EPA Grant Tasks Timeline

	Start Date	End Date
Assemble Work Group	01/01/08	03/31/10
Examine Current Coatings/Methods	01/01/08	04/01/08
Examine Alternative Coatings/Methods	01/01/08	05/01/08
Develop Panel Test Protocol	04/01/08	06/01/08
Conduct Panel Tests	06/01/08	10/01/08
Analyze Results / Select Best Coatings	10/01/08	01/01/09
Develop Boat Test Protocols	01/01/09	03/01/09
Conduct Boat Tests	03/01/09	10/01/09
Analyze Results	10/01/09	02/01/10
Prepare Report	12/01/09	03/31/10

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Panel Testing Review

- 21 Top Performing Coatings
  - Identified on their ability to minimize fouling and ease of cleaning
- Placed coatings into tiers
  - Tier 1: Non-biocide coatings
  - Tier 2: Single active ingredient coatings
  - Tier 3: Zinc or multiple active ingredients)
- Selected subset of top performing coatings for use in hull testing

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Hull Testing Approach

- Evaluating 10 coatings for performance on boat hulls
  - All 5 Tier 1 (non-biocide) coatings
  - Best performing hard non-biocide coating
  - 1 organic biocide coating (Tier 2)
  - 1 Zinc Oxide coating (Tier 2)
  - 2 Tier 3 coatings with Zinc Pyrithione as active ingredient

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Boater Requirements

- Boats need to be available for entire 2-year study period
- No outside hull cleaning can occur – must use project designated hull cleaners
- Using boats in 20-50 foot range
- Boaters must track vessel use over study period

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Project Scoping Meetings

- Boater Meeting (Feb 9, 2009)
  - Intended to answer questions and encourage boaters to participate
  - Refined cost sharing
  - Discussed assessment guidelines
- Hull Cleaner Meetings (Feb 2 and March 2)
  - Solicited hull cleaners for the project
  - Discussed assessment guidelines
  - Used input from CPDA

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Hull Testing Progress

- Developed cost share agreements
  - Boaters, Boatyards, Hull Cleaners
  - Ensures that costs are covered and invoices can be properly routed
- Have started applying test coatings
- Developing boater welcome packets and vessel logs
- Developing assessment/cleaning protocol

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Test Coating Schedule

Coating ID	Supplier	Coating Category	Boat Size	Boat Type	Boatyard	Marina	Status
03302F26	Int'l Paint	Tier 1	28′	Sail	Driscolls	Half Moon	Boat hauled
03312H12	Int'l Paint	Tier 1	36′	Sail	Driscolls	Silvergate YC	Boat hauled
01171D48	Sherwin Williams	Tier 3	26′	Power	Nielsen Beaumont	Half Moon	Completed
02182G03	Blue Water Marine	Tier 2	38′	Sail	SIBY	Shelter Island	Completed
02202G05	E-paint	Tier 3	42′	Power	Marine Group	SDYC	Being painted
03271B06	E-paint	Tier 2	44′	Power	Nielsen Beaumont	SDYC	Completed
03292G28	Innovative Marine	Tier 1	36′	Sail	SIBY	SWYC	Being painted
03372F26	Petit	Tier 1	35′	Sail	SIBY	SDYC	Pending
03352F08	Microphase	Tier 1	32′	Sail	SIBY	Shelter Island	Pending
01161D19	Propspeed	Tier 1	21′	Power	Marine Group	SWYC	To be applied in June

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Coating Application




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Coating Application

- Stripping process at Marine Group


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Education & Outreach Materials

- Boater Welcome Packets
  - General information about study
  - FAQ related to study
  - Provide information to boater participant about their coating
  - Provide photos of coating application
  - Contact information for supplier, project team and hull cleaner
  - Enables boater participant to talk to others about the project

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Safer Alternatives Antifouling Paint Study Vessel Log Book

Martha Blue – 01171D48

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Welcome Packet Information

Welcome to the Port of San Diego's Safer Alternatives to Copper Antifouling Paints Project!

Did you know that your boat's hull paint could be affecting the water in San Diego Bay?

Conventional hull paints contain copper, which has the potential to impair the surrounding water as it seeps from the paint. San Diego Bay is one of our region's most valuable natural resources, and maintaining its water quality is a critical component of environmental protection. San Diego Bay provides a home for at least 88 species of fish, over 300 species of birds, and seven local endangered species such as the California Least Tern.

Recently, the San Diego Regional Water Quality Control Board found elevated levels of copper in the Shelter Island area. In an effort to improve the water quality in this region, a regulation has been issued which directs the Port of San Diego to reduce the environmental impacts of copper. The Port has secured funding from an EPA grant and developed the Safer Alternatives to Copper Antifouling Paints Project in order to address this regulation. The primary goals of this project are to:

- Identify viable alternatives to copper-based hull paints.
- Work collectively to encourage the transition to alternative hull paints.

Your participation in this innovative study will provide the Port with information to further protect and enhance San Diego Bay's environment. The results of the project are expected to extend beyond San Diego, because the validation of viable alternative paints will benefit other water bodies throughout the state. This fact sheet gives you the information that you need to be an active participant in this project, and also provides you with useful facts to help you explain your role in this project to others.

Frequently Asked Questions

What does the project involve?

The Project Team is conducting a comprehensive evaluation of several alternative paints, focusing on their performance and cost. The Project Team recently tested 48 alternative paints using test panels. Based on these results, the most promising alternative paints were identified and selected for further testing on boat hulls. The Project Team will also be examining the other costs associated with these paints including hull preparation, application, maintenance and the cleaning methods.

Who is part of the Project Team?

The Project Team is a partnership between the Port's Environmental Services Department staff and the Institute for Research and Technical Assistance (IRTA), a non-profit organization specializing in alternative product substitution.

I've heard copper is a "biocide"... what does that mean?

A biocide is defined as a chemical agent, such as a pesticide, that is capable of destroying living organisms. The copper in most conventional hull paints serves as the biocidal agent by slowly releasing the copper, which prevents marine organisms from fouling your hull.

What types of paints will be tested?

Each participant will receive one of the following types of paints on their hull:

- Non-biocidal: These paints do not contain ingredients that are toxic to marine organisms. Instead the paints create a surface that makes attachment difficult.
- Organic biocide: These paints contain carbon-based compounds that act as the biocidal agent instead of copper.
- Zinc-based: These paints contain zinc as the biocidal agent instead of copper. Zinc is considered to be less toxic than copper.

How do I benefit from participating in this project?

Bay-wide copper-based paint regulations may be forthcoming. Your proactive participation in this project means that you can rest easy... your boat will already be in compliance once any required transitions to alternative paints are established. Additionally, you're saving money by receiving a reduced cost for applying an alternative paint.

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Hull Testing Objective

- Evaluate performance of test coatings on boat hulls for an extended time period
  - Maintenance needs
    - Identify number of times or frequency boat hulls require cleaning
    - Identify level of effort and cleaning tools needed to clean the hull
  - Longevity
    - Detect any physical deterioration which may influence lifespan of test coatings

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Hull Assessment – Protocol

- Conduct performance evaluation in consistent manner for all coatings
  - Visit all boats on a 3 week schedule
  - Assign hull cleaners to boats for duration of project
  - Use standard rating scales to assess fouling, coating condition, and cleaning
  - Perform cleaning only when needed
  - Utilize consistent sequence of cleaning tools to identify the least abrasive hand cleaning tool effective in removing fouling

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Four Steps of Assessment

- Step 1 - Pre-cleaning assessment
  - Fouling
  - Coating condition
- Step 2 - Hull Cleaner/Project Team Debriefing
- Step 3 - Cleaning and Cleaning Assessment
  - Level of effort required
  - Appropriate hand cleaning tool
- Step 4 - Post Cleaning Assessment

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Pre-Cleaning Assessment

- Fouling Assessment
  - Boat hull divided into 6 quadrants
  - Degree and type of fouling in each quadrant
  - Assign a fouling performance rating for each quadrant
    (0 – best condition, 5 – worst condition)
- Coating Condition
  - Identify any blemishes or physical deterioration on coating surface
  - Assign a single rating for entire hull
- Photographs

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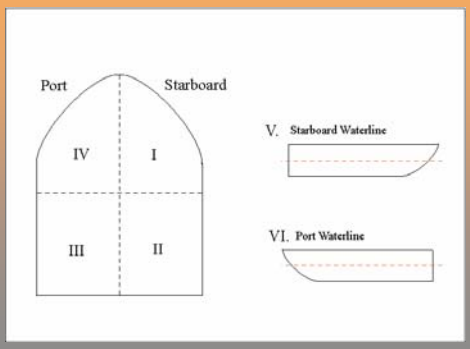
Quadrant Assessment Form



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Fouling Performance Rating

Fouling Rating	Fouling Growth
0	No silting, biofilm or fouling growth present.
1	Light silting or biofilm. Little to no discoloration; Paint surface still clearly visible beneath.
2	Heavy biofilm; Light to moderate silting as indicated by discoloration (a solid, discernible, physical layer); Painted surface may be slightly obscured.
3	Low to medium levels of fouling present; Dark algae impregnation; Hard growth may be present (tubeworms, barnacles, bryozoans, etc.); Painted surface definitely obscured.
4	Medium to high levels of fouling present; Hard growth present, such as tubeworms, barnacles, bryozoans, etc.; Macrofoulers may include mature forms that may be densely grouped; Paint surface no longer visible beneath fouling in areas.
5	High levels of fouling present; Lengthy, soft algae and hard, tube worms and possibly barnacles impregnating the coatings; Macrofoulers may be densely grouped; Coral** growth can be seen to extend out from the hull; Paint surface no longer visible beneath fouling.

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Coating Condition Assessment

Coating Condition Rating	Coating Condition Description
1	Antifouling paint intact, new or slick finish. May have a mottled pattern of light and dark portions of the original paint color
2	Shine is gone or surface lightly etched. No physical failures
3	Physical failure on up to 20% of boat hull. Coating may be missing from slightly curved or flat areas to expose underlying coating. Coating has visible swirl marks within the outermost layer, not extending into any underlying layers of paint
4	Physical failure of coating on 20-50% of boat bottom. Coating missing from slightly curved or flat areas to expose underlying coating. Coating missing from intact blisters or blisters which have ruptured to expose underlying coating layer(s). Visible swirl marks expose underlying coating layer
5	Phyisical failure of coating on over 50% of boat bottom. Coating missing from intact blisters or blisters which have ruptured to expose underlying coating layer(s). Visible swirl marks expose underlying coating layer

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Project Team Debriefing

- Discuss the extent and type of fouling present
- Determination to clean based on fouling rating
  - 0 No cleaning required
  - 1 No cleaning recommended
  - 2 Project Team and hull cleaner discuss whether to initiate cleaning
  - 3-5 Cleaning recommended

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Project Team Debriefing

- Three cleaning categories options
  - No Cleaning
  - Partial Cleaning – discrete sections or quadrants of boat hull
  - Full Cleaning – all quadrants or entire boat hull
- Consensus between hull cleaner and Project Team of cleaning to occur

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Cleaning Assessment

- Type of hand cleaning tool used
  - Identify least abrasive hand cleaning tool which effectively removes fouling growth
  - Hand cleaning supplies will be provided by the Port
- Initiate cleaning with least abrasive cleaning tool
  - Move to next cleaning tool on list until fouling is removed
    - Carpet → white → green → purple → brown pad
    - Supplier recommended cleaning tool

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Cleaning Assessment Rating

Cleaning Rating	Effort Description
0	None; No cleaning required
1	Light pressure: very easy to remove growth with one wipe
2	Light to medium pressure: still easy to remove growth but may require two or more passes in some areas to remove growth
3	Firm effort: firm scrubbing and multiple passes required to remove fouling growth.
4	Firm scrub, hard effort: With very hard physical effort, firm scrub and continuous passes required to remove fouling growth.
5	Hard scrub, very hard effort: even with hard physical effort, growth presented a challenge to remove

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Cleaning Assessment

- Level of cleaning effort
  - Performance rating for the overall physical effort required to clean the boat hull
  - Rating will be assigned to the least abrasive hand cleaning tool which effectively removes fouling growth
  - A single cleaning performance rating for entire hull

  (0 – No cleaning required, 5 – Very hard effort)

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Post-Cleaning Assessment

- Identify physical failures that may have been previously covered by fouling
- Identify if cleaning efforts removed coating from boat hull
- Assign a single post-cleaning coating condition rating for entire hull
- Photographs

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Quality Assurance

1. Adherence to field protocol methodologies to assure consistency over the study period
2. Peer review of field assessment protocol
3. Project hull cleaners periodically perform pre-cleaning assessment on a single boat at the same time
4. Port designated consultant to periodically accompany project hull cleaners during pre-cleaning assessment

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Agenda Item 4:

Secondary Efforts

1. Tracking additional boats
2. Newport Hornblower

Tracking Additional Boats

- Maintain a database of additional boats having study related coatings
  - Provides supplemental information on use and performance
  - Increases confidence on coating performance
  - May provide additional longevity data
  - Can contribute to assessment of cleaning needs
  - More confidence in overall cost evaluation

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Identifying Secondary Boats

- Start with current list of known alternative paint use in San Diego Bay
- Talk to suppliers about local use of their coatings
- Gather recent coating information from boatyards
- Discuss tracking hull paint use with marinas

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Supplemental Information

- Objective is to track limited information to enhance project findings
  - Frequency of cleaning
  - Method of cleaning
  - Boat use
  - Location in San Diego Bay
  - General boat information (type, size, etc)
  - Longevity information (application date)

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Secondary Efforts

Newport Hornblower

- 72′ aluminum vessel
- Used by Hornblower Cruises for San Diego Bay Harbor tours
- Education and outreach component in development

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Newport Hornblower

- Used a subset of the 21 top performing paints
  - 4 paints coincided with boat hull testing
  - Aluminum hull and no stripping
- 24″ width stripe from pontoon to keel applied to starboard side of vessel
- Applied at Knight & Carver in March 2009

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Upcoming Meetings / Deadlines

April – May 2009

- Apply coatings to boat hulls
- Initiate assessments and cleaning

October 2009

- First summer evaluation complete

November 2009

- Tentative stakeholder meeting for progress update

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THANK YOU
FOR BEING A PART
OF OUR PROJECT!