U.S. ENVIRONMENTAL PROTECTION AGENCY

TechDirect, May 1, 2024

Welcome to TechDirect! Since the April 1 message, TechDirect gained 56 new subscribers for a total of 43,887. If you feel the service is valuable, please share TechDirect with your colleagues. Anyone interested in subscribing may do so on CLU-IN at https://clu-in.org/techdirect . All previous issues of TechDirect are archived there. The TechDirect messages of the past can be searched by keyword or can be viewed as individual issues.

TechDirect's purpose is to identify new technical, policy and guidance resources related to the assessment and remediation of contaminated soil, sediments and groundwater.

Mention of non-EPA documents or presentations does not constitute a U.S. EPA endorsement of their contents, only an acknowledgment that they exist and may be relevant to the TechDirect audience.

> Announcements

Biden-Harris Administration Finalizes Critical Rule to Clean up PFAS Contamination to Protect Public Health. The U.S. Environmental Protection Agency (EPA) is taking another step in its efforts to protect people from the health risks posed by exposure to "forever chemicals" in communities across the country. Exposure to per-and polyfluoroalkyl substances (PFAS) has been linked to cancers, impacts to the liver and heart, and immune and developmental damage to infants and children. This final rule will designate two widely used PFAS chemicals, perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS), as hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), also known as Superfund, and will help ensure that polluters pay to clean up their contamination. To learn more, visit https://www.epa.gov/superfund/designation-perfluorooctanoic-acid-pfoa-and-perfluorooctanesulfonic-acid-pfos-cercla.

Interim Guidance on Destroying and Disposing of Certain PFAS and PFAS-Containing Materials That Are Not Consumer Products Available for Public Comment. The 2024 updated interim guidance presents currently available information on the destruction and disposal of per- and polyfluoroalkyl substances and PFAS-containing materials. This update identifies available, effective and methods to remediate, dispose of and destroy PFAS contamination. It provides information on the current state of science and associated uncertainties for three large-scale capacity technologies that can destroy PFAS or control PFAS release into the environment: thermal destruction, landfills, and underground injection. This guidance will help decision-makers select technologies based on characteristics of the waste and options available to prevent releases and keep PFAS out of the environment. The primary audience of this guidance is decision makers who need to identify the most effective means for destroying or disposing of PFAS-containing materials and wastes. EPA will accept comments for 180 days from the date of the Federal Register notice initiating the

public comment period. For more information, visit https://www.epa.gov/newsreleases/epa-releases-updated-interim-guidance-destroying-and-disposing-certain-pfas-and-pfas.

> Upcoming Live Internet Seminars

SERDP/ESTCP Advances in PFAS Destructive Technologies - May 2, 2024, 12:00PM EDT (16:00 GMT). Join SERDP and ESTCP on Thursday, May 02, for a webinar featuring DoD-funded research efforts to develop technologies for PFAS destruction. First, Dr. Mike Wong (Rice University) will talk about his research on the use of novel boron nitride semiconductor photocatalysts for PFAS decomposition. Second, Dr. David Major (Savron) will present his research developing and demonstrating in situ and ex situ smoldering combustion approaches for PFAS destruction. For more information and to register, see https://serdp-estcp.mil/webinars.

SRP Progress in Research Webinar Series: Emerging Technologies in Occupational Health and Safety Training and Education - Session II - May 3, 2024, 1:00PM-3:00PM EDT (17:00-19:00 GMT). The NIEHS Superfund Research Program (SRP) is hosting their 2024 Progress in Research webinar series showcasing federally-funded researchers developing curricula and educational programs focused on emergent technologies in the sphere of occupational health and safety. Over the three sessions, presenters will highlight their research projects and accomplishments - included in this group of researchers are SRP's Occupational Health and Safety Training Education Programs on Emerging Technologies grant recipients. For more information and to register, see https://www.clu-in.org/live.

ITRC: Pump & Treat Optimization Training - May 7, 2024, 1:00PM-3:15PM EDT (17:00-19:15 GMT). ITRC's Pump & Treat (P&T) Optimization training aims to summarize existing information and best practices while also developing a systemic and adaptive optimization framework specifically for P&T well-network design and management. P&T systems have been one of the most commonly used methods for hydraulic containment and treatment of contaminated groundwater at sites with large groundwater plumes. This method cleans up groundwater contaminated with dissolved chemicals by pumping groundwater from wells to an above-ground treatment system that removes the contaminants. Optimization of P&T remedies is important for maintaining contaminant removal effectiveness throughout the operation lifetime and managing the system toward an exit strategy. A strategy for routine optimization of P&T remedies is key for maintaining the contaminant removal efficiency of these systems. The Pump & Treat Optimization Training will provide a roadmap for optimizing a P&T system and refining the remedial strategy or shifting toward another remedial approach. For more information and to register, see https://www.itrcweb.org or https://www.clu-in.org/live.

ITRC PFAS Beyond the Basics: Topics on PFAS Biosolids: Sources, Transport, and Management of PFAS Surface Releases Training - May 9, 2024, 1:00PM-3:00PM EDT (17:00-19:00 GMT). This training class builds on the earlier information for introductory PFAS topics presented in the PFAS 101 CLU-IN training. The ITRC PFAS Beyond the Basics class provides more information related to potential sources of PFAS in biosolids, implications of PFAS associated with land-applied biosolids, vadose zone fate and transport processes that likely govern biosolids releases, treatment/disposal options for PFAS-impacted biosolids, and regulatory considerations. For more information and to register, see https://www.itrcweb.org or https://www.clu-in.org/live.

Federal Facilities Online Academy: Determining Applicable or Relevant and

Appropriate Requirements (ARARs) in RODs - May 14, 2024, 1:00PM-3:00PM EDT (17:00-19:00 GMT). This webinar course will highlight how to determine Applicable or Relevant and Appropriate Requirements (ARARs) in decision-documents based on Environmental Protection Agency (EPA) guidance, identify commonly used ARARs, and when to involve partners. For more information and to register, see https://www.clu-in.org/live.

ITRC Optimizing Injection Strategies and In situ Remediation Performance Training - May 16, 2024, 1:00PM-3:15PM EDT (17:00-19:15 GMT). In 2020, ITRC recognized that In situ remediation technologies using amendment injections have advanced to mainstream acceptance and offer a competitive advantage over many forms of ex situ treatment of soil and groundwater. Developing a detailed site-specific strategy is absolutely critical to the success of such in situ remedies. These strategies include conducting a thorough site characterization that will allow development of a detailed Conceptual Site Model (CSM) to guide critical analysis of subsurface features and improving remediation effectiveness. In the interest of developing expedited solutions, many past in situ remediation projects have been executed based on an incomplete understanding of the hydrogeology, geology, and contaminant distribution and mass. In an effort to overcome these challenges and improve the effectiveness of in situ remediation using injected amendments, ITRC developed the guidance: Optimizing Injection Strategies and In Situ Remediation Performance (OIS-ISRP-1). The guidance and this associated training course identify challenges that may impede or limit remedy effectiveness and discuss the potential optimization strategies, and specific actions that can be pursued, to improve the performance of in situ remediation. For more information and to register, see https://www.itrcweb.org or https://www.clu-in.org/live.

SRP Progress in Research Webinar Series: Emerging Technologies in Occupational Health and Safety Training and Education - Session III - May 17, 2024, 12:00PM-2:00PM EDT (16:00-18:00 GMT). The NIEHS Superfund Research Program (SRP) is hosting their 2024 Progress in Research webinar series showcasing federally-funded researchers developing curricula and educational programs focused on emergent technologies in the sphere of occupational health and safety. Over the three sessions, presenters will highlight their research projects and accomplishments - included in this group of researchers are SRP's Occupational Health and Safety Training Education Programs on Emerging Technologies grant recipients. For more information and to register, see https://www.clu-in.org/live.

FRTR Spring 2024 General Meeting: Artificial Intelligence and Machine Learning to Optimize Site Remediation - May 21, 2024, 8:00AM-4:45PM EDT (12:00-20:45 GMT). The FRTR 2024 Spring General Meeting provides an opportunity to share progress and results of recent artificial intelligence (AI) and machine learning (ML) projects providing advanced contaminant plume characterization and predictive modeling, and improved cleanup efficiency. The meeting highlights site-specific case studies where AI/ML has substantially enhanced remedial decisions, remedy implementation and performance monitoring, and reduced needs for extensive sampling. Discussions during the meeting seek to provide remedial project managers and technical staff with information and best practices for deploying AI/ML technology. For more information and to register, see https://www.clu-in.org/live.

ITRC Contaminants of Emerging Concern (CEC) Identification Framework Training - May 21, 2024, 1:00PM-3:00PM EDT (17:00-19:00 GMT). In 2023, the ITRC Contaminants of Emerging Concern (CEC) Framework was published to help environmental regulatory agencies and other stakeholders identify, evaluate, and manage CEC's while acknowledging uncertainties in their environmental fate and transport, receptor exposure, and/or toxicity. Such an approach can be conducive to improved allocation of regulatory response resources and provide a foundation for communicating potential risk to stakeholders. For more information and to register, see https://www.itrcweb.org or https://www.clu-in.org/live.

EPA Superfund Remedial Program's Approach for Risk Harmonization when addressing Chemical and Radioactive Contamination at Sites - May 22, 2024, 1:30PM-3:30PM EDT (17:30-19:30 GMT). To help meet the U.S. Environmental Protection Agency (EPA) Superfund program's mandate to protect human health and the environment from current and potential threats posed by uncontrolled hazardous substance (both radiological and non-radiological), pollutant, or contaminant releases, the Superfund program has developed a human health evaluation process as part of its remedial response program. The process of gathering and assessing human health risk information is adapted from well-established chemical risk assessment principles and procedures. Within the Superfund remediation framework, radioactive contamination is dealt with in a consistent manner as with chemical contamination, except to account for the technical differences between radionuclides and chemicals. This consistency is important since at every radioactively contaminated site being addressed under Superfund's primary program for long-term cleanup, the National Priorities List (NPL), chemical contamination is also present. For more information and to register, see https://www.clu-in.org/live.

ITRC PFAS Beyond the Basics: PFAS Fate and Transport, Site Characterization and Source ID Training - May 23, 2024, 1:00PM-3:00PM EDT (17:00-19:00 GMT). This training class builds on the earlier information for fate and transport and site characterization presented in the PFAS 101 CLU-IN training. It provides more in-depth information for fate and transport, site characterization, source identification and some introductory information on environmental forensics. These topics will be presented along with options and a framework for data visualization. This training will focus largely on PFAS fate and transport in groundwater. The goal is to provide detailed information about the inputs practitioners can use to develop a robust conceptual site model to help understand fate and transport at PFAS sites, and how to gather evidence of multiple sources. For more information and to register, see https://www.itrcweb.org or https://www.clu-in.org/live.

ITRC Managed Aquifer Recharge (MAR) Training - May 30, 2024, 1:00PM-3:00PM EDT (17:00-19:00 GMT). The ITRC Managed Aquifer Recharge (MAR-1) Training is intended for state regulators and stakeholders who may not be familiar with the opportunities and challenges associated with MAR. It provides a basic understanding of MAR concepts, along with case studies, that showcase examples of successful MAR applications. For those who are familiar with MAR, the training gives an overview of the components of the MAR process along with the important considerations associated with each component necessary for the design and implementation of a MAR project. It is important to understand that MAR is an area of active research and expanding practical applications, and that this management process is continuing to evolve with time. For more information and to register, see https://www.itrcweb.org or https://www.clu-in.org/live.

> New Documents and Web Resources

Research Brief 352: Tracking Mercury Conversion and Distribution in Aquatic Environments. NIEHS Superfund Research Program (SRP)-funded researchers, led by Heileen Hsu-Kim, Ph.D., of the Duke University SRP Center, provided insight into how and at what timescale mercury changes within a wetland ecosystem. They found mercury from different sources is converted into other mercury forms that eventually have similar properties. This finding can inform environmental management or pollution control strategies. For more information, please visit https://tools.niehs.nih.gov/srp/researchbriefs/view.cfm?Brief_ID=352

Technology Innovation News Survey Corner. The Technology Innovation News Survey contains market/commercialization information; reports on demonstrations, feasibility studies and research; and other news relevant to the hazardous waste community interested in technology development. Recent issues, complete archives, and subscription information is available at https://www.clu-in.org/products/tins/. The following resources were included in recent issues:

- Development of a Cost Effective 1,4-Dioxane Treatment System for Small Community Water Supplies
- Remote Monitoring of Natural Source Zone Depletion Using Temperature Data to Support Long-Term Passive Management Strategies
- Trace Metal and Phosphorus Loading from Groundwater Seepage into South Fork Coeur D'Alene River After Remediation at the Bunker Hill Superfund Site, Northern Idaho, 2022

Guidance on the Assessment and Monitoring of Natural Attenuation of Contaminants in Groundwater (CL:AIRE 2024). Monitored natural attenuation (MNA) can be a sustainable risk management strategy for a wide range of groundwater contaminants, where environmental data are collected and assessed that demonstrate natural attenuation will protect receptors from pollution or harm. Natural attenuation refers to the combination of physical, chemical and biological processes that act, without human intervention, to reduce contaminant concentrations, flux or toxicity. The Environment Agency originally published technical guidance for MNA in 2000 in its R&D Publication 95. Since then, significant scientific advances have been made in understanding contaminant behaviour and reactive transport in the subsurface, alongside ongoing developments in site characterisation, monitoring and predictive modelling approaches and technologies, that are captured in this updated guidance. View or download from https://www.claire.co.uk/home/news/1945-guidance-on-the-assessment-and-monitoring-of-natural-attenuation-of-contaminants-in-groundwater

Guidance on Natural Source Zone Depletion (CL:AIRE 2024). Natural source zone depletion (NSZD) can be a sustainable risk-management strategy for petroleum hydrocarbon light non-aqueous phase liquids (LNAPLs) impacting the subsurface. NSZD refers to the combination of naturally occurring processes - biodegradation, vaporisation, volatilisation and dissolution - that act to reduce LNAPL mass, saturation and mobility in the subsurface. Recent advances in NSZD are captured in this document, alongside a decision-making framework, to provide technical guidance for practitioners, regulators and liability owners on the science and practical considerations for the application of NSZD-based risk management strategies in the UK. View or download from https://www.claire.co.uk/home/news/1946-guidance-on-natural-source-zone-depletion

EUGRIS Corner. New Documents on EUGRIS, the platform for European contaminated soil and water information. More than 7 resources, events, projects and news items were added to EUGRIS in April. These can be viewed at http://www.eugris.info/whatsnew.asp . Then select the appropriate month and year for the updates in which you are interested.

> Conferences and Symposia

Federal Remediation Technologies Roundtable (FRTR): Spring 2024 General Meeting - May 21, 2024, Washington, DC and online. In this meeting, FRTR member agencies will revisit artificial intelligence (AI) and machine learning (ML), discussed

previously at the Spring 2022 General Meeting. This meeting will focus on progress and results of recent projects providing advanced contaminant plume characterization and predictive modeling, and improved cleanup efficiency. Presentations will highlight case studies where AI/ML has substantially enhanced remedial decisions, remedy implementation and performance monitoring, and reduced needs for extensive sampling. Discussions during the meeting will provide remedial project managers and technical staff with information and best practices for deploying AI/ML technology. Two public attendance options will be available - attending in-person in Washington, D.C. and attending virtually via Zoom. Registration will open soon. For more information and to view recordings of Spring 2022 presentations, please visit https://www.frtr.gov/meetings1.cfm.

Tribal Lands and Environment Forum (TLEF) - Eugene, OR, August 12-15, 2024. This is the fourteenth annual forum for environmental professionals from Tribes, USEPA, State/Local/Federal agencies, community organizations, and other interested parties to meet, share knowledge, and learn from one another how to improve management, protection, and restoration of Tribal lands for us and all our relations. This forum will be held in person and online. For more information and to register, please visit http://nau.edu/tlef2024

NOTE: For TechDirect, we prefer to concentrate mainly on new documents and the Internet live events. However, we do support an area on CLU-IN where announcement of conferences and courses can be regularly posted. We invite sponsors to input information on their events at https://clu-in.org/courses . Likewise, readers may visit this area for news of upcoming events that might be of interest. It allows users to search events by location, topic, time period, etc.

If you have any questions regarding TechDirect, contact Jean Balent at (202) 566-0832 or balent.jean@epa.gov. Remember, you may subscribe, unsubscribe or change your subscription address at https://clu-in.org/techdirect at any time night or day.

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