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The U.S. Nuclear Regulatory Commission's Decommissioning Program

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Acronyms

- **ALARA – As Low As Is Reasonably Achievable**
- **CERCLA – Comprehensive Environmental Response Compensation & Liabilities Act**
- **CFR – Code of Federal Regulations**
- **DECON – Active cleanup reactor decommissioning option**
- **DOE – Department of Energy**
- **DP – Decommissioning Plan**
- **EIS – Environmental Impact Statement**
- **EPA – Environmental Protection Agency**
- **FSSR – Final Status Survey Report**
- **IDIP – Integrated Decommissioning Improvement Plan**
- **ISFSI – Independent Spent Fuel Storage Installation**
- **LTP – License Termination Plan**
- **LTR – License Termination Rule**
- **LTSP – Long Term Surveillance Plan**



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Acronyms (Continued)

- **MOU – Memorandum of Understanding**
- **NEPA – National Environmental Policy Act**
- **NMSS – Office of Nuclear Materials Safety and Safeguards**
- **NRR – Office of Nuclear Reactor Regulation**
- **NUREG – Nuclear Regulation (guidance)**
- **OGC – Office of General Counsel**
- **PSDAR – Post-Shutdown Decommissioning Activities Report**
- **RES – Office of Research**
- **RIS – Regulatory Issues Summary**
- **SAFSTOR – Storage/on-hold reactor decommissioning option**
- **SDMP – Site Decommissioning Management Plan**
- **SECY – Secretary to the Commission**
- **SRM – Staff Requirements Memorandum**
- **SRP – Standard Review Plan**
- **TEDE – Total Effective Dose Equivalent**



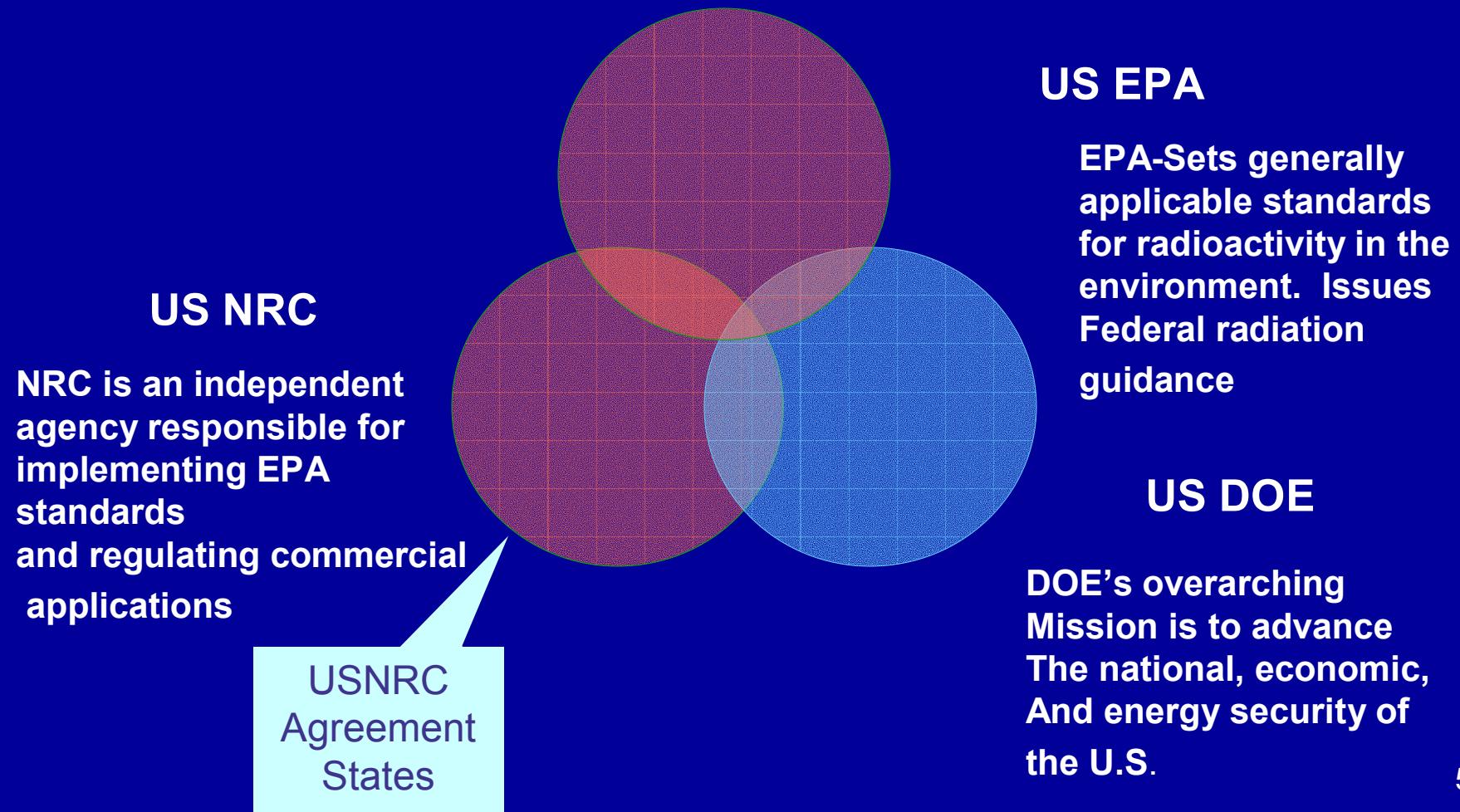
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Decommission

“To remove (as a facility) safely from service and reduce radioactivity to a level that permits:

- 1. Release of the property for unrestricted use and termination of the license; or**
- 2. Release of the property under restricted conditions and termination of the license”**

Roles and Responsibilities of U.S. Agencies





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NRC's Decommissioning Program Activities

- **Developing regulations and guidance**
- **Reviewing/approving DPs & LTPs, license amendment requests and FSSRs**
- **NEPA compliance**
- **Conducting research**
- **Inspections**
- **Confirmatory surveys**



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Laws

**Regulations
(CFR)**

**NRC Guidance
(NUREGs, SRP...)**

**Inspection Manual Chapters,
Operational Procedures, Industry Standards**



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Current Status of NPPs in Decommissioning

- **5 LTPs approved**
 - **2 licenses modified to ISFSI only**
 - **3 licensees conducting FSSs**
- **1 LTP currently under review**
- **1 LTP to be submitted next year**



Region I

Region II

Region III

Region IV

Legend:

- Power Reactor Sites
- Research and Test Reactor Sites
- Complex Materials Sites
- Uranium Recovery Sites
- Fuel Cycle Facilities (Partial)



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Decommissioning Infrastructure - Laws

- **Atomic Energy Act of 1954, as amended**
 - Establishment of program of gov't control of atomic energy and nuclear materials
- **Energy Reorganization Act of 1974**
 - Creation of NRC as regulatory agency
- **National Environmental Policy Act**
 - Establishment of policies for protection of the environment
- **Other specific laws**
 - West Valley Demonstration Project Act of 1980 (for WVDP)
 - Uranium Mill Tailings Radiation Control Act of 1978



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Decommissioning Infrastructure - Regulations

- **10 CFR Part 2 – Rules of Practice**
Licensing, Hearings, Petitions, Rulemaking
- **10 CFR Part 20 – Radiation Protection Standards**
Public dose limits, License termination criteria
- **10 CFR Part 30 – Byproduct Material Licensing**
License termination requirements
- **10 CFR Part 40 – Source Material Licensing**
License termination requirements



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Decommissioning Infrastructure - Regulations

- **10 CFR Part 50 – Reactor Licensing**
License termination requirements
- **10 CFR Part 51 - Environmental Protection**
NEPA compliance
- **10 CFR Part 70 – Source Material Licensing**
License termination requirements
- **10 CFR Part 72 – ISFSI Licensing**



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License Termination Standards for Unrestricted Release (10 CFR 20.1402)

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



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License Termination Standards for Restricted Release (10 CFR 20.1403)

- **≤ 0.25 mSv/a TEDE and ALARA, with institutional controls in effect**
- **Legally enforceable institutional controls**
- **If institutional controls fail, doses do not exceed 1 mSv/a, or 5 mSv/a, under specific circumstances**
- **Financial assurance - independent third party**
- **Licensee and NRC public input/outreach requirements**



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Principle Guidance Documents

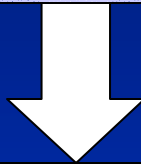
- **NUREG-1700 – Standard Review Plan for Evaluating Nuclear Power Reactor License Termination Plans**
- **NUREG-1757 – Consolidated NMSS Decommissioning Guidance**
- **NUREG-1575 – Multi-Agency Radiation Survey & Site Assessment Manual**
- **NUREG-1748 – Environmental Review Guidance for Licensing Actions Associated with NMSS Programs**

General Decommissioning Process

Materials/Fuel Cycle Facilities

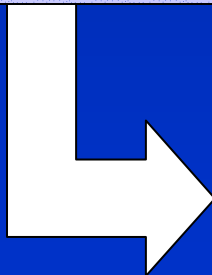
Before Cleanup

- Licensee ceases operations and notifies NRC
- Licensee submits decommissioning plan to NRC for review
- NRC reviews and approves plan, if it is acceptable



During Cleanup

- Licensee conducts cleanup work
- NRC conducts inspections



After Cleanup

- Licensee conducts final status survey
- NRC conducts confirmatory surveys
- NRC approves final status survey report and terminates license

Power Reactor Facilities

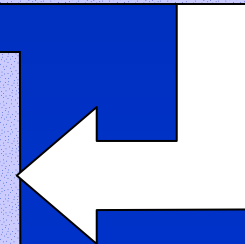
Before Cleanup

- Licensee ceases operations and notifies NRC
- Licensee submits post-shutdown decommissioning activities report to NRC for information
- Licensee waits 90 days before starting any major decommissioning activities



During Cleanup

- Licensee conducts cleanup activities
- Licensee submits license termination plan to NRC 2 years before termination
- NRC approves LTP if acceptable
- NRC conducts inspections





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Reactor Decommissioning Options

- **DECON:** Equipment, structures, etc. removed or decontaminated to a level that permits unrestricted release
- **SAFSTOR:** Plant placed in a safe stable condition and maintained in that state until it is subsequently decontaminated to levels that permit unrestricted release



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Power Reactor Decommissioning Process

- **Licensee Notifies (certifies) NRC within 30 days of permanently ceasing operations**
- **Certification also required once the fuel has been permanently removed from the spent fuel pool**
- **Licensee submits Post-Shutdown Decommissioning Activities Report (PSDAR) prior to or within 2 years of cessation of operations**



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PSDAR Contents

- **A description and schedule for the planned decommissioning activities**
- **An estimate of the expected decommissioning costs**
- **A discussion that provides the means for concluding that the environmental impacts associated with the decommissioning activities will be bounded by appropriately issued EISs.**



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Power Reactor Decommissioning Process

- **NRC notices the PSDAR in the Federal Register**
- **NRC holds a Public Meeting to discuss the PSDAR**
- **NRC does not approve the PSDAR**
- **Licensee begins decommissioning 90 days after NRC receives the PSDAR**
- **Licensee performs site decommissioning – NRC Inspection**
- **Licensee submits License Termination Plan within 2 years of requesting license termination**
- **NRC notices LTP in the Federal Register**
- **NRC holds a Public Meeting to discuss LTP**



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Power Reactor Decommissioning Process (continued)

- **NRC reviews the LTP**
- **NRC Approves LTP by amending the license**
- **Licensee performs remaining decommissioning activities**
- **Decommissioning must be completed within 60 years**
- **Licensee submits Final Status Survey Report**
- **NRC Reviews/approves FSSR**
- **NRC performs confirmatory surveys**
- **NRC terminates license**



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License Termination Plan Contents

- **Site characterization information**
- **Identification of remaining dismantlement activities**
- **Plans for site remediation**
- **Detailed plans for the final radiation survey**



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License Termination Plan Contents

- **A description of the end use of the site, if restricted**
- **An updated site-specific estimate of remaining decommissioning costs**
- **A supplement to the environmental report describing any new information or significant environmental change associated with the licensee's proposed termination activities**



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Formal Opportunities for Public Involvement

- **Public notification and participation in decommissioning (10 CFR 20.1403 and 20.1405)**
- **Hearings (10 CFR 2 - Subpart L)**
- **2.206 Petition (10 CFR 2 - Subpart B)**
- **Freedom of Information Act requests**
- **Allegations**

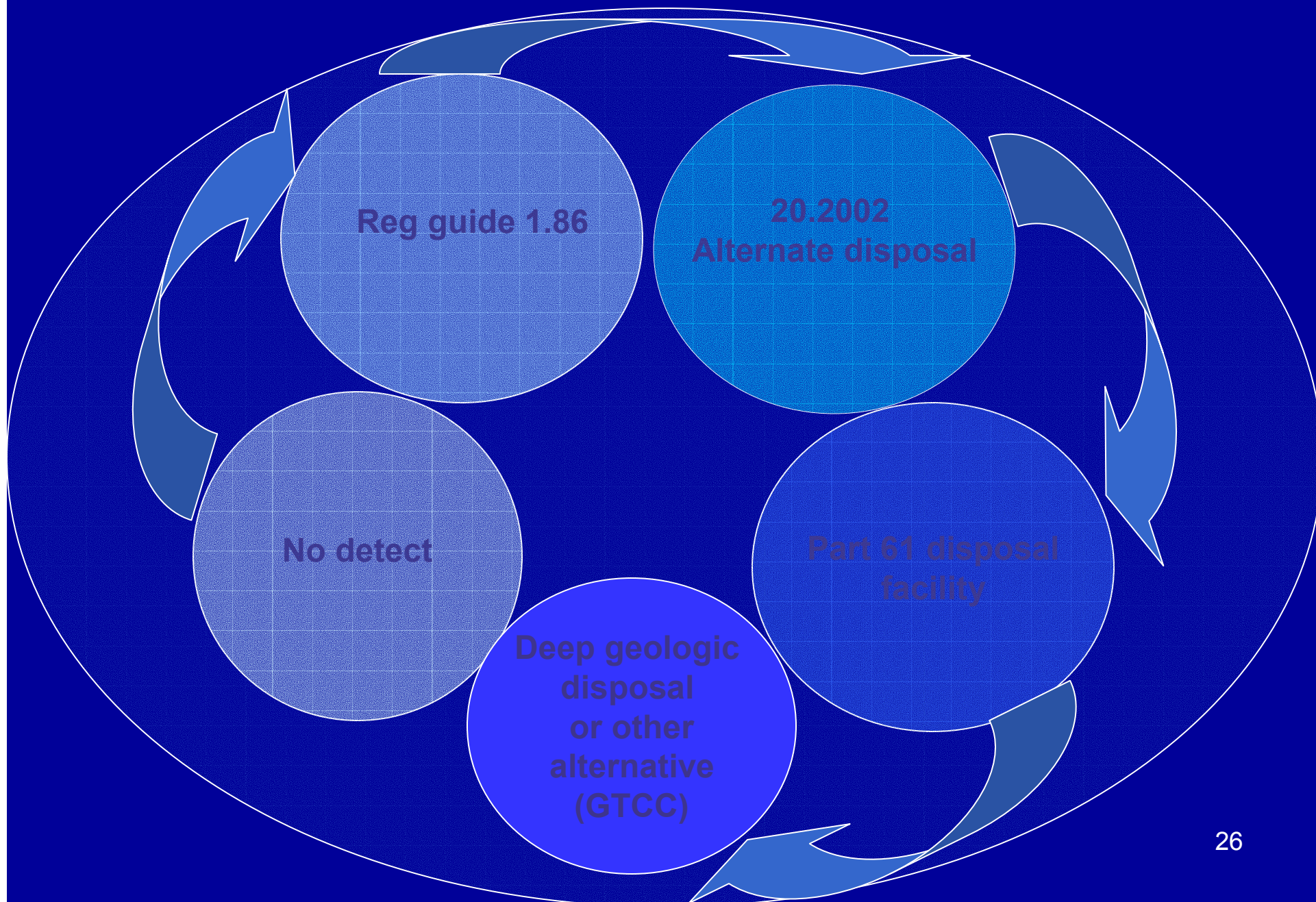


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Public Outreach Activities

- **Public Meetings**
- **Publicly-noticed meetings with the licensee**
- **Workshops**
- **Informal contacts with NRC staff**
- **Press Releases**
- **Federal Register Notices**
- **Licensee-initiated community outreach**
- **NRC Web Site**

Regulatory Framework for Disposition of Solid Materials (non-HLW)





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Integrated Decommissioning Improvement Program

- **Consolidates several staff actions and numerous issues into one focused plan**
- **Outcome -- a more open, timely, efficient, effective, and flexible program**
- **Includes**
 - **license termination rule implementation issues**
 - **improvements from staff's self assessment**
 - **Commission directed improvements**
 - **Communication strategy**



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Program Improvements

- **License Termination Rule and subsequent analysis**
- **Consolidated Guidance – NUREG 1757**
- **NRC Strategic Plan**
 - **Improve Efficiency, Effectiveness, Realism, Timeliness, Openness**



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Process Improvements

- **90 day acceptance review**
- **Pre-submittal meetings**
- **Realistic scenarios**
- **Focused inspections**



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Maine Yankee - Before





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Maine Yankee - During





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Maine Yankee - After





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Communication Improvements

- **Webpage Enhancements**
- **Biennial NUREG Report on the Decommissioning Program**
- **Site specific communication plans**



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Site Specific Practical Solutions

- **Long Term Control license**
- **Other institutional control options**
- **Limited financial assets**
- **Realistic scenarios**
- **Soil mixing**



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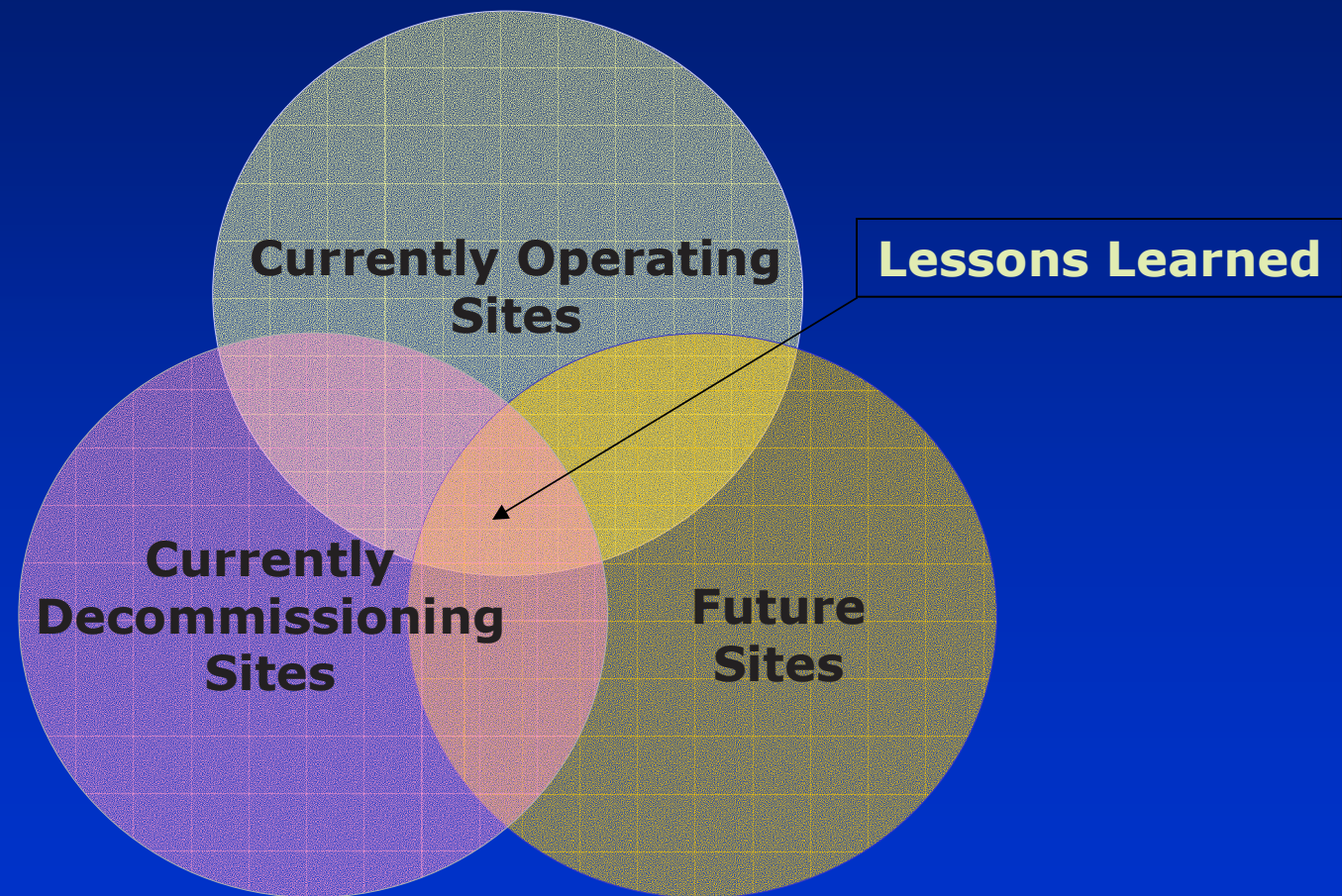
Categories of Lessons Learned

- **Communication**
- **Site characterization**
- **Groundwater monitoring**
- **Operational event documentation**
- **Take advantage of flexibility**



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Applicability of Lessons Learned





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Benefits of Lessons Learned

- **NRC/States – Regulatory Framework and Process**
- **Licensees – Decommissioning Actions**
- **Licensee/Contractors – Future Designs**



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Existing NRC Lessons Learned Documentation

- **RIS-2002-02: Lessons Learned Related to Recently Submitted Decommissioning Plans and License Termination Plans**
- **RIS-2004-08: Results of the License Termination Rule Analysis**
- **Appendix O in NUREG-1757**
- **Lessons-Learned Webpage**

<http://www.nrc.gov/what-we-do/regulatory/decommissioning/lessons-learned.html>



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Specific Examples of NRC Lessons Learned

- **Early and Frequent Communications**
- **Confirmatory Survey Coordination**
- **Realistic Exposure Scenario Justification**
- **Formal Submittals Consistent with Discussions between NRC and Licensees**



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Cooperative Effort with Industry & Agreement States

- **NRC is working with FCFF, NEI, EPRI, and OAS on approaches to identify and preserve decommissioning lessons learned**
- **Two meetings held**
- **Discussion of options for managing lessons learned**



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Other Related Activities

- **Rulemaking to Prevent Legacy Sites**
- **Regulatory Guidance in Support of Rulemaking**
- **Standard Review Plan by NRC's Office of Nuclear Reactor Regulation**



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Options to Manage Lessons Learned in the Future

- **Periodic Workshops**
- **Hard Copy Publication of Lessons Learned**
- **Centralized Database System**
- **NRC Website with Links to Lessons Learned from Industry Groups and Agreement States**
- **Compact Discs with Lessons Learned**
- **Rulemaking requiring consideration of lessons learned in the design of new facilities**



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Looking to the Future for Lessons Learned

- **Capturing Lessons Learned**
- **Incorporating Lessons Learned into Current Projects**
- **Incorporating Lessons Learned into Future Design and Construction**
- **Webpage Enhancements**
- **Links with other Lessons Learned web sites**



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Challenges

- **Increasing Efficiency to Reduce LTP/DP Reviews**
- **Ensuring that the Decommissioning Program is Risk-Informed and Realistic**
- **Implementing Flexibility in the NRC's Regulations**
- **Ensuring that the Decommissioning Program is Transparent and Open**
- **Ensuring Finality**
- **Taking advantage of lessons learned**

LLW Paradox

Industry

Pragmatic approach
System is working (reduced volumes, e.g.)
Questionable need
Known costs
Practices and procedures established

Other Stakeholders

More risk-informed
Greater flexibility
Increased consistency
Better public understanding
Cost containment

Regulatory Framework



Right Issues & ROI

Stakeholders

External

Congress

GAO

NAS

Industry

States

Other

Internal

Commission

ACNW

**Other NRC
Programs**

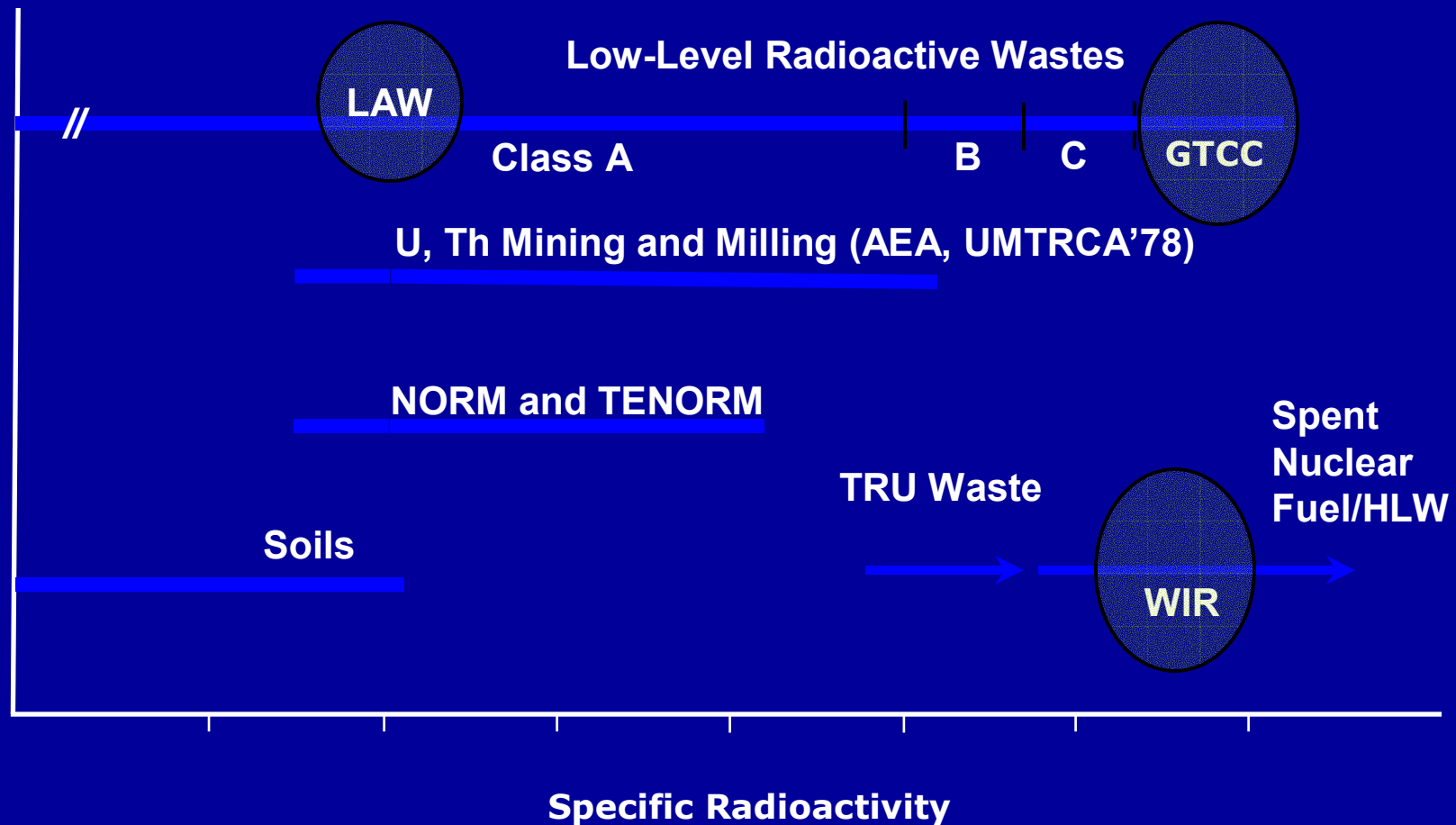
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FTE

Action Needed

Strategy

Spectrum of Radioactive Wastes





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LLW Strategic Assessment

- **Scope the issues**
- **Gather stakeholder input**
- **Factor in future needs**
- **Identify potential NRC actions**
- **Prioritize**
- **Develop implementation plan**



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Conclusions

The NRC program for regulation of decommissioning nuclear facilities has evolved to one which has clear regulations and guidance, is flexible, is open, and has produced and continues to produce successful results which are protective of public health and safety and the environment.



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Conclusions

The decommissioning program continues to look for improvement opportunities and seeks to take advantage of the lessons learned today so that the decommissioning projects of the future are easier.



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Conclusions

- **Licensees have reduced waste volumes through innovative approaches**
- **Opportunities exist to make LLW regulations and approaches more risk-informed.**



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More Information

- **Decommissioning Web Page -**
<http://www.nrc.gov/what-we-do/regulatory/decommissioning.html>
 - Sites; regulations and guidance; process; public involvement; key program documents; International aspects; FAQs; Lessons Learned
 - Map of site locations
 - <http://www.nrc.gov/info-finder/decommissioning/index.html>
- **NEPA compliance: NUREG-0586**
 - <http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr0586>



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