

# Superfund Research Program *e-Posted Notes*

SRP Annual Meeting Special Edition

## E-Posted Notes Special Edition: 2020 SRP Annual Meeting

### First Virtual SRP Annual Meeting a Success

The NIEHS Superfund Research Program (SRP) 2020 Annual Meeting, held virtually December 14-15, connected over 650 researchers, administrators, trainees, and partners from across the country to share findings and discuss their experiences. There were more than 250 posters submitted, a new record.

This special edition e-Posted Notes newsletter provides a recap of sessions, photos, and other moments throughout the two-day broadcast. Thank

you to everyone involved and a special note of thanks to the organizers from Texas A&M University (TAMU) SRP Center for making the meeting such a success!

For a broad overview of the meeting, visit the [NIEHS Environmental Factor](#).

### Welcoming Grantees

The program brought together a network of multidisciplinary scientists with expertise in diverse fields who provide solutions to public and environmental health issues. This year the meeting focused on two over-arching themes:

- Addressing hazardous substance exposures at the community level.
- Meeting the challenges of environmental protection with 21st century science.

The meeting kicked off with TAMU SRP Center Director **Ivan Rusyn** who thanked TAMU SRP Center Administrator **Arlean Rhode** and SRP Health Scientist Administrator **Michelle Heacock**, whose combined effort helped the meeting come together.

Additional opening remarks were provided by the TAMU Vice President for Research, **Mark Barteau** who described how integral the TAMU SRP Center is to the university's science program. He stressed the importance of funds provided by SRP for interdisciplinary projects to address the needs and priorities of local communities, such as maternal health disparities and toxic releases during disasters.

During opening remarks, NIEHS SRP Director **William Suk** wished attendees to stay safe and healthy during these difficult and unprecedented times and expressed admiration for all SRP Centers providing support to their communities this year. He stressed the importance of how SRP's multi-disciplinary framework enabled SRP researchers to expand their research and collaborations to meet the immediate needs of populations most vulnerable to the COVID-19 pandemic.



## Keynote Speakers Address Environmental Challenges

### T.e.j.a.s and TAMU: Building Resilient Communities

**Juan Parras** and **Nalleli Hidalgo**, from the non-profit [Texas Environmental Justice Advocacy Services](#) (t.e.j.a.s.), described work in marginalized communities in Texas suffering from a high burden of environmental injustice. They presented a video of tours around several residential areas in Houston exposed to hazardous air pollutants, including a metal recycling facility that has exposed community members to an array of pollutants.

T.e.j.a.s. is dedicated to educating individuals on the health concerns and implications arising from environmental pollution.

They collaborate with the Community Engagement Core (CEC) at the TAMU SRP Center to provide community members with tools necessary to create sustainable and environmentally healthy communities.



T.e.j.a.s leads tours that showcase the environmental concerns of communities in Southeast Texas.

### Russell Thomas: Environmental Protection in the 21st Century

Director of the Center for Computational Toxicology and Exposure at the U.S. Environmental Protection Agency (EPA), **Russell Thomas**, discussed the EPA's work to eliminate animal testing by 2035. Thomas acknowledged the cutting-edge computational and technological advances from SRP researchers, including the development of high throughput toxicokinetic assays and phenotypic profiling, that have enabled new approaches for toxicological and exposure-related evaluations. He stressed that scientific advances by SRP grantees and trainees are key to the short- and long-term success of the EPA's goal to fill data gaps in evaluating chemicals for effects on human health while reducing animal use.



Thomas expressed that researchers play a key role in achieving the EPA's goals.

## Main Meeting Sessions: Scientific Innovations

### Session 1: Community-Informed Superfund Research

In the first scientific session, SRP researchers discussed various projects focused on community-informed science.

- **Harrison Schmitt**, a graduate student at the University of Arizona, is exploring psychological health consequences, risk factors, and pathways to community resilience surrounding chronic environmental contamination. Schmitt and team have been engaged in a community-based research project with community members who have lived through water contamination and continue to experience its impacts.
- TAMU graduate student **Rui Zhu** discussed an engaged approach to repurposing vacant community lots with green infrastructure. Green infrastructure regeneration projects were evaluated for three marginalized neighborhoods in Houston, Texas, using landscape, economic, and hydrologic performance measures.
- **Tyler Gripshover**, a University of Louisville graduate student, is developing ways to understand the effects of volatile organic compound exposures on liver apoptosis. The analysis evaluates associations of exposure biomarkers with liver injury and adipose tissue in a sample of 214 volunteers participating in the Gulf Long-term Follow-up (GuLF) Study. The GuLF Study is a five-year research project examining the human health



TAMU graduate student Rui Zhu was introduced by TAMU CEC Co-Investigator, Galen Newman.

consequences of the Deepwater Horizon oil spill in April 2010.

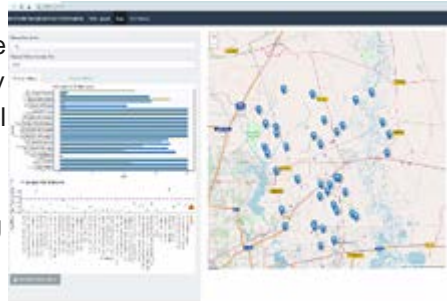
- University of California, Berkeley (UC Berkeley) postdoc **Claire Pace** is working on advancing California's Human Right to Water Law by characterizing disparities in drinking water quality among domestic well communities and community water systems. Pace has contributed to the [UC Berkeley Community Engagement Core—Water Equity Science Shop](#) (CEC WESS) by creating a domestic well community data layer for the [Drinking Water Tool](#). This tool was developed by the UC Berkeley CEC WESS in partnership with the [Community Water Center](#).

## Session 2: Data Science Solutions for Superfund Challenges

The second session highlighted work by SRP-funded scientists who are exploring how data-driven research can be used to better characterize environmental exposures and their potential adverse health effects.

- Michigan State University (MSU) postdoc **Rance Nault** described a collaboration between SRP Centers at MSU, University of Kentucky, University of Louisville, and University of Iowa to make toxicological data findable, accessible, interoperable, and reusable (FAIR). The researchers developed and implemented guiding principles to effectively standardize toxicology studies to make collected data FAIR. The guiding principles include a data management framework, ontologies for specific fields, metadata requirements, and data collection templates.

- **Dillon Lloyd**, a research assistant at North Carolina State University, collaborated with TAMU to develop an R Shiny tool to visualize and analyze location-based data. The tool allows users to analyze their data without any scripting knowledge. Lloyd demonstrated the effectiveness of the tool to perform geospatial analysis and visualization using data on chemical and biological assays from samples in Houston, Texas.



Lloyd showed a screen capture of the R Shiny tool, which has an easy input interface and can be applicable to multiple data types.

- UC Davis graduate student **Madison Hattaway** described her work to identify breakdown products of anthropogenic chemicals. She developed a workflow using tools such as a feature-based molecular network and machine learning algorithms to process nontarget data. Hattaway applies this methodology to assess the removal and transformation of pesticides from agricultural run-off in municipal wastewater and woodchip-based bioreactors.
- **James Gibson**, a recent graduate from Dartmouth College, introduced the Biological Elemental Imaging Database (BEID), a tool to make synchrotron-based spectroscopy data FAIR. Dartmouth researchers use synchrotron x-ray fluorescence to precisely localize various elements within living plant tissues. Elemental imaging data from synchrotrons come in wide formats, and BEID is a crucial first step to easily share, standardize, and exchange data.

## Successes of Transdisciplinary Training

### Wetterhahn Award: Jennifer Kay, Ph.D.

**Jennifer Kay** was named the 23rd winner of the Karen Wetterhahn Memorial Award at the 2020 Annual Meeting. Kay completed her Ph.D. under the direction of Bevin Engelward at the Massachusetts Institute of Technology (MIT) SRP Center and studies how genetic factors affect susceptibility to mutations and cancer following exposure to N-nitrosodimethylamine (NDMA). NDMA is a contaminant found near a Superfund site in Wilmington, Massachusetts. As a postdoctoral fellow, Kay directed the center's Research Translation Core (RTC). Earlier this year, she moved to a research scientist position at Silent Spring Institute. Read more about Kay and her research in the

## KC Donnelly Award Talks

Scientific sessions featured talks given by [2019 KC Donnelly Externship Award Winners Jill Riddell](#) and **Nabil Shaikh**, who described their experiences and results from their SRP-funded externship. Riddell is a Ph.D. candidate at West Virginia University. She gained insight into the mechanisms by which chemicals adhere to sediments as a result of her externship under the mentorship of Jon Chorover at the University of Arizona. Shaikh is a Ph.D. candidate at the University of New Mexico and traveled to the University of Iowa to work with Keri Hornbuckle and Andres Martinez. He discussed findings from uranium uptake experiments performed with the help of resources provided by the KC Donnelly Award.

The SRP also congratulated the eleven students who received [2020 KC Donnelly Externship Awards](#). The experiences of these SRP trainees are unique and wide-ranging, and these awards showcase the diversity of research performed by a new generation of passionate scientists.

## Graduate Student Poster Winners

The graduate student poster competition provided an opportunity for SRP graduate students to explain their research and showcase innovative findings. Congratulations to the six students who received awards in the annual poster competition!

The winners were:

- **Meichen Wang**, TAMU: “Testing the Efficacy of Broad-Acting Sorbents for Environmental Mixtures using Isothermal Analysis, Mammalian Cells, and *H. vulgaris*”
- **Brittany Rice**, University of Kentucky: “Lack of Nrf2 Does Not Exacerbate the Detrimental Metabolic Outcomes Caused by In Utero PCB126 Exposure”
- **Jennifer Toyoda**, University of Louisville: “Hexavalent Chromium Decreases Securin Expression and Increases Separate Substrate Cleavage in Human Lung Cells”
- **Mathew Malecha**, TAMU: “Comparing Regional Drivers of Toxics Transferal Risk: Applying the Toxics Mobility Vulnerability Index in San Diego County, CA; Harris County, TX; and the State of Rhode Island”
- **Aaron Whitt**, University of Louisville: “Exploring the Role of Paraoxonase 2 in Non-small Cell Lung Carcinoma”
- **Jessica Beard**, MIT: “Atlantic Killifish Retain PAH-Adapted Phenotype Following Elizabeth River Remediation”

As a reminder for SRP Annual Meeting attendees, all posters and meeting materials are still available for review in the [annual meeting webpage](#).

## Platform Award Winners

The scientific presentations provided an opportunity for SRP trainees to share their unique SRP-funded research and showcase interesting findings. Congratulations to the winners from Sessions I and II!

Session I winner:

- **Clare Pace**, University of California, Berkeley: “Advancing California’s Human Right to Water Law: Characterizing inequities in drinking water quality among domestic well communities and community water systems”

Session II winner:

- **Dillon Lloyd**, TAMU and North Carolina State University: “An R Shiny tool for spatial correlations analysis of biological and chemical measurements”

### TAMU SRP Center CEC gets Spotlight

The SRP Annual Meeting customarily offers a satellite meeting highlighting research translation and community engagement activities. In 2020, this event occurred as a webinar in November, and offered the TAMU SRP Center CEC a chance to present some of the great work they are doing in the community.

- TAMU SRP Center CEC Co-Investigator **Galen Newman** described their focus on building capacity among community members in detection, assessment, and evaluation of health effects of hazardous substances. The TAMU CEC works with community partners like t.e.j.a.s. to conduct sampling after natural and technological disasters. The CEC's findings support and build upon the research that suggests an engaged community is better able to anticipate future threats and prepare for and recover disasters. He explained how including residents and participants in educational and outreach efforts improves overall outcomes, especially regarding public health measures. Their team also develops tools and resources for community engagement using applications and citizen science. One tool Newman highlighted was the [Green Values National Stormwater Calculator](#) which calculates the impact of infrastructure in the community.
- TAMU SRP Center CEC Principal Investigator **Jennifer Horney** described their work engaging communities in collaborative participatory research to reduce exposure during environmental emergency events. As part of the engagement and outreach process, the team conducted site visits, assessed infrastructure, and collected drone footage. The team also brought in community organizations to present at TAMU and organized additional outreach through local media. Finally, they created visual renderings of community sites and explained them to community members. Horney also described the group's work determining factors that help communities proactively plan for and manage future environmental risk related to emergency contamination. The TAMU CEC has linked with policy makers to conduct a lead assessment and participated in the Disaster Research Response workshop to learn from and interact with NIEHS leadership and other decision makers.



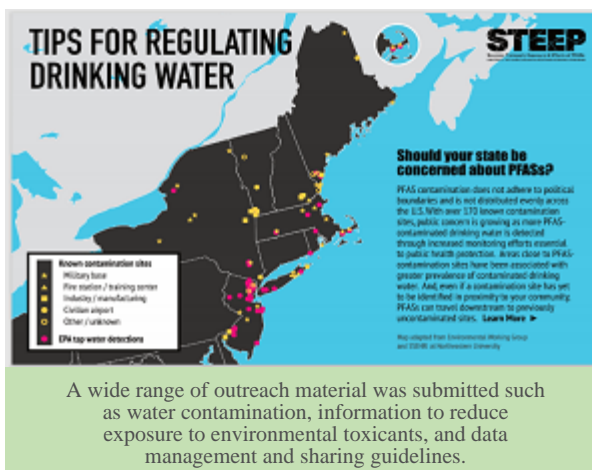
Green infrastructure facilities were suggested in areas of extreme stormwater ponding or flow paths to asset with infrastructure issues. These provisions were visualized and explained to community members.

During the subsequent discussion, participants asked questions about community use of the renderings, follow-up studies, and how economic benefit of green infrastructure was determined. Additionally, the TAMU CEC offered tips and recommendations for working closely with communities and ways to combat common obstacles.

### Research Translation and Outreach Tools Hub

A special publicly available Research Translation and Outreach Tools [website](#) was developed to showcase meaningful tools created by SRP researchers with the purpose to communicate research findings and advance public and environmental health. During breaks, meeting attendees were able to explore over 30 different outreach materials created by NIEHS staff, SRP researchers, and trainees from centers across the nation.

Available materials cover a wide range of topics such as water contamination, information to reduce exposure to environmental toxicants, and data management and sharing guidelines for researchers.



## Building a Sustainable Community for Data Science and Sharing

### Data Science/Sharing Mini-Workshop

On December 16, the SRP hosted a virtual mini workshop, which focused on fostering collaboration and facilitating a community of practice to enhance data sharing. Researchers involved in an SRP data supplement or in data management and analysis cores were invited to attend.

Participants had the opportunity to hear from Director of NIEHS and the National Toxicology Program (NTP) **Rick Woychik**, and Senior Director for the American Geophysical Union's Data Leadership Program **Shelley Stall**. They discussed new NIH Policy for Data Management and Sharing, the state of open data, and the importance of making data FAIR. They also emphasized the building of a community of practice to promote data sharing, metadata standards, and criteria for interoperability.

During break-out sessions, participants discussed how to increase collaboration within their Centers, among the SRP, and with stakeholders from two points of view, the data scientist and the subject matter expert. Participants then came together as collective group to report the main takeaways from these sessions, including the importance of making data sharing tools publicly available and creating educational tools for training other scientists and stakeholders.

SRP scientists and staff came together to discuss best practices for data management and sharing. A special thank you was given to all participants for providing thoughtful insight into building a sustainable community of practice for data science and sharing within SRP.

## Innovative Environmental Remediation and Monitoring Tools

### NIEHS Virtual Technology Fair for Small Business Grantees

On December 16, SRP also hosted a Virtual Technology Fair featuring innovative remediation and monitoring tools being developed by [NIEHS-funded small business grantees](#). The technologies have the potential of protecting health through preventing harmful exposures. For descriptions of each of the technologies presented during the fair, visit the [Virtual Technology Fair Meeting Book](#).

The first session featured tools being developed for detection or remediation of organic chemicals:

- **AxNano LLC:** "Hydraulic Fracturing of Controlled Release Oxidants for Remediation of Low Permeability Zones"
- **Bluegrass Advanced Materials LLC:** "Development of Smart Flocculants for the Treatment of PFAS"

Contaminated Water”

- **CycloPure Inc.:** “Remediation of Perfluorinated Chemicals in Water Using Novel High-Affinity Polymer Adsorbents”
- **EnChem Engineering Inc.:** “Combined In-Situ/Ex-Situ Remediation of PFAS at Hazardous Waste Sites”



Alexis Carpenter described AxNano’s technology to treat organic contaminants trapped in low permeability zones.

- **Lynntech Inc.:** “Continuous Removal/Disposal System for the Concurrent Sorption and Breakdown of Contaminants into Harmless Precipitates”
- **Microbial Insights Inc.:** “Expanding the Tool-Box: Environmental Metabolomics Improves Decision-Making and Management of Contaminated Superfund Sites”
- **Microvi Biotechnologies Inc.:** “High-Throughput Biocatalyst Manufacturing for Environmental Biotechnology”
- **RemBac Environmental LLC:** “Development of an Innovative Approach for In-Situ Treatment of PCB Impacted Sediments by Microbial Bioremediation”
- **Statera Environmental Inc.:** “Composite Integrative Passive Sampler (CIPS)”



Dora Taggart, president of Microbial Insights, explained their technology to assess chlorine contamination in groundwater samples.

The second session featured tools being developed for detection or remediation of metals and metalloids:

- **GlycoSurf LLC:** “Rhamnolipid-Based Remediation Technologies for Uranium and Rare Earth Element Contamination”
- **Microvi Biotechnologies Inc.:** “Intensified, High-Rate Reductive Immobilization of Hexavalent Chromium”
- **NanoAffix Science LLC:** “Graphene-Based Nanosensor Device for Rapid, On-Site Detection of Total Lead in Tap Water”
- **OndaVia Inc.:** “Semi-Continuous, Online Monitoring of Selenium in Coal-Fired Power Plant Wastewater”
- **Picoyune:** “Plasmonic Mercury Sensor and Wearable Gas Detector”
- **PowerTech Water LLC:** “Targeted Lead (Pb) Removal for Drinking Water Purification Using INCION”
- **Stemloop Inc.:** “A Paper-Based Synthetic Biology Platform for the On-Demand Testing of Water Quality”



Jay James introduced Picoyune’s low-cost portable mercury detector monitor.

## Recognizing Outstanding Grantees Retiring

During closing remarks, Suk expressed gratitude towards **Joe Graziano**, **Larry Robertson**, and **David Ozonoff**, outstanding scientists who have been with SRP for a long time and recently announced their retirements.

Graziano, internationally recognized for his research findings about the neurodevelopmental effects of arsenic, acted as director of the Columbia SRP Center since the center’s inception in 2000 until 2017.

Robertson, director of the University of Iowa SRP Center between 2005-2015, is known within the research community for his work on toxicology of persistent organic pollutants and polychlorinated biphenyls.

Ozonoff, who acted as director of the Boston University SRP Center from 1995-2012, devoted his career to studying the health effects of toxic exposures from hazardous waste sites.

Suk praised each as pioneers in their fields who have been pivotal to the success of their centers. Thanking them for their great contributions to the research community, he stressed that while SRP is sad to see them go, it is now time for SRP trainees to step up and continue the work these researchers started.