

NAVAL SEA SYSTEMS COMMAND RECENT DEVELOPMENTS IN COATINGS



National Shipbuilding Research Program – SPC Panel

Feb. 2011

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SEA 05P2

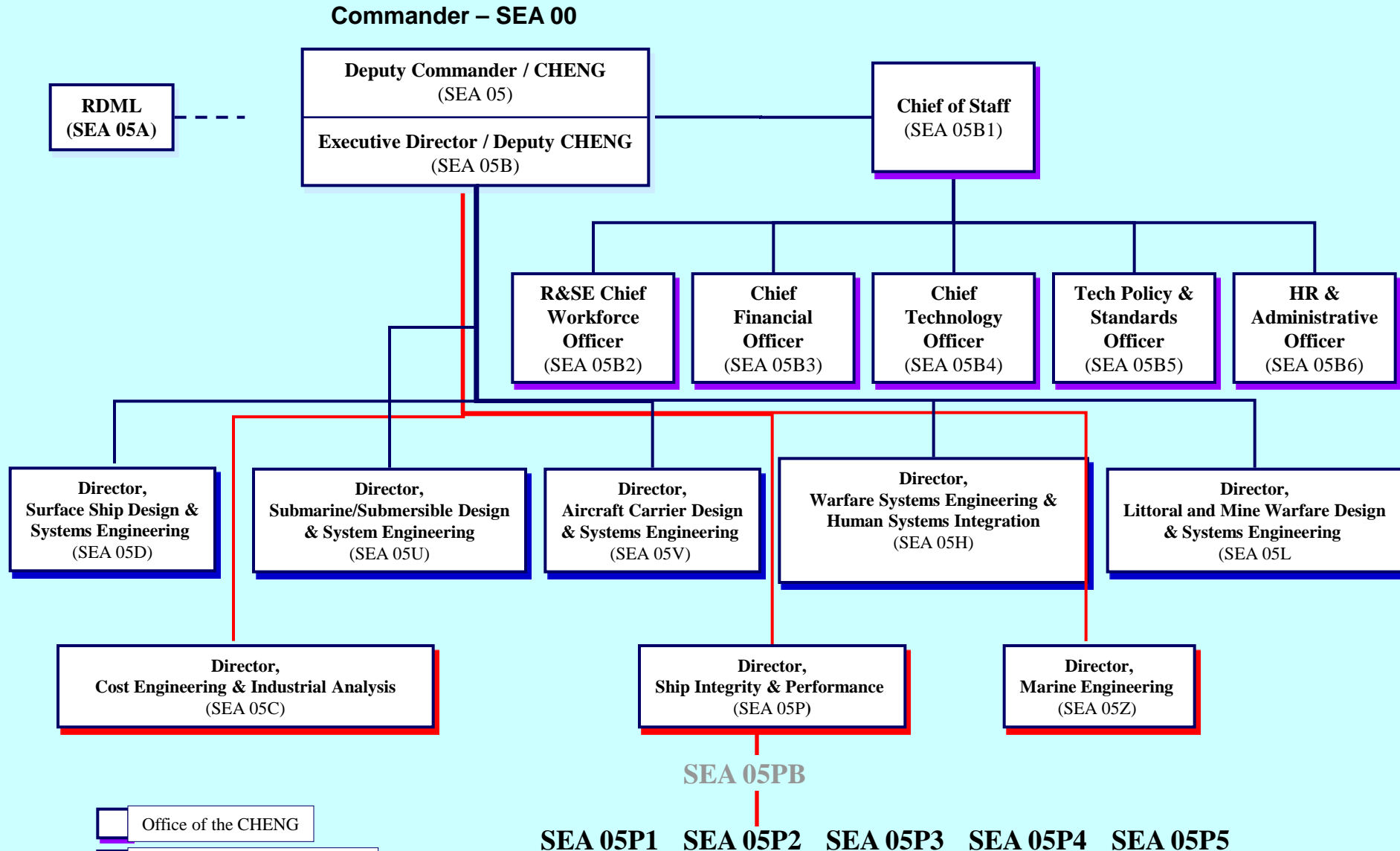
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OBJECTIVES

- **Summarize evolving Naval Sea Systems Command (NAVSEA) organization and coating requirements:**
 - Headquarters NAVSEA organization & Objectives.
- **Summarize recent **accomplishments** in NAVSEA coatings and maintenance cost reduction strategies:**
 - FY-12 Updates to Standard Item 009-32.
- **Summarize FY-11 **initiatives** in NAVSEA coatings and maintenance cost reduction strategies:**
 - Status of single-coat paint initiatives.
 - Implementation of enhanced performance topside coatings.
- **Discuss Cooperative NAVSEA/NSRP Projects.**
 - Comment on “Fall FY-10” proposed NSRP SP-3 Panel projects.

NAVSEA & Naval Systems Engineering Directorate (SEA 05)



- Office of the CHENG
- Chief Systems Engineer (CSE)
- Competency Domain Manager (CDM)

Pre-decisional

Coatings & Corrosion Control Technical Pyramid

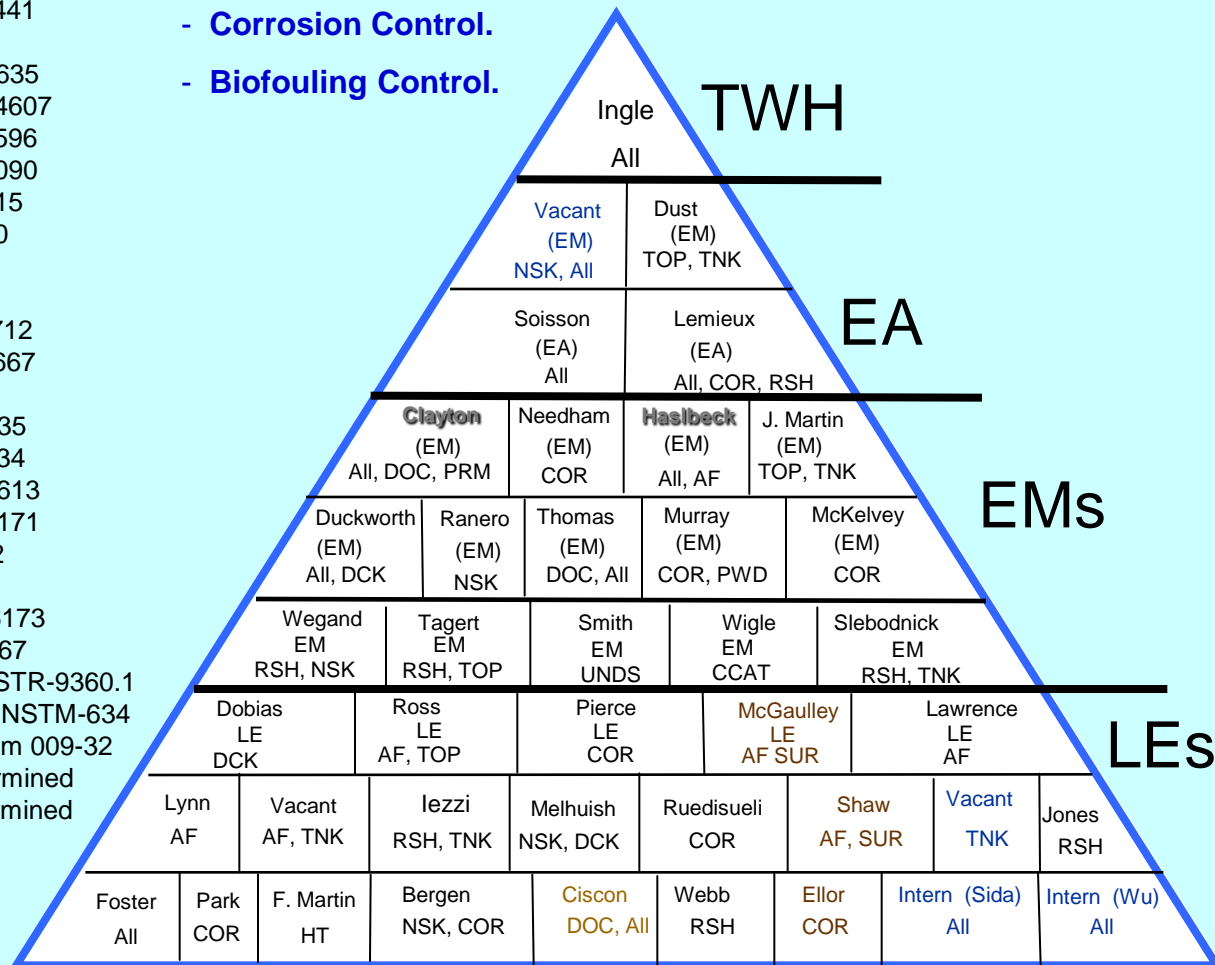
DRAFT Oct. 2010

Code - Product - Related Specifications

- All - All Technical Products, Managerial - All
- AF - Antifouling Coating System - MIL-PRF-24647
- TNK - Tank Coatings, Epoxy Primers - MIL-PRF-23236
MIL-DTL-24441
- PRM - Primers, Single Component - TT-P-645
- TOP - Topside Coatings, Alkyd Colors - MIL-PRF-24635
- INT - Interior Coatings (SEA 08) - DOD-DTL-24607
- MIL-PRF-24596
- MIL-DTL-15090
- MIL-DTL-1115
- MIL-DTL-700
- TT-P-28
- HT - High Temp. Coatings, Metallic Corrosion Control Coatings
- PWD - Powder, Interior, Cosmetic - MIL-PRF-24712
- NSK - Non-Skid, High Temperature, Non-traditional - MIL-PRF-24667
- DCK - Deck Coverings - MIL-PRF-3135
- MIL-PRF-3134
- MIL-PRF-24613
- MIL-PRF-32171
- MIL-A-22262
- SUR - Abrasive blasting, surface preparation, pretreatments
- SEL - Sealants and Preservatives - MIL-PRF-16173
- COR - Corrosion Policy and Design - DODI-5000.67
- NAVSEAINSTR-9360.1
- DOC - Policy Documents - NSTM-631, NSTM-634
Standard Item 009-32
- RSH - Research, Corrosion, Coatings - To Be Determined
- UNDS - Regulations, Underwater-hull, Flight-deck Cleaners, Cooling Water Fouling Control - To Be Determined

Technical Warrant Holder (TWH) for Coatings & Corrosion Control responsible for:

- Coating Environmental Compliance.
- Corrosion Control.
- Biofouling Control.



Pre-decisional

Key: Navy employee, Navy Developmental Employee, Contractor Employee ⁴

OBJECTIVE

REDUCE TOTAL OWNERSHIP COST

- NAVSEA focused on reducing Total Ownership Cost (TOC):
 - Significant factor in performance evaluation.
 - Funding to support projects to reduce TOC.
- TOC proposals require use of a spreadsheet that includes:
 - Specific cost and service life data fields.
 - Discount rate of 4.2% per annum for future savings.
 - Five and ten year Return On Investment (ROI) review.
- Service life cannot be traded away for up-front cost savings.
- Performance risk needs to be managed by technical warrant holder.

Program Office must concur with reported savings & must appear in FY-13 Standard Item 009-32 Proposals.

Universal Paints Requirement Document

- Navy historically applied coatings to ships in accordance with:
 - NSTM 631 – Ship, submarine & carrier maintenance painting & ship's force painting.
 - Standard Item 009-32 – Maintenance work on ships.
 - Submarine Maintenance Standard (SMS), 631-081-015 – Maintenance work on subs.
 - New construction contract, RCOH contract, other contracts.
- Each document has its own, similar, but not identical requirements.

PROBLEM: Multiple requirements documents create training cost drivers & confusion.

SOLUTION: Reduce training, planning, & implementation costs by having one document.

Accomplishments:

1. SEA 00 letter directed use of Standard Item 009-32 as universal paints requirements document on 3 July 2008.
2. NSTM 631 updated to reference to Standard Item 009-32 on 1 Nov. 2008.
3. SMS updated to reflect use of Standard Item 009-32 on 1 June 2009.
4. FY-12 Standard Item 009-32 fully coordinated with SEA 08 and approved, via route sheet on 27 Jan. 2011 – to be issued as Change 1.
 - Clarifies Receipt Inspection.
 - Expands touch-up to 10% of tank area.
 - Reduces time between coats for potable water tanks.

Universal Paints Requirement Document

FY-12 Receipt Inspection

Modified FY-12 receipt inspection testing requirements:

3.8.1.1 For aircraft carriers and submarines, accomplish additional receipt inspection of coatings to be applied in critical coated areas (excluding underwater hull and non-skid coating systems) upon receipt from the manufacturer. Receipt inspect coating systems in accordance with applicable coating specification requirements. Receipt inspect coating components for density, fineness of grind, and condition in container. Receipt inspect mixed coating for viscosity, dry hard time, sag resistance, and color of dry film. Report "Not Applicable" for any receipt inspection test that is not based on a requirement or "Identification Characteristic" in the applicable coating specification. Submit one legible copy, in hard copy or electronic media, to the SUPERVISOR upon request."

Rationale:

1. Current practice in fleet was to not conduct receipt inspection on antifouling and non-skid.
2. Low risk based on Cumbersome Work Practices project to eliminate receipt inspection one failed coating from plant to work site, epoxy in Siberia.
3. Key issue is "Identification Characteristics" in MIL-PRF-23236.

MIL-PRF-23236, Table IV "Identification Characteristics" - shows - "Dry time" (no requirement).

MIL-DTL-24441, Formula 150 states Dry-hard, time: at 4.4 °C (40 °F) <24-hrs, at 23 °C (73 °F) <6-hrs.

Manufacturer to supply dry time RANGE (GO / NO-GO) for their product on ASTM-F-718

Universal Paints Requirement Document

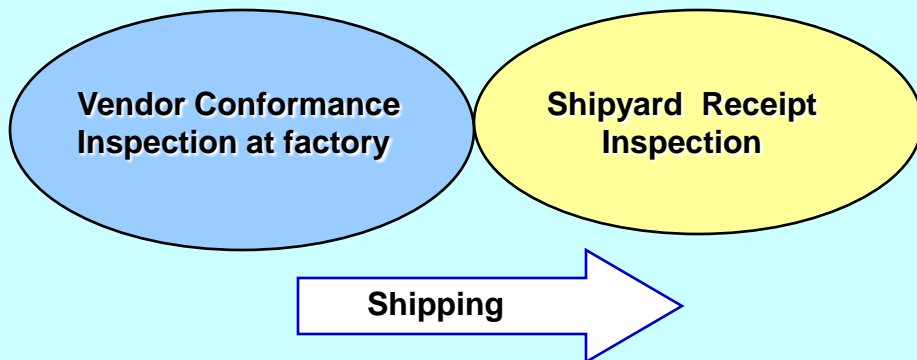
Receipt Inspection Issues

NAVSEA Cumbersome Work Practice project addressing receipt inspection testing.

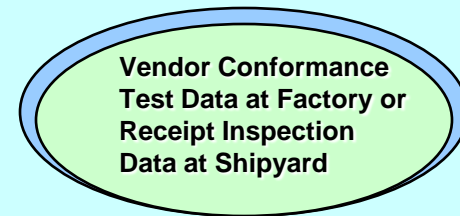
Issues:

1. Need to generate data on paint after shipping is unclear with manufacturers only reporting one failed coating from plant to work site (an epoxy in Siberia).
2. Key concern is data set for paint. Which organization generates the data is not critical.
3. Goal to reduce false negatives and still avoid “bad paint” getting on ships.

TODAY



TOMMORROW



Goal Is to Have Complete Test Data Set on:

Density, Grind, Condition in Container,
Viscosity, Dry time, Sag, Color
Appearance dry film

Universal Paints Requirement Document

FY-12 Update Summary

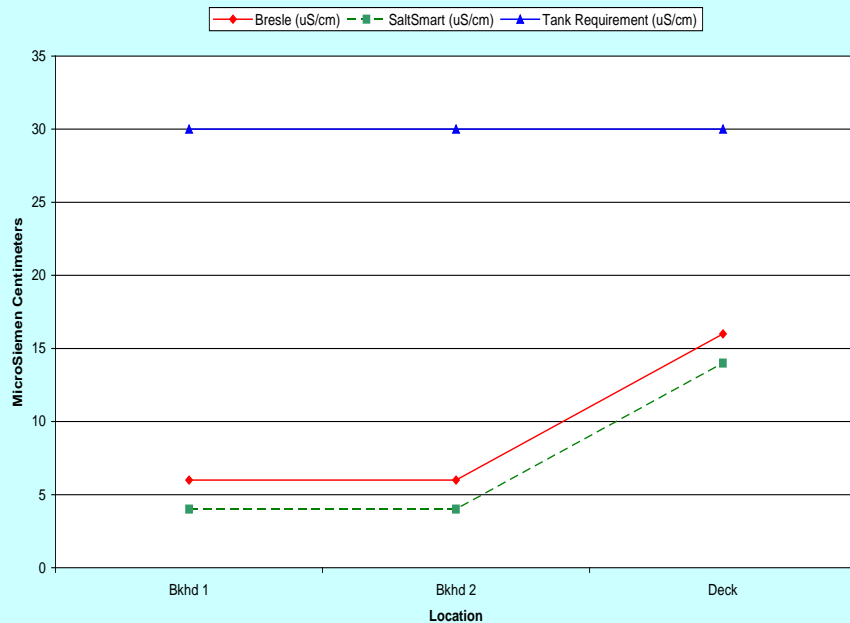
Allowed Use of SaltSmart Technology to Measure Surface Conductivity.

Allowed use of SaltSmart: Conductivity samples shall be collected using a product that meets the requirements of NACE SP0508-2008, "Methods of Validating Equivalence to ISO 8502-9 on Measurement of the Levels of Soluble Salts."

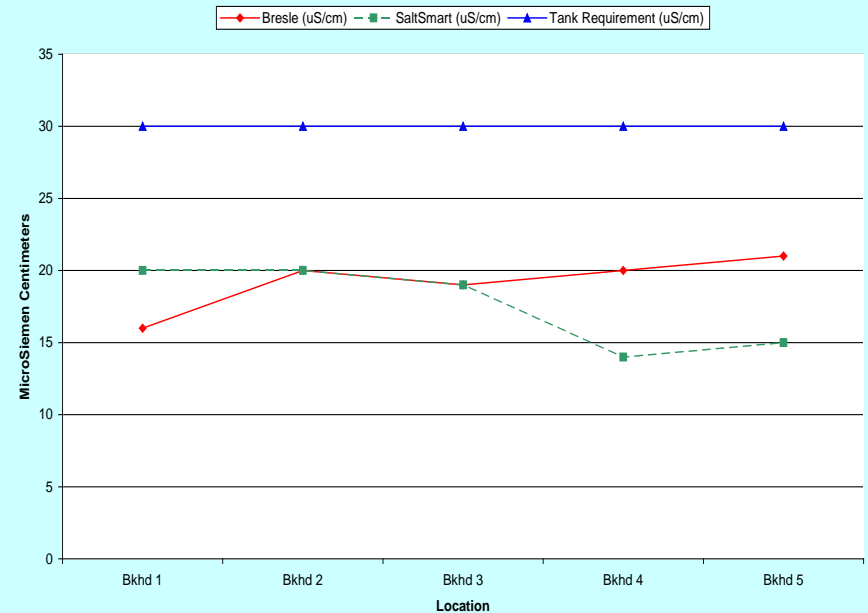
Rationale:

1. SaltSmart could reduce time and cost associated with conductivity measurement.
2. Strips passed NACE test at three salt levels, not just the one level normally required.
3. Field trials completed on USS FOR McHENRY (LSD-43).

SALT SMART DATA 30 June 2010



SALT SMART DATA 9 July 2010



Universal Paints Requirement Document

FY-12 Update Summary

Updated the “Definition” of Touch-up and Expanded Allowable Areas (excluding reserve feedwater, potable water, and freshwater drain collecting tanks).

Changed surface ship "touchup" that **was** less than 1% and no area more than 10 sq.ft., to **now be** less than 10% and no area more than 10 sq.ft.

Rationale:

1. Consistent with current submarine practice.
2. Consistent with CCAMMS policy for a “fair” coating (i.e., previous requirement for a “good” coating).
3. Avoids leaving exposed bare metal because budgets will not support full re-preservation.

Allowed Steel Added to Ship’s Uncompensated Fuel Tanks to Remain Unpainted.

Changed Note (65) to allow “new” steel to be uncoated; but **required** “new” steel with pre-construction primer (PCP) to be over-coated with one coat of MIL-PRF-23236, Type VI, Class 5, at 4-6 mils.

Rationale:

1. Consistent requirement for new and existing steel in the tank.
2. Fuel & Engine Technical Warrants will not accept large areas of uncoated PCP due to potential zinc release into fuel.
3. Costs still low, do not have to blast in tank.

Clarified that Only Uptake Spaces on Steel Ships (e.g., DDG-51) are Critical Coated Areas.

Modified which Uptake spaces are on critical list: **only critical uptakes are:**

“Gas turbine exhaust uptake spaces and trunks (steel surfaces only).”

Rationale:

1. Aluminum uptakes not subject to severe corrosion.
2. Fleet does not want to pay for added documentation for FFG, CG, LCS.
3. Aluminum uptakes still preserved.

Universal Paints Requirement Document

FY-12 Update Summary

Reduce Environmental Requirements for Touch-up.

For individual areas 2 sq.ft. or less totaling less than 0.03 percent of the total surface area, **relax** 50% RH requirement for PW/FW tanks to be 85% RH to match what we allow for all other locations. Incorporated PSNS reduced cure time guidance for MIL-DTL-24441, 48-hours to 36 hours.

Rationale:

1. Small area equates to small risk.
2. High cost to dehumidify tank for such small repairs.
3. Speeds touch-up and tank close out, without causing water contamination.

Allow Spray Applied Capastic Shield.

Allow use of either Sherwin Williams Novaplate or International's Interline 624 coatings for spray applied capastic shield.

Rationale:

1. Performance of two systems documented, novalac chemistry can resist cathodic current/potential.
2. Different products apply differently (**potential NSRP input**).
3. Plan to develop specification requirement for such products and investigate single-coat.

Expanded Allowable Profile Range for Non-skid.

Allow profile readings of 3 - 6 mils, as compared with current requirement of 3 - 4.5 mil, with no individual reading over 7 mils (i.e., was 5 mils).

Rationale:

1. Non-skid can cover high profile.
2. Many decks have high profile already.
3. Still need some control pressure and grit size.
Plan to evaluate applying coating over any profile revealed by ultrahigh pressure waterjet blast (**potential NSRP input**).

Universal Paints Requirement Document

FY-12 Update Summary

Prohibit Painting in High Winds.

Added requirement from NSTM 631 that painting shall not be performed when sustained winds exceed 15 mph, without an enclosure.

Eliminated Requirement to Apply Antifouling Inside of Stern Tubes and MTS Ballast Tanks.

Eliminated requirement that interior surfaces of stern tubes and coupling covers get antifouling topcoat.

Allowed six inches of unpainted pipe (ferrous and non-ferrous) in PW/RF/FWDCT.

Replaced call outs for "Spongejet" media with new, SSPC AB-4 for "Recyclable Encapsulated Abrasive Media."

Added crushed glass as option for surface preparation.

Inaccessible areas will be as agreed upon with the supervisor and masking on noble-metal pipe defined.

Added polysiloxanes as option for wet space topcoat.

Added powder coating as only option for DDG louvers, and as alternative option for all other removable louvers.

Waived paint storage requirement when MIL-PRF-23236 Type VII coatings are applied using a plural component spray pump with recirculation and preheating.

Single Coat Paint

- Application of rapid-cure, edge-retentive, high-solids paints in a single-coat more cost effective than applying multiple coats.

PROBLEM: Ultra-high-solids coatings require three coats (i.e., primer, stripe, and top coat) = Excessive Labor.

SOLUTION: Single-coat system based on application of a single color of paint, during a single coating evolution in the tank, with multiple passes of the paint gun. Cure time only four hours at 77F and one day to service.

Accomplishments:

1. FY-11, Standard Item 009-32 ONLY ALLOWS use of single-coat system in ballast tanks, voids, and chain lockers.
2. Completed single-coat installation on well-deck overheads with shipyard savings of \$246K.
3. SSN 688 Class SHAPEC incorporated notionals ($\approx 30\%$ paint application savings) into availability planning.
4. Completed demonstration installation of single-coat paints in submarine CHT tanks.
5. Shipbuilder agreed to \$32K in savings to implement single coat in fuel tanks.
6. USS WASP (LHD-1) June, 2003 install, 20,000 sq.ft. tank still CCIMS Condition 1.

Single-coat Performing “As Advertised” Saving Time/Money.



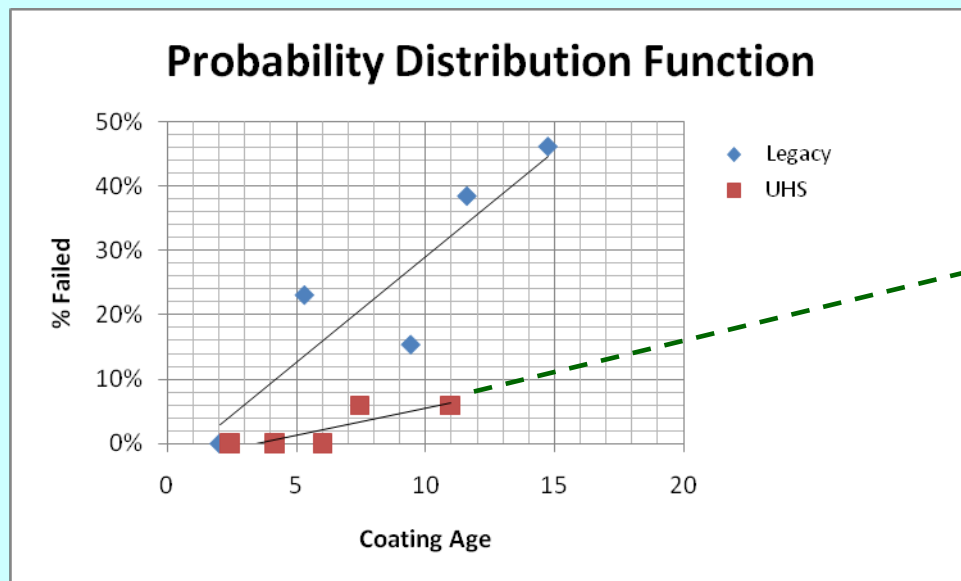
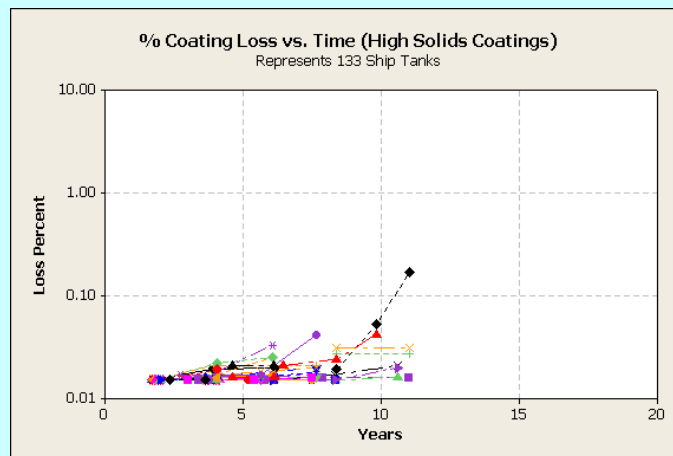
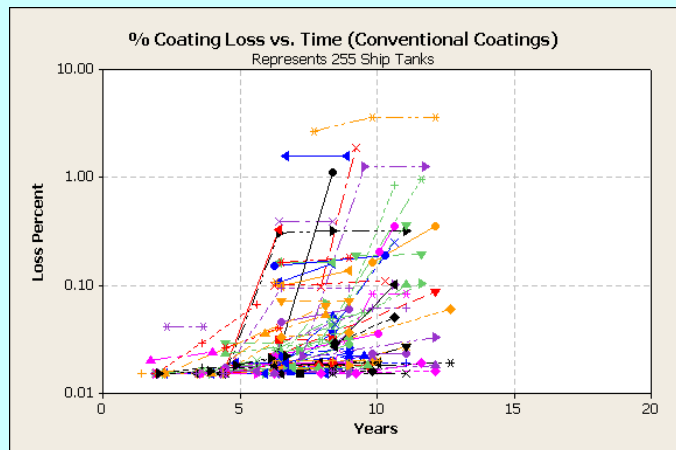
When Fully Implemented

“Top down” cost estimate suggests annual savings of \$7.1M.

“Bottom Up” cost estimate suggests annual savings of \$6.5M.

High Solids, Single Coat Paint Works

- Application of edge-retentive, high-solids paints statistically appears on track to provide intended 20-year service life, single-coat in data mix, but too few installs to draw conclusions. SEA 05P2 NACE paper submitted to session chair.



Extrapolation, based on limited available data suggests “20 year” paints will satisfy NAVSEA’s advertised goal of:

- 80% of tanks,
- after 20 years,
- having CCAMM ratings of 2 or lower on tops, sides, bottoms, and stiffeners.

Reduce Color Shift of Navy Topside Paints

Issue:

- Office of Naval Research estimates Navy could save over \$5M/year by avoiding sailor and contractor labor to overcoat ships with “pink paint.”

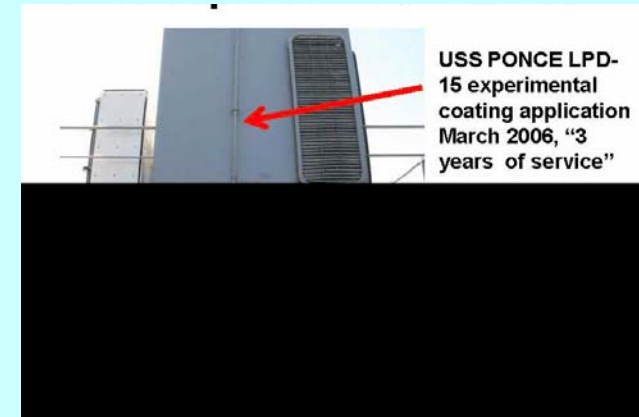


Problem: First generation, Low Solar Absorbance (LSA) paints lose gloss and color shift toward red over time

Solution: Accelerate implementation of improved, LSA paints that more slowly.

Accomplishments:

- FY-12 Standard Item 009-32 only allows use of the MIL-PRF-24635, Type III, 250 g/l silicone alkyds and Type V polysiloxanes.
- Issued Naval Message 131732Z DEC 10 that provides NSNs for MIL-PRF-24635:
 - Type II products – no longer authorized
USE UP EXISTING STOCKS
 - Type III products – recommended.
 - Type V products – highly recommended.
- Qualified Sherwin Williams PXLE-80, International Interfine 979, and Ameron PPG PSX-700 polysiloxane in May 2010.
- Manufacturers working on “sailor proof” quart/gallon kits.



Reduce Color Shift of Navy Topside Paints

Sherwin-Williams PXLE-80 Polysiloxane in Dual Pack Cartridges – 12 Month Shelf Stability



SHERWIN-WILLIAMS
Protective & Marine Coatings

Reduce Color Shift of Navy Topside Paints

 **International**

Interfine 979SG Polysiloxane
Mix Ratio 4:1



Qt Touch Up Kit
Part A = .8qt, Part B = .2qt



1-gallon boxed Kit
Part A = .8g, Part B = .2g



Qt Touch Up Kit
Part A = .8qt, Part B = .2qt



USS BOXER (LHD-4)



All products supplied and technical advice or recommendations given are subject to our standard Conditions of Sale

Marine Coatings

Paint Center of Excellence

FY-11 Program Status

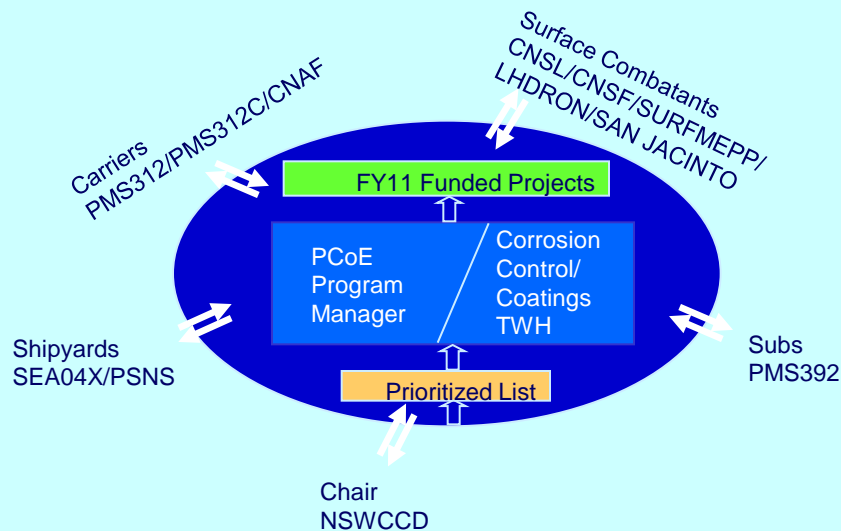
Paint issues have the potential to offer high total ownership cost savings (up to U.S.\$2.4B/year).

PROBLEM: Funding required to develop, qualify, and field new coating systems, preservation processes, and Fleet support strategies.

SOLUTION: Obtain resources to support paint & corrosion control material & process improvement.

Accomplishments:

- OPNAV provided funding for FY-11 Paint Center of Excellence.
- Project selection involves fleet and NAVSEA.



Paint Center of Excellence

FY-11 New Starts

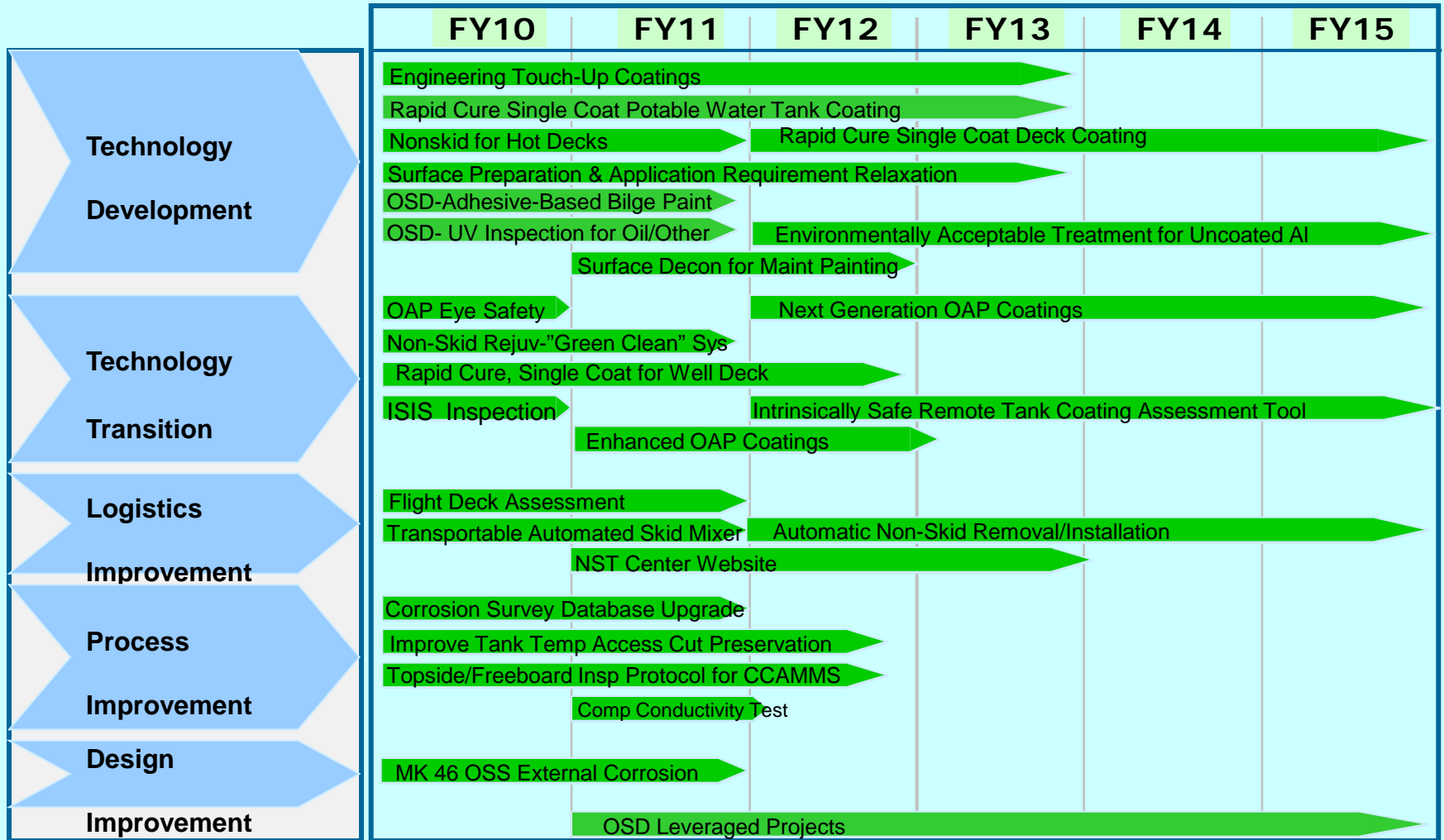
Resources limited for four FY-11 new-start tasks:

- * **Optically Active Pigment (OAP) project to look at application over heavily pitted steel to provide the best means of covering rough, blasted steel.**
- * **Surface decontamination with Hydrogel.**
- * **Comparative testing of conductivity test methods to determine lowest cost option for measuring surface contamination of SaltSmart, Bresle, RPP Device, and Elcometer.**
- * **Maintain operations of www.nstcenter.com web site.**

[All Projects Useful to NAVSEA and supported by TWH](#)

Paint Center of Excellence

Milestones



NSRP New Start Tasks

SEA 05P2 / NSRP

NSRP PROJECT

SEA 05P2 Comments

Evaluation of “Spot and Sweep” Blasting as a Cost Effective method of Underwater and Outer Hull Surface Preparation

Objective: To evaluate and recommend a reliable, efficient, and cost-effective alternative to completely blasting and painting Navy underwater hull in a method consistent with MSC and commercial ship owners “shave and a haircut.”

Good project, lower Total Ownership Cost (TOC) immediately apparent.

Need to determine population of long service life underwater hull primer to avoid false economy of repair.

Cost Reduction of Surface Preparation in the Shipyard with Laser Ablation Featuring the New Technology of Closed-Loop Control

Objective: Perform lab tests to validate laser surface prep process and continue with the limited research conducted at U.S. Naval Base Kitsap- Bangor that shows laser technology can be used as a safe, non-destructive method. Perform “in the field” tests at Naval shipyard.

Need to address the TOC issue, how much does laser cost to buy and operate vs. productivity improvement?

Compatibility of “Single Coat” Tank Coatings with Retained Pre-construction Primer

Objective: Determine if qualified, single-coat systems are compatible by applying them to test tanks constructed as part of a previous NSRP project.

Good project that addresses key technical issue with single-coat.

Need to perform analyses of alternative surface preparation methods:

Brush blast?

Pressure wash?

Laser?

Need data on disbondment before moving to ship test.

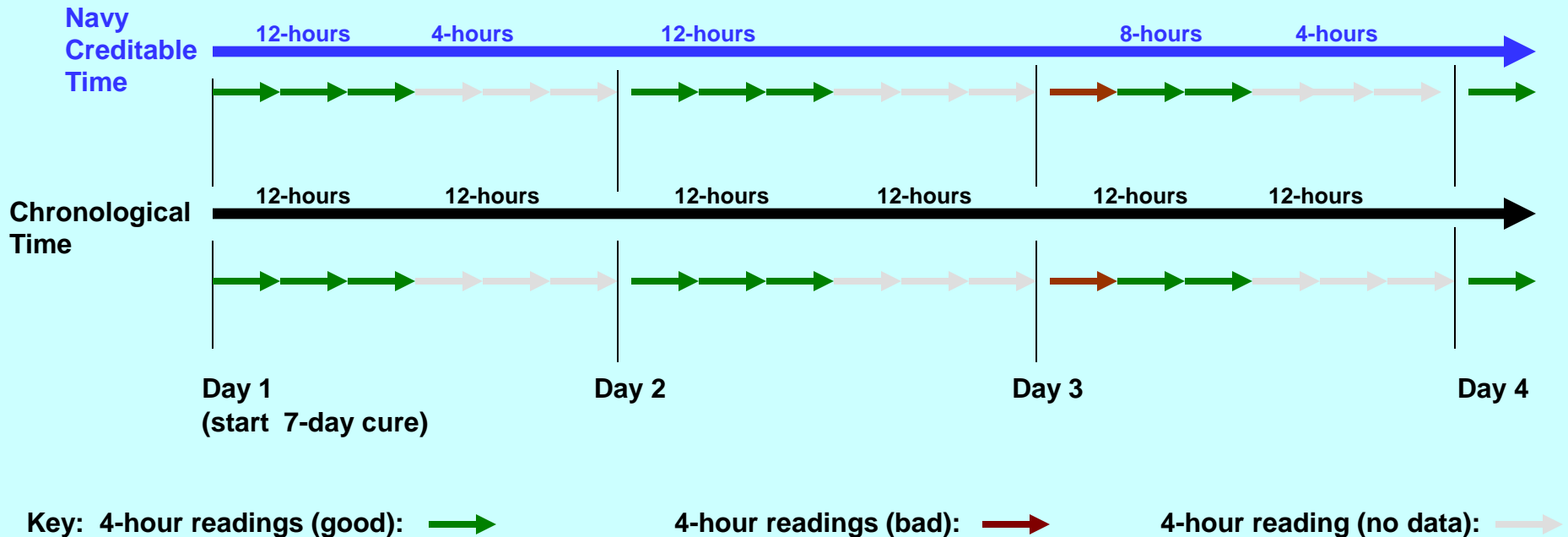
Conclusions

- NAVSEA goal is to reduce coating application costs from new ship acquisition through to ship disposal.
- NAVSEA making progress toward:
 - Issuing FY-12 Standard Item 009-32.
Work with NSRP to continue to reduce total ownership costs.
 - Specification Update (Paint Conformance Testing and Receipt inspection).
 - Implementing findings of Cumbersome Work Practices tasks:
 - Rapid Cure, Single Coat.
- NAVSEA to continue with FY-11 new start tasks.
 - NSRP
 - PCOE
- NAVSEA to support NSRP new start projects.



Universal Paints Requirement Document

- Navy shipyards requested “Creditable” hours concept be included to address limited ability to fund overtime.
 - Assume manual readings are being used for tank work and requirement is every 4-hours.
 - Time only applies to final cure, **does not apply to overcoat window.**
 - Must add up 168-hours of credible cure time for a seven-day cure. May be more chronological time.



Example Above Shows 72-hrs of Actual Time Yields 40-hrs of Navy “Creditable” Cure Time

Backup slides

DOCKING CYCLE OF NAVY SHIPS OPNAV NOTICE 4700

- **OPNAV NOTICE Ser N43/9UI58557 18 AUG 2009 “REPRESENTATIVE INTERVALS, DURATIONS, MAINTENANCE CYCLES, AND REPAIR MANDAYS FOR DEPOT LEVEL MAINTENANCE AVAILABILITIES OF U.S. NAVY SHIPS.**

NAVSEA COATING QUALITY ASSURANCE REQUIREMENTS

- **NAVSEA Quality Assurance Provisions appear in NAVSEA Standard Items:**

- **Standard Item 009-04 “Quality Management System; Provide”**
- **Standard Item 009-32, “Cleaning and Painting; Accomplish”**
- **Provisions based on verification of quality by trained personnel:**

(G) Point = SUPSHIP or government representative.

(I) Point = Inspection by qualified contractor inspector

Standard Item 009-04 paragraph 3.9.1 states:

(I) inspections require verification and documentation by a separate individual, other than the person who has accomplished the work, who is qualified as an inspector and currently certified where required by the technical documents (e.g., NBPI, NACE, nondestructive testing, electrical cableway inspections, etc.).

(V) Point = Inspection by contractor trade person

Standard Item 009-04 paragraph 3.9.2 states:

(V) inspections require verification and documentation by the qualified tradesperson, trade supervisor, or inspector.

NAVSEA COATING QUALITY ASSURANCE REQUIREMENTS

- **(G) points do not delay or disrupt work:**

- **Standard Item 009-04 paragraph 3.10.3 states:**

Proceed with the test or inspection if the SUPERVISOR is not present, provided the required advance notice has been furnished to the SUPERVISOR and the contractor has completed and documented the preceding tests and inspections.

- **(G) points solely related to critical coated areas:**

Checkpoint	Critical Areas	Non-Critical Areas	Other
(I) Process Inspection			Pre-Construction Primer
Temperature			Paint Storage
Environmental Monitoring	(V)	(V)	
Degreasing/Cleanliness	(I)(G)	(I)	
Surface Profile	(I)(G)	(I)	
Conductivity/Chloride Test	(I)(G)	N/A	
Surface Preparation Completion	(I)(G)	(I)	
Surface Cleanliness – Dust	(I)(G) (Underwater Hull and Flight Deck Nonskid only)	N/A	
DFT	(I)(G)	(I)	
Holiday Inspection	(I)(G)	(I)	
Nonskid Mixing/Application	(I)(G) (Nonskid only)	(I) (Nonskid only)	
Nonskid Spread Rate & Holidays	(I)(G) (Nonskid only)	(I) (Nonskid only)	

NAVSEA COATING QUALITY ASSURANCE REQUIREMENTS

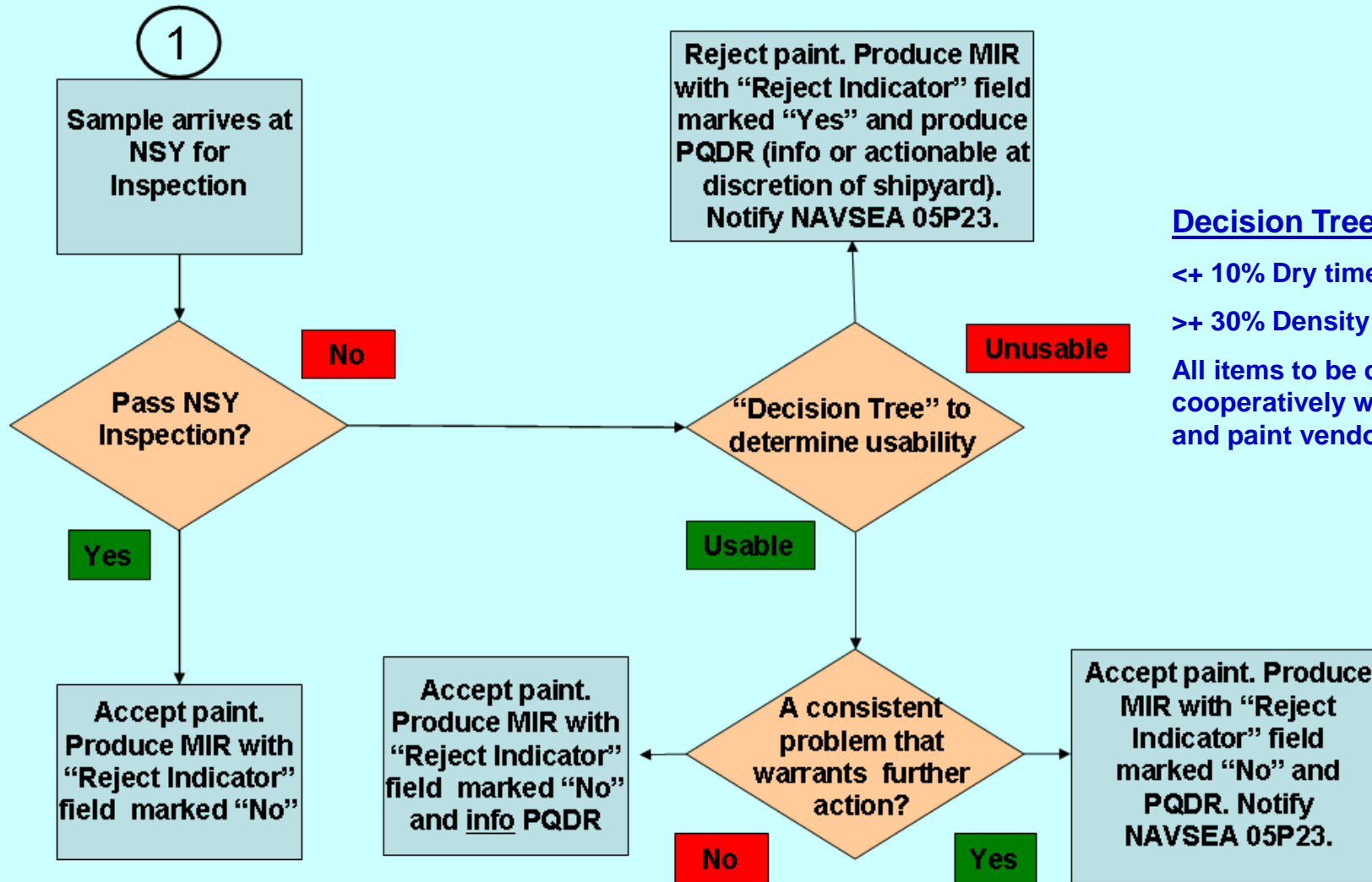
- (G) points solely related to critical coated areas and critical coated areas are constantly updated to reflect fleet customer demand for verified, high-quality paint job.
 - Topside had been considered critical coated areas until 29 July 2004 in the FY-06 Standard Item 009-32. After February, 2005, topside was removed from critical coated area list, **eliminating 100% of (G) points** for largest single paint job in the fleet.
 - Chain Lockers, and AFFF Station Decks and Coaming had been considered critical coated areas until 29 July 2004 in the FY-06 Standard Item 009-32. After February, 2005, these areas were removed from critical coated area list, **eliminating 100% of (G) points** for largest single paint job in the fleet.
 - Created category for limited touchup for individual areas <2 sq.ft. or less totaling less than 0.03 percent of the total surface area in 13 July 2008, FY10 Standard Item. After February, 2009 small areas were non-critical resulting in **eliminating 100% of (G) points**.
 - All plenums had been considered critical coated areas until 30 July 2010 in the FY-12 Standard Item 009-32. After February, 2011, aluminum plenums were removed from critical coated area list, **eliminating 100% of (G) points**.

Key Question: Has historical (G) point elimination generated cost reduction?

NAVSEA COATING QUALITY ASSURANCE REQUIREMENTS

- (G) points are constantly tested and refined as part of annual SSRAC update process.
 - Environmental Readings were reduced for non-critical areas from (V)(G) to an (I) in FY-06 (2004) **(G) point reduction: 10%**
 - Reduced ISO Dust test from all areas, to only Underwater Hull and Nonskid in FY-07 Change 1 (2006) **(G) point reduction: 15%**
 - Elimination of stripe coat. Stripe coat QA checkpoint waived if additional DFT measurements taken on prior coat to confirm adequate edge thickness in FY-10 (2008) (G) point reduction: 15%
 - Single coat coating systems removed the checkpoint for the primer coat if one continuous work evolution in FY-10 (2008) **(G) point reduction: 15%**
 - High-solids coating option added to Potable Water Tanks, allowing two full coats and one stripe coat as an option to three full coats and two stripe coats in FY-10 Change 1 (2009) **(G) point reduction: 25%**
 - Fuel oil storage, fuel oil service, and diesel service tanks shall not be painted. For existing paints, when flaking occurs, SSPC-SP 3 surface preparation shall be accomplished and a light coat of lube oil 3150 shall be wiped over the surface prior to closing. FY-11 (2009) **(G) point reduction: 50%**

Receipt Inspection Decision Tree



Decision Tree Examples:

<+ 10% Dry time = Usable

>+ 30% Density = Unusable

All items to be developed cooperatively with shipyards and paint vendors

Retention of Preconstruction Primer

SEA 05P23 / NAVSEA / Shipbuilders / Shipyards

- n FY-09 NSRP SP-3 and NAVSEA 05P23 agree to evaluate the possibility of retaining preconstruction primer in critical coated areas.

PROBLEM: Removal of preconstruction primer in critical coated areas can increase costs.

SOLUTION: Reduce number of tests in a LEAN mode to the “right” number for shipyard OQE and paint manufacturer’s process.

Accomplishments:

- n Preconstruction primer retained in commercial shipbuilding.
- n NAVSEA eliminated preconstruction primer from MIL-PRF-23236 tank coating specification requirements on 15 Sept. 2009.
- n NSTM 631, 1 Nov. 2008, paragraph 8.18.6.4 requires removal of preconstruction primer in tanks & voids. Silent on non-critical areas.
- n NAVSEA shipbuilding specifications allow retention of preconstruction primer in non-critically coated areas. Paragraph 3.4.2 of DDG-1000 requires:
“The following requirements shall apply to areas other than defined Critical Coated Areas: Areas may be painted without removing sound pre-construction primer, provided that all visible grease, dust and debris are removed. However, loose or damaged pre-construction primer and visible rust shall be removed by blasting to NACE No. 8/SSPC-SP-14 cleanliness or power tool cleaning to SSPC-SP-11 cleanliness, with a minimum profile of 2 mils (50 micrometers) for exposed metal surfaces or as required by the deck covering system in Section 634.”

Retention of Preconstruction Primer

SEA 05P23 / NAVSEA / Shipbuilders / Shipyards

Accomplishments:

- n Demonstration installation on USS VICKSBURG (CG-69) in compensated fuel tanks is August 2008.
 - Required SSPC SP-10 from plate line with 2-mils profile.
 - Required SP-1 after installation with a pressure wash and spray bottle to validate surface cleanliness by “water-break” test.
 - Required standard coating system applied over PCP after PCP was visibly dry (as Government inspection point).

- n CG-69 inspected on 12 Feb. 2010.
 - Coating system in excellent condition, no evidence of blistering or delamination.
 - SP-10 areas at weld tie-in sound and no evidence of cracking or delamination.



Next Step to Define Actual Process and Process Constraints

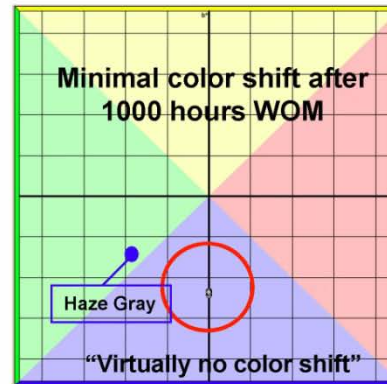
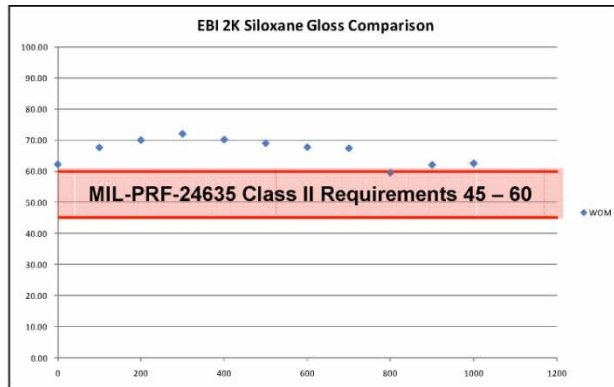
- Fuel issues and zinc. Gas turbine manufacturers reporting that fuel should have no measurable zinc.
- Questions raised about solvent vs. water-base product performance.
- Test data in potable water, ballast, bilge, service.
- Conductivity testing for large area application.
- Applicability as a function of surface area (i.e., small scale repair as per Standard Item 009-32 lower risk than large scale new construction).

Reduce Color Shift of Navy Topside Paints

SEA 05P23 / ONR

Color and Gloss

- **NRL Developed Topside Coatings**
: **Polysiloxane Resin**
- 2 component (2K) system with commercially available raw materials
- Direct-to-metal (DTM) or over a primed surface
- Applied via spray, brush or roll
- Good hardness, solvent resistance and cleanability



Commercial siloxane on USS KEARSAGE (LHD-3)
No measurable color change after 17 months.