

APPENDIX 5.5A

Material Safety Data Sheets



GE Betz

GE Betz, Inc.
4636 Somerton Road
Trevose, PA 19053
Business telephone: (215) 355-3300

Material Safety Data Sheet

Issue Date: 05-MAY-2003

EMERGENCY TELEPHONE (Health/Accident): (800) 877-1940

1 PRODUCT IDENTIFICATION

PRODUCT NAME:

CORTROL OS5607

PRODUCT APPLICATION AREA:

WATER BASED DISSOLVED OXYGEN SCAVENGER/METAL PASSIVATOR.

2 COMPOSITION / INFORMATION ON INGREDIENTS

Information for specific product ingredients as required by the U.S. OSHA HAZARD COMMUNICATION STANDARD is listed. Refer to additional sections of this MSDS for our assessment of the potential hazards of this formulation.

HAZARDOUS INGREDIENTS:

CAS#	CHEMICAL NAME
497-18-7	CARBONIC DIHYDRAZIDE Exothermic hydrolysis to hydrazine can occur with high temperature; also occurs by contact with mineral acids, oxidizers, or low grade metals; irritant (skin and eyes)

No component is considered to be a carcinogen by the National Toxicology Program, the International Agency for Research on Cancer, or the Occupational Safety and Health Administration at OSHA thresholds for carcinogens.

Avoid contact with low grade metals (LCS, AL, Cu), mineral acids and oxidizers to avoid accelerated actives degradation.

Do not mix with other chemicals. Feed independently to system.

3 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

CAUTION

May cause slight irritation to the skin. May cause slight irritation to the eyes. Mists/aerosols may cause irritation to upper respiratory tract.

DOT hazard is not applicable

Emergency Response Guide is not applicable

Odor: Slight; Appearance: Colorless To Light Yellow, Liquid

Fire fighters should wear positive pressure self-contained breathing apparatus(full face-piece type). Proper fire-extinguishing media: dry chemical, carbon dioxide, foam or water

POTENTIAL HEALTH EFFECTS

ACUTE SKIN EFFECTS:

Primary route of exposure; May cause slight irritation to the skin.

ACUTE EYE EFFECTS:

May cause slight irritation to the eyes.

ACUTE RESPIRATORY EFFECTS:

Mists/aerosols may cause irritation to upper respiratory tract.

INGESTION EFFECTS:

May cause gastrointestinal irritation.

TARGET ORGANS:

No evidence of potential chronic effects.

MEDICAL CONDITIONS AGGRAVATED:

Not known.

SYMPTOMS OF EXPOSURE:

May cause redness or itching of skin.

4 FIRST AID MEASURES

SKIN CONTACT:

Wash thoroughly with soap and water. Remove contaminated clothing. Get medical attention if irritation develops or persists.

EYE CONTACT:

Remove contact lenses. Hold eyelids apart. Immediately flush eyes with plenty of low-pressure water for at least 15 minutes. Get medical attention if irritation persists after flushing.

INHALATION:

If nasal, throat or lung irritation develops - remove to fresh air and get medical attention.

INGESTION:

Do not feed anything by mouth to an unconscious or convulsive victim. Do not induce vomiting. Immediately contact physician. Dilute contents of stomach using 3-4 glasses milk or water.

NOTES TO PHYSICIANS:

No special instructions

5 FIRE FIGHTING MEASURES

FIRE FIGHTING INSTRUCTIONS:

Fire fighters should wear positive pressure self-contained breathing apparatus (full face-piece type).

EXTINGUISHING MEDIA:

dry chemical, carbon dioxide, foam or water

HAZARDOUS DECOMPOSITION PRODUCTS:

Thermal decomposition (destructive fires) yields elemental oxides.

FLASH POINT:

> 200F > 93C P-M(CC)

6 ACCIDENTAL RELEASE MEASURES

PROTECTION AND SPILL CONTAINMENT:

Ventilate area. Use specified protective equipment. Contain and absorb on absorbent material. Place in waste disposal container. Flush area with water. Wet area may be slippery. Spread sand/grit.

DISPOSAL INSTRUCTIONS:

Water contaminated with this product may be sent to a sanitary sewer treatment facility, in accordance with any local agreement, a permitted waste treatment facility or discharged under a permit. Product as is - Incinerate or land dispose in an approved landfill.

7 HANDLING & STORAGE

HANDLING:

Contact with oxidizers, peroxide and metal oxide may result in a violent reaction. Contamination with low pH products and low grade metal accelerate decomposition to hydrazine.

STORAGE:

Keep containers closed when not in use. Store in a manner that minimizes potential contamination. Store only in vented containers. Protect from freezing.

8 EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMITS**CHEMICAL NAME**

CARBONIC DIHYDRAZIDE

PEL (OSHA): NOT DETERMINED

TLV (ACGIH): NOT DETERMINED

ENGINEERING CONTROLS:

adequate ventilation

PERSONAL PROTECTIVE EQUIPMENT:

Use protective equipment in accordance with 29CFR 1910 Subpart I

RESPIRATORY PROTECTION:

A RESPIRATORY PROTECTION PROGRAM THAT MEETS OSHA'S 29 CFR 1910.134 AND ANSI Z88.2 REQUIREMENTS MUST BE FOLLOWED WHENEVER WORKPLACE CONDITIONS WARRANT A RESPIRATOR'S USE.

USE AIR PURIFYING RESPIRATORS WITHIN USE LIMITATIONS ASSOCIATED WITH THE EQUIPMENT OR ELSE USE SUPPLIED AIR-RESPIRATORS.

If air-purifying respirator use is appropriate, use a respirator with ammonia/methylamine cartridges.

SKIN PROTECTION:

neoprene gloves-- Wash off after each use. Replace as necessary.

EYE PROTECTION:

splash proof chemical goggles

9 PHYSICAL & CHEMICAL PROPERTIES

Specific Grav.(70F,21C)	1.021	Vapor Pressure (mmHG)	~ 18.0
Freeze Point (F)	32	Vapor Density (air=1)	< 1.00
Freeze Point (C)	0		
Viscosity(cps 70F,21C)	9	% Solubility (water)	100.0

Odor		Slight	
Appearance		Colorless To Light Yellow	
Physical State		Liquid	
Flash Point	P-M(CC)	> 200F > 93C	
pH As Is (approx.)		8.0	
Evaporation Rate (Ether=1)		< 1.00	

NA = not applicable ND = not determined

10 STABILITY & REACTIVITY

STABILITY:

Stable under normal storage conditions.

HAZARDOUS POLYMERIZATION:

Will not occur.

INCOMPATIBILITIES:

May react with strong oxidizers.

DECOMPOSITION PRODUCTS:

Thermal decomposition (destructive fires) yields elemental oxides.

INTERNAL PUMPOUT/CLEANOUT CATEGORIES:

"B"

11 TOXICOLOGICAL INFORMATION

Oral LD50 RAT:	>2,000 mg/kg
NOTE - Value is for testing of similar material.	
Dermal LD50 RABBIT:	>2,000 mg/kg
NOTE - Value is for testing of similar material.	
Skin Irritation Score RABBIT:	0.23
NOTE - Value is for testing of similar material.	
Eye Irritation Score RABBIT:	0.33
NOTE - Value is for testing of similar material.	

12 ECOLOGICAL INFORMATION

AQUATIC TOXICOLOGY

Ceriodaphnia 48 Hour Static Renewal Bioassay
LC50= 160; 10% Mortality= 96 mg/L
Daphnia magna 48 Hour Static Renewal Bioassay
LC50= 850; No Effect Level= 190 mg/L
Fathead Minnow 96 Hour Static Renewal Bioassay
LC50= 260; 5% Mortality= 96 mg/L

BIODEGRADATION

No Data Available.

13 DISPOSAL CONSIDERATIONS

If this undiluted product is discarded as a waste, the US RCRA hazardous waste identification number is :
Not applicable.

Please be advised; however, that state and local requirements for waste disposal may be more restrictive or otherwise different from federal regulations. Consult state and local regulations regarding the proper disposal of this material.

14 TRANSPORT INFORMATION

DOT HAZARD: Not Applicable
UN / NA NUMBER: Not applicable
DOT EMERGENCY RESPONSE GUIDE #: Not applicable

15 REGULATORY INFORMATION

TSCA:

All components of this product are listed in the TSCA inventory.

CERCLA AND/OR SARA REPORTABLE QUANTITY (RQ):

No regulated constituent present at OSHA thresholds

SARA SECTION 312 HAZARD CLASS:

Immediate(acute)

SARA SECTION 302 CHEMICALS:

No regulated constituent present at OSHA thresholds

SARA SECTION 313 CHEMICALS:

No regulated constituent present at OSHA thresholds

CALIFORNIA REGULATORY INFORMATION

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65) CHEMICALS PRESENT:

No regulated constituent present at OSHA thresholds

MICHIGAN REGULATORY INFORMATION

No regulated constituent present at OSHA thresholds

16 OTHER INFORMATION

NFPA/HMIS		CODE TRANSLATION
Health	1	Slight Hazard
Fire	1	Slight Hazard
Reactivity	0	Minimal Hazard
Special	NONE	No special Hazard
(1) Protective Equipment	B	Goggles,Gloves

(1) refer to section 8 of MSDS for additional protective equipment recommendations.

CHANGE LOG

	EFFECTIVE DATE	REVISIONS TO SECTION:	SUPERCEDES
	-----	-----	-----
MSDS status:	05-MAY-1999		** NEW **
	13-MAY-1999	;EDIT:9	05-MAY-1999

20-JUL-1999 12
01-NOV-1999 4,8
05-MAY-2003 2,7

13-MAY-1999
20-JUL-1999
01-NOV-1999



GE Betz

GE Betz, Inc.
4636 Somerton Road
Trevose, PA 19053
Business telephone: (215) 355-3300

Material Safety Data Sheet

Issue Date: 13-MAY-2002

EMERGENCY TELEPHONE (Health/Accident): (800) 877-1940

1 PRODUCT IDENTIFICATION

PRODUCT NAME:

OPTISPERSE HP3100

PRODUCT APPLICATION AREA:

WATER BASED INTERNAL BOILER TREATMENT CHEMICAL.

2 COMPOSITION / INFORMATION ON INGREDIENTS

Information for specific product ingredients as required by the U.S. OSHA HAZARD COMMUNICATION STANDARD is listed. Refer to additional sections of this MSDS for our assessment of the potential hazards of this formulation.

HAZARDOUS INGREDIENTS:

CAS#	CHEMICAL NAME
1310-73-2	SODIUM HYDROXIDE (CAUSTIC SODA) Corrosive; toxic (by ingestion)

No component is considered to be a carcinogen by the National Toxicology Program, the International Agency for Research on Cancer, or the Occupational Safety and Health Administration at OSHA thresholds for carcinogens.

3 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

DANGER

May cause moderate irritation to the skin. Corrosive to the eyes.
Mists/aerosols may cause irritation to upper respiratory tract.

DOT hazard: Corrosive to aluminum, RQ
Emergency Response Guide #154
Odor: None; Appearance: Colorless To Light Yellow, Liquid

Fire fighters should wear positive pressure self-contained breathing

apparatus(full face-piece type). Proper fire-extinguishing media:
dry chemical, carbon dioxide, foam or water

POTENTIAL HEALTH EFFECTS

ACUTE SKIN EFFECTS:

Primary route of exposure; May cause moderate irritation to the skin.

ACUTE EYE EFFECTS:

Corrosive to the eyes.

ACUTE RESPIRATORY EFFECTS:

Mists/aerosols may cause irritation to upper respiratory tract.

INGESTION EFFECTS:

May cause gastrointestinal irritation.

TARGET ORGANS:

No evidence of potential chronic effects.

MEDICAL CONDITIONS AGGRAVATED:

Not known.

SYMPTOMS OF EXPOSURE:

May cause redness or itching of skin, irritation, and/or tearing of eyes (direct contact).

4 FIRST AID MEASURES

SKIN CONTACT:

Wash thoroughly with soap and water. Remove contaminated clothing. Thoroughly wash clothing before reuse. Get medical attention if irritation develops or persists.

EYE CONTACT:

URGENT! Immediately flush eyes with plenty of low-pressure water for at least 20 minutes while removing contact lenses. Hold eyelids apart. Get immediate medical attention.

INHALATION:

If nasal, throat or lung irritation develops - remove to fresh air and get medical attention.

INGESTION:

Do not feed anything by mouth to an unconscious or convulsive victim. Do not induce vomiting. Immediately contact physician. Dilute contents of stomach using 3-4 glasses milk or water.

NOTES TO PHYSICIANS:

No special instructions

5 FIRE FIGHTING MEASURES

FIRE FIGHTING INSTRUCTIONS:

Fire fighters should wear positive pressure self-contained breathing apparatus (full face-piece type).

EXTINGUISHING MEDIA:

dry chemical, carbon dioxide, foam or water

HAZARDOUS DECOMPOSITION PRODUCTS:

Thermal decomposition (destructive fires) yields elemental oxides.

FLASH POINT:

> 200F > 93C P-M(CC)

MISCELLANEOUS:

Corrosive to aluminum, RQ
UN3266;Emergency Response Guide #154

6 ACCIDENTAL RELEASE MEASURES

PROTECTION AND SPILL CONTAINMENT:

Ventilate area. Use specified protective equipment. Contain and absorb on absorbent material. Place in waste disposal container. Flush area with water. Wet area may be slippery. Spread sand/grit.

DISPOSAL INSTRUCTIONS:

Water contaminated with this product may be sent to a sanitary sewer treatment facility, in accordance with any local agreement, a permitted waste treatment facility or discharged under a permit. Product as is - Incinerate or land dispose in an approved landfill.

7 HANDLING & STORAGE

HANDLING:

Alkaline. Corrosive(Eyes). Do not mix with acidic material.

STORAGE:

Keep containers closed when not in use. Protect from freezing. If frozen, thaw and mix completely prior to use. Store below 100F (38C).

8 EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMITS**CHEMICAL NAME**

SODIUM HYDROXIDE (CAUSTIC SODA)

PEL (OSHA): 2 MG/M3

TLV (ACGIH): 2 MG/M3(CEILING)

ENGINEERING CONTROLS:

Adequate ventilation to maintain air contaminants below exposure limits.

PERSONAL PROTECTIVE EQUIPMENT:

Use protective equipment in accordance with 29CFR 1910 Subpart I

RESPIRATORY PROTECTION:

A RESPIRATORY PROTECTION PROGRAM THAT MEETS OSHA'S 29 CFR 1910.134 AND ANSI Z88.2 REQUIREMENTS MUST BE FOLLOWED WHENEVER WORKPLACE CONDITIONS WARRANT A RESPIRATOR'S USE.
USE AIR PURIFYING RESPIRATORS WITHIN USE LIMITATIONS ASSOCIATED WITH THE EQUIPMENT OR ELSE USE SUPPLIED AIR-RESPIRATORS.
If air-purifying respirator use is appropriate, use a respirator with dust/mist filters.

SKIN PROTECTION:

neoprene gloves-- Wash off after each use. Replace as

necessary.

EYE PROTECTION:

splash proof chemical goggles

9 PHYSICAL & CHEMICAL PROPERTIES

Specific Grav.(70F,21C)	1.113	Vapor Pressure (mmHG)	~ 18.0
Freeze Point (F)	21	Vapor Density (air=1)	< 1.00
Freeze Point (C)	-6		
Viscosity(cps 70F,21C)	12	% Solubility (water)	100.0
Odor		None	
Appearance		Colorless To Light Yellow	
Physical State		Liquid	
Flash Point	P-M(CC)	> 200F > 93C	
pH As Is (approx.)		> 13.0	
Evaporation Rate (Ether=1)		< 1.00	

NA = not applicable ND = not determined

10 STABILITY & REACTIVITY

STABILITY:

Stable under normal storage conditions.

HAZARDOUS POLYMERIZATION:

Will not occur.

INCOMPATIBILITIES:

May react with strong oxidizers.

DECOMPOSITION PRODUCTS:

Thermal decomposition (destructive fires) yields elemental oxides.

INTERNAL PUMPOUT/CLEANOUT CATEGORIES:

"B"

11 TOXICOLOGICAL INFORMATION

Oral LD50 RAT: >2,000 mg/kg

NOTE - Estimated value

Dermal LD50 RABBIT: >2,000 mg/kg

NOTE - Estimated value

12 ECOLOGICAL INFORMATION

AQUATIC TOXICOLOGY

Daphnia magna 48 Hour Static Renewal Bioassay (pH adjusted)

LC50= 3300; No Effect Level= 1250 mg/L

Fathead Minnow 96 Hour Static Renewal Bioassay (pH adjusted)

LC50= 5020; No Effect Level= 2750 mg/L

BIODEGRADATION

Product contains only inorganics that are not subject to typical biological degradation. Assimilation by microbes may occur in waste treatment or the environment.

13 DISPOSAL CONSIDERATIONS

If this undiluted product is discarded as a waste, the US RCRA hazardous waste identification number is :
D002=Corrosive(pH).

Please be advised; however, that state and local requirements for waste disposal may be more restrictive or otherwise different from federal regulations. Consult state and local regulations regarding the proper disposal of this material.

14 TRANSPORT INFORMATION

DOT HAZARD: Corrosive to aluminum, RQ
UN / NA NUMBER: UN3266
DOT EMERGENCY RESPONSE GUIDE #: 154

15 REGULATORY INFORMATION

TSCA:

All components of this product are listed in the TSCA inventory.

CERCLA AND/OR SARA REPORTABLE QUANTITY (RQ):

2,158 gallons due to SODIUM HYDROXIDE (CAUSTIC SODA);

FOOD AND DRUG ADMINISTRATION:

ALL ingredients in this product are authorized in 21CFR173.310 for use as boiler water additives where the steam may contact food.

USDA FEDERALLY INSPECTED MEAT AND POULTRY PLANTS:

This product is composed of ingredients previously approved by USDA to meet the G6 classification and may be used in boilers or steamlines where the steam produced may contact edible products.

SARA SECTION 312 HAZARD CLASS:

Immediate(acute)

SARA SECTION 302 CHEMICALS:

No regulated constituent present at OSHA thresholds

SARA SECTION 313 CHEMICALS:

No regulated constituent present at OSHA thresholds

CALIFORNIA REGULATORY INFORMATION

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65) CHEMICALS PRESENT:

No regulated constituent present at OSHA thresholds

MICHIGAN REGULATORY INFORMATION

No regulated constituent present at OSHA thresholds

16 OTHER INFORMATION

NFPA/HMIS		CODE TRANSLATION
Health	3	Serious Hazard
Fire	0	Minimal Hazard
Reactivity	0	Minimal Hazard
Special	CORR	DOT corrosive
(1) Protective Equipment	B	Goggles,Gloves

(1) refer to section 8 of MSDS for additional protective equipment recommendations.

CHANGE LOG

	EFFECTIVE DATE	REVISIONS TO SECTION:	SUPERCEDES
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MSDS status:	08-APR-1997		** NEW **
	02-JUN-2000	12	08-APR-1997
	05-JUN-2001	15	02-JUN-2000
	13-MAY-2002	4,7	05-JUN-2001

MATERIAL SAFETY DATA SHEET

PRODUCT

PermaTreat® PC-391

EMERGENCY TELEPHONE NUMBER(S)
(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **PermaTreat® PC-391**

APPLICATION : REVERSE OSMOSIS ANTISCALANT

COMPANY IDENTIFICATION : Ondeo Nalco Energy Services, L.P.
P.O. Box 87
Sugar Land, Texas
77487-0087

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 0 / 1 FLAMMABILITY : 0 / 0 INSTABILITY : 0 / 0 OTHER :
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme

2. COMPOSITION/INFORMATION ON INGREDIENTS

Based on our hazard evaluation, none of the substances in this product are hazardous.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

CAUTION

May cause irritation with prolonged contact.
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of water.
Wear suitable protective clothing.
May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of nitrogen (NOx) under fire conditions. May evolve oxides of phosphorus (POx) under fire conditions.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
No adverse effects expected.

SKIN CONTACT :
No adverse effects expected.

INGESTION :
Not a likely route of exposure. No adverse effects expected.

MATERIAL SAFETY DATA SHEET

PRODUCT

PermaTreat® PC-391

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

INHALATION :

Not a likely route of exposure. No adverse effects expected.

SYMPTOMS OF EXPOSURE :

Acute :

A review of available data does not identify any symptoms from exposure not previously mentioned.

Chronic :

A review of available data does not identify any symptoms from exposure not previously mentioned.

AGGRAVATION OF EXISTING CONDITIONS :

A review of available data does not identify any worsening of existing conditions.

4. FIRST AID MEASURES

EYE CONTACT :

Flush affected area with water. If symptoms develop, seek medical advice.

SKIN CONTACT :

Flush affected area with water. If symptoms develop, seek medical advice.

INGESTION :

Do not induce vomiting without medical advice. If conscious, washout mouth and give water to drink. If reflexive vomiting occurs, rinse mouth and repeat administration of water.

INHALATION :

Remove to fresh air, treat symptomatically. If symptoms develop, seek medical advice.

NOTE TO PHYSICIAN :

Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT :

Will not burn: inorganic or water-based product

EXTINGUISHING MEDIA :

This product would not be expected to burn unless all the water is boiled away. The remaining organics may be ignitable. Keep containers cool by spraying with water. Use extinguishing media appropriate for surrounding fire.

FIRE AND EXPLOSION HAZARD :

May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of nitrogen (NOx) under fire conditions. May evolve oxides of phosphorus (POx) under fire conditions.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :

In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

MATERIAL SAFETY DATA SHEET

PRODUCT

PermaTreat® PC-391

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :

Restrict access to area as appropriate until clean-up operations are complete. Ensure clean-up is conducted by trained personnel only. Ventilate spill area if possible. Do not touch spilled material. Stop or reduce any leaks if it is safe to do so. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection). Notify appropriate government, occupational health and safety and environmental authorities.

METHODS FOR CLEANING UP :

SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. **LARGE SPILLS:** Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Wash site of spillage thoroughly with water. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :

Do not contaminate surface water.

7. HANDLING AND STORAGE

HANDLING :

Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. Do not breathe vapors/gases/dust. Keep the containers closed when not in use. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Ensure all containers are labelled.

STORAGE CONDITIONS :

Store in suitable labelled containers. Store the containers tightly closed.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :

This product does not contain any substance that has an established exposure limit.

ENGINEERING MEASURES :

General ventilation is recommended.

RESPIRATORY PROTECTION :

Respiratory protection is not normally needed.

HAND PROTECTION :

When handling this product, the use of chemical gloves is recommended.

SKIN PROTECTION :

When handling this product, the use of overalls is recommended.

EYE PROTECTION :

Wear safety glasses with side-shields.

MATERIAL SAFETY DATA SHEET

PRODUCT

PermaTreat® PC-391

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

HYGIENE RECOMMENDATIONS :

Use good work and personal hygiene practices to avoid exposure. Consider the provision in the work area of a safety shower and eyewash. Always wash thoroughly after handling chemicals. When handling this product never eat, drink or smoke.

HUMAN EXPOSURE CHARACTERIZATION :

Based on our recommended product application and personal protective equipment, the potential human exposure is: Low

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Clear
ODOR	None
SPECIFIC GRAVITY	1.10
DENSITY	9.17 lb/gal
SOLUBILITY IN WATER	Complete
pH (100 %)	11.0

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :

Stable under normal conditions.

HAZARDOUS POLYMERIZATION :

Hazardous polymerization will not occur.

CONDITIONS TO AVOID :

Extremes of temperature

MATERIALS TO AVOID :

Strong acids Contact with strong acids (e.g. sulfuric, phosphoric, nitric, hydrochloric, chromic, sulfonic) may generate heat, splattering or boiling and toxic vapors.

HAZARDOUS DECOMPOSITION PRODUCTS :

Under fire conditions: Oxides of carbon, Oxides of nitrogen, Oxides of phosphorus

11. TOXICOLOGICAL INFORMATION

No toxicity studies have been conducted on this product.

SENSITIZATION :

This product is not expected to be a sensitizer.

MATERIAL SAFETY DATA SHEET

PRODUCT

PermaTreat® PC-391

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

CARCINOGENICITY :

None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HUMAN HAZARD CHARACTERIZATION :

Based on our hazard characterization, the potential human hazard is: Low

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

No toxicity studies have been conducted on this product.

MOBILITY :

The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM , provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models. If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	30 - 50%	50 - 70%

The portion in water is expected to be soluble or dispersible.

BIOACCUMULATION POTENTIAL

This preparation or material is not expected to bioaccumulate.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION

Based on our hazard characterization, the potential environmental hazard is: Low

Based on our recommended product application and the product's characteristics, the potential environmental exposure is: Moderate

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it is not a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

As a non-hazardous waste, it is not subject to federal regulation. Consult state or local regulation for any additional handling, treatment or disposal requirements. For disposal, contact a properly licensed waste treatment, storage, disposal or recycling facility.

MATERIAL SAFETY DATA SHEET

PRODUCT

PermaTreat® PC-391

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

LAND TRANSPORT :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

AIR TRANSPORT (ICAO/IATA) :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

15. REGULATORY INFORMATION

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :

Based on our hazard evaluation, none of the substances in this product are hazardous.

CERCLA/SUPERFUND, 40 CFR 117, 302 :

Notification of spills of this product is not required.

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :

This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :

Our hazard evaluation has found that this product is not hazardous under 29 CFR 1910.1200.

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :

This product does not contain substances on the List of Toxic Chemicals.

MATERIAL SAFETY DATA SHEET

PRODUCT

PermaTreat® PC-391

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

TOXIC SUBSTANCES CONTROL ACT (TSCA) :

The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

NSF INTERNATIONAL :

This product has received NSF/International certification under ANSI/NSF Standard 60 in the reverse osmosis antiscalant category. The official name is "Miscellaneous Water Supply Products." Maximum product application dosage is : 15 mg/l.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :

None of the substances are specifically listed in the regulation.

CLEAN AIR ACT, Sec. 111 (40 CFR 60, Volatile Organic Compounds), Sec. 112 (40 CFR 61, Hazardous Air Pollutants), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :

None of the substances are specifically listed in the regulation.

CALIFORNIA PROPOSITION 65 :

This product does not contain substances which require warning under California Proposition 65.

MICHIGAN CRITICAL MATERIALS :

None of the substances are specifically listed in the regulation.

STATE RIGHT TO KNOW LAWS :

None of the substances are specifically listed in the regulation.

NATIONAL REGULATIONS, CANADA :

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) :

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

WHMIS CLASSIFICATION :

Not considered a WHMIS controlled product.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :

The substances in this preparation are listed on the Domestic Substances List (DSL), are exempt, or have been reported in accordance with the New Substances Notification Regulations.

INTERNATIONAL CHEMICAL CONTROL LAWS

EUROPE

The substances in this preparation have been reviewed for compliance with the EINECS or ELINCS inventories.

JAPAN

All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Ministry of International Trade & Industry List (MITI).

MATERIAL SAFETY DATA SHEET

PRODUCT

PermaTreat® PC-391

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

KOREA

All substances in this product comply with the Toxic Chemical Control Law (TCCL) and are listed on the Existing Chemicals List (ECL)

16. OTHER INFORMATION

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: Low

* The environmental risk is: Low

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH, (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

MATERIAL SAFETY DATA SHEET

PRODUCT

PermaTreat® PC-391

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

Ariel Insight# (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Prepared By : Product Safety Department

Date issued : 07/07/2003

Replaces : 05/16/2002

Material Safety Data Sheet

SECTION 1 – CHEMICAL PRODUCT AND COMPANY INFORMATION

Product Name: Sodium Hydroxide Solutions, 30%

Part Number: none

Chemical Family: Caustic Soda

Manufacturer's Name: Siemens Water Technologies Corp.

Address: 181 Thorn Hill Rd., Warrendale, PA 15086

Product/Technical Information Phone Number: (724) 772-0044

Medical/Handling Emergency Phone Number: CHEMTREC 1.800.424.9300
24 hours a day

Transportation Emergency Phone Number: CHEMTREC 1.800.424.9300
24 hours a day

Revision Date/Revision Number: August 15, 2000/#1

SECTION 2 – COMPOSITION INFORMATION

<u>Chemical Name</u>	<u>Percent by Weight</u>	<u>CAS#</u>
Sodium hydroxide	30	1310-73-2
Water	70	7732-18-5

SECTION 3 – HAZARDS IDENTIFICATION

Appearance & Odor: Clear odorless solution.

Emergency Overview: Sodium hydroxide is corrosive to the skin, eyes, respiratory tract, and digestive system.

Fire & Explosion Hazards: None known.

Primary Route(s) of Exposure: Skin and eye contact, inhalation, and ingestion.

Inhalation – Acute Effects: Sodium hydroxide aerosols may cause severe irritation of the respiratory tract and could cause pulmonary edema. Inhalation may cause a cough and labored breathing. Occupational exposure limits should not be exceeded during any part of the working exposure. The symptoms of lung edema often do not manifest until a few hours have passed and they are aggravated by physical effort.

Skin Contact – Acute Effects: Sodium hydroxide is extremely corrosive to skin and is capable of causing severe burns with deep ulceration and permanent scarring. The severity of injury depends on the concentration of the solution and the duration of exposure. Burns may not be immediately painful; onset of pain may be delayed minutes to hours. Multiple skin burns may cause temporary loss of hair.

Eye Contact – Acute Effects: Sodium hydroxide is extremely corrosive to the eyes. The severity of injury depends on the concentration of the solution, the duration of exposure, and the speed of penetration into the eye. Damage can range from severe irritation and mild scarring to blistering, disintegration, ulceration, severe scarring, and clouding. Conditions, which affect vision such as glaucoma and cataracts, are possible late developments. In severe cases, there is progressive ulceration and clouding of eye tissue which may lead to permanent blindness.

Material Safety Data Sheet

Ingestion – Acute Effects: Ingestion may produce severe burns to the esophageal tissue, which may progress to stricture formation. Should ingestion occur, severe pain, burning of the mouth, throat and esophagus, vomiting, diarrhea, collapse, and possible death may result. Ingestion causes swallowing to become painful and difficult almost immediately. In terms of total dose, caustic alkalis have killed adult humans who have ingested less than 10 grams.

SECTION 4 – FIRST AID MEASURES

Inhalation First Aid: Remove affected person from area to fresh air and provide oxygen if breathing is difficult. Give artificial respiration ONLY if breathing has stopped. Obtain medical attention.

Skin Contact First Aid: Immediately remove clothing from affected area and wash skin for 15-20 minutes with flowing water. Clothing should be discarded or washed before reuse. DO NOT instruct person to neutralize affected skin area. OBTAIN MEDICAL ATTENTION.

Eye Contact First Aid: Immediately irrigate eyes with flowing water continuously for 15-20 minutes while holding eyes open. Contacts should be removed before or during flushing. DO NOT instruct person to neutralize. OBTAIN MEDICAL ATTENTION IMMEDIATELY.

Ingestion First Aid: If victim is alert and not convulsing rinse mouth with water and give water to drink. If spontaneous vomiting occurs, have affected person lean forward with head down to avoid breathing in of vomitus. Rinse mouth again and give more water to drink. OBTAIN MEDICAL ATTENTION IMMEDIATELY.

Medical Conditions Aggravated: None known.

Note to Physician: Treat symptomatically.

SECTION 5 – FIRE FIGHTING MEASURES

Flash Point/Method: Not applicable.

Auto Ignition Temperature: Not applicable.

Upper/Lower Explosion Limits: Not applicable.

Extinguishing Media: Use media appropriate for surrounding material.

Fire Fighting Procedures: Wear appropriate protective clothing to prevent contact with skin and eyes. Wear a self-contained breathing apparatus (SCBA) to prevent contact with thermal decomposition products. Use water with caution and in flooding amounts.

Fire & Explosion Hazards: None known.

Hazardous Products of Decomposition and/or Combustion: Toxic fumes of sodium oxide, sodium peroxide fumes.

Material Safety Data Sheet

NFPA Ratings:

HEALTH-3 FLAMMABILITY-0 REACTIVITY-2 OTHER-none

SECTION 6 – ACCIDENTAL RELEASE MEASURES

Spill/Leak Procedures: If safe to do so, absorb spill with inert material, (e.g., dry sand or earth), then place into a chemical waste container.

Cleanup: Neutralize sodium hydroxide with 6M HCl or dilute with water.

Regulatory Requirements: All disposal methods must be in compliance with all Federal, State, Local and Provincial laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waster generator.

Disposal: DO NOT DUMP ON THE GROUND OR INTO ANY BODY OF WATER. All disposal methods must be in compliance with all Federal, State, Local and Provincial laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waster generator.

SECTION 7 – HANDLING AND STORAGE

Handling: Wash thoroughly after handling. Use with adequate ventilation. Do not get in eyes, on skin, or on clothing. Do not ingest or inhale. Wear all recommended personal protective equipment (PPE).

Storage: Store in tightly sealed containers in a cool, dry, well-ventilated area away from incompatible substances. Keep away from strong acids, metals, flammable liquids and organic halogens.

General Comments: This substance is a strong base, it reacts violently with acid and is corrosive in moist air to metals like zinc, aluminum, tin, and lead forming a combustible / explosive gas (hydrogen). It will attack some forms of plastics, rubber or coatings; it rapidly absorbs carbon dioxide and water from the air and contact with moisture or water may generate heat.

SECTION 8 –PERSONAL PROTECTION/ EXPOSURE CONTROL

Respiratory Protection: None required under normal use conditions.

Skin Protection: Wear neoprene, rubber or latex gloves, coveralls, rubber boots and other protective clothing as appropriate to prevent skin contact.

Eye Protection: Safety glasses or goggles with face shield are recommended.

Ventilation Protection: None required under normal use conditions.

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

Material Safety Data Sheet

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

Exposure Limits:

For Sodium Hydroxide:

OSHA PEL-TWA: 2 mg/m³

ACGIH TLV-TWA: 2 mg/m³

NIOSH REL-TWA: 2 mg/m³; CEIL: 15 mg/m³

NIOSH IDLH: 10 mg/m³

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

Appearance & Odor: Clear odorless solution.

Vapor Pressure: 13 mmHg @60C

Vapor Density (Air=1): ND*

Boiling Point: 289 °F

Melting Point: 59 °F

Specific Gravity: 1.54

Solubility in Water: Completely soluble in water.

Volatile Percentage: ND

pH: Alkaline

Flash Point/method: NA**

Auto Ignition Temperature: NA

Upper/Lower Explosion Limits: NA

Other: ND

*ND=Not determined

**NA=Not applicable

SECTION 10 – STABILITY AND REACTIVITY

Stability: This material is stable under normal use conditions

Incompatibilities: Reacts with mineral acids to form corresponding salts; reacts with weak acids gases like hydrogen sulfide, sulfur dioxide, and carbon dioxide; ignites when in contact with cinnamaldehyde or zinc; and reacts explosively with a mixture of chloroform and methane. Corrosive to metals such as aluminum, tin, and zinc as well as to alloys such as steel, and may cause formation of flammable hydrogen gas.

Polymerization: Hazardous polymerization will not occur.

Decomposition: Toxic fumes of sodium oxide, sodium peroxide fumes.

Conditions to Avoid: Incompatible materials, acids.

SECTION 11 – TOXICOLOGICAL INFORMATION

Inhalation – Acute: Sodium hydroxide aerosols may cause severe irritation of the respiratory tract and could cause pulmonary edema. Inhalation may cause a cough and labored breathing. Occupational exposure limits should not be exceeded during any part of the working exposure.

Material Safety Data Sheet

The symptoms of lung edema often do not manifest until a few hours have passed and they are aggravated by physical effort.

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

Skin Contact – Acute Effects: Sodium hydroxide is extremely corrosive to skin and is capable of causing severe burns with deep ulceration and permanent scarring. The severity of injury depends on the concentration of the solution and the duration of exposure. Burns may not be immediately painful; onset of pain may be delayed minutes to hours. Multiple skin burns may cause temporary loss of hair.

Skin Contact – Chronic: Prolonged or repeated skin contact may cause dermatitis.

Eye Contact – Acute Effects: Sodium hydroxide is extremely corrosive to the eyes. The severity of injury depends on the concentration of the solution and the duration of exposure, and the speed of penetration into the eye. Damage can range from severe irritation and mild scarring to blistering, disintegration, ulceration, severe scarring and clouding. Conditions which affect vision, such as glaucoma and cataracts, are possible late developments. In severe cases, there is progressive ulceration and clouding of eye tissue which may lead to permanent blindness.

Ingestion – Acute Effects: Ingestion may produce severe burns to the esophageal tissue, which may progress to stricture formation. Should ingestion occur, severe pain, burning of the mouth, throat and esophagus, vomiting, diarrhea, collapse, and possible death may result. Ingestion causes swallowing to become painful and difficult almost immediately. In terms of total dose, caustic alkalis have killed adult humans who have ingested less than 10 grams.

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

Carcinogenicity/Mutagenicity: There are no known carcinogenic/mutagenic effects.

Reproductive Effects: There are no known reproductive effects.

Neurotoxicity: There are no known neurotoxic effects.

Other Effects: There are no other known toxic effects.

Target Organs: Target organs include the skin and eyes.

SECTION 12 – ECOLOGICAL INFORMATION

This product may be hazardous to the environment, special attention should be given to water organisms.

Safely store product to prevent inadvertent release to the environment.

SECTION 13 – DISPOSAL CONSIDERATIONS

Spill/Leak Procedures: Neutralize with 6M HC1 or dilute with water.

Material Safety Data Sheet

Cleanup: Material that cannot be used, or reprocessed for use, and empty containers should be disposed of in accordance with all applicable regulations. Product containers should be thoroughly emptied before disposal.

Disposal: Material that cannot be used, or reprocessed for use, and empty containers should be disposed of in accordance with all applicable regulations. Product containers should be thoroughly emptied before disposal. Generators of waste material are required to evaluate all waste for compliance with RCRA and any local disposal procedures and regulations. NOTE: State and local regulations may be more stringent than federal regulations.

SECTION 14 – TRANSPORTATION INFORMATION

DOT Shipping Description:

Shipping Name: SODIUM HYDROXIDE SOLUTION

Hazard Class: 8

UN Number: UN1824

Packing Group: II

SECTION 15 – REGULATORY INFORMATION

CERCLA SECTION 103 (40CFR302.4): yes RQ: 1000 lbs. (≈80 gallons).

SARA SECTION 302 (40CFR355.30): no

SARA SECTION 304 (40CFR355.40): no

SARA SECTION 313 (40CFR372.65): no

OSHA PROCESS SAFETY (29CFR1910.119): no

CALIFORNIA PROPOSITION 65: no

SECTION 16 – OTHER INFORMATION

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



GE Betz

GE Betz, Inc.
4636 Somerton Road
Trevose, PA 19053
Business telephone: (215) 355-3300

Material Safety Data Sheet

Issue Date: 31-MAR-2005

EMERGENCY TELEPHONE (Health/Accident): (800) 877-1940

1 PRODUCT IDENTIFICATION

PRODUCT NAME:

STEAMATE NA1321

PRODUCT APPLICATION AREA:

STEAM CONDENSATE TREATMENT

2 COMPOSITION / INFORMATION ON INGREDIENTS

Information for specific product ingredients as required by the U.S. OSHA HAZARD COMMUNICATION STANDARD is listed. Refer to additional sections of this MSDS for our assessment of the potential hazards of this formulation.

HAZARDOUS INGREDIENTS:

CAS#	CHEMICAL NAME
1336-21-6	AMMONIUM HYDROXIDE (AMMONIA SOLUTION) Corrosive; toxic (by ingestion)

No component is considered to be a carcinogen by the National Toxicology Program, the International Agency for Research on Cancer, or the Occupational Safety and Health Administration at OSHA thresholds for carcinogens.

3 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

DANGER

Corrosive to skin. Corrosive to the eyes. Vapors, gases, mists and/or aerosols cause irritation to the upper respiratory tract.

DOT hazard: Corrosive to skin
Emergency Response Guide #154

Odor: Strong Ammonia; Appearance: Colorless To Light Yellow, Liquid

Fire fighters should wear positive pressure self-contained breathing

apparatus(full face-piece type). Proper fire-extinguishing media:
dry chemical, carbon dioxide, foam or water

POTENTIAL HEALTH EFFECTS

ACUTE SKIN EFFECTS:

Primary route of exposure; Corrosive to skin.

ACUTE EYE EFFECTS:

Corrosive to the eyes.

ACUTE RESPIRATORY EFFECTS:

Primary route of exposure;Vapors, gases, mists and/or aerosols
cause irritation to the upper respiratory tract.

INGESTION EFFECTS:

Toxic;

May cause severe irritation or burning of mouth, throat, and
gastrointestinal tract with severe chest and abdominal pain,
nausea, vomiting, diarrhea, lethargy and collapse. Possible death
when ingested in very large doses.

TARGET ORGANS:

Prolonged or repeated exposures may cause tissue necrosis.

MEDICAL CONDITIONS AGGRAVATED:

Not known.

SYMPTOMS OF EXPOSURE:

Symptoms range from headache, eye irritation, chest pain, nausea
and vomiting to severe coughing, difficulty in breathing, pulmonary
edema and production of pink frothy sputum.

4 FIRST AID MEASURES

SKIN CONTACT:

URGENT! Wash thoroughly with soap and water. Remove contaminated
clothing. Get immediate medical attention. Thoroughly wash clothing
before reuse.

EYE CONTACT:

URGENT! Immediately flush eyes with plenty of low-pressure water
for at least 20 minutes while removing contact lenses. Hold eyelids
apart. Get immediate medical attention.

INHALATION:

Remove to fresh air. If breathing is difficult, give oxygen. If
breathing has stopped, give artificial respiration. Get immediate
medical attention.

INGESTION:

Do not feed anything by mouth to an unconscious or convulsive
victim. Do not induce vomiting. Immediately contact physician.
Dilute contents of stomach using 3-4 glasses milk or water.

NOTES TO PHYSICIANS:

Material is corrosive. It may not be advisable to induce vomiting.
Possible mucosal damage may contraindicate the use of gastric
lavage.

5 FIRE FIGHTING MEASURES

FIRE FIGHTING INSTRUCTIONS:

Fire fighters should wear positive pressure self-contained breathing apparatus (full face-piece type).

EXTINGUISHING MEDIA:

dry chemical, carbon dioxide, foam or water

HAZARDOUS DECOMPOSITION PRODUCTS:

Thermal decomposition (destructive fires) yields elemental oxides.

FLASH POINT:

> 200F > 93C P-M(CC)

MISCELLANEOUS:

Corrosive to skin

UN2672;Emergency Response Guide #154

6 ACCIDENTAL RELEASE MEASURES

PROTECTION AND SPILL CONTAINMENT:

Ventilate area. Use specified protective equipment. Contain and absorb on absorbent material. Place in waste disposal container. Flush area with water. Wet area may be slippery. Spread sand/grit.

DISPOSAL INSTRUCTIONS:

Water contaminated with this product may be sent to a sanitary sewer treatment facility, in accordance with any local agreement, a permitted waste treatment facility or discharged under a permit. Product as is - Incinerate or land dispose in an approved landfill.

7 HANDLING & STORAGE

HANDLING:

Alkaline. Corrosive (Skin/eyes). Do not mix with acidic material.

STORAGE:

Keep containers closed when not in use. Store in cool ventilated location. Store away from oxidizers.

8 EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMITS**CHEMICAL NAME**

AMMONIUM HYDROXIDE (AMMONIA SOLUTION)

PEL (OSHA): 50 PPM

TLV (ACGIH): 25 PPM

ENGINEERING CONTROLS:

Adequate ventilation to maintain air contaminants below exposure limits.

PERSONAL PROTECTIVE EQUIPMENT:

Use protective equipment in accordance with 29CFR 1910 Subpart I

RESPIRATORY PROTECTION:

A RESPIRATORY PROTECTION PROGRAM THAT MEETS OSHA'S 29 CFR 1910.134 AND ANSI Z88.2 REQUIREMENTS MUST BE FOLLOWED WHENEVER WORKPLACE CONDITIONS WARRANT A RESPIRATOR'S USE.

USE AIR PURIFYING RESPIRATORS WITHIN USE LIMITATIONS ASSOCIATED WITH THE EQUIPMENT OR ELSE USE SUPPLIED AIR-RESPIRATORS.

If air-purifying respirator use is appropriate, use a respirator with ammonia/methylamine cartridges.

SKIN PROTECTION:

gauntlet-type neoprene gloves, chemical resistant apron--

Wash off after each use. Replace as necessary.

EYE PROTECTION:

splash proof chemical goggles, face shield

9 PHYSICAL & CHEMICAL PROPERTIES

Specific Grav.(70F,21C)	0.932	Vapor Pressure (mmHG)	~ 280.0
Freeze Point (F)	-24	Vapor Density (air=1)	> 1.00
Freeze Point (C)	-31		
Viscosity(cps 70F,21C)	10	% Solubility (water)	100.0
Odor		Strong Ammonia	
Appearance		Colorless To Light Yellow	
Physical State		Liquid	
Flash Point	P-M(CC)	> 200F > 93C	
pH As Is (approx.)		> 13.0	
Evaporation Rate (Ether=1)		< 1.00	

NA = not applicable ND = not determined

10 STABILITY & REACTIVITY

STABILITY:

Stable under normal storage conditions.

HAZARDOUS POLYMERIZATION:

Will not occur.

INCOMPATIBILITIES:

May react with acids.

DECOMPOSITION PRODUCTS:

Thermal decomposition (destructive fires) yields elemental oxides.

INTERNAL PUMPOUT/CLEANOUT CATEGORIES:

"C"

11 TOXICOLOGICAL INFORMATION

Oral LD50 RAT: 350 mg/kg
Dermal LD50 RABBIT: >1,000 mg/kg

NOTE - Estimated value

12 ECOLOGICAL INFORMATION

AQUATIC TOXICOLOGY

Ceriodaphnia 48 Hour Static Screen (pH adjusted)
100% Mortality= 300; 0% Mortality= 30 mg/L
Daphnia magna 48 Hour Static Renewal Bioassay (pH adjusted)
LC50= 525; No Effect Level= 375 mg/L
Fathead Minnow 96 Hour Static Renewal Bioassay (pH adjusted)
LC50= 210; No Effect Level= 150 mg/L

BIODEGRADATION

Product contains only inorganics that are not subject to typical biological degradation. Assimilation by microbes may occur in waste treatment or the environment.

13 DISPOSAL CONSIDERATIONS

If this undiluted product is discarded as a waste, the US RCRA hazardous waste identification number is :
D002=Corrosive(pH).

Please be advised; however, that state and local requirements for waste disposal may be more restrictive or otherwise different from federal regulations. Consult state and local regulations regarding the proper disposal of this material.

14 TRANSPORT INFORMATION

DOT HAZARD: Corrosive to skin
UN / NA NUMBER: UN2672
DOT EMERGENCY RESPONSE GUIDE #: 154

15 REGULATORY INFORMATION

TSCA:

All components of this product are listed in the TSCA inventory.

CERCLA AND/OR SARA REPORTABLE QUANTITY (RQ):

688 gallons due to AMMONIUM HYDROXIDE (AMMONIA SOLUTION);

FOOD AND DRUG ADMINISTRATION:

ALL ingredients in this product are authorized in 21CFR173.310 for use as boiler water additives where the steam may contact food.

USDA FOOD PLANT APPROVALS:

SEC.G6

SARA SECTION 312 HAZARD CLASS:

Immediate(acute);Delayed(Chronic)

SARA SECTION 302 CHEMICALS:

No regulated constituent present at OSHA thresholds

SARA SECTION 313 CHEMICALS:

CAS#	CHEMICAL NAME	RANGE
1336-21-6	AMMONIUM HYDROXIDE (AMMONIA SOLUTION)	16.0-20.0%

CALIFORNIA REGULATORY INFORMATION

CALIFORNIA SAFE DRINKING WATER AND TOXIC

ENFORCEMENT ACT (PROPOSITION 65) CHEMICALS PRESENT:

No regulated constituents present

MICHIGAN REGULATORY INFORMATION

No regulated constituent present at OSHA thresholds

16 OTHER INFORMATION

NFPA/HMIS		CODE TRANSLATION
Health	3	Serious Hazard
Fire	0	Minimal Hazard
Reactivity	0	Minimal Hazard
Special	CORR	DOT corrosive
(1) Protective Equipment	D	Goggles,Face Shield,Gloves,Apron

(1) refer to section 8 of MSDS for additional protective equipment recommendations.

CHANGE LOG

	EFFECTIVE DATE	REVISIONS TO SECTION:	SUPERCEDES
	-----	-----	-----
MSDS status:	30-JAN-1997		** NEW **
	16-APR-1997	15	30-JAN-1997
	14-JUL-1997	15	16-APR-1997
	20-APR-1998	8	14-JUL-1997
	06-MAY-1998	;EDIT:9	20-APR-1998
	21-JAN-2000	4	06-MAY-1998
	28-FEB-2001	4,15	21-JAN-2000
	30-AUG-2001	12	28-FEB-2001
	03-FEB-2004	15	30-AUG-2001
	31-MAR-2005	16	03-FEB-2004

Material Safety Data Sheet



Sulfuric Acid

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Sulfuric Acid

OTHER/GENERIC NAMES: Battery acid

PRODUCT USE: Industrial

MANUFACTURER: General Chemical Corporation
90 East Halsey Road
Parsippany, NJ 07054

FOR MORE INFORMATION CALL: 973-515-1840
(Monday-Friday, 9:00am-4:30pm)

IN CASE OF EMERGENCY CALL: 800-631-8050
(24 Hours/Day, 7 Days/Week)

2. COMPOSITION/INFORMATION ON INGREDIENTS

<u>INGREDIENT NAME</u>	<u>CAS NUMBER</u>	<u>WEIGHT %</u>
Sulfuric acid	7664-93-9	>51
Water	7732-18-5	Balance

Trace impurities and additional material names not listed above may appear in Section 15 of this MSDS. These materials may be listed for local "Right-To-Know" compliance and for other reasons.

OSHA Hazard Communication Standard: *This product is considered hazardous under the OSHA Hazard Communication Standard.*

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Oily, colorless to slightly yellow, clear to turbid liquid. Odorless. Causes severe skin burns. Causes severe eye burns. Causes burns of the mouth, throat, and stomach.

POTENTIAL HEALTH HAZARDS

SKIN: Causes severe burns.

EYES: Liquid contact can cause irritation, corneal burns, and conjunctivitis. May result in severe or permanent injury. May cause blindness.

INHALATION: Inhalation of fumes or acid mist can cause irritation or corrosive burns to the upper respiratory system, including the nose, mouth and throat. May irritate the lungs. May cause pulmonary edema.

INGESTION: Causes burns of the mouth, throat and stomach. May be fatal if swallowed. Hazards are also applicable to dilute solutions.

MATERIAL SAFETY DATA SHEET

Sulfuric Acid

DELAYED EFFECTS: Erosion of teeth, lesions of the skin, tracheo-bronchitis, mouth inflammation, conjunctivitis and gastritis. IARC and NTP have classified "strong inorganic acid mists containing sulfuric acid" as a known human carcinogen. This classification is for inorganic acid mists only and does not apply to sulfuric acid or sulfuric acid solutions. The basis for the classifications rests on several epidemiology studies which have several deficiencies. These studies did not account for exposure to other substances, some known to be animal or potential human carcinogens, social influences (smoking or alcohol consumption) and included small numbers of subjects. Based on the overall weight of evidence from all human and chronic animal studies, no definitive causal relationship between sulfuric acid mist exposure and respiratory tract cancer has been shown.

Ingredients found on one of the three OSHA designated carcinogen lists are listed below.

<u>INGREDIENT NAME</u>	<u>NTP STATUS</u>	<u>IARC STATUS</u>	<u>OSHA LIST</u>
Sulfuric acid	Known carcinogen – sulfuric acid mist	1-Known carcinogen – sulfuric acid mist	Not listed

4. FIRST AID MEASURES

SKIN: Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing while washing. Get medical attention immediately.

EYES: Immediately flush eyes with large amounts of water for at least 15 minutes. Get immediate medical attention.

INHALATION: If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

INGESTION: If swallowed, do NOT induce vomiting. Give victim two glasses of water. Call a physician immediately. Never give anything by mouth to an unconscious person.

ADVICE TO PHYSICIAN: Treat symptomatically.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT:	Not applicable.
FLASH POINT METHOD:	Not applicable.
AUTOIGNITION TEMPERATURE:	Not applicable.
UPPER FLAME LIMIT (volume % in air):	Not applicable.
LOWER FLAME LIMIT (volume % in air):	Not applicable.
FLAME PROPAGATION RATE (solids):	Not applicable.
OSHA FLAMMABILITY CLASS:	Not flammable.

EXTINGUISHING MEDIA:

Water spray or fog may be used to knock down corrosive vapor cloud. Water may be applied to the sides of the containers exposed to flames provided the water does not come in contact with the tank contents.

MATERIAL SAFETY DATA SHEET

Sulfuric Acid

UNUSUAL FIRE AND EXPLOSION HAZARDS:

Flammable and potentially explosive hydrogen gas can be generated inside metal drums and storage tanks. Concentrated sulfuric acid can ignite combustible materials on contact.

SPECIAL FIRE FIGHTING PRECAUTIONS/INSTRUCTIONS:

Do not use solid water streams near ruptured tanks or spills of sulfuric acid. Acid reacts violently with water and can spatter acid onto personnel. Wear approved positive-pressure self-contained breathing apparatus and protective clothing.

6. ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR OTHER RELEASE: (See section 8 for recommended personal protective equipment.)

Dilute small spills or leaks cautiously with plenty of water. Neutralize residue with sodium bicarbonate or other suitable neutralizing agent. When using carbonates for neutralization, adequate precautions should be taken to minimize hazards from carbon dioxide gas generation. No smoking in spill area. Major spills must be handled by a predetermined plan. Attempt to keep out of sewers.

Spills and releases may have to be reported to Federal and/or local authorities. See Section 15 regarding reporting requirements.

7. HANDLING AND STORAGE

NORMAL HANDLING: (See section 8 for recommended personal protective equipment.)

Avoid contact with skin, eyes and clothing. Avoid breathing mist. Use appropriate personnel protective equipment. Do not add water to acid. When diluting, always add acid to water cautiously and with agitation. Use with adequate ventilation.

STORAGE RECOMMENDATIONS:

Protect from physical damage. Store in a cool, well-ventilated area away from combustibles and reactive chemicals. Keep out of sun and away from heat. Keep containers upright. No smoking in storage area.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS:

Sufficient to reduce vapor and acid mists to permissible levels. Packaging and unloading areas and open processing equipment may require mechanical exhaust systems. Corrosion-proof construction recommended. Closed ventilation systems (e.g. vapor hoods) are frequently used in the electronics industry.

PERSONAL PROTECTIVE EQUIPMENT

SKIN PROTECTION: As a minimum, wear acid-resistant, preferably rubber, gloves and apron. Acid resistant boots, trousers and jacket may be used for increased protection.

EYE PROTECTION: Wear chemical safety goggles. Add a full faceshield for pouring liquids. Do not wear contact lenses.

MATERIAL SAFETY DATA SHEET

Sulfuric Acid

RESPIRATORY PROTECTION: Generally, none required. If misting conditions prevail, wear a NIOSH-approved acid-mist respirator.

ADDITIONAL RECOMMENDATIONS: Provide eyewash stations and quick-drench shower facilities in or near areas of use or handling.

EXPOSURE GUIDELINES

<u>INGREDIENT NAME</u>	<u>ACGIH TLV</u>	<u>OSHA PEL</u>	<u>OTHER LIMIT</u>
Sulfuric acid	1 mg/m ³ – TWA 3 mg/m ³ – STEL	1 mg/m ³ – TWA	15 mg/m ³ - IDLH

- ¹ = Limit established by General Chemical Corporation.
² = Workplace Environmental Exposure Level (AIHA).
³ = Biological Exposure Index (ACGIH).

OTHER EXPOSURE LIMITS FOR POTENTIAL DECOMPOSITION PRODUCTS:
None.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless to light yellow liquid
PHYSICAL STATE: Liquid
MOLECULAR WEIGHT: 98.08 (H₂SO₄)
CHEMICAL FORMULA: H₂SO₄ (various concentrations) in water
ODOR: Odorless
SPECIFIC GRAVITY (water = 1.0): 1.842
SOLUBILITY IN WATER (weight %): 100%
pH: 0.9 (1% solution)
BOILING POINT: ~310C (94%)
MELTING POINT: ~ -27C (94%)
VAPOR PRESSURE: <0.001 mm Hg @ 20C
VAPOR DENSITY (air = 1.0): Not applicable
EVAPORATION RATE: Not applicable **COMPARED TO:** Not applicable
% VOLATILES: Not applicable
FLASH POINT: Not applicable
(Flash point method and additional flammability data are found in Section 5.)

10. STABILITY AND REACTIVITY

NORMALLY STABLE? (CONDITIONS TO AVOID):

Normally stable. Avoid temperatures greater than 300C: yields sulfur trioxide gas, which is toxic, corrosive, and an oxidizer.

INCOMPATIBILITIES:

Nitro compounds, carbides, dienes, alcohols (when heated): causes explosions.
Oxidizing agents, such as chlorates and permanganates: causes fires and possible explosions.
Allyl compounds and aldehydes: undergoes polymerization, possibly violent.
Alkalies, amines, water, hydrated salts, carboxylic acid anhydrides, nitriles, olefinic organics, glycols, aqueous acids: causes strong exothermic reactions.

MATERIAL SAFETY DATA SHEET

Sulfuric Acid

Carbonates, cyanides, sulfides, sulfites, metals such as copper: yields toxic gases.

HAZARDOUS DECOMPOSITION PRODUCTS:

Sulfur trioxide gas.

HAZARDOUS POLYMERIZATION:

Will not occur.

11. TOXICOLOGICAL INFORMATION

IMMEDIATE (ACUTE) EFFECTS:

LD₅₀ (oral-rat): 2140 mg/kg

LC₅₀ (inhl-rat): 510 mg/m³/2 hr

LC₅₀ (inhl-mouse): 320 mg/m³/2 hr

DELAYED (SUBCHRONIC AND CHRONIC) EFFECTS:

IARC and NTP have classified "strong inorganic acid mists containing sulfuric acid" as known human carcinogens. The state of California has also listed "strong inorganic acid mists containing sulfuric acid" on the Proposition 65 list as a cancer causing agent. No definitive causal relationship between sulfuric acid mist exposure and respiratory cancer has been shown.

OTHER DATA:

None.

12. ECOLOGICAL INFORMATION

24.5 ppm/24 hr./bluegill/lethal/fresh water

42.5 ppm/48 hr./prawn/LC₅₀/salt water

13. DISPOSAL CONSIDERATIONS

RCRA

Is the unused product a RCRA hazardous waste if discarded? Yes

If yes, the RCRA ID number is: D002

OTHER DISPOSAL CONSIDERATIONS:

The information offered in section 13 is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

14. TRANSPORT INFORMATION

US DOT HAZARD CLASS: 8, PG II

US DOT ID NUMBER: UN1830

PROPER SHIPPING NAME: Sulfuric acid

MATERIAL SAFETY DATA SHEET

Sulfuric Acid

For additional information on shipping regulations affecting this material, contact the information number found in Section 1.

15. REGULATORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT (TSCA)

TSCA INVENTORY STATUS: Listed on the TSCA Inventory.

OTHER TSCA ISSUES: None.

SARA TITLE III/CERCLA

"Reportable Quantities" (RQs) and/or "Threshold Planning Quantities" (TPQs) exist for the following ingredients.

<u>INGREDIENT NAME</u>	<u>SARA/CERCLA RQ (lb)</u>	<u>SARA EHS TPQ (lb)</u>
Sulfuric acid	1000	1000

Spills or releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National Response Center [(800) 424-8802] and to your Local Emergency Planning Committee.

SECTION 311 HAZARD CLASS: Immediate.

SARA 313 TOXIC CHEMICALS:

The following ingredients are SARA 313 "Toxic Chemicals" and may be subject to annual reporting requirements. CAS numbers and weight percents are found in Section 2.

<u>INGREDIENT NAME</u>	<u>COMMENT</u>
Sulfuric acid	None

STATE RIGHT-TO-KNOW

In addition to the ingredients found in Section 2, the following are listed for state right-to-know purposes.

<u>INGREDIENT NAME</u>	<u>WEIGHT %</u>	<u>COMMENT</u>
No ingredients listed in this section.		

ADDITIONAL REGULATORY INFORMATION:

"Strong inorganic acid mists containing sulfuric acid" has been listed on California Proposition 65 as a cancer-causing agent.

WHMIS CLASSIFICATION (CANADA):

Listed on Canadian DSL and EU EINECS.

FOREIGN CHEMICAL CONTROL INVENTORY STATUS:

Listed on the Canadian DSL and EU EINECS.

16. OTHER INFORMATION

CURRENT ISSUE DATE: May, 2003

MATERIAL SAFETY DATA SHEET
Sulfuric Acid

PREVIOUS ISSUE DATE: November, 2001

CHANGES TO MSDS FROM PREVIOUS ISSUE DATE ARE DUE TO THE FOLLOWING:

Addition of Prop 65 listing.

OTHER INFORMATION: None