Technical Session T7

Evaluating Residual Radioactivity in the Subsurface at Operating and Decommissioning Nuclear Power Plants

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Purpose: **Assess radionuclide leaks and spills from nuclear power plants (NPP)**

Focus: **Evaluation of residual radioactivity[1] in the subsurface during operations and for decommissioning planning at NPP**

[1] Residual radioactivity means radioactivity in structures, materials, soils, groundwater, and other media at a site resulting from activities under the licensee's control (from 10 CFR Part 20.1003).

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BACKGROUND

- Discovery of *abnormal* liquid releases at operating and shutdown NPP sites.
- Ongoing experiences at NPP sites undergoing decommissioning reveal residual radioactivity in the subsurface which needs to be assessed.
- In 2006, U.S. NRC forms the *Groundwater Task Force* to study liquid radioactive releases, identify lessons learned, and make recommendations.
- In 2007, NEI develops an *Industry Groundwater Protection Initiative NEI-07-07* that commits to ground-water monitoring at U.S. NPP sites to detect and assess significant onsite radioactive releases to the subsurface.

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Relationship of Residual Radioactivity in the Subsurface to Decommissioning

- Approximately 70% of NPP sites have had tritium leaks and spills. A few sites have found other radionuclides (e.g., Co-60, Cs-137, Sr-90).
- U.S. NRC issues new regulations and guidance to address minimization of contamination, subsurface surveys and the keeping of records important to decommissioning.
- Prompt remediation to be considered.

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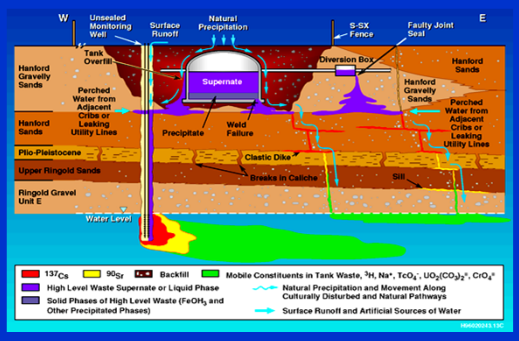
Residual Radioactivity in the Subsurface



from Ward et al. (1997) after Cagayan et al. (1996)

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Technical Challenges:

1) Identify the presence and behavior of residual radioactivity in the subsurface
2) Identify what constitutes an effective monitoring and assessment program
3) Discuss implementation of, and lessons learned from, these programs, particularly –
   - identification of radionuclide source term and release pathways
   - site characterization
   - radiological surveys
   - remediation of subsurface and ground-water systems

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Presentations/Speakers:

Decommissioning Planning Rule: Activities Related to Residual Radioactivity in the Subsurface - Marlayna Vaaler, Project Manager, Division of Decommissioning, Uranium Recovery and Waste Programs, NMSS/NRC

Experience with Characterization and Remediation of Residual Radioactivity during Nuclear Plant Decommissioning - Richard Dawson Reid, Principal Technical Leader, Electric Power Research Institute

French Policy and Methodology for Responding to Residual Radioactivity in Soil and Groundwater – Anthony Delamotte, Senior Engineer, Autorité de Sûreté Nucléaire (ASN)

Residual Radioactive Contamination at the Chernobyl Site, and Prospectives of an Effective Monitoring and Remediation Assessment Program - Boris Faybishenko, Senior Research Scientist, Lawrence Berkeley National Laboratory

Panelist: Ralph Andersen, Senior Technical Advisor, Nuclear Energy Institute

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Information Sources:

U.S. NRC Groundwater Task Force, *Liquid Radioactive Release Lessons Learned Task Force Final Report*, September 1, 2006.
http://pbadupws.nrc.gov/docs/ML0626/ML062650312.pdf

NEI, *Industry Ground Water Protection Initiative – Final Guidance Document*, NEI-07-07, August 2007.
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NEI, *Generic FSAR Template Guidance for Life Cycle Minimization of Contamination,* NEI-08-08A [Revision 0], *October 2009*.
http://pbadupws.nrc.gov/docs/ML0932/ML093220530.pdf

Inspection Procedure 71124.06, *Radioactive Gaseous and Liquid Effluent Treatment*, January 2010.
http://pbadupws.nrc.gov/docs/ML0928/ML092810408.pdf

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Information Sources (continued):

U.S. NRC, (Second) Groundwater Task Force - Final Report, June 2010
http://pbadupws.nrc.gov/docs/ML1016/ML101680435.pdf

NUREG/CR-7029, *Lessons Learned in Detecting, Monitoring, Modeling and Remediating Radioactive Ground-Water Contamination*, April 2011.
http://www.nrc.gov/reading-rm/doc-collections/nuregs/contract/cr7029/

Regulatory Guide 4.22, *Decommissioning during Operations*, December 2012. http://pbadupws.nrc.gov/docs/ML1215/ML12158A361.pdf

U.S. NRC Public Website, *Groundwater Contamination (Tritium) at Nuclear Plants*, October 2014.
http://www.nrc.gov/reactors/operating/ops-experience/grndwtr-contam-tritium.html

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Information Sources (continued):

U.S. NRC Public Website, *List of Historical Leaks and Spills at U.S. Commercial Nuclear Power Plants*, December, 2014
http://www.nrc.gov/reactors/operating/ops-experience/tritium/list-leaks-spills.pdf

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