MATERIAL SAFETY DATA SHEET

MSDS # AF1

ARCTIC FIRE UNIVERSAL ANTIFREEZE 100%

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1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

TRADE NAME: **Universal Antifreeze 100%**

PRODUCT CODES:

SYNONYMS: Antifreeze

EMERGENCY PHONE: CHEMTREC – (800) 424-9300 or (703) 527-3887 (collect)

SUPPLIER: Sinclair Oil Corporation
P.O. Box 30825
Salt Lake City, Utah 84130

TELEPHONE / FAX: (888) 340-3466 / (801) 524-2740

2. COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENTS	CAS#	Typical wt.%
Monoethylene Glycol*	107-21-1	90
Diethylene Glycol	111-46-6	5
Inhibitors		2
Water	7732-18-5	3

- Ethylene Glycol from Dow Chemical

3. HAZARDS IDENTIFICATION

APPEARANCE: Colored at customer request

PHYSICAL STATE: Liquid

ODOR: Glycol odor

EMERGENCY OVERVIEW: Repeated excessive exposures may cause severe kidney and also liver and gastrointestinal effects. Signs and symptoms of excessive exposure may be nausea and/or vomiting. Signs and symptoms of excessive exposure may be abdominal cramps and/or diarrhea. Excessive exposure may cause irritation to upper respiratory tract. Excessive exposure may cause central nervous system effects. Observations in animals include formation of bladder stones after repeated oral doses of diethylene glycol. Observations in animals include kidney and liver effects and deposition of calcium salts in various tissues after long-term dietary intake of ethylene glycol. Reports of kidney failure and death in burn patients suggest the ethylene glycol may have been a factor. The use of topical applications containing this material may not be appropriate in severely burned patients or individuals with impaired renal function.

Repeated excessive exposure to one of the inhibitor additives has also caused adverse effects of the sex organs; ovaries, testes, pancreas, brain, and lung in animal studies. However, this material is present in small amounts and is not expected to appreciably add to the toxicity of the formulation.

INHALATION: At room temperature, vapors are minimal due to low vapor pressure. If heated or sprayed as an aerosol, concentrations may be attained that are sufficient to cause irritation and other effects.

EYE CONTACT: May cause slight transient (temporary) eye irritation. Corneal injury is unlikely. Vapors or mists may irritate eyes.

SKIN CONTACT: Prolonged or repeated exposure not likely to cause significant skin irritation. A single prolonged exposure is not likely to result in the material being absorbed through skin in harmful amounts. Repeated skin exposure may result in absorption of harmful amounts. The dermal LD50 has not been tested. Repeated skin exposure to large quantities may cause significant skin irritation. Massive contact with damaged skin or of material sufficiently hot to burn skin may result in absorption of potential lethal amounts. Repeated skin contact with ethylene glycol may, in a very small proportion of cases, cause sensitization with the development of allergic contact dermatitis. The incidence is significantly less than 1% with the undiluted material.

INGESTION: Single dose oral toxicity is moderate. Excessive exposure may cause central nervous system effects, cardiopulmonary effects (metabolic acidosis), and kidney failure. The estimated lethal dose for an average person is 100 ml. Single dose oral LD50 has not been determined. Amounts ingested incidental to industrial handling are not likely to cause injury; however, ingestion of larger amounts could cause serious injury or even death.

CARCINOGENICITY: Based on data from long-term animal studies, ethylene glycol is not believed to pose a carcinogenic risk to man.

4. FIRST AID MEASURES

INHALATION: Remove victim immediately from source of exposure. Get medical attention if any discomfort continues. For breathing difficulties oxygen may be necessary. If breathing stops, provide artificial respiration.

EYE CONTACT: Flush immediately with water for at least 15 minutes. If symptoms or irritation persist seek medical attention promptly.

SKIN CONTACT: Wash contact areas with soap and water. Launder contaminated clothing before reuse. Get medical attention if irritation persists.

INGESTION: Consult medical personnel.

Notes To Physician: Supportive care. Treatment based on judgment of the physician in response to reactions of the patient. Early administration of ethanol may counter the toxic effects of ethylene glycol (metabolic acidosis and renal failure). Hemodialysis or peritoneal dialysis has been of benefit. New Eng. J. Med. 304:21 1981.
It is estimated that the lethal oral dose to adults is of the order of 1.0 ml/kg. Ethylene glycol is metabolized by alcohol dehydrogenate to various metabolites including glyceraldehydes, glycolic acid and oxalic acid which cause an elevated anion-gap metabolic acidosis and renal tubular injury. The signs and symptoms in ethylene glycol poisoning are those of metabolic acidosis, CNS depression, and kidney injury. Urinalysis may show albuminuria, hematuria and oxaluria. Clinical chemistry may reveal anion-gap metabolic acidosis and uremia. The currently recommended medical management of ethylene glycol poisoning includes elimination of ethylene glycol and metabolites, correction of metabolic acidosis and prevention of kidney injury. It is essential to have immediate and follow up urinalysis and clinical chemistry. There should be particular emphasis on acid-base balance and renal function tests. A continuous infusion of 5% sodium bicarbonate with frequent monitoring of electrolytes and fluid balance is used to achieve correction of metabolic acidosis and forced diuresis. As a competitive substrate for alcohol dehydrogenase, ethanol is antidotal. Given in the early stages of intoxication, it blocks the formulation of nephrotoxic metabolites. A therapeutically effective blood concentration of ethanol is in the range 100-150 mg/dl, and should be achieved by a rapid loading dose and maintained by intravenous infusion. For severe and/or deteriorating cases, hemodialysis may be required. Dialysis should be considered for patients who are symptomatic, have severe metabolic acidosis, a blood ethylene glycol concentration greater than 25 md/dl, or compromise of renal functions.

A more effective intravenous antidote for physician use is 4-methylpyrazole, a potent inhibitor of alcohol dehydrogenases, which effectively blocks the formation of toxic metabolites of ethylene glycol. It has been used to decrease the metabolic consequences of ethylene glycol poisoning before metabolic acidosis coma, seizures, and renal failure have occurred. A generally recommended protocol is a loading dose of 15 mg/kg followed by 10 mg/kg every 12 hours for 4 doses and then 15 mg/kg every 12 hours until ethylene glycol concentrations are below 20 mg/100 ml. Slow intravenous infusion is required. Since 4-methyplyrozole is dialyzable, increased dosage may be necessary during hemodialysis. Additional therapeutic measures may include the administration of cofactors involved in the metabolism of ethylene glycol. Thiamine (100 mg) and pyridoxine (50 mg) should be given every six hours.

Pulmonary edema with hypoxemia has been described in a number of patients following poisoning with ethylene glycol. The mechanism of production has not been elucidated, but it appears to be non-cardiogenic in origin in several cases. Respiratory support with mechanical ventilation and positive end expiratory pressure may be required. There may be cranial nerve involvement in the late stages of toxicity from swallowed ethylene glycol. In particular, effects have been reported involving the seventh, eighth and ninth cranial nerves, presenting with bilateral facial paralysis, diminished hearing and dysphasia.

5. FIRE FIGHTING MEASURES

FLASH POINT: >247ºF Setaflash

FLAMMABLE LIMITS: % of vapor concentration at which product can ignite in presence of spark.

Lower Flammability Limit: 3.2%
Upper Flammability Limit: 15.3%

AUTOIGNITION TEMPERATURE: 748ºF

FIRE FIGHTING INSTRUCTIONS: No fire and explosion hazards expected under normal storage and handling conditions (i.e. ambient temperatures). However, ethylene glycol or solutions of ethylene glycol and water can form flammable vapors with air if heated sufficiently. Keep people away. Isolate fire area and deny unnecessary entry.

FIRE FIGHTING MEDIA: Water fog or fine spray. Alcohol resistant foams (ATC type) are preferred if available. General purpose synthetic foams (including AFFF) or protein foams may function, but much less effectively. Carbon dioxide. Dry chemical. Do not use direct water stream. May spread fire.

HAZARDOUS DECOMPOSITION PRODUCTS: Hazardous combustion products may include and are not limited to carbon monoxide, carbon dioxide and trace amounts of aldehydes and organic acids. When available oxygen is limited, as in a fire or when heated to very high temperatures by a hot wire or plate, carbon monoxide and other hazardous compounds such as aldehydes might be generated.

6. ACCIDENTAL RELEASE MEASURES

SPILL PROCEDURES:
-Provide adequate ventilation
-Contain spill to minimize contaminated area and facilitate salvage or disposal
-Flush area sparingly with water or use absorbent material.

-Small Spills: Keep product out of sewers and watercourses by diking or impounding. Take up with noncombustible absorbent such as fuller's earth or sand. Place into containers for later disposal.
-Large Spills: Contain spill in earthen dikes for later recover. Report spills as required to appropriate authorities. Report spill to Coast Guard toll free number (800) 424-8802 for spills that could reach any waterway including intermittent dry creeks. In case of accident or road spill notify Sinclair Oil Corporation at (888) 340-3466 or Chemtrec Emergency Spill (800) 365-7300

7. HANDLING AND STORAGE

STORAGE / HANDLING: Comply with all applicable OSHA, NFPA and consistent local requirements. Store in properly closed containers that are appropriately labeled and in a cool well-ventilated area. Avoid repeated or prolonged skin contact or contact with your eyes. Exercise good personal hygiene including removal of soiled clothing and prompt washing with soap and water. Practice reasonable care and cleanliness. Avoid breathing spray mists if generated.

Trace quantities of ethylene oxide (EO) may be present in this product. While these trace quantities could accumulate in headspace areas of storage and transport vessels, they are not expected to create a condition, which will result in EO concentration greater than 0.5 ppm (8 hour TWA) in the breathing zone of the workplace for appropriate applications. OSHA has established a permissible exposure limit of 1.0 ppm (8 hour TWA) for EO. (Code of Federal Regulations Part 1910.1047 of Title 29).

8. EXPOSURE CONTROLS, RESPIRATORY & PERSONAL PROTECTION

ENGINEERING CONTROLS: Good general ventilation should be sufficient for most conditions. Local exhaust ventilation may be necessary for some operations. Use in well-ventilated confined spaces, mechanical ventilation may be required to keep levels of certain components below mandated standards. Responsible individuals should evaluate the concentrations of specific regulated chemicals.

PERSONAL PROTECTION:

PROTECTIVE CLOTHING: Wear body-covering work clothes to avoid prolonged or repeated exposure. Launder soiled work clothes before reuse. Safety goggles, or chemical splash goggles if splashing is anticipated. Wear oil impervious gloves if frequent or prolonged contact is expected.

RESPIRATOR: Not normally required for routine operations. Approved organic vapor chemical cartridge or supplied air respirators should be worn when excessive vapors or mists are generated. Observe respirator protection factor criteria cited in ANSI Z88.2. Self-contained breathing apparatus should be used for fire fighting.

OCUPATIONAL EXPOSURE LIMITS

COMPONENT	*LIMIT*	*TWA*	*STEL*	*CEILING*	*NOTATION*	*OTHER*
Monoethylene Glycol	OSHA PEL			50ppm		
Monoethylene Glycol	ACGIH TLV			100mg/M^3	Aerosol	A4/Irritation
Diethylene Glycol	ACGIH WEEL	50ppm			Aerosol/Vapor	
Diethylene Glycol	ACGIH WEEL	10mg/M^3			Aerosol only	
Proprietary Ingredient	ACGIH TLV	*1mg/M^3				

A4 – Not classifiable as a human carcinogen
*Anhydrous Material

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE/PHYSICAL STATE: Liquid

COLOR: Colored at customers request

DENSITY/SPECIFIC GRAVITY (g/ml): 1.11 - 1.14 @60ºF

VAPOR DENSITY (air=1): > 1.00

VAPOR PRESSURE: Very low

BOILING POINT/RANGE: 330ºF

SOLUBILITY IN WATER: Completely miscible

pH : 8.7

EVAPORATION RATE (Butyl Acetate=1): Nil

10. STABILITY AND REACTIVITY

GENERAL: Stable under normal storage conditions. Ethylene glycol will ignite in air at 775F (413C).

INCOMPATIBLE MATERIALS AND CONDITIONS TO AVOID: Strong acids or oxidizing agents

HAZARDOUS DECOMPOSITION: Hazardous combustion products may include and are not limited to carbon monoxide, carbon dioxide and trace amounts of aldehydes and organic acids. When available oxygen is limited, as in a fire or when heated to very high temperatures by a hot wire or plate, carbon monoxide and other hazardous compounds such as aldehydes might be generated.

11. TOXICOLOGICAL INFORMATION

Based on data from long-term animal studies, diethylene glycol is not believed to pose a carcinogenic risk to man. Ethylene glycol and one minor component did not cause cancer in long-term animal studies. Screening studies in mice suggest that diethylene glycol does not affect fetal development. Ethylene glycol has been reported to cause birth defects in rats and mice given high oral doses, which were toxic to the mothers. Birth defects were also reported in mice at a high oral dose, which was apparently non-toxic to the mother. Exposure of rats and mice to high aerosol concentration resulted in teratogenic effects in mice but not in rats. Much of the total dose of EG in the aerosol studies probably resulted from ingestion of material deposited on fur. Diethelyene glycol has not interfered with reproduction in animal studies. In studies on rats, ethylene glycol has been shown not to interfere with reproduction. In studies on mice, ingestion of EG in large amounts caused a small decrease in the number of litters/pair, live pups/litter, and in live pup weight. A minor component, when tested separately, has interfered with fertility in males and females. Results of invitro ('test tube') mutagenicity tests have been negative for both EG and diethylene glycol. Result of mutagenicity tests in animals has been negative for ethylene glycol.

12. ECOLOGICAL INFORMATION

MOVEMENT & PARTITIONING: Bioconcentration potential is low (BCF less than 100 or Log Kow less than 3). Log octanol/water partition coefficient (log Kow) is -1.36. Henry's Law Constant (H) is 6.0E-08 atm-m3/mol. Bioconcentration factor (BCF) is 10 in golden orfe.

DEGRADATION & TRANSFORMATION: Biodegradation under aerobic static laboratory conditions is high (BOD20 or BOD28/ThOD greater than 40%). 5-Day biochemical oxygen demand (BOD5) is 0.78 p/p. 10-Day biochemical oxygen demand (BOD10) is 1.06 p/p. 20-Day biochemical oxygen demand (BOD20) is 1.15 p/p. Theoretical oxygen demand (THOD) is calculated

to be 1.29 p/p. Biodegradation may occur under both aerobic and anaerobic conditions (in either the presence or absence of oxygen). Inhibitory concentration (IC50) in OECD "Activated Sludge, Respiration Inhibition Test" (Guideline # 209) is < 1000 mg/L. Degradation is expected in the atmospheric environment within days to weeks.

ECOTOXICOLOGY: Material is practically non-toxic to aquatic organisms on an acute basis (LC50 greater than 100 mg/L in most sensitive species). Acute LC50 for fathead minnow (Pimephales promelas) is 51000 mg/L. Acute LC50 for bluegill (Lepomis macrochirus) is 27549 mg/L. Acute LC50 for rainbow trout (Oncorhynchus mykiss) is about 18000-46000 mg/L. Acute LC50 for guppy (Poecilia reticulata) is 49300 mg/L. Acute LC50 for water flea (Daphnia magna) is 46300-51100 mg/L. Acute LC50 for the cladoceran Ceriodaphnia dubia is 10000-25800 mg/L. Acute LC50 for crayfish is 91430 mg/L. Acute LC50 for brine shrimp (Artemia salina) is 20000 mg/L. Acute LC50 for golden orfe (Leuciscus idus) is greater than 10000 mg/L. Acute LC50 for goldfish (Carassius auratus) is greater than 5000 mg/L. Growth inhibition EC50 for green alga Selenastrum capricornutum is 9500-13000 mg/L.

13. DISPOSAL INFORMATION

WASTE DISPOSAL: It is the responsibility of the user to determine if disposal material is hazardous according to federal, state and local regulations**.** Check before disposing to be sure you are in compliance with all applicable laws and regulations.

Protective Measures During Repair and Maintenance of Contaminated Equipment:
-Wash exposed skin thoroughly with soap and water.
-Use polymer gloves if extended, direct contact is expected.
-Avoid prolonged contact with product
- Supplied air respiratory protection should be used for cleaning large spills or upon entry into tanks, vessels, or other confined spaces

After draining product, wash skin thoroughly with soap and water. Consult appropriate Federal, State and Local authorities before reusing, reconditioning, reclaiming, recycling or disposing of empty containers and/or waste residues of this product.

Burn in an approved incinerator in accordance with Federal, State, and Local regulations.

14. TRANSPORT INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION
NON-BULK
Proper Shipping Name: ETHYLENE GLYCOL

BULK
Proper Shipping Name: Environmentally Hazardous Substance, LIQUID N.O.S. (ETHYLENE GLYCOL)
Technical Name: ETHYLENE GLYCOL
ID Number: UN 3082
Hazard Class: 9
Packing Group: PG III
Reportable Quantity: 5,000 lb.

IATA
NON-BULK
Proper Shipping Name: Ethylene Glycol
Not Regulated by IATA

15. REGULATORY INFORMATION

THIS PRODUCT CONTAINS COMPONENT(S) CITED ON THE FOLLOWING REGULATIONS.

Chemical Name	**Cas Number**
Ethylene Glycol	107-21-1

UNITED STATES - TSCA INVENTORY: Listed

WATER STANDARDS: No data available

ATMOSPHERIC STANDARDS: Clean Air Act (1990) - List of Hazardous Air Contaminants: listed
CERCLA: Reportable Quantity (RQ): 5,000 pounds (532 gallons)

OSHA HAZARD COMMUNICATION STANDARD: This product is a “hazardous chemical” as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

SARA TITLE III: Section 311/312 - Categories: Acute hazard; chronic hazard

Section 312 - Inventory Reporting: Ethylene glycol is subject to Tier I and/or Tier II annual inventory reporting.

Section 313 - Emission Reporting: Ethylene glycol is subject to Form R reporting requirements.

Section 302 - Extremely Hazardous Substances: Ethylene glycol is not listed.

STATE RIGHT-TO-KNOW:

California - Exposure Limits - Ceilings: vapor-50 ppm ceiling; 125 mg/m3 ceiling
Director's List of Hazardous Substances: listed
Florida - Hazardous Substances List: listed
Massachusetts - Right-to-Know List: listed
Minnesota - Haz. Subs. List: listed (particulate and vapor)
New Jersey - Right-to-Know List (Total): Present greater than 1.0%
Pennsylvania Right-to-Know List: environmental hazard

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

WHMIS INFORMATION: D2A - material has potential toxic effects. Refer elsewhere in the MSDS for specific warnings and safe handling information. Refer to the employer's workplace education program.

CALIFORNIA PROPOSITION 65 (SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986): This product contains the following chemical(s) known to the State of California to cause cancer:

Component	CAS #	Amount
1,4 – Dioxane	123-91-1	<=0.0086%
Acetaldehyde	75-07-0	<=0.1000PPM

CALIFORNIA PROPOSITION 65 (SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986): This product contains the following chemical(s) known to the State of California to cause birth defects and/or other reproductive harm.

Component	CAS #	Amount
Ethylene glycol monomethyl ether	109-86-4	<=0.0009%

California SCAQMD Rule 443.1 (South Coast Air Quality Management District Rule 443.1, Labeling of Materials Containing Organic Solvents)**:**

VOC: Vapor pressure 0.06 mmHg at 20°C
1113.38 g/l

16. OTHER INFORMATION

NFPA 704/HMIS:
Health – 1 Flammability – 1 Reactivity – 0
(0 = insignificant, 1 = slight, 2 = moderate, 3 = high, 4 = extreme)

REVISION SUMMARY:
Complete review of MSDS, December 2005.

THIS PRODUCT MATERIAL SAFETY DATA SHEET PROVIDES HEALTH AND SAFETY INFORMATION. THE PRODUCT SHOULD BE USED IN APPLICATIONS CONSISTENT WITH THIS PRODUCT LITERATURE. FOR ANY OTHER USES, EXPOSURES SHOULD BE EVALUATED SO THAT APPROPRIATE HADLING PRACTICES AND TRAINING PROGRAMS CAN BE ESTABLISHED TO ENSURE SAFE WORKPLACE OPERATIONS.

THIS MATERIAL SAFETY DATA SHEET IS PROVIDED IN GOOD FAITH AND MEETS THE REQUIREMENTS OF THE HAZARDOUS COMMUNICATION PROVISIONS OF SARA TITLE III AND 29CFR1910.1200(g) OF THE OSHA REGULATIONS. THE ABOVE INFORMATION IS BASED ON REVIEW OF AVAILABLE INFORMATION SINCLAIR BELIEVES IS RELIABLE AND IS SUPPLIED FOR INFORMATIONAL PURPOSES ONLY. SINCLAIR DOES NOT GUARANTEE ITS COMPLETENESS OR ACCURACY. SINCE CONDITIONS OF USE ARE OUTSIDE THE CONTROL OF SINCLAIR, SINCLAIR DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, AND ANY LIABILITY FOR DAMAGE OR INJURY WHICH RESULTS FROM THE USE OF THE ABOVE DATA. NOTHING HEREIN IS INTENDED TO PERMIT INFRINGEMENT OF VALID PATENTS AND LICENSES.

DATE: December 2005