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# **Status of the Decommissioning Program**

**2014 Annual Report**

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**Division of Decommissioning, Uranium Recovery, and Waste Programs  
Office of Nuclear Material Safety and Safeguards  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001**

Enclosure

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## ABBREVIATIONS

ACL	alternate concentration limit
ADAMS	Agencywide Documents Access and Management System
ANC	American Nuclear Corporation
CAP	Corrective Action Plan
CBP	Cementitious Barriers Partnership
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	<i>Code of Federal Regulations</i>
DOE	U.S. Department of Energy
DoD	U.S. Department of Defense
DP	decommissioning plan
DUST	Disposal Unit Source Term
DWMEP	Division of Waste Management and Environmental Protection
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FCSE	Division of Fuel Cycle Safety, Safeguards, and Environmental Review
FONSI	Finding of No Significant Impact
FSME	Office of Federal and State Materials and Environmental Management Programs
FSSR	Final Status Survey Report
FRN	<i>Federal Register</i> notice
FTE	full-time equivalents
FUSRAP	Formerly Utilized Sites Remedial Action Program
FY	fiscal year
GETR	General Electric-Hitachi Test Reactor
IAEA	International Atomic Energy Agency
IDIP	Integrated Decommissioning Improvement Plan
ISFSI	independent spent fuel storage installation
ISR	in situ recovery
LTP	license termination plan
LTR	License Termination Rule

LTSP	long-term surveillance plan
MOU	Memorandum of Understanding
N/A	not applicable
NARM	naturally occurring and accelerator-produced radioactive material
NEA	Nuclear Energy Agency
NIST	National Institute of Standards and Technology
NMSS	Office of Nuclear Material Safety and Safeguards
NRC	U.S. Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation
NSIR	Office of Nuclear Security and Incident Response
OGC	Office of the General Counsel
PNNL	Pacific Northwest National Laboratory
PSDAR	Post-Shutdown Decommissioning Activities Report
RAI	request for additional information
RES	Office of Nuclear Regulatory Research
RIS	Regulatory Issue Summary
RP	reclamation plan
SDMP	Site Decommissioning Management Plan
SER	Safety Evaluation Report
SLDA	Shallow Land Disposal Area
SNM	special nuclear material
SRM	Staff Requirements Memorandum
TBD	to be determined
TER	technical evaluation report
TRIGA	Training, Research, Isotopes General Atomics
UMTRCA	Uranium Mill Tailings Radiation Control Act
UNC	United Nuclear Corporation
USACE	U.S. Army Corps of Engineers
VESR	Vallecitos Experimental Superheat Reactor
WPDD	Working Party on Decommissioning and Dismantling

# 1. INTRODUCTION

This report provides a summary of decommissioning of nuclear facilities in the United States. Its purpose is to provide a reference document that summarizes the U.S Nuclear Regulatory Commission's (NRC) decommissioning activities in fiscal year (FY) 2014, including the decommissioning of complex materials sites, commercial reactors, research and test reactors, uranium recovery facilities, and fuel cycle facilities. As such, this report discusses the current progress and accomplishments of the NRC's Comprehensive Decommissioning Program, provides information supplied by Agreement States on decommissioning in their States, and identifies key Decommissioning Program activities that the staff will undertake in the coming year. The information contained in this report is current as of September 30, 2014.<sup>1</sup>

Approximately 10 years ago, the Division of Waste Management and Environmental Protection (DWMEP) began an effort to enhance the effectiveness of the NRC's Decommissioning Program. These enhancements included several initiatives: upgrading the resources available for decommissioning; developing, updating, and consolidating all guidance associated with decommissioning into a concise NUREG guidance document, NUREG-1757, "Consolidated Decommissioning Guidance;" developing metrics to track staff and licensee activities; establishing a proactive communication approach with licensees to facilitate decommissioning; and developing an integrated decommissioning improvement plan to systematically examine the Decommissioning Program for efficiency gains. This effort resulted in a significant improvement in the decommissioning process and a corresponding increase in the number of sites that have been successfully decommissioned since 2000 (over 50), some of which had been in decommissioning since the late 1980s. In FY 2014, the staff continued to focus on enhancing the effectiveness of the Decommissioning Program through a comprehensive effort to consolidate and update decommissioning guidance.

As noted in the staff's FY 2013 report (SECY-13-0128, "Status of the Decommissioning Program—2013 Annual Report"), the character of the decommissioning program has changed a great deal as successes in the past have substantially reduced the inventory of complex materials sites in decommissioning status. In turn, new programmatic issues have arisen as the NRC has increased its involvement with facilities with different decommissioning challenges. Examples of such challenges are the regulation of military sites contaminated with depleted uranium from past testing of munitions and the contamination of military sites with radium and other Atomic Energy Act of 1954, as amended, material subject to the NRC's regulatory authority.

In FY 2015, the NRC expects two to three complex materials sites to complete decommissioning activities, with similar numbers completing decommissioning in subsequent years. Most power reactors undergoing decommissioning will remain in SAFSTOR, with Zion, Humboldt Bay, and San Onofre Units 2 and 3 in active decommissioning. Staff within the Office of Nuclear Material Safety and Safeguards (NMSS), the Regional offices, as well as the Office

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<sup>1</sup> On October 5, 2014, the Office of Federal and State Materials and Environmental Management Programs (FSME) merged with the Office of Nuclear Material Safety and Safeguards (NMSS). Since the reorganization, the Decommissioning Program has resided within the Division of Decommissioning, Uranium Recovery, and Waste Programs in NMSS. Subsequent versions of this report will include the new organizational titles.

of Nuclear Reactor Regulation (NRR), the Office of Nuclear Security and Incident Response (NSIR), and the Office of the General Counsel (OGC) will continue to coordinate extensively on activities that support the transition of Crystal River Unit 3, Kewaunee, and San Onofre Units 2 and 3, from operating reactors to plants in a decommissioning status. Staff will also increase activities related to the transition of Vermont Yankee nuclear power plant, which expects to permanently cease power operation in December 2014. Progress in research and test reactor decommissioning will also continue as two or three more sites are expected to complete decommissioning in FY 2015. Within the next several years, several Title II<sup>2</sup> uranium recovery sites are expected to complete decommissioning and be transferred to the U.S. Department of Energy (DOE) for long-term control under a general license.

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<sup>2</sup> The Uranium Mill Tailings Radiation Control Act of 1978, as amended, classifies certain facilities that mill or process certain radioactive material as: Title I, which refers to those facilities that were inactive, unregulated processing sites when the act was passed; or Title II, which refers to those facilities licensed by the NRC or an Agreement State. Section 2.4, *infra*, explains this in detail.

## 2. DECOMMISSIONING SITES

The NRC regulates the decontamination and decommissioning of materials and fuel cycle facilities, power reactors, research and test reactors, and uranium recovery facilities. The purpose of the Decommissioning Program is to ensure that NRC-licensed sites, and sites that were, or could be, licensed by the NRC, are decommissioned in a safe, timely, and effective manner so that they can be returned to beneficial use and to ensure that stakeholders are informed and involved in the process, as appropriate. This report summarizes a broad spectrum of activities associated with the Program's functions.

Each year, the NRC terminates approximately 125 materials licenses. Most of these license terminations are routine, and the sites require little, if any, remediation to meet the NRC's unrestricted release criteria. This report focuses on the more challenging sites where the termination of the site's license is not a routine licensing action.

As of September 30, 2014, 18 nuclear power and early demonstration reactors, 7 research and test reactors, 16 complex materials facilities, 2 fuel cycle facilities, and 11 Title II uranium recovery facilities are undergoing decommissioning or are in long-term safe storage, under NRC jurisdiction. Additionally, 22 Title I and 6 Title II uranium recovery facilities are in long-term care under a general license held by DOE under Title 10 of the *Code of Federal Regulations* (10 CFR) 40.27 and 40.28. The NRC public Web site (<http://www.nrc.gov/waste/decommissioning.html>) contains site status summaries for the facilities managed under the Decommissioning Program. These summaries describe the status of each site and identify the current technical and regulatory issues affecting the completion of decommissioning. The site summaries are updated on a quarterly basis. For those licensees or responsible parties that have submitted a decommissioning plan (DP) or license termination plan (LTP), the schedules for completion of decommissioning are based on an assessment of the complexity of the DP or LTP review. For those that have not submitted a DP or LTP, the schedules are based on other available site-specific information and on the anticipated decommissioning approach.

Through the Agreement State Program, 37 States have signed formal agreements with the NRC, by which those States have assumed regulatory responsibility over certain byproduct, source, and small quantities of special nuclear material (SNM), including the decommissioning of some complex materials sites and uranium recovery sites. Agreement States do not have regulatory authority over nuclear reactors licensed under Title 10, Part 50, "Domestic Licensing of Production and Utilization Facilities," or Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," of the *Code of Federal Regulations* (10 CFR Part 50 or Part 52) or fuel cycle facilities. Section 7 of this report discusses the NRC's coordination with the Agreement States' decommissioning programs.

### 2.1 Nuclear Power Reactor Decommissioning

The NRC's power reactor decommissioning activities include project management for decommissioning power reactors, technical review of licensee submittals in support of decommissioning, core inspections, support for the development of rulemaking and guidance,

public outreach efforts, international activities, and participation in industry conferences and workshops. In addition, the staff routinely processes license amendments and exemptions to support the progressive stages of decommissioning. The staff regularly coordinates with other offices on issues affecting both operating and decommissioning power reactors, and with the Division of Spent Fuel Management in NMSS regarding the independent spent fuel storage installations (ISFSIs) at reactor sites undergoing decommissioning.

As of September 30, 2014, the 18 nuclear power and early demonstration reactors identified in Table 2-1a are undergoing decommissioning. Table 2-1a provides an overview of the status of these nuclear power reactors. Plant status summaries for all decommissioning nuclear power reactors are available at <http://www.nrc.gov/info-finder/decommissioning/power-reactor/>. Table 2-1b lists the decommissioned power reactors that have ISFSIs onsite.

### **2.1.1 Decommissioning Process**

The decommissioning process begins when a licensee decides to permanently cease operations. The major steps that make up a licensee's reactor decommissioning process are: notification to the NRC of cessation of operations; submittal of the Post-Shutdown Decommissioning Activities Report (PSDAR); submittal of the LTP; implementation of the LTP; and completion of decommissioning.

#### Notification

When the licensee has decided to permanently cease operations, it is required to submit a written notification to the NRC. In addition, the licensee is required to notify the NRC in writing once fuel has been permanently removed from the reactor vessel.

#### Post-Shutdown Decommissioning Activities Report

Before, or within 2 years after cessation of operations, the licensee must submit a PSDAR to the NRC and a copy to the affected State(s). The PSDAR must include:

- a description of and schedule for the planned decommissioning activities;
- an estimate of the expected costs; and
- a discussion of the reasons for concluding that the environmental impacts associated with site-specific decommissioning activities will be bounded by appropriate, previously issued Environmental Impact Statements (EISs).

The NRC will notice receipt of the PSDAR in the *Federal Register* and make the PSDAR available for public comment. In addition, the NRC will hold a public meeting in the vicinity of the licensee's facility to discuss the PSDAR. Although the NRC does not approve the PSDAR, the licensee cannot perform any major decommissioning activities until 90 days after the NRC has received the PSDAR. After this period, the licensee can perform decommissioning activities as long as the activities do not have the following results:

- Foreclose release of the site for unrestricted use;
- Result in significant environmental impacts not previously reviewed; or
- Jeopardize reasonable assurance that adequate funds will be available for decommissioning.

The regulations in 10 CFR 50.59, "Changes, Tests, and Experiments," allow a reactor licensee to make certain changes in the facility without a license amendment. In taking actions permitted under 10 CFR 50.59 after submittal of the PSDAR, the licensee must notify the NRC, in writing, before performing any decommissioning activity inconsistent with, or making any significant schedule change from, those actions and schedules in the PSDAR (10 CFR 50.82).

### License Termination Plan

Each power reactor licensee must submit an application for termination of its license. An LTP must be submitted at least 2 years before the license termination date. The NRC and licensee hold pre-submittal meetings to agree on the format and content of the LTP. These meetings are open to the public, and intended to improve the efficiency of the LTP development and review process. The LTP must include the following:

- a site characterization;
- identification of remaining dismantlement activities;
- plans for site remediation;
- detailed plans for the final radiological survey;
- 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; and
- identification of parts, if any, of the facility or site that were released for use before approval of the LTP.

In addition, the licensee should demonstrate that it will meet the applicable requirements of the License Termination Rule (LTR) in 10 CFR Part 20, "Standards for Protection Against Radiation," Subpart E, "Radiological Criteria for License Termination."

The NRC will notice receipt of the LTP and make the LTP available for public comment. In addition, the NRC will hold a public meeting in the vicinity of the licensee's facility to discuss the LTP and the LTP review process. The LTP technical review is guided by NUREG-1700,

“Standard Review Plan for Evaluating Nuclear Power Reactor License Termination Plans,” Revision 1, issued April 2003 (Agencywide Document Access and Management System (ADAMS) No. ML031270391); NUREG-1757, “Consolidated Decommissioning Guidance,” Revision 1 of Volume 2, issued September 2006 (ADAMS No. ML063000243); and NUREG-0586, “Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities—Supplement 1,” issued November 2002 (ADAMS No. ML023470327). The LTP is approved by license amendment.

### Implementation of the License Termination Plan

After approval of the LTP, the licensee or responsible party must complete decommissioning in accordance with the approved LTP. The NRC staff will periodically inspect the decommissioning operations at the site to ensure compliance with the LTP. These inspections will normally include in-process and confirmatory radiological surveys.

Decommissioning must be completed within 60 years of permanent cessation of operations, unless otherwise approved by the Commission.

### Completion of Decommissioning

At the conclusion of decommissioning activities, the licensee will submit a Final Status Survey Report (FSSR) that identifies the final radiological conditions of the site, and request that the NRC either: (1) terminate the 10 CFR Part 50 license; or (2) if the licensee has an ISFSI, reduce the 10 CFR Part 50 license boundary to the footprint of the ISFSI. For decommissioning reactors with no ISFSI, or an ISFSI holding a specific license under 10 CFR Part 72, “Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor Related Greater Than Class C Waste,” completion of reactor decommissioning will result in the termination of the 10 CFR Part 50 license. The NRC will approve the FSSR and the licensee’s request if it determines that the licensee has met both of the following conditions:

- The remaining dismantlement has been performed in accordance with the approved LTP.
- The final radiation survey and associated documentation demonstrate that the facility and site are suitable for release in accordance with the LTR.

### **2.1.2 Summary of Fiscal Year 2014 Activities**

- During FY 2014, work continued on the transfer of project management responsibility for four reactors from NRR to the Decommissioning Program: Crystal River Unit 3, Kewaunee, and San Onofre Units 2 and 3. Staff within FSME, Regional offices, as well as NRR, NSIR, and OGC coordinated extensively regarding licensing activities, transfer of inspection responsibilities, and public meetings at these sites that have permanently ceased operations and have transferred into a decommissioning status.

- To ensure openness during the regulatory process, the staff held several public meetings,<sup>3</sup> including a meeting regarding the PSDAR for Crystal River 3 and a discussion on Vermont Yankee's decision to cease operations and begin decommissioning during the Reactor Oversight Process end-of-cycle meeting. In addition, staff held a government-to-government meeting with the States of Vermont, New Hampshire, and Massachusetts.
- Staff completed oversight activities/inspections at reactor decommissioning facilities in accordance with Inspection Manual Chapter 2561 at GE Vallecitos, Humboldt Bay, Indian Point Unit 1, Peach Bottom Unit 1, La Crosse, Millstone Unit 1, Peach Bottom Unit 1, Three Mile Island Unit 2, Zion Units 1 and 2, and Crystal River Unit 3. The staff also conducted site visits at Dresden, San Onofre, Kewaunee, and Vermont Yankee.

### **2.1.3 Fiscal Year 2015 Trends and Areas of Focus**

Staff will continue its extensive coordination with other offices while working to complete the transfer of Crystal River Unit 3, Kewaunee, and San Onofre Units 2 and 3 to the Decommissioning Program. Reactors that have recently ceased operation remain under NRR project management until formal transfer occurs around the time when the de-fueled technical specifications and safety analysis are approved. These four reactors are expected to formally transfer to NMSS by 2016. Staff also expects the Vermont Yankee nuclear power plant to permanently cease operations and enter decommissioning status at the end of calendar year 2014.

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<sup>3</sup>Public meetings include formal public meetings sponsored by the NRC, as well as technical meetings that are open to observation by members of the public.

**Table 2-1a Power and Early Demonstration Reactors Undergoing Decommissioning**

	<b>Reactor</b>	<b>Location</b>	<b>PSDAR* Submitted</b>	<b>LTP Submitted</b>	<b>LTP Approved</b>	<b>Completion of Decomm.**</b>
1	Crystal River Unit 3	Crystal River, FL	12/13	TBD	TBD	2073
2	Dresden Unit 1	Morris, IL	6/98	TBD	TBD	2036
3	Fermi Unit 1	Newport, MI	4/98	2011***	TBD	2032
4	GE-VESR	Pleasanton, CA	TBD	TBD	TBD	2019
5	GE-Vallecitos Boiling Water Reactor	Pleasanton, CA	7/66	TBD	TBD	2019
6	Humboldt Bay	Eureka, CA	2/98	2013	TBD	2016
7	Indian Point Unit 1	Buchanan, NY	1/96	TBD	TBD	2026
8	Kewaunee	Kewaunee, WI	5/13	TBD	TBD	2073
9	La Crosse	La Crosse, WI	5/91	TBD	TBD	2026
10	Millstone Unit 1	Waterford, CT	6/99	TBD	TBD	2056
11	Nuclear Ship Savannah	Baltimore, MD	12/08	TBD	TBD	2031
12	Peach Bottom Unit 1	Delta, PA	6/98	TBD	TBD	2034
13	San Onofre Unit 1	San Clemente, CA	12/98	TBD	TBD	2030
14	San Onofre Unit 2	San Clemente, CA	9/14	TBD	TBD	2030
15	San Onofre Unit 3	San Clemente, CA	9/14	TBD	TBD	2030
16	Three Mile Island Unit 2	Harrisburg, PA	6/13	TBD	TBD	2053
17	Zion Unit 1	Zion, IL	2/00	TBD	TBD	2020
18	Zion Unit 2	Zion, IL	2/00	TBD	TBD	2020

GE General Electric  
 TBD to be determined  
 VESR Vallecitos Experimental Superheat Reactor

\* PSDAR or DP equivalent. Prior to August 28, 1996, the effective date of Final Rule “Decommissioning of Nuclear Power Reactors” (61 FR 39278; July 29,1996), licensees submitted DPs (or equivalent).

\*\* For decommissioning reactors with no ISFSI or an ISFSI licensed under 10 CFR Part 72, completion of decommissioning will result in the termination of the 10 CFR Part 50 license. For reactors with an ISFSI licensed under the provisions of 10 CFR Part 50, completion of decommissioning will result in reducing the 10 CFR Part 50 license boundary to the footprint of the ISFSI.

\*\*\* Licensing action put on hold at licensee’s request.

**Table 2-1b Decommissioned Power Reactors That Have Independent Spent Fuel Storage Installations**

	<b>Reactor</b>	<b>Onsite Fuel Status</b>	<b>Cask Vendor</b>	<b>Model</b>
1	Big Rock Point	10 CFR 50 ISFSI	Energy Solutions, Inc.	Fuel Solutions W74
2	Connecticut Yankee	10 CFR 50 ISFSI	NAC International, Inc.	NAC-MPC
3	Fort St. Vrain (DOE site)	10 CFR 72 ISFSI	Foster Wheeler Energy Applications, Inc.	Modular Vault Dry Store
4	Maine Yankee	10 CFR 50 ISFSI	NAC International, Inc.	NAC-UMS
5	Rancho Seco	10 CFR 72 ISFSI	Transnuclear, Inc.	NUHOMS-24P
6	Trojan	10 CFR 72 ISFSI	BNFL Transtor/Holtec International	HI-STORM 100
7	Yankee Rowe	10 CFR 50 ISFSI	NAC International, Inc.	NAC-MPC

## **2.2 Research and Test Reactor Decommissioning**

The NRC research and test reactor decommissioning activities include project management for the decommissioning of these reactors, technical review of licensee submittals in support of decommissioning, inspections, support for the development of rulemaking and guidance, public outreach, and participation in industry conferences and workshops. In addition, the staff routinely processes license amendments and exemptions to support the progressive stages of decommissioning. The staff regularly coordinates with other offices on issues affecting research and test reactors, both operating and decommissioning.

As of September 30, 2014, the 7 research and test reactors identified in Table 2-2 were undergoing decommissioning. Plant status summaries for all decommissioning research and test reactors are available at <http://www.nrc.gov/info-finder/decommissioning/research-test/>.

### **2.2.1 Decommissioning Process**

The decommissioning process begins when a licensee decides to permanently cease operations. The major steps of the decommissioning process are submittal, review and approval of a DP, implementation of the DP, and completion of decommissioning.

#### **Application**

Within 2 years following permanent cessation of operations, and in no case later than 1 year before license expiration, the licensee must submit a written application for license termination to the NRC. Each application for license termination must be accompanied by a DP submitted for NRC approval. The NRC and licensee hold pre-submittal meetings to agree on the format and content of the DP. These meetings are open to the public, and intended to improve the efficiency of the DP development and review process.

#### **Decommissioning Plan**

The DP must include the following:

- The choice of the alternative<sup>4</sup> for decommissioning with a description of the planned decommissioning activities;
- A description of the controls and limits on procedures and equipment to protect occupational and public health and safety;
- A description of the planned final radiation survey;

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<sup>4</sup> An alternative is acceptable if it provides for completion of decommissioning without significant delay. Consideration will be given to delayed alternatives only when necessary to protect public health and safety, including cases where waste disposal capacity is unavailable or other site-specific conditions, such as the presence of co-located nuclear facilities, are a factor.

- An updated estimate of the expected costs for the alternative chosen, including the following:
  - A comparison with the estimated present funds set aside for decommissioning.
  - A plan for assuring the availability of adequate funds for completion of decommissioning.
- A description of technical specifications, quality assurance provisions, and physical security plan provisions in place during decommissioning.

In addition, the licensee should demonstrate that it will meet the applicable requirements of the LTR.

The technical review is guided by NUREG-1537, "Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors," issued February 1996 (ADAMS No. ML042430055), and applicable portions of NUREG-1757. The DP is approved by license amendment, as a supplement to the Safety Evaluation Report (SER), or equivalent.

#### Implementation of the Decommissioning Plan

For DPs in which the major dismantlement activities are delayed by first placing the facility in storage, planning for these delayed activities may be less detailed. Updated detailed plans must be submitted and approved before the start of any dismantlement activities.

For DPs that delay completion of decommissioning by including a period of storage or surveillance, the licensee shall meet the following conditions:

- Funds needed to complete decommissioning will be placed into an account segregated from the licensee's assets and outside the licensee's administrative control during the storage or surveillance period, or a surety method or fund statement of intent will be maintained in accordance with the criteria of 10 CFR 50.75(e).
- Means will be included for adjusting cost estimates and associated funding levels over the storage or surveillance period.

After approval of the DP, the licensee or responsible party must complete decommissioning in accordance with the approved DP. The NRC staff will periodically inspect the decommissioning operations at the site to ensure compliance with the DP. These inspections will normally include in-process and confirmatory radiological surveys.

#### Completion of Decommissioning

At the conclusion of decommissioning activities, the licensee will submit an FSSR, which identifies the final radiological conditions of the site, and request that the NRC terminate the 10 CFR Part 50 license. The NRC will review the FSSR and the licensee's termination request if it determines that the licensee has met the following conditions:

- The decommissioning has been performed in accordance with the approved DP.
- The final radiation survey and associated documentation demonstrate that the facility and site are suitable for release in accordance with the LTR.

### **2.2.2 Summary of Fiscal Year 2014 Activities**

- After the completion of decommissioning activities at the University of Michigan Ford Reactor site in Ann Arbor, Michigan, the staff performed inspections and independent confirmatory surveys and reviewed the licensee's FSSRs.
- After the completion of decommissioning activities at the Worcester Polytechnic Institute site in Worcester, Massachusetts, the staff performed inspections and independent confirmatory surveys and reviewed the licensee's FSSRs.
- At the State University of New York at Buffalo in Buffalo, New York, the staff performed inspections and independent confirmatory surveys to support the demolition and "free-release" of the facility.

### **2.2.3 Fiscal Year 2015 Trends and Areas of Focus**

In FY 2015, the staff expects the decommissioning to be completed at the University of Michigan Ford Reactor, Worcester Polytechnic Institute, and State University of New York at Buffalo facilities.

**Table 2-2 Research and Test Reactors Undergoing Decommissioning**

Reactor		Location	Status	Completion of Decomm.
1	University of Michigan Ford Reactor	Ann Arbor, MI	DP Approved	2015
2	General Atomics TRIGA Mark F	San Diego, CA	DP Approved	2019
3	General Atomics TRIGA Mark I	San Diego, CA	DP Approved	2019
4	General Electric-Hitachi GETR	Pleasanton, CA	Possession-Only	2019
5	State University of New York at Buffalo	Buffalo, NY	DP Approved	2015
6	Veterans Administration	Omaha, NE	DP Submitted	2016
7	Worcester Polytechnic Institute	Worcester, MA	DP Approved	2015
GETR		General Electric Test Reactor		
TRIGA		Training, Research, Isotopes General Atomics		

## **2.3 Complex Materials Facility Decommissioning**

Materials facilities decommissioning activities include maintaining regulatory oversight of complex decommissioning sites, undertaking financial assurance reviews, examining issues and funding options to facilitate remediation of sites in non-Agreement States and sites in Agreement States that have exclusive federal jurisdiction, interacting with the U.S. Environmental Protection Agency (EPA), interacting with the U.S. Army Corps of Engineers (USACE), inspecting complex decommissioning sites, conducting public outreach, participating in international decommissioning activities, conducting program evaluations, and participating in industry conferences and workshops. In addition, the staff routinely reviews decommissioning financial assurance submittals for operating materials and fuel cycle facilities and maintains a financial instrument security program.

As of September 30, 2014, 16 complex materials sites are undergoing decommissioning (see Table 2-3). Complex materials sites are defined as sites where the complexity of the decommissioning will require more than minimal technical and administrative support from the headquarters program office. It is expected that these sites will take more than a year to complete the decommissioning process. Examples of complex materials sites include: sites with groundwater contamination; sites containing significant soil contamination; sites in which the owners are in bankruptcy; any site where a decommissioning plan is required; all fuel cycle facilities undergoing decommissioning; and sites where there is significant public and/or Congressional interest.

Table 2-3 identifies whether the completion compliance criteria are based on the dose-based LTR criteria or the concentration-based Site Decommissioning Management Plan (SDMP) Action Plan criteria. Under the provisions of 10 CFR 20.1401(b), any licensee or responsible party that submitted its DP before August 20, 1998, and received NRC approval of that DP before August 20, 1999, may use the SDMP Action Plan criteria for site remediation. In the staff requirements memorandum on SECY-99-195, "Notation Vote on an Exemption for Decommissioning Management Program Sites with Decommissioning Plans under Nuclear Regulatory Commission Review and Eligible for Grandfathering, Pursuant to 10 CFR 20.1401(b)(3)," dated August 18, 1999, the Commission granted an extension of the DP approval deadline for 12 sites to August 20, 2000. In September 2000, the staff notified the Commission that the NRC had approved all 12 DPs by the deadline. All other sites must use the dose-based criteria of the LTR. Only one complex material site, Cimarron (Kerr-McGee), remains eligible to use the SDMP Action Plan criteria (see Table 2-3).

Status summaries for the complex materials sites undergoing decommissioning are provided at <http://www.nrc.gov/info-finder/decommissioning/complex/>.

### **2.3.1 Decommissioning Process**

Any one of the following events can initiate the decommissioning process:

- The license expires;

- The licensee has decided to permanently cease operations at the entire site (or in any separate building or outdoor area that contains residual radioactivity, such that the building or outdoor area is unsuitable for release in accordance with the NRC requirements). In the parenthetical cases, the decommissioning process does not lead to license termination;
- No principal activities have been conducted for a period of 24 months;
- No principal activities have been conducted for a period of 24 months in any separate building or outdoor area that contains residual radioactivity, such that the building or outdoor area is unsuitable for release in accordance with the NRC requirements. In these cases, the decommissioning process does not lead to license termination.

Major steps in the decommissioning process are notification of cessation of operations, submittal, review and approval of the DP, implementation of the DP, and completion of decommissioning.

#### Notification

Within 60 days of the occurrence of any of the triggering conditions, the licensee or responsible party is required to notify the NRC of such occurrence and either begin decommissioning or, if required, submit a DP within 12 months of notification and begin decommissioning after approval of the plan. With NRC approval, the regulations allow alternative schedules.

#### Decommissioning Plan

A DP must be submitted if required by license condition or if the NRC has not previously approved the procedures and activities necessary to decommission and the procedures could increase potential health and safety impacts on workers or the public, such as in any of the following cases:

- Procedures would involve techniques not applied routinely during cleanup or maintenance operations;
- Workers would be entering areas not normally occupied where surface contamination and radiation levels are significantly higher than routinely encountered during operation;
- Procedures could result in significantly greater airborne concentrations than are present during operations;
- Procedures could result in significantly greater releases of radioactive material to the environment than those associated with operations.

Generally, before submitting a DP, the licensee or responsible party meets with the NRC to agree on the form and content of the DP. This pre-submittal meeting is intended to make the DP review process more efficient by reducing the need for requests for additional information

(RAIs). It is important for the NRC and the licensee to work effectively in a cooperative manner to resolve the issues that make the decommissioning of complex sites challenging.

In a process similar to LTPs and research and test reactor DPs, the complex material site DP review process begins with an acceptance review, to ensure that the DP contains: (1) all required information; (2) legible drawings; (3) justification for any proprietary information claims; and, (4) no obvious technical inadequacies. The objective of the acceptance review is to verify that the application contains sufficient information before the staff begins an in-depth technical review. In addition, the staff will conduct a limited technical review to identify significant technical deficiencies at an early stage, thereby avoiding a detailed technical review of a technically inadequate submittal. At the conclusion of the acceptance review, the NRC will either accept the DP for detailed technical review or not accept it and return it to the licensee or responsible party with the deficiencies identified. The staff's detailed technical review is guided by NUREG-1757 and its supporting references.

The staff documents the results of its detailed technical review in an SER and either an Environmental Assessment (EA) or EIS. If an EA is developed and a Finding of No Significant Impact (FONSI) is made, the final EA is published in full or summary form in the *Federal Register*. If a FONSI cannot be made, an EIS is developed. Before finalizing the EA/EIS, the staff provides its draft to the appropriate State agency for review and comment.

The NRC conducts reviews of DPs proposing restricted release in two phases. The first phase of the review focuses on the financial assurance and institutional control provisions of the DP. The staff will begin the review of the remainder of the DP only after it is satisfied that the licensee's or responsible party's proposed institutional control and financial assurance provisions comply with the requirements of the LTR. The applicable portions of NUREG-1757 guide both phases of the review.

The second phase of the review addresses all other sections of the technical review and will usually include the development of an EIS. If an EIS is to be prepared, the following steps are taken:

- Publication of a Notice of Intent;
- Public scoping meeting;
- Preparation and publication of the scoping report;
- Preparation and publication of the draft EIS;
- Public comment period on the draft EIS, including a public meeting; and
- Preparation and publication of the final EIS.

In parallel with the development of the EIS, the staff develops a draft and final SER. The staff coordinates the development of the draft SER with the development of the draft EIS so that any RAIs can be consolidated.

Regardless of whether an EA or EIS is developed, the staff structures its reviews to minimize the number of RAIs, without diminishing the technical quality or completeness of the licensee's or responsible party's ultimate submittal. For example, the staff first develops a set of additional information needs and clarifications, including the bases for the additional information and clarifications, and then meets with the licensee or responsible party to discuss the issues. The staff gives notice of, and conducts, this meeting in accordance with the NRC requirements for meetings open to the public. The staff documents the results of the meeting in a meeting report. The formal RAI includes any issues that cannot be resolved during the meeting. In developing the final RAI, the staff documents the insufficient or inadequate information submitted by the licensee or responsible party and communicates what additional information is needed to address the identified deficiencies. The quality and completeness of the licensee's DP factor directly into the scope and extent of the NRC's RAIs.

After publication of the EIS or EA and FONSI, and presuming a determination that the DP is otherwise acceptable, the NRC issues a license amendment, approving the DP, along with any additional license conditions found to be necessary as a result of the findings of the EA, EIS, and/or the SER.

#### Implementation of the Decommissioning Plan

After approval of the DP, the licensee or responsible party must complete decommissioning within 24 months in accordance with the approved DP, or apply for an alternate schedule. The NRC staff will periodically inspect the decommissioning operations at the site to ensure compliance with the DP. These inspections will normally include in-process and confirmatory radiological surveys.

#### Completion of Decommissioning

As the final step in decommissioning, the licensee or responsible party is required to do the following:

- Certify the disposition of all regulated material, including accumulated wastes, by submitting a completed NRC Form 314, "Certificate of Disposition of Materials," or equivalent information.
- Conduct a radiation survey of the premises where licensed activities were carried out (in accordance with the procedures in the approved DP, if a DP is required) and submit a report of the results of the final status survey, unless the licensee or responsible party demonstrates in some other manner that the premises are suitable for release in accordance with the LTR.

Licenses are terminated or the site is released by written notice when the NRC determines that the licensee has met the following conditions:

- Regulated material has been disposed of properly.
- Reasonable effort has been made to eliminate residual radioactive contamination, if present.

- The radiation survey has been performed or other information submitted by the licensee or responsible party demonstrates that the premises are suitable for release in accordance with the LTR.

### **2.3.2 Summary of Fiscal Year 2014 Activities**

- Staff approved the remediation work plan for the AAR Manufacturing site in Livonia, Michigan. AAR subsequently completed the remediation of 32 grids of thorium contaminated soil, and staff expects to receive a final work completion report in early FY 2015. AAR is a former unlicensed SDMP site.
- In February 2014, DOE and New York State Energy and Research Development Authority established a path forward for Phase 2 Decommissioning of the West Valley site. The decisions for Phase 2 Decommissioning are to be made by 2020, and NRC staff plans to stay informed as these plans mature.
- Staff approved a 10 CFR 20.2002 request made by Westinghouse Electric-Hematite for alternate disposal of waste at US Ecology in Idaho. Staff is currently reviewing another request for alternate disposal that was submitted by Westinghouse Electric-Hematite in July 2014.
- Staff began the review of a request for license termination for the Stepan Company site in Maywood, New Jersey. Remediation of the three NRC-licensed burial pits was completed in 2012 by the USACE.
- Staff completed the review of a revised Characterization Survey Plan for the United Nuclear Corporation (UNC) Naval site in New Haven, Connecticut. The plan details the strategy that will be implemented to assess conditions in areas that have exhibited some level of contamination but are a challenge to actively remediate.
- Considerable decommissioning progress was made at the Mallinckrodt site in St. Louis, Missouri. Mallinckrodt completed removal of most of the contaminated soil from the NRC-licensed portion of the site. Mallinckrodt has completed most final status surveys and submitted the FSSRs to NRC for review.
- Considerable decommissioning progress was made at the U.S. Department of Agriculture's Beltsville Agricultural Research Laboratory site in Beltsville, Maryland. Most final status surveys have been completed at the site. Staff completed inspections and performed independent confirmatory sampling.
- Staff began the review of a DP and environmental report to terminate the license for the Jefferson Proving Ground site in Madison, Indiana. If approved, this would be the first time that the NRC approves the release of a site with restricted use.
- Staff completed inspections or site visits at AAR, Beltsville Agricultural Research Laboratory, FMRI, Cimarron, Mallinckrodt, Shallow Land Disposal Area (SLDA), and

West Valley. The staff also conducted site visits at McClellan Air Force Base, Alameda Naval Air Station, and Hunters Point Shipyard as part of its limited involvement approach approved by the Commission in 2008.

Other significant activities are described below.

#### Shallow Land Disposal Area

After the NRC placed the BWX Technologies, Inc., license in abeyance for the SLDA site, USACE assumed physical possession of the site on August 22, 2011, and began cleanup activities. The USACE is congressionally mandated to clean-up the SLDA site under the Formerly Utilized Sites Remediation Action Program (FUSRAP).

On September 30, 2011, USACE ceased excavation activities after a contractor exhumed material that was beyond the scope of USACE's established procedures. In August 2012, all exhumed material was safely shipped offsite. Based on several interagency meetings with USACE and other Federal partners, a consensus was reached that USACE would remain as the lead agency for the SLDA remediation project with on-site support from DOE, with the NRC remaining in its consulting role.

The NRC staff assisted USACE with the development of an interagency Site-specific Supplemental Memorandum of Understanding (MOU) between USACE, DOE, and the NRC. The Supplemental MOU was signed by all parties in early 2014. It complements the existing MOU and incorporates for SLDA the relevant and appropriate requirements of 10 CFR Parts 70, 73 and 74. The Supplemental MOU also stipulates the specific roles of each Federal entity throughout the remainder of the remediation process. The NRC is a member of the USACE SLDA Project Development Team, and staff will continue to work collaboratively with USACE with respect to site remediation activities.

#### Hunters Point, McClellan, and Alameda Military Sites in California

The staff continued implementing the Limited Involvement Approach approved by the Commission in June 2008 for the Navy's remediation of the Hunters Point Shipyard site in San Francisco, California. (See Staff Requirements Memorandum (SRM) – SECY-08-0077 – "Options for U.S. Nuclear Regulatory Commission Involvement with the Navy's Remediation of the Hunters Point Naval Shipyard Site in California," dated June 26, 2008). This approach includes reliance on the Navy's ongoing remediation of this Superfund site conducted under the Comprehensive Environmental Response Compensation and Liability Act of 1980 (CERCLA) process and with EPA oversight. The primary purpose of the NRC's approach is to stay informed about the ongoing Navy remediation activities and confirm its continued reliance on the CERCLA process and EPA oversight. The staff also utilized the same approach for the McClellan former Air Force Base, a Superfund site in Sacramento, California, and the Navy's Alameda Naval Air Station in Alameda, California. The staff conducted its sixth annual visit to these sites in July 2014, which included site visits with the Navy and Air Force, along with meetings with EPA Region 9, and State of California agencies. These discussions with the principal stakeholders that are participating in the ongoing remediation process continue to be an effective way to understand the remediation progress, issues that are being addressed, and the oversight activities of EPA and the State agencies. Based on these interactions, the staff

plans to continue its reliance on the CERCLA process and EPA oversight at these three sites. Additionally, NRC staff held conference calls with representatives from Sacramento County and the City of Alameda to discuss their insights on these sites, since some site lands have transferred or will transfer to them.

#### Clarification of the NRC's Jurisdiction over Military Radium-226

The Statement of Considerations for the NRC's November 2007 NARM rule included a commitment for the NRC to interact with the military to obtain a common understanding of the uses of discrete sources of radium-226 and resolve any potential conflicts on a case-by-case basis. Issues and staff recommendations for clarifying the NRC's jurisdiction over certain types of radium-226 under military control were identified in a February 16, 2011, SECY paper (SECY-11-0023). On March 24, 2011, the Commission approved the staff's recommendation to prepare a guidance document and *Federal Register* notice (FRN) clarifying that certain types of military radium-226 would be subject to the NRC regulations, and described possible regulatory approaches to be used to implement the NRC authority for radium-226 contamination and radium-226 in items and equipment (SRM-SECY-11-0023). The FRN and associated draft Regulatory Issue Summary (RIS) were issued on July 8, 2011 (76 FR 40282), for public comment.

The NRC staff continued its discussions with the U.S. Department of Defense (DoD) working group consisting of representatives from each of the military services and the Office of the Deputy Under Secretary of Defense to address the DoD comments on the draft RIS. As a result, the NRC staff and DoD working group agreed to proceed with NRC's involvement with DoD remediation under the CERCLA process through a MOU, rather than licensing as proposed in the draft RIS. In August 2014, NRC staff presented the option for a proposed comprehensive MOU to the Commission for their consideration in SECY-14-0082. Key components of the proposed comprehensive MOU were provided within SECY-14-0082.

#### Army Depleted Uranium License Application

The NRC staff continued its work on the licensing of U.S. Army installations possessing depleted uranium from the Davy Crockett weapon system. A license for the Schofield Barracks and Pohakuloa Training Area sites in Hawaii was issued in October 2013. Throughout FY 2014, FSME and OGC staff worked with the Army to identify and develop information necessary and sufficient for NRC to issue license amendment(s) adding the remaining 15 installations, which are located in other states, to the current license. Throughout FY 2014, staff continued consultations with Native Hawaiian Organizations, State of Hawaii, and U.S. Fish and Wildlife Service pursuant to Section 7 of the Endangered Species Act and Section 106 of the National Historic Preservation Act.

### **2.3.3 Fiscal Year 2015 Trends and Areas of Focus**

Progress in the decommissioning of complex materials sites is expected to increase in FY 2015. AAR, Stepan, and Beltsville Agricultural Research Laboratory are expected to complete decommissioning or license termination in the upcoming FY. The staff will also continue its focus on Army sites with depleted uranium contamination, and continue to work with DoD toward clarifying the NRC's jurisdiction over military radium-226 and involvement with military

remediation of residual radioactive material. Staff has been in discussions with the National Park Service regarding the ongoing remediation under the CERCLA process of the Great Kills Park site, located in Staten Island, New York. The Great Kills Park site is currently under consideration for addition to the Superfund National Priorities List of proposed sites. NRC staff has also been in discussions with EPA Region I, regarding their cleanup activities at the former Waterbury Clock factory located in Waterbury, Connecticut. NRC staff is continuing its development of a process for the identification of non-military sites with potential radium contamination.

**Table 2-3 Complex Decommissioning Sites**

Name		Location	Date DP Submitted	Date DP Approved	Compliance Criteria	Projected Removal
1	AAR Manufacturing, Inc.	Livonia, MI	8/13, amended 10/13*	12/13*	LTR-UNRES	2015
2	Alameda Naval Air Station**	Alameda, CA	N/A	N/A	N/A	N/A
3	Beltsville Agricultural Research Laboratory	Beltsville, MD	8/09	12/13	LTR-UNRES	2015
4	Cimarron (Kerr-McGee)	Cimarron, OK	4/95	8/99	Action-UNRES	2018
5	Department of the Army, U.S. Armament Research, Development, and Engineering Center	Picatinny, NJ	11/13	TBD	LTR-UNRES	TBD
6	FMRI (Fansteel), Inc.	Muskogee, OK	8/99, revised 5/03	12/03	LTR-UNRES	2023
7	Hunter's Point Naval Shipyard** (former Naval shipyard)	San Francisco, CA	N/A	N/A	N/A	N/A
8	Jefferson Proving Ground	Madison, IN	8/99 revised 6/02, 9/13	10/02 TBD	LTR-RES	2019
9	Mallinckrodt Chemical, Inc.	St. Louis, MO	Phase 1 11/97, Phase 2 9/08	Phase 1 5/02, Phase 2 7/10	LTR-UNRES	2016

**Table 2-3 Complex Decommissioning Sites**

<b>Name</b>		<b>Location</b>	<b>Date DP Submitted</b>	<b>Date DP Approved</b>	<b>Compliance Criteria</b>	<b>Projected Removal</b>
10	McClellan** (former Air Force base)	Sacramento, CA	N/A	N/A	N/A	N/A
11	Shallow Land Disposal Area (BWX Technologies, Inc.)	Vandergrift, PA	6/01 revised N/A	N/A	LTR-UNRES	2020
12	Sigma-Aldrich	Maryland Heights, MO	10/08, revised 11/10	5/09, revised TBD	LTR-UNRES	2016
13	Stepan Company	Maywood, NJ	N/A	N/A	LTR-UNRES	2015
14	UNC Naval Products	New Haven, CT	8/98, revised 2004, 12/06	4/99, revised 10/07	LTR-UNRES	TBD
15	West Valley Demonstration Project	West Valley, NY	Phase 1 3/09	Phase 1 2/10	LTR-UNRES***	TBD
16	Westinghouse Electric-Hematite Facility	Festus, MO	4/04 revised 6/06, 8/09	10/11	LTR-UNRES	TBD

- \* AAR Manufacturing is an unlicensed site; therefore, these dates apply to a work plan instead of a DP.
- \*\* The Hunter's Point Shipyard and Alameda Naval Air Station sites are being remediated by the Navy, and the McClellan site is being remediated by the Air Force, under the required CERCLA process and EPA oversight. It is assumed that some licensable material might be present at both sites; however, the NRC has not licensed these sites. Instead, the Commission has approved a "limited involvement approach to stay informed" and will rely on the ongoing CERCLA process and EPA oversight. More information is available on this approach in SECY-08-0077.
- \*\*\* The West Valley Phase I DP includes plans to release a large portion of the site for unrestricted use, while the remainder of the site may have a perpetual license or be released with restrictions.

Notes:

- The compliance criteria identified in this table present the staff's most recent information but do not necessarily represent the current or likely outcome.
- Abbreviations used in this table include: "N/A" for not applicable, "TBD" for to be determined, "Action" for SDMP Action Plan criteria, "LTR" for LTR criteria, "RES" for restricted use, and "UNRES" for unrestricted use.
- Reasons for multiple DP submittals range from changes in the favored decommissioning approach, to the phased implementation of decommissioning, to poor submittals.

## 2.4 Uranium Recovery Facility Decommissioning<sup>5</sup>

In enacting the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA), as amended, Congress had two general goals. The first was to provide a remedial action program to stabilize and control the residual radioactive material at various identified inactive mill sites. The second was to ensure the adequate regulation of uranium production activities and cleanup of mill tailings at mill sites that were active and licensed by the NRC (or Agreement States). At the time, the NRC did not have direct regulatory control over uranium mill tailings. The tailings themselves did not fall into any category of NRC-licensable material. Before 1978, the NRC was regulating tailings at active mills indirectly through its licensing of source material milling operations under the Atomic Energy Act of 1954, as supplemented by authority provided by the National Environmental Policy Act of 1969.

Through the provisions of Title I of UMTRCA, Congress addressed the problem of inactive, unregulated tailings piles. Title I of UMTRCA specifies the inactive processing sites for remediation. Except at the Atlas Moab site, surface reclamation activities have been completed and approved by the NRC at all Title I sites. However, groundwater cleanup is still ongoing at many of these Title I sites. When groundwater cleanup is completed, DOE will submit a revised long-term surveillance plan (LTSP) for NRC concurrence. Table 2-4a identifies the 22 Title I sites that are undergoing decommissioning. Title 10 of the *Code of Federal Regulations* (10 CFR), Section 40.27, "General License for Custody and Long-Term Care of Residual Radioactive Material Disposal Sites," governs the long-term care of Title I sites under a general license held by either DOE or the State in which the site is located.

Title II of UMTRCA addresses mill tailings produced at active sites licensed by the NRC or an Agreement State. Title II amended the definition of byproduct material to include mill tailings and added specific authority for the Commission to regulate this new category of byproduct material at licensed sites. Title II uranium recovery decommissioning activities include regulatory oversight of decommissioning uranium recovery sites; review of site characterization plans and data; review and approval of reclamation plans (RPs); preparation of EAs and EISs; inspection of decommissioning activities, including confirmatory surveys; decommissioning cost estimate reviews, including annual surety updates; and oversight of license termination. Regulations governing uranium recovery facility decommissioning are at 10 CFR Part 40, "Domestic Licensing of Source Material," and in Appendix A to that Part, "Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings of Wastes Produced by the Extraction or Concentration of Source Material from Ores Processed Primarily for Their Source Material Content." Licensed operations include conventional uranium mill facilities and in situ recovery (ISR) facilities, as both types of these facilities conduct "uranium milling" (as defined in 10 CFR 40.4). Table 2-4b identifies the Title II sites no longer operating and in decommissioning. As of September 30, 2014, 11 Title II uranium recovery facilities are undergoing decommissioning. Title 10 of the *Code of Federal Regulations*, Section 40.28, "General License for Custody and Long-Term Care of Uranium or Thorium Byproduct Materials Disposal Sites," governs the long-term care of Title II conventional uranium mill sites under a general license held by either DOE or the State in which the site is located. The six Title II sites that have been transferred for

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<sup>5</sup> This report does not address regulation of new or operating uranium recovery facilities with the exception of a brief discussion on their decommissioning.

long-term care are identified in Table 2-4c. Status summaries for the Title II sites undergoing decommissioning are provided at <http://www.nrc.gov/info-finder/decommissioning/uranium/>.

#### **2.4.1 Decommissioning Process for Uranium Mills**

These facilities are not subject to the license termination criteria set forth in Subpart E, “Radiological Criteria for License Termination,” to 10 CFR Part 20, “Standards for Protection Against Radiation.” Instead, they are subject to similar requirements in 10 CFR Part 40, Appendix A, as summarized below.

Any one of the following events may initiate the decommissioning process for uranium recovery facilities:

- The license expires or the license is revoked;
- The licensee has decided to permanently cease principal activities at the entire site or in any separate building or outdoor area;
- No principal activities have been conducted for a period of 24 months (except for impoundments and disposal areas);
- No principal activities have been conducted for a period of 24 months in any separate building or outdoor area (except for impoundments and disposal areas).

The uranium recovery facility decommissioning process includes several major steps, depending on the type of facility. These steps may include notification of intent to decommission; submittal, review and approval of the DP<sup>6</sup> or RP; implementation of the DP/RP; completion of decommissioning/reclamation; submittal and review of a completion report; submittal and review of a well-field restoration report (for ISR facilities); submittal and review of an LTSP for sites with tailings piles; termination of the license; and transfer of the property to the long-term care custodian, for sites with tailings piles, under a general license held by either DOE or a State.

##### Notification

Within 60 days of the occurrence of any of the triggering events, the licensee must notify the NRC of such occurrence and either begin decommissioning or, if required, submit a DP/RP within 12 months of notification and begin decommissioning upon plan approval. For new ISR or conventional facilities, the licensee submits groundwater restoration, surface reclamation, and facility DPs with the initial license application. The NRC reviews and approves these plans before issuing a license. For ISR facilities, groundwater restoration should occur at one well-field, while other well-fields are actively extracting uranium. Under 10 CFR 40.42(f), facilities may delay decommissioning if the NRC determines that such a delay is not detrimental to public health and safety and is otherwise in the public interest.

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<sup>6</sup> For uranium recovery sites, DPs typically deal with the remediation of structures, while RPs typically deal with tailings impoundments, groundwater cleanup, and other remediation efforts.

### Decommissioning Plan/Reclamation Plan—Existing Facilities

All uranium recovery facilities currently licensed by the NRC have NRC-approved DP/RPs. Therefore, for these facilities, the staff would review only amendments to the existing DP/RPs. Amendments would be necessary under the following circumstances:

- Environmental contamination exists or other new conditions arise that were not considered in the existing DP/RP;
- The licensee requests a change in reclamation design or procedures; or
- The licensee requests a change in the timing of restoration.

Depending on the complexity of the revision, a public meeting between the licensee and the NRC staff may be warranted.

### Decommissioning Plan/Reclamation Plan—New Facilities

Procedures for reviewing DP/RPs for new facilities are similar to those for existing facilities. Note that, under 10 CFR 51.20(b)(8), preparation of an EIS is a required part of the licensing process for new uranium milling facilities. A generic EIS is now in place for ISR facilities. Site specific supplemental EISs (SEISs) are being developed for the new ISR license applications under review, and these SEISs will tier off of the generic EIS.

### Implementation of the Decommissioning Plan/Reclamation Plan

Typically, a DP/RP is submitted with an application for an ISR facility. As the licensee prepares to enter decommissioning, a revised DP/RP is submitted. After approval of the revised DP/RP, the licensee must complete decommissioning within 24 months or apply for an alternate schedule. For conventional facilities, with groundwater contamination, or for ISR facilities with well-field restoration, 24 months is usually insufficient, because remediation of groundwater contamination is more time-consuming than remediation of surface contamination. As such, an alternate schedule may be appropriate.

The NRC staff will inspect the licensee's activities during decommissioning/reclamation to ensure compliance with the DP/RP, associated license conditions, and NRC and other applicable regulations (e.g., U.S. Department of Transportation regulations). The staff will also ensure that there is no degradation in groundwater quality after the completion and approval of groundwater restoration by monitoring the groundwater for a period of time.

Decommissioning at uranium recovery sites involves two main activities: surface reclamation (i.e., soil contamination cleanup, 11e.(2) byproduct material reclamation and disposal, equipment removal, and structure decommissioning), and groundwater restoration. Groundwater restoration is considered completed when concentrations on and off site (depending on the extent of contaminant migration) meet previously established groundwater protection standards in accordance with Appendix A of 10 CFR Part 40. For the groundwater constituents being monitored at a given site, three types of standards are potentially applicable in accordance with Criterion 5B(5) in Appendix A:

1. NRC-approved background concentrations;
2. Maximum contaminant levels established by the EPA (in Table 5C of 10 CFR Part 40, Appendix A); and
3. NRC-approved alternate concentration limits (ACLs).

If the licensee demonstrates that concentrations of monitored constituents cannot be restored to either background or Appendix A, Table 5C values (whichever value is higher), the staff may approve ACLs, after considering all the factors required in Appendix A, Criterion 5B(6). To obtain approval of ACLs, the licensee submits a license amendment request and a detailed environmental report that addresses all the Criterion 5B(6) factors. If the staff determines that the ACLs are protective of public health and the environment, the staff may approve the ACLs.

After surface decommissioning/reclamation is completed, the licensee issues a construction completion report for staff review and approval. As part of this review, the staff performs a completion inspection to confirm that surface reclamation was performed according to the DP/RP, license conditions, and the NRC regulations. Inspections also include surveys of tailings disposal areas to ensure that radon emissions comply with 10 CFR Part 40, Appendix A, Criterion 6. If additional information is required, the staff will issue RAs to address outstanding issues.

#### License Termination—Conventional Mills

After all reclamation activities have been completed and approved, the licensee, the NRC staff, and the long-term custodian will start license termination procedures. Before a conventional mill license is terminated, the custodial agency (i.e., State agency, DOE, or other Federal agency) will submit an LTSP for the NRC staff review and acceptance. The LTSP documents the custodian's responsibilities for long-term care, including security, inspections, groundwater and surface water monitoring, and remedial actions. Concurrent with the staff's acceptance of an LTSP, the existing license is terminated and titles to any mill tailings disposal sites are transferred to the custodian under 10 CFR 40.28, "General License for Custody and Long-Term Care of Uranium or Thorium Byproduct Materials Disposal Sites."

#### License Termination—In Situ Uranium Recovery Facilities

License termination at an ISR uranium recovery facility occurs when all groundwater is restored to acceptable levels and surface decommissioning/reclamation is completed and approved by the NRC. Surface decommissioning completion typically would include an inspection. Because 10 CFR Part 40, Appendix A, Criterion 2 generally prohibits ISR uranium extraction facility owners from disposing of 11e.(2) byproduct material at their sites, long-term care of ISR facilities by a governmental custodian under a general license is not required. However, ISR facilities are still required to find a licensed 11e.(2) disposal site for their waste, though some facilities are allowed to dispose of liquid wastes in deep disposal wells. Thus, all groundwater restoration and surface reclamation is performed so that the site can qualify for unrestricted release.

## 2.4.2 Summary of Fiscal Year 2014 Activities

- In FY 2014, the NRC staff conducted an in-process inspection of decommissioning activities at the Sequoyah Fuels Corporation site in Gore, Oklahoma. During that inspection, the NRC staff also visited a quarry in Zeb, Oklahoma, that Sequoyah Fuels is considering for the supply of rock cover material. In FY 2014, Sequoyah Fuels completed construction of the Phase III cell base after completing soil and perched groundwater remediation under the footprint of Phase III. All of the stabilized calcium fluoride sludge has been excavated and placed in the cell along with all of the impacted soil from the Phase III footprint cleanup. Buried solid waste materials from the North Waste Burial Area and impacted soils from the Pond 1 Spoils Pile have also been excavated and placed in the cell. Land surface within the Restricted Area north of the Cell has been remediated and is being surveyed in preparation for NRC confirmation. The Calcium Fluoride Settling Basins and Clarifier, the two Calcium Fluoride Burial Areas and the Pond 1 Spoils Pile Area, all located within the Restricted Area, will be ready for verification by mid-November. NRC staff anticipates conducting the confirmatory survey in November 2014. Remediation completion is expected in October 2015.
- Staff continued to work with the State of Wyoming to evaluate options for completing decommissioning at the American Nuclear Corporation (ANC) Gas Hills site, including determining the best use of the amount remaining in the decommissioning fund. NRC and the Wyoming Department of Environmental Quality have established monthly calls to discuss the best path forward for decommissioning the site.
- In FY 2014, staff continued its increased interaction with the Navajo Nation by participating in the EPA Navajo Nation Uranium Contamination Stakeholder Workshop and participating in Navajo Nation/DOE Quarterly Meetings. NRC staff continued to work with other Federal agencies on the Navajo Nation 5-Year Plan.
- The UNC Church Rock Mill Site is licensed by NRC and designated a Superfund Site by the EPA. A small scale groundwater remediation system, and semi-annual groundwater monitoring is in progress at the UNC Mill Site. In September 2011, the EPA issued a Non-Time-Critical Removal Action Memorandum for permanent disposal of approximately one million cubic yards of mine waste from the Northeast Church Rock Mine Site at the adjoining UNC Church Rock Mill Site. This proposed action will require UNC to submit a license amendment request to place the mine waste above the existing tailings impoundment, which is expected in FY 2016. Moreover, disposal of mine waste from the Northeast Church Rock Mine Site at the UNC Mill Site would be a major Federal action requiring significant collaboration among multiple agencies and with the Navajo Nation. As a result, the staff has been participating in the EPA's Technical Design Committee to ensure close coordination of the effort. The cleanup of the Northeast Church Rock Mine Site is a high priority objective in the Navajo Nation 5-Year Plan.
- Staff continued meeting with Western Nuclear regarding the termination of the radioactive materials license for their Split Rock facility in Jeffery City, Wyoming. In July 2014, Western Nuclear submitted a letter outlining the activities they have

performed to complete the termination of the license and their rationale for concluding that the license can be terminated. The staff is currently reviewing this letter and the licensee's rationale.

- Groundwater restoration activities continue at the Homestake site near Milan, New Mexico, in accordance with the NRC License SUA-1471. The site is also an EPA Superfund site, and NRC has an MOU with EPA to coordinate cleanup criteria for the site. The MOU stipulates that the remediation of the site would be done under NRC regulatory authority. In March 2012, Homestake submitted Revision 2 of the Corrective Action Plan (CAP) for NRC review and approval. Because Revision 2 of the CAP was also an attempt to meet the requirements to have the site removed from EPA's National Priorities List, the NRC requested comments from EPA to ensure the CAP satisfied their requirements. NRC staff also held a public meeting near the site in June 2012 to discuss and accept public comments on the CAP. Due to requests from the public, NRC provided a several month extension to the public comment period. NRC staff review of Revision 2 of the CAP and response to the public comments is in concurrence. In April 2013, Homestake submitted an update to its Decommissioning and Reclamation Plan for NRC review and approval. The NRC held a public meeting near the site in August 2013 to accept public comment on the Decommissioning and Reclamation Plan. The public requested an extension of the opportunity for hearing and public comment period. The opportunity for hearing was not extended, but the public comment period was extended an additional 3 months. With an approach similar to the review of the CAP, NRC staff review and response to public comments is ongoing. In April 2014, staff met with New Mexico Senator Heinrichs' staff to review the remediation progress being made at the site. Staff performed an inspection of the Homestake site in August 2014.
- Staff conducted observational site visits at sites that have been transferred to DOE and are generally licensed pursuant to 10 CFR 40.27 and 40.28. Site visits were conducted at Ambrosia Lake, Bluewater, Burrell, Canonsburg, L-Bar, and Shiprock.
- In addition, staff conducted site inspections or site visits at the ANC Gas Hills, UNC Church Rock, Sequoyah Fuels, Durita, Rifle, and Uravan sites.

### **2.4.3 Fiscal Year 2015 Trends and Areas of Focus**

In FY 2015, the staff expects the completion of remediation at Sequoyah Fuels, and the subsequent transfer of the site to the DOE for long-term surveillance and monitoring. The staff will also continue coordinating with other Federal agencies regarding the anticipated license amendment request for mine waste to be placed in the disposal cells on the UNC Church Rock Mill Site. In FY 2015, staff will continue its outreach efforts for the four Title I sites located within the Navajo Nation by participating in future DOE/Navajo Nation/Hopi quarterly meetings and consulting with the Navajo Nation on the review of DOE reports and plans for the reclamation and management of these sites. Staff will continue to participate in activities associated with the Navajo Nation 5-Year Plan. Staff will also continue to work with the State of Wyoming on a path forward for the ANC Gas Hills site. During FY 2015, staff will issue a request for additional information and respond to public comments on the Homestake Decommissioning and Reclamation Plan, hold a public meeting near the site, and conduct an inspection of the site.

<b>Table 2-4a Decommissioning Title I Uranium Recovery Sites</b>			
	<b>Name</b>	<b>Location</b>	<b>Status</b>
1	Ambrosia Lake	New Mexico	Monitoring
2	Burrell	Pennsylvania	Monitoring
3	Canonsburg	Pennsylvania	Monitoring
4	Durango	Colorado	Active
5	Falls City	Texas	Monitoring
6	Grand Junction	Colorado	Monitoring
7	Green River	Utah	Active
8	Gunnison	Colorado	Active
9	Lakeview	Oregon	Active
10	Lowman	Idaho	Monitoring
11	Maybell	Colorado	Monitoring
12	Mexican Hat	Utah	Monitoring
13	Monument Valley	Arizona	Active
14	Moab Mill	Utah	Active
15	Naturita	Colorado	Monitoring
16	Rifle	Colorado	Active
17	Riverton	Wyoming	Monitoring
18	Salt Lake City	Utah	Monitoring
19	Shiprock	New Mexico	Active

<b>Table 2-4a Decommissioning Title I Uranium Recovery Sites</b>			
20	Slick Rock	Colorado	Active
21	Spook	Wyoming	Monitoring
22	Tuba City	Arizona	Active
<p>Note: Active denotes that a site is still undergoing surface reclamation or is resolving groundwater issues. Monitoring denotes that the site is being monitored under its LTSP or a groundwater compliance action plan.</p>			

<b>Table 2-4b Decommissioning Title II Uranium Recovery Sites</b>				
	<b>Name</b>	<b>Location</b>	<b>DP/RP Approved</b>	<b>Completion of Decomm.</b>
1	American Nuclear Corporation	Casper, WY	10/88, Revision 2006	TBD
2	Bear Creek	Converse County, WY	5/89	2016
3	ExxonMobil Highlands	Converse County, WY	1990	TBD
4	Homestake Mining Company	Grants, NM	Revised plan—3/95	2018
5	Pathfinder—Lucky Mc	Gas Hills, WY	Revised plan—7/98	2016
6	Pathfinder—Shirley Basin	Shirley Basin, WY	Revised plan—12/97	TBD
7	Rio Algom—Ambrosia Lake	Grants, NM	2003 (mill); 2004 (soil)	2017
8	Sequoyah Fuels Corporation	Gore, OK	2008	2015
9	Umetco Minerals Corporation	East Gas Hills, WY	Revised soil plan—4/01	2016
10	United Nuclear Corporation	Churchrock, NM	3/91, Revision 2005	TBD
11	Western Nuclear Inc.—Split Rock	Jeffrey City, WY	1997	TBD
<p>Note: COGEMA, Crow Butte, Kennecott Uranium Company, and Power Resources Inc., are all operating, or in standby, uranium recovery facilities in various stages of partial restoration/decommissioning.</p> <p>TBD to be determined</p>				

<b>Table 2-4c Title II Uranium Recovery Sites – DOE Licensed Under 10 CFR 40.28</b>			
	<b>Name</b>	<b>Location</b>	<b>Transferred to DOE</b>
1	Bluewater (Arco)	New Mexico	2003
2	Edgemont	South Dakota	2003
3	L-Bar	New Mexico	2003
4	Maybell West	Colorado	2010
5	Sherwood	Washington	2003
6	Shirley Basin South	Wyoming	2003

## **2.5 Fuel Cycle Facility Decommissioning**

Currently, there are two fuel cycle facilities undergoing partial decommissioning: The Nuclear Fuel Services site in Erwin, TN, and the Honeywell site in Metropolis, IL. The NRC's public Web site at <http://www.nrc.gov/info-finder/decommissioning/fuel-cycle/> summarizes additional information about the status of these facilities.

### **2.5.1 Fuel Cycle Facility Decommissioning Process**

The decommissioning processes for fuel cycle facilities and for complex materials sites are similar (see Section 2.3.1). Decommissioning activities at fuel cycle facilities can be conducted during operations (partial decommissioning) or after the licensee has ceased all operational activities.

Project management responsibility for fuel cycle facilities resides within NMSS and the Division of Fuel Cycle Safety, Safeguards, and Environmental Review (FCSE) during licensee operations and partial site decommissioning with technical support from the Decommissioning Program. In cases where the entire site is being decommissioned in support of license termination, the project management responsibility resides within the Decommissioning Program. Project management responsibility for fuel cycle facilities is transferred from FCSE when the licensee has ceased all operational activities and a critical mass of material no longer remains at the site.

### **2.5.2 Summary of Fiscal Year 2014 Activities**

During FY 2014, Honeywell began work to decommission a portion of its Metropolis Works facility located in Metropolis, IL. Honeywell is decommissioning four surface impoundment ponds, and plans to release the ponds from its source material license for unrestricted use. The DP was approved in September 2013.

Nuclear Fuel Services has continued to work toward releasing portions of an area within its site located in Erwin, TN. In FY 2014, Decommissioning Program staff continued to provide support to FCSE by reviewing FSSRs for several survey units in the North Site area. The FSSRs primarily address subsurface layers of the North Site area, which include former radiological burial areas and ponds that received effluents.

### 3. GUIDANCE AND RULEMAKING ACTIVITIES

In FY 2014, the staff worked to increase the effectiveness of the Decommissioning Program and to gain a better perspective on decommissioning as a whole. The Decommissioning Program has been performing a self-evaluation of dose modeling to help it become more effective in the decommissioning of sites. Additionally, staff has been working on initiatives that will help prevent the creation of sites that are unable to complete decommissioning.

#### Division of Waste Management and Environmental Protection (DWMEP) Self-Evaluation of Dose Modeling

DWMEP continued an evaluation of the uses and applicability of computer codes employed in carrying out DWMEP licensing activities, particularly those codes used for the demonstration of compliance with the decommissioning dose criteria. This evaluation is intended for NRC's use when assessing ways to enhance the efficiency of the use of codes and models and to establish consistency and relevance in the selection of these computer codes and models. This activity is expected to continue into FY 2015.

#### Decommissioning Guidance

Revision 1 of NUREG-1757, Volume 2, "Consolidated Decommissioning Guidance: Characterization, Survey, and Determination of Radiological Criteria," was published in September 2006. An effort to update the volume was initiated in early 2014. This update will amend the guidance to address longstanding technical issues and lessons learned which would improve the quality of licensee decommissioning plans and license termination plans and improve the efficiency of staff review of these documents. Some of the revisions are to as low as reasonably achievable (ALARA) analysis, composite sampling, and decommissioning licensee versus contractor responsibilities. Additionally, miscellaneous editorial changes were made. The revised NUREG is expected to go to the Regions for review by the end of the year and be published for public comment early in 2015.

Because the guidance for uranium recovery licensing dates back to the late 1970s, the NRC staff determined that a thorough reexamination, consolidation, and updating of the guidance being used by DWMEP staff would be appropriate. This is a multi-year effort to review, consolidate and update over 130 uranium recovery decommissioning guidance documents. The update is being prepared as Volume 4 of NUREG-1757. This volume will incorporate those provisions and aspects of the existing uranium recovery guidance, which are specifically relevant to the reclamation, restoration, and decommissioning of uranium recovery facilities. All commercial licensed facility types will be addressed: convention mills, ISR, heap leach and byproduct recovery operations. This volume will incorporate provisions unique to byproduct material (as defined in section 11(e).2 of the Atomic Energy Act of 1954) permanent waste disposal, and financial assurance, which are significantly different from such considerations in the decommissioning of other materials facilities.

## 4. RESEARCH ACTIVITIES

The Office of Nuclear Regulatory Research (RES) continues to focus its support on key decommissioning issues through a number of activities discussed below.

The RES staff has continued the development or modification of computer codes useful for site decommissioning analyses. The incorporation of source-term modeling into RESRAD-OFFSITE was completed with Argonne National Laboratory incorporating the Disposal Unit Source Term (DUST) code, which contains several source-term models and was prepared by Brookhaven National Laboratory, into RESRAD-OFFSITE. A final report on the use of the DUST-modified RESRAD-OFFSITE was published as NUREG/CR-7127, "New Source Term Model for the RESRAD-OFFSITE Code Version 3." The RESRAD-OFFSITE User's Manual is in final editing and will be submitted for publication in November 2014.

Cooperative efforts with DOE, National Institute of Standards and Technology (NIST), and academic, private sector, and international experts continued on the Cement Barriers Partnership (CBP). The CBP memorandum of understanding among DOE, NRC, and NIST has been revised and signed by NRC and DOE, and it awaits final approval by NIST. The CBP is a multi-disciplinary collaboration formed to develop the next generation of simulation tools to evaluate the structural, hydraulic and chemical performance of cementitious barriers used in nuclear applications over extended time frames (e.g., more than 100 years for operating facilities and greater than 1000 years for waste management applications). The CBP has published numerous reports assessing the behavior of cementitious materials for waste disposal and describing models for their evaluation and prediction of long-term processes. CBP conducted several workshops on use of their Toolbox Version 2, a group of models on concrete chemistry and behavior. RES and FSME staff attended. Complementary work at NIST to examine pore solution chemistry and mineral phases in cementitious composites with chemical and mineral admixtures has been completed and published as NIST/TIR-7947.

Cooperative studies between Pacific Northwest National Laboratory (PNNL) and Oregon State University to study radionuclide uptake in fruit and nut trees were completed with the publication in July 2014 of NUREG/CR- 7174; "Transfer Factors for Nuclide Uptake by Fruit and Nut Trees". The data in this report will be used to update parameter values in dose assessment codes that evaluate exposures to radioactive materials in the food chain pathway.

Researchers at PNNL and the U.S. Geological Survey completed their work to determine the long term efficacy of bioremediation of groundwater contaminated with uranium at both surficial sites and deeper ISR facilities. Results for these deeper sites indicate that re-establishing the natural reducing conditions at depth can be an effective remediation strategy in spite of the severe disruption of the original biological community by the ISR process. The experimental and modeling results are documented in NUREG/CR-7167, "Assessing the Potential for Bioremediation of Uranium In-Situ Recovery Sites," which was published in June 2014. The U.S. Geological Survey experimental results for bioremediation of shallow uranium contaminated soils and those from the PNNL modeling show that uranium can be readily reoxidized and released to solution in these shallow formations. The use of added iron to generate large quantities of adsorptive minerals, was shown to reduce uranium concentrations and release rates but not enough to allow use of this technology on near-surface sites. NUREG/CR-7178,

“Uranium Sequestration during Biostimulated Reduction and in Response to the Return of Oxidic Conditions in Shallow Aquifers,” has been submitted by NRC staff for publication.

NUREG/CR-7169, “Sensors and Monitoring to Assess Grout and Vault Behavior for Performance Assessment,” was published in June 2014. This report was done under the RES Long-Term Research Program and examines approaches to monitoring moisture and cracking in large grout monoliths and their associated vaults. A presentation was made to FSME staff on this topic. The work indicates that several geophysical methods may be useful in assessing grout conditions.

A new research program was begun, in response to a User Need, on the effects of changes in properties of mill tailings engineered covers on the emission of radon. This study will evaluate the effects of soil structure formation by abiotic and biotic process on the hydraulic conductivity and gaseous diffusivity of radon barriers, how structural development varies with depth and thickness of the radon barrier, and how structure influences transmission of radon and seepage carrying ground water contaminants.

The draft NUREG/CR, “Radionuclide Release from Slag and Concrete Waste Materials: Part 3 Testing Protocols,” was prepared by Argonne National Laboratory. It takes information from the previous two NUREG/CR reports for this project, and recommends short-term testing protocols and modeling approaches to characterize the release of contaminants from waste materials in large-scale surface disposal sites. The objectives of these tests are to provide contaminant release rates and to characterize transport behavior within the waste pile, based on representative samples of the waste material. Results can then be used in performance assessment models.

The RES staff also continued direct assistance to FSME efforts through a variety of tasks that included: (1) contributing to the critical review for the Savannah River H-Tanks Performance Assessments; (2) participating in the MARSSIM Interagency Working Group; (3) preparing a short course entitled “Fundamentals of Adsorption of Contaminants;  $K_d$ , the Partition Coefficient, What Does That Mean?;” (4) participating in reviews and providing suggestions to the Center for Nuclear Waste Regulatory Analyses regarding their experimental plan on tank backfill grout behavior; and (5) contributing to a Desk Guide on Adsorption for FSME. The short course was presented to FSME staff on two occasions and was well attended. It was recorded, edited, and is now available as a Knowledge Management course.

## 5. INTERNATIONAL ACTIVITIES

The NRC participates in multiple international activities to fulfill U.S. commitments to international conventions, treaties, and bilateral/multilateral agreements. Staff is also actively engaged in reviewing, developing, and updating international radiation safety standards, and technical support documents through interaction with international organizations, including the International Atomic Energy Agency (IAEA) and the Nuclear Energy Agency (NEA), and foreign governments. The NRC participates in bilateral and trilateral exchanges with other countries, hosting foreign assignees and providing reciprocal assignments, developing and providing workshops to requesting countries, and providing technical support as needed. The NRC is generally recognized in the international nuclear community as an experienced leader in the regulation and safety of decommissioning, spent fuel management and storage, radioactive waste management and disposal, site remediation, and environmental protection. Interaction with international organizations and governments allows the NRC to share insights about lessons learned and successful, safe, and effective decommissioning approaches. This interaction also allows the staff to provide input for various international guidance documents and standards that benefit other countries in establishing and implementing safe decommissioning strategies in the international community. Conversely, the staff gains insight into approaches and methodologies used in the international community and considers these approaches as they continue to risk-inform the NRC Decommissioning Program. The most significant of these activities are summarized below.

### International Atomic Energy Agency Activities

- Staff participated in the review and development of IAEA Safety Standards and also participated in IAEA projects and workshops related to decommissioning and waste disposal, as well as participation as expert consultants to update IAEA key standards or to advise on development of other countries' regulatory programs. For example: (1) staff conducted reviews and updated several IAEA standards related to decommissioning during the Waste Safety Standards Committee 36<sup>th</sup> and 37<sup>th</sup> review cycles; (2) staff provided a presentation at an IAEA workshop on Deferred Decommissioning at Materials sites; (3) staff participated in planning and organization of the International Forum of Uranium Legacy Sites for remediation, supervision, and regulatory development; (4) staff participated in development and update of IAEA safety requirements on "Decommissioning of Nuclear Installations;" (5) staff participated in the "Regulatory Aspects and Practical Experiences in the "Application of Entombment Decommissioning Strategies;" (6) staff participated in an IAEA project on "Human Intrusion Scenarios" applicable to waste management and decommissioning; (7) staff participated in the development of an IAEA Technical Document on "Review of Remediation Plans;" (8) staff participated in an IAEA consultancy meeting for "Developing Romania's Decommissioning Regulations;" and (9) staff participated in a workshop on uranium mill decommissioning for Brazil.
- Staff has initiated the preparation of the fifth United State National Report on the safety of spent fuel, radioactive waste and disused sealed sources. This process involves an interagency (NRC, DOE, EPA and the State Department) Steering Committee and working group, and the report is prepared as a national obligation under the provisions of the Joint

Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (Joint Convention). Decommissioning staff in NRC provided technical and programmatic support to the U.S. Delegation to the Inter-Sessional Meeting of the Joint Convention which took place in April 2013 and to the U.S. Delegation to the Second Extraordinary Meeting of the Contracting Parties in May 2014. Decommissioning of nuclear facilities was included in the scope of this convention for achieving a uniform global level of safety in such management of radioactive materials and activities. The DWMEP Division Director served as the Chairman of a Country Review Group in May 2012 and continued to serve as a member of the General Committee through the Second Extraordinary Meeting in May 2014.

- Staff participated in a technical meeting of the International Forum on Regulatory Supervision of Legacy Sites, related to the remediation of legacy nuclear facilities. The DWMEP Deputy Division Director served as chairman of this IAEA effort and led the most recent meeting in July 2014.
- The NRC coordinated the Member State review of the IAEA General Safety Requirements Part 6, "Safety Requirements for Decommissioning of Nuclear Facilities," which was published in July 2014.
- NRC staff participated in the development of predisposal management of waste (including waste generated from decommissioning) for power reactors and Nuclear Fuel Cycle Facilities. Staff is also coordinating final reviews of these standards.

#### Nuclear Energy Agency Activities

- The NRC contributed to the 16<sup>th</sup> Session of the NEA Radioactive Waste Management Committee Bureau Annual Report for the Radioactive Waste Management Committee.
- Staff continued as a U.S. representative and core group member of the NEA Working Party on Decommissioning and Dismantling (WPDD), and participated in the 14<sup>th</sup> annual meeting in Paris, France.
- Staff co-authored the NEA technical report on "Site Characterization for Decommissioning."
- Staff participated as U.S. and NRC representative in NEA Working Groups and Task Groups on: (1) WPDD Core Group; (2) Working Group on Radiological Characterization for Decommissioning-Phase II; (3) Nuclear Site Restoration Task Group; (d) Working Group on R&D for Decommissioning; and (4) Working Group on Decommissioning Funding.
- Staff provided technical support for a presentation in the NEA Policy Debate on Decommissioning.

#### Other International Interactions

- In January 2014, staff provided support to the Korean Institute of Nuclear Safety by conducting a workshop on reactor decommissioning. With support from the Office of

International Programs, staff completed a Joint Cooperation Plan for Reactor Decommissioning.

- In June 2014, staff escorted a Taiwanese Atomic Energy Council regulator to Zion to observe decommissioning inspection activities, and coordinated a two-day meeting at NRC Headquarters on the decommissioning program. This was a follow up to the Reactor Decommissioning Workshop staff conducted in Taiwan in 2013.

## **6. PROGRAM INTEGRATION AND IMPROVEMENT**

The Decommissioning Program currently encompasses power and early demonstration reactors, research and test reactors, complex materials facilities, fuel facilities, and uranium recovery facilities. In addition to the sites undergoing decommissioning regulated by the NRC, many complex decommissioning sites are being decommissioned under the purview of the Agreement States. Given this breadth of projects, the Decommissioning Program has undertaken many initiatives to keep abreast of sites undergoing decommissioning.

### Power Reactor Program Evaluation

The Decommissioning Program has a history of seeking opportunities to improve its processes in order to accomplish decommissioning activities more effectively. Due to the shutdowns of Crystal River Unit 3, Kewaunee, and San Onofre Units 2 and 3, the NRC expects an increase in the decommissioning workload. In response to this anticipated increase in workload, the FSME staff performed a program evaluation of its power reactor decommissioning regulatory function. The power reactor decommissioning program evaluation was an outgrowth of the staff's Integrated Decommissioning Improvement Plan (IDIP) efforts and part of its initiative to foster continuous improvement.

The staff interviewed senior staff members and project managers involved with the decommissioning power reactor program to obtain recommended improvements that could enhance work quality and effectiveness. These interviews provided input that focused on improvements in knowledge management, policy, and processes. The resulting set of recommendations was used in conjunction with a review of all guidance and policy documents within the power reactor decommissioning program to identify guidance documents in need of updating as well as other potential improvements. Subsequently, FSME management reviewed the tasks identified to promote programmatic enhancement and set task priorities. Staff is currently working these programmatic enhancement tasks.

### Comprehensive Decommissioning Program

The NRC has continued the implementation of an enhanced Comprehensive Decommissioning Program, which allows the NRC to compile, in a centralized location, information on the status of decommissioning and decontamination of complex sites and uranium recovery sites in the United States. In FY 2014, State contacts provided responses to letter FSME-14-075, "Information Request: Status of Current Complex Decommissioning and Uranium Recovery Sites." This site information was compiled and placed into a database for publication on NRC's public website. Summaries of information on sites regulated by the Agreement States are currently available to the public to ensure openness and promote communication and thus enhance public confidence by providing them with a national perspective on decommissioning.

### Knowledge Management

Progress continued on knowledge management activities identified by IDIP, as several knowledge management seminars were held by managers and senior staff. Seminars were held throughout FY 2014 on a variety of topics, including the power reactor decommissioning

process, decommissioning lessons learned, and an overview of the License Termination Rule. These knowledge management activities should result in future efficiencies and enhancements in the staff's oversight of sites, particularly with the expected increase in workload with reactors entering decommissioning. In addition, the staff has taken a proactive approach to enhance knowledge transfer by continuing its implementation of succession planning in FY 2014.

#### Uranium Recovery Decommissioning Program Enhancements

Throughout FY 2014, FSME staff continued interactions with DOE for those sites that are generally licensed under 10 CFR 40.27 and 40.28. Staff is working with DOE to develop a site transfer protocol and has provided comments to DOE on its site transfer guidance for DOE staff. Staff has also continued its participation in DOE meetings with the Navajo Nation and Hopi Tribe pertaining to the sites on the Navajo Nation and Hopi Reservation.

In addition to site oversight activities by project managers, in FY 2014, staff developed and implemented a process for reviewing routine ground and surface water reports for the UMTRCA Title I and Title II sites that have been transferred to the DOE for long-term care and maintenance pursuant to 10 CFR 40.27 and 40.28. The new process uses a checklist, and accompanying guidance, that allows the site Project Manager to perform a screening evaluation of the report that can identify issues or concerns before the report is reviewed by a staff hydrologist. This effort should result in a more efficient review of the routine reports and allow the staff hydrologists to focus on more complex groundwater issues. The guidance was also incorporated into Volume 4 of NUREG-1757 that is currently being developed.

In 2014 the staff reviewed and provided input on several DOE reports pertaining to the remediation of ground water at the sites on the Navajo Nation. These reports were developed by DOE to support their evaluation of the remediation strategies at the sites on the Navajo Nation and may provide the basis for revising the strategies in the future.

In 2014, the NRC staff continued working with the EPA, along with the Bureau of Indian Affairs, DOE, the Agency for Toxic Substances and Disease Registry, and the Indian Health Service, in consultation with Navajo Nation, on a coordinated 5-Year Plan to address uranium contamination on the Navajo Nation from past mining and milling activities. The 5-Year Plan represents a coordinated approach by the agencies, and outlines a strategy for gaining a better understanding and addressing the problem of uranium contamination on the Navajo Nation from past mining and milling activities. In 2013, the agencies reported to Congress on the status of activities outlined under the first 5-Year Plan and committed to continuing the work in the future. In 2014, the NRC worked with the same agencies to develop the 2014-2019 5-Year Plan, which builds on the first 5-Year Plan's successes, uses information gained during the first 5-Year Plan to better plan for future work under the Plan, and includes several enhanced outreach activities.

## 7. AGREEMENT STATE ACTIVITIES

Thirty-seven States have signed formal agreements with the NRC and assumed regulatory responsibility over certain byproduct, source, and small quantities of SNM, including the decommissioning of some complex materials sites. However, after a State becomes an Agreement State, the NRC continues to have formal and informal interactions with the State.

Formal interactions with Agreement States in FY 2014 included the following:

- On October 1, 2013, Shieldalloy filed a petition for review in the United States Court of Appeals for the D.C. Circuit of CLI-13-6, which had reinstated the transfer of authority over Sheildalloy's Newfield, New Jersey, site back to the State of New Jersey. The D.C. Circuit Court issued an opinion on October 14, 2014, that denied Shieldalloy's petition for review.
- DWMEP staff worked with the Agreement States to incorporate more detailed information about complex materials decommissioning sites and uranium recovery facilities undergoing decommissioning under the purview of the Agreement States on the decommissioning Web site. These site summaries are available at <http://www.nrc.gov/info-finder/decommissioning/complex/>.
- Integrated Materials Performance Evaluation Program reviews that included decommissioning were conducted in several Agreement States (Arkansas, Kansas, Georgia, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, and Texas).

Table 7-1 identifies the decommissioning and uranium recovery sites in the Agreement States.

<b>Table 7-1 Agreement State Decommissioning Sites</b>				
<b>State</b>	<b>Name</b>	<b>Location</b>	<b>Date DP Submitted</b>	<b>Date DP Approved</b>
CA	Chevron Mining, Inc. (formerly Molycorp)	Mountain Pass, CA	6/06	7/08
CA	Halaco	Oxnard, CA	N/A	N/A
CA	Isotope Specialties	Burbank, CA	2013	TBD
CA	Magnesium Alloy Products	Compton, CA	2006	2008
CA	The Boeing Company	Simi Valley, CA	10/03	10/03
CO	Cotter Schwartzwalder Mine	Golden, CO	7/10	7/10
CO	Cotter Uranium Mill	Canon City, CO	9/03	1/05
CO	Hecla Mining Company – Durita	Naturita, CO	10/91	3/92
CO	Umetco Uravan	Uravan, CO	6/93	10/93
FL	Iluka Resources	Green Cove Springs, FL	TBD	TBD
IL	ADCO Services, Inc.	Tinley Park, IL	2/13	TBD
IL	Weston Solutions (formerly Kerr-McGee)	West Chicago, IL	9/93	6/94
KS	Beta Chem Laboratory	Lenexa, KS	TBD	TBD
MA	BASF (formerly Engelhard)	Plainville, MA	N/A	N/A
MA	Norton/St. Gobain	Worcester, MA	TBD	TBD
MA	Shpack Landfill	Norton, MA	09/04	09/04
MA	Starmet Corp. (formerly Nuclear Metals)	Concord, MA	10/06	TBD

<b>Table 7-1 Agreement State Decommissioning Sites</b>				
<b>State</b>	<b>Name</b>	<b>Location</b>	<b>Date DP Submitted</b>	<b>Date DP Approved</b>
MA	Texas Instruments	Attleboro, MA	TBD	TBD
MA	Wyman-Gordon Co.	North Grafton, MA	TBD	TBD
NJ	Shieldalloy Metallurgical Corp.	Newfield, NJ	TBD	TBD
OH	Advanced Medical Systems, Inc.	Cleveland, OH	6/04	5/05
OH	Ineos USA (formerly BP Chemical)	Lima, OH	4/92	6/98
OR	PCC Structurals, Inc.	Portland, OR	6/06	9/06
OR	TDY Industries d/b/a Wah Chang	Albany, OR	6/03	3/06
PA	Curtiss-Wright Cheswick	Cheswick, PA	3/06	6/07
PA	Global Tungsten & Powders Corp.	Towanda, PA	6/13	9/13
PA	Karnish Instruments	Lock Haven, PA	N/A	N/A
PA	Keystone Metals Reduction	Cheswick, PA	N/A	N/A
PA	Remacor	West Pittsburg, PA	N/A	N/A
PA	Safety Light Corporation	Bloomsburg, PA	TBD	TBD
PA	Strube Incorporated	Lancaster, PA	TBD	TBD
PA	Superbolt (formerly Superior Steel)	Carnegie, PA	TBD	TBD
PA	Westinghouse Electric (Waltz Mill)	Madison, PA	4/97	1/00
PA	Whittaker Corporation	Greenville, PA	12/00, revised 8/03, 10/06	5/07

<b>Table 7-1 Agreement State Decommissioning Sites</b>				
<b>State</b>	<b>Name</b>	<b>Location</b>	<b>Date DP Submitted</b>	<b>Date DP Approved</b>
TN	CB&I Federal Services, LLC	Knoxville, TN	6/14	7/14
TX	ASARCO (Federated Metals)	Houston, TX	TBD	TBD
TX	ConocoPhillips	Falls City, TX	11/87	9/80
TX	ExxonMobil	Three Rivers, TX	4/85	9/82
TX	Intercontinental Energy Corp.	Three Rivers, TX	3/03	TBD
TX	Iso-Tex Diagnostics	Houston, TX	11/06, revised 11/10	TBD
TX	Pearland-Manvel Landfill	Pearland, TX	2/02	TBD
TX	Rio Grande Resources	Hobson, TX	4/93, ACL—11/97	11/96
TX	South Texas Mining Venture, LLP (Tex-1, Mt. Lucas sites)	Hobson and Dinero, TX	8/01	TBD
UT	Rio Algom Uranium Mill	Lisbon Valley, UT	9/02	7/04
WA	Dawn Mining Company	Ford, WA	6/94	1/95
N/A not applicable				
TBD to be determined				

## **8. RESOURCES**

The total Decommissioning Program staff budget for FY 2014 was 63.2 full-time equivalents (FTE); and for FY 2015 the program has requested 65.0 FTE. These resource figures include personnel to perform licensing casework directly related to decommissioning sites; inspections; project management and technical support for decommissioning power reactors, research and test reactors, complex materials sites, uranium mill tailings facilities, and fuel cycle facilities; development of rules and guidance; EISs and EAs; research to develop more realistic analytical tools to support licensing and rulemaking activities; and Office of the General Counsel support. These figures also include nonsupervisory indirect FTE associated with the Decommissioning Program, and safety and environmental reviews for new uranium recovery facilities.

## **9. FISCAL YEAR 2015 PLANNED PROGRAMMATIC ACTIVITIES**

The staff plans the continued implementation of IDIP and its knowledge management tasks during FY 2015. Specifically, the NRC staff has identified knowledge management activities for documenting and exchanging decommissioning lessons learned for selected topics (e.g., uranium recovery, restricted release, and ALARA).

The power reactor decommissioning program evaluation resulted in a set of recommendations, which was used in conjunction with a review of all guidance and policy documents within the power reactor decommissioning program to identify guidance documents in need of updating as well as other potential improvements. Subsequently, FSME management reviewed the tasks identified to promote programmatic enhancement and set task priorities. Throughout FY 2015, staff will continue to work on these programmatic enhancement tasks.

In FY 2011, staff began a multi-year effort to review, consolidate, and update over 130 uranium recovery decommissioning guidance documents as part of the IDIP improvement process. This process will continue throughout FY 2015, and, when completed, this document will be published as Volume 4 of the Consolidated Decommissioning Guidance, NUREG-1757.

In response to the emerging issue of historic, non-military sites with radium contamination (e.g., Great Kills Park, Waterbury Clock Factory), NRC staff began work to develop a process for the identification of other potential historic, non-military sites with potential radium contamination. Staff will continue this effort during FY 2015.

The October 5, 2014, FSME and NMSS merger involved a reorganization that will enable the new NMSS to meet anticipated future challenges and operate more effectively by balancing workload. Throughout FY 2015, staff and management will focus on this transition and the implementation of improved processes in the new NMSS.