National Perspectives and Expectations

IAEA International Project on Managing the Decommissioning and Remediation of Damaged Nuclear Facilities

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NRC Decommissioning Criteria

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License Termination Standards for Unrestricted Use (10 CFR 20.1402)

- Total Effective Dose Equivalent (TEDE) ≤ 0.25 mSv/a and As Low As is Reasonably Achievable (ALARA) to Average member of the critical group (AMCG); All pathways; Period of performance - 1000 years

License Termination Standards for Restricted Use (10 CFR 20.1403)

- TEDE ≤ 0.25 mSv/a and ALARA, with institutional controls In effect . If institutional controls were no longer in effect, the TEDE would be ALARA and dose to AMCG would not exceed 1 mSv/a; or 5 mSv/a, under provisions of 10 CFR 20.1403 (e).

Alternate Criteria for License Termination (10 CFR 20.1404)

- TEDE > 0.25 mSv/a, but < 1 mSv/a, with institutional controls in effect with similar requirements for license termination under restricted conditions
- Licensee must demonstrate doses to public from all man-made sources other than medical will be < 1 mSv/a and ALARA
- Unusual, due to site-specific circumstances

Tiered/Graded Approach After an Event/Accident

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Events

- May not require an offsite response or present offsite consequences
- Consequences generally limited to onsite radiological issues

Accidents

- Require an offsite response and present offsite consequences
- Emergency response guided by EPA Protective Action Guides and Protective Actions for Nuclear Incidents (EPA-400)
- Early, Intermediate, and Late Phases
- Late Phase Cleanup - presently, no official pre-set radiological criteria for late phase cleanup, “Optimization” approach is used based on risk prioritization and socioeconomic impacts

Decommissioning Program Implications

- Event – less severe radiological consequences (e.g., failed fuel, “hot” particles, operation with failed fuel)
- Accident - more severe radiological consequences (e.g., fuel melt, core damage)

Examples of Events at Reactor Sites

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Connecticut Yankee and Yankee Rowe Sites

- Event: failed fuel, hot particles
- Decommissioning Implications: high dose rates, potential for high skin doses, initial iodine and noble gases source terms
- Mitigation: changes to radiation protection program, Full System Chemical Decontamination, additional waste output

Humboldt Bay Site

- Event: operation with failed fuel
- Decommissioning Implications: high dose rates, increased alpha/hard-to-detect contamination
- Mitigation: 30 Years in SAFSTOR, major shift in radiological protection program – from an external to internal dose program

Examples of Accidents at Reactor Sites

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Fermi 1

- Accident: loss of sodium coolant flow, two fuel subassemblies began to melt
- Decommissioning Implications: contaminated sodium, additional waste output

TMI 2

- Accident: loss of coolant to reactor resulting in major core damage and damaged nuclear fuel
- Decommissioning Implications: major radiological protection program changes, high gamma dose rates, high levels of Cs/Sr (beta dose rates), need to handle major fuel debris, increased waste, management of accident generated water

NRC Perspectives and Expectations

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Recommend a Tiered or Graded Approach for the Report

- **Events**
- Consider the less severe events, such as fuel failures and fuel particles, as it relates to decommissioning complexity and implications to implementing the dismantling and cleanup/remediation
- Consider more severe events, such as major fuel failures and consequences as it relates to decommissioning complexity and implications to implementing the dismantling and cleanup/remediation

- **Accidents**
- The content of the report should focus on the consequences of the accidents on decommissioning with core and fuel damage