

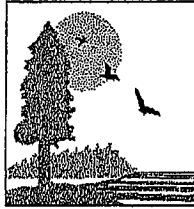
# Appendix F

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**Invasive Species Work Plan and  
California State Lands Commission Letter**

## CALIFORNIA STATE LANDS COMMISSION

100 Howe Avenue, Suite 100-South  
Sacramento, CA 95825-8202



CURTIS L. FOSSUM, Executive Officer

(916) 574-1800 FAX (916) 574-1810

California Relay Service from TDD Phone 1-800-735-2929  
from Voice Phone 1-800-735-2922

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May 16, 2011

File Ref: W9777.291

Mr. Robert Kent  
Pacific Battleship Center  
1077 N. Bradford Avenue  
Placentia, CA 92870

**RE: Battleship USS IOWA BB6 Invasive Species Removal Work Plan May 3, 2011**

Dear Mr. Kent:

The Marine Facilities Division (MFD) of the California State Lands Commission appreciates the opportunity to review the proposed work plan titled "Battleship USS IOWA BB6 Invasive Species Removal Work Plan May 3, 2011". After reviewing the proposed plan, I have determined that the proposed in-water cleaning will take place outside of State waters. I have also determined that the prescribed in-water cleaning to be conducted prior to the vessel's arrival to the Port of Los Angeles will be sufficient to meet the requirements of California's Marine Invasive Species Act or associated regulations.

Since 1999, California has been and remains a national and world leader in the development of effective science-based management strategies for preventing species introductions through vessel vectors. The MFD's Marine Invasive Species Program (MISP) pursues aggressive strategies to limit the introduction and spread of nonindigenous species, including requirements to manage biofouling on vessels operating within California waters. These requirements are included in California's Marine Invasive Species Act, specifically in Public Resources Code 71204(f):

71204. Subject to Section 71203, the master, owner, operator, or person in charge of a vessel carrying, or capable of carrying, ballast water, that operates in the waters of the state shall do all of the following to minimize the uptake and the release of nonindigenous species:

- (f) (1) Remove hull fouling organisms from hull, piping, propellers, sea chests, and other submerged portions of a vessel, on a regular basis, and dispose of removed substances in accordance with local, state, and federal law.
- (2) For purposes of paragraph (1), prior to and until the date that the regulations described in Section 71204.6 are adopted, "regular basis" means any of the following:

Mr. Robert Kent  
May 16, 2011  
Page 2 of 3

- (A) No longer than by the date of expiration on the vessel's full-term Safety Construction Certificate or an extension of that expiration date.
- (B) No longer than by the date of expiration of the vessel's full-term United States Coast Guard Certificate of Inspection or an extension of that expiration date by the United States Coast Guard.
- (C) No longer than 60 months since the time of the vessel's last out-of-water drydocking. The commission may approve a time extension to this period.

Please note that the State Lands Commission does not have jurisdiction over California water quality requirements or over any federal requirements. Therefore, this determination is only applicable to California's requirements related to the Marine Invasive Species Act.

If you have any questions, please do not hesitate to contact me.

Sincerely,



Kevin Mercier  
Acting Chief  
Marine Facilities Division

cc: Maurya Falkner, Marine Invasive Species Program Manager

# PACIFIC BATTLESHIP CENTER

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## Battleship USS IOWA BB61

### Invasive Species Removal Work Plan

May 3, 2011

To: Christopher Scianni  
Staff Environmental Scientist  
Marine Invasive Species Program  
California State Lands Commission  
100 Howe Ave., Suite 100 South  
Sacramento, CA 95825  
(916) 574-0209

From: Robert Kent  
Pacific Battleship Center  
1077 N. Bradford Avenue  
Placentia, CA 92870  
714-926-5991



### SUMMARY

On November 25, 2010, the Pacific Battleship Center (PBC) submitted its application the Navy for the donation of the battleship IOWA. The Navy has now asked the PBC to address the issue of invasive species. The PBC has completed this work plan for the California State Lands Commission for their review and concurrence.

It is anticipated the Navy will award the IOWA to the PBC in early summer of 2011 and the battleship is expected to be towed out of Suisun Bay in the fall of 2011. The PBC will clean the hull of the IOWA prior to docking the vessel at her new home in the Port of Los Angeles.

The IOWA was towed into San Francisco Bay from Rhode Island in 2001 and has been in storage at the MARAD national defense fleet storage in Suisun Bay for the last ten years.

There is no drydock in San Francisco capable today to lift IOWA and since her hull anti-fouling paint may contain biocides, we cannot clean her hull in the San Francisco Bay. It is the intent of the PBC to mechanically and manually clean her hull by the services of Muldoon Marine, an expert at hull cleaning of large vessels such as the IOWA in international waters and insure no invasive species from San Francisco Bay enter the Port of Los Angeles.

## CURRENT HULL STATUS

IOWA was decommissioned in 1991 and was mothballed under the National Defense Act which would preserve her for future use in event of a National emergency.

All hull openings have been plated over, dehumidification and cathodic protection equipment was installed to protect the hull from the interior and the exterior. The IOWA has two rudders, two four bladed and two five bladed propellers. The inner shafts are contained in skegs and the two outer shafts each have one support strut.

The length at the waterline is 860', the width of her beam is 108' and her draft is a nominal 31'. The IOWA's underwater hull is essentially flat with flat sides except at the bow and the stern.

The hull is in excellent shape and is not expected to need dry docking for at least 15 years.



## HULL CLEANING METHODOLOGY

The IOWA's hull cleaning will not require a permit to clean her hull at the SF-3 location which is outside of the three mile limit from shore off Long Beach. However, the cleaning will be done pursuant to Federal Guidelines as outlined in the VGP requirements. The battle ship Iowa will most likely be fouled with a combination of algae, grass, slime and soft and hard animal fouling on areas of both intact and damaged antifouling coatings. The goal of our underwater cleaning is to remove all fouling and invasive species without damaging the antifouling and anticorrosive layers of coating which were applied during the last dry docking. The bottom paint test sample has been tested for the presence of TBT and has been found to contain no TBT.

A combination of underwater tools from hydraulic powered multi and single brushed machines to divers utilizing hand scrapers and low pressure water to blow out niches and gaps will be used to clean the ship as efficiently and as carefully as possible.

The vertical side shell and flat bottom will be brushed using a hydraulic triple brush underwater machine which can utilize brushes that vary from nylon to flat wire to affectively remove the hard and soft fouling without damaging the coatings.



Hydraulic triple brush “Scamping” machine used for large ship surfaces.

Areas of curvature such as the tear drop bow, turn of the bilge, rudder, shafting and skegs will be brushed using single and dual brush machines that function well in smaller tighter bend radiuses.

Attachments to the shell plate such as bilge keels, struts, cofferdams, pad eyes, etc. will require cleaning using individual divers using large and small scrapers. The divers will use caution to only remove the fouling without causing damage to the protective coatings and anodes.

Under Chapter 081 of Waterborne Underwater Hull Cleaning of Navy Ships Section 1 – General Information:

### 081-1.1.1 GENERAL.

Biological fouling of the underwater hull and appurtenances of surface ships and submarines can be removed mechanically between regularly scheduled drydockings to restore effectiveness of intact antifouling paint systems and the performance of various ship systems



#### 081-1.1.5 EXTENDED PAINT SERVICE LIFE.

The service life of a properly applied non-ablative vinyl antifouling paint system, normally 2 years, can be extended to as much as 7 or more years when supported over its lifetime by regularly scheduled inspections and periodic cleanings as part of the hull cleaning program. The service life of a properly applied ablative antifouling paint system, normally 5 to 7 years, can be maintained and extended when supported over its lifetime by regularly scheduled inspections and periodic cleanings as part of the hull cleaning program.

#### 081-1.1.6 CORROSION CONTROL.

Calcareous fouling accelerates paint system failure, thereby increasing the hull structure's susceptibility to corrosion.

#### 081-1.2.1 GENERAL.

The biological fouling of Navy ships is a recurring process following identifiable patterns of growth. Relatively few types of organisms are responsible for hull fouling and they tend to develop in the order listed in paragraphs 081-1.2.2.1 through 081-1.2.2.3 (depending on geographical locality).

#### 081-1.2.2 TYPES AND CATEGORIES OF FOULING.

The types of fouling are separated into soft, hard, and composite categories. Soft fouling typically algae, slime and grasses, have a minimum effect on the coating systems and the performance of the ship. Hard fouling is more tenacious having a calcareous structure which may become detrimental to the performance of the ship and coating systems. Composite fouling includes both hard and soft fouling organisms and is extremely detrimental to the ship's performance and coating and machinery systems.

##### 081-1.2.2.1 SOFT FOULING.

The dominant organisms in this stage of fouling are slime and grass.

##### 081-1.2.2.1.1 SLIME.

Formation of slime is the first step in the fouling process. Almost any object immersed in seawater rapidly accumulates a coating of slime, consisting of bacteria, fungi, protozoa, and algae. Bacteria frequently are attached within one-half hour of wetting the surface, and slime can often be felt by hand within an hour. The coating of slime is smooth and generally follows hull contours.

##### 081-1.2.2.1.2 GRASS AND OTHER SOFT FOULING.

Grass is a form of multicellular green and brown algae. It forms most heavily near the water-line, where adequate light is available for photosynthesis. It is less evident as depth increases, and the dominant color changes from green to brown.

##### 081-1.2.2.2 HARD FOULING.

The dominant forms of hard biofouling are barnacles (usually acorn) and tubeworms (serpulids). Some underwater components, such as the bare metal of a propulsor, can experience severe conditions where a combination of biofouling (hard and soft) and calcareous deposits can form.

##### 081-1.2.2.2.1 BARNACLES.

Acorn barnacles have conical hard shells with jagged tops.

#### 081-1.2.2.2.2 TUBEWORMS.

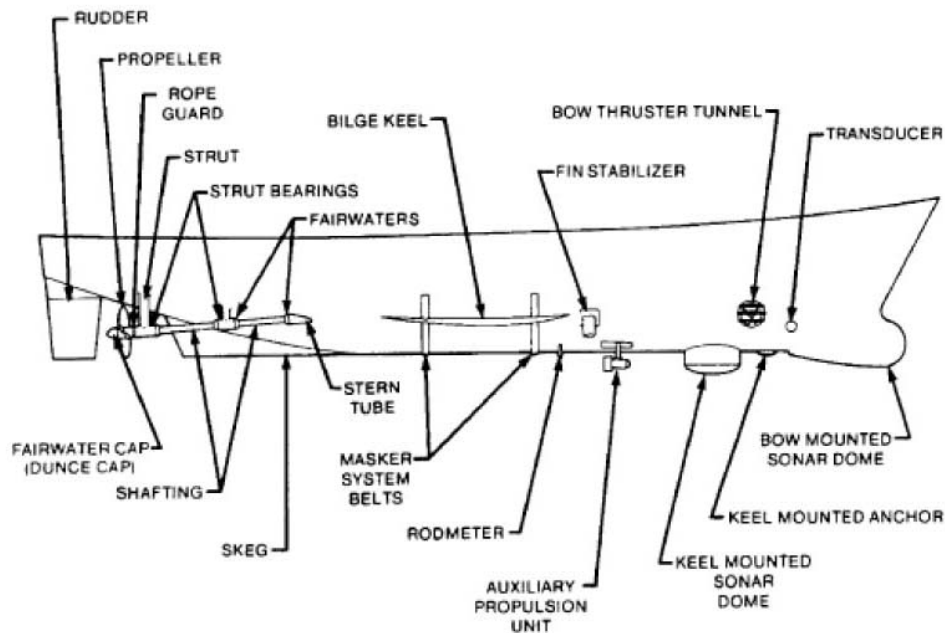
Tubeworms form intertwined tubes lying along or projecting out from the hull.

#### 081-1.2.2.2.3 CALCAREOUS DEPOSITS.

A result of an active cathodic protection system is the deposition of magnesium and calcium carbonate on bare metal surfaces. The bare nickel-aluminum-bronze-surfaces of a propulsor are highly susceptible to a uniform accumulation of calcareous deposit. The thickness will depend upon the time from the last cleaning and the functionality of the cathodic protection system and although usually more fragile than biological hard-fouling, can still be tenacious and difficult to remove.

#### 081-1.2.2.3 COMPOSITE FOULING.

In advance stages of fouling, mature barnacles and tubeworms may be present along with calcareous bivalves organisms such as mussels or oysters, or hydroids with calcareous cellular structure such as coral or anemones. In advanced stages of fouling, the ship will be affected by slime, grass, barnacles, and tubeworms. In addition, this stage of fouling will include soft shell-less animal forms, such as hydroids, anemones, and tunicates (sea squirts).



- NOTES:
1. IN ADDITION TO THE ABOVE APPENDAGES, THE CONDITION OF THE HULL PLATING (FOULING AND PAINT SYSTEM) SHOULD BE NOTED FOR THE BOW AREA, STERN AREA, FLAT BOTTOM, SIDES, BOOTTOPPING, AND DOCKING BLOCK BEARING AREAS.
  2. NOTE CONDITION OF ZINC ANODES, IMPRESSED CURRENT CATHODIC PROTECTION SYSTEM ANODES AND REFERENCE CELLS.
  3. NOTE CONDITION OF SEACHEST/HULL PENETRATIONS.
  4. PHOTOGRAPHS SHOULD BE TAKEN BEFORE AND AFTER CLEANING AND ANNOTATED IN ACCORDANCE WITH THE ABOVE NOMENCLATURE.

Figure 081-2-2 Example of Survey Plan for Surface Ships.



081-2.3.1.3 Non-ablative vinyl antifouling paint, although no longer specified for use on Navy ships since the MIL-P-15931 specification was cancelled in 2005, will form a green chemically insoluble layer on the surface that will become harder to remove as the paint system ages. This layer of cuprous oxide is insoluble, nontoxic and will not prevent marine growth from adhering to the surface. The degree of removal of this green layer is proportional to the age of the paint system and the time between cleanings. Cleaning should partially remove the green chemical layer to expose a mottled pattern of 40 to 60 percent red antifouling paint. Cleaning the coating to alternate mottled pattern and continuous red will allow rejuvenation of antifouling (AF) paint with minimum damage to intact AF paint and prevent the formation of a tough insoluble layer over the AF paint. The lower portion of a submarine hull from maximum beam to keel may be painted with red formula 121 AF paint. However, in the area from maximum beam to maximum load line, black formula 129 AF is normally used. There is usually no green chemical layer formed on formula 129 AF paint; therefore, removal of the green slime layer cannot be used as a cleaning criterion. This lack of visual criterion requires exercising of great care to prevent removal of excessive amounts of formula 129 AF paint. Removal of the heavy slime layer will expose a black hull. A mottled pattern on this hull paint system is not desirable, as this indicates removal of paint exposing different colored anticorrosion paint.

081-2.3.2 Cleaning the non-ablative vinyl anti-fouling paint to alternate mottled pattern and continuous red will allow rejuvenation of antifouling (AF) paint with minimum damage to intact AF paint and prevent the formation of a tough insoluble layer over the AF paint.

081-3.2.1 For diver safety and efficient cleaning operations:

- a. The ship shall be breasted out a minimum of 4 feet from the pier and clear on the outboard side. In the case of aircraft carriers, the ship shall be breasted out a minimum of 20 feet.
- b. There shall be sufficient depth of water under the keel, a minimum of 6 feet at Mean Low Water (MLW).
- c. The underwater hull shall be free of obstruction.
- d. Retractable speed log rod-meters will be in the fully raised position. On those ships with fixed rod-meters, mark the locations with visual or auditory warning devices.
- e. Main and auxiliary circulating pumps shall be secured.
- f. The ship and any adjacent ships shall be properly tagged out for diving. All ships in the vicinity will also be informed of the diving operation to prohibit unauthorized operations of underwater systems such as, but not limited to, sonar, masker air, PRAIRIE, and main propulsion tests.
- g. Cofferdams or other obstructions that would impede the cleaning operations or become dislodged or damaged from cleaning shall be identified to the divers prior to commencing with cleaning operation.

#### **CAUTION**

**It is important that the impressed current cathodic protection system be reenergized after cleaning to prevent corrosion.**

- h. The impressed current cathodic protection system on the ship being cleaned shall be de-energized and the limits of the dielectric shield shall be marked with visual or auditory warning devices to enable the cleaning personnel to keep the cleaning equipment clear of the shield and anodes. The IOWA impressed system is not in operation and over-the-side cathodic protection is being used. The anodes will be stored topside until reactivated at Berth 87.

081-3.3.1.2 Where convex hull curvature permits, multi-brush units may be used. The brushes used on these units shall be in good condition and conform to Section 4. The least aggressive brush necessary to achieve a properly cleaned surface while minimizing any impact on coating system shall be used. All rotating brushes shall be turned off or retracted from the hull during idle periods when the machine is resting on the hull as well as when the machine is being turned on the hull at the end of each swath.

081-3.3.1.3 In areas of smaller convex curvature, areas of concave curvature (such as found between the skeg and the ship's bottom) and areas of limited access, hand-held single brush units are permissible. The brushes used on these units shall be in good condition and conform to Section 4. The least aggressive brush necessary to achieve a properly cleaned surface while minimizing any impact on coating system shall be used.

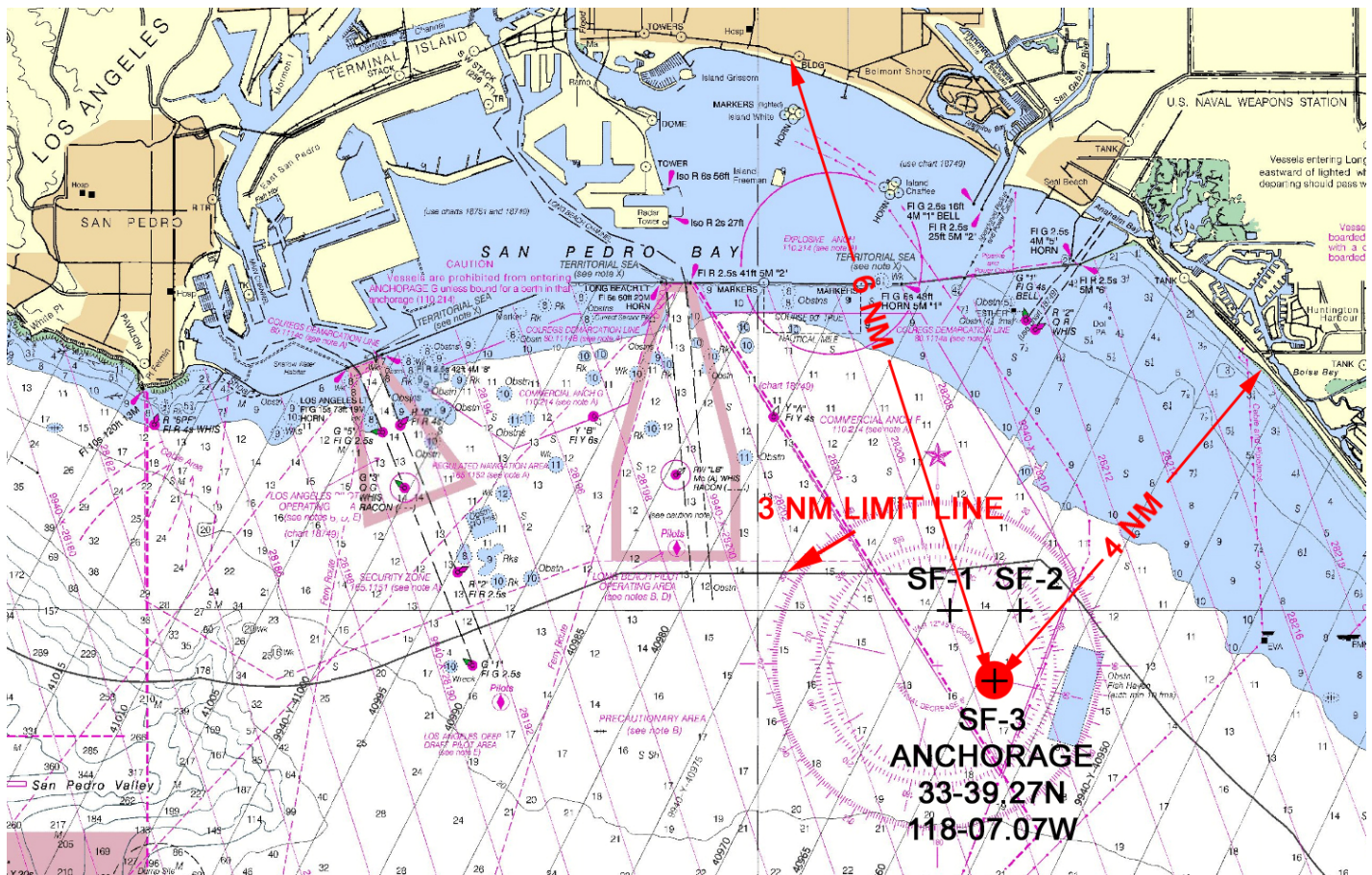
081-3.3.1.4 All marine fouling shall be removed from painted surfaces painted with Formula 121, although this occurs less common since the paint specification was cancelled in 2005, along with a sufficient amount of the chemical surface layer which forms on antifouling (AF) formula 121 so that a mottled pattern of the red AF paint is visible interspersed with the green. Extreme caution should be exercised to prevent damage to the paint. A properly cleaned painted surface is described in section 081-2.3.

## HULL CLEANING LOCATION

PBC will contract with a major towing company to tow the IOWA with a Navy approved tow plan out of San Francisco Bay to an approved anchorage location designated Sierra Foxtrot Three (SF3) located about four nautical miles off shore from Seal Beach, California and almost six nautical miles from the shores of Long Beach. SF3 is located at coordinates 33-39.27 N 118-07.07 W and is in sixteen fathoms or almost 100' deep.

The IOWA will remain hooked up to the towing tug as the IOWA's utilizes its own anchor to hold the vessel in place for hull cleaning. The IOWA's anchor windlass system will be reactivated in Suisun Bay in order to raise her anchors for departure. The power for the windlass will be from a generator located on deck for the entire tow and will be activated in order to raise and lower IOWA's anchor at SF3. Once, the hull cleaning is complete, the IOWA will raise her anchor and will be towed into the Port of Los Angeles to her permanent home at Berth 87.

The Vessel Traffic Service will be notified coordinated via the US Coast Guard for the anchorage as well as the Marine Exchange for traffic guidance around the IOWA during her hull cleaning operation.



## **HULL CLEANING DURATION**

Cleaning of IOWA's hull will take about 48 hours. Muldoon Marine will utilize (2) teams, each working one 12 hour shift each day for a total of 48 hours. Working in this manner will shorten the overall cleaning duration in order to reduce tug standby costs.

Cleaning operations will be conducted on a around the clock basis. However, the bottom of the hull will be cleaned only during daylight hours. The sides will be cleaned around the clock to reduce the hull cleaning duration. Lights will illuminate the sides for cleaning during darkness.

## **HULL CLEANING COST**

The cost for the operation has been determined by the amount of hull area, complexity of the hull, current fouling of the hull the location of cleaning the hull with IOWA at anchor at SF-3.

Muldoon Marine Services, Inc has cleaned several ships in the SF-1, SF-2 or SF-3 anchorages in the last two years.

Each (12) hour shift is \$19,392 (see estimate on next page). The size of the IOWA will require four (4) 12 hour shifts. A cost estimate is therefore estimated at \$78,000, which is based on accomplishing the cleaning in the shortest amount of time possible in order to reduce towing charges.



March 14, 2011

Mr. Robert Kent  
The Pacific Battleship Center  
248 Grand Ave  
Long Beach, CA 90803

RE: USS Iowa Underwater Hull Cleaning Cost Estimate

Dear Mr. Kent,

The following estimate is based on performing an underwater hull cleaning on the USS Iowa at the SF Anchorage position approximately 3.5 miles off shore in Los Angeles / Long Beach Harbor, California.

The ship will be anchored in approximately 90' of water with a large ocean going tug standing by on or near the ship.

All diving will be done according to Occupational Safety and Health Administration (OSHA), Cal OSHA, Association of Diving Contractors (ADC), Port of Long Beach and United States Coast Guard (USCG) regulations.

All divers are commercially trained and will use surface supplied diving equipment with two way communications.

#### Price Estimate

Seven man dive team – (Supervisor, four divers and two tenders)

Weekday Rate 12 Hour Day	\$10,592.00/ Day
Rentals – Brush Kart / Consumables (12 Hour Day)	\$2,000.00/ Day
Work Boat	\$3,000.00/ Day
Brushes	\$3,500.00/ Day
Fuel (12 Hours)	<u>\$300.00/Day</u>
Estimated Total	\$19,392.00 / Day

Please respond to [mmsi@muldoonmarine.com](mailto:mmsi@muldoonmarine.com) if you have any questions.

Regards,

Richard Barta





April 28, 2011

LABORATORY NUMBER: 5004.5813  
CUSTOMER AUTHORIZATION: P.O. No. 041910-01  
SUBMITTED: April 21, 2011  
REPORT TO: Pacific Battle Ship Center  
Attn: Jonathan Williams  
615 Centre Street, #301  
San Pedro, CA 90731

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SUBJECT:

One sample of paint chips was submitted for determination of tributyltin content.

ANALYSIS:

The paint sample was analyzed by X-Ray fluorescence spectrometry.

RESULTS OF ANALYSIS:

The X-Ray fluorescence data obtained on the paint sample were negative for the presence of elemental tin, indicative that the paint sample does not contain tributyltin <sup>1</sup>.

<sup>1</sup> Detection Limit, tin (Sn) = 0.01%

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Submitted by:

*Harold R. Harlan*

Harold R. Harlan,  
Director, Organic Chemistry Laboratories

Reviewed by:

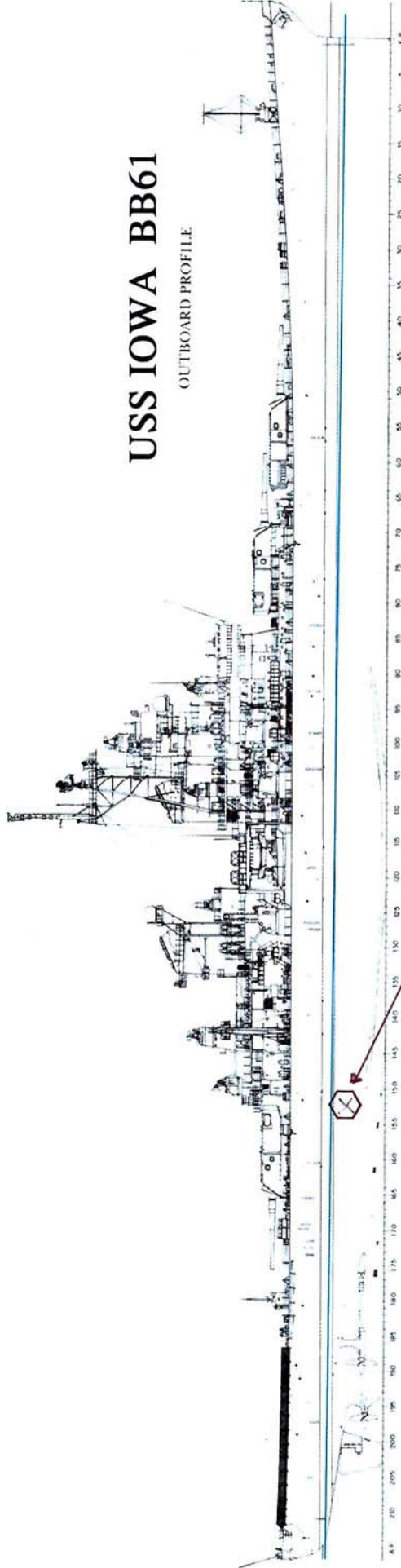
*Edward A. Foreman*

Edward A. Foreman,  
Quality Manager



UNDERWATER PAINT  
SAMPLE LOCATION CERTIFICATION

MAR 29 2011



USS IOWA BB61  
OUTBOARD PROFILE

SAMPLE DATE: 3-29-11

SAMPLE LOCATION: STB FR153

SAMPLE TAKEN BY: NATHAN JONES

1837 Reservoir Dr

Syrial Hill Cal 90755

Ph-562-597-3609

SIGNATURE: Nathan Jones

WITNESSED BY: RIZAT KENT

TITLE: PRESIDENT

COMPANY: PACIFIC BATTLESHIP CTR

SIGNATURE: Rizat Kent

DATE: 3-29-11

## Ameron International

### ABC #3

Unfazed by the ban on TBT is **Ameron. Its ABC No. 3, introduced in 1983**, has never contained TBT. Ameron's ABC No. 3 depends on high levels of cuprous oxide for its biocidal action. The product releases cuprous oxide in a controlled, engineered manner via the hydrolysis of the superficial antifouling layer in seawater in combination with the polishing action caused by the motion of the vessel through the water. The outer layer continually wears away exposing fresh layers of antifouling.

Ameron's ABC No. 3 is suitable for most vessels in a wide range of operating conditions. It is recommended where long-life fouling protection in severe service is required.

Among the benefits of ABC No. 3 is that it can be applied at temperatures down to 18° C with material temperature down to 5° C. The product has a two-year shelf life, as opposed to six months for many competitive products and a reduced number of coats are needed. There is no need for special tie coats between anti-corrosive primer and ABC No. 3.

A particular advantage of the product is that an indefinite recoat window allows following coats of ABC No. 3 to be applied at any time after the first coat is applied.

ABC No. 3 is competitively priced with TBT-containing antifouling products meaning that it has a lower cost than other tin-free self-polishing products.

# AMERON MARINE COATINGS



## ABC<sup>®</sup>3 - The Tin-free Antifouling with a Unique Track Record

### **Introduction**

TBT containing antifoulings have been under environmental scrutiny for some years and from January 2003 the International Marine Organization (IMO) has banned new applications. From January 2008 the ban will be extended to prohibit the leaching of TBT antifoulings into the environment.

This has meant that marine coatings manufacturers have been forced to develop new technologies to replace their premier antifouling ranges, because they have almost all relied on TBT for fouling control. However, Ameron International has marketed high performance TBT-free antifouling for many years. Today, Ameron is the only supplier able to offer economical and proven TBT-free technology that meets both Owners' operational requirements and recent and pending legislation.

This technology is used in Ameron's ABC antifouling range. The premier product, ABC<sup>®</sup>3, utilizes a tin-free biocide package to control shell, slime, weed and other marine growth for in-service periods up to 60 months. The biocide is released in a controlled manner by the polishing action of the antifouling as the vessel moves through water. This polishing effect also reduces hull roughness and drag on underwater surfaces, consistently reducing fuel consumption over the service life of the coating system. The performance of ABC<sup>®</sup>3 is well documented in hundreds of project references and case histories ([www.ABC-3.com](http://www.ABC-3.com)). For over 20 years it has consistently provided Owners with long-term fouling free performance, rivaling TBT containing materials.

### **Mechanism**

ABC<sup>®</sup>3 is based on unique engineered terpolymer binder technology that provides controlled polishing and biocide release.

- The binder has both hydrophobic and hydrolyzing characteristics.
- The binder's hydrophobic characteristics limit the ingress of water, thus limiting contact of the coating with seawater to a very thin surface layer.
- The coating erodes via controlled hydrolysis of the terpolymer in contact with water. The hydrolyzed terpolymer residue or fragments are washed away by the water movement. The result is controlled polishing. Unlike traditional rosin based antifouling, only a very thin spent or depleted layer remains.
- Controlled polishing or ablation of the binder results in regulated delivery of the biocide package.
- Both the polishing and biocide release rates of ABC<sup>®</sup>3 are self-regulating, depending on the vessel's speed and the trading conditions. This provides the significant advantage that only one formulation of ABC<sup>®</sup>3 is needed for all vessels under all conditions, as opposed to different formulations being required for differing operating conditions.

### **Binder**

ABC<sup>®</sup>3 is not a low-tech rosin-based antifouling. The binder matrix is an engineered terpolymer resin that contains a proportion of rosin as one of several constituents. The terpolymer resin system was designed to provide several key properties:

- good surface tolerance to give excellent adhesion to a variety of substrates and old coatings
- an indefinite recoat window with itself
- a 2-year shelf-life
- easy application without restrictive application and weather condition requirements

## **ABC3 – The tin-free antifouling with a unique track record.**

This blended terpolymer binder differentiates ABC technology from traditional antifoulings based on rosin alone. It takes advantage of the positive aspects of rosin, whilst overcoming the drawbacks normally associated with these types of materials - short service life, UV sensitivity and no polishing or biocide leach control. The terpolymer binder developed for the ABC range was a quantum upgrade of the traditional rosin binder. This type of terpolymer binder matrix also provides the additional benefit of no maximum time before launching.

An analogy could be made with the internal combustion engine. It was introduced around the time that the first rosin technology was introduced to antifoulings. Indy and Formula I cars still use exactly the same basic technology as the first automobiles, yet we don't equate them to a Model T just because they work on a century old principle.

### **Biocide Package**

In the ABC range, the biocide package that replaces the organo-tin used in the old antifoulings controls, slime, algae and weed growth (like TBT), but also imparts some additional properties:

- controlled solubility that reduces premature depletion of the film and provides increased protection time
- control of barnacle and other shell and animal fouling

Like most effective formulations, the excellent performance of the ABC range is due to the synergistic effect of a series of carefully chosen components. The controlled polishing of the binder results in regulated delivery of the biocide package to the surface of the coating film for maximum fouling control over an extended period. This very controlled release of biocides throughout the service life minimizes the required biocide loading and helps make ABC®3 an ecologically sensitive, cost-effective formulation that still provides protection for the specified service life. The theories behind antifouling paints are interesting, but in practice it is performance that really counts.

### **Performance**

Actual service experience is still the only way of being sure that an antifouling meets all the supplier's claims and really provides Owners with value for their money. This experience must be gained under a wide range of operating conditions and on a variety of vessel types over a realistically long period.

ABC®3 has been in service for **twenty years** and has consistently achieved **5-years performance** and better under all types of conditions and on a wide range of commercial, military, and recreational vessels. This makes the product unique. There is no other tin-free product on the market with a track record that matches ABC®3. It has a loyal following of repeat customers that includes the US Navy and commercial Owners operating on a worldwide basis. It is compatible with most existing antifoulings and its five-year capability is well documented.

### **Track record**

The following are examples of a satisfied customer and typical photos of ABC®3 following 5-years in service.

Maritrans Operating Company L.P. is one of many satisfied customers using ABC®3:



## ABC3 – The tin-free antifouling with a unique track record.



Maritrans' Vice President, Operations & Maintenance, Mr. Peter G. Nielsen comments:

Maritrans has benefited greatly over the years by the use of ABC<sup>®</sup>3 Self Polishing Antifouling, with excellent service for up to five years. This high level of service being provided by a TBT-free antifouling, without any major environmental impact, has also greatly reduced our routine maintenance drydocking costs. We are particularly pleased to know that we will be able to continue to use ABC<sup>®</sup>3 well into the future as it satisfies pending IMO restrictions regarding the use of antifouling coatings. ABC<sup>®</sup>3 is also helping us to reduce overall painting costs associated with our ongoing double hull conversion projects by reducing the degree of re-painting required with the new hulls. We are confident that our fleet's future operating costs will also benefit from this well-proven technology.

The photos below are of an ultra-large crude carrier coated with ABC<sup>®</sup>3 after 5 years in service. The polishing effect can be clearly seen by the wear-through of the red final coat of ABC<sup>®</sup>3 exposing the blue/gray coat of ABC<sup>®</sup>3 underneath. The presence of only a minimal leached layer is clearly indicated by the bright red color of the remaining antifouling.



## **ABC3 – The tin-free antifouling with a unique track record.**

### **Operational savings**

A major factor that Ameron has taken into account with ABC<sup>®</sup>3 is cost engineering. The product was formulated and is manufactured to achieve a high **performance: cost** ratio. The liter (gallon) cost of ABC<sup>®</sup>3 is favorable compared with the new tin-free antifouling, but that is just the tip of the iceberg. There are so many other practical factors that play a role in the overall cost. A few of these are:

#### **Application**

ABC<sup>®</sup>3 may be applied by airless spray, conventional spray, roller or brush, while some competitive products are really only designed for airless spray application. Some of these products tend to pull or cobweb when applied by brush or roller. ABC<sup>®</sup>3 gives the applicator more flexibility during both new construction and M&R.

#### **Minimum drying time before recoating itself**

ABC<sup>®</sup>3 must dry for five hours at 20°C (68°F) before being overcoated with itself compared to twelve hours at 25°C (77°F) for a competitive product. This means that double the number of coats of ABC<sup>®</sup>3 can be applied in a day compared to the competitive product.

#### **Recoat window**

ABC<sup>®</sup>3 has an indefinite recoating window with itself compared to twenty-eight days for some competitive products. This allows for unexpected delays during new construction applications.

#### **Minimum time between application and launch**

Some competitors need a delay of thirty-six hours between the last application and launch, compared to six hours for ABC<sup>®</sup>3. This can save an entire day in drydock.

#### **Maximum time after application before launch**

There is no maximum time after application by which an ABC<sup>®</sup>3 coated vessel must be launched. This gives the flexibility to allow for unexpected delays during construction. This unlimited period compares to a twenty-eight day maximum time before launch for some competing products.

#### **One formula**

One ABC<sup>®</sup>3 formula is suitable for all hull areas and services, compared to the two or four different formulas required by many competitors. This avoids confusion, errors and extra stocking costs. ABC<sup>®</sup>3 left in stock is not wasted, because of the long shelf-life and the fact that it can be used on all positions on the hull and for all trading conditions.

#### **Substrate temperature during application**

ABC<sup>®</sup>3 may be applied to substrates at temperatures down to -18°C (-0.4°F) compared to -5°C (23°F) for some competing products. This allows for application worldwide at most times of the year.

#### **Material temperature during application**

ABC<sup>®</sup>3 can be applied when the material temperature is 5°C (41°F). Other products on the market are more critical. One requires the material temperature to be controlled between 25°C (77°F) and 30°C (86°F) for optimum application. The ABC range is less critical, making application in a wider range of climates more practical and reducing the chance of error.



## **ABC3 – The tin-free antifouling with a unique track record.**

### **Volume solids**

ABC<sup>®</sup>3 has a volume solids of 52% compared to around 40% for some competitive products. This can mean less coats of ABC<sup>®</sup>3 to achieve the dft needed for five years service. It also enables ABC<sup>®</sup>3 to meet US and other strict VOC limitations.

### **Shelf-life**

Two years for ABC<sup>®</sup>3 compared to as little as three months for some antifouling. Thus using ABC<sup>®</sup>3 reduces the risk of application of antifouling that is over its shelf-life causing early failure or application difficulties.

To summarize, ABC<sup>®</sup>3 does not require extraordinary surface preparation before initial application or subsequent repainting. A five-year service life can be achieved without the application of numerous coats. The controlled polishing action, combined with the antifouling action, reduces hull roughness and drag, increasing efficiency and reducing fuel costs. Thus ABC<sup>®</sup>3 provides owners with major operational savings, because application and drydocking costs are significantly lower than for competitive materials and fuel costs are also reduced.

### **Conclusions**

Most coatings companies have been forced to develop new antifouling based on unproven technology to meet legislation and Owners' current service demands. New tin-free antifouling are being introduced and some of them may perform well, but this will not be certain for some years to come. ABC<sup>®</sup>3 self polishing antifouling is the only material available that can offer the Owner a tin-free antifouling with a well documented five year performance, rivaling that of TBT containing materials. And this without the additional costs, restrictions and risks associated with the use of non-proven TBT-free antifouling technology.

**There are few owners in these times who can afford to take the risk of incurring much higher costs for their company by relying upon new and relatively unproven technology when proven and reliable performance is available for much less.**

Please refer to Ameron product data sheet and application instructions for specific product use. Contact your Ameron representative for specific recommendations and further information.

### **Limitation of Liability**

Ameron's liability on any claim of any kind, including claims based upon Ameron's negligence or strict liability, for any loss or damage arising out of, connected with, or resulting from the use of the products, shall in no case exceed the purchase price allocable to the products or part thereof which give rise to the claim. In no event shall Ameron be liable for consequential or incidental damages.

### **Warranty**

Ameron warrants its products to be free from defects in material and workmanship. Ameron's sole obligation and Buyer's exclusive remedy in connection with the products shall be limited, at Ameron's option, to either replacement of products not conforming to this Warranty or credit to Buyer's account in the invoiced amount of the nonconforming products. Any claim under this Warranty must be made by Buyer to Ameron in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life, or one year from the delivery date, whichever is earlier. Buyer's failure to notify Ameron of such non-conformance as required herein shall bar Buyer from recovery under this Warranty.

Ameron makes no other warranties concerning the product. No other warranties, whether expressed, implied, or statutory, such as warranties of merchantability or fitness for a particular purpose, shall apply. In no event shall Ameron be liable for consequential or incidental damages.

Any recommendation or suggestion relating to use of the products made by Ameron, whether in its technical literature, or in response to specific inquiry, or otherwise, is based on data believed to be reliable; however, the products and information are intended for use by Buyers having requisite skill and know-how in the industry, and therefore it is for Buyer to satisfy itself of the suitability of the products for its own particular use and it shall be deemed that Buyer has done so, at its sole discretion and risk. Variation in environment, changes in procedures of use, or extrapolation of data may cause unsatisfactory results.

# ABC<sup>®</sup> 3

ABC3 Series

High-performance tin-free self-polishing antifouling coating

## Product Data/ Application Instructions (For Marine & Offshore use)

- Tin Free
- Contains high levels of cuprous oxide
- Unique self-polishing mechanism prevents attachment of fouling organisms
- Provides long-life protection, even under severe fouling conditions
- Smoothing action helps reduce drag resistance
- Available in contrasting colors
- Suitable for most vessels in a wide range of operating environments

### Typical Uses

ABC 3 antifouling coating is recommended:

- where long-life fouling protection in severe service is required;
- where reduction in operating costs and extended drydocking intervals is desirable;
- where maximum compatibility with a wide range of bottom systems or other special surfaces is required

### Physical Data

Finish	Flat	
Color	Black*, Red*, Light Red, Blue	
*Globally available colors		
Components	1	
Curing mechanism	Solvent release	
Volume solids (ASTM D2697 modified)	56% ± 3%	
Dry film thickness per coat	4-6 mils (100-150 microns)	
Coats	2 or 3	
Theoretical coverage	ft <sup>2</sup> /gal	m <sup>2</sup> /L
1 mil (25 microns)	898	22.0
4 mils (100 microns)	224	5.6
VOC (EPA 24)	lb/gal	g/L
EPA Method 24	3.3	396
Flash point (SETA)	°F	°C
ABC 3	77	25
T-10 Thinner	80	27

## Surface Preparation

Coating performance, in general, is proportional to the degree of surface preparation. Refer to anticorrosive coating being applied.

Dependent upon condition of hull and existing antifouling; surface cleaning will vary from high pressure water cleaning to abrasive blasting. After immersion service of ABC 3, high pressure water wash is required prior to topcoating with additional ABC 3.

Apply over suitable primer system or clean, intact, existing bottom system.

**Note** – If applying antifouling coating over epoxy or coal-tar epoxy anticorrosive coatings, apply the first coat of antifouling while the anticorrosive (epoxy or coal-tar epoxy) is tack free but still soft to finger pressure. If the epoxy or coal-tar epoxy has cured too hard, apply another thin coat of epoxy or coal-tar epoxy within the recommended recoat intervals, and then apply the antifouling coating. Failure to apply the antifouling coating while the anticorrosive is still soft to finger pressure may result in poor adhesion between coatings and the eventual delamination of antifouling from the anticorrosive.

**Steel** – Prepare surface in accordance with instructions for anticorrosive coating to be used.

**Aluminum** – Prepare surface in accordance with instructions for primer to be used. At least 3 coats of primer for a total film thickness of 20 mils (500 microns) is recommended. Suitable primers include Amercoat 238, 235, 240, 71TC and 385. Improperly primed surfaces or failure to immediately repair damaged primer will result in rapid galvanic corrosion of the aluminum hull.

### Cleaning After Service

**Non-Fouled Surface** – High-pressure fresh water wash.

**Existing Fouled surfaces** - Remove fouling by scraping and /or sand sweeping. Loose paint should be removed by high-pressure fresh water wash. Tightly adhering anticorrosive and antifouling coating may remain.

### Application Data

Adhere to all application instructions, precautions, conditions and limitations to obtain the maximum performance. For conditions outside the requirements or limitations described, contact your PPG representative.

Applied over Prepared and primed steel or aluminum

Surface preparation See anticorrosive product literature

Method Brush, roller or spray

Environmental conditions

Temperature °F °C  
air and surface 0 to 120 -18 to 49

Surface temperatures must be at least 5°F (3°C) above dew point to prevent condensation.

Drying and cure time @ 4 mils (100 microns) (hours)

	°F/°C				
	120/49	90/32	70/21	50/10	32/0
recoat	1	3	5	10	20
before immersion	3	4	6	12	20

max recoat time not restricted

max to launch not restricted

Equipment cleaner T-10

## Application Equipment

The following is a guide; suitable equipment from other manufacturers may be used. Changes in pressure, hose and tip size may be needed for proper spray characteristics.

**Airless spray** – Standard equipment such as Graco Bulldog Hydra-Spray or larger with a 0.021- to 0.25-inch fluid tip.

**Conventional spray** – Industrial equipment such as DeVilbiss MBC or JGA spray gun. Separate regulators for air and fluid pressure, mechanical pot agitator and a moisture and oil trap in the main air supply line are recommended.

**Power mixer** – Jiffy mixer powered by an air- or an explosion-proof electric motor.

### Application Procedure

1. Clean all application equipment with T-10.
2. Stir material thoroughly and continue stirring during application to insure pigment suspension.
3. Thin only for workability; no more than 10% by volume .
4. Apply a wet coat in even, parallel passes; overlap each pass 50 percent to avoid pinholes, bare areas or holidays. Give special attention to weld seams, rough or badly pitted areas. If required, cross spray at right angles.
5. For touch-up and repair, apply additional material after removing dirt, contaminants or old loose coatings or antifouling.
6. Allow 4 hours drying time at 70°F (21°C) before applying second coat.
7. Before immersing, allow ABC 3 to dry at least 6 hours at 70°F (21°C).
8. Clean application equipment immediately after use with T-10.

### Caution

This product is flammable. Keep away from heat and open flame. Keep container closed. Use with adequate ventilation. Avoid prolonged and repeated contact with skin. If used in confined areas, observe the following precautions to prevent hazards of fire or explosion or damage to health:

1. circulate adequate fresh air continuously during application and drying;
2. use fresh air masks and explosion proof equipment;
3. prohibit all flames, sparks, welding and smoking.

Do not empty into drains. Take precautionary measures against static discharges. For specific information on hazardous ingredients, required ventilation, possible consequences of contact, exposure and safety measures see Safety Data Sheet.

### Shipping Data

Packaging	1- and 5-gal containers	
	Approximate Shipping weight	
	lb	kg
Packaging - US		
1-gal unit	17.1	7.7
5-gal unit	85.8	39
Packaging - Europe	lb	kg
51 (1.3 gallon) unit	22	10.0
201 (5.2 gallon) unit	91.0	41.4

Shelf life when stored indoors at 40 to 100°F (4 to 38°C)  
1 year from shipment date

Numerical values are subject to normal manufacturing tolerances, color and testing variances. Allow for application losses and surface irregularities.

The mixed product is nonphotochemically reactive as defined by South Coast Air Quality Management District's Rule 102 or equivalent regulations.

Improper use and handling of this product can be hazardous to health and cause fire or explosion.

## Safety Precautions

Read each component's material safety data sheet before use. Mixed material has hazards of each component. Safety precautions must be strictly followed during storage, handling and use.

**CAUTION – Improper use and handling of this product can be hazardous to health and cause fire or explosion.**

**Do not use this product without first taking all appropriate safety measures to prevent property damage and injuries. These measures may include, without limitation: implementation of proper ventilation, use of proper lamps, wearing of proper protective clothing and masks, tenting and proper separation of application areas. Consult your supervisor. Proper ventilation and protective measures must be provided during application and drying to keep spray mist and vapor concentrations within safe limits and to protect against toxic hazards. Necessary safety equipment must be used and ventilation requirements carefully observed, especially in confined or enclosed spaces, such as tank interior and buildings.**

**This product is to be used by those knowledgeable about proper application methods. PPG makes no recommendation about the types of safety measures that may need to be adopted because these depend on application environment and space, of which PPG is unaware and over which it has no control.**

**If you do not fully understand these warnings and instructions or if you cannot strictly comply with them, do not use the product.**

**Note:** Consult Code of Federal Regulations Title 29, Labor, parts 1910 and 1915 concerning occupational safety and health standards and regulations, as well as any other applicable federal, state and local regulations on safe practices in coating operations.

*This product is for industrial use only. Not for residential use.*



**PPG Protective &  
Marine Coatings**  
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