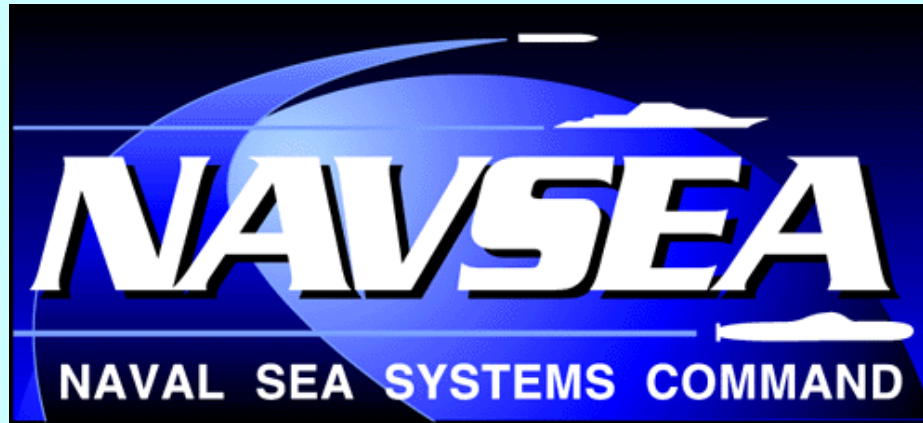


# **NAVAL SEA SYSTEMS COMMAND**

## **COATINGS & CORROSION CONTROL STATUS UPDATE**



**NATIONAL SHIPBUILDING RESEARCH PROGRAM**

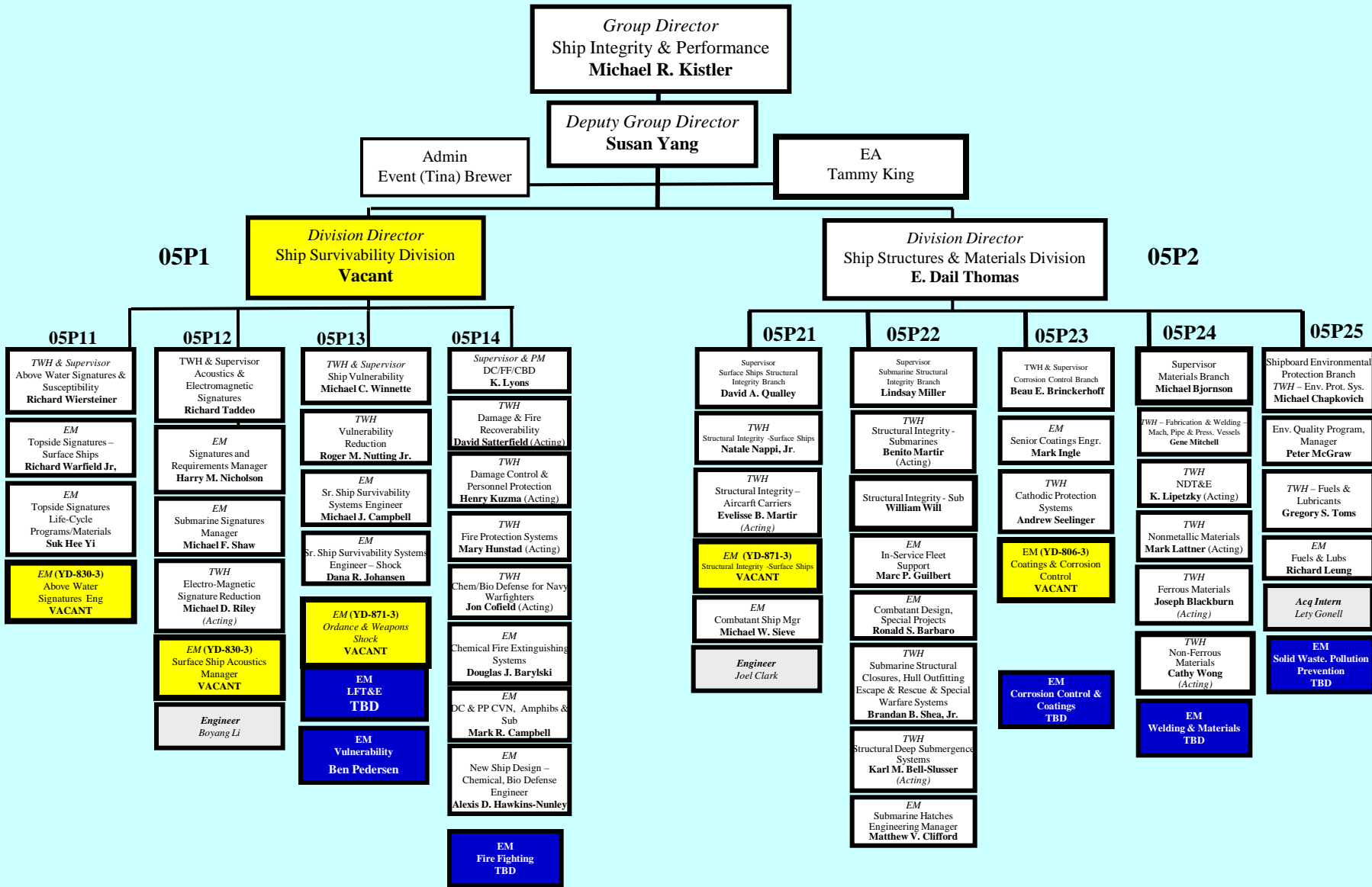
**June 2009**

**Mr. Mark Ingle, P.E.**  
**(202) 781-3665**  
**Mark.w.ingle@navy.mil**

# OBJECTIVES

- **Update NAVSEA structure and organization.**
- **Summarize NAVSEA progress toward reducing coating application costs:**
  - **Standard Item 009-32 as a Universal Paints Requirements Document.**
  - **Reduce coating specification conformance test requirements.**
- **Summarize NAVSEA Progress toward reducing coating application costs Cumbersome Work Practices tasks:**
  - **Delete Stripe Coat.**
  - **Rapid Cure, Single Coat.**
  - **Induction Heating Coating Removal.**
  - **Paperless QA & QA Tools.**
- **Discuss potential future interface with NRSP Research Projects and “new start” projects:**
  - **Allowing Moderate flash rust on underwater hull & freeboard.**
  - **Retention of high-solids paint in tanks being repaired.**

# Ship Integrity & Performance (SEA 05P)



Pre-decisional

Key:

WFC Developmental "Pilot"

Vacancy

Intern

# Universal Paints Requirement Document

- Navy currently applies 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 Manual (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 and can lead to waterfront confusion.**

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

## Accomplishments:

1. ADM McCoy signed letter authorizing use of Standard Item 009-32 as universal paints requirements document on 3 July 2008.
2. SEA 08 concurred with use of Standard Item 009-32 as universal paints requirements document on 26 Sept. 2008.
3. NSTM 631 Update, to include reference to Standard Item 009-32 as paint requirement document, signed on 1 Nov. 2008.
4. Change 1 to FY-10 NAVSEA Standard Item 009-32 that includes provisions to allow only single-coat paints in submarines and surface ship ballast tanks, voids, and chain lockers, issued 9 March 2009.
5. SMS updated to reflect use of Standard Item 009-32 on 1 June 2009.

# Coating Specification Conformance Testing

SEA 05P23 / NAVSEA / Shipbuilders / Shipyards

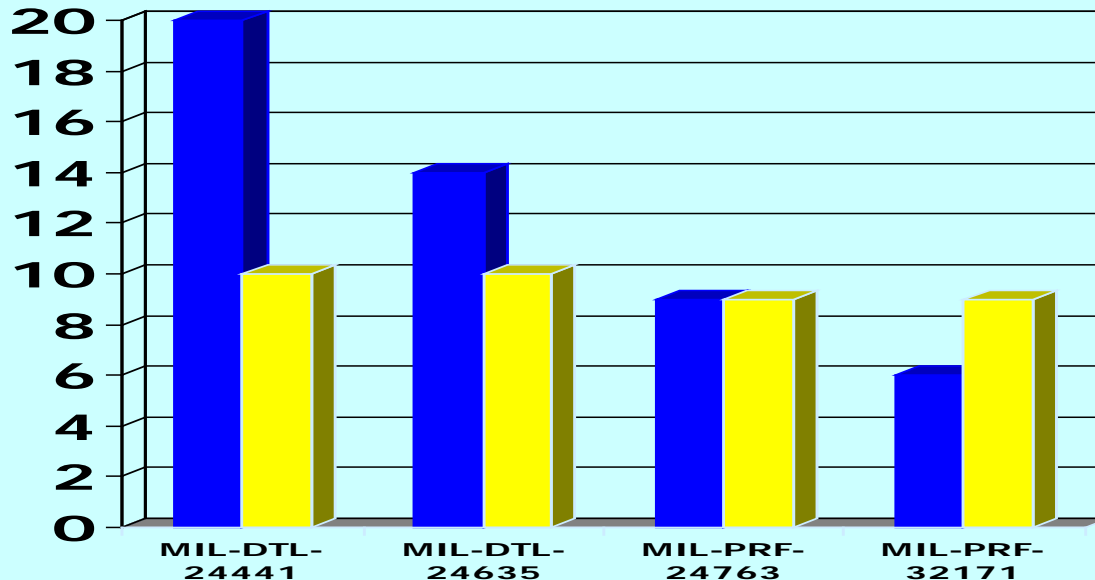
- SEA 05P23 alerted to paint specification conformance testing not being conducted by paint vendor or shipbuilder or shipyard –

**PROBLEM:** Too many tests, duplicative approaches, too time consuming.

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

## Accomplishments:

- Shipyard-lead LEAN event funded and first batch of four paints completed Government and Industry review on 18 May 2009.



## Plan to reduce conformance tests to:

Viscosity  
Color  
Flash Point (receipt)  
Sag resistance  
Gloss  
Weight/gallon  
Fineness of Grind  
Dry Time

■ Initial Conformance Tests  
■ Proposed Conformance Tests

# Delete Stripe Coat

Puget Sound Naval Shipyard / SEA 05P23

## Issue:

- Legacy coatings retain 30% thickness on edges, stripe-coat required to establish minimum required coating thickness.
- Ultra-high solids, edge-retentive, coatings retain about 70% of thickness on edges, so an additional stripe coat protects edges more than required.

**Problem:** Requiring stripe coat increases time and costs to apply coatings and may not be needed.

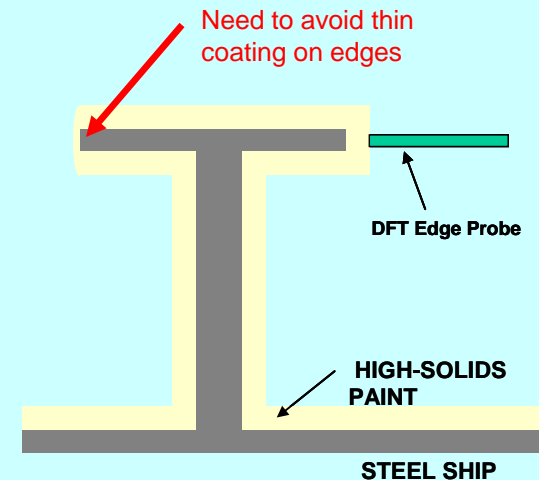
**Solution:** Eliminate the stripe-coat requirement for edge-retentive paints and add additional OQE checks on areas in close proximity to edges to ensure minimum, specified coating thickness obtained.



## Accomplishments:

- Delete stripe coat system applied to two submarine tanks. QA process developed and demonstrated.
- Savings 10-20% of overall job time & cost. Estimated savings of \$154K on CVN docking.
- PPIs for delete stripe coat included in CVN-71 RCOH.
- Change 1 to FY-10 Standard Item 009-32 includes process on 9 March 2009.

Item is Essentially in the “Done Pile”



# Single Coat Preservation System

## Portsmouth Naval Shipyard / SEA 05P23

- Application of rapid-cure, high-solids paints in a single-coat is more cost effective than applying paints in two or three discrete steps.



**PROBLEM:** Ultra-high-solids coatings require three coats (i.e., primer, stripe coat, and top coat) = Excessive Labor. Legacy coatings require 24-hours between coats and seven days before service, for total process time of >14 days.

**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:

- Change 1 to FY-10, Standard Item 009-32, allowing only use of single-coat paints in ballast tanks, voids, and chain lockers issued on 9 March 2009.
- Completed single-coat ballast tank/void installations on carriers, submarines, amphibious ships and combatant tanks/spaces.
- Completed demonstration installation of single-coat paints in three fuel and two CHT tanks.
- Completed one-year inspection of single-coat paints in ballast tanks on submarines and amphibious ships.



CWP reports savings of up to 20% possible for CVN (\$433K) availability.

Contactors report job cost savings of 26% possible.

# BUSINESS CASE FOR SINGLE COAT PAINTS

## Cost Estimate Summary

Cost estimates based data from shipyards, contractors, and paint vendors. Costs estimates are for painting a “representative” 5,000 ft<sup>2</sup> tank and do not include consistent costs like cleaning, staging set-up, blasting, and clean-up. NAVSEA business case consistent with:

Cumbersome work practices, single-coat project

20% paint application cost reduction  
after CWP demonstration

\$433K possible savings DPIA.

15% to 30%

Contractor reports savings:

### MODEL RESULTS:

Single-coat paint total application costs lower than other coating systems.

Solvent-based paints (MIL-PRF-23236, V or MIL-DTL-24441) 15 mils DFT \$31,128 to \$30,888

100% Solids paints at 17 mils DFT \$24,833 } 22% reduction

100% Solids, single-coat paints at 25 mils DFT \$19,250

- Single-coat paint material costs higher for 5,000 square foot tank.

Solvent-based paints \$1,296 to \$1,056

100% Solids paints \$2,898

100% Solids, single-coat paints \$6,292

- Facilities & utilities costs lower for single-coat paints.

Solvent-based paints \$13,100

100% Solids paints \$8,300

100% Solids, single-coat paints \$7,300

- Labor for single-coat paint lower than other paints.

Solvent-based paints \$16,732

100% Solids paints \$13,635

100% Solids, single-coat paints \$5,658

# BUSINESS CASE FOR SINGLE COAT PAINTS

## Cost Estimate Summary

Cost data for painting a variety of tanks:

<u>Application Activity</u>	<u>Tank</u>	<u>Costs</u>	<u>Fleet Costs</u>
NRL	LSD-50/Ballast	\$23,744	Open, Gas Free, Blast
NRL	LSD-50/Ballast	\$16,960	Open, Gas Free, Blast
NRL	LSD-51/CHT/cement	\$24,204	Open, Gas Free, Blast
Contractor	CVN Void	\$22,258	Open, Gas Free, Blast
PSNS	SSN-722/Main Ballast	\$41,657	Blasting not included
PSNS	SSN-722/Main Ballast	\$22,185	Blasting not included
PSNS	SSN-722/Trim	\$10,640	Blasting not included
PSNS	SSN-722/Aux.-2	\$10,782	Blasting not included

# BUSINESS CASE FOR SINGLE COAT PAINTS

## Background

Business case based on paint only. Service-life issues are not addressed, but would favor high-solids and single-coat products.

Solvent-based paints (Amercoat 235 or MIL-DTL-24441)

5-7 years in ballast tanks

100% Solids paints

15-20 years in ballast tanks

100% Solids, single-coat paints

15-20 years in ballast tanks

Cleaning, gas-free, staging, repairs, and other, non-paint activities take more time in tanks than painting.

- Cleaning, blasting, and entire paint process is 19 days with three-coat, high-solids paint.
- Cleaning, blasting, an entire paint process is 17 days with single-coat.
- Navy shipyard reports total time savings of 17 days to 10 days using single coat.

New construction issues raised by shipbuilders could not be added into the business case (i.e., one time charge, sunk cost, etc.):

- Need to bid job with “learning curve” for new process: \$9K to \$12K
- Need to buy “new” QA equipment: \$1K (Elcometer 456)
- Need to dehumidify tanks to 50%RH to achieve 15-20 year service life. Not required if lower service life satisfies requirements: \$1K to \$81K (to purchase unit based on capacity)
- Need to train workers with new process: \$1K (SSPC C-12 course)  
\$2K (worker salary)
- Need to buy new pumps, guns lines: \$21K (Graco 185)



# BUSINESS CASE FOR SINGLE COAT PAINTS

## Background

### New construction issues not in business case (continued):

- Dehumidification of building too expensive: **No cost data provided. Ships build in sections could require new, or major retrofit of buildings to dehumidify.**
- Short pot life retards touch-up: **No cost data. Pot life is 7 minutes at 77F. Have cartridge to dispense touch-up.**
- Spray equipment more difficult to set-up and clean: **No cost data.**
- Fire watch issues: **No cost data, all paints require fire watch if doing hot work.**
- Coating is thicker and harder to repair: **No cost data, repair paint is thicker and cures more rapidly.**
- Coating needs to use vinyl masking tape instead of paper tape: **No cost data provided but vinyl tape costs \$2 more per roll than paper tape.**

# BUSINESS CASE FOR SINGLE COAT PAINTS

## Preparation and Staging Costs

Preparation and staging costs for tanks are essentially the same per unit time.

1. All tanks need to be cleaned and checked to ensure they are “gas free.”
2. All tanks require explosion-safe lighting, staging, monitoring and ventilation.
3. All tanks currently require dehumidification to 50% relative humidity to apply 20-year service life coatings or SEA 08 MIL-DTL-24441 potable water coatings. No humidity requirement in DDG contract. 85% relative humidity allowed to apply single-coat paint with 10-12 year service life.
4. All tanks need to be abrasive blasted to SSPC SP-10, near white metal cleanliness.
5. All tanks require a 2-4 mil profile.
6. All tanks require clean-up and removal of grit and staging/masking material from tanks.

New construction yards do not currently use dehumidification and count on “weather” in yard or in a shed to apply paint. Yards can achieve 85% relative humidity without dehumidification based on time of year and weather, risk of work delay vs. cost for dehumidification.

1. NSRP is working an FY-09, R&D task to determine if 50% RH is needed or if higher humidity can produce 15-20 year coating service life.
2. Costs for relative humidity control ill-defined. Paint team historical information: \$4,700 to lift unit into dock and set up and \$200/day for unit rental and \$100/day for power.

Key Point: Applying any paint, using 50% RH “best practice” increases costs, no difference single coat

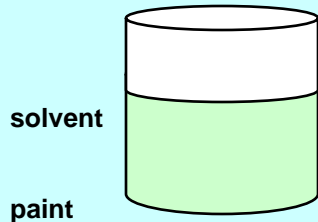
# BUSINESS CASE FOR SINGLE COAT PAINTS

## Material Utilization

Paint material utilization based on solvent content and required thickness. Assumptions are:

1. Paint thickness estimated at mid-point of requirement range (e.g., 4-6 mil requirement would use 5-mil coat).

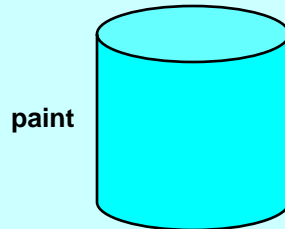
### 5-7 Year Paint



One Gallon Solvent Based  
60% solids like  
MIL-PRF-23236 Type V similar to  
MIL-DTL-24441

1 gallon \* 67% = 155 in<sup>3</sup> solids

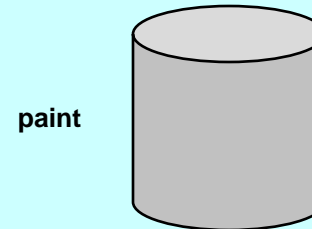
### 15-20 Year Paint



One Gallon High Solids  
100% Solids Paint  
MIL-PRF-23236, Type VII

1 gallon = 231 in<sup>3</sup> solids

### 15-20 Year Paint



One Gallon Single Coat  
100% Solids Paint  
MIL-PRF-23236, Type VII, Class 18

1 gallon = 231 in<sup>3</sup> solids

**One gallon (solids) = 1,600 ft<sup>2</sup> per 1 mil of coating.**

Coating applied at 5-mils  
or 15 mils in prime/stripe/top  
(MIL-DTL-24441 at 3-mils/coat)

Coverage per gallon/coat = 214 ft<sup>2</sup>  
(MIL-DTL-24441 coverage/coat = 320 ft<sup>2</sup>)

System Coverage per gallon = 93 ft<sup>2</sup>  
(MIL-DTL-24441 coverage = 137 ft<sup>2</sup>)

Coating applied at 17 mils  
(6 prime and 11 mil top)

Coverage per gallon/coat = 145 ft<sup>2</sup>

System coverage per gallon = 94 ft<sup>2</sup>

Coating applied at 25 mils  
in one coat

Coverage per gallon/coat = 64 ft<sup>2</sup>

System coverage per gallon = 64 ft<sup>2</sup>

**Key Point: Less coverage per gallon from single coat due to thicker, more durable film.**

# BUSINESS CASE FOR SINGLE COAT PAINTS

## Materials Costs

Material costs raised as an issue driving costs of single-coat paints. Assumptions are:

1. Include 20% loss factor to account for paint loss in lines and spray gun set-up.
2. Include **30% loss factor for single coat** to account for contractor report of need to change tips five times per shift due to single-coat, rapid-cure paint.

<u>Coating System</u>	<u>Material Cost/gal.</u>	<u>Number of Coats</u>	<u>Gallons/Coat</u>	<u>Total Cost</u>
MIL-PRF-23236, Type V Or MIL-DTL-24441	\$24 / gallon	Prime, stripe, top	23 / 8 / 23 19 / 6 / 19	\$1,296 \$1,056
100% Solids	\$46 / gallon	Prime, top	22 / 41	\$2,898
100% Solids Single Coat	\$62 / gallon	Single	101	\$6,262

**Key Point: Single-coat paint 6x higher cost than solvent-based & 2x higher cost than 100% solids**

# BUSINESS CASE FOR SINGLE COAT PAINTS

## Facilities & Utilities

Paint facility and utility times based on data from paint teams and contractors who applying high-solids paints on carriers.

1. Tank must be kept open, ventilated, and gas free during coating application, with small amounts of labor and utilities included in base cost for monitoring.
2. Tanks cost \$300/day to keep open and ventilated.
5. Dehumidification equipment cost \$4,700 for lifts and set up, \$200/day for rental of equipment, and \$100/day for electric power to maintain 50% RH.

<u>Coating System</u>	<u>Time to Coat Tank</u>	<u>Ventilation</u>	<u>Dehumidification</u>	<u>Total</u>
MIL-PRF-23236, Type V Solids, Similar Cost & Process to MIL-DTL-24441)	14	\$4,200	\$8,900	\$13,100
100% Solids	7	\$2,100	\$6,200	\$8,300
100% Solids Single Coat	5	\$1,500	\$5,800	\$7,300

Key Point: Single-coat turns tanks over more rapidly, reducing costs for utilities and dehumidification.

# BUSINESS CASE FOR SINGLE COAT PAINTS

## Paint Application Labor

Paint application labor estimates based on a Naval Shipyard man-hour rate of \$47/hour or \$380/day.

1. Contractor rates are lower and variable (paint labor is as low as \$24 hour).
2. Factor of 2x applied to labor hours to account for time in yard, interference, etc.
3. Teams require a painter, line watcher, pump operator, and paint handler. Touch-up is usually just painters, working by hand. QA is hand labor.
4. **Single coat team adds an additional painter to keep gun working and avoid clogs.**
5. Paint application shown in black, touch-up shown in blue, paint application QA/QC shown in green.

(All Times in Man-hours)

Coating System	Team		Time 1 <sup>st</sup>	Time Stripe	Time Top		Total Time	Labor Costs
MIL-PRF-23236, Type V	4	*	3	3	4	=	40	\$1,880
Solids, Similar	3	*	10	12	22	=	132	\$6,204
Cost & Process to (MIL-DTL-24441)	2	*	1	1	1	=	6	\$282
								<u>\$8,366</u>
							Shipyard efficiency corrected	\$16,732
100% Solids	4	*	3		4	=	28	\$1,316
	3	*	12		24	=	108	\$5,076
	2	*	2		2	=	8	\$376
								<u>\$6,768</u>
							Shipyard efficiency corrected	\$13,536
100% Solids	5	*	4			=	20	\$940
Single Coat	3	*	12			=	36	\$1,692
	2	*	2			=	4	\$188
								<u>\$2,829</u>
							Shipyard efficiency corrected	\$5,658

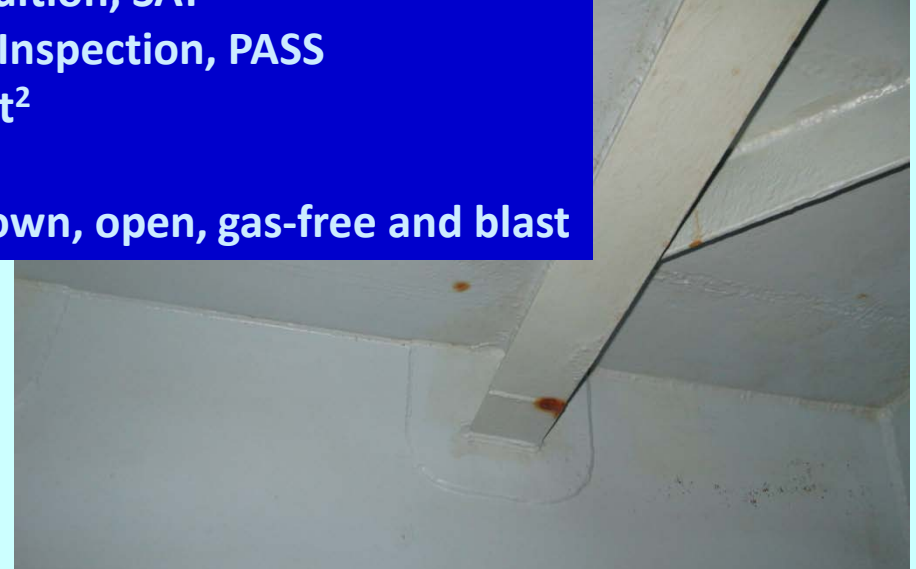
**Key Point: Single-coat reduces labor by 58% as compared with high solids and 67% to solvent bearing**

# USS CARTER HALL LSD-50, 1 Year In-Service Inspection

## One-Coat, Rapid-Cure Coating Application



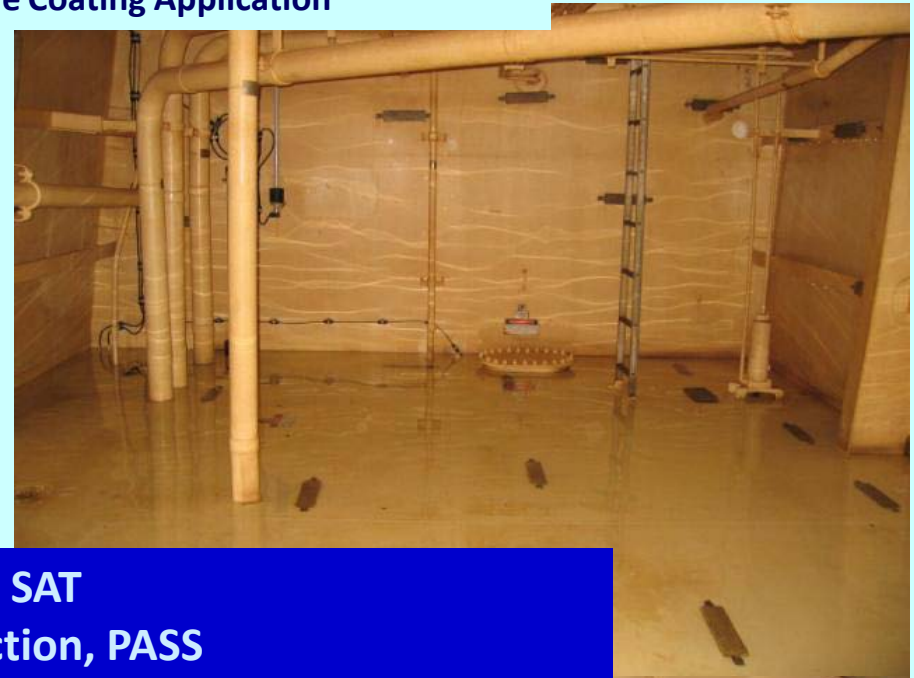
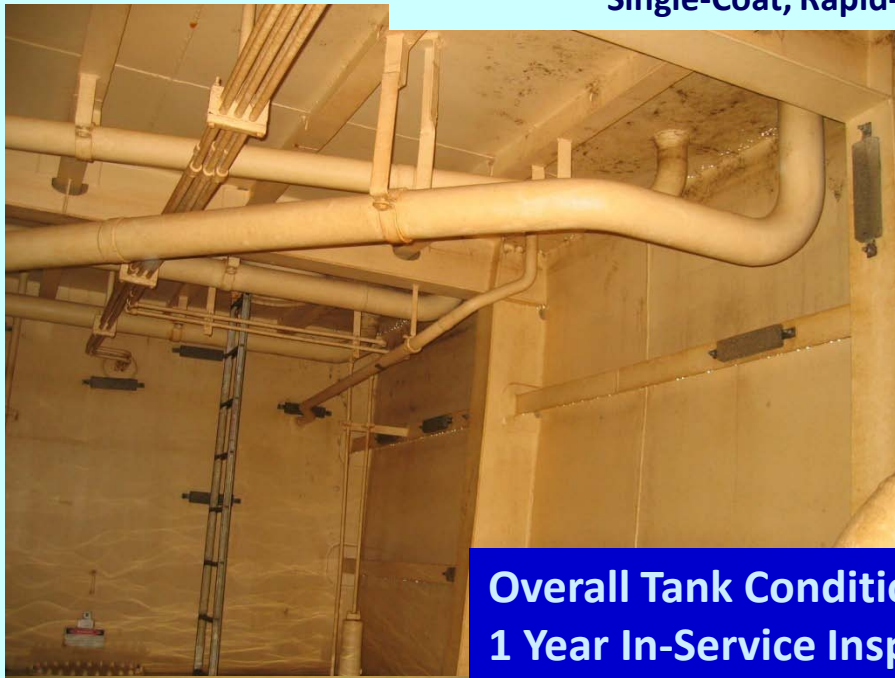
**Overall Tank Condition, SAT**  
**1 Year In-Service Inspection, PASS**  
**Tank Size: 3,300 ft<sup>2</sup>**  
**Cost: \$16,960**  
**Fleet Cost: Unknown, open, gas-free and blast**



**Access Cut in  
Excellent Condition**

# USS CARTER HALL LSD-50, 1 Year In-Service Inspection

## Single-Coat, Rapid-Cure Coating Application



**Overall Tank Condition, SAT**  
**1 Year In-Service Inspection, PASS**  
**Tank Size: 3,800 ft<sup>2</sup>**  
**Cost: \$23,744**  
**Fleet Cost: Unknown, open, gas-free and blast**



**Access Cut in  
Excellent Condition**

# Induction Heating Coating Removal

Portsmouth Naval Shipyard / SEA 05P23

## Issue:

Current methods of coatings removal require media (e.g., mineral grit, shot, water, etc.), or cumbersome hand tools.

**Problem: Removal of thick, tough paints takes to much time.**

**Solution: Use the Induction Heating (IH) Coatings Removal system to “pop” paint up from heated substrate, no need to wear paint away.**



## Accomplishments:

- NAVSEA Itr Ser 5000 - 07T/0226 dtd 3 July 07 provided interim approval to PNSY, with conditional requirements addressing substrates, controls, etc.
- Uniform Industrial Process Instruction (UIPI) 1905-115 signed on 31 July 2008.
- Each Naval shipyard has at least one induction heat unit. Qualification in process at all yards.
- Units used to remove rubber in battery boxes on submarine in April 2009.

PSNY projects, potential cost reduction:

Submarine - \$93K / availability.

Carrier - \$57K / availability.

[Development of Automatic Control Head Key to Expand Applications for Units](#)

# Surface Condition Measurement Tools

Puget Sound Naval Shipyard / SEA 05P23

## Issue:

Paper used to track records is archaic and can lead to transcription errors, use new technology to improve rate/accuracy data collection.

**Problem:** Existing surface measurement technology is expensive, labor intensive, and has poor repeatability.

**Solution:** Identify and qualify improved surface inspection tools. Verify tools are compatible with the Paperless QA Initiative.

- Dry Film Thickness (DFT) meter.
- Surface Profile meter.
- Soluble Salt/Conductivity meter.

## Accomplishments:

- Paperless QA policy statement signed jointly by SEA05P23 and USFFC.
- POA&M for paperless QA being completed in April 2009.
- Data transfer map completed and to be out-briefed on 11 June 2009.
- EDS testing not yet started due to funding (4 to 8 month test period).
- Developing detailed process maps of data transfer process to determine codification and training requirements: establish working group (shipyards, RMC's, Commercial yards) at NACE in March 2009.
- Navy's Metrology issues addressed (NAVSEAINST 4734.1B). The profile meter and salt meter apparently only need field calibration and the DFT gages have been in the metrology program for years.



# Cumbersome Work Practices

## Surface Condition Measurement Tools

QA Tools Distro List	PSNS	PNS	NNS	PHNS	Totals
QA Inspection Tool	Qty	Qty	Qty	Qty	Qty
Elcometer 224 Model T	4	8	4	4	20
RPCT Soluble Salt Meter RPCT-07-001	3	3	3	3	12
Elcometer 456 (DFT)	4	0	4	4	12
Totals	11	11	11	11	44



### SURFACE PROFILE

Elcometer 224 Model T or  
ElectroPhysicTR200

Both have resolution to 0.1 mil

Elcometer has memory and  
USB, while ElectroPhysic just  
has USB.



### SALT METER

Rich Parks, soluble salt meter  
RPCT-07-001 or

Elcometer 130 SCM400 Salt  
Contamination Meter

Both have 0.1 uS/cm resolution

RPCT has memory, USB and  
data transfer



### DRY FILM THICKNESS

Elcometer 456, QNIX 8500  
Premium, PosiTector 6000  
MemoryF90S3, or Oxford  
Instruments CMI233-RSMP1

All have 0.1 mil resolution

All have memory, USB and data  
transfer

# Reduce Costs by Allowing Retention of Moderate Flash Rust

Norfolk Naval Shipyard / SEA 05P23

## Issue:

- Surfaces cleaned with hand lance waterjet equipment tend to develop *Moderate* flash rust which must be removed using a secondary surface preparation. Allowing paint application over moderate flash rust will result in cost savings provided risk of premature coating failure is mitigated.



**Problem:** Rework to achieve Light level of flash rust leads to failed check points and rework.

**Solution:** Allow painting over moderate flash rust on hand-lanced areas by developing a tool to determine when surface has high flash rust instead of acceptable moderate level.

## Accomplishments:

- NSRP completed 2007 project showing Moderate is acceptable with little added risk of coating failure.
- NAVSEA, NSRP, and NSWC-CD/Elzly working to develop tool to determine when flash rust is excessive.
- Key issue is how to account for cost savings, cost reduction. Rework of flash-rust double cost of CVN painting at Puget Sound Naval Shipyard in 2004-2005.

[Need Contractors - Who Do Work - to Validate Cost Savings](#)

# Reduce Costs by Allowing Retention of Flash Rust

## NAVSEA Approach:

1. Industry to provide estimated cost savings for underwater-hull coating with Moderate instead of Light level of flash rust.
2. SEA05P23 to modify Standard Item 009-32 to allow underwater-hull coating over “Moderate” level of flash rust. Timing dependent on tool/process development.
  - Tool/process to be rapid, reproducible, implementable in shipyard.
  - Likely candidates based on ISO Dust tape, used in conjunction with a Pocket Detective 2.0 “tint” measuring device already used by police to ticket cars for dark windows.
3. Industry & SUPSHIP to implement Moderate level of flash rust:
  - Use established SSPC, SP-12 Criteria to adjudicate flash-rust level.
  - Require surfaces to satisfy established 30 mScm conductivity requirements.
  - When rust level debated with contractor/yard, use SEA 05P23 tool to adjudicate Heavy to Moderate determination.
4. Process/Tool to be submitted to SSPC for incorporation into SSPC, SP-12.



# Reduce Costs by Allowing Retention of Flash Rust

- Draft Test Procedure Developed to use Pocket Detective 2.0 and ISO Dust Tape.
- Lab Testing including; Coating Adhesion and Cathodic Disbondment in process and will be completed in June 2009.
- Evaluated process on:
  - Test Panels
  - USS BOONE (FFG-28)
  - USS KEARSARGE (LHD-3)
- “Round Robin” Test Being Planned:
  - Multiple test surfaces
  - Multiple Inspectors
  - Validate Criteria



# Retention of High Solids Paints During Repair Proposed CWP Task

**Issue:** New start, CWP task initiated by PSNS. Goal would be to reduce the time & money required to blast off intact, adherent high-solids coatings during repair while ensuring long service life from tank coatings.

**PROBLEM:** Currently, tanks are required to be completely blasted and repainted if damaged area exceeds 10% of tank area. Such a requirement represented the most cost-effective means of repairing tanks with solvent-based coatings, but may increase costs for tanks with high-solids, single-coat paints.

**SOLUTION:** Develop process for blasting areas of tanks coated with high-solids paints that have been damaged or failed, but retain intact, adherent high-solids paint. Overcoat entire tank at 50% RH to produce final coating with 10-12 year service life.



## **Accomplishments:**

1. SEA 05P23 & Puget Sound Naval Shipyard prepared procedures to blast steel to SSPC SP-10, brush-blast retained paint, obtain OQE from entire tank, and overcoat with high-solids single-coat paints.
2. Conducted demonstration of procedure on USS BUFFALO (SSN-715) and compared with historical:
  - (a) Blasting production rate eight times higher when brush-blasting over intact high-solids as compared with completely removing legacy, solvent-based paints.
  - (b) Blasting man-hour reductions on SSN-715 of between 50% and 65%.

# Conclusions

- NAVSEA goal is to reduce coating application costs from new ship acquisition through to ship disposal.
- NAVSEA making progress toward:
  - Making Standard Item 009-32 the Universal Paints Requirements Document.
  - Specification Update (Paint Conformance Testing).
  - Implementing findings of Cumbersome Work Practices tasks:
    - Delete Stripe Coat.
    - Rapid Cure, Single Coat.
    - Induction Heating Coating Removal.
    - Paperless QA & QA Tools.
- NAVSEA would encourage NRSP SP-3 participation in response to projects evaluating:
  - Retention of Flash Rust.
  - Retention of High Solids Paint.



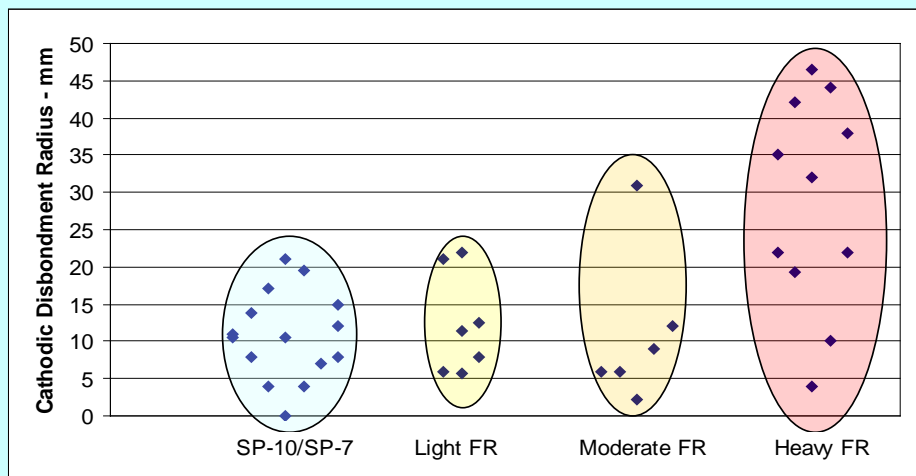
# Backup slides

# NAVSEA 05P23 Concept for New Start

## NSRP SP-3 Project to Reduce Costs by Allowing Retention of Flash Rust

### Project Findings to Date:

- There is little (known) risk associated with painting over “Moderate” flash rust
  - Elzly, Ocean City Research, paint company test data supports conclusion.
  - NSRP field data supports this conclusion.
  - Day to day painting in commercial yards support conclusion.
- Painting over Heavy flash rust will not result in catastrophic failure of underwater hull paint in near term,
  - Laboratory testing of cathodic disbondment is only consistent discriminator.
  - Anecdotal observations from ships in service and paint company support accepting the Moderate level of flash rust.



# NAVSEA 05P23 Concept for New Start

## NSRP SP-3 Project to Reduce Costs by Allowing Retention of Flash Rust

	Initial Condition	Initial Prep.	Flash Rust Development	Remediate	Rationale
1	Old steel with paint intact or new, blasted steel with light “yard rust”	Waterjet and blow down	Store inside for as short of a duration as possible	None*	Create a condition which is <i>definitely light flash rust</i> . Although prepared with hand lance equipment, the condition is intended to simulate the condition achieved with vacuum equipment.
2		Waterjet clean	Store in “tented” environment to retain humidity, operate pressure washer or UHPWJ equipment to create humidity and cross-contamination.	None*	Intended to create a <i>Moderate to Heavy flash rust</i> which might result from cross-contamination by ongoing adjacent waterjetting operations.
3		Waterjet clean		Pressure Wash	The above <i>Moderate to Heavy flash rust</i> , remediated prior to painting.
4		Waterjet clean	Store outside for 3 weeks	None*	Create a <i>Moderate to Heavy flash rust</i> under conditions which represent the longest time which waterjetted steel might conceivably be exposed.
5	Old, pitted steel or new steel which has been exposed in a seawater tidal zone	Waterjet clean	Same as 2 and 3.	None*	Investigate the <i>impact of previously rusted steel</i> on the development of flash rust and subsequent evaluation and performance. <i>Moderate to Heavy flash rust is expected.</i>

# Cumbersome Work Practices

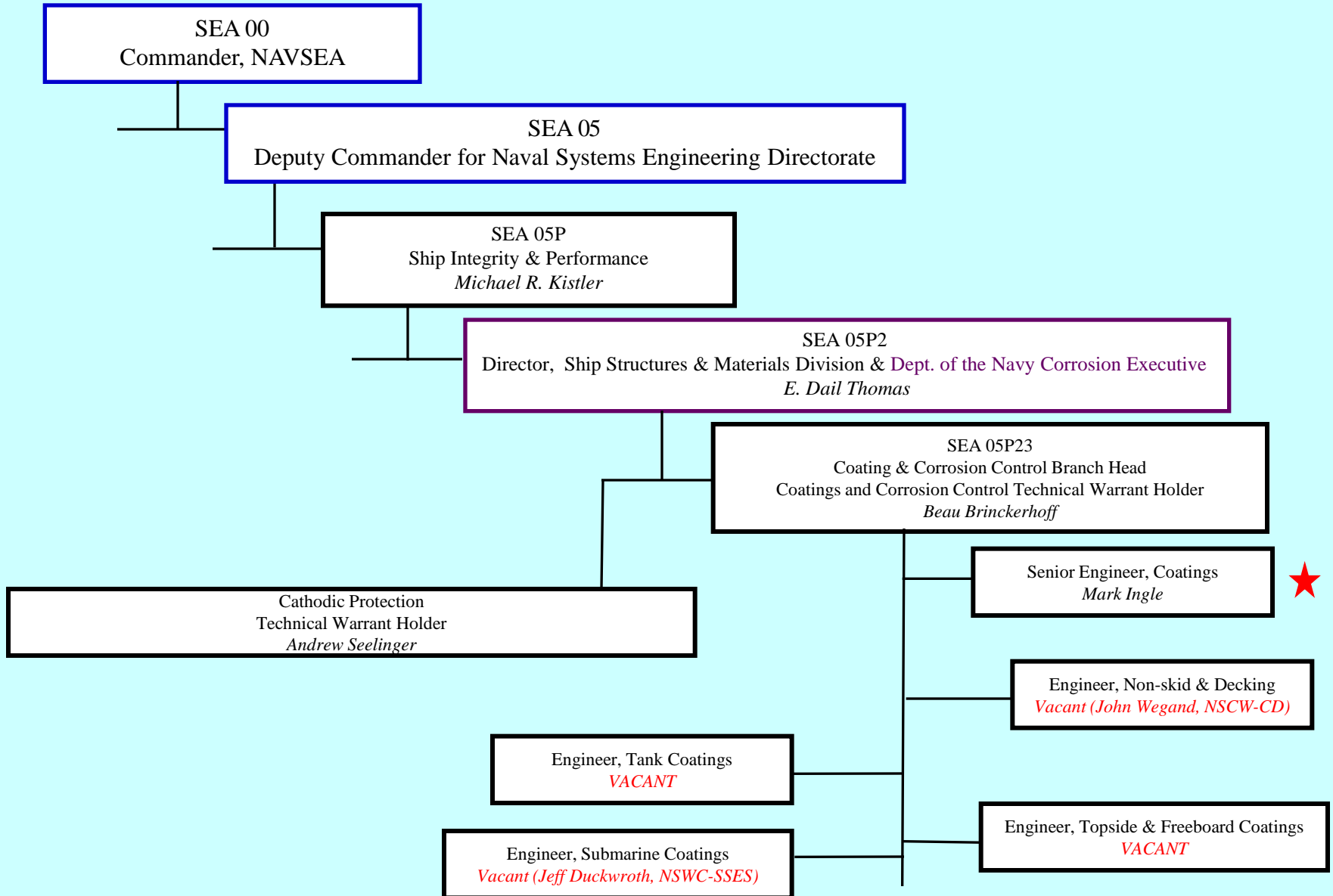
## NSRP Project to Reduce Costs by Allowing Retention of Moderate Flash Rust

### Accomplishments (continued):

1. Industry to provide estimated cost savings for underwater-hull coating with Moderate instead of Light level of flash rust.
2. SEA05P23 to modify FY-11 Standard Item 009-32 to allow underwater-hull coating over “Moderate” level of flash rust.
  - Tool/process to be rapid, reproducible, implementable in shipyard.
  - Tool/process to use standard dust tape and optical “tint” measuring device already used by police to ticket cars for dark windows.
3. Industry & SUPSHIP to implement Moderate level of flash rust:
  - Use established SSPC, SP-12 Criteria to adjudicate flash rust level.
  - Require surfaces to satisfy established 30 mScm conductivity requirements.
  - When rust level debated with contractor/yard, use SEA 05P23 tool to adjudicate Heavy to Moderate determination.
4. Process/Tool to be submitted to SSPC for incorporation into SSPC, SP-12.



# NAVSEA Corrosion Control & Coatings Organization



# NAVSEA 05P23 Concept for New Start Retention of High-solids Paint, NSRP SP-3 Task

- **New start, CWP task initiated by PSNS. Goal would be to reduce the time & money required to blast off intact, adherent high-solids coatings during repair.**

**SEA 05P23 concept is as follows:**

- 1. SP-1 entire tank, use water or steam to reduce chlorides as much as possible even from fissures or cracks in paint.**
- 2. Obtain SSPC, SP-10 on all bare areas of the tank. Areas of tight, adherent paint surrounding bare steel shall be retained.**
- 3. Residual, tight, adherent paint shall have a uniform color (e.g., no staining or residual oil, dirt, or rust); shall have no lifting, pulling or delamination visible with the unaided eye at edges; and shall have a minimum profile of 2-mils (note: there shall be no maximum profile on retained paint). Within a given PA-2 measurement area, profile on bare steel and profile on retained paint shall be evaluated as separate data sets.**
- 4. Coating shall be applied to bare steel areas in a stripe coat mode to overlap existing paint a < full, specified coating thickness.**
- 5. The final or second pass of the paint gun shall apply coatings to the entire tank and should not exceed 50-mils even over areas of retained paint.**
- 6. All standard QA/QC procedures & 50% RH shall be used in the tank and UV-light shall be used to inspect the coating for holidays and defects.**
- 7. The final tank shall be considered a 10-12 year tank coating for purposes of planning and re-inspection.**

# NAVSEA 05P23 Concept for New Start Preconstruction Primer Retention

## Problem:

- 009-32 and the NVR require PCP be removed from critical coated surfaces prior to applying coating system.

## Solution:

- Allow PCP to be retained on surfaces with appropriate QA/QC checks and Paint manufacturers approval as per commercial process around the world.
- NAVSEA suggests producing panels that fail due to improperly prepared preconstruction prime and work back to a "go, no-go" test for surface cleanliness and profile.
  1. Require >2 mils of profile and SP-10 surface cleanliness, and <85% RH during surface preparation and PCP application.
  2. Clean up installed plate using either blasting or pressure wash.
  3. Water-break/water-quality test of substrate quality.

## Accomplishments:

- Completed a DFS test on USS VICKSBURG (CG-69). PCP was over coated with UHS tank lining.
- Plan to inspect performance in FY-09.

