

USNRC RIC 2017

Technical Session Th28

Ground-Water Monitoring and Remediation at Operating & Decommissioning NPP Sites

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 Office of Nuclear Regulatory Research
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Session Objectives:

- Examine ground-water monitoring and remediation methods that have been applied at operating and decommissioning nuclear power plant sites.
- Share ground-water monitoring and remediation experiences to help assess the significance of residual radioactivity in the subsurface, and determine the need and timing for remediation.

Regulatory Issue: Residual radioactivity means radioactivity in structures, materials, soils, ground water, and other media at a site resulting from activities under the licensee's control (from 10 CFR 20.1003). **10 CFR 20.1406 requires that, to the extent practical, operations be conducted to minimize the introduction of residual radioactivity into the site, including the subsurface.**

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Session Technical Focus

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Technical Challenge:

- Characterize and develop a conceptual site model of the subsurface flow and transport properties and conditions affecting the migration of residual radionuclides to offsite receptors.
- This information, when coupled to radionuclide release scenarios, is important for:
 - assessing and selecting the appropriate monitoring and remediation methods to minimize subsurface contamination during operations, and
 - understanding, and possibly reducing, the activities and financial resources needed during decommissioning.

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Session Highlights:

- Information on EPRI's ground-water and soil remediation guidelines, and ground-water protection guidelines.
- NRC's regulatory guidance on ground-water monitoring.
- Case-study examples including remediation methods from industry and regulatory agencies, both domestic and international.

Takeaway Messages:

- Information on how to monitor and assess residual subsurface radioactivity, including what computer codes can be employed to estimate offsite radionuclide discharges.
- Information and insights from previous remediation programs to assist others in their selection and evaluation of the efficacy of remediation methods, and to help reduce significant offsite discharges of radionuclides.

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Panelists:

- **Jack Parrott**, Senior Project Manager, NRC/NMSS/Reactor Decommissioning Branch
- **Jerry Hiatt**, Senior Manager, Nuclear Energy Institute
- **Karen Kim**, Senior Technical Leader, Electric Power Research Institute
- **Carol Eddy-Dilek**, Environmental Scientist, Savannah River National Laboratory

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Panelists:

- **Jay Vouglitois**, Nuclear Engineer, Nuclear Environmental Engineering Section/Radiation Protection Element, Department of Environmental Protection, State of New Jersey
- **ShiZhong Lei, PhD**, Geoscience Technical Specialist, Environmental Risk Assessment Division, Canadian Nuclear Safety Commission

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NRC Staff Collaborators:

- Daniel Barnhurst, NRO
- William Ford, John Adams and Michael Smith, NRR
- Jack Parrott, Paul Michalak, Boby Abu-Eid, Hans Arlt, and Marlayna Vaaler, NMSS
- Mark Fuhrmann and Cyndi Jones, RES


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Information Sources

- EPRI Groundwater and Soil Remediation Guidelines for Nuclear Power Plants
<http://www.epri.com/abstracts/Pages/ProductAbstract.aspx?ProductId=000000000001023464&Mode=download>
- EPRI Groundwater Protection Guidelines for Nuclear Power Plants
<https://www.nrc.gov/docs/ML0804/ML080450056.pdf>
- U.S. NRC Draft Regulatory Guide DG-4025 "Assessment of Radioactive Discharges in Ground Water to the Unrestricted Area at Nuclear Power Plant Sites"
<https://www.nrc.gov/docs/ML1523/ML15237A388.pdf>
- U.S. NRC Regulatory Guide 1.21, Rev 2 "Measuring, Evaluating, and Reporting Radioactive Material in Liquid and Gaseous Effluents and Solid Waste" June 2009
<https://www.nrc.gov/docs/ML0911/ML091170109.pdf>

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Information Sources
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- U.S. NRC NUREG/CR-2907, Volume 15 "Radioactive Effluents from Nuclear Power Plants: Annual Report 2009, Final Report"
<https://www.nrc.gov/docs/ML1321/ML13218A300.pdf>
- U.S. NRC Radioactive Effluent and Environmental Reports
<https://www.nrc.gov/reactors/operating/ops-experience/tritium/plant-info.html>
- U.S. NRC Regulatory Guide 4.21, "Minimization of Contamination and Radioactive Waste Generation: Life-Cycle Planning"
<https://www.nrc.gov/docs/ML0805/ML080500187.pdf>
- American Nuclear Society, "Evaluation of Subsurface Radionuclide Transport at Commercial Nuclear Power Plants," ANSI/ANS-2.17-2010 (R2016)
<http://shop.standards.ie/nsai/Details.aspx?ProductID=1454660>

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