SPRING/SUMMER 2018

NESDI NEWS

Highlights & Happenings

INSIDE THIS ISSUE:

Who We Are

The NESDI program is the Navy's environmental research and development demonstration and validation (6.4) program, sponsored by the Chief of Naval Operations Energy and Environmental Readiness Division (OPNAV N45) and managed by the Naval Facilities Engineering Command (NAVFAC) from the Engineering and Expeditionary Warfare Center (EXWC) in Port Hueneme, CA. The mission of the program is to provide solutions by demonstrating, validating and integrating innovative technologies, processes and materials and by filling knowledge gaps to minimize operational environmental risks, constraints and costs while ensuring Fleet readiness.

https://epl.navfac.navy.mil/nesdi

NAVFAC Naval Facilities Engineering Command

The NESDI Program: Integrating Green Technologies Into the Fleet

From the Program Manager's Desk

Ken Kaempffe

Welcome to the spring/summer 2018 issue of *NESDI News: Highlights & Happenings*— part of our ongoing effort to keep you informed about the Navy Environmental Sustainability Development to Integration (NESDI) program.

This quarterly update provides you with the latest information about program operations, significant accomplishments and future focus areas for the NESDI program. We hope you will find these insights useful and that they encourage you to participate (or increase your involvement) in the program over the coming months.

Our website has a new home at NAVFAC's InformationTechnology Center (NITC) in Port Hueneme, CA. Our new web address is https://epl.navfac.navy.mil/nesdi. All of the functionality that you experienced via our prior URL (www.nesdi.navy.mil), including methods for submitting needs and proposals and viewing our Year in Review reports and quarterly newsletters, is now available on the NITC site. In addition to our new web address, and to comply with Navy security requirements, access to our website now requires a Common Access Card.

Our new web address is https://epl.navfac.navy.mil/nesdi.

The URL for our public presence on the Department of the Navy's Energy, Environment and Climate Change website has also changed. The new address for our public website is http://navysustainability.dodlive.mil/nesdi.

Another major milestone on our schedule is the execution of our needs solicitation process for fiscal year (FY) 2019. Although you can submit a need at any time, our formal needs collection process runs until 3 August. (See the "FY19 Needs Solicitation Process Launched" section in this issue of *NESDI News* for more insights.) So if you want to submit a need for consideration as part of our FY19 solicitation, you'll have to hurry.

The new address for our public website is http://navysustainability.dodlive.mil/nesdi.

We have just completed our In-Progress Reviews (IPR) for this fiscal year at the Pearl Harbor Naval Shipyard and NAVFAC EXWC. For more insights, see "Successful 2018 IPRs Held" in this issue of *NESDI News*.

Ken Kaempffe
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Successful 2018 IPRs Held

Each year, the NESDI program holds IPRs to check in on the progress made by the program's Principal Investigators and make sure that their efforts will achieve the intended results. These annual reviews bring together end users, resource sponsor representatives and researchers—shrinking the gap between the research and required integration efforts. Each year, dozens of participants attend or dial in to hear briefings about ongoing projects and to provide valuable feedback to the program's Principal Investigators.

At our first FY18 IPR held at the Ford Island Conference Center on board Joint Base Pearl Harbor-Hickam, NESDI Principal Investigators highlighted their ongoing efforts to address the persistent and difficult environmental issues facing the Navy. In addition to the dozens of project presentations, IPR attendees were also able to observe ongoing operations during an afternoon tour of the local shipyard.

The program's second FY18 IPR was held at NAVFAC EXWC in Port Hueneme, CA. Nearly 70 attendees from 18 different organizations participated in this IPR either in person or over the phone to hear the latest information on a number of our ongoing projects. Among the highlights of this second IPR were briefings on three of our projects that address the presence and management of perfluorooctanoic acid (PFOA) at environmental restoration sites.

Final attendee lists and briefings for both FY18 IPRs are available from Cindy Webber at cynthia.webber@navy.mil and 760-939-2060. More information about our FY19 IPRs will be provided in future issues of *NESDI News*.

FY19 Needs Solicitation Process Launched

Our formal needs collection process for FY19 runs from 1 June until 3 August. A total of 57 unique needs were collected via our needs solicitation process last year (for FY18). Once our Technology Development Working Group (TDWG) completed its screening and prioritization of these needs, a ranked list was forwarded to OPNAV N45's subject matter experts (SME) for their final review and approval. The following seven needs were ultimately reviewed and approved by those SMEs:

No.	Title	Need No.	Submitter
1.	Electromagnetic Interference Shielding Tape	N-1220-18	Peter Sheridan (NAVAIR)
2.	Demonstration/Validation of Air Filtration for Indoor Air Quality	N-1187-18	Mike Singletary (NAVFAC)
3.	Replacement of Cadmium in Ground Support Equipment Avionics Applications	N-1234-18	Dane Hanson (NAVAIR)
4.	Under Pier Sediment Pile Assessment Tools	N-1196-18	Len Sinfield (NAVFAC)
5.	Stormwater Piping-Based Pollutant Best Management Practice	N-1194-18	Len Sinfield (NAVFAC)
6.	Improving Site Closure Decision-Making with Time-Integrated Groundwater Samples	N-1188-18	Laura Himes (NAVFAC)
7.	Cost Effective Main Charge Remediation of Insensitive Munitions for Range Clearance	N-1179-18	Lesley Wilhelm (NAVSEA)

Due to FY18 funding reductions, the NESDI program did not request proposals to address the seven needs above. Instead, these needs will be addressed during this year's needs evaluation and ranking processes.

So, if you submitted a need that is not included on the list above and you want the program to consider it again this year, you must resubmit it. New needs will also be considered if submitted to the NESDI program's website by 3 August 2018.

The NESDI program defines a "need" as a requirement to eliminate or reduce an environmental constraint that:

1. Addresses an operational challenge
2. Identifies an existing gap in knowledge, technology and/or capability
3. Is associated with an environmental constraint or regulatory driver

When submitting a need, we encourage you to provide as much information as you can about your issue. What is the problem? How big is it? What's the basis of the problem? Is it due to a current or impending regulatory requirement that now makes your job more difficult? Is it a technology gap? Is it an operational challenge? Is the problem unique to your facility or is it applicable across the Navy?

https://epl.navfac.navy.mil/nesdi

To submit your need by 3 August, go to the NESDI website at its new address (https://epl.navfac.navy.mil/nesdi). Visit the "Needs" section on the NESDI website (at https://epl.navfac. navy.mil/nesdi/Needs.aspx) then click on the "Submit Your Need Now" button. This will take you to the "NESDI Environmental Needs Submission Form.

https://epl.navfac.navy.mil/nesdi/Needs.aspx

Use this form to tell us everything you can about your need. Then click on the "Submit Need" button to complete the process.

Once you submit your need, technical experts assembled by NESDI program management will assess, validate and rank it. You will be notified about the ultimate status of your need once this ranking process is complete. If you submitted a need in a previous year and it is still a valid need, please resubmit it via our website and provide any updated information you may have.

For more information, download our Reference Guide: Submitting and Evaluating Needs by visiting the NESDI website at https://epl.navfac.navy.mil/nesdi/Needs.aspx then clicking on the "Needs" banner and then clicking on the "reference guide" hyperlink. Any other questions about the use of our website can be directed to Eric Rasmussen, our webmaster, at eric.rasmussen@navy.mil and 732-323-7481.

New Projects Underway

In this section of *NESDI News*, we introduce you to three of our "new start" projects that focus on environmentally-friendly coating application and removal processes.

Initiation Decision Report of Laser Coating Removal on Naval Aircraft Components (project no. 557)

Removing Paint with Lasers Reduces Risk, Saves Time

The depainting processes performed on Navy aircraft generate significant quantities of primary and secondary hazardous waste, resulting in substantial wastewater treatment and hazmat disposal costs. At the Fleet Readiness Center Southeast (FRC-SE) the current wastewater treatment facilities are antiquated and commercially available off-the-shelf products to upgrade these facilities are unable to process the current wastewater due to high levels of organic compounds.

In addition, the conventional chemical and abrasive depainting processes employed at FRC-SE may pose significant safety and health risks to production artisans. Despite safety precautions, workers are routinely exposed to volatile organic compounds (VOC) and hazardous air pollutants (HAP). These operations also cause repetitive motion-related injuries and muscle strain. The existing process may pose a risk to delivering aircraft on time.

One operation that is particularly problematic is the removal of coatings on the radar dome (radome) located on the nose of the aircraft. Since aircraft radar is situated in this area, a protective film known as a radome boot is applied. Currently, these radome boots are removed via sanding (mechanical) operations. These operations generate waste and dust and may result in damage to the underlining composite structure. The repair of damage caused by mechanical coating removal contributes to long lead times on these in-demand components—approximately eight hours to remove the radome and 24 hours for a full re-work. In addition, current workload for aircraft and component coating removal is significant at FRC-SE and is expected to increase.

In recent years, the laser paint stripping process has undergone dramatic improvements. Unlike mechanical techniques, paint stripping by laser is fast, efficient and safe for workers.

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In laser stripping, paint is heated by lasers and vaporized, followed

New Projects Underway (continued)

Typical radome with boot. (Photo Credit: Stephen Starnes)

by immediate combustion as it leaves the surface and encounters oxygen in the air.

Several different laser depainting systems are available, ranging from simple hand-held laser equipment to fully automated systems capable of coating removal from an entire aircraft. The Ogden Air Logistics Center at Hill Air Force Base is currently using the Laser Automated De-coating System (LADS) II for coatings removal on F-16 Fighting Falcon and C-130 Hercules radomes. This system has significantly reduced coating removal time, reduced hazardous waste generation by over 99 percent, eliminated worker exposure to hazardous de-coating chemicals and repetitive motion-related injuries and eliminated damage to the radomes caused during de-coating.

This NESDI project will survey various existing technologies to determine the potential effectiveness of these technologies for use at FRCs. Differences in Navy and Air Force radomes and coatings will be identified to determine what type of additional testing is required. If the technology meets the project team's acceptance criteria, the results of this Initiation Decision Report could lead to additional needs for the testing of laser depainting equipment on naval coatings and substrates.

The project's final report will detail advantages and limitations of the identified technology, including level of development, applicability (i.e., substrate and coating compatibility) and will specify required testing protocols to compare current hand sanding method and laser depainting techniques.

The successful application of this process on radomes will likely scale up for future full aircraft coatings removal, further reducing costs and human health risks, saving time and requiring minimal facility modification.

For more information about this project, contact Stephen Starnes (Fleet Readiness Center Southeast) at 904-790-6410 and stephen.starnes@navy.mil.

New Projects Underway (continued)

Elimination of Hexavalent Chromium from Magnesium Conversion Coating Processes at Fleet Readiness Centers (project no. 562)

Color Changing Chemistry Will Aid Alternative Process Assessment

Metal finishing processes, including conversion coatings, are performed at all major Navy FRCs. Conversion coatings are thin films applied to alloys to provide some measure of corrosion protection and to promote adhesion between the alloy and subsequent surface treatments. These coatings are generated by reaction between the metal and a chemical solution. While process specifications vary among FRCs, all current processes for applying conversion coatings to magnesium alloys use hexavalent chromium (hex chrome) -based chemistries, long established as both toxic and carcinogenic.

At the FRCs responsible for processing magnesium parts, the total magnesium conversion process tank volume exceeds 3,200 gallons, meaning that at any given time there is over 3,200 gallons of solution containing some level of hex chrome. At a single FRC, the cost associated with cleaning to limit heavy metal exposure to personnel exceeds $1 million per year. Similar costs are borne across other FRCs—and this does not even include the further costs associated with management of the hazardous waste.

Components of the H-53 and other helicopters are target applications for a non-hex chrome conversion coating process. (Photo Credit: Ismael Ortega)

Elimination of hexavalent chromium from magnesium finishing processes would be of great benefit toward the Navy's goal of reducing heavy metal usage.

All current processes for applying conversion coatings to magnesium alloys use hex chrome-based chemistries.

Several hexavalent chromium-free conversion coating formulations were evaluated by the Navy in the past for use on magnesium alloys and laboratory results showed comparable performance to the hex chrome-based formulas. Attempts to transition these technologies for use on magnesium alloys were not successful for various reasons; one of which is the lack of an observable color change. The presence of hex chrome conversion coatings is readily apparent due to their characteristic iridescent gold color, making it simple for artisans to assess the efficacy of a coating process. In contrast, none of the hex chrome-free coatings were observable, making process assessment very challenging.

The project team will first compare the processes in place at each FRC such that any new process at a minimum meets existing requirements. Next, extensive laboratory tests will be conducted using metrics such as coating weight/thickness and appearance to identify two to three potential candidates. The evaluation of color additives will be an integral part of

this process. These candidates will be subjected to corrosion resistance testing. If successful, a pilot process line will be established at a suitable FRC using the chosen formulation. Corrosion/adhesion performance will remain the primary metric, but effectiveness of the color additive will also be a critical metric in assessing the process.

To be successful, replacement coatings need to perform at least comparably to the current coatings and exhibit similar process characteristics. If successful, demonstration at a second FRC will start at the beginning of year three. A secondary goal is to generate sufficient data and know-how for the possible future development of a detailed specification for a non-hex chrome conversion coating process with the aim of aligning processes across FRCs.

If demonstration/validation work proves successful, implementation will begin at the demonstration site(s) immediately, before transitioning to other FRCs. This technology could be of value to other services, in particular the Army. Army engineers have expressed interest in the proposed program and possible future collaboration.

For more information about this project, contact Alan Grieve (Naval Air Warfare Center – Aircraft Division, Patuxent River, MD) at 301-342-6807 and alan.grieve@navy.mil.

Low-VOC Primers for Ground Support Equipment Application (project no. 563)

Validating Primers to Keep Pace with Rigorous Environmental Regulations

There is a push both at the federal and local levels for the continual reduction of VOCs and HAPs associated with painting operations. Many of the military specification (mil-spec) primers have not changed significantly, whereas local and federal environmental regulations are continually changing. Two of these local regulations, in the state of Maryland and Ventura County California, have the most stringent regulations in the nation with a primer maximum VOC limit of 250 gallons per liter (2.1 pounds per gallon). The current mil-specs for aircraft ground support equipment (GSE) primers have a maximum VOC requirement of 340 gallons per liter (2.8 pounds per gallon), meaning they are out of compliance with these current regulations.

While these rules currently affect only two jurisdictions (Maryland and Ventura County), environmental regulations are traditionally broadly adopted and likely to be adopted elsewhere. The effects on the Maryland jurisdiction is significant because the primary overhaul facility for aviation support equipment is located in Solomons, MD.

Failure to identify low-VOC primer alternatives can adversely affect Navy GSE coatings operations and increase compliance cost of current and future local and U.S. Environmental Protection Agency environmental legislation.

Failure to identify low-VOC primer alternatives can adversely affect Navy GSE coatings operations and increase compliance cost of current and future local and U.S. Environmental Protection Agency environmental legislation.

According to the Naval Air Systems Command, the preferred primer for GSE are products qualified to the Army-maintained MIL-PRF-53022 specification. Acceptable alternate primers are products qualified to MIL-PRF-23377 Class N (the mil-spec for the non-chrome class of primers). This effort will identify, test and qualify GSE-acceptable primers to the MIL-PRF-23377 specification that are both HAP-free and VOC-compliant. Modified low-VOC formulations of qualified MIL-PRF-23377 non-chrome primers will be evaluated, as will metal-rich primer technologies and other potential low-VOC primers.

Laboratory testing will be performed on both steel and aluminum substrates with pretreatments and surface preparations that will capture the varying requirements of MIL-PRF-23377 and

New Projects Underway (continued)

Primer is applied to GSE such as this mid-range tow tractor (left) and fire truck (right).

(Photo Credit: Atish Gupta)

MIL-DTL-53022 and the capabilities of the GSE rework locations. Testing will include but not be limited to viscosity, spraying properties, pot life, dry time, adhesion, corrosion resistance, flexibility, fluid resistance, strippability as well as compatibility to qualified topcoats.

Upon successful laboratory testing, demonstration and validation of the low-VOC primers is anticipated to occur at FRCs in North Island, CA and Solomons Island, MD. The low-VOC primers will be applied on both land-based and shipboard GSE. The coating(s) will be evaluated for application characteristics and user friendliness.

The durability of the new coating systems will be evaluated by photo documentation and direct visual inspection. Land-based evaluation intervals will be every six months for a total of two years. Shipboard GSE will similarly be evaluated as close to the six-month interval as ship schedules permit.

The proposed primers must pass the rigorous performance requirements that are currently asked of MIL-PRF-23377 products and perform satisfactorily to many of the performance requirements of MIL-DTL-53022.

Upon successful laboratory testing and field demonstration, MIL-PRF-23377 will be revised and the Qualified Products List will be populated with low-VOC and HAP-free products. If an acceptable primer(s) is identified that satisfies both GSE and aerospace requirements, the "Cleaning and Corrosion Control" manual (NAVAIR 01-1A-509) and the "Airborne Weapons and Associated Equipment" manual (NAVAIR 01-1A-75) will be updated at their next revision or Interim Rapid Action Changes will be generated.

For more information about this project, contact Michael Brindza (Naval Air Warfare Center – Aircraft Division, Patuxent River, MD) at 301-995-3897 and michael.brindza@navy.mil.

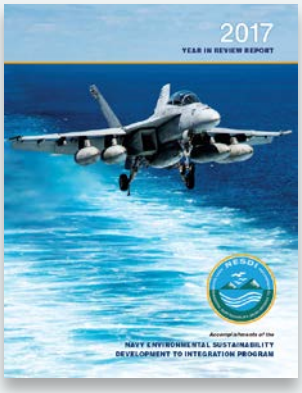
Program Schedule

Through the summer, the program will concentrate its efforts on collecting and evaluation the needs received via our FY19 solicitation. A complete program schedule for the next year is provided below.

No.	What	When
1.	**Close FY19 Needs Solicitation**	**3 August 2018**
2.	**Screen Needs**	**13-17 August 2018**
3.	**Evaluate & Rank Needs**	**10-14 September 2018**
4.	**Obtain Sponsor Review & Approval of Needs**	**21 September - 12 October 2018**
5.	Request Pre-proposals	15 October 2018
6.	Pre-proposals DUE	14 November 2018
7.	Make Pre-proposals Assignments to FWGs	30 November 2018
8.	TDWG & FWG Comments on Pre-proposals DUE	19 December 2018
9.	Evaluate Pre-proposals	7-11 January 2019
10.	Request Full Proposals	17 January 2019
11.	Conduct OPNAV N45 Programmatic Review	January 2019
12.	Conduct First FY19 In-Progress Review	29 April – 3 May 2019 (Washington Navy Yard, DC)
13.	Conduct Second FY19 In-Progress Review	3-7 June or 10-14 June 2019 (San Diego, CA)
14.	Quarterly Status Reports Due	2 July 2018 October 2018 7 January 2019 1 April 2019

Getting on Our Mailing List

If you're not already on our mailing list and want to subscribe to *NESDI News*, please send your email address to Lorraine Wass at ljwass@outlook.com.



Annual Report Published

We have just published our FY17 Year in Review report. This report profiles "new starts" for the past fiscal year and discusses projects that were particularly successful in demonstrating the use of an innovative technology or integrating critical information to stakeholders across the Navy. To download a copy, visit https://epl.navfac.navy.mil/nesdi/AnnualReports.aspx (Common Access Card required).

Contact Your TDWG Member

For more information about the operation of the NESDI program, contact Ken Kaempffe, the NESDI program manager, or members of the TDWG.

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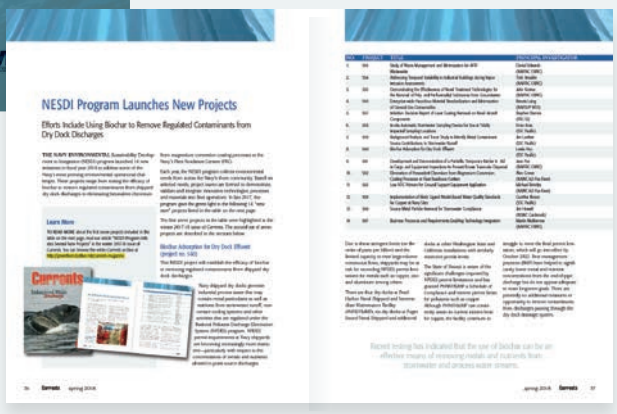
In the Next Issue of *NESDI News*

There is a lot more information coming your way in the next issue of *NESDI News: Highlights & Happenings*. In our fall 2018 issue, we will provide you with updates on our efforts to evaluate and rank the needs we received via our FY19 solicitation process.



Until then, look for an article about some of our FY18 "new start" projects in the spring 2018 issue of *Currents*, the Navy's energy and environmental magazine.

You can read our latest article "NESDI Program Launches New Projects" on-line at http://navysustainability.dodlive.mil/currents-magazine.