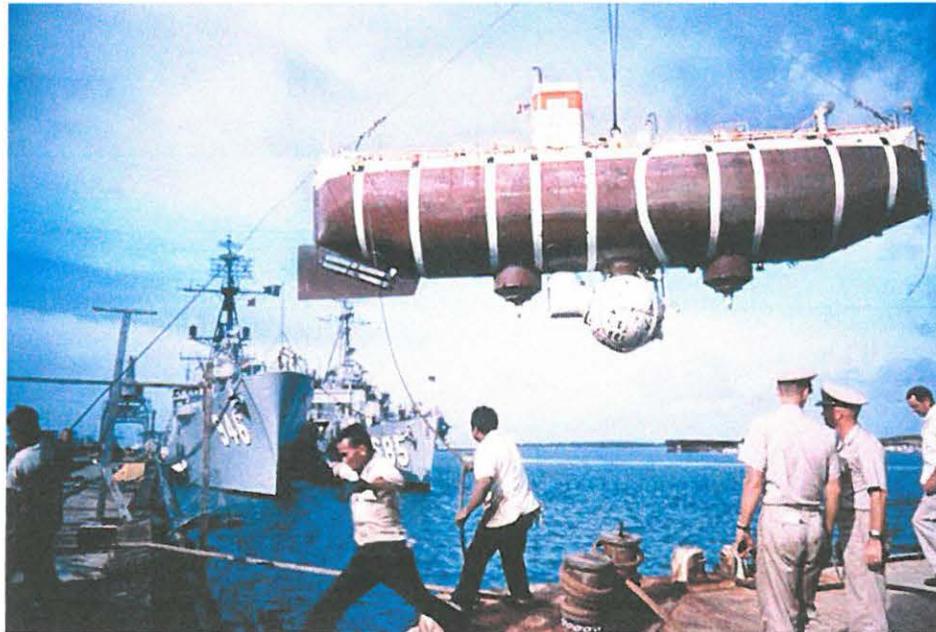


67-175-A - SPHERE
67-176-A - TRIESTE

Terra Mare Conservation

Terra Mare Conservation, LLC
14 Marbel Lane
Charleston, SC USA 29403
terramareconservation.com

**CONSERVATION OF THE TRIESTE SUBMARINE
AT THE NATIONAL MUSEUM OF THE UNITED STATES
NAVY**



Final Report
Prepared for: Southeastern Archaeological Research (SEARCH)
Prepared by: Claudia Chemello
Co-founder and Senior Conservator
November 9, 2015



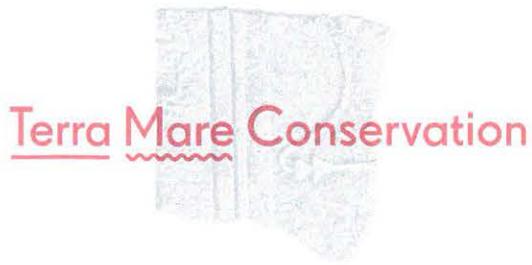
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Executive Summary

Terra Mare Conservation, LLC (TMC) was contracted by Southeastern Archaeological Research (SEARCH) to undertake conservation of the Trieste submarine for the National Museum of the United States Navy. TMC performed the conservation work from October 6-15, 2015 at the Museum where the submarine is on display.

This final report details the treatment undertaken by conservators Claudia Chemello and Paul Mardikian of TMC, including all materials and methods used. The report includes maintenance recommendations for the submarine.

Photo credit on title page: "Deepest Sea Challenge" National Geographic, source:
<http://www.deepseachallenge.com/the-expedition/1960-dive/>



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Bathyscaphe Trieste

History

The Trieste is a free-diving, self-propelled, deep-sea submarine known as a bathyscaphe. Trieste is well known for an historic dive to the bottom of the Mariana Trench, the deepest known point on Earth at 35,813 feet (10,916 meters) on January 23, 1960. The submarine was piloted by Don Walsh (Lieutenant, US Navy) and co-piloted by Jacques Piccard (oceanographer, engineer, and son of the boat's designer Auguste Piccard). The nearly 7-mile descent took almost 5 hours (To the depths in Trieste, n.d.).

The Trieste was constructed by Acciaierie Terni/Cantieri Riuniti dell'Adriatico in Trieste, Italy and launched on August 26, 1953 near Naples. After several years of operations in the Mediterranean, the US Navy acquired the vessel in 1958. Following its 1959-60 mid-Pacific work, Trieste operated out of San Diego, California, supporting Navy research objectives. In 1963, Trieste went to the Atlantic Ocean to search for the lost submarine *USS Thresher*. Soon after completion of that mission, Trieste was taken out of service and is now on display at the National Museum of the United States Navy at the Washington Navy Yard in Washington DC (To the Depths in Trieste, 2015).

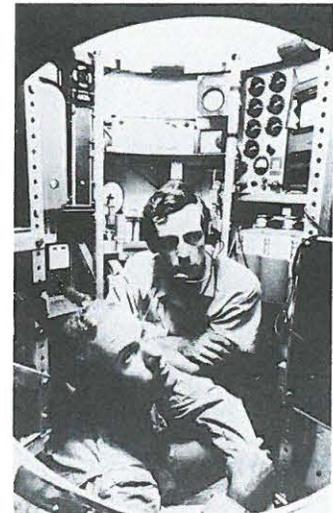


Figure 1: Wash and Piccard emerge from their historic dive to the bottom of the Mariana Trench (left), photo by Thomas J. Abercrombie, source: nationalgeographic.com. The two pilots (right), source: https://en.wikipedia.org/wiki/Bathyscaphe_Trieste

Description

The Trieste is approximately 59 feet 6 inches (18.14 meters) in length, 12 feet in diameter, and its displacement is 51 tons. The vessel has two distinct sections, both made from steel. The largest section houses the gasoline (center) and water ballast tanks (at the bow and stern) that gave the Trieste its buoyancy. Two ballast tanks held steel pellets that were released when the submarine required positive buoyancy (The Bathyscaphe Trieste celebrates, 2010). The second chamber is a suspended pressurized sphere with acrylic viewing port, attached to the underside of the submarine. The sphere housed the two pilots and equipment, and is 6.5 feet in diameter with walls approximately 5 inches thick (Bathyscaphe Trieste overcomes, 2015). The hull and deck are painted in a maroon color with white stripes and the pressurized sphere is painted white. All paint systems are unknown. There are two brass propellers on the forward deck and 8 zinc anodes located on the rudder, four on the starboard side and four on the port side. Numerous other materials exist on the interior of the submarine, however the interior was not accessible. The submarine is supported on two vertical steel support columns that pierce the hull at the bow and stern.

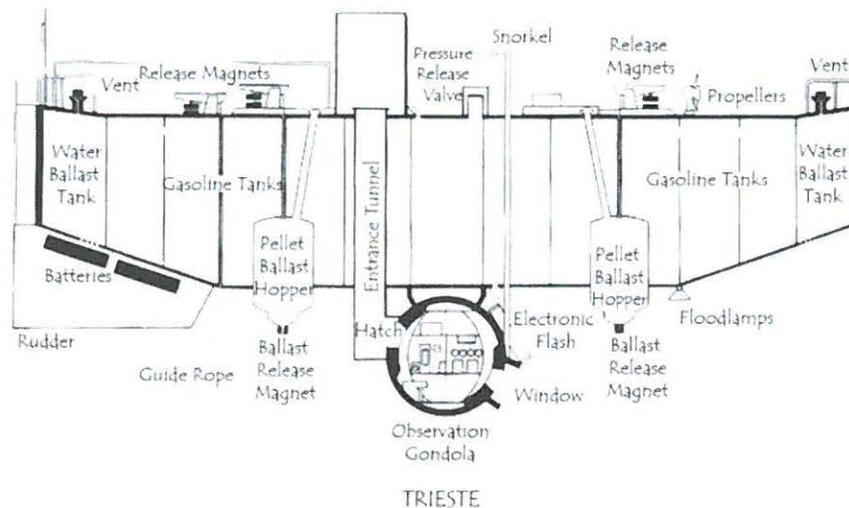


Figure 2: Line drawing of the Trieste. Source: <http://www.navalhistory.org/2015/01/23/bathyscaphe-trieste-overcomes-the-challenge-of-the-deep>



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Condition

General

The submarine is on open display at the Museum in the Undersea Exploration exhibit. The surface has a layer of dirt and dust overall and numerous areas where ingrained grime results from visitors touching the surface. In particular, the deck is very dirty with accumulated deposits of thick dirt, cobwebs, greasy stains, and other debris.

The paint used on the Trieste appears to have faded somewhat and is slightly chalky in places. Brush marks are visible in areas where the paint appears to have been touched up. The roof of the Museum directly over the submarine has glass panels that allow light and direct sunlight to enter the display gallery. It is unclear whether the glass is filtered for ultraviolet or visible light, which can cause fading of pigments and deterioration of many materials. The submarine may have been repainted, although it is not clear when this occurred. Examination of the space between the submarine wall the ballast tanks reveals that bright red paint is present underneath the maroon color now visible. It is unclear if this is an undercoat or a previously used topcoat. In historic photographs of the vessel, it was painted white in the late 1950's with dark colored stripes.

Drip-marks

Numerous disfiguring drip marks are visible on the painted surface. These are understood to be the result of leaks in the roof above the submarine. It is TMC's understanding that the roof has now been repaired. Several areas on the deck, along the port and starboard sides, and on the underside of the vessel, are stained with the drip marks as well as a thick greasy residue resembling motor oil.

There are several different types of stains caused by the drips. Some of the marks are lighter in color, some are white, and the majority are dark brown/black in color. The lighter colored stains appear to be caused by dirty water and other material (including accumulated dirt and grime on the deck) that was carried and deposited by the water. The white drip marks are translucent with a solid white border, few in number, and were mostly located near the bow on the starboard side of the submarine. These do not always extend all the way down the sides of the submarine. The majority of the stains are dark brown in color and in some areas there are 20-25 drips parallel and over the top of each other. Many of the marks have a darker, very obvious outline, are



sticky to the touch, and appear to be tar-like, possibly from material that has dislodged from the roof. The drip marks are present on both the maroon red and the white stripes of the submarine.



Figure 3: Dark brown, sticky, and white drip marks on the sides of Trieste (top row), grease stains and drip marks (bottom row)

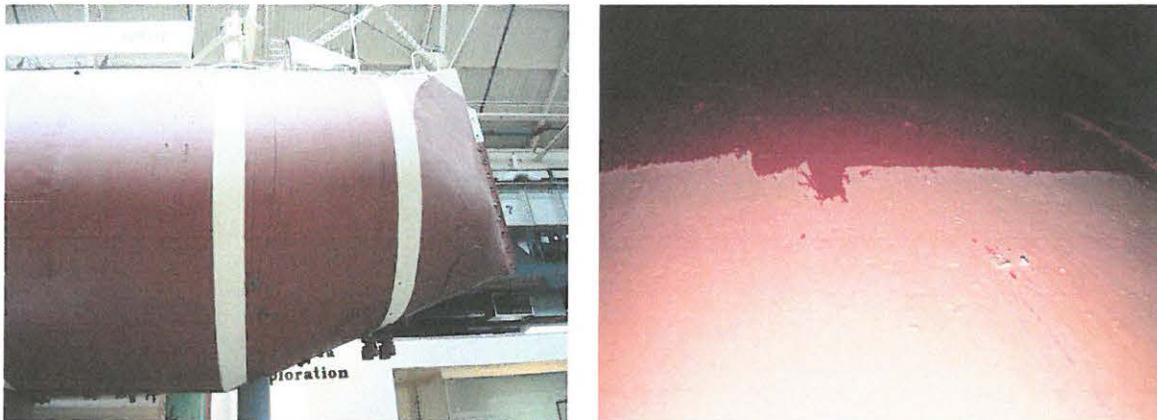


Figure 4: Drip marks extend all the way down to the floor (left), bright red paint visible on the ballast tanks (right)

Numerous drips extend all the way down the sides of the Trieste, onto the underside and down the sides of the ballast tanks. All of these are dark brown/black in color. Several drips at the bow have run all the way down the hull and onto the steel support column.

Dirty water and dark brown/black greasy material has pooled in areas on the deck surface, especially near the propeller on the port side. A large dark brown/black stain and tide marks are visible in this area. This stain appears to be grease from the propellers that has slowly dripped down the side. The drip marks extending from this area were very pronounced and well adhered to the surface.

Previous cleaning attempts are visible on the surface, including scrub marks that have marked the paint, very pale stains which have been partially cleaned, and areas where the surface appears to have been over-painted to disguise the drip marks. This is particularly visible on some of the white stripes where dark stains underneath the last layer of white paint are partially visible.

Light red/brown stains are visible in areas on some of the white stripes. These areas may correspond to the location of wedge supports placed against the hull when the submarine was docked

Treatment

The goal of conservation treatment was to mechanically clean the exterior surface of the submarine and remove or reduce as far as possible all drip marks, particularly the disfiguring brown/black drip marks.

A safety plan that included working from the deck of the vessel attached to the overhead truss of the roof via a fall restraint system was originally proposed. However, if used as an anchoring point, the truss was not certified to support the weight of two people, as specified by the Occupational Safety and Health Administration (OSHA) guidelines for fall protection. Therefore, the treatment plan was modified to include working from a scissor lift with telescoping poles for cleaning as much of the deck as possible. Due to more limited access from the lift, not all surfaces in the middle of the deck and on the conning tower could be fully reached. However, access to the sides of the submarine, especially the upper sections that had the heaviest stains, were fully reachable from the scissor lift.



Figure 5: TMC clean the Trieste using a scissor lift to access the upper sides and deck.

A sample of dirt and dust from the deck of the Trieste was submitted for asbestos analysis before treatment commenced. Test results indicated that no asbestos fibers were present in the sample. Prior to treatment, all museum display cases that were located under or near to the Trieste were relocated by museum personnel to allow free access by the scissor lift during the treatment.

All surfaces were initially brush vacuumed to remove loose dirt and debris prior to wet cleaning. Solubility tests were performed on the stains to determine optimal removal methods. The following materials were tested:

- Warm water
- Warm water with 1% Orvus paste (sodium lauryl sulfate, Proctor and Gamble)
- Cortec 300 wipes (degreaser and corrosion inhibitor, Cortec Corporation)
- 100% ethanol
- 1:1 ethanol and water
- Commercial water-based degreaser Original Krud Kutter (Krud Kutter, Inc.)
- Cortec Corr Lube VpCl® Super Penetrant (Cortec Corporation)

| Cleaning agent | Solubility | | | |
|--|--|------------------------------|-------------------------------|------------------|
| | Soluble (2), Slightly Soluble (1), Not Soluble (0), Not Applicable (N/A) | | | |
| | Light drip marks | Heavy brown/black drip marks | Grease/oil and ingrained dirt | White drip marks |
| Warm water | 1 | 2 | 0 | 1 |
| Warm water/1% Orvus paste | 2 | 2 | 1 | 1 |
| Cortec 300 wipes | 1 | 1 | 2 | 0 |
| Ethanol | 0 | 0 | 0 | 0 |
| 1:1 Ethanol/Water | 0 | 0 | 0 | 0 |
| Commercial degreaser, Krud Kutter | N/A | 1 | 1 | N/A |
| Cortec Corr Lube VpCl® super penetrant | N/A | N/A | 2 | N/A |

Table 1: Results of solubility tests on various drip marks on the surface of the Trieste

Warm water was moderately successful at removing light stains, however warm water with the addition of 1% Orvus was very successful at removing or significantly reducing most of the stains both light and dark, with repeated application required for stains with heavy outlines (dark and white). Following stain removal, the surface was immediately rinsed with warm water only and wiped with a dry cotton cloth to remove excess moisture and then air-dried.

Ethanol and 1:1 water/ethanol were not successful and did not remove the stains. Cortec 300 wipes were very good at removing and/or reducing grease, oil and dirt marks, and sticky residue. The Cortec Corr Lube was more successful at removing the large grease stain near the propeller on the port side at the bow. After the wipes and/or the Corr Lube had removed the majority of the greasy, sticky stains, the area was repeatedly wiped with warm water and Orvus, followed by warm water alone to remove all residues. The surface was then air-dried.

In general, the paint coatings used on Trieste were slightly soluble if overly abraded. As the paint is degraded and slightly chalky in some areas, care was taken during cleaning not to overly saturate or abrade the surface.

Two telescopic aluminum 3-stage poles, fitted with microfiber cleaning pads, were used to facilitate access to areas high up on the sides and the deck. Owing to restricted access to the deck, not all parts could be reached from the scissor-lift. These areas were mostly in the middle of the deck and underneath parts of the catwalk where the structure of the deck prevented access.

Non-abrasive nylon pads also assisted in areas where the stains were heavy, particularly for the white stains with a heavy border. These stains were very obstinate and could not be fully removed, leaving a ghost-like stain on the surface only visible from close range.

The light red/brown stains from wedge supports could not be removed. During treatment to remove the drip marks, TMC noted that the forward anode on the port side of the stern was fractured. The anode should be monitored and a plan for consolidation of the surface considered.

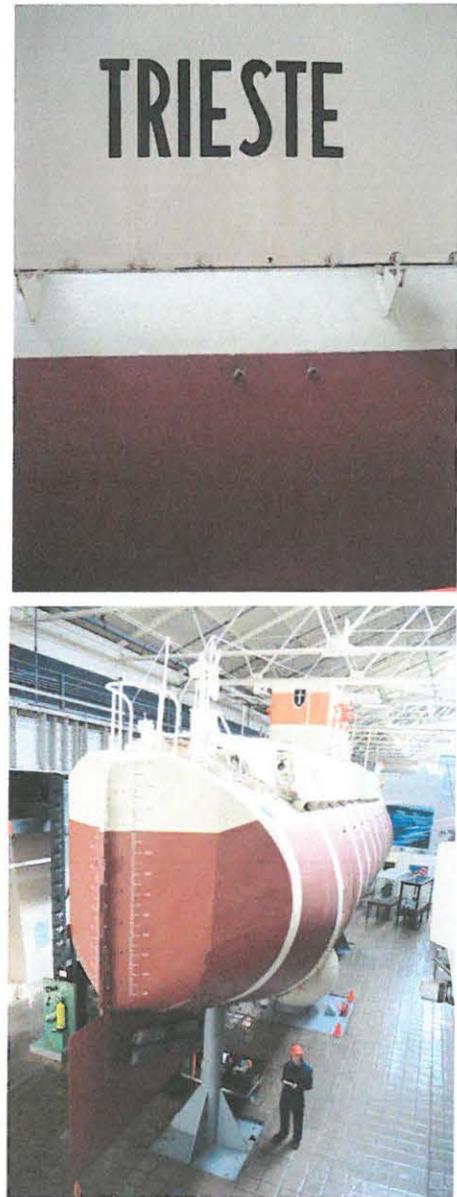


Figure 6: During cleaning of the submarine (top left), after treatment (top right, middle and bottom right), left top anode is fractured (bottom row)

Maintenance Recommendations

Maintenance and advocacy are essential components of the conservation process for all artifacts, particularly large, oversized objects. Once objects enter a museum collection, they are no longer used and subject to the same wear and tear. In the museum setting, they may be subject to different risks of deterioration in storage, on exhibit or during study. Regular maintenance will help to extend the life of interventive conservation treatments as well as identify any potential issues that may require future treatment before they become unmanageable. As the Trieste is displayed indoors, deterioration of its numerous materials is significantly reduced. However, regular monitoring and housekeeping will contribute to the long-term preservation of the vessel.

For the Trieste, a yearly inspection is recommended in addition to a full assessment to document its condition. The yearly inspection should include written observations on the current condition. During the inspection, the external surface of the submarine should be assessed using a scissor lift to view all upper exterior surfaces. Removal of accumulated dirt, dust, cobwebs and debris is recommended, either by shop vac or wiping with a cloth moistened with warm water and a mild detergent. If new grease or oil stains are noted, these should be immediately removed. New drip marks may signal a problem with the roof and should be documented and investigated as soon as possible. To assist with reducing the amount of light and ultraviolet rays entering the glass roof of the Museum, consideration may be given to installation of ultraviolet and visible light filtering film on the glass, light filtering shades, or panels. This would help reduce fading of the paint significantly and would have the added benefit of reducing deterioration of other objects located near the Trieste. For example, the rubber diving suit of the U.S. Navy diver suspended behind the Trieste, which is severely deteriorated.

Survey and Long-Term Maintenance Plan

If the Trieste has never undergone a full condition survey since it was exhibited, this would be a good opportunity to do so. It is often assumed that if a large object looks fine on the outside then it must be fine on the inside. The preservation of the internal elements of large objects is often overlooked and is an essential part of the conservation process to ensure long-term preservation. The survey should gather information about the condition state of all parts of the vessel, and all materials and

systems present and should include photographic documentation and maintenance recommendations, and estimated resources need to implement the recommendations. From the survey, a long-range maintenance plan and program can be developed if needed, with clearly articulated goals and priorities.

Key components that should be assessed during the survey are the engine compartment, the fuel tanks, fuel lines, the water ballast tanks, the pellet ballast tanks, and the interior of the pressurized sphere. Issues that may need addressing include whether the gasoline tanks, fuel lines and engine oil have been drained and all moisture removed. A thorough inspection should also assess whether there is any active corrosion, particularly since the vessel was in salt water during its working life.



Figure 7: Regular maintenance will assist with the long-term preservation of the Trieste

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Appendices

Appendix A: Asbestos test results

Appendix B: Material Data Sheets for all products used

201511555

SEATTLE ASBESTOS TEST, LLC

19711 Scriber Lake Road, Suite D, Lynnwood, WA 98036
Tel: (425) 673-9850 Fax: (425) 673-9810
www.seattleasbestostest.com

NVLAP Accredited, 200768-0

Accredited, Experienced, Insured, and Well Managed!

CHAIN OF CUSTODY

ANALYSIS: BULK ASBESTOS TEST ____, POINT COUNT (400) ____, POINT COUNT (1000) ____, POINT COUNT (Gravimetric) ____, Other _____

Client Name Terra Mare Conservation, LLC

Address 14 Market Lane City Charleston ST SC ZIP 29403

Phone: 734.358.4854

Fax: _____

Email: claudia@terramareconservation.com

Project Location: _____ Proj. Manager: Claudia Chemeillo

Turn Around Time 1d Number of Samples 1 Client Job # _____

Sample Condition: Good _____ Damaged _____ Severe Damage(Spillage) _____

| SEQ# | CLIENT SAMPLE # | SAMPLE DESCRIPTION | LAB ID | A/R |
|------|-----------------|--------------------|--------|-----|
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |
| 6 | | | | |
| 7 | | | | |
| 8 | | | | |
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| 16 | | | | |
| 17 | | | | |
| 18 | | | | |
| 19 | | | | |
| 20 | | | | |

| | Print Name | Signature | Company Name | Date | Time |
|--------------|--------------------|--------------------|--------------|---------------|--------------|
| Sampled | | | | | |
| Relinquished | | | | | |
| Delivered | | | | | |
| Received | <u>Chara Peter</u> | <u>[Signature]</u> | <u>SAT</u> | <u>6/9/15</u> | <u>9:55</u> |
| Analyzed | <u>Ca Ca Xu</u> | <u>[Signature]</u> | <u>SAT</u> | <u>6/9/15</u> | <u>13:58</u> |
| Reported | | | | | |

Result reporting method: Phone ____, Fax ____, Email ____, Pick-up report ____

Seattle Asbestos Test warrants the test results to be of a precision normal for the type and methodology employed for each sample submitted and disclaims any other warrants, expressed or implied, including warranty of fitness for a particular purpose and warranty of merchantability. Seattle Asbestos Test accepts no legal responsibility for the purpose for which the client uses the test results. By signing on this form the clients agree to relieve Seattle Asbestos Test of any liability that may arise from the test results. Invoices paid late may be charged of interest, and invoices go to collection may be charged 17% to 25% of collection fee. Checks with NSF will be charged \$50.

SEATTLE ASBESTOS TEST

Seattle Laboratory: 4500 9th Ave. NE, Suite 300, Seattle, WA 98105, Tel: 206.633.1111, Fax: 206.633.4747, NVLAP Lab Code: 201057-0

ANALYTICAL LABORATORY REPORT PLM by Method EPA/600/R-93/116

Attn.: Mr. Claudia Chemello
Client: Terra Mare Conservation, LLC
Address: 14 Marbel Lane, Charleston, SC 29403
Job#: N/A
Batch#: 201511555
Date Received: 6/9/2015
Samples Rec'd: 1
Date Analyzed: 6/10/2015
Samples Analyzed: 1
Project Loc.: N/A

Analyzed by:  Ci Ci Xu
Reviewed by: Steve (Fanyao) Zhang, President

| Lab ID | Client Sample ID | Layer | Description | % | Asbestos Fibers | Non-fibrous Components | % | Non-asbestos Fibers |
|--------|------------------|-------|--|---|----------------------|------------------------|----|---------------------|
| 1 | 1 | 1 | White woven fibrous material with debris | | None detected | Filler, Binder, Debris | 82 | Cellulose |

1. IDENTIFICATION

| | |
|----------------------------|---|
| Product Name | Orvus® WA Paste Surfactant Cleaner |
| Product Code(s) | 9-00 |
| Product ID: | 95161362_PROF_NG |
| Product Type: | Finished Product - Professional Use Only |
| Recommended Use | Cleaning agent |
| Restrictions on Use | Use only as directed on label. |
| Manufacturer | Procter & Gamble Professional 2 P&G Plaza Cincinnati, Ohio 45202 Procter & Gamble Inc. P.O. Box 355, Station A Toronto, ON M5W 1C5 1-800-332-7787 |
| E-mail Address | pgsds.im@pg.com |
| Emergency Telephone | Transportation (24 HR) CHEMTREC - 1-800-424-9300 (U.S./ Canada) or 1-703-527-3887 Mexico toll free in country: 800-681-9531 |

2. HAZARD IDENTIFICATION

This product is classified under 29CFR 1910.1200(d) and the Canadian Hazardous Products Regulation as follows:

Hazard Category

| | |
|----------------------------------|-------------|
| Skin corrosion/irritation | Category 2 |
| Eye Damage / Irritation | Category 2A |

| | |
|--------------------|---------|
| Signal Word | WARNING |
|--------------------|---------|

| | |
|--------------------------|---|
| Hazard Statements | Causes serious eye irritation Causes skin irritation |
|--------------------------|---|

Hazard pictograms



| | |
|--|---|
| Precautionary Statements - Prevention | Wash hands thoroughly after handling |
| Precautionary Statements - Response | IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing If eye irritation persists: Get medical advice/attention IF SWALLOWED: Drink 1 or 2 glasses of water IF ON SKIN: Rinse with plenty of water If skin irritation occurs, get medical advice/attention |
| Precautionary Statements - Storage | None |
| Precautionary Statements - Disposal | None |
| Hazards not otherwise classified (HNOC) | None |

3. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients are listed according to 29CFR 1910.1200 Appendix D and the Canadian Hazardous Products Regulation

| Chemical Name | Synonyms | Trade Secret | CAS-No | Weight % |
|---|----------|--------------|------------|-----------|
| Sulfuric acid monododecyl ester sodium salt (1:1) | - | No | 151-21-3 | 25 - 30 |
| Alcohols, C12-14 | - | No | 80206-82-2 | 1 - 5 |
| Boric acid, disodium salt | - | No | 1330-43-4 | 0.1 - 1.0 |

4. FIRST AID MEASURES

First aid measures for different exposure routes

| | |
|---|---|
| Eye contact | Rinse with plenty of water. Get medical attention immediately if irritation persists. |
| Skin contact | Rinse with plenty of water. Get medical attention if irritation develops and persists. |
| Ingestion | Drink 1 or 2 glasses of water. Do NOT induce vomiting. Get medical attention immediately if symptoms occur. |
| Inhalation | Move to fresh air. If symptoms persist, call a physician. |
| Most important symptoms/effects, acute and delayed | None under normal use conditions. |

Indication of immediate medical attention and special treatment needed, if necessary

Notes to Physician Treat symptomatically.

5. FIRE-FIGHTING MEASURES

| | |
|---------------------------------------|--|
| Suitable extinguishing media | Dry chemical, CO ₂ , alcohol-resistant foam or water spray. |
| Unsuitable Extinguishing Media | None. |

| | |
|---|--|
| Special hazard | None known. |
| Special protective equipment for fire-fighters | As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. |
| Specific hazards arising from the chemical | None. |

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal precautions Use personal protective equipment. Do not get in eyes, on skin, or on clothing.

Advice for emergency responders Use personal protective equipment as required.

Methods and materials for containment and cleaning up

Methods for containment Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal.

Methods for cleaning up Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling Use personal protective equipment as required. Keep container closed when not in use. Never return spills in original containers for re-use. Keep out of the reach of children.

Conditions for safe storage, including any incompatibilities

Storage Conditions Keep containers tightly closed in a dry, cool and well-ventilated place.

Incompatible products None known.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines

| Chemical Name | CAS-No | ACGIH TLV | OSHA PEL | Mexico PEL |
|---------------------------|-----------|---|-------------------------------------|---------------------------------|
| Boric acid, disodium salt | 1330-43-4 | STEL: 6 mg/m ³ inhalable fraction TWA: 2 mg/m ³ inhalable fraction | (vacated) TWA: 10 mg/m ³ | Mexico: TWA 1 mg/m ³ |

| Chemical Name | CAS-No | Alberta | Quebec | Ontario TWAEV | British Columbia |
|---------------------------|-----------|---|--------------------------|---|---|
| Boric acid, disodium salt | 1330-43-4 | TWA: 1 mg/m ³ STEL: 3 ppm | TWA: 1 mg/m ³ | TWA: 2 mg/m ³ STEL: 6 mg/m ³ | TWA: 2 mg/m ³ STEL: 6 mg/m ³ |

No relevant exposure guidelines for other ingredients

Exposure controls

Engineering Measures **Distribution, Workplace and Household Settings:**
Ensure adequate ventilation

Product Manufacturing Plant (needed at Product-Producing Plant ONLY):
Where reasonably practicable this should be achieved by the use of local exhaust ventilation and good general extraction

Personal Protective Equipment

Eye Protection

Distribution, Workplace and Household Settings:
No special protective equipment required

Product Manufacturing Plant (needed at Product-Producing Plant ONLY):
Use appropriate eye protection

Hand Protection

Distribution, Workplace and Household Settings:
For sensitive skin or prolonged use, wear gloves

Product Manufacturing Plant (needed at Product-Producing Plant ONLY):
Protective gloves

Skin and Body Protection

Distribution, Workplace and Household Settings:
No special protective equipment required

Product Manufacturing Plant (needed at Product-Producing Plant ONLY):
Wear suitable protective clothing

Respiratory Protection

Distribution, Workplace and Household Settings:
No special protective equipment required

Product Manufacturing Plant (needed at Product-Producing Plant ONLY):
In case of insufficient ventilation wear suitable respiratory equipment

9. PHYSICAL AND CHEMICAL PROPERTIES

| | |
|-----------------------------|----------------------------|
| Physical State @20°C | liquid |
| Appearance | White to pale yellow paste |
| Odor | Detergent |
| Odor threshold | No information available |

| Property | Values | Note |
|---|--------------------------|------|
| pH value | 7.8 | |
| Melting/freezing point | 24 °C / 75 °F | |
| Boiling point/boiling range | No information available | |
| Flash point | > 93.3 °C / > 200 °F | |
| Evaporation rate | No information available | |
| Flammability (solid, gas) | No information available | |
| Flammability Limits in Air | | |
| Upper flammability limit | No information available | |
| Lower Flammability Limit | No information available | |
| Vapor pressure | No information available | |
| Vapor density | No information available | |
| Relative density | 1.04 | |
| Water solubility | 100% | |
| Solubility in other solvents | No information available | |
| Partition coefficient: n-octanol/water | No information available | |
| Autoignition temperature | No information available | |
| Decomposition temperature | No information available | |
| Viscosity of Product | No information available | |

VOC Content (%) Products comply with US state and federal regulations for VOC content in consumer products.

10. STABILITY AND REACTIVITY

| | |
|---|--|
| Reactivity | None under normal use conditions. |
| Stability | Stable under normal conditions. |
| Hazardous polymerization | Hazardous polymerization does not occur. |
| Hazardous Reactions | None under normal processing. |
| Conditions to Avoid | None under normal processing. |
| Materials to avoid | None in particular. |
| Hazardous Decomposition Products | None under normal use. |

11. TOXICOLOGICAL INFORMATION

Product Information

Information on likely routes of exposure

| | |
|---------------------|--------------------------------|
| Inhalation | No known effect. |
| Skin contact | Irritating to skin. |
| Ingestion | No known effect. |
| Eye contact | Causes serious eye irritation. |

Delayed and immediate effects as well as chronic effects from short and long-term exposure

| | |
|--|--------------------------------|
| Acute toxicity | No known effect. |
| Skin corrosion/irritation | Irritating to skin. |
| Serious eye damage/eye irritation | Causes serious eye irritation. |
| Skin sensitization | No known effect. |
| Respiratory sensitization | No known effect. |
| Germ cell mutagenicity | No known effect. |
| Neurological Effects | No known effect. |
| Reproductive toxicity | No known effect. |
| Developmental toxicity | No known effect. |
| Teratogenicity | No known effect. |
| STOT - single exposure | No known effect. |
| STOT - repeated exposure | No known effect. |
| Target Organ Effects | No known effect. |
| Aspiration hazard | No known effect. |
| Carcinogenicity | No known effect. |

Component Information

| Chemical Name | CAS-No | LD50 Oral | LD50 Dermal | LC50 Inhalation |
|---|----------|------------------------------|--|-----------------|
| Sulfuric acid monododecyl ester sodium salt (1:1) | 151-21-3 | 977 mg/kg bw (OECD 401; rat) | > 500 mg/kg bw (Read across data C10-16ASO ₄ , NH ₄ ; guideline: Standard Procedure #10; fixed dose procedure; rabbit; based on active ingredient) | - |

12. ECOLOGICAL INFORMATION

Ecotoxicity

The product is not expected to be hazardous to the environment.

Persistence and degradability No information available.

| | |
|----------------------------------|---------------------------|
| Bioaccumulative potential | No information available. |
| Mobility | No information available. |
| Other adverse effects | No information available. |

13. DISPOSAL CONSIDERATIONS

Waste treatment

| | |
|---|---|
| Waste from Residues / Unused Products | Disposal should be in accordance with applicable regional, national and local laws and regulations. |
| Contaminated packaging | Disposal should be in accordance with applicable regional, national and local laws and regulations. |
| California Hazardous Waste Codes (non-household setting) | 331 |

14. TRANSPORT INFORMATION

| | |
|--------------------|---------------|
| <u>DOT</u> | Not regulated |
| <u>IMDG</u> | Not regulated |
| <u>IATA</u> | Not regulated |

15. REGULATORY INFORMATION

U.S. Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

CERCLA

This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

Clean Air Act, Section 112 Hazardous Air Pollutants (HAPs) (see 40 CFR 61)

This product does not contain any substances regulated as hazardous air pollutants (HAPS) under Section 112 of the Clean Air Act Amendments of 1990.

Clean Water Act

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

California Proposition 65

This product is not subject to warning labeling under California Proposition 65.

U.S. State Regulations (RTK)

| Chemical Name | CAS-No | Massachusetts |
|---------------|--------|---------------|
|---------------|--------|---------------|

| | | |
|---------------------------------|---------------|---------------------|
| Sulfuric acid sodium salt (1:2) | 7757-82-6 | X |
| Chemical Name | CAS-No | Pennsylvania |
| Sulfuric acid sodium salt (1:2) | 7757-82-6 | X |
| Boric acid, disodium salt | 1330-43-4 | X |

International Inventories**United States**

All intentionally-added components of this product(s) are listed on the US TSCA Inventory.

Canada

This product is in compliance with CEPA for import by P&G.

Legend

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory

CEPA - Canadian Environmental Protection Act

| |
|------------------------------|
| 16. OTHER INFORMATION |
|------------------------------|

HMIS Ratings

| | |
|-----------------|---|
| Health hazard | 1 |
| Flammability | 1 |
| Physical hazard | 0 |

NFPA Ratings

| | |
|---------------|---|
| Health hazard | 1 |
| Flammability | 1 |
| Instability | 0 |

Issuing Date: 09-Jan-2015

Revision Date: 07-Apr-2015

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS



**KRUD KUTTER® ORIGINAL
CLEANER/DEGREASER & STAIN REMOVER**

DESCRIPTION AND USES

Krud Kutter® Original Cleaner/Degreaser/Stain Remover is a water-based biodegradable, non-toxic cleaner designed to cut grease, oil, grime, tar and wax fast. It is color fast, fabric safe and leaves no residue.

This concentrated commercial strength formula safely and easily removes food and drink stains, dried latex paint, paint overspray, tape residue, glue and adhesive, acid rain, bird droppings, smoke damage, tree sap, grease & oil, marker & crayon, pet stains, brake dust, fireplace soot, oxidation, lipstick, scuff marks, blood stains, sun tan oil, tar & wax, chewing gum, soap scum, mildew stains, shoe polish and more.

The heavy cleaning (full strength) removes dirt, oil, and grease from BBQ grills and ovens, hoods and exhaust fans, tubs, sinks and showers, tools and equipment, machinery, tile and grout, whitewalls, driveways, engines, and floor wax removal.

An all purpose formula (1½ cups of concentrate to 1 gallon of water) cleans and degreases appliances, mini-blinds, canvas, chrome, silver, brass, copper, porcelain, plastic, fiberglass, linoleum, aluminum, vinyl, patio furniture, walls and baseboards, carpets, upholstery, stainless steel and wheels.

For reflective surfaces such as computer and TV screens, glass mirrors, windows, display case, crystal, lights and car finishes, add 1½ ounces of concentrate to 1 gallon of water.

Krud Kutter Cleaner/Degreaser & Stain Remover is recommended for exterior siding (wood, vinyl, aluminum), roofing of all types (asphalt shingles, fiberglass shingles, cedar, tile), gutters, wood fences and decks, stucco, brick and cement block, masonry, concrete driveways, walkways and walls, RV's patio furniture and boats.

PRODUCTS

| SKU | Description |
|---------|------------------------|
| KK0424D | 4 oz. Flip Top |
| KK326 | 32 oz. Trigger Sprayer |
| KK012 | 1-Gallon Bottle |
| KK05 | 5-Gallon Pail |
| KK55 | 55- Gallon Drum |

PRODUCT APPLICATION

DIRECTIONS

Always test on an inconspicuous area first. Apply directly on surface to be cleaned and allow to penetrate briefly. Wipe off with a clean cloth or towel.

PRODUCT APPLICATION (cont.)

DIRECTIONS (cont.)

For older, more difficult jobs, apply a generous amount of cleaner and allow to stand for a few minutes before wiping dry. For extremely tough jobs such as the removal of old, dried latex paint, scrub with a brush or scouring pad and wipe off with a wet rag. For engine cleaning, use on a cold, dry engine. **Do not use on varnished surfaces or leather. Do not mix this product with any other chemicals.**

PRESSURE WASHER APPLICATION

Contains anti-corrosive agents to safeguard pressure washer parts (bleach can erode O-rings). Please be aware that water pressure alone may remove paint or highlight existing discoloration caused by sun exposure.

Rinse surrounding plants with water before and after application. Wet the surface to be cleaned prior to applying the product. Place detergent application siphon tube and screen filter directly into container. Open the meter valve (if applicable) for maximum product flow. For reservoir machines, pour product (full strength) into pressure washer. Spray at low pressure onto a wet surface. On vertical surfaces, always spray from the top down. Allow product to remain on the surface for 3 to 5 minutes to penetrate. Do not allow product to dry on surface. Remove siphon tube from solution and rinse surface with high-pressure spray thoroughly. Flush siphon tube with clean water prior to storage.

CARPET CLEANING AND STAIN REMOVAL

Krud Kutter is safe for all carpet types, including synthetic as well as stain resistant carpets. Test in an inconspicuous area first. The concentrated formula will clean six 9' x 12' (2.5m x4.0m) carpets. Coverage may vary depending on type and condition of carpet. Vacuum the carpet thoroughly. Pre-treat any stubborn spots or stains by using the undiluted concentrate as a stain remover prior to cleaning carpet. Add concentrate to the receiving/waste tank of the machine to reduce buildup. Add 4 ounces of concentrate for each gallon of water in the dispensing/fill tank. For heavy traffic areas or heavily soiled carpets, add 6 ounces of concentrate for each gallon of water. Use hot (not boiling) or cold water according to the carpet manufacturer's cleaning directions. Read machine instructions carefully. Do not overfill.

CAUTION! In case of contact with eyes or skin, flush with water for at least 15 minutes. If irritation persists, seek medical attention. If swallowed, take large amounts of water. **Do not induce vomiting.** Get medical attention.

KEEP OUT OF REACH OF CHILDREN.



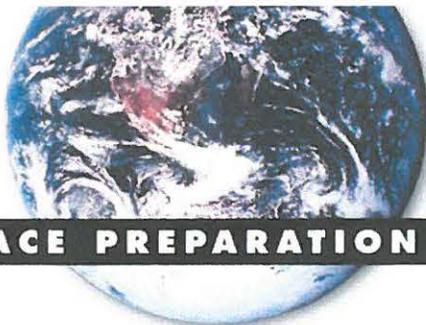
TECHNICAL DATA

KRUD KUTTER® ORIGINAL CLEANER/DEGREASER & STAIN REMOVER

PHYSICAL PROPERTIES

| ORIGINAL CLEANER/DEGREASER & STEAIN REMOVER | |
|---|--|
| Composition | Proprietary Blend of Biodegradable Surfactants, Detergents and Emulsifiers |
| pH | <12.2 |
| VOC | 0% |
| Practical Coverage | Heavy Soils (Full Strength) – 200-300 sq.ft./gal. |
| | Medium Soils (10 to 1) – 2,200-3,300 sq.ft./gal. |
| | Light Soils (30 to 1) – 6,200-9,300 sq.ft./gal. |
| Shelf Life | NA |
| Flash Point | Non-flammable |
| Caution! | In case of contact with eyes or skin, flush with water for at least 15 minutes. If irritation persists, seek medical attention. If swallowed, take large amounts of water. Do not induce vomiting. Get medical attention. KEEP OUT OF REACH OF CHILDREN. |
| Safety Information | For additional information, see MSDS. |

The technical data and suggestions for use contained herein are correct to the best of our knowledge, and offered in good faith. The statements of this literature do not constitute a warranty, express, or implied, as to the performance of these products. As conditions and use of our materials are beyond our control, we can guarantee these products only to conform to our standards of quality, and our liability, if any, will be limited to replacement of defective materials. All technical information is subject to change without notice.



SURFACE PREPARATION PRODUCTS

Corwipe® 300, Patented



PRODUCT DESCRIPTION

Corwipe® 300 (U.S. Patent #5,854,145) is a revolutionary wipe which removes grease, oil and light corrosion deposits while leaving behind a thin film of corrosion inhibitors. Corwipe® 300 is designed for both industrial and commercial cleaning applications. It cleans machinery equipment, machine shop tools, hoods, parts in-process, food processing equipment, office equipment, etc. Corwipe® 300 contains an active water-based material that is safe to handle, is not harmful to skin and is classified as nonhazardous. Corwipe® 300's thin film of corrosion inhibitors will protect most metal surfaces against corrosion.

TYPICAL APPLICATIONS

Corwipe® 300 is designed to clean, protect and maintain products, components or assemblies such as:

- Slightly rusted or tarnished parts
- Tools
- Machinery, pumps, controls, connections or engines contaminated with grease or oil deposits
- Machined parts coated with waxes or greases prior to assembly
- Sheets of metal covered with oily or waxy films prior to painting
- Office equipment, floors, walls, and restrooms
- Stainless counter tops, handrails, fountains

ADVANTAGES

- Reduces need for multiple cleaners
- Provides excellent cleaning action at ambient temperatures
- Leaves temporary protective film, providing anti-corrosion protection for up to several months indoors
- Non-hazardous, non-corrosive, and non-flammable
- Not harmful to the atmosphere
- Pleasant citrus aroma
- Reduces chemical consumption and costs
- Results in fewer spills that occur with traditional cleaners
- Increases productivity

FEATURES

Provides triple-action performance: degreases, removes light rust and leaves a thin film of corrosion inhibitors.

METALS PROTECTED*

- Carbon steel
- Stainless steel
- Copper and its alloys
- Aluminum and its alloys

* Length of protection varies upon conditions, average 3-4 months.

PACKAGING AND STORAGE

Corwipe® 300 is available in 72 wipes count canisters. Do not store in conditions above 130°F (54°C). The shelf life of a canister is up to 24 months.

DIMENSIONS

Wipe: 10.5"W x 11"H (27 cm x 30 cm)



FOR INDUSTRIAL USE ONLY
KEEP OUT OF REACH OF CHILDREN
KEEP CONTAINER TIGHTLY CLOSED
NOT FOR INTERNAL CONSUMPTION
CONSULT MATERIAL SAFETY DATA SHEET FOR MORE INFORMATION

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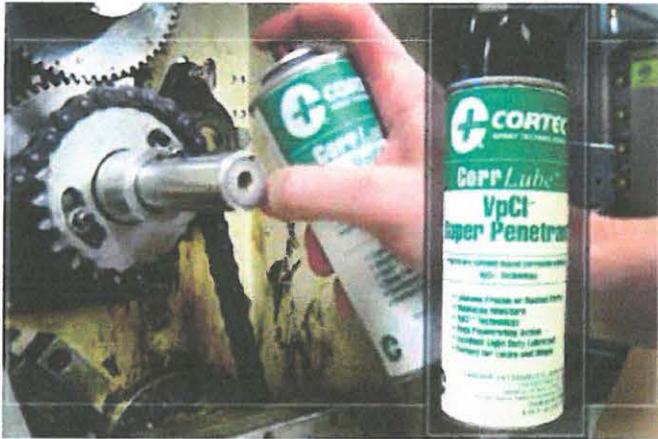
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VpCI® Super Penetrant



PRODUCT DESCRIPTION

Cortec VpCI Super Penetrant offers a deep penetrating formulation that loosens frozen parts locked in rust. Its deep penetrating capabilities allow the user to go through as much as 1/2 inch (13 mm) of rust in 30 minutes. VpCI Super Penetrant can be applied by a variety of convenient methods to meet any application needs including brush, hand pump spray, aerosol, spray application, or dipping.

As VpCI Super Penetrant breaks through deep rust, it displaces moisture and water. Its superior surface wetting and moisture displacing properties allow it to spread rapidly and get underneath the moisture layer normally present on metal under atmospheric conditions. While loosening the rust, it lubricates metal so frozen parts can move freely. Utilizing patented Cortec VpCI technology, the VpCI Super Penetrant forms an ultra thin film on metal that offers 6 months of protection from corrosion in extreme conditions.

Cortec VpCI Super Penetrant can be used for indoor and outdoor applications. Its superior water displacing characteristics make it an ideal choice for applications of equipment and components that are exposed to outside weather. It also conforms to Federal Specifications for VV-P-216 Penetrating Oil for Loosening Frozen Metallic Parts and ASTM D-971 Test for Interfacial Tension of Oil against water.

FEATURES

- Provides universal corrosion protection for ferrous metals, galvanized steel, aluminum, brass, copper, babbitt, zinc, cadmium, and silver
- Loosens frozen and rusted metal parts making them easy to remove
- Meets the regulations set by California Air Resources Board for Volatile Organic Compounds in consumer products

TYPICAL APPLICATIONS

- Maintenance
- Lubrication
- Temporary storage - spray a light coating on flat metal before or after metalworking
- Small or complex metal parts - spray on or dip in
- General surface treatment - spray, dip, or brush surfaces to be protected for up to 24 months
- Home repairs of squeaky items

TYPICAL PROPERTIES

| | |
|----------------------|--|
| Appearance | Clear amber liquid |
| Film Type | Oily |
| Flash Point | 170°F (77°C) |
| Removal Methods | Alkaline cleaners and solvents (VpCI-416/VpCI-419) |
| Density | 6.8-7.0 lb/gal (0.82-0.84 kg/l) |
| Non-volatile Content | 30-40% |

PACKAGING AND STORAGE

VpCI Super Penetrant is packaged in 5 gallon (19 liter) pails, 55 gallon (208 liter) metal drums, liquid totes, and bulk. It is also available in aerosol form net weight 5.25oz (148.84g). The product should be stored sealed. Agitate before each use. Shelf life is up to 24 months.



PROTECTION PROPERTIES

VpCI Super Penetrant displaces water as effectively as a leading lubricating rust preventive (R.P.) oil while providing much better protection against corrosion.

| Time Before Corrosion | | | | | | | | |
|----------------------------------|---------------------------------|----------|--------|-------------------------------------|--------------|----------|--------|--|
| | Salt Spray (Days) ASTM B-117 | | | Humidity Test (Days) ASTM D-1748 | | | | Water Dis- placing per MIL-C-83933 |
| | Carbon Steel | Aluminum | Copper | Carbon Steel | Cast Iron | Aluminum | Copper | |
| VpCI Super Penetrant | 5 | 15+ | 5 | 30+ | 10+ | 50+ | 50+ | Pass |
| Leading Lubricating/ R.P. Oil | 5 | 15+ | 3 | 30+ | 1 | 50+ | 50+ | Pass |

FOR INDUSTRIAL USE ONLY
KEEP OUT OF REACH OF CHILDREN
KEEP CONTAINER TIGHTLY CLOSED
NOT FOR INTERNAL CONSUMPTION
CONSULT SAFETY DATA SHEET FOR MORE INFORMATION

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Denatured Alcohol

| | |
|-------|-----------|
| QSL26 | Quart |
| GSL26 | Gallon |
| CSL26 | 5 Gallon |
| DSL26 | 55 Gallon |



REGULATORY DATA SHEET

VOC Content: 3% by wt. 30 g/L

| <u>VOC Product Categories</u> | <u>Geographic Region</u> | <u>VOC Limit</u> |
|-------------------------------|---|------------------|
| Glass Cleaner | National | 8% |
| Glass Cleaner | CA, CT, DE, IL, ME, MD, MA, NH, NJ, NY, OH, PA, RI, VA | 4% |

SALES BANS: None

Future Limits: None



MATERIAL SAFETY DATA SHEET

Klean-Strip Denatured Alcohol

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| | |
|---------------|---|
| HEALTH | |
| FLAMMABILITY | 3 |
| PHYSICAL HAZ. | 0 |
| PPE | G |



Printed: 12/14/2005

Revision: 06/13/2005

Date Created: 06/13/2005

1. Product and Company Identification

Product Code: QSL26
Product Name: Klean-Strip Denatured Alcohol
Reference #: 1625.5
Manufacturer Information
Company Name: W. M. Barr
2105 Channel Avenue
Memphis, TN 38113
Phone Number: (901)775-0100
Emergency Contact: 3E 24 Hour Emergency Contact (800)451-8346
Information: W.M. Barr Customer Service (800)398-3892
Web site address: www.wmbarr.com
Preparer Name: W.M. Barr EHS Department (901)775-0100

2. Composition/Information on Ingredients

| Hazardous Components (Chemical Name) | CAS # | Percentage | OSHA PEL | ACGIH TWA | Other Limits |
|--------------------------------------|----------|--------------|----------|-----------|--------------|
| 1. Ethyl alcohol | 64-17-5 | 45.0 -50.0 % | 1000 ppm | 1000 ppm | No data. |
| 2. Methanol | 67-56-1 | 45.0 -50.0 % | 200 ppm | 200 ppm | No data. |
| 3. Methyl isobutyl ketone | 108-10-1 | 1.0 -4.0 % | 100 ppm | 50 ppm | No data. |

| Hazardous Components (Chemical Name) | RTECS # | OSHA STEL | OSHA CEIL | ACGIH STEL | ACGIH CEIL |
|--------------------------------------|-----------|-----------|-----------|------------|------------|
| 1. Ethyl alcohol | KQ6300000 | No data. | No data. | No data. | No data. |
| 2. Methanol | PC1400000 | No data. | No data. | 250 ppm | No data. |
| 3. Methyl isobutyl ketone | SA9275000 | No data. | No data. | 75 ppm | No data. |

3. Hazards Identification

Emergency Overview

Danger! Flammable! Keep away from heat, sparks, flame, and all other sources of ignition. Do not smoke. Extinguish all flames and pilot lights, and turn off stoves, heaters, electric motors and all other sources of ignition during use and until all vapors are gone. Beware of static electricity that may be generated by synthetic clothing and other sources.

OSHA Regulatory Status: This material is classified as hazardous under OSHA regulations.

Health Hazards (Acute and Chronic)

Inhalation Acute Exposure Effects:

Vapor harmful. May cause dizziness, headache, watering of eyes, irritation of respiratory tract, irritation to the eyes, drowsiness, nausea, other central nervous system effects, spotted vision, dilation of pupils, and convulsions.

Skin Contact Acute Exposure Effects:

May cause irritation, drying of skin, redness, and dermatitis. May cause symptoms listed under inhalation. May be absorbed through damaged skin.

Eye Contact Acute Exposure Effects:

May cause irritation.

Ingestion Acute Exposure Effects:

Poison. Cannot be made non-poisonous. May be fatal or cause blindness. May produce fluid in the lungs and pulmonary edema. May cause dizziness, headache, nausea, drowsiness, loss of coordination, stupor, reddening of face and or neck, liver, kidney and heart damage, coma, and death. May produce symptoms listed under

MATERIAL SAFETY DATA SHEET

Klean-Strip Denatured Alcohol

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inhalation.

Chronic Exposure Effects:

May cause symptoms listed under inhalation, dizziness, fatigue, tremors, permanent central nervous system changes, blindness, pancreatic damage, and death.

Signs and Symptoms Of Exposure

No data available.

Medical Conditions Generally Aggravated By Exposure

Diseases of the liver.

OSHA Hazard Classes:

HEALTH HAZARDS : N/E

PHYSICAL HAZARDS : N/E

TARGET ORGANS & EFFECTS: N/E

4. First Aid Measures

Emergency and First Aid Procedures

Inhalation:

If user experiences breathing difficulty, move to air free of vapors. Administer oxygen or artificial respiration until medical assistance can be rendered.

Skin Contact:

Wash with soap and water.

Eye Contact:

Flush with large quantities of water for at least 15 minutes. If irritation from contact persists, get medical attention.

Ingestion:

Call your poison control center, hospital emergency room or physician immediately for instructions to induce vomiting.

Note to Physician

Poison. This product contains methanol. Methanol is metabolized to formaldehyde and formic acid. These metabolites may cause metabolic acidosis, visual disturbances and blindness. Since metabolism is required for these toxic symptoms, their onset may be delayed from 6 to 30 hours following ingestion. Ethanol competes for the same metabolic pathway and has been used as an antidote. Methanol is effectively removed by hemodialysis. Call your local poison control center for further instructions.

5. Fire Fighting Measures

| | |
|-------------------------------------|--------------------------|
| Flammability Classification: | OSHA Class IB |
| Flash Pt: | 45.00 F Method Used: SCC |
| Explosive Limits: | LEL: 1.00 UEL: No data. |
| Autoignition Pt: | No data. |

Special Fire Fighting Procedures

Self-contained respiratory protection should be provided for fire fighters fighting fires in buildings or confined area. Storage containers exposed to fire should be kept cool with water spray to prevent pressure build-up. Stay away from heads of containers that have been exposed to intense heat or flame.

Unusual Fire and Explosion Hazards

No data available.

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Extinguishing Media

Use carbon dioxide, dry powder, or foam.

Unsuitable Extinguishing Media

No data available.

6. Accidental Release Measures

Steps To Be Taken In Case Material Is Released Or Spilled

Clean-up:

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind, out of low areas, and ventilate closed spaces before entering. Shut off ignition sources, keep flares, smoking or flames out of hazard area.

Small spills:

Take up liquid with sand, earth or other noncombustible absorbent material and place in a plastic container where applicable.

Large spills:

Dike far ahead of spill for later disposal.

7. Handling and Storage

Precautions To Be Taken in Handling

Read carefully all cautions and directions on product label before use. Since empty container retains residue, follow all label warnings even after container is empty. Dispose of empty container according to all regulations. Do not reuse this container.

Precautions To Be Taken in Storing

Keep container tightly closed when not in use. Store in a cool, dry place. Do not store near flames or at elevated temperatures.

8. Exposure Controls/Personal Protection

Respiratory Equipment (Specify Type)

For OSHA controlled work place and other regular users. Use only with adequate ventilation under engineered air control systems designed to prevent exceeding appropriate TLV. For occasional use, where engineered air control is not feasible, use properly maintained and properly fitted NIOSH approved respirator for organic solvent vapors. A dust mask does not provide protection against vapors.

Eye Protection

Safety glasses, chemical goggles or face shields are recommended to safeguard against potential eye contact, irritation, or injury. Contact lenses should not be worn while working with chemicals.

Protective Gloves

Wear impermeable gloves. Gloves contaminated with product should be discarded. Promptly remove clothing that becomes soiled with product.

Other Protective Clothing

Various application methods can dictate the use of additional protective safety equipment, such as impermeable aprons, etc., to minimize exposure. A source of clean water should be available in the work area for flushing eyes and skin. Do not eat, drink, or smoke in the work area. Wash hands thoroughly after use. Before reuse, thoroughly clean any clothing or protective equipment that has been contaminated by prior use. Discard any clothing or other protective equipment that cannot be decontaminated, such as gloves or shoes.

Ventilation

Use only with adequate ventilation to prevent build-up of vapors. Open all windows and doors. Use only with a cross ventilation of moving fresh air across the work area. If strong odor is noticed or you experience slight dizziness, headache, nausea, or eye-watering -- Stop -- ventilation is inadequate. Leave area immediately.

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9. Physical and Chemical Properties

Physical States: [] Gas [X] Liquid [] Solid
Melting Point: No data.
Boiling Point: 147.00 F
Autoignition Pt: No data.
Flash Pt: 45.00 F Method: SCC
Explosive Limits: LEL: 1.00 UEL: No data.
Specific Gravity: No data.
Bulk Density: 6.61 LB/GA
Vapor Pressure: No data.
Vapor Density: No data.
Evaporation Rate: No data.
Solubility in Water: No data.
Percent Volatile: 100.0 % by weight.
VOC / Volume: 792.0000 G/L
Corrosion Rate: No data.
pH: No data.

Appearance and Odor

No data available.

10. Stability and Reactivity

Stability: Unstable [] Stable [X]

Conditions To Avoid - Instability

No data available.

Incompatibility - Materials To Avoid

Incompatible with strong oxidizing agents.

Hazardous Decomposition Or Byproducts

Decomposition may produce carbon monoxide and carbon dioxide.

Hazardous Polymerization: Will occur [] Will not occur [X]

Conditions To Avoid - Hazardous Polymerization

No data available.

11. Toxicological Information

Toxicological Information

No data available.

Carcinogenicity/Other Information

No data available.

Carcinogenicity: NTP? No IARC Monographs? No OSHA Regulated? No

12. Ecological Information

Ecological Information

No data available.

13. Disposal Considerations

Waste Disposal Method

Dispose in accordance with applicable local, state, and federal regulations.

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14. Transport Information

LAND TRANSPORT (US DOT)

DOT Proper Shipping Name

No data available.

15. Regulatory Information

US EPA SARA Title III

| Hazardous Components (Chemical Name) | CAS # | Sec.302 (EHS) | Sec.304 RQ | Sec.313 (TRI) | Sec.110 |
|--------------------------------------|----------|---------------|-------------|---------------|---------|
| 1. Ethyl alcohol | 64-17-5 | No | No | No | No |
| 2. Methanol | 67-56-1 | No | Yes 5000 LB | Yes | No |
| 3. Methyl isobutyl ketone | 108-10-1 | No | Yes 5000 LB | Yes | Yes |

US EPA CAA, CWA, TSCA

| Hazardous Components (Chemical Name) | CAS # | EPA CAA | EPA CWA NPDES | EPA TSCA | CA PROP 65 |
|--------------------------------------|----------|---------|---------------|----------|------------|
| 1. Ethyl alcohol | 64-17-5 | No | No | No | No |
| 2. Methanol | 67-56-1 | HAP | No | No | No |
| 3. Methyl isobutyl ketone | 108-10-1 | HAP | No | No | No |

SARA (Superfund Amendments and Reauthorization Act of 1986) Lists:

- Sec.302:** EPA SARA Title III Section 302 Extremely Hazardous Chemical with TPQ. * indicates 10000 LB TPQ if not volatile.
- Sec.304:** EPA SARA Title III Section 304: CERCLA Reportable + Sec.302 with Reportable Quantity. ** indicates statutory RQ.
- Sec.313:** EPA SARA Title III Section 313 Toxic Release Inventory. Note: -Cat indicates a member of a chemical category.
- Sec.110:** EPA SARA 110 Superfund Site Priority Contaminant List

TSCA (Toxic Substances Control Act) Lists:

- 5A(2):** Chemical Subject to Significant New Rules (SNURS)
- 6A:** Commercial Chemical Control Rules
- 8A:** Toxic Substances Subject To Information Rules on Production
- 8A CAIR:** Comprehensive Assessment Information Rules - (CAIR)
- 8A PAIR:** Preliminary Assessment Information Rules - (PAIR)
- 8C:** Records of Allegations of Significant Adverse Reactions
- 8D:** Health and Safety Data Reporting Rules
- 8D TERM:** Health and Safety Data Reporting Rule Terminations

Other Important Lists:

- CWA NPDES:** EPA Clean Water Act NPDES Permit Chemical
- CAA HAP:** EPA Clean Air Act Hazardous Air Pollutant
- CAA ODC:** EPA Clean Air Act Ozone Depleting Chemical (1=CFC, 2=HCFC)
- CA PROP 65:** California Proposition 65

EPA Hazard Categories:

This material meets the EPA 'Hazard Categories' defined for SARA Title III Sections 311/312 as indicated:

- Yes No Acute (immediate) Health Hazard
- Yes No Chronic (delayed) Health Hazard
- Yes No Fire Hazard
- Yes No Reactive Hazard
- Yes No Sudden Release of Pressure Hazard

16. Other Information

Company Policy or Disclaimer

The information contained herein is presented in good faith and believed to be accurate as of the effective date shown above. This information is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determination of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. Any use of this data and information must be determined by the user to be in accordance with applicable federal, state and local laws and regulations.