on individual gasoline constituents also available.

SECTION 13 DISPOSAL CONSIDERATIONS

Use material for its intended purpose or recycle if possible. This material, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA under RCRA (40 CFR 261) or other State and local regulations. Measurement of certain physical properties and analysis for regulated components may be necessary to make a correct determination. If this material is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.

SECTION 14 TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

DOT Shipping Description: GASOLINE,3,UN1203,II

IMO/IMDG Shipping Description: GASOLINE,3,UN1203,II,FLASH POINT SEE SECTION 5

ICAO/IATA Shipping Description: GASOLINE, 3, UN1203, II

SECTION 15 REGULATORY INFORMATION

EPCRA 311/312 CATEGORIES: 1. Immediate (Acute) Health Effects: YES
2. Delayed (Chronic) Health Effects: YES
3. Fire Hazard: YES
4. Sudden Release of Pressure Hazard: NO
5. Reactivity Hazard: NO

REGULATORY LISTS SEARCHED:

01-1=IARC Group 1	03=EPCRA 313
01-2A=IARC Group 2A	04=CA Proposition 65
01-2B=IARC Group 2B	05=MA RTK
02=NTP Carcinogen	06=NJ RTK
	07=PA RTK

The following components of this material are found on the regulatory lists indicated.

Benzene	01-1, 02, 03, 04, 05, 06, 07
Butane	05, 06, 07

Cyclohexane	03, 05, 06, 07
Ethanol	05, 06, 07
Ethyl benzene	01-2B, 03, 05, 06, 07
Gasoline	01-2B, 07
Heptane	05, 06, 07
Hexane	03, 05, 06, 07
Methyl tert-butyl ether (MTBE)	03, 05, 06, 07
Methylcyclohexane	05, 06, 07
Naphthalene	01-2B, 2, 03, 04, 05, 06, 07
Pentane, 2,2,4-trimethyl- (Isooctane)	05, 06, 07
Toluene (methylbenzene)	03, 04, 05, 06, 07
Xylene (contains o-, m-, & p- xylene isomers in varying amounts)	03, 05, 06, 07

CERCLA REPORTABLE QUANTITIES(RQ)/EPCRA 302 THRESHOLD PLANNING QUANTITIES(TPQ):

Component	Component RQ	Component TPQ	Product RQ
Benzene	10 lbs	None	186 lbs
Butane	100 lbs	None	725 lbs
Cyclohexane	1000 lbs	None	34188 lbs
Ethanol	100 lbs	None	1934 lbs
Ethyl benzene	1000 lbs	None	34964 lbs
Gasoline	100 lbs	None	107 lbs
Heptane	100 lbs	None	3644 lbs
Hexane	5000 lbs	None	129149 lbs
Methyl tert-butyl ether (MTBE)	1000 lbs	None	7513 lbs
Methylcyclohexane	100 lbs	None	4278 lbs
Naphthalene	100 lbs	None	4000 lbs
Pentane, 2,2,4-trimethyl- (Isooctane)	1000 lbs	None	6270 lbs
Toluene (methylbenzene)	1000 lbs	None	5480 lbs
Xylene (contains o-, m-, & p- xylene isomers in varying amounts)	100 lbs	None	649 lbs

CHEMICAL INVENTORIES:
All components comply with the following chemical inventory requirements: DSL (Canada), EINECS (European Union), KECI (Korea), TSCA (United States).

WHMIS CLASSIFICATION:
Class B, Division 2: Flammable Liquids
Class D, Division 2, Subdivision A: Very Toxic Material - Carcinogenicity
Class D, Division 2, Subdivision B: Toxic Material - Skin or Eye Irritation

SECTION 16 OTHER INFORMATION

NFPA RATINGS: Health: 1 Flammability: 3 Reactivity: 0

(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE:- Personal Protection Equipment Index recommendation, *- Chronic Effect Indicator). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint and Coating Association (for HMIS ratings).
Additional Product Number(s): CPS201023, CPS201054, CPS201055, CPS201075, CPS201090, CPS201105, CPS201106, CPS201120, CPS201121, CPS201122, CPS201126, CPS201128, CPS201131, CPS201136, CPS201141, CPS201142, CPS201148, CPS201153, CPS201158, CPS201161, CPS201162, CPS201168, CPS201181, CPS201185, CPS201186, CPS201188, CPS201216, CPS201217, CPS201218, CPS201236, CPS201237, CPS201238, CPS201266, CPS201267, CPS201268, CPS201277, CPS201278, CPS201279, CPS201286, CPS201287, CPS201289, CPS201296, CPS201297, CPS201298, CPS201849, CPS201850, CPS201855, CPS201856, CPS201857, CPS204000, CPS204001, CPS204002, CPS204003, CPS204010, CPS204011, CPS204022, CPS204023, CPS204046, CPS204047, CPS204070, CPS204071, CPS204088, CPS204089, CPS204104, CPS204105, CPS204116, CPS204117, CPS204140, CPS204141, CPS204164, CPS204165, CPS204188, CPS204189, CPS204200, CPS204201, CPS204212, CPS204213, CPS204224, CPS204225, CPS204248, CPS204249, CPS204272, CPS204273, CPS204290, CPS204291, CPS204322, CPS204323, CPS204324, CPS204350, CPS204352, CPS204354, CPS204356, CPS204358, CPS204359, CPS204364, CPS204365, CPS204370, CPS204371, CPS204376, CPS204377, CPS204382, CPS204383, CPS204388, CPS204389, CPS204394, CPS204395, CPS204400, CPS204401, CPS204406, CPS204407, CPS204412, CPS204413, CPS204418, CPS204419, CPS204424, CPS204425, CPS204430, CPS204431, CPS204436, CPS204437, CPS204442, CPS204446, CPS204450, CPS204454, CPS204458, CPS204462, CPS204466, CPS204467, CPS204484, CPS204485, CPS204502, CPS204503, CPS204520, CPS204521, CPS204538, CPS204539, CPS204556, CPS204557, CPS204574, CPS204575, CPS204592, CPS204593, CPS204610, CPS204611, CPS204628, CPS204629, CPS204646, CPS204647, CPS204664, CPS204665, CPS204682, CPS204690, CPS204691, CPS204696, CPS204697, CPS204702, CPS204703, CPS204708, CPS204709, CPS204721, CPS204722, CPS204727, CPS204728, CPS241765
REVISION STATEMENT: This revision updates the following sections of this Material Safety Data Sheet: 15.
Revision Date: 04/29/2005

ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:

TLV - Threshold Limit Value	TWA - Time Weighted Average
STEL - Short-term Exposure Limit	PEL - Permissible Exposure Limit
	CAS - Chemical Abstract Service Number
ACGIH - American Conference of Government Industrial Hygienists	IMO/IMDG - International Maritime Dangerous Goods Code
API - American Petroleum Institute	MSDS - Material Safety Data Sheet
CVX - ChevronTexaco	NFPA - National Fire Protection Association (USA)
DOT - Department of Transportation (USA)	NTP - National Toxicology Program (USA)
IARC - International Agency for Research on Cancer	OSHA - Occupational Safety and Health Administration

Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by the ChevronTexaco Energy Research & Technology Company, 100 Chevron Way, Richmond, California 94802.

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 this information 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 modifications 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

SECTION 1. PRODUCT IDENTIFICATION

PRODUCT NAME: **Hydrogen, compressed**
CHEMICAL NAME: Hydrogen **FORMULA:** H_2
SYNONYMS: None
MANUFACTURER: **Air Products and Chemicals, Inc.**
7201 Hamilton Boulevard
Allentown, PA 18195-1501
PRODUCT INFORMATION: 1-800-752-1597
MSDS NUMBER: 1009 **REVISION:** 4
REVISION DATE: June 1994

SECTION 2. COMPOSITION/INFORMATION ON INGREDIENTS

Hydrogen is sold as pure product >99%

CAS NUMBER: 1333-74-0

EXPOSURE LIMITS:
OSHA: None **ACGIH:** Simple asphyxiant

SECTION 3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW

Hydrogen is a flammable, colorless, odorless, compressed gas packaged in cylinders at high pressure. It poses an immediate fire and explosive hazard when concentrations exceed 4%. It is much lighter than air and burns with an invisible flame. High concentrations that will cause suffocation are within the flammable range and must not be entered.

EMERGENCY TELEPHONE NUMBERS

(800) 523-9374 Continental U.S., Canada, and Puerto Rico
(610) 481-7711 other locations

POTENTIAL HEALTH EFFECTS INFORMATION:

INHALATION: Asphyxiant. It should be noted that before suffocation could occur, the lower flammability limit of hydrogen in air would be exceeded possibly causing both an oxygen-deficient and explosive atmosphere. Exposure to moderate concentrations may cause dizziness, headache, nausea and unconsciousness. Exposure to atmospheres containing 8-10% or less oxygen will quickly bring about unconsciousness without warning leaving individuals unable to protect themselves. Lack of sufficient oxygen may cause serious injury or death.

EYE CONTACT: None

SKIN CONTACT: None

CHRONIC EFFECTS: None

OTHER EFFECTS OF OVEREXPOSURE: None

EXPOSURE INFORMATION:

ROUTE OF ENTRY: Inhalation

TARGET ORGANS: None

EFFECT: Asphyxiation (suffocation)

SYMPTOMS: Exposure to an oxygen-deficient atmosphere (<19.5%) may cause dizziness, drowsiness, nausea, vomiting, excess salivation, diminished mental alertness, loss of consciousness, and death.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: None

CARCINOGENIC POTENTIAL: Hydrogen is not listed by NTP, OSHA or IARC.

SECTION 4. FIRST AID

INHALATION: Persons suffering from lack of oxygen should be removed to fresh air. If victim is not breathing, administer artificial respiration. If breathing is difficult, administer oxygen. Obtain prompt medical attention.

SKIN CONTACT: None

EYE CONTACT: None

INGESTION: None

NOTES TO PHYSICIAN: None

SECTION 5. FIRE AND EXPLOSION

FLASH POINT:	**AUTOIGNITION:**	**FLAMMABLE LIMITS:**
Flammable gas	565.5_C (1050_F)	**LOWER:** 4% **UPPER:** 74%

EXTINGUISHING MEDIA: CO_2, dry chemical, water spray or fog for surrounding area. Do not extinguish until hydrogen source is shut off.

HAZARDOUS COMBUSTION PRODUCTS: None

SPECIAL FIRE FIGHTING INSTRUCTIONS: Evacuate all personnel from danger area. Immediately cool container with water spray from maximum distance, taking care not to extinguish flames. If flames are accidentally extinguished, explosive re-ignition may occur. Stop flow of gas if without risk while continuing cooling water spray.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Burns with a pale blue, nearly invisible flame. Hydrogen is easily ignited with low-ignition energy, including static electricity. Hydrogen is lighter than air and can accumulate in the upper sections of enclosed spaces. Pressure in a container can build up due to heat, and it may rupture if pressure relief devices should fail to function.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Evacuate immediate area. Eliminate any possible sources of ignition, and provide maximum explosion-proof ventilation. Shut off source of hydrogen, if possible. If leaking from cylinder, or valve, call the Air Products' emergency phone number. The presence of a hydrogen flame can be detected by approaching cautiously with an outstretched straw broom to make the flame visible.

SECTION 7. HANDLING AND STORAGE

STORAGE: Specific requirements are listed in NFPA 50A. Cylinder storage locations should be well-protected, well-ventilated, dry, and separated from combustible materials. Cylinders should never knowingly be allowed to reach a temperature exceeding 125 _F (52 _C). Cylinders of hydrogen should be separated from oxygen cylinders or other oxidizers by a minimum distance of 20 ft., or by a barrier of noncombustible material at least 5 ft. high having a fire resistance rating of at least _ hour.

Cylinders should be stored upright with valve protection cap in place and firmly secured to prevent falling or being knocked over. Protect cylinders from physical damage; do not drag, roll, slide or drop. Use a suitable hand truck for cylinder movement. Post "No Smoking or Open Flames" signs in the storage areas. There should be no sources of ignition. All electrical equipment should be explosion proof in the storage and use areas. Storage areas must meet national electric codes for class 1 hazardous areas.

HANDLING: Do not "open" hydrogen cylinder valve before connecting it, since self-ignition may occur. Hydrogen is the lightest gas known and may collect in the top of buildings with out proper ventilation. It may leak out of a system which is gas-tight for air or other gases. Leak check system with leak detection solution, never with flame. If user experiences difficulty operating cylinder valve, discontinue use and contact supplier. Use only approved CGA connections. DO NOT USE ADAPTERS. Never insert an object (e.g., wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may damage valve, causing a leak to occur. Use an adjustable strap wrench to remove over-tight or rusted caps. Never strike an arc on a compressed gas cylinder or make a cylinder a part of an electrical circuit.

SPECIAL PRECAUTIONS: Use piping and equipment adequately designed to withstand pressures to be encountered. Use a check valve or other protective apparatus in any line or piping from the cylinder to prevent reverse flow.

SECTION 8. PERSONAL PROTECTION/EXPOSURE CONTROLS

ENGINEERING CONTROLS: Provide natural or explosion-proof ventilation adequate to ensure hydrogen does not reach its lower explosive limit of 4%.

RESPIRATORY PROTECTION:

General Use: None

Emergency Use: Air supplied respirators are required in oxygen-deficient atmospheres. Before entering area you must check for flammable or oxygen-deficient atmospheres.

PROTECTIVE GLOVES: Work gloves are recommended when handling cylinders.

EYE PROTECTION: Safety glasses are recommended when handling cylinders.

OTHER PROTECTIVE EQUIPMENT: Safety shoes are recommended when handling cylinders.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AND STATE: Colorless gas at normal temperature and pressure.

ODOR: Odorless

MOLECULAR WEIGHT: 2.016

BOILING POINT (1 atm): -423.0 _F (-252.8 _C)

SPECIFIC GRAVITY (Air =1): 0.06960

FREEZING POINT/MELTING POINT: -434.5 °F (-259.2 _C)

VAPOR PRESSURE (at 70 °F): Not applicable

GAS DENSITY (At 70_F (21.1_C) and 1 atm): 0.00521 lb/ft^3 (0.08342 kg/m^3)

SOLUBILITY IN WATER (Vol/Vol at 60_ F (15.6_C)): 0.019

SPECIFIC VOLUME (At 70_F (21.1_C) and 1 atm): 192 ft^3/lb (11.99m^3/kg)

SECTION 10. REACTIVITY/STABILITY

CHEMICAL STABILITY: Stable

CONDITIONS TO AVOID: None

INCOMPATIBILITY (Materials to Avoid): Oxidizing agents. Some steels are susceptible to hydrogen embrittlement at high pressures and temperatures.

REACTIVITY:

A) HAZARDOUS DECOMPOSITION PRODUCTS: None
B) HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11. TOXICOLOGICAL INFORMATION

Hydrogen is a simple asphyxiant.

SECTION 12. ECOLOGICAL INFORMATION

No adverse ecological effects are expected. Hydrogen does not contain any Class I or Class II ozone depleting chemicals (40 CFR Part 82). Hydrogen is not listed as a marine pollutant by DOT (49 CFR Part 171).

SECTION 13. DISPOSAL

WASTE DISPOSAL METHOD: Do not attempt to dispose of residual or unused product in the cylinder. Return to supplier for safe disposal.

Residual product within process system may be vented at a controlled rate, to the atmosphere through a vent stack that discharges to an elevated point. This stack should be in an isolated area away from ignition sources.

SECTION 14. TRANSPORTATION

DOT/IMO SHIPPING NAME: Hydrogen, compressed

HAZARD CLASS: 2.1 (Flammable Gas)

IDENTIFICATION NUMBER: UN1049

PRODUCT RQ: None

SHIPPING LABEL(s): Flammable gas.

PLACARD (When required): Flammable gas.

SPECIAL SHIPPING INFORMATION: Cylinder should be transported in a secure upright position in a well ventilated truck. NEVER TRANSPORT IN PASSENGER COMPARTMENT OF A VEHICLE.

Shipment of compressed gas cylinders which have not been filled with the owner's consent is a violation of Federal law (49 CFR Part 173.301 (b)).

SECTION 15. REGULATORY INFORMATION

U.S. FEDERAL REGULATIONS:

EPA - ENVIRONMENTAL PROTECTION AGENCY

CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (40 CFR Parts 117 and 302):

Reportable Quantity (RQ): None

SARA: Superfund Amendment and Reauthorization Act

SECTION 302/304: Requires emergency planning on threshold planning quantities (TPQ) and release reporting based on reportable quantities (RQ) of EPA's extremely hazardous substances (40 CFR Part 355).

Extremely Hazardous Substances: None

Threshold Planning Quantity (TPQ): None

SECTIONS 311/312: Require submission of material safety data sheets (MSDSs) and chemical inventory reporting with identification of EPA defined hazard classes (40 CFR Part 370). The hazard classes for this product are:

IMMEDIATE:	No	PRESSURE:	Yes
DELAYED:	No	REACTIVITY:	No
		FLAMMABLE:	Yes

SECTION 313: Requires submission of annual reports of release of toxic chemicals that appear in 40 CFR Part 372.

Hydrogen does not require reporting under Section 313

40 CFR PART 68: Risk Management for Chemical Accidental Release. Requires the development and implementation of risk management programs at facilities that manufacture, use, store, or otherwise handle regulated substances in quantities that exceed specified thresholds.

Hydrogen is not listed as a regulated substance. However, any process that involves a flammable gas on site in one location, in quantities of 10,000 pounds (4,553 kg) or greater, is covered under this regulation.

TSCA: Toxic Substance Control Act: Hydrogen is listed on the TSCA inventory.

OSHA - OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION:

29 CFR 1910.119: Process Safety Management of Highly Hazardous Chemicals. Requires facilities to develop a process safety management program based on Threshold Quantities (TQ) of highly hazardous chemicals.

Hydrogen is not listed in Appendix A as a highly hazardous chemical. However, any process that involves a flammable gas on site in one location, in quantities of 10,000 pounds (4,553 kg) or greater is covered under this regulation unless it is used as fuel.

SECTION 16. OTHER INFORMATION

OTHER INFORMATION:

NFPA RATINGS:		**HMIS RATINGS:**	
HEALTH:	= 0	HEALTH:	= 0
FLAMMABILITY:	= 4	FLAMMABILITY:	= 4
REACTIVITY:	= 0	REACTIVITY:	= 0

SPECIAL: = SA (CGA recommends this to designate simple asphyxiant)

Material Safety Data Sheet

Material Name: Quaker State Deluxe® SAE 10W-40 Motor Oil **ID: QS-015**

* * * Section 1 - Chemical Product and Company Identification * * *

Product Numbers: 36306 (5 gallon); 36310 (55 gallon), 36319 (bulk)
Chemical Name: Motor Oil
Manufacturer Information

Quaker State Corporation
225 E. John Carpenter Freeway
Irving, Texas 75062

Phone: (800)562-5928

Emergency # (800)424-9300 CHEMTREC

General Comments

CHEMTREC Emergency telephone number is to be used in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals. All non-emergency questions should be directed to customer service.

* * * Section 2 - Composition / Information on Ingredients * * *

CAS #	Component	Percent
Not Available	Lube Oil Additive with Ethylene and Propylene Copolymer in Mineral Oil	15-22
Not Available	Lube Oil Additive containing Zinc Salt of Dialkyl Dithiophosphoric Acid, Borated Polyisobutenyl Succinic Anhydride Nitrogen Functionalized Dispersant, Magnesium Alkylaryl Detergent and Solvent Dewaxed Mineral Oil	6-10
Not Available	Lube Oil Additive with Dialkyl Fumarate and Vinyl Acetate Copolymer in Mineral Oil	1-3
64742-65-0	Petroleum Distillates, Solvent Dewaxed Heavy Paraffinic	Blend
64742-54-7	Petroleum Distillates, Hydrotreated Heavy Paraffinic	Blend

Component Information/Information on Non-Hazardous Components

The maximum percentage of the petroleum distillate and/or residual oil blend contained in this product is: 80%
All mineral oils used in this product have been severely hydrotreated and/or solvent refined. This product is considered hazardous under 29 CFR 1910.1200 (Hazard Communication).

* * * Section 3 - Hazards Identification * * *

Emergency Overview

Product is a non-flammable petroleum distillate mixture. Liquid and vapor may be irritating to the eyes, skin and respiratory system. Irritating and toxic vapors may be released upon combustion of product. Extinguish fire with carbon dioxide, dry chemical, foam or water fog.

Hazard Statements

This product is irritating to the eyes, and may be irritating to the skin and respiratory system. Pulmonary aspiration hazard if swallowed.

Potential Health Effects: Eyes

This product is irritating to the eyes.

Potential Health Effects: Skin

This product may cause irritation to the skin. Prolonged or repeated contact with this product may dry and/or defat the skin.

Potential Health Effects: Ingestion

No significant adverse effects are expected upon ingestion of the product. Ingestion of this product may cause nausea, vomiting and diarrhea. Small amounts of this product, if aspirated into the lungs, may cause mild to severe pulmonary injury, possibly death.

Potential Health Effects: Inhalation

Low vapor pressure makes inhalation unlikely at standard temperatures and pressures. Inhalation of oil mists or fumes can cause irritation of the nose, throat and upper respiratory tract. Repeated and prolonged overexposure to oil mists may result in droplet deposition, oil granuloma formation, inflammation and increased incidence of infection. If this product is heated over 70 C (155 F), hydrogen sulfide gas may be released. Hydrogen sulfide is irritating to the eyes and respiratory system. Continued overexposure may cause respiratory collapse, coma, and death without necessarily any warning odor being sensed.

HMIS Ratings: Health: 1 **Fire:** 1 **Reactivity:** 0 **Pers. Prot.:** Impervious gloves for prolonged contact, safety glasses or chemical goggles

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe * = Chronic hazard

* * * Section 4 - First Aid Measures * * *

First Aid: Eyes

Flush eyes with large amounts of water for 15 minutes. Seek medical attention if eye irritation develops or persists.

First Aid: Skin

Remove contaminated clothing. Wash affected area with mild soap and water. Launder contaminated clothing before reuse. Seek medical attention if symptoms develop or persist.

First Aid: Ingestion

If the material is swallowed, seek immediate medical attention or advice -- Do not induce vomiting.

First Aid: Inhalation

Remove to fresh air. Call a physician if symptoms develop or persist.

First Aid: Notes to Physician

Pulmonary aspiration hazard if swallowed; treat symptomatically.

* * * Section 5 - Fire Fighting Measures * * *

Flash Point: 400 ºF (204 ºC)
Method Used: Cleveland Open Cup
Upper Flammable Limit (UFL): Not determined
Lower Flammable Limit (LFL): Not determined
Auto Ignition: Not determined
Flammability Classification: Non-flammable
Rate of Burning: Not determined

General Fire Hazards

Product is a non-flammable petroleum distillate mixture. Liquid can burn upon heating to temperatures at or above the flash point. Mist or sprays may be flammable below the products normal flash point.

Hazardous Combustion Products

Upon combustion this product may release oxides of copper, oxides of boron, oxides of sulfur, oxides of magnesium, oxides of phosphorus, oxides of zinc, carbon monoxide, carbon dioxide, and/or other low molecular weight hydrocarbons. Hydrogen sulfide and alkyl mercaptans may also be released.

Extinguishing Media

Use water spray, dry chemical, foam or carbon dioxide to extinguish the fire. Direct water spray or foam may cause frothing and spattering. If a leak or spill has not ignited, use water spray to disperse vapors and to flush spills away from exposure. Use water to cool fire-exposed containers and to protect personnel.

Fire Fighting Equipment/Instructions

Firefighters should wear full-face, self contained breathing apparatus and impervious protective clothing. Firefighters should avoid inhaling any combustion products.

NFPA Ratings: Health: 1 **Fire:** 1 **Reactivity:** 0 **Other:**

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

* * * Section 6 - Accidental Release Measures * * *

Containment Procedures

Stop the flow of material, if this is without risk.

Clean-Up Procedures

Absorb with non-flammable suitable absorbent such as sand or earth. Sweep up or gather material and place in appropriate container for disposal.

Evacuation Procedures

Persons not wearing protective equipment should be excluded from area of spill until clean-up has been completed.

Special Procedures

Remove soiled clothing and launder before reuse. Wear appropriate personal protection equipment. Avoid skin contact and inhalation of vapors during disposal of spills. Surfaces may become slippery after spillage. Do not allow product to enter sewer or waterways.

* * * Section 7 - Handling and Storage * * *

Handling Procedures

Avoid getting this material into contact with your skin and eyes. Avoid prolonged or repeated breathing of this material. Avoid the generation of oil mists. Wash hands after handling and before eating. Launder work clothes frequently.

Storage Procedures

Keep the container tightly closed and in a cool, well-ventilated place. Do not store this material in open or unlabeled containers. Store away from strong oxidizers. Empty containers may retain product residue including flammable or explosive vapors. Do not cut, drill, grind, or weld near full, partially full, or empty product containers.

* * * Section 8 - Exposure Controls / Personal Protection * * *

Exposure Guidelines

A: General Product Information

If oil mists are generated, observe the OSHA exposure limit of 5 mg/m3; short term exposure limit of 10 mg/m3. The following are recommended exposure limits for hydrogen sulfide: OSHA PEL 8H TWA 10 ppm (14 mg/m3), Ceiling 20 ppm and ACGIH 8H TWA 10 ppm (14 mg/m3).

B: Component Exposure Limits

ACGIH, OSHA, and NIOSH have not developed exposure limits for any of this product's components.

Engineering Controls

Use general ventilation. Use in a well-ventilated area. If product is heated above 70 C (155 C), hydrogen sulfide vapors may be released. Ventilation should be sufficient to keep hydrogen sulfide levels below recommended exposure limits.

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment: Eyes/Face

Wear safety glasses; chemical goggles (if splashing is possible).

Personal Protective Equipment: Skin

Use impervious gloves for prolonged contact or any contact with used oil.

Personal Protective Equipment: Respiratory

If mist is generated (heating, spraying) and engineering controls are not sufficient, wear approved organic vapor respirator suitable for oil mist.

Personal Protective Equipment: General

Use good hygiene when handling petroleum product.

* * * Section 9 - Physical & Chemical Properties * * *

Appearance:	Amber	**Odor:**	Mild hydrocarbon
Physical State:	Liquid	**pH:**	Not available
Vapor Pressure:	Not available	**Vapor Density:**	Not determined
Boiling Point:	Not determined	**Melting Point:**	Not determined
Solubility (H2O):	Not available	**Specific Gravity:**	0.86-0.89
Viscosity:	95.2-113 cSt @ 40 ºC; 14.3-14.8 cSt @ 100 ºC	**Pour Point:**	-25 ºF (-31.7 ºC)

* * * Section 10 - Chemical Stability & Reactivity Information * * *

Chemical Stability

Stable

Chemical Stability: Conditions to Avoid

Avoid excessive heat and all sources of ignition.

Incompatibility

Strong oxidizing agents (peroxides, chlorine, strong acids).

Hazardous Decomposition

Upon decomposition this product may release oxides of copper, oxides of boron, oxides of sulfur, oxides of magnesium, oxides of phosphorus, oxides of zinc, carbon monoxide, carbon dioxide, and/or other low molecular weight hydrocarbons. Hydrogen sulfide and alkyl mercaptans may also be released.

Hazardous Polymerization

Hazardous polymerization will not occur.

* * * Section 11 - Toxicological Information * * *

Acute Toxicity

A: General Product Information

No data available for product. Based on similar materials, this product is expected to have a low order of acute oral and dermal toxicity, but minute amounts aspirated into the lungs during ingestion or vomiting may cause mild to severe pulmonary injury and possibly death.

B: Component Analysis - LD50/LC50

Petroleum Distillates, Hydrotreated Heavy Paraffinic (64742-54-7)

Oral LD50 Rat: >15 gm/kg

Dermal LD50 Rabbit: >5 gm/kg

Carcinogenicity

A: General Product Information

No data available on the product as a whole. Note that USED oils tend to contain higher amounts of the cancer-causing aromatics, which have been linked to scrotal and lung cancer in humans.

B: Component Carcinogenicity

None of this product's components are listed by ACGIH, IARC, OSHA, NIOSH, or NTP.

Epidemiology

No epidemiological data is available for this product.

Neurotoxicity

No data available on this product as a whole.

Mutagenicity

No data available on this product as a whole.

Teratogenicity

No data available for this product as a whole.

Other Toxicological Information

Persons with skin or respiratory conditions may be more sensitive to product. This product contains a blend of petroleum distillates and residual oils, all of which have been solvent refined or severely hydrotreated. The petroleum distillate and residual oil blend consists of one or more of the components identified by CAS Number in Section 2. Since these components vary with the availability of materials their presence is noted as "blend".

* * * Section 12 - Ecological Information * * *

Ecotoxicity

No information is available on ecotoxicity of this product. Keep product out of sewers and waterways.

Environmental Fate

No information is available.

* * * Section 13 - Disposal Considerations * * *

US EPA Waste Number & Descriptions

A: General Product Information

Product as shipped does not meet the definition or characteristics of a hazardous waste. User must test waste using methods described in 40 CFR Part 261 to determine if it meets applicable definitions of hazardous wastes.

B: Component Waste Numbers

No EPA Waste Numbers are applicable for this product's components.

Disposal Instructions

Used oil can be returned to a collection center or provided to a licensed recycler. All wastes must be handled in accordance with local, state and federal regulations.

* * * Section 14 - Transportation Information * * *

US DOT Information

Shipping Name: Not regulated as a hazardous material
Hazard Class: None
UN/NA #: None
Packing Group: None

International Transportation Regulations

Not regulated as dangerous goods.

* * * Section 15 - Regulatory Information * * *

US Federal Regulations

A: General Product Information

This product may be classified as an oil under Section 311 of the Clean Water Act, and under the Oil Pollution Act. Discharges of spills into or leading to surface waters that cause sheen must be reported to the National Response Center. (1-800-424-8802) All components of this product are listed on the U.S. EPA TSCA Inventory.

B: Component Analysis

None of this products components are listed under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), or CERCLA (40 CFR 302.4).

State Regulations

A: General Product Information

Other state regulations may apply.

B: Component Analysis - State

None of this product's components are listed on the state lists from CA, FL, MA, MN, NJ, or PA.

Other Regulations

A: General Product Information

No additional information is available.

B: Component Analysis - Inventory

Component	CAS #	TSCA	DSL	EINECS
Petroleum Distillates, Solvent Dewaxed Heavy Paraffinic	64742-65-0	Yes	Yes	Yes
Petroleum Distillates, Hydrotreated Heavy Paraffinic	64742-54-7	Yes	Yes	Yes

C: Component Analysis - WHMIS IDL

No components are listed in the WHMIS IDL.

* * * Section 16 - Other Information * * *

Other Information

This information is, to the best of Quaker State Corporation's knowledge and belief, accurate and reliable. However, no representation, warranty, or guarantee is made to its accuracy, reliability, or completeness. It is the user's responsibility to satisfy himself as to the suitableness and completeness of such information for his own particular use.

Key/Legend

N = No; Y = Yes; ppm - parts per million; mg/m3 = milligrams per cubic meter of air; ACGIH = American Conference of Governmental Industrial Hygienists; OSHA = Occupational Safety and Health Administration; TLV = Threshold Limit Value; NIOSH = National Institute of Occupational Safety and Health; NTP = National Toxicology Program; IARC = International Agency for Research on Cancer.

MSDS History

Preparation Information: last revised 02/07/1997. Revision 2.0000: 11/19/1997.
Revision 2.0000: Section 2 was revised to indicate that the product contains a "blend" of petroleum distillates and/or residual oils. Section 11 revised to the nature of the product blend.
Revision (06/05/98): Text correction.
Revision 3.0000: Change in formulation.

Contact: Vince Bernard, Corporate Safety Director
Contact Phone: (800) 562-5928

This is the end of MSDS # QS-015

BOC GASES

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: OXYGEN

1. Chemical Product and Company Identification

BOC Gases,
Division of
The BOC Group, Inc.
575 Mountain Avenue
Murray Hill, NJ 07974

TELEPHONE NUMBER: (908) 464-8100
24-HOUR EMERGENCY TELEPHONE NUMBER:
CHEMTREC (800) 424-9300

BOC Gases
Division of
BOC Canada Limited
5975 Falbourne Street, Unit 2
Mississauga, Ontario L5R 3W6

TELEPHONE NUMBER: (905) 501-1700
24-HOUR EMERGENCY TELEPHONE NUMBER:
(905) 501-0802
EMERGENCY RESPONSE PLAN NO: 20101

PRODUCT NAME: OXYGEN
CHEMICAL NAME: Oxygen
COMMON NAMES/SYNONYMS: None
TDG (Canada) CLASSIFICATION: 2.2 (5.1)
WHMIS CLASSIFICATION: A, C

PREPARED BY: Loss Control (908)464-8100/(905)501-1700
PREPARATION DATE: 6/1/95
REVIEW DATES: 6/7/96

2. Composition, Information on Ingredients

INGREDIENT	% VOLUME	PEL-OSHA[1]	TLV-ACGIH[2]	LD_{50} or LC_{50} Route/Species
Oxygen FORMULA: O_2 CAS: 7782-44-7 RTECS #: RS2060000	99.6 to 100.0	Not Available	Not Available	Not Available

[1] As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)
[2] As stated in the ACGIH 1994-95 Threshold Limit Values for Chemical Substances and Physical Agents

3. Hazards Identification

EMERGENCY OVERVIEW

Elevated oxygen levels may result in cough and other pulmonary changes. High concentrations of oxygen (greater than 75%) causes symptoms of hyperoxia which included cramps, nausea, dizziness, hypothermia, ambylopia, respiration difficulties, bradycardia, fainting spells and convulsions capable of leading to death. Nonflammable. Oxidizer, will accelerate combustion.

ROUTE OF ENTRY:

Skin Contact	Skin Absorption	Eye Contact	Inhalation	Ingestion
No	No	No	Yes	No

HEALTH EFFECTS:

Exposure Limits No	Irritant No	Sensitization No
Teratogen No	Reproductive Hazard No	Mutagen Yes
Synergistic Effects None known		

Carcinogenicity: -- NTP: No IARC: No OSHA: No

EYE EFFECTS:
Adverse effects not anticipated.

SKIN EFFECTS:
Adverse effects not anticipated.

INGESTION EFFECTS:
Adverse effects not anticipated.

INHALATION EFFECTS:
High concentrations of oxygen (greater than 75%) causes symptoms of hyperoxia which included cramps, nausea, dizziness, hypothermia, ambylopia, respiration difficulties, bradycardia, fainting spells and convulsions capable of leading to death. The property is that of hyperoxia which leads to pneumonia. Concentrations between 25 and 75% present a risk of inflammation of organic matter in the body.

Oxygen concentrations between 20 to 95% have produced genetic changes in mammalian cell assay test systems.

NFPA HAZARD CODES	HMIS HAZARD CODES	RATINGS SYSTEM
Health: 0	Health: 0	0 = No Hazard
Flammability: 0	Flammability: 0	1 = Slight Hazard
Reactivity: 0	Reactivity: 0	2 = Moderate Hazard
		3 = Serious Hazard
		4 = Severe Hazard

4. First Aid Measures

EYES:
Never introduce ointment or oil into the eyes without medical advice. If pain is present, refer the victim to an ophthalmologist for treatment and follow up.

SKIN:
Remove contaminated clothing and flush affected areas with lukewarm water. If irritation persists, seek medical attention.

INGESTION:
Ingestion is not anticipated.

INHALATION:
PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO OXYGEN. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Conscious persons should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. Further treatment should be symptomatic and supportive. Inform the treating physician that the patient could be experiencing hyperoxia.

5. Fire Fighting Measures

Conditions of Flammability: Not flammable, Oxidizer		
Flash point: None	Method: Not Applicable	Autoignition Temperature: None
LEL(%): None	UEL(%): None	
Hazardous combustion products: None		
Sensitivity to mechanical shock: None		
Sensitivity to static discharge: None		

FIRE AND EXPLOSION HAZARDS:
High oxygen concentrations vigorously accelerate combustion.

EXTINGUISHING MEDIA:
Water spray to keep cylinders cool. Extinguishing agent appropriate for the combustible material.

FIRE FIGHTING INSTRUCTIONS:
If possible, stop the flow of oxygen which is supporting the fire.

6. Accidental Release Measures

Evacuate all personnel from affected area. Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with inert gas prior to attempting repairs. If leak is in container or container valve, contact the appropriate emergency telephone number listed in Section 1 or call your closest BOC location.

7. Handling and Storage

Electrical classification:
Nonhazardous

Dry product is noncorrosive and may be used with all materials of construction. Moisture causes metal oxides which are formed with air to be hydrated so that they include volume and lose their protective role (rust formation). Concentrations of SO_2, $C1_2$, salt, etc. in the moisture enhances the rusting of metals in air.

Carbon steels and low alloy steels are acceptable for use at lower pressures.

For high pressure applications stainless steels are acceptable as are copper and its alloys, nickel and its alloys, brass bronze, silicon alloys, Monel ®, Inconel ® and beryllium. Lead and silver or lead tin alloys are good gasket materials. Teflon ®, Teflon ® composites, or Kel-F ® are preferred non-metallic gasket materials.

Check with the supplier to verify oxygen compatibility for the service conditions.
Oxygen should not be used as a substitute for compressed air in pneumatic equipment since this type generally contains flammable lubricants.

Stationary customer site vessels should operate in accordance with the manufacturer's and BOC's instruction. Do not attempt to repair, adjust or in any other way modify the operation of these vessels. If there is a malfunction or other type of operations problem with the vessel, contact the closest BOC location immediately.

Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure (<3000 psig) piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the system.

Protect cylinders from physical damage. Store in cool, dry, well-ventilated area away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 130°F (54°C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders being stored for excessive periods of time. Post "NO SMOKING OR OPEN FLAMES" signs in the storage area or use area. There should be no sources of ignition in the storage or use area.

For additional storage recommendations, consult Compressed Gas Association's Pamphlets P-1, P-14 and Safety Bulletin SB-2.

Never carry a compressed gas cylinder or a container of a gas in cryogenic liquid form in an enclosed space such as a car trunk, van or station wagon. A leak can result in a fire, explosion, asphyxiation or a toxic exposure.

8. Exposure Controls, Personal Protection

EXPOSURE LIMITS[1]:

INGREDIENT	% VOLUME	PEL-OSHA[2]	TLV-ACGIH[3]	LD_{50} or LC_{50} Route/Species
Oxygen FORMULA: O_2 CAS: 7782-44-7 RTECS #: RS2060000	99.6 to 100.0	Not Available	Not Available	Not Available

[1] Refer to individual state of provincial regulations, as applicable, for limits which may be more stringent than those listed here.
[2] As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)
[3] As stated in the ACGIH 1994-1995 Threshold Limit Values for Chemical Substances and Physical Agents.

ENGINEERING CONTROLS:
Use local exhaust to prevent accumulation of high concentrations that increase the oxygen level in air to more than 25%.

EYE/FACE PROTECTION:
Safety goggles or glasses as appropriate for the job.

SKIN PROTECTION:
Protective gloves made of any suitable material appropriate for the job.

OTHER/GENERAL PROTECTION:
Safety shoes, safety shower.

9. Physical and Chemical Properties

PARAMETER	VALUE	UNITS
Physical state (gas, liquid, solid)	: Gas	
Vapor pressure	: Above critical temp.	
Vapor density (Air = 1)	: 1.11	
Evaporation point	: Not Available	
Boiling point	: -297.3	^{o}F
	: -182.9	^{o}C
Freezing point	: -361.8	^{o}F
	: -218.8	^{o}C
pH	: Not Applicable	
Specific gravity at STP	: Not Available	
Oil/water partition coefficient	: Not Available	
Solubility (H20)	: Slightly soluble	
Odor threshold	: Not Applicable	
Odor and appearance	: Colorless, odorless gas	

10. Stability and Reactivity

STABILITY:
Stable.

INCOMPATIBLE MATERIALS:
All flammable materials.

HAZARDOUS DECOMPOSITION PRODUCTS:
None.

HAZARDOUS POLYMERIZATION:
Will not occur.

11. Toxicological Information

MUTAGENIC:
Oxygen concentrations between 20 to 95% have produced genetic changes in mammalian cell assay test systems.

12. Ecological Information

No data given.

13. Disposal Considerations

Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED, WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to BOC Gases or authorized distributor for proper disposal.

14. Transport Information

PARAMETER	United States DOT	Canada TDG
PROPER SHIPPING NAME:	Oxygen, compressed	Oxygen, compressed
HAZARD CLASS:	2.2	2.2 (5.1)
IDENTIFICATION NUMBER:	UN 1072	UN 1072
SHIPPING LABEL:	NONFLAMMABLE GAS, OXIDIZER	NONFLAMMABLE GAS, OXIDIZER

15. Regulatory Information

SARA TITLE III NOTIFICATIONS AND INFORMATION

SARA TITLE III - HAZARD CLASSES:
Fire Hazard
Sudden Release of Pressure Hazard

16. Other Information

Compressed gas cylinders shall not be refilled without the express written permission of the owner. Shipment of a compressed gas cylinder which has not been filled by the owner or with his/her (written) consent is a violation of transportation regulations.

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES:
Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).

SULFURIC ACID
MATERIAL SAFETY DATA SHEET

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product Identity: Sulfuric Acid (93 percent)

Manufacturer:
Teck Cominco Metals Ltd.
Trail Operations
Trail, British Columbia
V1R 4L8
Emergency Telephone: 250-364-4214

Supplier:
Teck Cominco American Incorporated
Industrial Chemicals
15918 East Euclid Avenue
P.O. Box 3087
Spokane, WA 99216-1815

MSDS Preparer:
Teck Cominco Metals Ltd.
600 - 200 Burrard Street
Vancouver, British Columbia
V6C 3L9

Date of Last Review/Edit: December 15, 2003.

Product Use: Used in the manufacturing of chlorine dioxide (a pulp and paper bleaching chemical), in the manufacturing of phosphate and sulphate fertilizers, in the manufacturing of metal sulfates, as a metal pickling chemical and as a component of lead storage batteries.

SECTION 2. COMPOSITION / INFORMATION ON INGREDIENTS

Hazardous Ingredient	Approximate Percent by Weight	C.A.S. Number	Occupational Exposure Limits (OELs)		LD_{50} / LC_{50} Species and Route	
Sulfuric Acid	93	7664-93-9	OSHA PEL	1 mg/m^3	LD_{50} orl-rat	2140 mg/kg
			ACGIH TLV	1 mg/m^3	LC_{50} ihl-rat	510 mg/m^3/2H
			NIOSH REL	1 mg/m^3	LC_{50} ihl-mouse	320 mg/m^3/2H

NOTE: OELs for individual jurisdictions may differ from OSHA PELs. Check with local authorities for the applicable OELs in your jurisdiction. OSHA - Occupational Safety and Health Administration; ACGIH - American Conference of Governmental Industrial Hygienists; NIOSH - National Institute for Occupational Safety and Health. OEL – Occupational Exposure Limit, PEL – Permissible Exposure Limit, TLV – Threshold Limit Value, REL – Recommended Exposure Limit.

Trade Names and Synonyms: Oil of vitriol, electrolyte acid, battery acid, matting acid, H_2SO_4.

SECTION 3. HAZARDS IDENTIFICATION

Emergency Overview: A strong mineral acid present as a colorless and odorless oily liquid when pure but may appear yellow to dark brown when impure. Extremely corrosive to all body tissues, causing rapid tissue destruction and serious chemical burns. Skin or eye contact requires immediate first aid. Can decompose at high temperatures forming toxic gases such as sulfur oxides. Non-flammable but reacts violently with water generating large amounts of heat with potential for spattering of the acid. Can react with combustible materials to generate heat and ignition. Reacts with most metals, particularly when diluted with water, to form flammable hydrogen gas which may create an explosion hazard. It is highly toxic to aquatic organisms and plant life.

Potential Health Effects: Sulfuric acid is not very volatile and workplace exposures are therefore primarily due to accidental splashes or to processes or actions that generate an acid mist. It is extremely corrosive to all body tissues, causing rapid tissue destruction and serious chemical burns on contact with the skin or eyes. Skin or eye contact requires immediate first aid. Inhalation of sulfuric acid mist or fumes may produce irritation of the nose, throat and respiratory tract. High levels of acid mist are also irritating to the skin and eyes. Chronic inhalation of acid mist may cause pitting and erosion of tooth enamel. Sulfuric acid is not listed as a carcinogen by OSHA, NTP, IARC, ACGIH or the EU. IARC, the ACGIH and the NTP have concluded there is sufficient evidence that occupational exposure to strong inorganic acid mists containing sulfuric acid is carcinogenic or potentially carcinogenic to humans. (see Toxicological Information, Section 11)

Potential Ecological Effects: It is highly toxic to aquatic organisms and plant life but does not bioaccumulate or concentrate in the food chain. (see Ecological Information, Section 12)

EU Risk Phrase: R35 - Causes severe burns.

SECTION 4. FIRST AID MEASURES

Eye Contact: Immediately flush with warm, running water, including under the eyelids, for at least 15 minutes. Seek medical attention immediately. Flushing must begin immediately if permanent eye tissue damage is to be avoided.

Skin Contact: Immediately remove contaminated clothing and footwear under shower and thoroughly flush affected area. Seek immediate medical attention. Discard contaminated clothing, shoes and leather goods (e.g. watch bands, belts, etc.).

Inhalation: Remove victim from exposure area to fresh air immediately. If breathing has stopped, give artificial respiration. Medical oxygen may be administered, if available, where breathing is difficult. Seek medical attention immediately.

Ingestion: If victim is conscious and can swallow, dilute stomach contents with 2 to 4 cupfuls of water or milk. Do not induce vomiting. Seek medical attention immediately and bring a copy of this MSDS. Never give anything by mouth to an unconscious person.

SECTION 5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Sulfuric acid is not flammable or combustible. However, fires may result from the heat generated by contact of concentrated sulfuric acid with combustible materials. Sulfuric acid reacts with most metals, especially when diluted with water, to produce hydrogen gas which can accumulate to explosive concentrations inside confined spaces. It reacts violently with water and organic materials evolving a considerable amount of heat and is very hazardous when in contact with carbides, cyanides, and sulfides.

Extinguishing Media: Use dry chemical or carbon dioxide extinguishers. Use water spray to cool fire-exposed containers. Use water only if absolutely necessary and DO NOT USE WATER DIRECTLY ON ACID as a violent reaction may occur resulting in spattering of the acid.

Fire Fighting: Fire fighters must be fully trained and wear full protective clothing including an approved, self-contained breathing apparatus which supplies a positive air pressure within a full face-piece mask. For fires close to a spill or where vapors are present, use acid-resistant personal protective equipment.

Flashpoint and Method: Not Applicable.

Upper and Lower Flammable Limit: Not Applicable.

Autoignition Temperature: Not Applicable.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Procedures for Cleanup: Control source of release if possible to do safely. Contain spill, isolate hazard area, and deny entry to unauthorized personnel. Dike area around spill and pump uncontaminated acid back to process if possible. Neutralize spilled material with alkali such as sodium carbonate or sodium bicarbonate, soda ash, lime or limestone granules. If neutralized with lime rock or soda ash, good ventilation is required during neutralization because of the release of carbon dioxide gas. Allow to stand for 1-2 hours to complete neutralization, then absorb any liquid in solid absorbent such as vermiculite or clay absorbents. Place spilled material in suitable labeled containers for final disposal. Treat or dispose of waste spilled material and/or contaminated absorbent material in accordance with all local, regional and national regulations.

Personal Precautions: Acid resistant protective clothing and gloves. Sleeves and pant legs should be worn outside, not tucked into gloves and rubber boots. Use close-fitting safety goggles or a combination of safety goggles and a face shield where splashing is a possibility. Respiratory protection equipment should be worn where exposure to hazardous levels of mist or fume is possible.

Environmental Precautions: This product can pose a threat to the environment. Contamination of soil and water should be prevented. Keep spillage from entering ground, streams or sewers.

SECTION 7. HANDLING AND STORAGE

Store in a dry, cool, well-ventilated area away from incompatible substances. Keep in tightly closed containers which are appropriately labeled. Do not allow contact with water. Do not store near alkaline substances. Always practice good personal hygiene. Refrain from eating, drinking, or smoking in work areas. Thoroughly wash hands before eating, drinking, or smoking.

EU Safety Phrase(s): S26 - in case of contact with eyes, rinse immediately with plenty of water and seek medical advice; S30 - never add water to this product; S45 – In case of accident or if you feel unwell seek medical advice immediately (show the label where possible).

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Protective Clothing: Protective clothing and gloves as well as glasses, goggles or face shield. Appropriate protective clothing should be worn where any possibility exists that skin contact can occur. Use close-fitting safety goggles or a combination of safety goggles and a face shield where any possibility exists that eye contact can occur. An eyewash and quick drench should be provided. Workers should wash immediately when skin becomes contaminated and at the end of each work shift.

Ventilation: Use adequate local or general ventilation to maintain the concentration of sulfuric acid aerosol mists below recommended occupational exposure limits.

Respiratory Protection: Where sulfuric acid mists are generated and cannot be controlled to within acceptable levels, use appropriate NIOSH-approved respiratory protection equipment (a combination of a 42CFR84 Class N, R or P-100 particulate filter and an acid gas cartridge). Note: sulfuric acid mist also causes eye irritation at high concentrations and a full face respirator or supplied air respirator may be necessary in some cases.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Clear, Colorless, Oily Liquid	**Odor:** Odorless when cold	**Physical State:** Liquid	**pH:** Concentration dependant <0.1 (93% Sol'n), 0.3 (5% or 1N Sol'n)
Vapor Pressure: <0.04 kPa (<0.3 mm Hg) @ 25ºC	**Vapor Density:** 3.4 (air = 1)	**Boiling Point/Range:** 280°C	**Freezing/Melting Point/Range:** -35°C
Specific Gravity: 1.84	**Evaporation Rate:** Not Applicable	**Coefficient of Water/Oil Distribution:** No Data Available	**Odor Threshold:** > 1 mg/m³

Solubility in Water:
Completely soluble with generation of heat

SECTION 10. STABILITY AND REACTIVITY

Stability & Reactivity: Stable under normal temperatures and pressures. Decomposes at 340ºC into sulfur trioxide and water. Extremely reactive with metals, alkalis and many other organic and inorganic chemicals. Hazardous gases such as hydrogen cyanide, hydrogen sulfide and acetylene are evolved on contact with chemicals such as cyanides, sulfides and carbides. Contact with combustible organic matter may cause fire or explosion. Dilution with water generates excessive heat and spattering or boiling may occur. Always add acid to water, NEVER ADD WATER TO ACID.

Incompatibilities: Combustible materials, organic materials, oxidizers, amines, bases, water, excess heat, and metals .

Hazardous Decomposition Products: Sulfur dioxide, sulfur trioxide.

SECTION 11. TOXICOLOGICAL INFORMATION

General: Concentrated sulfuric acid exerts a strong corrosive action on all tissues due to its severe dehydration action (removing water from tissues). The severity of the chemical burn produced by the concentrated acid is proportional to the strength of the acid and the duration of contact. Burns are deep but typically not severely painful. Prolonged exposure to dilute solutions or acid mists may lead to irritation of the eyes and skin causing chronic conjunctivitis and dermatitis. Inhalation of sulfuric acid mist or fumes may result in irritation of the respiratory tract possibly leading to laryngeal spasm. Asthmatics may be more sensitive to inhaling sulfuric acid mists. IARC and the ACGIH have concluded there is sufficient evidence that occupational exposure to strong inorganic acid mists containing sulfuric acid is carcinogenic or potentially carcinogenic to humans.

Acute:
Skin/Eye: Splashes can cause severe eye burns and may cause irreversible eye injury and possible blindness. Skin contact results in severe burns and may result in permanent scarring. High levels of sulfuric acid mists and aerosols are also irritating to the eyes and skin.

Inhalation: Inhalation may cause severe irritation of the respiratory tract with sore throat, coughing, shortness of breath, laryngeal spasm and delayed lung edema. These symptoms may be aggravated by physical exertion.

Ingestion: Ingestion is unlikely in industrial use but will result in severe burns to the mouth, throat, esophagus and stomach which could lead to permanent damage to the digestive tract. Small amounts of acid can also enter the lungs during ingestion or subsequent vomiting and cause serious lung injury.

Chronic: Prolonged exposure to dilute solutions or mists may result in eye irritation (chronic conjunctivitis) and produce skin dermatitis. Exposure to high concentrations of acid mist has caused erosion and discoloration of the anterior teeth. Sulfuric acid is not listed as a carcinogen by OSHA, National Toxicology Program (NTP), International Agency for Research on Cancer (IARC), ACGIH or the EU. IARC has concluded that there is sufficient evidence that occupational exposure to strong inorganic acid mists containing sulfuric acid is carcinogenic to humans, resulting in an increased incidence of primarily laryngeal cancers. The ACGIH lists strong inorganic acid mists containing sulfuric acid as a suspect human carcinogen (A2) and the NTP have recently re-classified strong inorganic acid mists containing sulfuric acid to a known human carcinogen. OSHA and the EU do not list sulfuric acid mist as a carcinogen.

SECTION 12. ECOLOGICAL INFORMATION

Sulfuric acid is very corrosive and is highly toxic to aquatic and terrestrial life at low concentrations.

SECTION 13. DISPOSAL CONSIDERATIONS

Do not wash down drain or allow to reach natural watercourses. Dispose of neutralized waste consistent with regulatory requirements. If neutralized with lime rock or soda ash, good ventilation is required during neutralization because of the release of carbon dioxide gas.

SECTION 14. TRANSPORT INFORMATION

Proper Shipping Name Transport Canada and U.S. DOT	Sulfuric Acid
Transport Canada and U.S. DOT Hazard Classification	Class 8, Packing Group II
Transport Canada and U.S. DOT Product Identification Number	UN1830
Marine Pollutant	No
IMO Classification	Class 8

SECTION 15. REGULATORY INFORMATION

U.S.

Listed on TSCA Inventory: Yes

Hazardous Under Hazard Communication Standard: Yes

CERCLA Section 103 Hazardous Substances: Sulfuric Acid Yes RQ: 1000 lbs. (454 kg.)

EPCRA Section 302 Extremely Hazardous Substance: Yes RQ: 1000 lbs. (454 kg.)
Threshold Planning Quantity: 1000 lbs.

EPCRA Section 311/312 Hazard Categories: Immediate (Acute) Health Hazard - Corrosive
Immediate (Acute) Health Hazard - Highly Toxic

EPCRA Section 313 Toxic Release Inventory: Sulfuric Acid CAS NO. 7664-93-9
Percent by Weight: 93

CANADIAN:

Listed on Domestic Substances List: Yes

WHMIS Classification: Controlled Product, Classification D1A (Immediate & Serious Toxic Effects), E (Corrosive Material)

EUROPEAN UNION:

Listed on the European Inventory of Existing Commercial Chemical Substances (EINECS): Yes

EU Classification: Corrosive

SECTION 16. OTHER INFORMATION

The information in this Material Safety Data Sheet is based on the following references:

- American Conference of Governmental Industrial Hygienists, 1991, Documentation of the Threshold Limit Values and Biological Exposure Indices, 6th Edition plus updates.
- American Conference of Governmental Industrial Hygienists, 2002, Guide to Occupational Exposure Values.
- American Conference of Governmental Industrial Hygienists, 2003, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.
- Canadian Centre for Occupational Health & Safety CHEMINFO Record No. 122 - Sulfuric Acid, 2003-04.
- Commission de la santé et la sécurité du travail, Service du Répertoire toxicologique, Acide Sulfurique, 2000-03.
- European Economic Community, Commission Directives 91/155/EEC, 93/21/EEC, and 67/548/EEC.
- Industry Canada, Controlled Products Regulations SOR/88-66, as amended.
- International Chemical Safety Cards (WHO/IPCS/ILO), ICSC:0362 – Sulfuric Acid (Revised Oct 2000).
- Merck & Co., Inc., 2001, The Merck Index, An Encyclopedia of Chemicals, Drugs, and Biologicals, Thirteenth Edition.
- National Library of Medicine, National Toxicology Information Program, 2003, Hazardous Substance Data Bank.
- Patty's Toxicology, Fifth Edition, 2001: E. Bingham, B. Cohrssen & C.H. Powell, Ed.
- Sax, N. Irving, 1989, Dangerous Properties of Industrial Materials, Seventh Edition.
- U.S. Department of Health and Human Services, National Institute for Occupational Safety and Health. NIOSH Pocket Guide to Chemical Hazards. CD-ROM Edition DHHS (NIOSH) Publication No. 2001-145, August 2001.
- U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, Toxicological Profile for Sulfur Trioxide and Sulfuric Acid, December 1998.
- U.S. Occupational Safety and Health Administration, 1989, Code of Federal Regulations, Title 29, Part 1910.
- Urben, P.G., 1995, Bretherick's Handbook of Reactive Chemical Hazards, Fifth Edition.

Notice to Reader

Although reasonable precautions have been taken in the preparation of the data contained herein, it is offered solely for your information, consideration and investigation. Teck Cominco American Incorporated extends no warranty and assumes no responsibility for the accuracy of the content and expressly disclaims all liability for reliance thereon. This material safety data sheet provides guidelines for the safe handling and processing of this product; it does not and cannot advise on all possible situations. Therefore, your specific use of this product should be evaluated to determine if additional precautions are required. Individuals exposed to this product should read and understand this information and be provided pertinent training prior to working with this product.

1. **AGRICULTURAL TRACTOR**
2. **ASPHALT PAVING EQUIPMENT**
3. **CONCRETE PAVING EQUIPMENT**
4. **DRILL RIG**
5. **MULTI TERRAIN LOADER**
6. **ROUGH TERRAIN CRANE**
7. **TELEHANDLER**
8. **TRENCHERS**
9. **WHEEL LOADER**

Feature Model - Challenger®
MT765

- With more interior room than any other tractor in its size class, the cab features the latest technology in operator ergonomics.
- Linking the entire tractor together is the IntellitronicsTM network, an innovative electronic management system. The Intellitronics network enables the engine to communicate with the entire powertrain for smooth shifting, optimum power management and the most efficient use of fuel.

Row-Crop

Model	Drawbar Power	Width of Std. Track Belt	Maximum Operating Weight	Height	Length	Ground Clearance
Challenger® 35	149 hp	18 in	26750 lb	--	--	--
Challenger® 45	170 hp	18 in	26750 lb	--	--	--
Challenger® MT735	185 hp	18 in	36000 lb	132.8 in	236.6 in	23 in
Challenger® 55	191 hp	18 in	26750 lb	--	--	--
Challenger® MT745	201 hp	18 in	36000 lb	132.8 in	236.6 in	23 in
Challenger® MT755	229 hp	18 in	36000 lb	132.8 in	236.6 in	23 in
Challenger® MT765	241 hp	18 in	36000 lb	132.8 in	236.6 in	23 in

Tillage

Model	Drawbar Power	Width of Std. Track Belt	Maximum Operating Weight	Height	Length	Ground Clearance
Challenger® 65E	226 hp	25 in	--	--	--	--
Challenger® 75E	248 hp	25 in	--	--	--	--
Challenger® 85E	274 hp	25 in	--	--	--	--
Challenger® 95E	299 hp	25 in	--	--	--	--
Challenger® MT835	340 hp	--	60000 lb	138 in	269 in	16.8 in
Challenger® MT845	380 hp	--	60000 lb	138 in	269 in	16.8 in
Challenger® MT855	450 hp	--	60000 lb	138 in	269 in	16.8 in
Challenger® MT865	500 hp	--	--	138 in	269 in	16.8 in

Earthmover

Brand	Model	Type	Size	Description	Required Horsepower
Icon	18dB	Pull	18 yd	earth mover	300

FABICK CAT

Paving Equipment
Asphalt

Mobil-Trac System

Sales & Rental

Feature Model - BG-2455C

- The Mobil-trac System provides the flotation of tracks and the mobility of wheels for greater job flexibility.
- Productivity and quality enhancements are built-in features of the BG-2455C feeder/auger control system.
- Slower running feeders reduce wear and segregation.

Model	Flywheel Power	Operating Weight	Maximum Paving Width	Maximum Paving Speed	Belt Contact Length	Shipping Length
AP-655C	158 hp	40800 lb	15.5 ft	246 ft/min	11.9 ft	22.3 ft
AP-1055B	158 hp	44100 lb	24.17 ft	200 ft/min	9.92 ft	21.58 ft
BG-2455C	158 hp	44100 lb	24.17 ft	200 ft/min	9.92 ft	21.58 ft

FABICK CAT

Paving Equipment
Concrete

Paver

Sales & Rental

Brand	Model	Operating Weight	Standard Paving Width	Gross Engine Power	Max Paving Speed
Gomaco	Commander III (four track)+	33,400 lb	16.0 ft	169 hp	44.0 fpm
Gomaco	GP-4000-2T	88,000 lb	12.0 ft	425 hp	36.6 fpm
Gomaco	GP-4000-4T	115,000 lb	12.0 ft	425 hp	36.6 fpm
Gomaco	GT-6300-4t-Slipform	28,500 lb	12.0 ft	140 hp	28.0 fpm
Gomaco	GHP-2800-2T	70,000 lb	25.0 ft	335 hp	122.0 fpm
Gomaco	GHP-2800-4T	80,000 lb	25.0 ft	335 hp	73.0 fpm
Gomaco	GP-2600-2T	75,000 lb	18.6 ft	275 hp	69.5 fpm
Gomaco	GP-2600-4T	79,000 lb	18.6 ft	275 hp	57.8 fpm

FABICK CAT

DELMAG

DESIGNED to be DIFFERENT, with Results that DELIVER!

DELMAG

RIGS DESIGNED FOR HARD DRILLING CONDITIONS

RIGS DESIGNED TO DRILL MANY DIFFERENT APPLICATIONS

DELMAG DRILLING RIGS

DELMAG HISTORY

Delmag in Germany has been manufacturing construction equipment since 1922 and drilling rigs for over thirty years. The experience gained, along with customer input, has resulted in a job site tested, multi-purpose rig with many different applications for the shoring and foundation industry. Delmag has opened its office and workshop in California and has dealers in the Midwest and East Coast to ensure timely backup and spare parts delivery for its customers.

DELMAG MASTS

Mast crowd and pullback are created through winches mounted parallel to the mast, to reduce friction and increase the life of the kelly and crowd/pullback ropes

Hydraulic mast foot

Lower mast section for longer stroke & hydraulic mast foot

Remove lower mast section for larger drilling diameters

Mast crown folds down for transport hydraulically

Drive under obstacles in minutes

Mast folds down and re-erects under obstacles

Large batter pile angles

9.5° inclination

DELMAG FEATURES

Control panel mounted to obtain an unobstructed view from the cabs, which increases productivity and safety

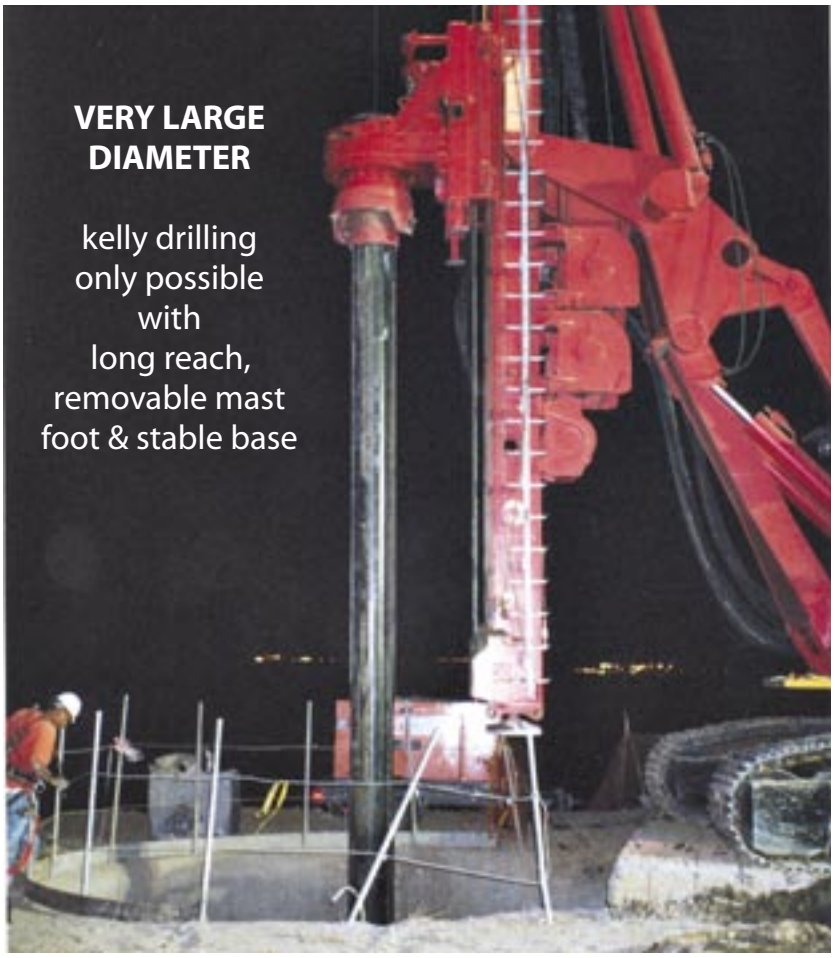
An additional 20ft stroke kelly extension can be added for CFA, or full displacement work

Up to 55ft mast stroke for CFA or full displacement piles

If required, counter weights are removable for transport

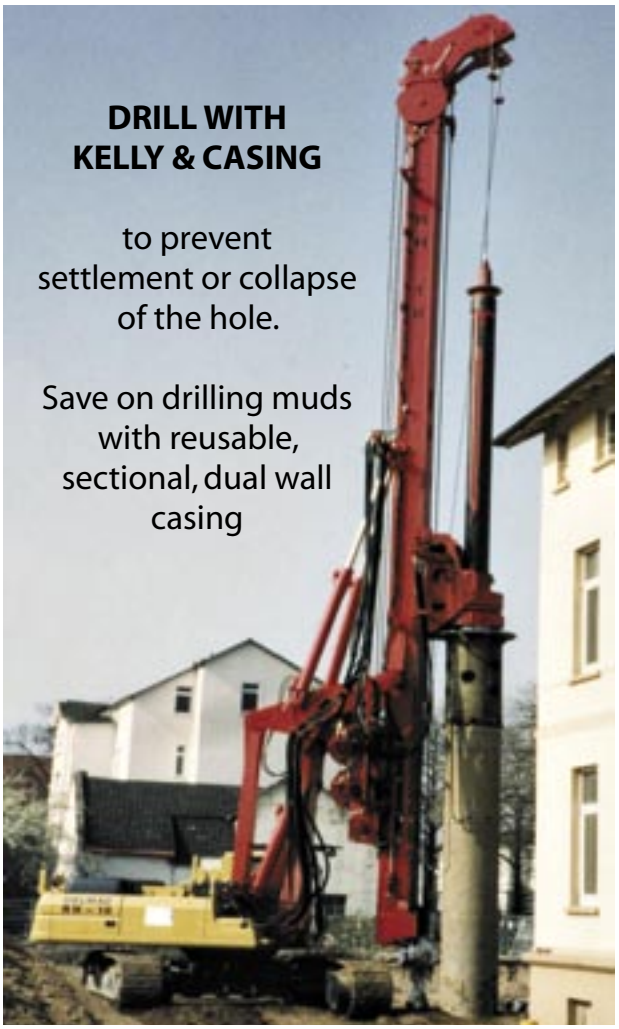
Telescopic, reinforced undercarriage, oscillator hookup ready

KELLY DRILLING APPLICATIONS



VERY LARGE DIAMETER

kelly drilling only possible with long reach, removable mast foot & stable base



DRILL WITH KELLY & CASING

to prevent settlement or collapse of the hole.

Save on drilling muds with reusable, sectional, dual wall casing

OSCILLATOR READY DRILL RIGS

Physical and hydraulic connections for oscillators

Drill up to 20,000 PSI **hard rock**

DRILLING APPLICATIONS NO KELLY

AUGER CAST PILES

PART DISPLACEMENT PILES

FULL DISPLACEMENT PILES

DOWN THE HOLE HAMMER

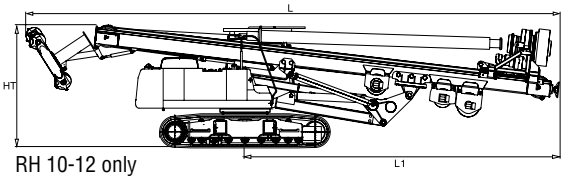
DUAL ROTARY HEAD

The long strokes of up to 55ft and 75ft with extensions allow drilling with many different drilling tools from soft, collapsing soils, to hard rock with varying amounts of spoils

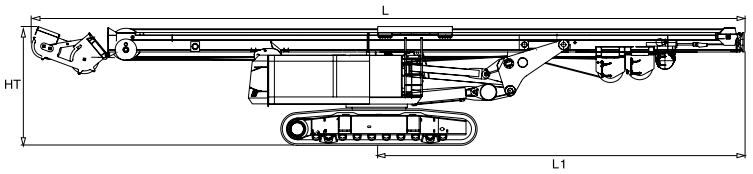
SOIL MIXING

DELMAG RIG MODELS & SPECIFICATIONS

DESCRIPTION		RH10-12	RH14	RH18	RH26	RH30
MAST						
Inclination forward/backward	degree	3.8/14°	3.8/14°	3.8/14°	3.8/14°	3.8/14°
Inclination right/left	degree	3.0/9.5°	9.5/9.5°	9.5/9.5°	9.5/9.5°	9.5/9.5°
CROWD WINCH						
Extraction force standard/optional	kN lbs	160/200 36,000/45,000	200 44,962	300 67,433	420 94,420	420 94,420
Crowd force	kN lbs	102 22,931	120 26,977	150 33,721	300 67,443	300 67,443
Rapid speed up-down	m/min ft/min	30 98	26 84	25 82	17.5 57	28.5/28.5 93
Working speed up-down	m/min ft/min	6 19	4.2 13	7 23	3.3 10'10"	5.5/5.5 18
KELLY WINCH						
Line pull standard/optional	kN lbs	100/120 22,500/27,000	100/120 22,500/27,000	150 33,721	210 47,210	210 47,210
Cable diameter	mm inch	19 3/4"	19 3/4"	24 15/16"	28 1 1/10"	28 1 1/10"
Cable speed/optional	m/min ft/min	58 190	64 209	70/100 229/328	57/80 187/262	57/80 187/262
AUXILIARY WINCH						
Line pull	kN lbs	42 9,442	55 12,364	75 16,861	75 16,861	75 16,861
Cable diameter	mm inch	16 5/8"	16 5/8"	18 3/4"	18 3/4"	18 3/4"
Cable speed/optional	m/min ft/min	50 164	66 216	30/60 98/196	30/60 98/196	30/75 98/196
CARRIER UNIT		**CAT 320C**	**CAT 325C**	**CAT 330C**	**CAT 330C**	**SEN SR50 BT**
Power	kW Hp	151 205	187 254	250 340	250 340	365-420 420-570
Standard track shoe width	m/min ft/min	600 23 1/2"	800 31 1/2"	750 29 1/2"	800 31 1/2"	800 31 1/2"
Track speed	km/h m/hr	2.5 1 1/2	2 1 1/4	2 1 1/4	2 1 1/4	2 1 1/4
TRANSPORT WEIGHT & DIMENSIONS						
With counterweight (approximate)	kg lbs	34,500-39,700 75,900-87,340	45,000 99,000	61,000 134,200	76,000 167,200	78,000 171,600
Without counterweight (approximate)	kg lbs	29,000 63,800	34,500 75,900	50,000 110,000	61,700 135,740	63,700 140,140
Length with long mast foot (L)	mm ft	14,170 46'6"	18,000 59'	19,300 63'4"	22,000 72'2"	22,000 72'2"
Length rig center to front (L1)	mm ft	8,270 27'2"	8,770 28'6"	11,050 36'3"	12,350 40'6"	11,200 36'9"
Height (HT)	mm ft	3,400 11'2"	3,300 10'7"	3,550 11'8"	3,600 11'10"	3,650 12'
Track width transport/operational (telescopic)	mm ft	2,550-3,650 8'5"-11'12"	3,000-4,300 9'10"-14'3"	3,000-4,450 9'10"-14'7"	3,000-4,560 9'10"-15'	3,200-4,700 10'6"-15'5"



RH 10-12 only



DRILL HEAD & KELLY BAR SPECIFICATIONS

DESCRIPTION		RH10-12	RH14	RH18	RH26	RH30
DRILL HEAD FOR KELLY BAR / CFA						
Torque, gear 1	Nm ft. lbs	120,000 88,500	144,000 110,000	180,000 130,000	260,000 191,620	300,000 221,100
Torque, gear 2	Nm ft. lbs	N/A N/A	optional optional	optional optional	130,000 95,810	150,000 11,550
Max speed, gear 1/gear 2	RPM	46/NA	32/optional	38/optional	28/55	24/48
Weight	kg lbs	2,850 6,270	3,200 7,040	4,500 9,900	6,000 13,200	6,500 14,300
Height	mm ft	1,845 6' 1/2"	2,000 6' 6"	1,970 6' 6"	2,170 7' 2"	2,170 7' 2"
Width	mm ft	980 3' 3"	950 3' 1"	1,290 4' 3"	1,320 4' 4"	1,320 4' 4"
Depth	mm ft	1,400 4' 7"	1,265 4' 1"	1,565 5' 2"	1,640 5' 5"	1,640 5' 5"
Distance from mast to drill center	mm inch	825 32 1/2"	800 33 1/2"	1,045 41"	1,100 43 1/3"	1,100 43 1/3"
DRILL HEAD (DOUBLE HEAD)		Not separable		Separable heads		
Lower drill head - Casing Drive						
Torque, max.	Nm ft. lbs	60,000 44,220	60,000 44,220	120,000 88,440	120,000 88,440	160,000 117,920
Max speed	RPM	15	15	26	26	36
Center hole through lower drill head	mm inch	100 4"	100 4"	630 24 3/4"	630 24 3/4"	830 32 5/8"
Upper drill head - Auger Drive						
Torque, max.	Nm ft. lbs	35,000 25,795	35,000 25,795	60,000 44,200	60,000 44,200	100,000 73,700
Max speed	RPM	30	30	42	42	28
Height	mm ft	3,371 11'	3,371 11'	3,400 10' 11"	3,400 10' 11"	4,350 14' 3"
Width	mm ft	880 2' 11"	880 2' 11"	1,300 4' 3"	1,300 4' 3"	1,730 5' 8"
Depth	mm ft	793 2' 7"	793 2' 7"	1,400 4' 7"	1,400 4' 7"	1,600 5' 3"
Stroke between lower & upper drill heads	mm inch	300 12"	300 12"	500 19 3/4"	500 19 3/4"	500 19 3/4"
KELLY BARS		Drill depth achieved with 2m (6ft) auger				
Standard 3 part kelly used with casing	m ft	15 49	15 49	23.7 78	23 75	27 89
Longest kelly bar, 3 part	mm ft	25 82	40 131	47.5 156	53.4 175	55.5 182
Longest kelly bar, 4 part, reduced torque	mm ft	N/A N/A	N/A N/A	61.9 203	73 238	75 247





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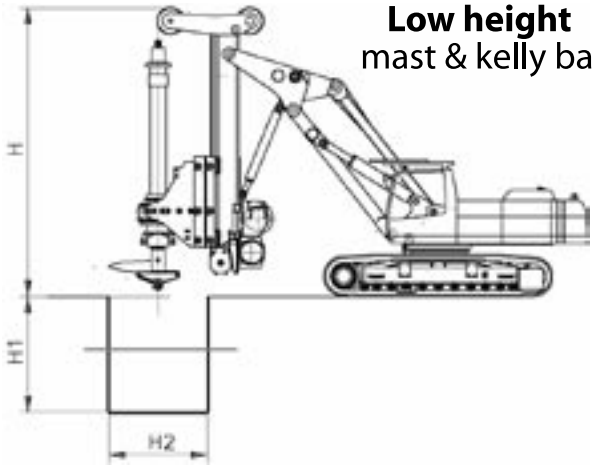
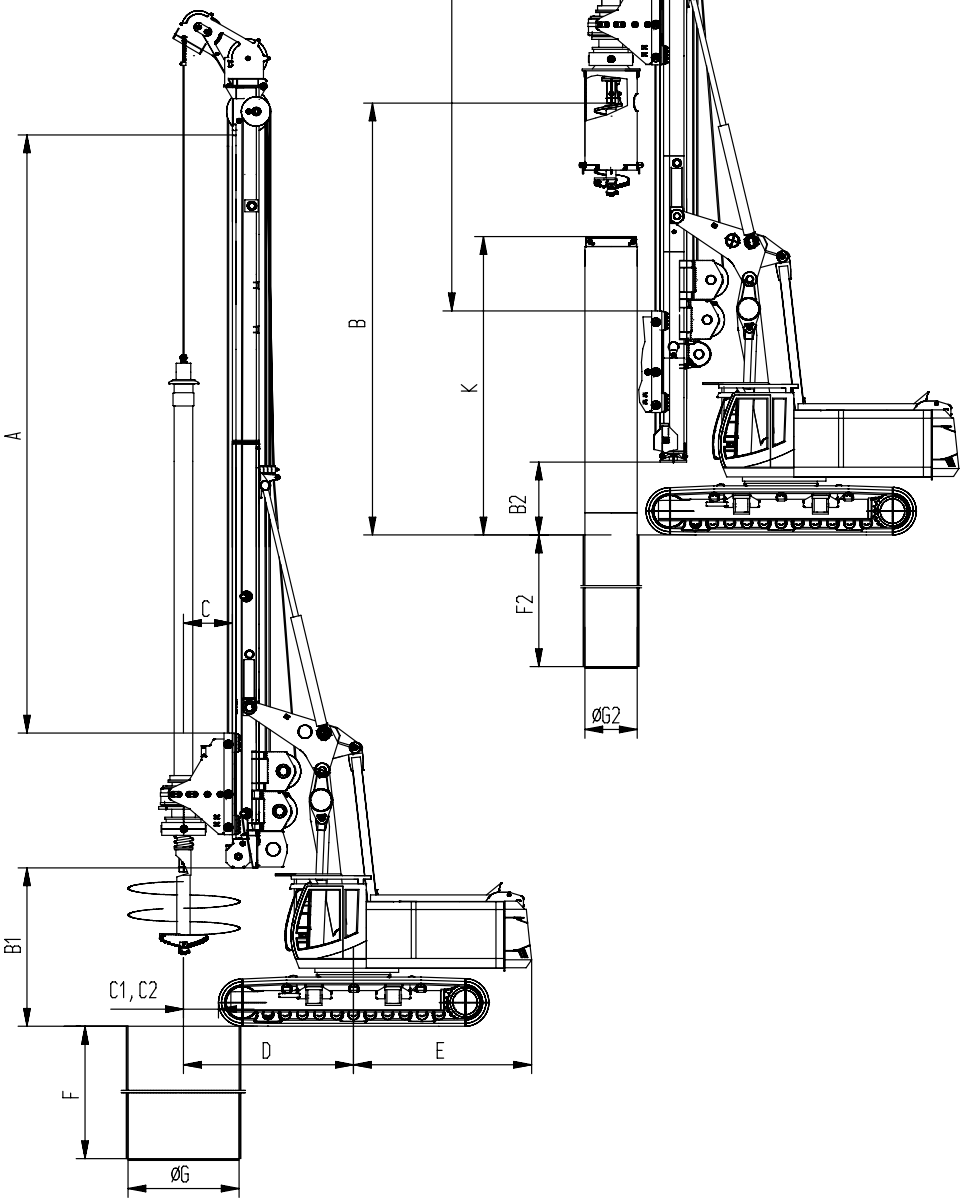
KELLY DRILLING WORKING DIMENSIONS

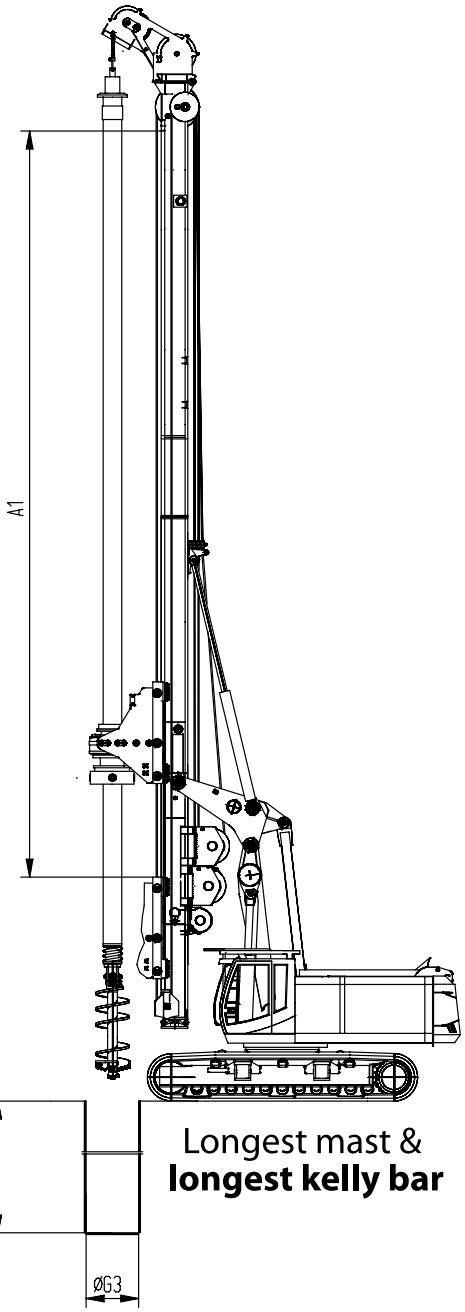
Longest mast & standard kelly for **casing drilling**



Low height mast & kelly bar

Standard mast foot removed for **large diameter**





Longest mast & **longest kelly bar**

*** Figures in ft. are approximate as they are converted from metric dimensions.**

DESCRIPTION OF DIMENSIONS

Kelly Bar Drilling			RH10-12	RH14	RH18	RH26	RH30
Mast stroke, standard mast, short mast foot	mm ft	A	8,900 29' 2"	11,100 36' 5"	11,250 36' 10"	13,300 43' 7"	13,300 43' 7"
Length of mast extension (RH10 no extra stroke)	mm ft		2,000 6' 6"	1,800 5' 10"	1,800 5' 10"	1,800 5' 10"	2,500 8' 4"
Mast stroke with extended mast, long mast foot	mm ft	A1	9,900 32' 5"	12,500 41'	15,000 49' 2"	16,800 55' 1"	17,500 57' 4"
Max. length from floor to kelly bar, mast closest to rig	mm ft	B	5,500 18'	7,800 25' 7"	8,300 27' 2"	9,450 31'	9,680 31' 9"
Length from floor to short mast foot	mm ft	B1	2,160 7'	2,560 8' 4"	3,470 11' 4"	3,380 11'	3,560 11' 8"
Max. length from floor to long mast foot	mm ft	B2	950 3' 1"	1,340 4' 4"	1,300 4' 3"	1,460 4' 9"	1,640 5' 4"
Ceterline drill to mast	mm ft	C	845 2' 9"	875 2' 10"	1,045 3' 5"	1,100 3' 7"	1,100 3' 7"
Front of tracks to centerline drill, mast closest to rig	mm ft	C1	690 2' 3"	450 1' 5"	1,080 3' 6"	1,060 3' 5"	800 2' 7"
Front of tracks to centerline drill, mast farthest from rig	mm ft	C2	1,250 4' 1"	1,400 4' 7"	1,630 5' 4"	1,640 5' 4"	1,710 5' 7"
Turning radius front, mast closest to rig	mm ft	D	2,960 9' 8"	2,950 9' 8"	3,650 11' 11"	4,060 13' 3"	3,740 12' 3"
Turning radius rear	mm ft	E	2,900 9' 6"	3,050 10'	3,660 12'	3,810 12' 6"	4,100 13' 5"
Max. drill depth with 6 ft long auger	mm ft	F	16,600 54' 5"	23,670 77' 7"	24,700 81'	27,870 91' 5"	27,700 90' 10"
Max. drilled diameter within drill parameters	mm ft	G	3,200 10' 6"	3,500 11' 5"	4,100 13' 5"	4,100 13' 5"	4,300 14' 1"
Max. depth casing w/standard kelly bar & 20 ft casing	mm ft	F2	15,600 51' 2"	23,500 77' 1"	24,250 79' 6"	27,700 90' 10"	27,700 90' 10"
Max. OD casing	mm ft	G2	1,000 3' 3"	1,500 4' 11"	1,500 4' 11"	1,800 5' 10"	1,800 5' 10"
Max. depth, longest 3 part kelly bar with 6 ft auger	mm ft	F3	25,000 82'	40,600 133' 2"	47,500 155' 10"	53,400 175' 2"	55,000 180' 5"
Max. depth, longest 4 part kelly bar with 1/2 torque	mm ft	F3	N/A N/A	N/A N/A	61,900 203'	72,500 237' 10"	75,300 247'
Max. OD hole, with 6 ft long auger	mm ft	G3	1,200 3' 11"	1,500 4' 11"	1,500 4' 11"	1,800 5' 10"	1,800 5' 10"
Max. length casing w/standard kelly bar & 6 ft auger	mm ft	K	4,000 13' 1"	5,000 16' 4"	6,000 19' 8"	6,000 19' 8"	6,000 19' 8"
Floor to CFA plate, drill head fully stroked down	mm ft	L	1,600 5' 3"	2,500 8' 2"	2,200 7' 2"	2,520 8' 3"	2,720 8' 11"
Low Height Kelly Bar Drilling			**RH10-12**	**RH14**	**RH18**	**RH26**	**RH30**
Floor to top of drill rig	mm ft	H	7,315 24'	upon request	upon request	7,315 24'	7,315 24'
Max. drill depth with short bar, 3 fold, 24 ft headroom	mm ft	H1	13,000 42' 7"	upon request	upon request	13,000 42' 7"	13,000 42' 7"
Max. drill diameter	mm ft	H2	2,200 7' 2"	upon request	upon request	2,500 8' 2"	2,500 8' 2"





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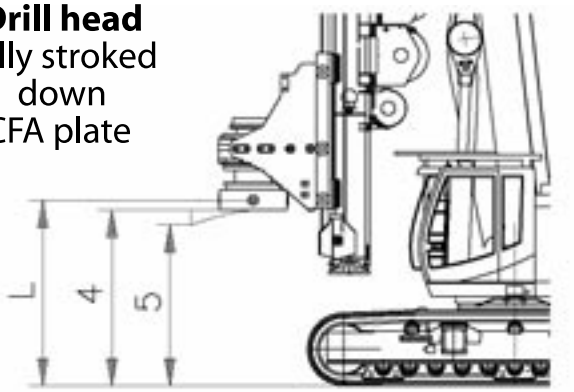
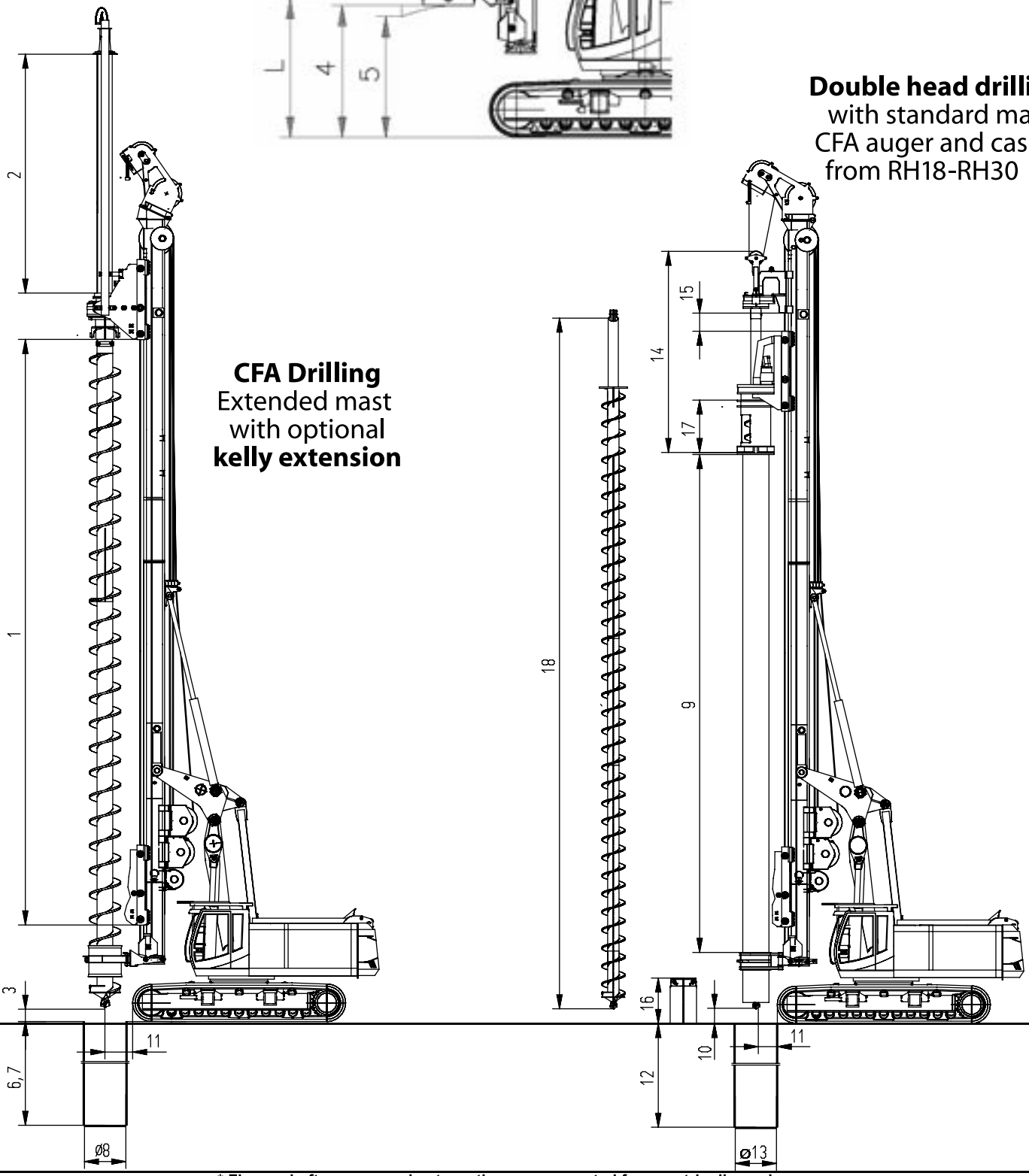
CFA & DOUBLE HEAD DRILLING WORKING DIMENSIONS

Drill head
fully stroked
down
CFA plate



Double head drilling
with standard mast
CFA auger and casing
from RH18-RH30

CFA Drilling
Extended mast
with optional
kelly extension



*** Figures in ft. are approximate as they are converted from metric dimensions.**

DESCRIPTION OF DIMENSIONS

CFA, part & full displacement auger			RH10-12	RH14	RH18	RH26	RH30
Stroke with mast extension and long mast foot	mm ft	1	9,900 32' 5"	12,500 41'	15,000 49' 2"	16,800 55' 1"	17,500 57' 4"
Kelly extension (add to 1)	mm ft	2	N/A N/A	4,000 13' 1"	4,000 13' 1"	6,000 19' 8"	6,000 19' 8"
Max. length from floor to auger, mast closest to rig	mm inch	3	300 11"	300 11"	300 11"	300 11"	300 11"
Height of auger above ground, 0 stroke, mast close	mm ft	4	1,450 4' 9"	2,335 7' 7"	2,120 6' 11"	2,330 7' 7"	2,720 8' 11"
Height of auger above ground, 0 stroke, mast far	mm ft	5	1,400 4' 7"	2,135 7'	1,990 6' 6"	2,320 7' 7"	2,455 8'
Drill depth without kelly extension, position 4	mm ft	6	9,600 31' 6"	12,200 40'	14,500 47' 6"	16,300 53' 5"	17,200 56' 5"
Drill depth with max. kelly extension	mm ft	7	N/A N/A	16,200 53' 1"	18,500 60' 8"	22,300 73' 1"	23,200 76' 1"
Max. drill diameter	mm ft	8	1,400 4' 7"	1,500 4' 11"	1,700 5' 6"	1,800 5' 10"	1,800 5' 10"





Double Head Drilling			Not separable	Separable heads		
Max. stroke with mast extension	mm ft	9	Please contact your dealer	12,400 40' 8"	16,000 52' 5"	16,200 53' 1"
Max. length from floor to auger, mast closest to rig	mm ft	10	Please contact your dealer	600 1' 11"	600 1' 11"	700 2' 3"
Reach in front of tracks	mm ft	11	Please contact your dealer	1,000 3' 3"	925 3'	640 2' 1"
Max. drill depth, double head system w/mast extension	mm ft	12	Please contact your dealer	10,700 35' 1"	14,300 46' 11"	14,500 47' 6"
Max. OD casing diameter	mm ft	13	Please contact your dealer	700 2' 3"	700 2' 3"	880 2' 10"
Length of double head	mm ft	14	Please contact your dealer	4,860 15' 11"	4,860 15' 11"	5,640 18' 6"
Relative stroke between head when connected	mm ft	15	Please contact your dealer	500 1' 7"	500 1' 7"	500 1' 7"
Length casing sticks out of ground	mm ft	16	Please contact your dealer	500 1' 7"	1,300 4' 3"	1,200 3' 11"
Length of casing drive adapter	mm ft	17	Please contact your dealer	1,460 4' 9"	1,460 4' 9"	1,560 5' 1"
Length of auger/inner drill rod w/mast extension	mm ft	18	Please contact your dealer	14,600 47' 10"	18,200 59' 8"	18,400 60' 4"

DELMAG




BACKUP & SERVICE

Our rental fleet can function as an additional backup for our customers

DELMAG's yard in Benicia, California

DELMAG SUPPORT

- Trained technicians to service the rigs
- Huge parts inventory for fast spares
- Experienced personnel to consult
- In-stock tooling for hard rock
- Fabrication facility for adapters & other tooling such as CFA
- Most models built on CAT carriers makes maintenance and obtaining spares easy

Part of the ABI-DELMAG workshop

YOUR LOCAL DEALER:

CONTACT US:

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ABI-DELMAG, Inc
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www.abi-delmag.com info@abi-delmag.com

MANUFACTURING HQ:
DELMAG, GmbH

Tel# 49-711-3100-0 Fax# 49-711-3100-254
Max-Planck-Str 3, Esslingen, Germany 73730
www.delmag.de info@delmag.de

SALES - RENTAL - CONSULTING - TOOLING

Feature Model - 287B

- World-class operator station provides exceptional working comfort with excellent visibility, enhanced fingertip controls and optimum instrumentation.
- The unique rubber track undercarriage provides low ground pressure, stability, high traction, fast travel and suspension.
- The Caterpillar hystat power train delivers aggressive performance and easy operation.
- Designed and built for operation in the toughest working conditions requiring vertical lifting capabilities.
- The hydraulic system has built-in reliability and provides exceptional lift, breakout and auxiliary power to work tools.

Model	Flywheel Power	Operating Capacity	Tipping Load	Operating Weight	Overall Height	Shipping Length
247B	57 hp	1950 lb	3907 lb	6668 lb	78 in	129 in
257B	57 hp	2310 lb	4622 lb	7559 lb	80 in	137 in
267B	70 hp	2900 lb	5800 lb	9371 lb	82 in	145 in
277B	78 hp	2950 lb	5900 lb	9411 lb	82 in	145 in
287B	78 hp	3600 lb	7200 lb	10275 lb	84 in	145 in

Worktools

Augers
1700 lbf ft
3040 lbf ft
5034 lbf ft

Blades
Angle 72, 84 in

Buckets

Dirt	54-72 in
General Purpose	60-78 in
Industrial Grapple	60-78 in
Light Material	72, 84 in
Multi-Purpose	60-78 in
Utility	60-72 in
Utility Grapple	66, 72 in

Backhoes
3280 lb
4148 lb

Brooms
Angle 84 in
Pick Up 60, 72 in

Cold Planers
12 in
16 in
24 in
32 in

TEREX

Rough Terrain Crane Features | RT200/RT200XL

ROUGH TERRAIN
RT200/200XL

FEATURES

- 20-30 ton (18-27 mt) maximum lifting capacity
- 94' (28.6 m) or 100' (30.5 m) maximum boom length
- 141' (43.0 m) or 147' (44.8 m) maximum tip height
- Four-section full power, mechanically synchronized boom with single lever control
- Swingaway jib offsettable 0˚, 15˚ or 30˚
- Two-speed main and auxiliary winches
- Quick-reeving boom head and hook block
- Fully independent multi-position out and down outriggers
- Environmental operator's cab optimizes load visibility and productivity
- RCI 510 load system Rated Capacity Indicator
- Easy access for routine servicing of the engine, transmission, batteries, etc. provided by hinged lockable access doors
- Easy to read load chart books include range diagrams
- 12-month or 2000 hours warranty, major weldments are five-years or 10,000 hours

TEREX

ROUGH TERRAIN CRANE

RT200/200XL

RT200/200XL

ROUGH TERRAIN CRANES

RT220/RT200XL - 20 tons (18 mt)
RT250/RT250XL - 25 tons (23 mt)
RT275/RT275XL - 27.5 tons (25 mt)
RT230/RT230XL - 30 tons (27 mt)

FEATURES

- 94' (28.6 m) or 100' (30.5 m). Four section, full-power, mechanically synchronized boom with single lever control
- High strength, four plate construction welded inside and out with embossed side plate holes to reduce weight and increase strength.
- Single boom hoist cylinder provides boom elevation of -4° to 76° for easier reeving changes and close radius operation.
- Quick-reeving boom head; no need to remove wedge from socket.
- 360° house lock standard.

ENVIRONMENTAL OPERATOR'S CAB

- Rated Capacity Indicator (RCI) system including anti-two block system with automatic function disconnects.
- Deluxe six-way adjustable operator's seat has torsion bar suspension and adjustable head and arm rests.
- Sound and weather insulated for comfort.
- Removable front window, hinged tinted glass skylight, and sliding right-hand window.
- Dash-mounted controls for swing, boom telescope, boom hoist, and single lever two-speed main winch; pedals for swing brake and boom hoist. Foot accelerator with hand throttle.
- Complete instrumentation. Environmentally-sealed rocker switches. Circuit breakers in cab.

RUGGED EASY-TO-MANEUVER CARRIER

- Box-type chassis construction with reinforcing cross members.
- Range-shift type power-shift transmission with integral torque converter; neutral start; six speeds forward, six reverse.
- Hydraulic four-wheel power steering for two wheel, four wheel or crab steer.
- Full air over hydraulic drum type brakes with air dryer.
- Fully independent hydraulic outriggers may be utilized fully extended to 19' (5.79 m) in their 1/2 extended position, or fully retracted.
- Tail swing only 9' (2.74 m).
- Standard Cummins 6BT5.9 diesel engine. Easy access for routine servicing of the engine, transmission, batteries, etc. is provided by hinged lockable access doors without the need to unbolt access panels.
- Engine compartment access doors (4), and operators cab are all keyed alike.
- All outside compartments and fluid reservoir access doors/caps have lockable latches or are equipped with padlock hasps.
- Standard 20.5 x 25 24 P.R. tires.
- Tachometer and rear axle centering light standard.

POWERFUL TWO-SPEED WINCHES

- 474 fpm (144 m/min) maximum line speed, 12,510 lb (5 673 kg) maximum line pull. Single lever control.
- Integral automatic brake.
- Electronic drum indicators.
- Grooved drum, tapered flanges, and spring loaded cable roller for improved spooling.

HIGH CAPACITY, DEPENDABLE HYDRAULIC SYSTEM

- Three gear pumps driven off the transmission. Combined system capability is 113 gpm (428 lpm).
- Hydraulic reservoir with 94 gal (355 L) capacity and full flow oil filtration system.

OPTIONS INCLUDE

- 72' (21.9 m) main boom
- 26' or 26 to 43' (7.92 or 7.92 to 13.11 m) swing-on jib. Both offset 0°, 15° or 30°.
- Auxiliary winch with rope.
- Heater/defroster, air conditioner.
- Cold weather starting aid.
- 16.00 x 25, 28 P.R. tires.

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Telehandlers

Sales & Rental

Feature Model - TH580B

- The operator station provides comfort and protection with excellent job site visibility and convenient, logical controls.
- Ease of operation was paramount in the design of the new TH580B. The single joystick with its intuitive, modulated, hydraulic functions, and the new Cat electronic machine information display are designed to maximize operator efficiency.
- The TH580B delivers high performance to meet your specific job site needs.
- Cat engines, axles and transmissions give you the quality power train that you expect.

Model	Flywheel Power	Maximum Lift Capacity	Maximum Lift Height	Maximum Reach	Capacity at Maximum Reach	Operating Weight
TH210	83 hp	4850 lb	17 ft	9.2 ft	2200 lb	12450 lb
TH215	83 hp	5500 lb	18.1 ft	10.2 ft	2200 lb	12668 lb
TH220B	94.9 hp	5500 lb	20 ft	10.5 ft	3300 lb	14771 lb
TH330B	94.9 hp	7000 lb	24 ft	12.5 ft	2750 lb	15470 lb
TH340B	94.9 hp	6600 lb	30 ft	21.3 ft	1320 lb	16970 lb
TH350B	94.9 hp	6600 lb	36 ft	24 ft	1750 lb	18700 lb
TH360B	94.9 hp	7000 lb	44.3 ft	30.2 ft	1250 lb	20800 lb
TH460B	94.9 hp	9000 lb	44.3 ft	30.2 ft	1800 lb	24978 lb
TH560B	94.9 hp	11000 lb	44.25 ft	30.2 ft	4000 lb w/stabilizer	26450 lb
TH580B	117.5 hp	11000 lb	56 ft	42 ft	1650 lb w/stabilizer	30100 lb

Worktools

Buckets

General Purpose	95 in
Grapple	90 in
Light Material	98,106 in
MH	94 in
Multi Purpose	94 in

Forks

Block 48 in
Pallet 48, 60 in

Self Tipping Hoppers

Width 40 in

Carriages

48, 74 in

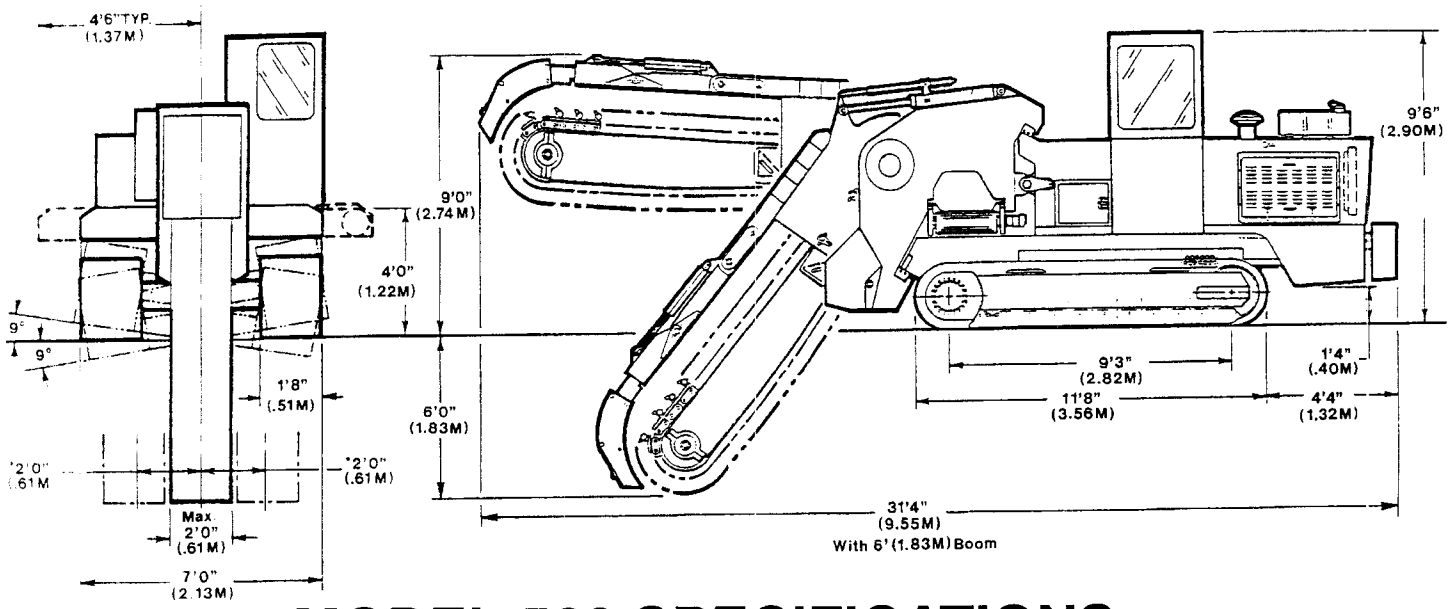
Lifting Hooks

Capacity 10000 lb

Truss Booms

Lifting Capacity 1102 lb

FABICK CAT



MODEL 560 SPECIFICATIONS

APPROXIMATE WEIGHT: 24,000 - 35,000 lbs. (10,886 - 13,608 kg)

DIGGING CAPACITY: 8' (2.44m) Maximum digging depth, 8" - 24" widths in 2" increments.

ENGINE: Cummins® 6BTA5.9, rated 177 hp @ 2,500 rpm. Adequate cooling capacity for 125º F. ambient temperature operation, heavy-duty two stage air cleaner system, muffler, rain cap, and tachometer. Fuel consumption is approximately 9 gallons per hour.

TRACKS: Heavy-duty crawler type, with 20 Ton rated components, on a long frame for good stability with 20" low profile, triple grouser shoes. Track adjusters are grease cylinder type with recoil spring for constant tension. Tracks are pivotally mounted to the mainframe to allow machine to maintain level on sloping terrain.

CRAWLER DRIVE: Separate hydrostatic systems for each track, directly driving a planetary speed reducer with the drive sprocket attached. No roller chains are used. Crawler speeds are variable from 0 to 2 mph. An automatic parking brake with a manual override is provided. Crawlers may be counter-rotated for increased maneuverability.

CONVEYOR: 24" belt width, hydraulically driven. Speed is infinitely variable up to 1000 feet per minute. Conveyor is hydraulically shiftable from side to side and reversible in direction.

BOOM HOIST: Dual, double-acting hydraulic cylinders provide boom hoist control, positive down-crowd, and adequate tail wheel clearance for transporting.

DIGGING CHAIN DRIVE: A hydrostatic transmission drives the headshaft through a planetary gearbox and fully enclosed, oil bath lubricated roller chain.

DIGGING CHAIN: Heavy-duty roller-type chain with attachment side bars to accept various widths of cutter plates with either cup cutters or conical carbide teeth.

TAILWHEEL: 20 inch diameter tailwheel mounted in heavy duty roller bearings.

DIGGING CHAIN ADJUSTER: Manually actuated adjuster with stepped plate to retain adjustment after desired tension is reached.

FUEL TANKS: Dual tanks with 150 gallon combined capacity for approximately 16 hours of continuous operation at full power without refueling.

HYDRAULIC RESERVOIR: 80 gallon capacity mounted to the side of the machine for easy accessibility.

• OPTIONAL EQUIPMENT •

Fully enclosed operator's cab

Air conditioning and heating units for cab

Hydraulic fold up crumbshoe (Digging chain guard is standard.)

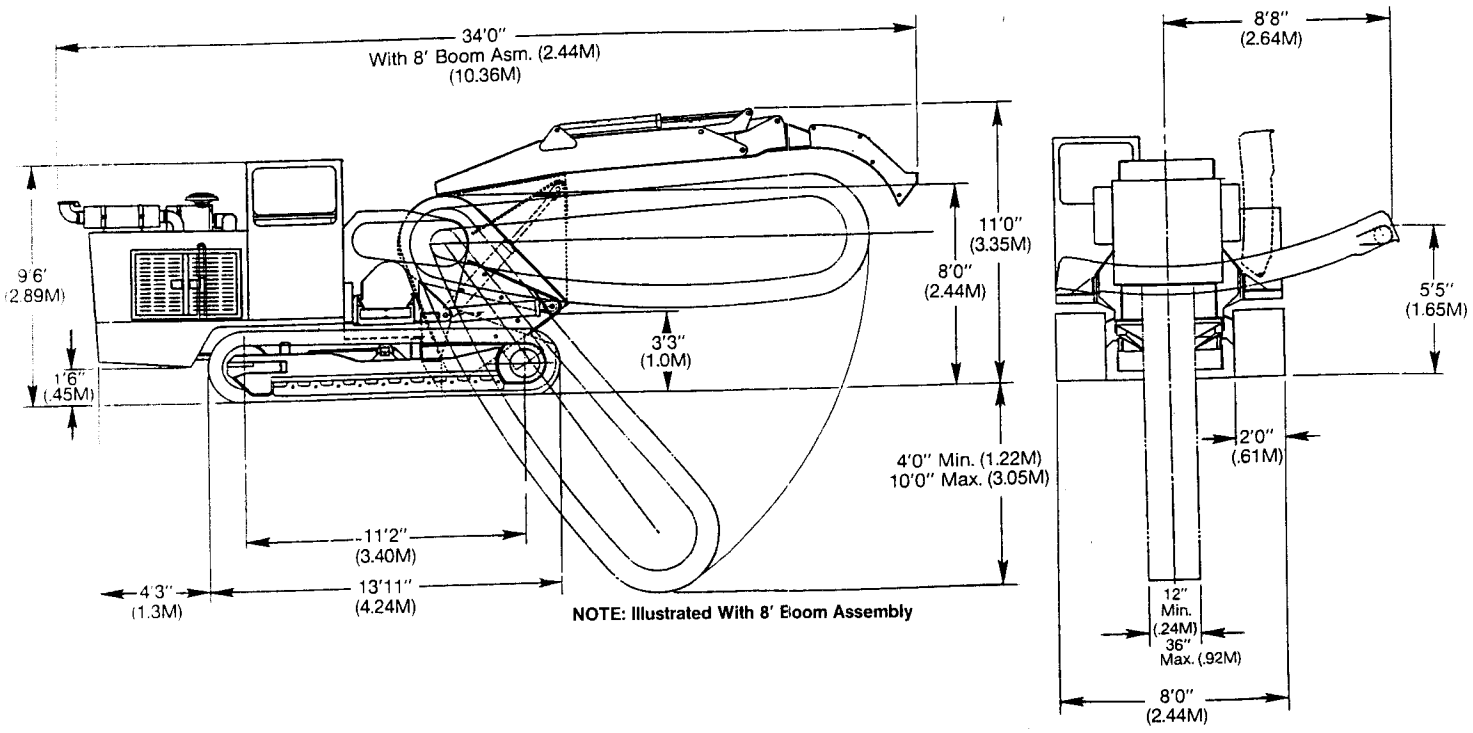
Full grouser track shoes

Automatic steering and/or grade control

Rocksaw attachment for 36" depth and 4½" to 8" widths

Side-shiftable digging chain attachment. (Pat. No. 5.070.632)

TRENCOR inc.
an Astec company



MODEL 860B SPECIFICATIONS

APPROXIMATE WEIGHT: 62,000 to 68,000 pounds

DIGGING CAPACITY: Trench widths of 10" through 36" up to 8 feet deep and widths of 10" through 24" up to 10 feet deep.

ENGINE: Caterpillar Model 3306B-DITA diesel, rated 300 HP @ 2100 rpm: equipped with a cooling system for 125 degree ambient temperature operation, heavy-duty two stage air cleaner system, muffler with rain cap, and tachometer. Fuel consumption is 17 gallons per hour.

CRAWLERS: Caterpillar D-5 components on long frames rigidly attached to mainframe. Crawler rollers are oil filled and sealed. Track adjusters are true Caterpillar type with recoil spring. Standard track shoes are 24" triple grouser type.

CRAWLER DRIVE: Separate hydrostatic transmission for each track directly driving a planetary speed reducer. No chain reductions used. An automatic parking brake with a manual override is provided. Maximum travel speed is 2 MPH. All drive chains and sprockets are fully enclosed and oil bath lubricated.

CONVEYOR: Arc type with 24 inch wide, center-guided conveyor hydraulically driven from both ends. Speed is infinitely variable from 0 up to 1000 fpm. Conveyor is hydraulically shiftable from side to side and is reversible in direction. An automatically engaged anti-drift brake is provided on the shift mechanism.

BOOM HOIST: Dual double acting hydraulic cylinders mounted to the substructure provide boom hoist control, positive down-crowd, and adequate tail wheel clearance.

DIGGING CHAIN: Heavy duty roller type chain with attachment side bars to accept cutter plates of various widths with either cup cutters or conical carbide teeth.

DIGGING CHAIN ADJUSTER: Hydraulically actuated adjuster (grease type) with stepped plate to retain adjustment after desired tension is reached.

TAILWHEEL: 36 inch diameter tailwheel mounted on heavy duty roller type bearings.

FUEL TANKS: Dual tanks with a total capacity of 185 gallons for over 10 hours operation.

HYDRAULIC TANK: 180 gallon capacity, mounted to the side of the machine for easy accessibility and air circulation.

• OPTIONAL EQUIPMENT •

Hydraulic fold up crumber (Digging chain guard is standard)

Automatic steering and/or grade control

Rocksaw attachment for 48" depth and 4½" to 12" widths

Fully enclosed operators cab

Air conditioning and heating unit for operators cab

Full grouser track shoes

TRENCOR inc.
an Astec company

Feature Model - 924G

- Rugged, dependable Cat components deliver maximum rimpull to the ground and full power to the loader hydraulics.
- Ergonomic design emphasizes comfort, visibility and easy operation.
- Linkage design offers unparalleled versatility without compromise to performance.
- Increase your productivity by performing a variety of jobs with one machine.
- Modular system provides improved efficiency and greater control.

Model	Flywheel Power	Bucket Capacity	Breakout Force	Operating Weight	Overall Height	Shipping Length
924Gz	114 hp	2.75 yd³	25479.73 lb	21795 lb	6.8 ft	7138
928G	125 hp	3.01 yd³	21356.94 lb	25554 lb	7.3 ft	7450
924G	129 hp	6.54 yd³	8047.16 lb	24990 lb	7.1 ft	7531
IT28G	143 hp	3.66 yd³	17787.53 lb	27860 lb	7.3 ft	7504

Worktools

Brooms

Angling	98 in
Pick Up	98 in

Couplers

Horizontal Pin Lock	270-525 lb

Rakes

Loader-Top Clamp	95 in
Loader	87-112 in

Blades

Angle	105-122 in
Landfill U-Blades	60 in

Forks

Core	60, 72 in
Logging	48 in
Lumber/Log	48-74 in
Pallet	48-96 in

Buckets

Coal	111, 116 in
Fertilizer	85-106 in
General Purpose	90-102 in
High Dump/Rollout	
Light Material	94-123 in
Material Handling	72-122 in
Penetration	96-102 in
Refuse	94-101 in
Rock	99 in
Side Dump	108-117 in
Top Clamp	94-101 in
Woodchip	108-122 in

Material Handling Arms

Retracted	35-123 in
Extended	123-195 in

Plows

One-Way	104 in
Moldboard Trip	120, 144 in
Trip Edge	112-144 in
V-Plows	104 in

FABICK CAT

Sales & Rental

APPENDIX S METAL FIN PIPE FOUNDATION OVERVIEW

F-000 MFPF
Metal Fin Pipe Foundation Overview

Compliance with Standards

FAA: Designed according to FAA facility standard drawings for Approach Lighting, NAVAIDS, Weather Sensing Systems, Guidance Signs

AASHTO: Meets design specifications

Uses

Metal Fin Pipe Foundations are designed to be used in place of traditional concrete airport foundations for:

- ALSF-1 & 2
- MALSR & MALSF
- REIL
- NAVAIDS
- LLWAS
- RVR
- Wind Cones
- Guidance Signs

Features

- FAA approved Metal Fin Pipe Foundations are application specific, hydraulically set foundations used to support various structures
- Design configuration consists of a steel pipe of various wall thicknesses, depending on load requirements, with a series of metal fins welded longitudinally to the pipe. A top plate is welded to the end of the pipe and fins to accommodate the structure for which it is designed.
- Top plate and fin arrangement differ, based upon application and structural mounting requirements
- Designed to a wide variety of soil conditions
- Designed for seismic conditions

Applicable Conditions

- All weather installation, no minimum or maximum temperature requirements
- Installed in numerous airport locations across the United States
- Ideal for limited right of way or limited access time

Finish

- Foundations are fabricated in an approved AWS Code Shop, and hot dipped galvanized following fabrication
- Epoxy coatings may be added in addition to hot dipped galvanizing, for use in highly acidic soil

Installation

1. Drill a plumb vertical shaft, at the location specified for the required foundation as indicated on the construction drawings. The diameter of the completed shaft shall be no greater than the outside diameter of the foundation pipe to be installed (field verify). Advance the shaft a minimum of two (2) feet deeper than the designed bottom of foundation depth. Record the soil type and classification on the SAFE foundation installation report.

PAPI-LHA Foundation

EMT Foundation (4-Light)

MG-20 with Flasher Foundation

Installation (Continued)

2. Immediately after the drilled shaft is complete, place a centering collar in the shaft and lower the primary installation anchor through the collar into the shaft. Place hydraulic cylinders over the anchor rod, on top of the anchor housing and lock into place with the upper anchor lock nut. Expand the hydraulic cylinders to the maximum required rod extension or hydraulic pressure for the installation anchor in use. It is extremely critical to field monitor the cylinder stroke length to ensure that the anchor rod is not overextended. Secure the lower anchor lock nut against the anchor housing. Relax and remove the hydraulic cylinders and the centering collar. Record the anchor installation pressure on the SAFE Foundation installation report.
3. Add rod segments to extend the high strength anchor rod to accommodate the total length of the foundation and the hydraulic cylinders. Lift the foundation into position over the installation anchor. Foundation fin orientation must conform to the construction drawings. Position hydraulics on top of the foundation and secure to the anchor rod with the lock nut. Check and adjust orientation, alignment, plumbness and level of the foundation before the first stroke of the cylinders.

Installation (Continued)

4. Expand the hydraulic cylinders in order to press the foundation into the earth. This may require several strokes of the cylinders to reach the required elevation. Record the foundation number as well as the installation force in PSI & Tons for each foot of depth below the ground surface on the SAFE Foundation installation report. Verify that the final recorded installation pressure meets or exceeds the design injection load.
5. Release the anchor lock nut, remove the hydraulics and drop the anchor expanding cone below the anchor plates by driving down the anchor rod. Withdraw the installing anchor through the foundation column. Fill the foundation column using the material that was removed during the drilling operation or as required by the contract documents. Consolidate the back-fill material sufficiently to achieve a stable condition.
6. When additional resistance is required to install the foundation, install one pair of satellite anchors, aligned perpendicular to each other, or if necessary, two pair of satellite anchors aligned perpendicular to each other at the centerline of the primary anchor. The center to center distance between satellite anchors in a pair shall be eleven (11) feet. Install satellite anchors in the same manner as the primary anchor. Record the installation pressure for each satellite anchor on the SAFE Foundation installation report. Attach the anchors to spreader beams positioned above the hydraulic cylinders. Expand the cylinders against the beams utilizing the resistance of the primary and satellite anchors to install the foundation to the required elevation.
7. Remove the spreader beams and hydraulics. Collapse and remove the satellite anchors as in item 5. Backfill the anchor shafts and foundation column using the material that was removed during the drilling operation or as required by contract documents. Consolidate the back-fill material sufficiently to achieve a stable condition.
8. The structure may be erected on the foundation immediately after the foundation is installed and approved by the Inspector. Use the bolts or studs, washers, lock washers and nuts as specified and/or shown on the approved contract drawings.
9. Contact the engineer if rock or obstructions are encountered above the design tip elevation of the foundation or if actual soil conditions differ from those utilized in the foundation design criteria.

Installation Tooling Set

200 Ton Package

2072 Rev. A
No Manual

F-000 MFPF
Metal Fin Pipe Foundation Advantages Sheet

2004 Rev 1

Compliance with Standards

FAA: Designed according to FAA standard facility drawings for Approach Lighting, NAVAIDS, Weather Sensing Systems, Guidance Signs

AASHTO: Meets design specifications

Eliminates Large Excavation

ADVANTAGES

- Eliminates open excavated areas for extended periods of time.
- Eliminates personnel or public concern over large, deep, and potentially unsafe excavated areas.
- Provides a safer work zone.
- Reduces construction down time.
- No dewatering.
- No 2 to 1 slope or benching required (Meets OSHA requirements)

Eliminates Concrete

ADVANTAGES

- Installation in any weather, hot or cold, rain or shine.
- Eliminates FAA required 28 day curing.
- Perfect for remote locations where concrete is impractical, or difficult to deliver to site.
- No temperature to maintain for concrete curing.
- Structure may be erected the same day as the foundation is installed.
- Reduces traffic through construction security gates. (One entry and one exit)
- No forms required.
- Eliminates additional cost for evening concrete deliveries.

Rapid Installation

ADVANTAGES

- Requires small work crew of two to three men for complete installation.
- Installed in an average of two to four hours in most cases.
- Significantly reduces total construction time thus saving manhours, down time, and money.
- Reduces runway closure time.

Environmentally Friendly

ADVANTAGES

- Because the soil from the relatively small diameter drilled shaft is used for backfill once the foundation is installed, there is no spoil to haul away. Thus, in areas of contaminated soils, costly remediation efforts and/or hazardous landfill disposal is eliminated.
- Foundation can be protected with a variety of coatings for use in acidic soil.

EMT Foundation (4-Light)

LLWAS Foundation

Guidance Sign Foundation

Advantages (continued)

Underground Obstructions

ADVANTAGES

- The ability to avoid underground obstructions is optimized by the size of the foundation and installation process.
- Ideal in congested underground areas.
- Underground water is no problem to the metal fin pipe foundation.

Right of Way and Access

ADVANTAGES

- Ideal for limited right of way.
- Ideal for limited down time.
- Removable and reusable.
- Eliminates the need to jack hammer and remove an old concrete foundation.

Pre-Engineered

ADVANTAGES

- Computer aided design and manufacturing requires less time.
- Foundation loading and soil information is all that is required for design of foundation.
- Designed for seismic conditions .
- Seventy-five year anti-corrosion guarantee.
- Tested to meet FAA requirements by an independent testing group. (Results available upon request)
- Shop controled QA/QC foundation is delivered to site ready to install.
- Due to excelent grounding characteristics, no external ground rods necessary.

Strengthens Poor Soil Conditions

ADVANTAGES

- Because of hydraulic installation process, poor soil is strengthened and improved by the force of the hydraulics compressing the soil around the foundation.

Hydraulic installation of an EMT Foundation (4-light)