

Remedy Protectiveness and Climate Resilience in Site Cleanups: *Recap of November 8th Session 1*

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Relevance of Climate Change Adaptation to Site Cleanups

- ◆ Executive Order (EO) 14008, *Tackling the Climate Crisis at Home and Abroad*, directs all agencies in the federal family to integrate climate adaptation planning into agency missions, programs and management functions.
- ◆ Our collective federal mission to clean up contaminated sites must include addressing the adverse human health, environmental and economic challenges of climate change in overburdened and underserved communities.
- ◆ A better understanding of site-specific climate risks is needed to assure existing or future site remedies are protective of human health and the environment.
- ◆ Inter-agency sharing of climate adaptation information, tools and lessons learned through venues such as the FRTR is critical to maximizing return on the billions of federal dollars invested annually to accomplish cleanups.
- ◆ By improving management and mitigation of climate risks is anticipated to avoid the costs associated with repairing site infrastructure or remedial components damaged by extreme weather events, which are anticipated to increase.

Implementation of Climate Action Plans

- ◆ Commonalities among climate action plans recently developed by federal agencies in response to EO 14008 include:
 - » Formulating or updating climate adaptation policies, guidance and decision-making tools pertaining to agency programs (including those targeting cleanup of Superfund and legacy sites).
 - » Developing or updating climate vulnerability assessments to determine site-specific exposure to climate hazards such as flooding, extreme heat, drought, land degradation or wildfire.
 - » Increasing efforts to assure climate literacy and preparedness of agency workers and operational partners, and to meaningfully engage with communities on climate-related technical issues.
- ◆ Implementation of each agency's climate action plan is managed by the respective agency's Sustainability Officer, which fosters synergies among climate adaptation and mitigation actions, greener cleanup strategies and sustainable remediation approaches.
- ◆ Climate change adaptation activities (to enhance resilience) and mitigation activities (to minimize greenhouse gas emissions) work in tandem; however, adaptation planning is most critical to assuring long-term protectiveness of site cleanup remedies.

Examples of Relevant Implementation Reports and Tools

- ◆ FRTR members jointly compiled a summary of existing agency-specific information resources that broadly apply to climate adaptation and mitigation efforts (as of November 8, 2021), such as the:
 - » Air Force Civil Engineer Severe Weather/Climate Hazard and Risk Assessment Playbook (April 2020)
 - » Army Climate Resilience Handbook (August 2020)
 - » Department of Defense Climate Risk Analysis (October 2021)
 - » DoD Regionalized Sea Level Change & Extreme Water Level Scenarios (interactive web tool)
 - » DOE Vulnerability Assessment and Resilience Planning Guidance
 - » DOI/USGS Using Information From Global Climate Models to Inform Policymaking—The Role of the U.S. Geological Survey (2020)
 - » DOT Vulnerability Assessment and Adaptation Framework (December 2017)
 - » EPA Superfund Climate Resilience (website), which includes access to a 2019 series of “climate resilience technical fact sheets”

Evaluating Climate Hazard Exposure and Risk

- ◆ Strategies for climate change adaptation involve:
 - » Assessing vulnerability (climate hazard exposure and sensitivity) of cleanup remedies
 - » Identifying and prioritizing measures to increase resilience
 - » Building adaptive capacity for projected climate scenarios.
- ◆ Greater use of information about potential climate conditions in the future (in addition to historic climate/weather data) is needed to assess climate risks at cleanup sites.
- ◆ Understanding the potential “delta” (change) in site conditions over a remedy’s lifespan is key.
- ◆ Global climate models project how climate may respond to an ensemble of changes (emission scenarios) rather than predict a single climate condition at a point in time.
- ◆ Downscaled climate model projections (at a regional or local level) should account for variables such as topography, land cover and coastline complexity.
- ◆ A range of models should be analyzed to better characterize uncertainty and risks.

Relevant Research on Climate Change Implications and Adaptation

- ◆ Relevant SERDP/ESTCP project topics in fiscal year 2022 include:
 - » Saltwater intrusion impacts on DoD installation infrastructure
 - » Climate model comparative assessment for DoD infrastructure applications
 - » Improved energy resilience of installations.
- ◆ In October SERDP requested project proposals concerning innovative approaches to resolving sea level-related data and datum gaps worldwide.
- ◆ Relevant NIEHS Superfund Research Program (SRP) projects have included examining:
 - » PAH and other contaminant exposure following Hurricane Harvey
 - » The effects of Hurricanes Irma and Maria on Puerto Rico's sewage system, drinking water supply and surface water
 - » Contaminant distribution and health effects of flooding
 - » Chemical and non-chemical stressors influencing health risks in New Bedford Harbor.

Technical Concerns Shared by Remediation Project Managers

- ◆ How climate change might affect protectiveness of remedies in light of potential site changes such as:
 - » Different types of vegetative cover
 - » Changes in hydrologic processes such as runoff generation, infiltration, aquifer recharge and groundwater-surface water interactions
 - » Altered hydrologic conditions such as water table levels, groundwater flow direction and water chemistry
 - » Different chemistry and saturation variability of soil
 - » Denudation due to wildfire or repeated washout
 - » Saltwater intrusion
 - » Thawing permafrost
 - » Different dispersal of air contaminants.
- ◆ Continued sharing of case studies and lessons learned will contribute to better cross-agency understanding of the direct and indirect impacts of climate change on site remedies.