Annex A

Mr Walton's report following cleaning of *Hilli*'s boiler, Bazan Shipyard at El Ferrol, Spain dated 19 June 2003

MEMORANDUM

To :Harris Pye Marine
Attn :Paul Hancock
Cc : Robert Stevens
From: Derek Walton
Date 19.06.03

Subject : LNG Hilli – Chemical Cleaning of Main Boilers at Bazan Shipyard

The above vessel was attended from 18th May until 31st May for the purpose of supervision of chemical cleaning the main boilers.

Work commenced on Monday 19th May.

All equipment was supplied by Harris Pye Marine comprising of a Package Boiler, electric circulating pump, chemical tank [with steam injector] and various lengths of 3" bore reinforced rubber hose with snaplock fasteners.

All cleaning and treatment chemicals for this operation were ordered by HMP and supplied to Ferrol by Eazy Chem. The cleaning procedure was provided by Eazy Chem and they recommended the usage of Eazy Chem descaler [inhibited sulphamic Acid] to be used at 10% solution for acid clean , followed by sodium hydroxide at 0.5% solution for neutralisation , and Hydrazine at 1.5litres per ton to prevent any flash rusting occurring prior to flashing up.
A working weight of 15 tons was used as the basis for calculations of chemicals quantities to be used.

Chemicals and quantities ordered were:-

1] 5000 litres Descaler
2]100 litres Sodium Hydroxide
3] 50 litres Hydrazine

The above chemicals were ordered based on the boilers being 25ton working wieght leaving a surplus of 80x25litres of Eazy Chem Descaler this can be used on another cleaning, at present being stored in chemical container.

The package boiler was positioned on the aft deck and heating/chemical mixing tank on the boat deck approx 15metres above the steam drum, and the circulating pump was located at the base of the boilers approx 35metres below the mixing tank.

Supply to the boilers was via the steam drum safety valve stub piece . Returns from the boilers were taken from the water drum blow down lines from the intermediate headers and front and rear headers total of five return points were used on both boilers the lines were led to a pig, at the base of the boilers and the circulation pump took suction from the pig . The circulating inlet to the steam drum was fitted with a ball valve this enabled disconnection of the hose without losing contents .Each return was fitted with ball valves for the same purpose and these were attached to single boiler primary shut –off valve. Additional valves were fitted to the pig inlets and outlets and at the circulating pump suction discharges.

Cleaning operations were carried out as follows:-

PORT AND STARBOARD BOILERS

It was note that the boiler water capacity was 18 tons including in this was the economiser which I estimated to be 3 tons leaving 15tons in the boiler . Therefore all calculations were based on these findings. Site of daily boiler log indicated that good boiler treatment control had been maintained .

Both Boilers were separately heated to 60 C , then 10% Eazy Chem descaler was added via the filling funnel on the mixing tank this was circulated for 12 Hrs, because of the cost of disposing of the acid to shore side tanker , it was suggested to neutralise the acid by adding Sodium Hydroxide to ph 9 , with the vessels permission boiler was dumped to number six wing ballast tank. On completion after draining both steam and water drum doors were opened and high pressure washing was accomplished, unfortunately due to the neutralisation reaction between the Sulphamic acic and the Sodium Hydroxide this produced a sludge requiring a lot of water washing on the water drum and drains, all drains were proved to be clear prior to closing up boiler.

On completion of acid cleaning and neutralising Both Boilers were then filled with vessels distilled feed water then heated to 60 C Hydrazine was added at 1.5 litres per ton and circulated for six hours this will prevent any flash rusting occurring until boiler is required for service.**Note passivation can only be successfully completed under full steaming conditions.**

Both boilers were inspected by both the chief and Second Engineers.

Should you require any further information please do not hesitate to contact the writer.

Yours sincerely

Derek Walton

Annex B

GBSL's purchase order dated 1 October 2003

PURCHASE ORDER No. 21367

All documentation must show this number
GBS Ltd. Terms and conditions of purchase apply

Delivery date: 02-October-2003

Order date: 01-October-2003

Vendor No. 03GEO01

Grand Bahama Shipyard Ltd.
P.O. Box F-42498-411
Fishing Hole Road
Freeport, Grand Bahama
Bahamas

Tel. (242) 350-4020
Fax. (242) 350-4012

Contact : Dot Hemming

Required by: Dave Slater

Shipping address

Tropical Shipping FCL
1489 Martin Luther King Jr. Blvd.
Riviera Beach, Florida 33404

Tel. (561) 882-3311
Fax. (561) 882-3350

Contact: Bill Sheets

GEOMETRIC MARINE
302 THIRD STREET,
SUITE 7
NEPTUNE BEACH, FL 32266

Tel. (904) 241-2601
Fax. (904) 241-2733

Contact : Tammy

Project No. V0508 Job No. 410

Qty.	UOM	GBS. Ref	Description	Unit Cost	Extended Price
68.0000	Ea	001/0001	Unitor Decalex (Dre SAF Acid)	118.0000	8,024.00
4.0000	Ea	001/0001	Unitor Alkalinity (Drew GC)	129.0000	516.00
1.0000	Ea	001/0001	Express Transport Charges	200.0000	200.00

All deliveries must be accompanied by an advice note showing the GBS Ltd. Purchase order number
All deliveries originating outside the Bahamas must also be accompanied by a commercial invoice, a copy of which is to be sent via fax along with a copy of the advice note to the shipping agent specified above.

Total	8,740.00
Currency	USD
Terms	Net Monthly

Annex C

Unitor’s Descalex - Product Data and Material Safety Data Sheets
– dated 3 Dec 1998

Powder Acid for Removal of Scale and Rust

Descalex

Product Description
Descalex is a dry acid cleaner formulated to remove rust and scale deposits.

Directions for Use and Dose Rates
The most effective descaling is accomplished by circulation. In the case of small components, the soak method in an immersion bath can be used.

If the equipment to be cleaned is contaminated by oil, grease and sludge, then pre-cleaning with Seaclean Plus or Enviroclean.

Depending on the extent of scaling, use a solution of 2.5-10% Descalex. The solution will have a red colour which disappear when the solution is neutralised. Whenever possible, the solution should be heated to 60°C.

Neutralised solutions can be reactivated by adding more Descalex until the red colour reappears. This should not be done more than twice.

Descalex should not be used on aluminium, zinc, tin or galvanised surfaces.

Descaling of Boilers, Descaling of Diesel Engine Cooling Water Systems, Condensers, Evaporators, Calorifiers, Heat Exchangers:

See Unitor's Practical Application Manual or Unitor's Water Treatment Handbook.

The strength of the acid can be enhanced by adding 1 part sodium chloride (common salt) to 20 parts of Descalex. This enhancement of the cleaning solution, however, should not be used when descaling diesel engine cooling water systems. After use of Descalex a 0.5% solution of Alkalinity Control in fresh water should be used for neutralisation.

Product Properties

APPEARANCE:	Reddish powder		
DENSITY, in g/cm3 at 15°C:	1.2		
FLASH POINT, (PMCC) in °C:	N/A		
pH, in 10 wt-%:	1.1		
COMPATIBILITY:			
Metal:	Avoid aluminium, zinc, tin and their alloys and galvanised surfaces.		
Rubber:	No known effect.		
PACKAGING:	Product no:	Size (in kg):	Container:
	651 571646	25	Steel

Test Kits, Cleaning & Dosing Equipment
Cleaning & Maintenance -Problem & Solution Summary

Features, Benefits and Applications

- Dry acid cleaner contains inhibitors to protect metals.
- Contains colour indicator to show the strength of the solution and anti-foam agent.
- Safe and easy handling and storage.
- Fast and effective scale remover.
- Removes scale from boilers.
- Removes scale from diesel engine cooling water systems.
- Removes scale and rust from condensers, evaporators, heat exchangers etc.
- Approved by the Norwegian National Institute of Public Health for cleaning of evaporators.

Read the Material Safety Data Sheet before using this product

For detailed information on safety and health, please refer to Material Safety Data Sheet and/or Product Label

Unitor or any associated or subsidiary company's warranties of fitness and merchantability, if any, as well as any expressed warranties regarding this product shall not be effective or actionable unless the goods are used as directed herein and in no other manner due to potential hazards from improper use of the goods described herein.

How to use this Product Guide

UNITOR
CORPORATE PRODUCT SAFETY

MATERIAL SAFETY DATA SHEET

Last changed: 03/Dec/1998 Internal no.: :Rev.LdV-2 Replaces date: 02/Mar/1995

DESCALEX

1. PRODUCT AND COMPANY

TRADE NAME	DESCALEX
APPLICATION	CLEANING PRODUCTS
ART-NO	651 571646 (25 kg)

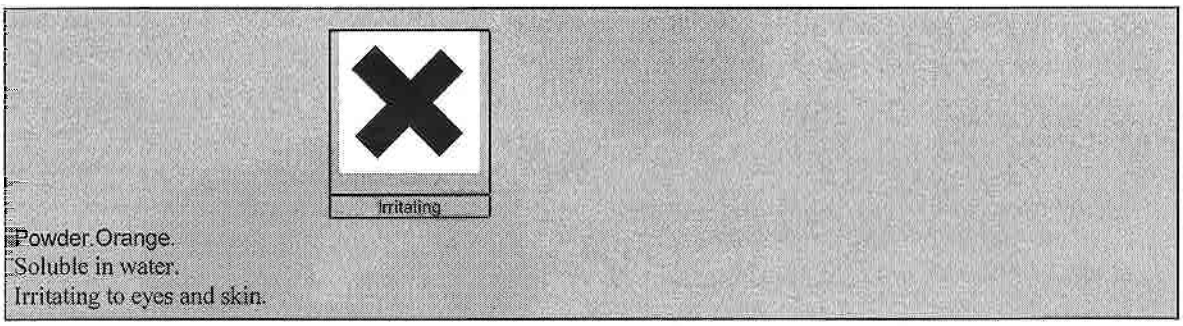
Producer/Importer	UNITOR CHEMICALS, Kjemi-Service AS
Address	P.O.Box 49
Zipcode & City	3163 Borgheim
Country	Norway
Telephone	+ 47 33 35 15 00
Fax	+ 47 33 35 15 05
Issued by	Leen de Visser (+31 6 538 63736)
Emergency number	Int. +44 1865 407333
	Int. +1 703 5273887
	USA (800) 424-9300
	Greece Int. +30 1 7793777

2. COMPOSITION OF PRODUCT

No	Ingredients name	CAS-NO	Cons.(weight%)	Classification
1	sulphamic acid	5329-14-6	60-100	Xi,36/38
2	Components which do not contribute to the classification of the product.		1-10	

Legend T+=Very toxic, T=Toxic, C=Corrosive, Xn=Harmful, Xi=Irritant, IK=No classification required, E=Explosive, O=Oxidising, F+=Extremely flammable, F=Very flammable, Fo=Flammable, N=Dang. to the environment, Mut=Genetoxic, Sens=Sensitizing, Carc=Carcinogen, Repr=Causes birth defects

3. HAZARD IDENTIFICATION



4. FIRST AID

GENERAL

Seek medical attention if any signs of unconsciousness or discomfort develop.Show this safety data sheet to the physician present.

DESCALEX

INHALATION
Low inhalation risk, except if the product is heated/burned.General first aid; provide fresh air, keep the patient warm and at rest.Get medical advice if discomfort develops.

SKIN CONTACT
Wash skin thoroughly with soap and water for several minutes.Get medical attention if irritation persists after washing.Remove contaminated clothing immediately.

EYE CONTACT
Flush with large amounts of water for at least 10 minutes.Get medical advice.

INGESTION
DO NOT INDUCE VOMITING!Give plenty of water or milk to drink.Never give anything to drink and never try to induce vomiting if the patient is not fully conscious.Get medical advice immediately.

5. FIRE FIGHTING MEASURES

PROPER FIREFIGHTING EQUIPMENT
Use extinguishing media appropriate for surrounding fire.

FIRE AND EXPLOSION HAZARDS
Non-flammable.

OTHER INFORMATION
Thermal decomposition may cause release of irritating gases and vapours.

6. ACCIDENTAL RELEASE MEASURES

SAFETY MEASUREMENTS TO PROTECT PERSONS
Use personal protective equipment as specified in section 8.

SAFETY MEASUREMENTS TO PROTECT ENVIRONMENT
No special environmental precautions required

PROPER METHODS FOR DAMAGE LIMITATION AND CLEANUP
Sweep up and empty into suitable containers for disposal.Flush with large amounts of water to clean the area.

OTHER INFORMATION
Small amounts can be flushed to sea or drain with large amounts of water.

7. HANDLING AND STORAGE

HANDLING ADVICE
Use personal protective equipment as specified in section 8.Avoid contact with skin and eyes.Eyewash facilities should be available at the workplace.

STORAGE
S-3/9/49 Keep only in the original container in a cool, well ventilated place.

8. EXPOSURE CONTROL AND PERSONAL PROTECTION

Ingredients name	CAS-no	TLV value	TLV Year
sulphamic acid	5329-14-6		




DESCALEX

EXPOSURE CONTROL
No information on exposure limits for the ingredient

RESP. PROTECTION
Normally not necessary in ordinary use.
Wear particulate respirator if there is dust formation.

EYE PROTECTION
Wear dust-proof goggles if dust formation is possible.

HAND PROTECTION
Use protective gloves of impervious material, e.g. rubber/plastic.

SKIN PROTECTION
Protective clothing should be worn if there is a possibility of direct contact or splashes.

9. PHYSICAL AND CHEMICAL PROPERTIES

Form	Hygroscopic powder.		
Colour	Orange.		
Odour	Characteristic.		
Solubility	Completely soluble in water.		
Melting point/range	205 °C	**Density**	1.2 @ 20 °C
Expl. limit LEL-UEL., %-%:	N/A	**Solubility in water**	~20 %
Vapor pressure	N/E	**Saturation conc.**	N/A
Decomposition temp.	N/A	**Rel. density sat. air (air=1)**	N/A
pH Solution	1 (10%)	**Boiling point/range**	N/E
Flash point	N/A	**pH konsentrat:**	N/A
Molecular weight	N/A	**Viscosity**	N/A
Ignition temp	N/A	**Smelling limits lo-hi**	N/A
Rel. vapor density (air=1)	N/A	**Rel. evap. velocity**	N/A
Air reactive	-	**Water reactive**	-

OTHER INFORMATION
N/A = Not applicable.
N/E = Not established.

10. STABILITY AND REACTIVITY

STABILITY
Stable under normal conditions.

MATERIALS TO AVOID
Aluminium.
Zinc
Copper.
Tin
Contact with alkalis.
Nitrite.

HAZARDOUS DECOMPOSITION PRODUCTS
No decomposition if stored and used as directed.

OTHER INFORMATION
Avoid intense heating.

11. TOXICOLOGICAL INFORMATION

DESCALEX

OTHER TOX. INFORMATION
Normal use of the product is expected to be of low health hazard.
LD50/oral/rat =3160 mg/kg

GENERAL
Repeated or prolonged exposure may cause irritation to eyes and skin.

INHALATION
Dust may irritate respiratory tract and lungs.

SKIN CONTACT
Irritating to skin.

EYE CONTACT
Dust particles in the eyes cause irritation and smarting.

INGESTION
Ingestion of small amounts will normally not cause any complications.May cause chemical burns to mouth and throat.

CANCER
Carcinogenic properties are not known.

12. ECOLOGICAL INFORMATION

MOBILITY
Dissolves in water .

BREAKDOWN
Contains no substances known to be hazardous to the environment or not degradable in waste-water treatment plants.

ACCUMULATION
Does not bioaccumulate.

ECOTOXITY
No ecological effects are expected in normal use.Exhibits low toxicity to water organisms.Discharge to water may cause local effects to aquatic organisms near the discharge point.LC50 (aquatic organisms, mg/litre / 96 hours):70.3 mg/l (Pimephates Promeless)

13. DISPOSAL

S-35 This material and its container must be disposed of in a safe way.S-35 In accordance with local and national regulations.

14. TRANSPORT INFORMATION

GENERAL

Goods classified for transport	:	YES
UN-no:	:	2967
PROPER SHIPPING NAME	:	Sulphamic acid
Flash point	:	N/A
Packing group	:	III

DESCALEX

Label information:

ADR

Class	:	8
Item.	:	16c
Haz. id. no.	:	80
ERI-Card	:	8-08
TREM-Card	:	80G09
Labeltype	:	8
Labelcolour	:	Black./White.

IMDG-CODE

Class	:	8
Subsidiary risk	:	-
Marine pollutant	:	-
EMS	:	8-08
MFAG	:	700
Page Number	:	8229
Labeltype	:	8
Labelcolour	:	Black./White.

IATA-DGR

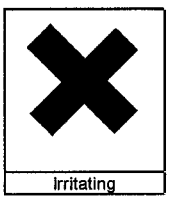
Class	:	8
Subsidiary risk	:	-
Labeltype	:	8
Labelcolour	:	Black./White.
Aircraft Cat.	:	Passenger & Cargo aircraft

US DOT

Class	:	8
Marine pollutant	:	NO
RQ	:	N/E
Labeltype	:	8
Labelcolour	:	Black./White.

15. REGULATORY INFORMATION

Classification



COMPOSITION
sulphamic acid (60-100)

R-PHRASES
R-36/38 Irritating to eyes and skin.

S-PHRASES

S-26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S-28 After contact with skin, wash immediately with plenty of Water.

REFERENCES

The product is labelled in accordance with EU directive 88/379.

16. OTHER INFORMATION

ISSUED: 03/Dec/1998

VENDOR NOTES

The safety data sheet fulfills requirements specified in Directive 93/112/EEC.The safety data sheet has been prepared on the basis of information given by our suppliers and our present knowledge.Information given is intented to present guidelines for safe handling, use, processing, storage, transport, disposal and discharge; it is not intended to be a guarantee or quality specification.The intent of this safety data sheet is to give a description of the product with regard to safe storage, handling and use.Information given applies only to the product itself, and not in combination with other products or in any processed form, unless this is specified in the text.We believe that all information in this safety data sheet (which replaces all previous versions) was correct at the date of issue.It is the responsibility of the recipient of this safety data sheet to ensure that information given here is read and understood by all who use, handle, dispose of or in any way come in contact with the product.

Annex D

Ashland Drew (Drew Marine (UK) Ltd) – SAF Acid - Product Data and Material Safety Data Sheets – dated 9 November 2002

SAF-ACID™ Descaling Compound

Description

SAF-ACID descaling compound is a special blend of sulfamic acid, wetting agent and color indicator. The wetting agent enhances the action of the sulfamic acid in removing deposits by its surface active cleaning properties. The color indicator provides a simple means for determining whether the strength of the SAF-ACID solution is adequate for effective, efficient cleaning.

Application and Use

SAF-ACID descaling compound is recommended for removing mineral scale deposits from evaporators, heat exchanger heat transfer surfaces and boilers. It is also effective in removing iron deposits when used in combination with salt. SAF-ACID compound is effective in removing shell growth from seawater heat exchangers.

Before using SAF-ACID descaling compound, if there is organic matter (oil) in the deposits, the equipment should be cleaned with HDE-777™ heavy duty emulsifier, LAC™ liquid alkaline cleaner or EDGE® heavy duty cleaner. If the organic material is baked on, it may require an initial cleaning with FOT™ fuel oil treatment.

SAF-ACID descaling compound must be dissolved in water before adding to cleaning equipment.

When dissolved in water, the SAF-ACID descaling compound strength is monitored by a built-in color indicator. A GOLD COLOR INDICATES THAT THE SAF-ACID SOLUTION IS THE APPROPRIATE STRENGTH FOR DESCALING. As scale is dissolved and the acid strength becomes exhausted, the solution will turn from gold to green. When this occurs, the solution is no longer sufficiently acidic to efficiently dissolve scale. The cleaning solution can be brought back to strength by the addition of approximately 25% of the initial dose of SAF-ACID descaling compound. The additional SAF-ACID descaling compound should turn the solution gold again while maintaining the cleaning solution temperature at 60-70° C (140-160° F).

When equipment is very heavily scaled and large amounts of SAF-ACID descaling compound are required, the solution may become saturated and will remain gold in color because no additional scale can be dissolved. To avoid this, not more than two subsequent acid charges should be added. If, after the second addition of SAF-ACID compound the equipment is not clean, dump the solution and repeat the cleaning procedure with a fresh acid solution.

After cleaning with SAF-ACID compound, drain and flush with fresh water and rinse with a 1% solution of GC™ concentrated alkaline liquid to neutralize any acid remaining on heat transfer surfaces.

Important Information and Precautions

Do not allow acid solution to remain in equipment for more than a total of 24 hours.

As with all acid cleaning, be sure to remove zinc plates and rods or other sacrificial anodes before cleaning. The acid cleaning process can generate flammable/hazardous gas. Do not perform hot work when acid is in circulation.

Continued on page 2

Features	Benefits
Concentrated liquid	Reduces cleaning time Cost effective Does not require equipment disassembly for cleaning
Contains a corrosion inhibitor	Minimizes metal attack during cleaning Can be used in most shipboard systems
Contains a wetting agent	Penetrates light, organic film Quick removal of scale
Contains a color indicator Does not require special test apparatus	Easy determination of solution strength
Free-flowing powdered acid	Easy to store and mix

Ashland is committed to the continuous evolution of technology and service solutions that promote health, safety and environmental protection around the world

Always make sure that equipment has sufficient ventilation to prevent the accumulation of gases.

For boiler cleaning:

- Do not acid clean a boiler with SAF-ACID™ descaling compound when deposits contain significant amounts of copper or a high percentage of silica.
- The boiler must never be fired while containing an acid solution.
- Vent to the outside

For evaporator/heat exchanger cleaning:

- Do not add sodium chloride (ordinary salt) to the acid solution for removing iron oxide deposits if the equipment is made of stainless steel.

NOTE: Care should be taken to follow local disposal regulations with all waste water.

Equipment Required

Proper planning is essential to acid cleaning with SAF-ACID descaling compound.

The following items are required:

1. The ideal equipment for this cleaning is the Chemical Cleaning Circulating Unit (P/C #0948028).
2. A vent pipe to carry any gases released during the cleaning to the outside.
3. Protective clothing for personnel performing the acid cleaning. This includes goggles or splash shield, rubber gloves and a rubber apron.

Cleaning Compounds Required and Dosing Chart

The Dosing Quantity Calculation

Capacity of equipment figured by the following:	*To obtain required dosage of SAF-ACID compound (10% concentration), multiply capacity of equipment by the following:*	
	Kgs.	Lbs.
Cubic meters (metric tons)	100	220

The dosage of GC™ concentrated alkaline liquid required for neutralization is listed below:

Capacity of equipment figured by the following:	*To obtain a 1% solution of GC liquid, multiply capacity of equipment in tons by the following:*
	Liters
Cubic meters (metric tons)	10

If the deposits contain iron oxide, add sodium chloride (ordinary salt) to the acid solution. The amount of salt needed is equal to half of the amount of SAF-ACID descaling compound used. Remember, if the equipment is stainless steel, do not add the salt.

Pretesting for Leaks

Before cleaning begins, equipment should be checked for leaks. Prepare the chemical cleaning equipment, fill the mix tank with water and turn on the circulating pump to fill the equipment to be cleaned. Maintain the level of water in the mix tank at half full. Circulate the water by means of the pump and check to be certain there are no leaks in the piping and that the equipment is functioning. If there are no leaks in the system, proceed with cleaning.

Cleaning Procedure

1. Boilers

Install the vent piping from a top opening in the boiler to the outside.

Disconnect the bottom blowdown piping and install a "tee". Run a line from one end of the tee to waste. Install a shut-off valve in this line. Run a line from the circulating pump discharge to the other end of the tee. Run a line from the bottom of the mix tank to the suction side of the circulating pump. Run another line from the top of the boiler to the top of the mix tank. Set all valves properly. Fill the boiler to the bottom of the gauge glass with water as well as the mix tank, pump and hoses. Fire the boiler using a low fire until the temperature of the water reaches 65° C (150° F).

Start the circulating pump and regulate the flow of solution so that the pump removes the water from the mix tank at the same rate as it is added. Circulation will be from the bottom to the top of the boiler. Refer to Diagram 1 for circulation through the boiler.

Slowly add the proper amount of SAF-ACID™ descaling compound to the mix tank. A 10% by weight solution will be required. Refer to the dosage chart to determine the required amount of SAF-ACID compound to add to the mix tank to make a 10% by weight solution relative to the size of the boiler.

When the acid cleaning solution is exhausted it will turn from a gold to green color. If this occurs, add approximately 25% of the initial dose of SAF-ACID descaling compound. Cleaning is complete when the strength of SAF-ACID descaling compound holds steady for at least two (2) hours as indicated by a steady gold color. After two (2) hours, stop the acid pump, drain and flush the boiler.

Continued on page 3

After the boiler is flushed, fill the boiler with water and add the required amount of GC™ concentrated alkaline liquid to obtain a 1% solution. Refer to the dosage chart to determine the required amount of GC liquid to add to make a 1% solution. This will neutralize any acid remaining in the equipment. Circulate the neutralizing solution for a minimum of two (2) hours.

Once neutralized, drain and inspect the boiler. If necessary, flush with a high-pressure hose to remove any loose matter. If satisfactory, return the boiler to normal operating condition by disconnecting the vent pipe and tee and reconnecting the blowdown line, etc.

If not returned to service, the boiler must be passivated. Check with your local Drew Marine representative for passivation procedures.

Cleaning Procedure
II. Evaporators/Heat Exchangers

Add SAF-ACID descaling compound slowly to the tank of water, stirring if necessary until the desired quantity of acid is dissolved. Refer to the dosage chart for the amount of acid required.

Circulate the acid cleaning solution at a temperature of 60-70° C (140-160° F). The solution may be heated by either the introduction of steam or the use of an immersion heater.

If the equipment is badly scaled, it may be necessary to discard the cleaning solution and make a fresh batch. Cleaning is complete when the SAF-ACID strength holds constant for at least half an hour as indicated by a steady gold color. Cleaning is generally accomplished in 2-6 hours.

Drain the cleaning solution, and flush the system. Refill with water and add the required amount of GC concentrated alkaline liquid. Refer to the dosage chart for making a 1% neutralizing rinse solution. Circulate for 1/2 to 1-1/2 hours, then drain the system. Inspect the system and return to service.

Typical Physical Properties

Appearance:	Green, granular powder
Solubility in Water:	20% at 16° C (6° F)
pH of 10% Solution:	1.5

Packaging

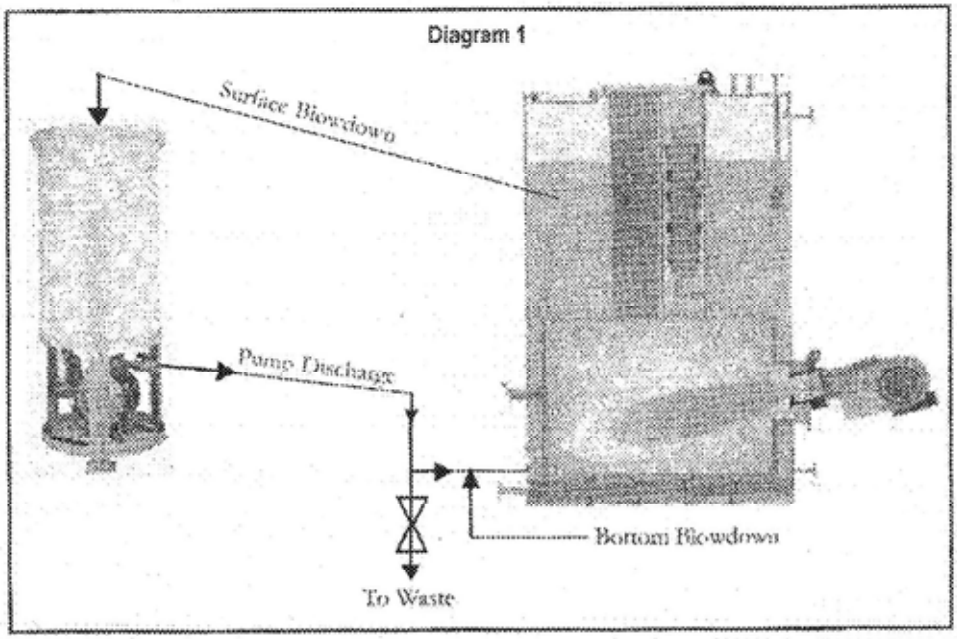
SAF-ACID descaling compound is available in 25-kg containers (P/C #0062349).

Important Information

Ashland maintains Material Safety Data Sheets on all of its products. Material Safety Data Sheets contain health and safety information for your development of appropriate product handling procedures to protect your employees and customers.

Our Material Safety Data Sheets should be read and understood by all of your supervisory personnel and employees before using Ashland products in your facilities.

Diagram 1



MATERIAL SAFETY DATA SHEET

Ashland

Date Prepared: 09/11/02

MSDS No: 306.0002464-006.006

SAF ACID

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1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Material Identity
Product Name: SAF ACID
General or Generic ID: DESCALING COMPOUND

Company
Ashland
Ashland Distribution Co. &
Ashland Specialty Chemical Co.
P. O. Box 2219
Columbus, OH 43216
614-790-3333

Emergency Telephone Number:
1-800-ASHLAND (1-800-274-5263)
24 hours everyday

Regulatory Information Number:
1-800-325-3751

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2. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient(s)	CAS Number	% (by weight)
SULFAMIC ACID	5329-14-6	
INHIBITOR COMPOSITION	Trade Secret	
MAGNESIUM OXIDE	1309-48-4	

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3. HAZARDS IDENTIFICATION

Potential Health Effects

Eye

Can cause permanent eye injury. Symptoms include stinging, tearing, redness, and swelling of eyes. Can injure the cornea and cause blindness.

Skin

Can cause permanent skin damage. Symptoms may include redness, burning, and swelling of skin, burns, and other skin damage.

Swallowing

Swallowing this material may be harmful or fatal. Symptoms may include severe stomach and intestinal irritation (nausea, vomiting, diarrhea), abdominal pain, and vomiting of blood. Swallowing this material may cause burns and destroy tissue in the mouth, throat, and digestive tract. Low blood pressure and shock may occur as a result of severe tissue injury.

Inhalation

This material is a dust or may produce dust. Breathing this material may be harmful or fatal. Symptoms may include severe irritation and burns to the nose, throat, and respiratory tract.

Symptoms of Exposure

Signs and symptoms of exposure to this material through breathing, swallowing, and/or passage of the material through the skin may include: irritation (nose, throat, airways), nosebleed, lung irritation, cough, choking, lung edema (fluid buildup in the lung tissue), lung damage, damage to the mouth, throat, and/or airways, convulsions, respiratory failure.

Target Organ Effects

No data

Developmental Information

There are no data available for assessing risk to the fetus from maternal exposure to this material.

Cancer Information

This material is not listed as a carcinogen by the International Agency for Research on Cancer, the National Toxicology Program, or the Occupational Safety and Health Administration.

Other Health Effects

No data

Primary Route(s) of Entry

Inhalation, Skin contact, Eye contact, Ingestion.

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4. FIRST AID MEASURES

Eyes

If material gets into the eyes, immediately flush eyes gently with water for at least 15 minutes while holding eyelids apart. If symptoms develop as a result of vapor exposure, immediately move individual away from exposure and into fresh air before flushing as recommended above. Seek immediate medical attention.

Skin

Immediately flush skin with water for at least 15 minutes while removing contaminated clothing and shoes. Seek immediate medical attention. Wash clothing before reuse and discard contaminated shoes.

Swallowing

Seek immediate medical attention. Do not induce vomiting. Vomiting will cause further damage to the mouth and throat. If individual is conscious and alert, immediately rinse mouth with water and give milk or water to drink. If possible, do not leave individual unattended.

Inhalation

If symptoms develop, immediately move individual away from

exposure and into fresh air. Seek immediate medical attention; keep person warm and quiet. If person is not breathing, begin artificial respiration. If breathing is difficult, administer oxygen.

Note to Physicians
Preexisting disorders of the following organs (or organ systems) may be aggravated by exposure to this material: respiratory tract skin, lung (for example, asthma-like conditions), eye.

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5. FIRE FIGHTING MEASURES

Flash Point
Not applicable

Explosive Limit
Not applicable

Autoignition Temperature
No data

Hazardous Products of Combustion
May form: carbon monoxide, magnesium oxide, nitrogen compounds, nitrogen oxides, sulfur compounds.

Fire and Explosion Hazards
No special fire hazards are known to be associated with this product.

Extinguishing Media
alcohol foam, water fog, carbon dioxide, dry chemical.

Fire Fighting Instructions
Water may be used to extinguish fire by cooling, and diluting liquid with water. Wear a self-contained breathing apparatus with a full facepiece operated in the positive pressure demand mode with appropriate turn-out gear and chemical resistant personal protective equipment. Refer to the personal protective equipment section of this MSDS.

NFPA Rating
Health - 3, Flammability - 0, Reactivity - 1

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6. ACCIDENTAL RELEASE MEASURES

Small Spill
Wear personal protective equipment to avoid contact. Scrub with plenty of water. Minimize dust. Sweep, shovel, or vacuum.

Large Spill
Persons not wearing protective equipment should be excluded from area of spill. Stop spill at source. Shovel and sweep material into plastic-lined containers to prevent further exposure to the

environment. If possible, area of spill should be vacuum-cleaned with an industrial vacuum cleaner equipped with exhaust filters and a dust-free disposal system.

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7. HANDLING AND STORAGE

Handling

Containers of this material may be hazardous when emptied. Since emptied containers retain product residues (vapor, liquid, and/or solid), all hazard precautions given in the data sheet must be observed.

Storage

Store in closed containers in a dry, well-ventilated area.

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8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Eye Protection

Chemical splash goggles in compliance with OSHA regulations are advised; however, OSHA regulations also permit other type safety glasses. Consult your safety representative.

Skin Protection

Wear resistant gloves such as: polyvinyl chloride, To prevent skin contact, wear impervious clothing and boots..

Respiratory Protections

If workplace exposure limit(s) of product or any component is exceeded (see exposure guidelines), a NIOSH/MSHA approved air supplied respirator is advised in absence of proper environmental control. OSHA regulations also permit other NIOSH/MSHA respirators (negative pressure type) under specified conditions (see your industrial hygienist). Engineering or administrative controls should be implemented to reduce exposure.

Engineering Controls

Provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure below TLV(s).

Exposure Guidelines

Component

SULFAMIC ACID (5329-14-6)
No exposure limits established

INHIBITOR COMPOSITION
No exposure limits established

MAGNESIUM OXIDE (1309-48-4)
OSHA PEL 15.000 mg/m3 - TWA total particulate
OSHA VPEL 10.000 mg/m3 - TWA total particulate
ACGIH TLV 10.000 mg/m3 - TWA

9. PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point
Not applicable

Vapor Pressure
Not applicable

Specific Vapor Density
Not applicable

Specific Gravity
Not applicable

Liquid Density
Not applicable

Percent Volatiles
< 1.0 %

Evaporation Rate
Not applicable

Appearance
FREE FLOWING

State
SOLID

Physical Form
POWDER

Color
GREEN

Odor
No data

pH
Not applicable

Bulk Density
69.000 - 87.000 lbs/ft3

10. STABILITY AND REACTIVITY

Hazardous Polymerization
Product will not undergo hazardous polymerization.

Hazardous Decomposition
May form: carbon monoxide, magnesium oxide, nitrogen compounds, nitrogen oxides, sulfur compounds.

Chemical Stability
Stable.

Incompatibility
Avoid contact with: amines, halogenated hydrocarbons, strong alkalies, strong mineral acids, strong oxidizing agents, water.

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11. TOXICOLOGICAL INFORMATION

LD 50 and LC 50 Data

SULFAMIC ACID (CAS# 5329-14-6)
Oral LD50 (rat): 3160 mg/kg
Dermal LD50: Not available
Inhalation LC50: Not available

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12. ECOLOGICAL INFORMATION

Ecotoxicological Information
This mixture has not been specifically tested.

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13. DISPOSAL CONSIDERATION

Waste Management Information
Dispose of in accordance with all applicable local, state and federal regulations. For assistance with your waste management needs - including disposal, recycling and waste stream reduction, contact Ashland Distribution Company, IC&S Environmental Services Group at 800-637-7922.

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14. TRANSPORT INFORMATION

DOT Information - 49 CFR 172.101
DOT Description:
SULPHAMIC ACID MIXTURES,8,UN2967,III

Container/Mode:
55 GAL DRUM/TRUCK PACKAGE

NOS Component:
None

RQ (Reportable Quantity) - 49 CFR 172.101
Not applicable

Other Transportation Information
The DOT Transport Information may vary with the container and mode of shipment.

15. REGULATORY INFORMATION

US Federal Regulations

TSCA (Toxic Substances Control Act) Status

TSCA (UNITED STATES) The intentional ingredients of this product are listed.

CERCLA RQ - 40 CFR 302.4(a)

None listed

CERCLA RQ - 40 CFR 302.4(b)

Materials without a "listed" RQ may be reportable as an "unlisted hazardous substance". See 40 CFR 302.5 (b).

SARA 302 Components - 40 CFR 355 Appendix A

None

Section 311/312 Hazard Class - 40 CFR 370.2

Immediate(X) Delayed( ) Fire( ) Reactive( ) Sudden Release of Pressure( )

SARA 313 Components - 40 CFR 372.65

None

OSHA Process Safety Management 29 CFR 1910

None listed

EPA Accidental Release Prevention 40 CFR 68

None listed

International Regulations

Inventory Status

DSL (CANADA) The intentional ingredients of this product are listed.

State and Local Regulations

California Proposition 65

The following statement is made in order to comply with the California Safe Drinking Water and Toxic Enforcement Act of 1986: This product contains the following substance(s) known to the state of California to cause cancer.

ETHYLENE OXIDE
ARSENIC
LEAD
CADMIUM
1,4-DIOXANE

The following statement is made in order to comply with the California Safe Drinking Water and Toxic Enforcement Act of 1986: This product contains the following substance(s) known to the state of California to cause reproductive harm.

ETHYLENE OXIDE
ARSENIC
LEAD

CADMIUM

New Jersey RTK Label Information

SULPHAMIC ACID	5329-14-6
MAGNESIUM OXIDE	1309-48-4

Pennsylvania RTK Label Information

MAGNESIUM OXIDE (MGO)	1309-48-4

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16. OTHER INFORMATION

The information accumulated herein is believed to be accurate but is not warranted to be whether originating with the company or not. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances.

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