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NATIONAL LABORATORY

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National Laboratory Capabilities in Support of Fukushima

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Waste Management 2015

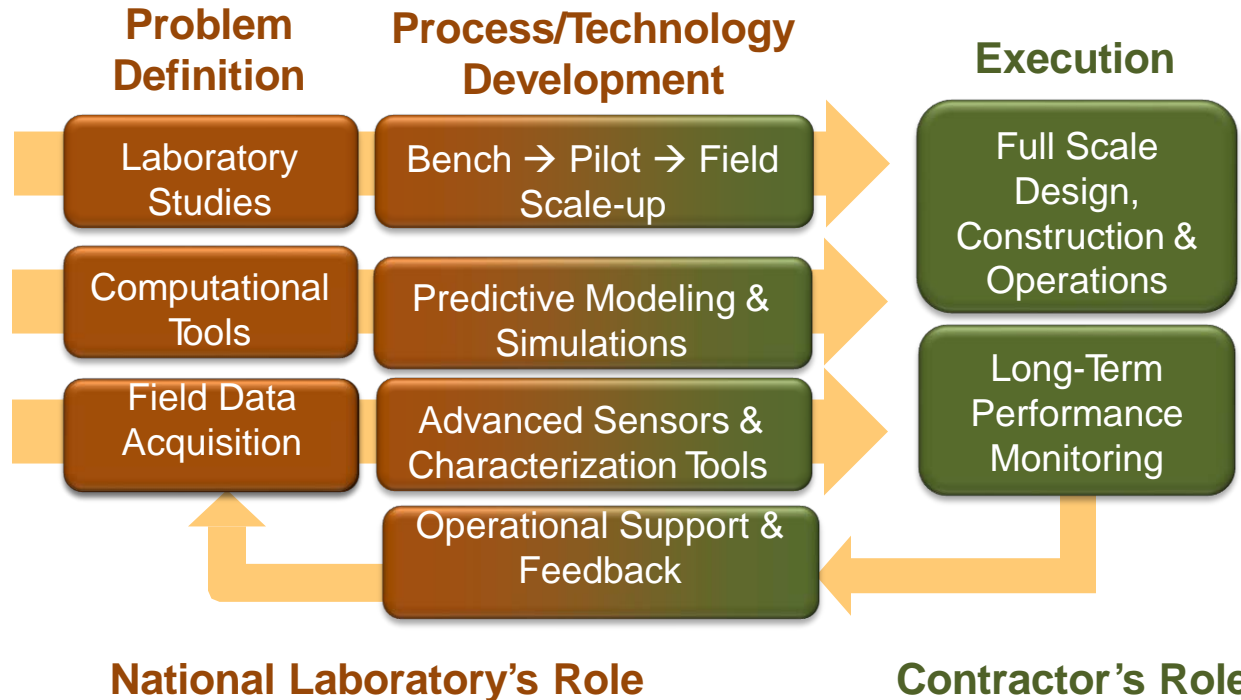
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Topics to be Addressed

- ▶ Role of the National Laboratories in Support of Cleanup
- ▶ Complex Site Cleanup Challenges using a Risk-Informed/Systems-Based Approach
- ▶ National Laboratory Engagement with Fukushima
- ▶ Pacific Northwest National Laboratory (PNNL)/Savannah River National Laboratory (SRNL) Partnership with Tokyo Electric Power Company (TEPCO)
 - Background on our Partnership
 - Support to TEPCO's Major Initiative for Water Management
- ▶ Looking to the Future

National Laboratory Role in Cleanup



- ▶ Provide the technical underpinnings enabling cleanup decisions and technology development and deployment to:
 - Enable startup and operation of the Waste Treatment Plant, while maintaining and closing tank farms
 - Provide scientifically defensible exit strategies for active remediation systems and resolving subsurface cleanup challenges

Complex Site Cleanup Requires a Risk-Informed/Systems-Based Approach

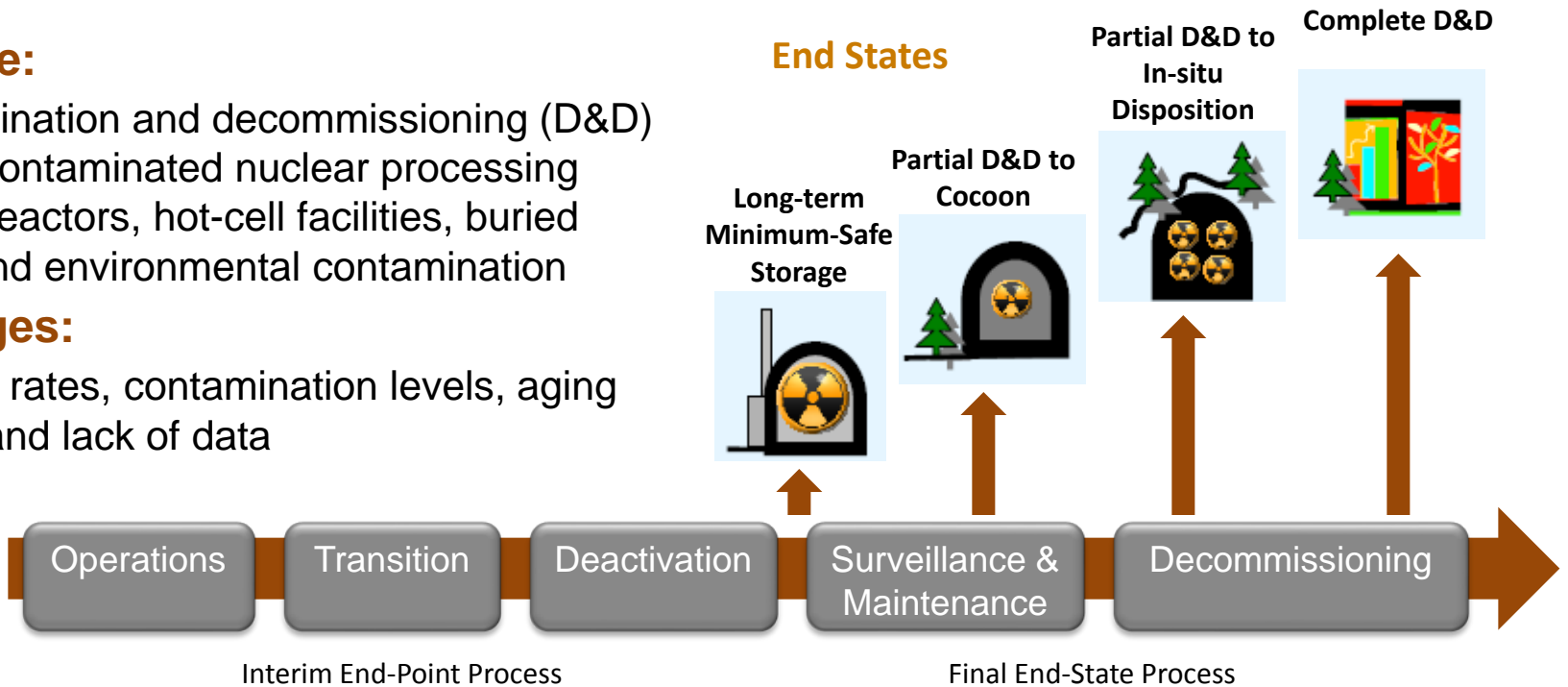
Objective:

Decontamination and decommissioning (D&D) of highly contaminated nuclear processing facilities, reactors, hot-cell facilities, buried wastes, and environmental contamination

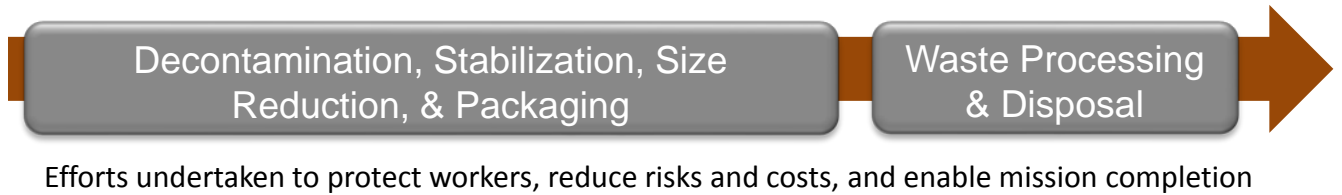
Challenges:

High dose rates, contamination levels, aging facilities, and lack of data

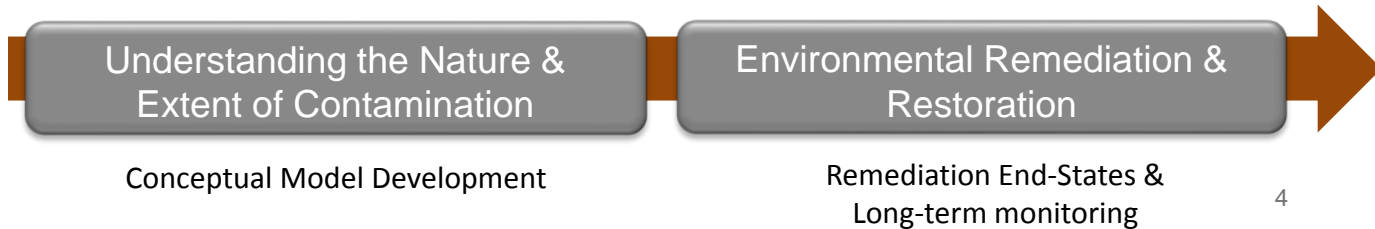
Facility Life-Cycle



Enabling Tools, Technologies, and Processes



Integration of D&D with Environmental Remediation



Laboratory Engagement with Fukushima

- ▶ DOE-EM has partnered with the Ministry of Trade and Industries (METI) and the Ministry of Environment (MOE)
 - Workshops in Tokyo and the Hanford Site
 - Embassy Science Fellows
 - Bilateral working group
 - Tours and visits

- ▶ National Laboratories are engaged
 - Collaborative research with the Japan Atomic Energy Agency (JAEA)
 - International Research Institute for Nuclear Decommissioning (IRID) proposal review team
 - Development of Muon detectors with Toshiba
 - Nuclear Compensations and Decommissioning Facilitation Corporation (NDF) development of risk-informed planning methodologies



PNNL/SRNL Partnership with TEPCO



- ▶ TEPCO and their engineering subcontractors are performing the on-site clean-up
- ▶ Much has been accomplished – but large challenges still remain
- ▶ PNNL/SRNL (as an integrated team) have been working under contract with TEPCO for the past three years
- ▶ Other National Laboratory experts have also been engaged
- ▶ The complex water management challenges are one of TEPCO's most urgent priorities and the focus of much of our work



TEPCO's Water Management Strategies



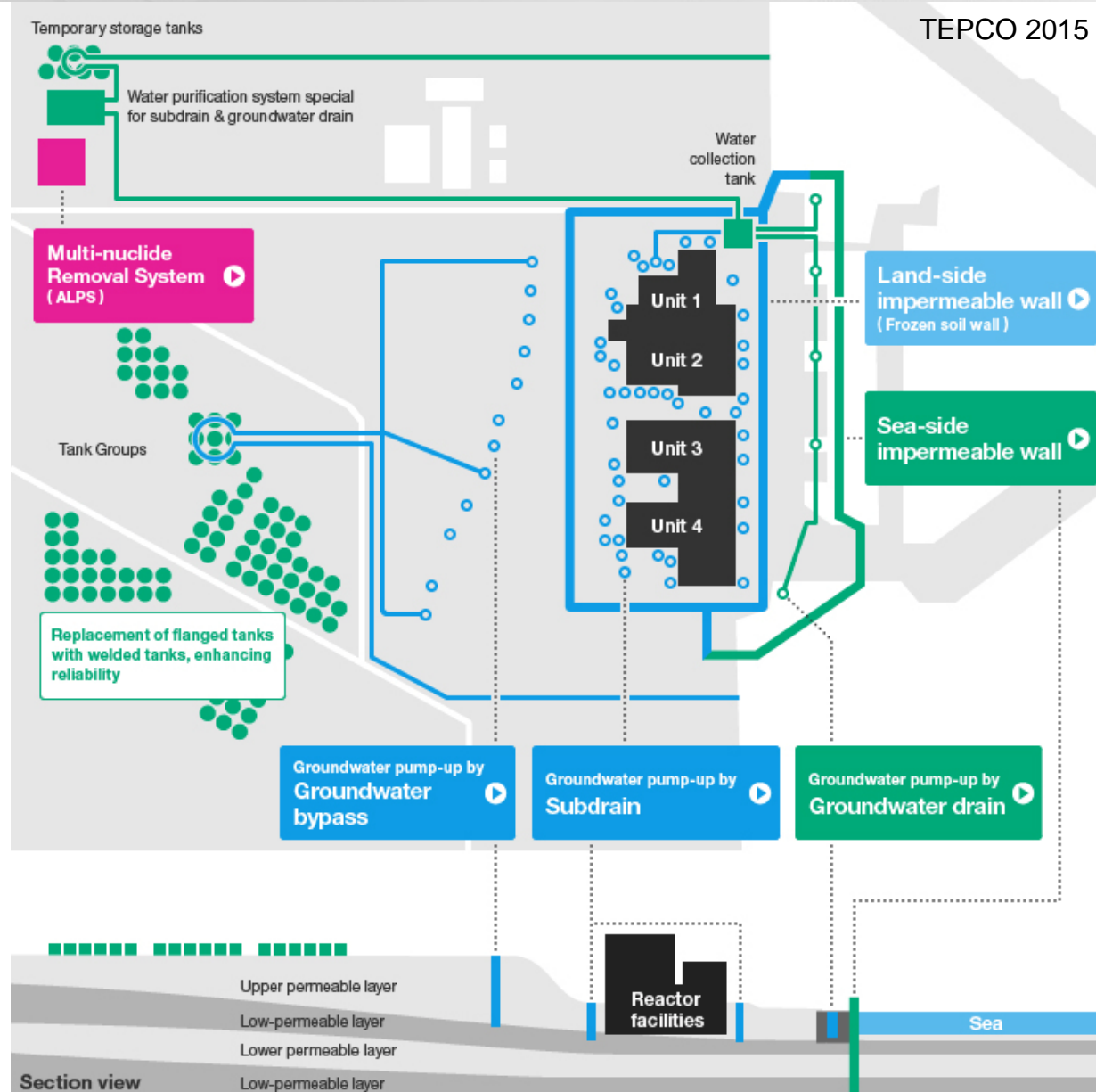
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TEPCO 2015

Basic Principles for Water Management

- ▶ REMOVE the source of water contamination
- ▶ REDIRECT fresh water from contaminated areas
- ▶ RETAIN contaminated water from leakage



Contaminated water countermeasures described at:
<http://www.tepco.co.jp/en/decommision/planaction/waterprocessing-e.html>

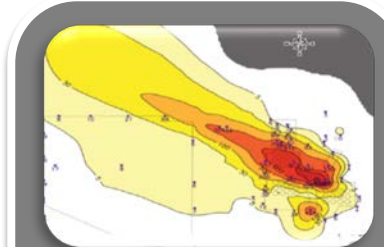
PNNL/SRNL Ongoing Support to Water Management Countermeasures

► The PNNL/SRNL team have undertaken a number of tasks, including:

- Technical review of the unit operations of the Multi-Radionuclide Removal Systems (Advanced Liquid Processing System [ALPS] and Additional ALPS)
- Assessment of secondary waste treatment and processing options
- Evaluation of commercial leak sealing technologies for preventing water ingress and egress into the reactor complex
- Independent review of the design, installation strategy, and operations of the frozen soil barrier
- Evaluation of testing protocols and data for assessing the effectiveness of phosphate-based (apatite) permeable reactive barriers



D&D Support



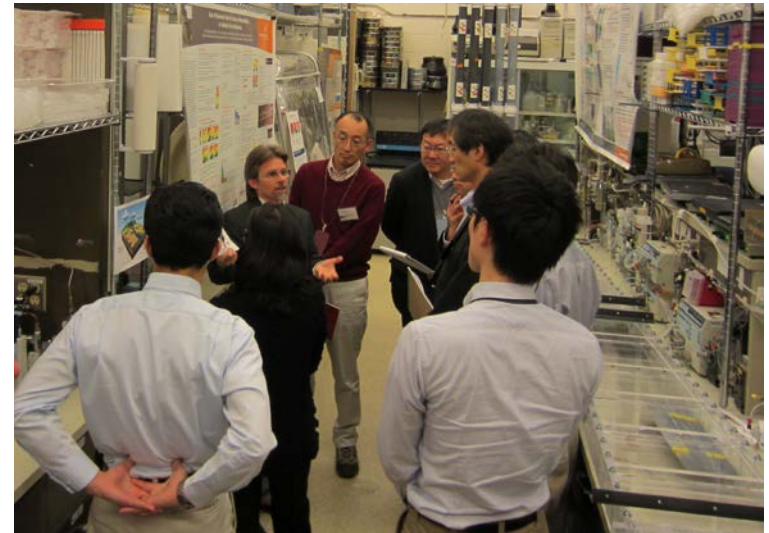
Subsurface Science and Remediation



Radiochemical Processing Research

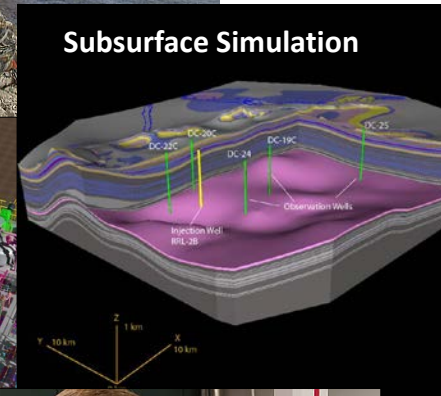
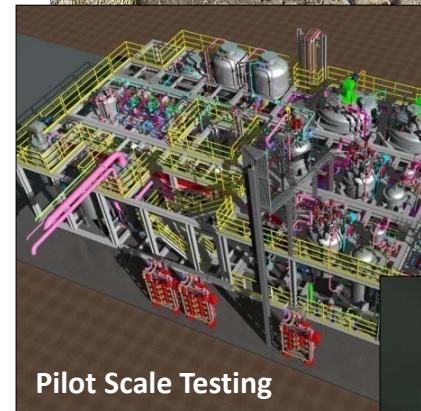
PNNL/SRNL Ongoing Support to Water Management Countermeasures (cont.)

- Assessment of site characterization, conceptual and numerical models, and monitoring strategies
- ▶ Other related efforts:
 - Review of nuclear decommissioning strategies
- ▶ Potential new areas of collaboration include:
 - Follow-on to the water management tasks
 - Safety planning and hazards analysis
 - Cleanup plans & priorities
 - Visualization tools for environmental monitoring data



Looking To The Future

- ▶ National labs provide the scientific and safety basis for transformational waste processing and remediation technologies
- ▶ Our approach and processes have evolved over decades
- ▶ We are committed to assisting in the remediation and recovery from the Fukushima Disaster



**Radiochemistry Processing
& Waste Form Development**



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Thank you

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