Center for the Remediation of Complex Sites (RemPlex)

2021 GLOBAL SUMMIT ON ENVIRONMENTAL REMEDIATION

Facilitating knowledge sharing, technology transfer, and hands-on, practical learning to address the most difficult challenges facing remediation sites worldwide

NOV 7-12 2021

PACIFIC NORTHWEST NATIONAL LABORATORY
RICHLAND, WA USA
SEE LAST PAGE FOR REGISTRATION DETAILS

SUMMIT OVERVIEW

The Center for the Remediation of Complex Sites (RemPlex), in collaboration with representatives within the U.S. and international environmental remediation community, invites participants to a Global Summit on Environmental Remediation: an international forum to share and discuss the challenges, barriers, and innovative solutions for successful remediation and long-term stewardship of contaminated sites worldwide.

The Summit's international case studies will provide a unique platform for knowledge sharing and technology transfer by bringing together government, industry, and research institutions to examine site-specific challenges and solutions. The integration of the case studies, panel discussions, and technical sessions will provide networking opportunities and interactive experiences for translating site-specific knowledge and lessons learned to the environmental remediation community.

SUMMIT OBJECTIVES

- Share knowledge, technology transfer, and hands-on, practical learning to address the most difficult global challenges facing remediation sites.
- Showcase international environmental remediation expertise and leadership.
- Explore opportunities for collaboration and partnerships.
- Identify research and capability needs.
- Provide a forum for networking and professional development.

ABSTRACTS DUE SEPTEMBER 15, 2021

Find submission details on the **RemPlex Summit event website**.

Subsurface Remote Sensing | Multiscale Modeling and Upscaling | Environmental Sensors | Emerging Contaminants of Concern | Big Data Analytics, Artificial Intelligence, and Machine Learning | General Session

SUMMIT PROGRAM DESCRIPTION

The RemPlex Summit provides in-depth, site-specific examinations of potential solutions to remediation challenges and barriers to success. The Summit will also provide

- focused and intimate networking opportunities with a diverse cross-section of professionals within the international environmental remediation community, including site owners, contractors, regulators, and researchers;
- identification of future research needs related to environmental remediation innovation; and
- enhanced understanding of common remediation needs worldwide.

I. International Case Study Sessions

These sessions are comprised of invited presentations/ speakers exploring one or more specific remediation challenges. Each case study will consist of presentations focusing on the technical and policy aspects of the challenges, followed by a round-table discussion that provides a forum for broader audience participation.

Case Study 1

Integrated Remedy Optimization: An Approach for Hanford Site Central Plateau Cleanup

This session will be focused on adaptive optimization strategies for pump-and-treat (P&T) remedies at the Hanford Site to address challenges associated with co-mingled plumes and the presence of continuing contaminant sources in the vadose zone.

Case Study 2

Environmental and Remediation Challenges and Responses Following Nuclear Accidents: Lessons Learned from the Fukushima Daiichi Accident

The focus of this case study will be on challenges and lessons learned related to both emergency and long-term environmental remediation of a nuclear accident, such as Fukushima Daiichi in 2011, including decision-making challenges and approaches, national-level planning for such accidents, and stakeholder engagement in these processes.

Case Study 3

U.S. Department of Energy (DOE) Legacy Management/ National Laboratory Collaboration to Assess High Risk Sites

The DOE Office of Legacy Management (LM) has applied a collaborative process involving staff from LM, DOE National Laboratories, site contractors, tribal partners, and other stakeholders to evaluate approaches to reduce LM's risk profile. This evaluation is addressing risk reduction in the areas of human health risk, stakeholder risk, regulatory risk, and institutional control risk, while also considering site complexities impacting remediation. The Tuba City, Arizona, Disposal Site is a former uranium processing/milling site (UMTRCA) with complex technical issues and a high risk rating, which will be presented as an example of the collaboration between government, technical, community, and regulatory entities.

Case Study 4

Optimization of Remediation Planning Approaches Based on Lessons Learned at the Sellafield Site, UK

This session will identify and discuss challenges at the Sellafield Site, UK, and lessons learned related to planning for potential future events requiring remediation at an active nuclear facility site, including development of appropriate scenarios and assumptions, establishing a framework for adaptive response and management, embedding appropriate plan review and revision cycles, and leveraging international expertise.

Case Study 5

The Multi-faceted Challenges of Confronting Emerging Contaminants at Complex Superfund Waste Sites: PFAS as a Case Study

Using PFAS as an important class of emerging contaminants of concern, this session will provide a landscape perspective of the multi-faceted, complex challenges for confronting emerging contaminants at Superfund waste sites. Discussions will touch on regulatory framework and policy developments, human health and toxicity, environmental monitoring, expanding conceptual site models, environmental and remediation challenges, site management, and stakeholder engagement.

II. Panel Discussion Sessions

As a complement to the technical program, panel sessions will provide new perspectives on the "human side" of environmental remediation, with the goals of fostering collaboration and professional growth for all summit participants.

Stakeholder Engagement

The involvement of stakeholders in environmental management decision making has been recognized as a critical step in the successful implementation of environmental remediation. This panel discussion will explore the perspectives, experiences, and lessons learned regarding the methods and outcomes of stakeholder engagement programs. The discussions will highlight the benefits and challenges associated with past or current stakeholder engagement efforts to advance environmental management activities and will include discussions of engagement with indigenous populations.

Environmental Justice

While Environmental Justice (EJ) issues are challenging and complex, at its core, EJ seeks to ensure that all persons and communities enjoy the same degree of protection from environmental risk or harm. The concept of EJ emerged in the United States in the early 1980s, but as recently as 2020, the U.S. Environmental Protection Agency (USEPA) recognized the need for more progress toward reducing the environmental and health disparities for minority, low-income, and tribal populations. The panel discussion will highlight the unique experiences and perspectives of panelists who are engaging in efforts to identify, address, track, and/or measure progress toward achieving EJ in overburdened communities and in relationship to site remediation.

Community Revitalization

This panel discussion will cover perspectives, experiences, and lessons learned regarding approaches to revitalizing communities adversely affected by large-scale environmental contamination or nuclear accident events. The panel discussion will identify strategies for successful economic, social, and community revitalization, and identify barriers or obstacles to recovery and potential strategies to overcome those barriers.

III. Technical (Topical) Sessions

Technical sessions will be focused on a specific technical topic related to the remediation of the complex sites and include oral and poster presentations from submittals in response to an open call for abstracts, which closes September 15, 2021.

Subsurface Remote Sensing for Contaminant Characterization and Remediation Applications

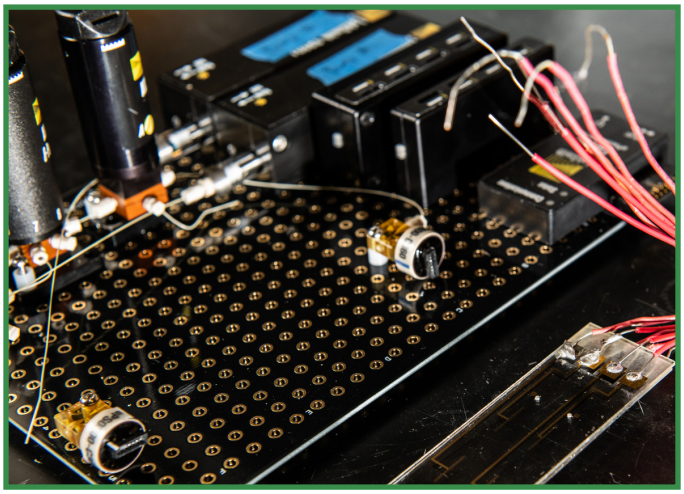
The combined effects of subsurface heterogeneity and inaccessibility and the corresponding inability to adequately sample the subsurface impedes understanding of contaminated subsurface environments and can lead to increased remediation costs, suboptimal remediation performance, and risks to human health and the environment. Geophysical methods can provide a significant and cost-effective source of information that reduces cost and risk. This technical session highlights novel uses of subsurface remote sensing to characterize and monitor contaminated sites. Topics range from the interpretation of geophysical data in terms of (bio)geochemical reactions to autonomous 3D monitoring of engineered remediation processes.

Multiscale Modeling and Upscaling

Natural subsurface systems are highly complex, with heterogeneity and coupled process interactions across a wide range of spatial and temporal scales giving rise to emergent properties and behaviors that are not readily predictable. Subsurface remediation often involves interplay among transport processes, geochemical reactions, and microbially-mediated reactions that exhibit scale-dependent behavior. For example, measurements of fundamental reaction rates as measured in controlled batch reactors usually differ significantly from field-observed (effective) reaction rates because of transport limitations and heterogeneous subsurface properties. Although much effort has been directed toward identifying relationships to quantify scale-dependent properties and processes, multiscale phenomena remain a critical challenge in subsurface science in general, and remediation design specifically. This session will explore recent developments in multiscale modeling of subsurface remediation. This topic is posed broadly and may include upscaling methods and upscaled model formulations, multiscale model coupling, multiresolution or multifidelity modeling, and linkage of physics-based models with machine learning approaches. New theoretical approaches as well as case studies of field applications are welcomed.

Big Data Analytics, Artificial Intelligence, and Machine Learning for Environmental Remediation of Complex Environmental Systems

A tremendous amount of environmental remediation data has been collected for waste sites around the world, particularly at heavily studied and high-visibility sites like Hanford (USA), Sellafield (UK), and Fukushima (Japan). Such data consists of high-dimensional, multiscale, multi-physics data collected for a range of contaminants, times, locations, and data types. The nature and volume of the environmental data provide opportunities and the necessary inputs for developing and applying big data analytics (BDA), artificial intelligence (AI), and machine learning (ML) for remediation of complex environmental systems. We seek research contributions which include, but are not limited to: (1) Development and application of BDA/AI/ML to facilitate understanding and design of multiscale, multi-phase remediation systems; (2) Physics-informed ML and ML-guided numerical modeling to increase the effectiveness and reduce the effort related to the design of remediation and monitoring systems; (3) Reduction of system complexity or identification of influential drivers of remediation system behaviors; (4) Exploratory data analysis,



pattern recognition, and signature discovery to provide a better understanding of the remediation and its progress over time; and (5) Acquisition/compilation of environmental data within a remediation engineering context to generate environmental remediation benchmark datasets that are findable, accessible, interoperable, and reusable (FAIR) for ML, providing a basis for remediation decision-making and adaptive and effective remediation design and assessment.

Environmental Sensors

Advances in sensing technologies to improve the quality and quantity of data collected are crucial to improve computational models, particularly in locales with high spatial and/or temporal biogeochemical variability. Arrays of sensors deployed over an area of interest may provide high spatiotemporal resolution; however, large quantities of data are produced from these distributed sensor networks, which can become difficult to manage and interpret. Advances in data management, machine learning, and other software technologies are essential to ensure the data produced from these networks can be interpreted accurately and effectively.

Emerging Contaminants of Concern

While many new contaminants are being detected throughout the environment, there is a limited understanding of their properties, behavior, and potential adverse effects. This technical session will highlight research surrounding emerging contaminants such as PFAS, 1,4-dioxane, UCMR 4 compounds, plastics, microplastics, and others. Topics include detection, environmental fate and transport behavior, human and environmental concerns, current policy, and other challenges surrounding emerging contaminants.

General Session

The General Session is open to all topics relevant to the remediation of complex sites. Examples include characterization studies, contaminant fate and transport, geochemical and microbiological contaminant controls over contaminants mobility, conceptual site model development, subsurface contaminant interactions, remedy development, and others. Abstracts relevant to case studies are also encouraged.

REGISTRATION

Registration for the hybrid virtual/in-person event opens August 16, 2021. In-person attendance will be dependent on evolving Department of Energy guidelines. Conference format will be finalized at least four weeks prior to the RemPlex Summit.

Please note that all foreign nationals will need to be registered and have foreign national paperwork submitted by October 1, 2021, irrespective of in-person or virtual attendance.

CONTACT

Nik Qafoku

Deputy Director of Outreach and Engagement

(509) 371-6089

Learn more about the Center for the Remediation of Complex Sites, our capabilities, and partnership opportunities: **remplex@pnnl.gov**, or **pnnl.gov/projects/remplex**

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