Submission from Friends of the Cerberus Inc.

in opposition to,

the Cerberus Concrete Fill Proposal,

& in favour of

Thoroughly & Impartially Investigating,

the Polyurethane/Tank Foam Solution.

Summary

Friends of the Cerberus maintains that filling *Cerberus* with concrete has no practical heritage benefits, and, on the contrary has important negative heritage outcomes.

The alternative Polyurethane/Tank Foam solution has no negative heritage outcomes and has numerous positive heritage benefits.

That the Polyurethane/Tank Foam solution was not thoroughly investigated is obvious from the many inaccurate and ill-informed criticisms made of it in the flawed Heritage Impact Statement (H.I.S.).

That the concrete proposal was not impartially investigated is evident from the glossing over of or ignoring of its negative outcomes, as well as misleading and unprofessional misquoting from the Burra Charter.

With the recent changes in Bayside's administration our hope is that the high level of co-operation that existed between the City of Bayside and Friends of the Cerberus, prior to 2010, will be re-established.

1 – Bayside Fixated on Concrete Solution

Since the meeting between the Federal Heritage Department, Heritage Victoria and the City of Bayside on the 7th of April 2017, to which Friends of the Cerberus and the National Trust were not invited, Bayside has been fixated on the concrete solution to the exclusion of all other possible solutions. Indeed the motion of the 27th of June to investigate the issue, specified concrete. The Council voted against amending the motion to remove the word concrete after the then Mayor's statement that the concrete solution came from Minister Frydenburg's department and that Heritage Victoria, who will assess the permit application, seemed to be supportive of it.

By the 24th of October Council meeting, the Mayor's view of Heritage Victoria's support for the concrete solution had firmed further when he stated "The concrete infill is supported by both the Federal [Heritage] Department and Heritage Victoria." And that "this [concrete infill] is the way that we were told by both the Federal Minister and by the Heritage Victoria rep, who came and spoke to us, this is the way forward for them."

Understandably Bayside's officers took their guidance from Council's fixation with the concrete solution and did not forward information to the Archaeologist writing the H.I.S., that we provided on the 9th of September on the use of Polyurethane. (Appendix 1)

That polyurethane has been used in the past to stabilise vessels in salt water would suggest that this method is a viable alternative and yet it was not considered by the Archaeologist until after the October 24 Council meeting, by which time Council had committed itself to the concrete solution by "endorsing the use of concrete in-fill as the preferred method" and voting to lodge a permit application with Heritage Victoria.

2 – Concrete is Not a Heritage Based Solution.

The proposal to use the NHII Heritage grant to fill *Cerberus* with concrete is claimed by Bayside to preserve *Cerberus*. It does however do no such thing. The only purpose that the concrete infill does is to reduce Bayside Council's legal liability. This was the same motive behind the 2011 proposal to fill *Cerberus* with sand. Interestingly sand filling it is now described in the current H.I.S. as having been a "short-term expedient only". By filling *Cerberus* with concrete, all heritage value of the ship's interior is destroyed by the very process clamed to preserve it.

3 – How to Prevent *Cerberus* from Collapsing.

It is generally recognised that the weight of the turrets will eventually overwhelm the supporting 12 inch beams and other structural elements currently supporting the two gun turrets. The turrets will then collapse. BMT's 2011 investigation tried to find a solution to support the turrets but was unsuccessful. The October 24 report to Council indicates that the concrete approach will not support the turrets, as explained later. Polyurethane injected under the turrets will support them and prevent their collapse.

4 – A Polyurethane/Tank Foam Based Heritage Solution.

Injected Polyurethane has been successfully used in Australian marine environments for many years. The earliest example that we are aware of was in the 1960s to extend the service life of leaking cutter-suction dredges by filling them with polyurethane. (Appendix 2) The most recent example was on the 5th of April this year when polyurethane was injected directly into a 1.8 metre diameter pipe filled with sea water. This work was undertaken for a large local company with very stringent environmental requirements. Both Polyurethane and Tank Foam are also used to repair sea walls.

The Polyurethane/Tank Foam solution is heritage based in that it:-

1 – Supports the turrets (thereby allowing the guns to be reinstated),
2 – Is reversible and
3 – Does not add any weight to the ship. (By displacing the water under the turrets with polyurethane & in access points with Tank Foam, not only is the weight of *Cerberus* not increased, but the weight partly causing *Cerberus* to settle into the sand is actually slightly decreased.)

a. Polyurethane could be injected under the gun turrets to prevent their collapse. Setting within seconds on contact with water, it would remain under the turrets expanding to fill the void between them and the silt layer below.
b. Lower cost Tank Foam, pumped from shore into thin biodegradable bags (Appendix 3), could be used to fill openings in the side of the ship to limit access, thereby addressing Bayside's legal liability concerns.

5 – Criticisms in the H.I.S. of Foam Based Solutions are Inaccurate

Criticisms of the use of foam products in the H.I.S. are either based on ignorance of their nature and application, or from assuming that they would be used in the same way as concrete.

For example, it is assumed in the H.I.S. that the entire ship would be filled with foam in the same way as it is proposed to fill it with concrete. Foam and polyurethane, as opposed to concrete, are far more flexible and subtle in their application. They do not need to fill the entire ship, as unlike concrete, due to its fast setting time of 12 to 70 seconds, polyurethane can be placed where required.

The main criticisms of foam based solutions in the H.I.S. are addressed below to point out the Statement's many inaccuracies and exaggerations.

a. The foam solution is criticised in the H.I.S. as not being able to be pumped from shore. This is simply incorrect. (Appendix 4).
b. As stated above, Polyurethane has been successfully used in marine environments since the 1960s.
c. The H.I.S. further states that "Cured foams have quite a low compressive strength". This is not true. Polyurethane has a more than adequate compressive strength of 24 psi (Appendix 5). A continuous layer of polyurethane under a gun turret would support 843 tonnes. As the weight of each turret with its guns is less than a quarter of this, even without a continuous layer under the turrets, Polyurethane would still be able to provide the required support for the turrets and guns.
d. Tank Foam and Polyurethane are environmentally neutral and therefore pose no danger to the environment. In fact Polyurethane is suitable for potable water contact. As Polyurethane and Tank Foam would be

pumped from shore by a trained operator there would be minimal risk and not the high risk mentioned in the H.I.S.

e. As it is not proposed to fill the entire ship with foam then excessive buoyancy would not be an issue.
f. The high risk through fire mentioned in the H.I.S. is hard to understand as The Safety Data Sheet for Tank Foam (Appendix 6), clearly states:- "Polymer is non-flammable: does not ignite or burn". As it is proposed that the Polyurethane would be placed under the turrets, it would be totally under water and hence unlikely to catch fire. Additionally, *Cerberus* is not known to catch fire.
g. It is estimated that the cost of injecting Polyurethane under both turrets would be within the available NHII grant funds of approximately $600,000. (Appendix 4)

A crucial advantage of Polyurethane over concrete is that Polyurethane will expand underneath the turrets thereby providing more support than the concrete which may not even flow under the turrets.

6 – Shortcomings of Concrete Solution not addressed

a – Concrete Infill will not Support the Turrets.

As identified in GHD's 2002 Geotechnical Report, the turrets are at risk of collapsing. This would probably cause a cascading effect causing other parts of *Cerberus* to collapse. This was recognised in 2011 when the funding conditions of the NHII grant were changed to allow an investigation of methods to prevent the turrets from collapsing.

Although ignored in the H.I.S., the 24th of October HMVS Cerberus Heritage Works Permit Update to Council, pointed out that the concrete infill method **would not provide sufficient structural support to enable the guns to be returned to the ship**. As the weight of two guns would only add 36 tonnes to each 173 tonne turret, one has to ask whether the calculation of the load that the concrete infill can support is so precise as to determine that the concrete will support 173 tonnes but not 209 tonnes. If this is not the case then one must conclude that the concrete infill will not support the turrets with or without their guns. From my recollection of the 2012 ROV footage, not much, if any, concrete would end up under the turrets. The turrets will therefore still collapse.

b – Increase in weight of the ship on the same seafloor footprint.

This negative heritage outcome was also not mentioned in the H.I.S. Adding 1,700 cubic metres of concrete, weighing approximately 4,000 tonnes would greatly increase the weight of *Cerberus*. Even allowing for the weight of the water displaced, the weight of *Cerberus* would still more than double from 1,900 tonnes to 4,500 tonnes. As this weight would bear on the same area of the seafloor, *Cerberus* would settle further into the sand, thereby changing its current profile.

c – Non-reversible Nature.

Acknowledging the important heritage principle that any works undertaken should be reversible, the H.I.S. makes the surprising claim that "Concrete infill could be removed if necessary but would be difficult and expensive." Presumably this would not involve divers inside *Cerberus* with jackhammers. One wonders how any removal process would not totally destroy the ship. To all intents and purposes, removing the concrete from *Cerberus* would be impossible.

It would seem that the author has not convinced himself that concrete can be removed, as his next point, which is quite deceptive, argues that the Burra Charter supports irreversible changes by writing:-

"Walker and Marquis-Kyle in their commentary on the Burra Charter do (sic) appear to offer a lifeline to *Cerberus* in their assertion that '**…Non-reversible changes should only be used as a last resort…**'".

The author of the H.I.S. has not quoted the entire sentence on page 6 of the Burra Charter (Appendix 7) which actually reads:-

"**Non-reversible changes should only be used as a last resort and should not prevent future conservation action**."

This misquoting from the Burra Charter is misleading and academically dishonest. As no future conservation work could ever be undertaken inside *Cerberus*, the use of concrete infill would clearly be in contravention of the Burra Charter.

The "last resort" argument also fails when it is realised that the Polyurethane solution was not properly explored. Indeed, the Archaeologist was not even aware of this solution the week prior to the October 24 report to Council (when Council voted to apply for a permit to fill *Cerberus* with concrete). Information that we had supplied over a month earlier through Bayside's officers, (Appendix 1) had not been forwarded to the Archaeologist.

d – Loss of Artifacts

Concrete infilling would prevent any further access to all remaining internal artifacts. Items such as the capstan on the lower deck (Appendix 8), turret bearing markings in the Breastwork, anchor chain in the chain lockers, other artifacts and remaining evidence of fittings as well as the internal layout would all be encased in concrete and lost forever.

Any future opportunity to check research used to prepare artist's impressions or indeed to confirm or disprove theories about ammunition transfer or the layout as modified over the life of *Cerberus*, would be lost. The lack of any surviving builder's plans and only the limited "as fitted plans" makes future examination very important. Concrete infill, being forever, will prevent this.

Conclusion

Filling *Cerberus* with concrete has no heritage benefits, has numerous negative heritage outcomes and contravenes the Burra Charter.

The use of Polyurethane and Tank Foam provides numerous heritage benefits with no negative outcomes.

Filling *Cerberus* with concrete should be rejected and the use of Polyurethane and Tank Foam thoroughly and impartially investigated.

Concrete Infill can best be described as "World's Worst Heritage Practise". *Cerberus* deserves better.

John Rogers
Fleet Engineer (Victorian Navy)
Website, research & President
Friends of the Cerberus Inc.

Email: John.Rogers@cerberus.com.au
Home Phone: 03 7018 1393
Mobile: 0403 070601

APPENDIX 1 Email to Bayside

Subject: Possible use of Injected Polyurethane in HMVS Cerberus
From: John Rogers <john.rogers@cerberus.com.au>
Date: 14/09/2017 4:06 PM
To: Paul Gibbs <pgibbs@bayside.vic.gov.au>
CC: Damien Van Trier <DVanTrier@bayside.vic.gov.au>

Hi Paul

as per our phone conversation the contact details of Lawrence Wolf are below. We have been corresponding with him regarding the possibility of injecting polyurethane under the gun turrets of Cerberus in order to support them. As I mentioned Lawrence has used polyurethane (possibly the Ausgrout that he mentioned to us) in the Sydney Heritage Fleet's 1912 Kangara, albeit in different circumstances.

We feel that injecting polyurethane is worth investigating as it may provide a cheaper, less invasive and reversible solution which we feel should be far superior to using concrete.

Should Geoff Hewitt wish to pick our brains regarding the structure of Cerberus he is more than welcome to and we would be happy to cc you &/or Damien on all correspondence.

A recent audit on the NHII grant that I signed off on indicated that the grant stood at $585,741 as of the 30th of June 2017.

John Rogers
Fleet Engineer (Victorian Navy)
website, research & President
Friends of the Cerberus Inc.

Lawrence Wolf

Foamed Insulations Pty Ltd
22B Euston Street, Rydalmere, NSW, 2116

T (612) 9898 0751 **F** (612) 9898 0753
E lawrence@foamedinsulations.com.au
www.foamedinsulations.com.au

join the Victorian Navy .....

Save the Cerberus
cerberus.com.au

Note: Ausgrout was not the product mentioned to us by Lawrence Wolf.

APPENDIX 2 Use of Polyurethane In Marine Environment in the 1960s

05/04/2018 Gmail - Re: Polystyrene Flotation

Gmail

George Reynolds <bra.reynolds088@gmail.com>

Re: Polystyrene Flotation

1 message

George Reynolds <bra.reynolds088@gmail.com> Thu, Apr 5, 2018 at 9:19 AM

To: john.rogers@cerebus.com.au

John, I think my machine defaulted to the original address. Third try.
GR

On Wed, Apr 4, 2018 at 4:15 AM, George Reynolds <bra.reynolds088@gmail.com> wrote:

John, in response to your request I detail my experience in using the material to get a few extra years of life from dredges suffering from marine corrosion.

In 1967-68 I was Operations Manaager of NSW Rutile Mining NL operating out of Kingscliff in Northern NSW. We were mining on the beach front, leaving the frontal dune in place to protect from high seas and storms although we once or twice lost a dredge and floating plant out to sea, when the dune was breached.

We used cutter - suction dredges which were a simple structural box with a hoistable ladder carrying the cutter and submersible pump. The movement of the dredge was controlled by an electro- hydraulic winch at both sides of the front and a single winch at the rear. As the main load was at the front of the vessel we used to trim by flooding a compartment at the rear of the vessel. We operated on a freeboard of about a foot.

While we could try to deal with external corrosion by regular painting we could not do much about the internal space. This corroded to the point of underwater leakage in about three years.

We found out about a technique of filling the trim compartment with foam generated from a chemical mix and placed so that it expanded from the bottom of the tank back to the roof. As it expanded it forced the water above it out through a couple of holes cut in the deck which were later welded up. The job was scheduled for a normal 8hr maintenance shift so was completed without any effect on the production schedule. The work was carried out by a contractor who supplied all labour and materials.

The success of the technique was recorded by the fact that we lost our trim. This was adjusted by placing a couple of 44 gallon drums of heavy mineral (ilmenite) on the deck at the rear.

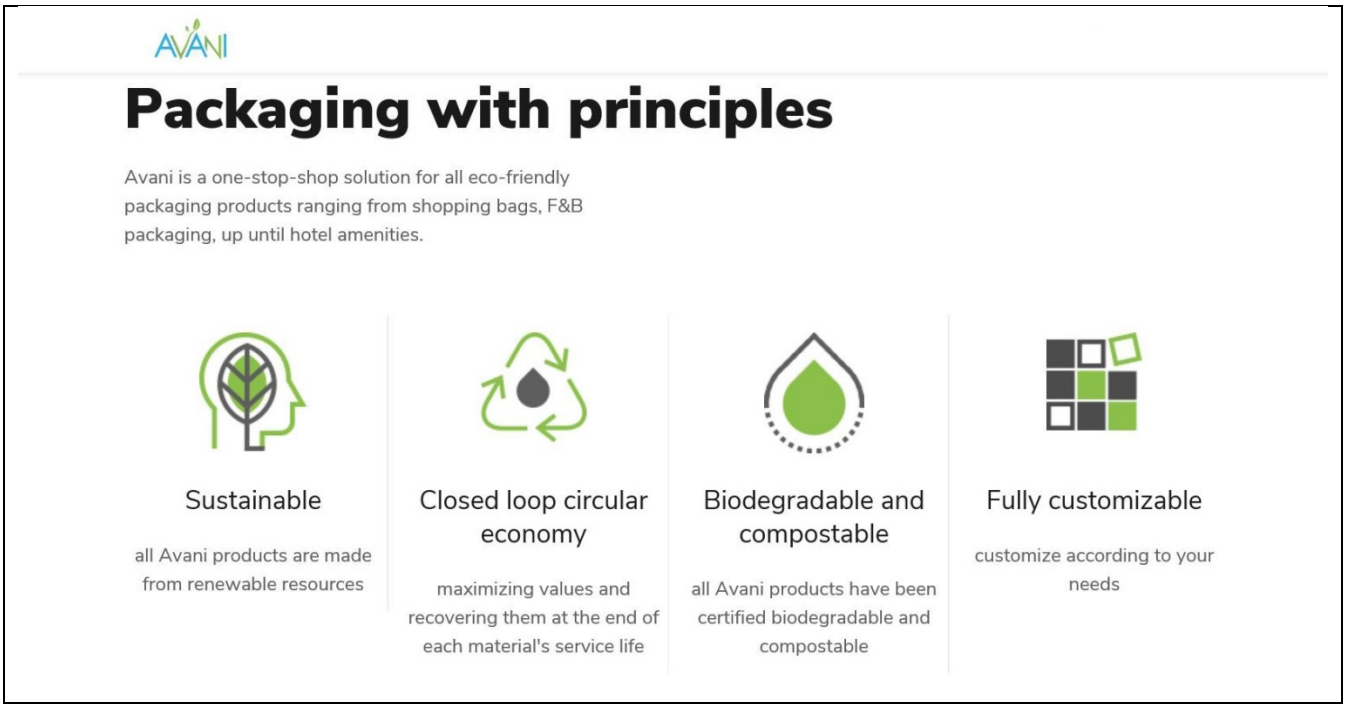
I trust this is clear. If you want me to talk to anyone about the issue I am happy to oblige.

GR

https://mail.google.com/mail/u/0/?ui=2&ik=2a86b50ff8&jsver=HcM5jMu2nSY.en.&view=pt&search=sent&th=16294e3fe0764cce&siml=16294e3fe0764cce&mb=1 1/1

NOTE: George Reynolds stated that, after 50 years, it was hard to remember whether the product used was polystyrene or polyurethane. Independent industry advice is that it would have been polyurethane.

APPENDIX 3 Biodegradable & Compostable Packaging



APPENDIX 4 Statement from Foamed Insulations

FOAMED INSULATIONS PTY. LTD.
ABN: 84 091 314 224
22B Euston Street, Rydalmere, NSW, 2116 Ph: (02) 9898 0751 Fax: (02) 9898 0753

19th April 2018

John Rogers
Fleet Engineer (Victorian Navy)
Website, Research & President,
Friends of the Cerberus Inc.

Dear John

Further to our ongoing discussions with regards to the Cerberus I can confirm that:

1 – The Polyurethane foam we are recommending can be pumped from the shore and injected at the part of Cerberus where required. As this operation would be undertaken by an experienced operator, the risk of spillage would be minimal.

3 - I have personally used this type of Polyurethane Foam in sea water and am aware of other instances where it has been used in marine environments.

4 - Subject to further investigation, I believe that sufficient Polyurethane Foam could be injected under the Cerberus gun turrets to support them and within the available budget of approximately $600,000.

Yours sincerely,

Lawrence Wolf
Foamed Insulations Pty Ltd.

APPENDIX 5 Polyurethane Data Sheet page 1

PRIME RESINS

Technical Data Sheet

PRIME FLEX™ 985 LX20 & LX20 FAST

Two-component structural polyurethane foam

DESCRIPTION

Prime Flex™ 985 LX20 is a two-component, low exotherm, polyurethane foam used to fill voids, stabilize soil and underseal concrete slabs. Its low viscosity allows for moderate permeation effects as well. The foam is a closed-cell, high density structural foam. The product has been independently tested and verified to meet **NSF/ANSI Standard 61.5 for contact with potable water**. LX20 Fast has the same features but with much faster reaction times. See test data below for comparision.

TYPICAL AREAS OF USE

- Concrete slabs
- Pipes
- Manholes
- Roadways
- Seawalls
- Sinkholes

ADVANTAGES

- **NSF/ANSI 61.5 compliant** (standard LX20 only)
- Quick set time
- Low viscosity
- Hydro insensitive
- Bonds with soil and to concrete
- Low exotherm (will not self ignite)

ACCESSORY PRODUCTS

Eco Flush, soil probes, pumps, pipe jack

PACKAGING

- 10 gallon units
- 100 gallon units
- 600 gallon units

Standard Prime Flex™ 985 LX20 will be shipped unless LX20 Fast is specified.

WEIGHT

A side: 10.258 lb/gallon
B side: 8.497 lb/gallon

MIX RATIO

A:B = 1:1 by volume

MATERIAL PREPARATION

Store material overnight to precondition to between 70 and 80ºF (21 to 27ºC) prior to use. Pre-mix each component prior to combining. "B" component contains chemicals that settle over time. Failure to properly pre-mix will result in uncured or improperly cured material.

LIMITATIONS

Cold temperatures will slow down reaction time and increase viscosity. pH below 3 or above 10 may adversely affect foam properties.

Typical Data: Physical Properties at 73ºF (23ºC) - Liquid

Properties will vary depending upon site conditions, application method, mixing method and equipment, material temperature, and curing conditions.

Solids content 100%
Viscosity 270-280 centipoise
Note: Viscosity scale for Prime Resins products: 50 and under= super low, 51-100= very low, 101-400= low, and 401-1000= moderate viscosity.

Flash point "B" component	< 72ºF (22ºC)

Physical properties - cured

Compressive strength	ASTM D-1621	24 p.s.i. / 3456 p.s.f.
Expansion	23 times	
Density	3 pounds per cubic foot	
Shrinkage	ASTM D-1042 / D-756	None

Reaction time LX20		**LX20 Fast**
Initial reaction time	70 seconds	12 seconds
Full rise	6-12.5 minutes	65-85 seconds
85% full strength	15 minutes	

APPENDIX 5 Polyurethane Data Sheet page 2

STORAGE
Store in dry environment between 40º and 80ºF (4.4-27º C)
Shelf Life: 12 months from date of manufacture in unopened containers properly stored.

CLEANUP
Flush injection equipment with Prime Flex Eco Flush. Clean off of skin with soap and water. Remove cured material by soaking in Prime Flex CGC (not appropriate for contact with plastic).

FIRST AID
Eye Contact: Immediately flush with large amounts of water. Seek medical attention.
Inhalation: Move to fresh air if symptoms occur. If breathing is difficult, seek medical attention.
Ingestion: Seek medical attention immediately.
Skin Contact: Wipe off contaminated area and wash with soap and water.

SHIPPING INFORMATION
Shipping Class: Flammable liquids, N.O.S Resin Solution, UN 1866, Class 3, PG II
Hazard Classification: 3

SAFETY
Use OSHA-approved personal protective equipment (PPE), including safety glasses, gloves and confined space equipment/procedures if applicable. Avoid skin contact; do not ingest. See SDS for complete safety precautions. For professional use only.

ENVIRONMENTAL PROTECTION
Cured material is environmentally safe. Dispose of in approved landfill. Clean up any spilled catalyzed liquid material and add a small amount of water to cure unreacted material.

MANUFACTURING INFORMATION
Products are manufactured by Prime Resins, Inc. in the U.S.A. under strict quality assurance practices at our Conyers, GA plant.

WARRANTY & DISCLAIMER
Prime Resins, Inc. warrants its products to be free from manufacturing defects and that products meet the published characteristics when tested in accordance with ASTM and Prime Resins standards. No other warranties by Prime Resins, Inc. are expressed or implied, including no warranty of merchantability or fitness for a particular purpose. Prime Resins, Inc. will not be liable for damages of any sort resulting from any claimed breach of warranty. Prime Resins' liability under this warranty is limited to replacement of material or refund of sales price of the material. There are no warranties on any product that has exceeded the "shelf life" or "expiration date" printed on the package label.

APPENDIX 6 Tank Foam Data Sheet page 1

SAFETY DATA SHEET

TANK FOAM UST ABATEMENT

Issue Date: 12/1/2015
Print Date: 12/1/2015

1. IDENTIFICATION

Product Name: Tank Foam UST Abatement™

Recommended Use: UST Abatement

Company Identification

cfiFOAM, Inc.
P.O. Box 10393
Knoxville, TN 37939
United States

CFI FOAM, INC. INJECTION FOAM PRODUCTS

Customer Information Number:	800-656-3626 / info@cfifoam.com
24-Hour Emergency Telephone Number:	Chemtrec / 800-424-9300
Manufacturer's Name:	Foam is manufactured on-site by authorized installers using raw materials furnished by cfiFOAM, Inc.
Manufacturer's Address:	Refer to local installer's literature

2. HAZARDS IDENTIFICATION

GHS Classification:	This product is not classified as hazardous.
Hazard Pictogram/s:	Not applicable
Signal Word:	Not applicable
Hazard Statement(s):	Not applicable
Precautionary Statement(s):	Wash skin thoroughly after handling

3. COMPOSITION/INFORMATION ON INGREDIENTS

Name of Hazardous Component/Composition: Not applicable

APPENDIX 6 Tank Foam Data Sheet page 2

4. FIRST AID MEASURES

Eye contact: Wash thoroughly with water. Remove contact lenses if possible and continue washing.

Skin contact: Wash affected area thoroughly with water.

Ingestion: No advserse effects anticipated. Unlikely due to physical state. May cause gagging if swallowed.

Inhalation (of dust): Seek medical attention if coughing, discomfort or air passage obstruction occurs.

5. FIRE FIGHTING MEASURES

Suitable extinquishing media: Not applicable

Unsuitable extinguishing media: Not applicable

Special hazards arising from the substance/mixture: Not applicable

Hazardous combustion products: Polymer is non-flammable; does not ignite or burn.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures: Not applicable. This is a solid product.

Environmental precautions: None known.

Methods and material for containment and clean up: Incinerate or bury in approved landfill according to local, state, and federal regulations.

7. HANDLING AND STORAGE

Precautions for safe handling: If needed, wear a dust mask to avoid dust inhalation when cutting to remove excess foam. If needed, wear safety glasses. Ventilate well until foam fully cures. Avoid prolonged foam contact with temperatures in excess of 190° F.

Conditions for safe storage, including any incompatibilties: Not applicable.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Personal Protective Equipment (PPE):

Eyes: Safety glasses if needed
Protective Gloves: None needed
Respiratory: Dust mask, if needed
Body: No special requirements

APPENDIX 6 Tank Foam Data Sheet page 3

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	White semi-rigid foam
Odor	Minimal
Boiling Temperature	Not applicable
Melting/Freezing Point	Not applicable
Flammability	Non-flammable
Flash Point	Not applicable
Explosive Properties	Non-Explosive
Relative Density	0.5-1.0 lb/ft^3
Partition Coefficient n-Octanol/Water	Not applicable
Viscosity at 60 % Solution	Not applicable
Auto Ignition Temperature	Not applicable
Gel Time @ 100° C	Not applicable
Solubility in Water	Negligible
pH @ 25° C	Not applicable
Oxidizing Properties	Not applicable

10. STABILITY AND REACTIVITTY

Stability: Normally stable.

Hazardous decomposition products: Carbon dioxide, carbon monoxide, and oxides of nitrogen may be released under fire conditions.

Incompatible materials: Incompatible with strong acids and oxidizing agents.

Conditions to avoid: Strong acids and alkalis may deteriorate foam.

11. TOXICOLOGICAL INFORMATION

Acute &Chronic Over-Exposure Effects: None established. Foam may contain trace amounts of formaldehyde which has an OSHA PEL of 2 ppm STEL and .75 ppm TWA.

Carcinogenicity Information: Aminoplast polymeric foam is not listed as a carcinogen.

Reproductive Toxicity. No data available.

Threshold limit value: None established.

12. ECOLOGICAL INFORMATION

Environmental toxicity:	No data available
Persistence and degradability:	No data available
Bioaccumulative:	No data available

APPENDIX 6 Tank Foam Data Sheet page 4

Mobility in soil:	No data available
Other adverse affects:	No data available

13. DISPOSAL CONSIDERATION

Waste information: Incinerate or bury in approved landfill according to local, state, and federal regulations.

14. TRANSPORT INFORMATION

DOT hazard class:	Not applicable
DOT shipping name:	Not applicable
DOT placard:	None required
UN number:	Not applicable
NA number:	Not applicable

15. REGULATORY INFORMATION

S.A.R.A. 311/312:	Acute: No Chronic: No Reactivity: No Pressure: No Fire: No
S.A.R.A. 313:	No component listed under Section 313 above the de minimis limit
S.A.R.A. 302 (EHS):	No components listed under Section 302

16. OTHER INFORMATION

cfiFOAM has provided the information in this SDS in good faith, but we make no representation to its comprehensiveness and/or accuracy. It is the user's responsiblity to determine the safety, toxicity, and suitability for his or her own use of the product described. Since the actual use by others is beyond our control, no guarantee, either expressed or implied, is made by cfiFOAM. cfiFOAM will not be responsible for damages resulting from the use or reliance upon this information. The user assumes all risk and responsibility.

APPENDIX 7 Burra Charter Excerpt

Conservation Processes

Article 14. Conservation processes

Conservation may, according to circumstance, include the processes of: retention or reintroduction of a *use;* retention of *associations* and *meanings; maintenance, preservation, restoration, reconstruction, adaptation* and *interpretation;* and will commonly include a combination of more than one of these.

There may be circumstances where no action is required to achieve conservation.

Article 15. Change

15.1 Change may be necessary to retain *cultural significance*, but is undesirable where it reduces cultural significance. The amount of change to a *place* should be guided by the *cultural significance* of the place and its appropriate *interpretation.*

When change is being considered, a range of options should be explored to seek the option which minimises the reduction of cultural significance.

15.2 Changes which reduce *cultural significance* should be reversible, and be reversed when circumstances permit.

Reversible changes should be considered temporary. Non-reversible change should only be used as a last resort and should not prevent future conservation action.

15.3 Demolition of significant *fabric* of a *place* is generally not acceptable. However, in some cases minor demolition may be appropriate as part of *conservation.* Removed significant fabric should be reinstated when circumstances permit.

15.4 The contributions of all aspects of *cultural significance* of a *place* should be respected. If a place includes *fabric, uses, associations* or *meanings* of different periods, or different aspects of cultural significance, emphasising or interpreting one period or aspect at the expense of another can only be justified when what is left out, removed or diminished is of slight cultural significance and that which is emphasised or interpreted is of much greater cultural significance.

Article 16. Maintenance

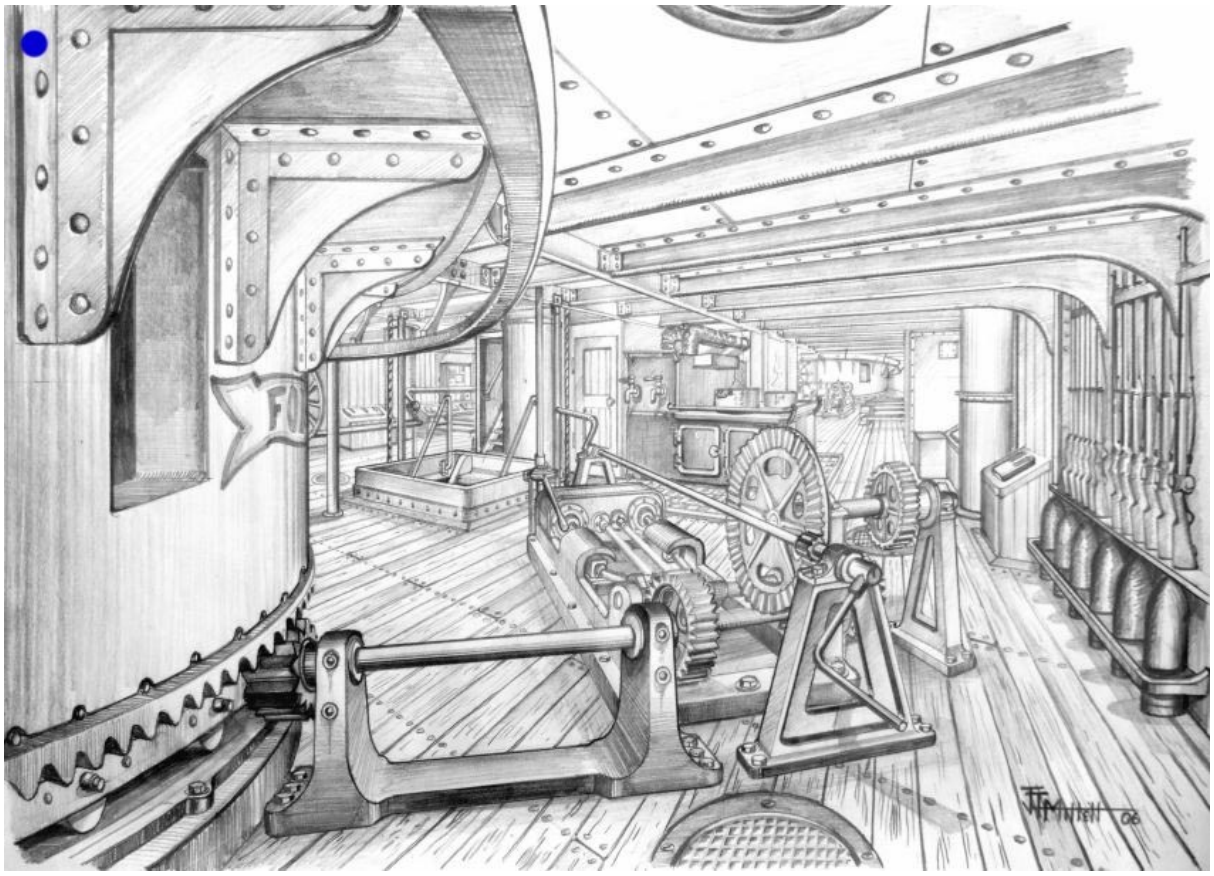
Maintenance is fundamental to *conservation* and should be undertaken where *fabric* is of *cultural significance* and its maintenance is necessary to retain that *cultural significance.*

APPENDIX 8 Images

Capstan on Lower Deck
Photo: Glen Agnew 1989

Turret Pointer Markings Inside the Breastwork
Photo: George Scott 1987

Fore Turret Riband
Photo: Leigh Doeg 1971



Artist's Impression of Shield Deck
By: Jim Millett 2006