NESDI News

Highlights & Happenings

WINTER/ SPRING 2023

INSIDE THIS ISSUE:

WHO WE ARE

The Navy Environmental Sustainability Development to Integration (NESDI) program is the Navy's environmental research and development, demonstration and validation (6.4) program, sponsored by the OPNAV N4I Installations Division and managed by the Naval Facilities Engineering Systems Command (NAVFAC) out of 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 Navy readiness and lethality.

The NESDI Program:
Integrating Green Technologies Into the Fleet

WINTER/
SPRING 2023

From the Program Manager's Desk

Ken Kaempffe

Welcome to the winter/spring 2023 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.

In this issue, we highlight four of the seven "new start" projects that we launched at the beginning of FY23—three of which are tackling the challenges associated with per and polyfluoroalkyl substances (PFAS) including quicker identification of PFAS in soil (project no. 605), treating PFAS co-contaminates (project no. 606), and the use of a mobile unit to destroy PFAS in aqueous media (project no. 608). We also provide a schedule for our FY23 In-Progress Reviews (IPR) as well as a year-out program schedule.

Our management committee—the Technology Development Working Group (TDWG)—will be busy over the next several months reviewing the dozens of full proposals we requested from potential investigators.

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.

Ken Kaempffe
ken.kaempffe@navy.mil

FY23 "New Start" Projects Launched

Subject matter experts from the program's resource sponsor approved the following seven efforts as our "new start" projects for FY23:

1. 3D-Printed Cone Spray Ionization Mass Spectrometry for the Rapid, Low-Cost and In-Situ Detection and Mapping of PFAS in Soil (project no. 605)
2. External Concentrating Parabolic Collector (XCPC) Solar Thermal Evaporation for PFAS-Impacted Wastewater Minimization (project no. 606)
3. Artificial Intelligence for Environmental Compliance (project no. 607)
4. Application of Supercritical Water Oxidation (SCWO) to Destroy PFAS-Impacted Waste Streams (project no. 608)
5. Oxsol-Free and Low-VOC Surface Ship Topside Coatings for Maintaining Environmental Regulations (project no. 609)
6. Evaluation of Existing and Required Pierside Infrastructure to Accommodate Shoreside Collection and Treatment of Navy Vessel Ballast Discharges (project no. 610)
7. Subsurface Fate and Transport of Petroleum Based Contaminants in Naval Facilities (project no. 611)

The first four of the projects listed above are highlighted on the following pages. The remaining three projects will be highlighted in the next issue of *NESDI News*.

FY23 "New Start" Projects Launched *(continued)*

3D-Printed Cone Spray Ionization Mass Spectrometry for the Rapid, Low-Cost and In-Situ Detection and Mapping of PFAS in Soil (project no. 605)

PRINCIPAL INVESTIGATOR:
Patrick Fedick, Ph.D.

Traditional analysis methods for PFAS detection utilize time-consuming extraction methods followed by lengthy chromatographic separations with mass spectrometry detection. To overcome these issues, a cone spray ionization (CSI) method is used, consisting of a three-dimensional cone constructed of folded filter paper, which allows solid samples to be placed within the hollowed compartment. A hole at the tip of the cone allows PFAS to pass through for analysis.

Analysis of PFAS in bulk soil by 3D-printed cone spray ionization mass spectrometry.
(Photo Credit: Patrick Fedick)

While this method produces good results, reproducibility can be a limitation due to variability of the manual cone construction. This team is using a rigid, 3D printed CSI (3D-PCSI) cone to replace the hand-shaped cone. The 3D-PCSI mass spectrometer will also be improved through the use of an autosampler, which will hold 6-8 cones at a time. This will result in a process that is at minimum 30 times faster than traditional chromatography MS.

External Concentrating Parabolic Collector (XCPC) Solar Thermal Evaporation for PFAS-Impacted Wastewater Minimization (project no. 606)

PRINCIPAL INVESTIGATOR:
Hunter Spence

Per and polyfluoroalkyl substances (PFAS) are a persistent problem at Department of Defense facilities. However, due to the co-constituents in PFAS wastewater, incineration is currently the only option available for much of this wastewater.

Evaporation is an attractive option for PFAS-impacted wastewater because PFASs of interest do not readily volatilize during boiling, thus do not leave the bulk solution during evaporation. The External Compound Parabolic Concentrator (XCPC) is an emerging technology that, when combined

FY23 "New Start" Projects Launched *(continued)*

The XCPC system. (Photo Credit: Winston Cone Optics)

with a commercial off-the-shelf (COTS) thermal evaporation unit and a steam condenser, is capable of achieving wastewater volume reductions of greater than 90 percent. This project will demonstrate and evaluate an XCPC system. At the end of the project, a peer-reviewed academic paper will document the results of the demonstration, and will serve as supporting evidence to regional regulators of the scientific validity of using this technique.

Artificial Intelligence for Environmental Compliance (project no. 607)

PRINCIPAL INVESTIGATOR: Hunter Klein

The objective of this effort is to demonstrate the capability of artificial intelligence (AI) and machine learning (ML) to predict the risk of an installation experiencing a future notice of violation (NOV) or noncompliance event.

Recent improvements in memory capacity, processing speed, and programming tools have made analytics via AI/ML more accessible and powerful than ever before. ML models present a way to evaluate large volumes of data to look for patterns, trends, relationships and other associations that can help the Navy to understand and predict the potential for violations. This project team will select candidate ML models based on prediction method and data constraints and apply them to identified regulatory data repositories. The end goal is to select a model or models that can be used to predict the probabilities of certain noncompliance events.

Machine learning and artificial intelligence are becoming part of everyday data science training programs. (Photo Credit: Elisha Gamboa)

FY23 "New Start" Projects Launched *(continued)*

Application of Supercritical Water Oxidation (SCWO) to Destroy PFAS-Impacted Waste Streams (project no. 608)

PRINCIPAL INVESTIGATOR: Ramona Iery, Ph.D.

This team is designing and demonstrating a mobile Supercritical Water Oxidation (SCWO) demonstration system capable of destroying PFAS. The SCWO technique has been demonstrated in the laboratory to destroy PFAS in various aqueous solutions. SCWO destroys PFAS compounds to form carbon dioxide, water, and hydrofluoric acid (HF). HF is neutralized with a base such as sodium hydroxide prior to discharging the treated water. SCWO differentiates itself from other PFAS treatment technologies in several ways, including the fact that it can destroy PFAS in aqueous media in less than 10 seconds. Because SCWO destroys PFAS rather than transferring them to other media, it eliminates future liability to the Navy. Successful demonstration of SCWO will validate it for application at sites having PFAS-impacted wastes and will provide data necessary for Navy project managers to assess the efficacy and cost of the technology.

Soil and/or wastewater from well installations can be a source of per and polyfluoroalkyl substances. (Photo Credit: Theanne Tangen)

Fact sheets for the above and other NESDI projects will be made available on the program's public website at www.navfac.navy.nil/nesdi.

NIWC Personnel Receive Patent for Stormwater Technology

Personnel from NIWC Pacific and NAVFAC Southwest were granted a patent of the "In-Pipe Stormwater Treatment System" (NESDI project no. 576) led by Brandon Swope). This project is evaluating the efficacy of a novel in-pipe treatment system to aid with stormwater permit compliance. Investigators successfully completed the first field demonstration with a "commercializable" version of the in-pipe stormwater BMP. The system was evaluated over the course of several storm events at Naval Amphibious Base Coronado. Results were promising with reductions in total suspended solids (TSS), copper and zinc. A few final design modifications were made to further optimize the system. A patent for the system (U.S. patent no. 11459744) was issued on 4 October 2022. Future work will include controlled BMP evaluation at the newly constructed pseudo-pipe testing site at Naval Information Warfare Center (NIWC) Pacific. Additional work will focus on technology transition, both to additional sponsors and end users, as well as a path to commercialization.

The final version of the patent is available from the USPTO website at http://patft.uspto.gov/netacgi/nph-Parser?patentnumber=11459744.

FY23 In-Progress Reviews Scheduled

The program is will hold two IPRs over the course of FY23 following the schedule below.Principal Investigators and TDWG members are encouraged to adjust their calendars accordingly.

What	When	Investigators Presenting
First IPR	25-27 April 2023	NAVFAC EXWC and others
Second IPR	9-11 May 2023	NIWC Pacific and others

WINTER/
SPRING 2023

Program Schedule

An entire program schedule for the next year is provided below.

No.	What	When
1.	Full Proposals DUE	10 March 2023
2.	Screen Full Proposals	27–31 March 2023
3.	Principal Investigator Answers to Full Proposal Screening Questions DUE	21 April 2023
4.	Full Proposal Review and Evaluation	21 April to 12 May 2023
5.	Conduct First In-Progress Review	24–28 April 2023
6.	Conduct Second In-Progress Review	8–12 May 2023
7.	Complete Evaluation of Full Proposals	19 May 2023
8.	Obtain Sponsor Review & Approval of Full Proposals	22 May to 30 June 2023
9.	Announce FY24 Needs Solicitation	1 June 2023
10.	Close FY24 Needs Solicitation	3 August 2023
11.	Screen FY24 Needs	21–25 August 2023
12.	Evaluate & Rank Needs	28 August to 29 September 2023
13.	Obtain Sponsor Review & Approval of Needs	2–27 October 2023
14.	Request Pre-proposals	30 October 2023
15.	Pre-proposals DUE	8 December 2023
16.	Evaluate Pre-proposals	8 December 2023 to 19 January 2024
17.	Request Full Proposals	24 January 2024
18.	Conduct Programmatic Review with NAVFAC Headquarters and OPNAV N4I Installations Division	January 2024
19.	Quarterly Status Reports Due	3 April 2023 3 July 2023 2 October 2023 8 January 2024

Check out our website www.navfac.navy.mil/nesdi/Schedule.aspx for the latest version of our program schedule.

WINTER/
SPRING 2023

NESDI News
Highlights & Happenings

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 Eric Rasmussen at eric.rasmussen@navy.mil.

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.

Kaempffe, Ken (Chair)
NAVFAC
805-982-4893
kenneth.c.kaempffe.civ@us.navy.mil

Bixler, Christy
CNIC
202-685-9313
christy.d.bixler.civ@us.navy.mil

Earley, Pat
NIWC
619-553-2768
patrick.j.earley.civ@us.navy.mil

Harre, Karla
NAVFAC
805-982-2636
karla.j.harre.civ@us.navy.mil

Henning, Jeff
NAVSUP
717-605-2861
jeffrey.a.henning.civ@us.navy.mil

Hertel, Bill
NAVSEA
301-227-5259
william.m.hertel4.civ@us.navy.mil

Jordan, Kristin
NAVSEA
202-781-2883
kristin.a.jordan.civ@us.navy.mil

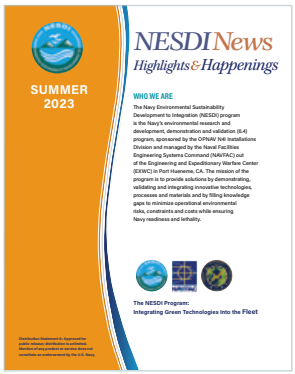
McCaffrey, Bruce
Consultant
773-376-6200
brucemccaffrey@sbcglobal.net

Rasmussen, Eric
NAVAIR
732-323-7481
eric.w.rasmussen6.civ@us.navy.mil

Webb, Tom
NAVFAC
805-982-2574
thomas.h.webb.civ@us.navy.mil

Webber, Cindy
NAVAIR
760-939-2060
cynthia.k.webber.civ@us.navy.mil

Youngers, Luzmarie
NAVAIR
904-790-6382
luzmarie.youngers.civ@us.navy.mil



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 summer 2023 issue, we will provide you with updates on the status of our review and ranking of our most recent set of full proposals.