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# **Status of the Decommissioning Program**

**2016 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
ALARA	as low as reasonably achievable
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
DTWG	Decommissioning Transition Working Group
DUWP	Division of Decommissioning, Uranium Recovery, and Waste Programs
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FCSE	Division of Fuel Cycle Safety, Safeguards, and Environmental Review
FSSR	Final Status Survey Report
FTE	full-time equivalents
FY	fiscal year
GETR	General Electric-Hitachi Test Reactor
HLW	high-level waste
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
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MOU	Memorandum of Understanding
N/A	not applicable
NARM	naturally occurring and accelerator-produced radioactive material

NEA	Nuclear Energy Agency
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
NYSERDA	New York State Energy and Research Development Authority
OAS	Organization of Agreement States
OGC	Office of the General Counsel
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
SNM	special nuclear material
SRM	Staff Requirements Memorandum
TBD	to be determined
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
WVDP	West Valley Demonstration Project

# 1. INTRODUCTION

This report provides a summary of decommissioning activities at 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) 2016, including the decommissioning of complex materials sites, power 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 Decommissioning Program, provides information supplied by Agreement States on decommissioning in their States, and identifies key Decommissioning Program activities that NRC staff will undertake in the coming year. The information contained in this report is current as of September 30, 2016.

Approximately 15 years ago, the Division of Decommissioning, Uranium Recovery, and Waste Programs (DUWP) began an effort to enhance the effectiveness of the NRC's Decommissioning Program. These enhancements included several initiatives: upgrading the resources available to regulate 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 NRC 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.

As noted in NRC staff's FY 2015 report (SECY-15-0151, "Status of the Decommissioning Program—2015 Annual Report"), 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 regulation of military and non-military sites with radium contamination.

In FY 2016, the NRC terminated materials licenses at the Mallinckrodt site in St. Louis, Missouri, and the Stepan Company site in Maywood, New Jersey. The NRC also terminated the operating license for the U.S. Department of Veterans Affairs research reactor in Omaha, Nebraska. Most power reactors undergoing decommissioning will remain in SAFSTOR, with Zion Units 1 and 2, Humboldt Bay, La Crosse, and San Onofre Units 2 and 3 in active decommissioning. The inventory of decommissioning power reactor sites is expected to increase as licensees for several reactors have expressed their intent to permanently cease power operations by 2019, including Fort Calhoun, Clinton, Quad Cities, Pilgrim, and Oyster Creek. Staff within the Office of Nuclear Material Safety and Safeguards (NMSS), the regional offices, as well as the Office 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 operating reactors to plants in a decommissioning status. In 2017, NRC staff expects to work toward the

termination of licenses at Beltsville Agricultural Laboratory, and begin decommissioning licensing and oversight at the Centrus Fuel Facility in Piketon, Ohio. NRC staff also expects that decommissioning activities will be completed at Humboldt Bay. Within the next few years, several Title II<sup>1</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>1</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, 2016, 19 nuclear power and early demonstration reactors, 4 research and test reactors, 13 complex materials facilities, 2 fuel cycle facilities (partial decommissioning), 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 website (<http://www.nrc.gov/waste/decommissioning.html>) contains status summaries for the facilities managed under the Decommissioning Program. These summaries, which are updated quarterly, describe the status of each site and identify the major technical and regulatory issues affecting the completion of decommissioning. 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, NRC staff routinely processes license amendments and exemptions to support the progressive stages of decommissioning. The Decommissioning Program 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, 2016, the 19 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: certification to the NRC of permanent cessation of operations and removal of fuel; submittal and implementation 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 certification to the NRC. In addition, the licensee is required to provide certification to 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(a)(7)).

NRC staff will periodically inspect operations at the site to ensure that decommissioning activities are being conducted in accordance with all applicable regulations and commitments.

### 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 discuss 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 Documents 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. 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 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 2016 Activities**

- In May, NRC staff approved the LTP for Humboldt Bay. The LTP provides the license requirements the licensee needs to meet for radiological termination of the license.
- In May, NRC staff issued an Order approving the transfer of the license for the La Crosse reactor from Dairyland Power Cooperative to LaCrosseSolutions, LLC, which is a wholly owned subsidiary of Energy Solutions, LLC. This transfer will allow LaCrosseSolutions to assume the licensed possession, maintenance, and

decommissioning authorities in order to expedite the completion of decommissioning at the site.

- NRC staff reviewed requests and issued partial site releases under 10 CFR 50.83 for non-impacted land at the Zion and GE Vallecitos sites.
- NRC staff received a request for an alternate decommissioning schedule for the reactors at the GE Vallecitos facility, which proposes to extend the schedule for decommissioning beyond the 60-year timeline required for power reactor licensees in 10 CFR 50.82(a)(3). As of September 2016, NRC staff is evaluating the licensee's request.
- NRR transferred project management responsibility for Vermont Yankee to NMSS. Staff within NMSS, regional offices, as well as NRR, NSIR, and OGC coordinated extensively regarding licensing activities, transfer of inspection responsibilities, and public meetings at sites that have permanently ceased operations and have transferred into a decommissioning status.
- To ensure openness during the regulatory process, NRC staff held several public meetings,<sup>2</sup> including a meeting regarding the LTP and partial site release for La Crosse in September 2016 and a meeting regarding the partial site release request for Zion in December 2015.
- NRC staff completed oversight activities and 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, Nuclear Ship Savannah, San Onofre Units 2 and 3, Three Mile Island Unit 2, Zion Units 1 and 2, Kewaunee, Fermi 1, and Crystal River Unit 3. NRC staff also conducted site visits at Dresden Unit 1 and Vermont Yankee.

### **2.1.3 Fiscal Year 2017 Trends and Areas of Focus**

NRC staff will continue its extensive coordination with other offices while working to complete the transfer of recently shut down reactors to the Decommissioning Program. Reactors that have recently ceased operation remain under NRR project management until formal transfer occurs shortly after the licensee's defueled technical specifications and safety analysis are approved. Licensees for several reactors have expressed their intent to permanently cease power operations by 2019 or sooner, including Fort Calhoun, Clinton, Quad Cities, Pilgrim, and Oyster Creek.

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<sup>2</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**

Reactor	Location	Status	Date of Shutdown	PSDAR* Submitted	LTP Submitted	LTP Approved	Completion of Decom**
1	Crystal River Unit 3	SAFSTOR	2/13	12/13	TBD	TBD	2074
2	Dresden Unit 1	SAFSTOR	10/78	6/98	TBD	TBD	2036
3	Fermi Unit 1	SAFSTOR	9/72	4/98	2011***	TBD	2032
4	GE-EVESR	SAFSTOR	2/67	N/A	TBD	TBD	2025
5	GE-Vallecitos Boiling Water Reactor	SAFSTOR	12/63	7/66	TBD	TBD	2025
6	Humboldt Bay	DECON	7/76	2/98	5/13	5/16	2017
7	Indian Point Unit 1	SAFSTOR	10/74	1/96	TBD	TBD	2026
8	Kewaunee	SAFSTOR	5/13	5/13	TBD	TBD	2073
9	La Crosse	DECON	4/87	5/91	7/16	TBD	2019
10	Millstone Unit 1	SAFSTOR	7/98	6/99	TBD	TBD	2056
11	Nuclear Ship Savannah	SAFSTOR	11/70	12/08	TBD	TBD	2031
12	Peach Bottom Unit 1	SAFSTOR	10/74	6/98	TBD	TBD	2034
13	San Onofre Unit 1	SAFSTOR	11/92	12/98	TBD	TBD	2030
14	San Onofre Unit 2	DECON	6/13	9/14	TBD	TBD	2031
15	San Onofre Unit 3	DECON	6/13	9/14	TBD	TBD	2031
16	Three Mile Island Unit 2	SAFSTOR	3/79	6/13	TBD	TBD	2036
17	Vermont Yankee	SAFSTOR	12/14	12/14	TBD	TBD	2073
18	Zion Unit 1	DECON	2/97	2/00	12/14	TBD	2020
19	Zion Unit 2	DECON	9/96	2/00	12/14	TBD	2020

GE General Electric  
 TBD to be determined  
 EVESR ESADA (Empire State Atomic Development Associates) 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, NRC staff routinely processes license amendments and exemptions to support the progressive stages of decommissioning.

As of September 30, 2016, the four 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 of a DP, review and approval of the 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 or preceded by a DP submitted for NRC approval. The NRC and licensee hold pre-submittal meetings to discuss 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>3</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>3</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. 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. The NRC will terminate the license 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 2016 Activities**

- In July, NRC staff terminated the license for the U.S. Department of Veterans Affairs research reactor in Omaha, Nebraska. NRC staff performed inspections, reviewed and approved a final status survey plan for the facility, and reviewed an independent confirmatory survey report and the licensee's final status survey report as part of the site closure.
- At the State University of New York at Buffalo in Buffalo, New York, NRC staff performed inspections and reviews of confirmatory surveys to support the demolition and release of the facility and land areas at the site.

### **2.2.3 Fiscal Year 2017 Trends and Areas of Focus**

In FY 2017, NRC staff expects to review a license termination request for the State University of New York at Buffalo facility.



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

<b>Reactor</b>		<b>Location</b>	<b>Date of Shutdown</b>	<b>Status</b>	<b>Completion of Decommissioning</b>
1	General Atomics TRIGA Mark F	San Diego, CA	9/94	DP Approved	2019
2	General Atomics TRIGA Mark I	San Diego, CA	12/96	DP Approved	2019
3	General Electric-Hitachi GETR	Sunol, CA	1/85	Possession-Only	2025
4	State University of New York at Buffalo	Buffalo, NY	7/96	DP Approved	2017
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, NRC 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, 2016, 13 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. Only one complex material site, Cimarron (Kerr-McGee), remains eligible to use the SDMP Action Plan criteria (see Table 2-3). All other sites must use the dose-based criteria of the LTR.

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 discuss 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.

The DP is approved by license amendment, as a supplement to the SER, or equivalent, along with any additional license conditions found to be necessary as a results of the findings of NRC staff's review.

### 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. 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 2016 Activities**

- In February 2016, NRC staff terminated the license for the Mallinckrodt site in St. Louis, Missouri, and released the site for unrestricted use.
- In February 2016, NRC staff terminated the license for the Stepan Company site in Maywood, New Jersey, and released the site for unrestricted use. Remediation of the three NRC-licensed burial pits was completed in 2012 by the USACE.

- In November 2015, the U.S. Army withdrew its application for the decommissioning of its Jefferson Proving Ground site in Madison, IN. As an alternative, the U.S. Army will be pursuing an exemption to the decommissioning timeliness rule under 10 CFR 40.42 and will request to amend their license to Possession Only.
- Remediation activities have been completed at the Westinghouse Electric-Hematite facility in Festus, MO. The licensee has completed radiological surveys and plans to submit a FSSR to the NRC within the next year.
- NRC staff completed its review of the Supplemental Radiological Survey Plan for the United Nuclear Corporation (UNC) Naval site in New Haven, Connecticut, and in June 2016, UNC began conducting characterization surveys of the additional areas described in the plan.
- NRC staff completed inspections or site visits at Beltsville Agricultural Research Laboratory, FMRI, Cimarron, Westinghouse Electric-Hematite, Shallow Land Disposal Area (SLDA), UNC Naval, and West Valley. NRC staff also conducted site visits at McClellan Air Force Base, Alameda Naval Air Station, and Hunters Point Shipyard.

Other significant activities are described below.

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

The Statement of Considerations for the NRC's November 2007 naturally occurring and accelerator-produced radioactive material (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. NRC staff and a U.S. Department of Defense (DoD) working group held many discussions about a 2011 draft Regulatory Issue Summary (RIS) that clarified the certain types of military radium-226 that would be under NRC regulatory authority and described regulatory approaches to be used to implement NRC's authority, including a Memorandum of Understanding (MOU). In August 2014, NRC staff presented the option for a proposed comprehensive MOU to the Commission for their consideration in SECY-14-0082. In December 2014, the Commission approved NRC staff's recommendation for a comprehensive MOU. Following the Commission's direction, NRC staff worked with the DoD working group and the final MOU (Accession No. ML16092A294) was signed in April 2016. Subsequently, NRC finalized the RIS (Accession No. ML15167A324) and an enclosure containing a summary of public comments on the draft RIS and NRC's responses. The availability of both the MOU and the RIS was noticed in the *Federal Register* (81 FR 31669, (May 19, 2016)). NRC staff and DoD have started implementing the MOU. DoD provided NRC with an initial site inventory and NRC staff has notified DoD that it will use a monitoring approach at two "pilot" sites during the remainder of FY 2016 and FY 2017 as described in SECY-14-0082 and noted above. The initial use of "pilot" sites will provide experience using the MOU with DoD and experience using NRC's draft monitoring procedures. The stay informed approach for the California sites, along with future sites, will continue under the MOU for all sites in FY 2017 based on site prioritization.

NRC has performed many outreach activities with the States regarding NRC's role under the MOU at these unlicensed military sites by: 1) presenting at Organization of Agreement States (OAS) conference calls; 2) holding a poster session at the 47<sup>th</sup> and 48<sup>th</sup> National Conference on Radiation Control; 3) sending an All Agreement States letter (STC-15-046) informing them of NRC's proposed role at unlicensed military sites under the MOU and to plans to coordinate with individual States, 4) sending another All Agreement States letter (STC-16-072) notifying them of the availability of the final MOU and final RIS, as well as providing them with the initial list of DoD sites under the MOU, and 5) making a presentation at the August 22, 2016, OAS conference on NRC's progress and path forward for the MOU with DoD and the RIS.

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

NRC staff continued implementing the stay informed 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 that remediation of the site meets 10 CFR 20.1402 or 1403 dose limits. NRC 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. NRC staff conducted its ninth annual visit to these sites in September 2016, 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, NRC 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 the City of San Francisco, 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.

As part of its oversight of service providers, NRC performed an investigation into whether Tetra Tech EC, Inc. deliberately falsified soil samples at Hunters Point Shipyard. NRC subsequently issued a Notice of Violation and escalated enforcement to Tetra Tech EC, Inc. for the deliberate falsification of soil samples.

In addition, NRC staff began implementing the NRC/DoD remediation MOU, related to the NRC's role at military sites with radium, which was signed in April 2016. As part of the pilot site approach discussed in SECY-14-0082, NRC staff identified the Navy's Treasure Island site in California as the first pilot site under the MOU and conducted a site visit in September 2016 in conjunction with its site visits to the California sites noted above. The purpose of this site visit was to obtain background about the site and its remediation to help NRC staff plan its future monitoring activities at this site. NRC staff also identified the Army's Dugway Proving Ground site in Utah as a second pilot site and is planning a site visit in late fall 2016 to obtain

background information about this site. Due to the regular communications between DoD and NRC staff, implementation of the MOU is going well.

### Non-Military Radium Sites

The Energy Policy Act of 2005 gave the NRC authority over radium and some other materials in a category known as NARM. The NRC's first step in implementing that new authority was to put in place regulations. These regulations, known as the NARM rule, became effective November 30, 2007. While the NRC was developing its program for military radium sites, NRC staff became aware of radium cleanup efforts at the former Waterbury Clock Factory in Waterbury, Connecticut, and the Great Kills Park site in Staten Island, New York. As the NRC learned more about these projects, it began a systematic effort to identify sites around the country where radium was used to ensure those sites no longer posed a risk. NRC staff has identified and prioritized a list of non-military sites with potential radium contamination due to historical manufacturing of consumer products. NRC staff has also started near-term programmatic follow-up actions for the identified sites. NRC staff has been coordinating with States regarding identified sites with historical radium use. Following the completion of the site identification effort, NRC staff began outreach with both Agreement and Non-Agreement States to share information about the sites identified and NRC staff's approach to these sites in both Agreement and non-Agreement States. More information regarding this approach is available at <http://www.nrc.gov/materials/radium.html>.

Great Kills Park is a Federally-owned landfill with radium contamination that is currently undergoing CERCLA investigation and remediation. NRC staff has been in discussion with EPA Region 2, the National Park Service, and the U.S. Department of the Interior regarding the possibility of entering into an MOU wherein the NRC would take an approach similar to the approach the NRC has taken to military sites to address an overlap between CERCLA and the Atomic Energy Act of 1954, as amended, at Great Kills Park. NRC staff also continued to work with EPA Region I regarding their cleanup activities at the former Waterbury Clock Factory, and will continue this coordination in FY 2017.

### Army Depleted Uranium License Application

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. In June 2015, the NRC received an application from the Army to amend its NRC license to add 15 other installations, which are located throughout the United States. NRC staff completed its review and issued Amendment 1 to License SUC-1593 to incorporate the additional sites in March 2016. NRC staff has continued consultations with Native Hawaiian Organizations, the State of Hawaii, and the U.S. Fish and Wildlife Service pursuant to Section 7 of the Endangered Species Act and Section 106 of the National Historic Preservation Act.

### West Valley Demonstration Project

Progress was made in 2016 at the West Valley Demonstration Project (WVDP) site near Buffalo, NY, which is a complex and multi-phase decommissioning project. The West Valley site was the first and only commercial reprocessing plant to operate in the United States from

1966-1972. Approximately four years after shutting down, the site was returned to the site owner, New York State Energy and Research Development Authority (NYSERDA). Through the West Valley Demonstration Project Act of 1980, the NRC has specific agency responsibilities for informal review, consultation, and monitoring of DOE activities at the site. In February 2014, DOE and NYSERDA, the licensee, established a path forward for Phase 2 Decommissioning of the WVDP site. During Phase 1 Decommissioning, a number of highly contaminated facilities will be removed, characterization activities will be conducted and soil remediation actions will be performed. Phase 2 Decommissioning will address the Waste Tank Farm, the waste disposal areas, and the non-source area of the groundwater plume. DOE intends to complete any remaining WVDP decision-making with its Phase 2 decision (to be made within 10 years of the Record of Decision) in a Supplemental EIS and expects to select either removal or in-place closure, or a combination of the two options, for portions of the site for which it has decommissioning responsibility. During 2016, DOE and NYSERDA continued to conduct planning activities for additional studies and evaluations, referred to as Phase 1 studies, which include erosion studies, exhumation studies, and engineered barrier studies. These studies are meant to assist decision-making or inform the Phase 2 Supplemental EIS. DOE and NYSERDA plan to manage the contract for the Supplemental EIS, which will be administered by DOE.

The first phase of decommissioning, estimated to take 10 years to complete, is in progress and is being conducted in accordance with the DOE's NRC-approved Phase 1 decommissioning plan. This work includes relocating the 275 high-level waste (HLW) canisters into a dry cask storage system on-site with the demolition of on-site structures (Remote Handled Waste Facility, Vitrification Facility, Process Plant), continuing to ship low-level waste, and managing dry tanks and the NRC-licensed disposal area. In November 2015, NRC staff conducted a monitoring visit to observe the start of the loading and lid welding of the first HLW canister to be moved to the onsite storage pad. In FY 2016, DOE began to relocate the legacy waste from the Main Process Plant Building, continued to ship legacy waste and deactivate buildings for demolition, and worked on the shutdown of the vitrification stack and stack monitoring system. As of August 2016, about 50% of the legacy waste has been shipped offsite, about 95% of the vitrification facility was deactivated, and about 53% of the Main Plant Process Building was deactivated. DOE plans to demolish the vitrification building and complete the relocation of the legacy waste from the Main Process Plant Building in FY 2017.

### **2.3.3 Fiscal Year 2017 Trends and Areas of Focus**

In FY 2017, NRC staff will continue its follow-up efforts related to non-military sites with potential radium contamination due to historical manufacturing of consumer products, including identifying and addressing contamination at these sites. NRC staff will continue its monitoring role at additional military radium MOU sites in FY 2017. NRC staff will reach out to DoD to better understand the inventory of depleted uranium at military installations. NRC staff will also continue oversight of activities at the WVDP, with a focus on the project for relocation of the HLW canisters into shielded casks at the onsite storage pad.



**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>	
1	Alameda Naval Air Station*	Alameda, CA	N/A	N/A	MOU**	N/A
2	Beltsville Agricultural Research Laboratory	Beltsville, MD	8/09	12/13	LTR-UNRES	2017
3	Cimarron (Kerr-McGee)	Cimarron, OK	4/95	8/99	Action-UNRES	2018
4	Department of the Army, U.S. Armament Research, Development, and Engineering Center	Picatinny, NJ	11/13	TBD	LTR-UNRES	TBD
5	FMRI (Fansteel), Inc.	Muskogee, OK	8/99, revised 5/03	12/03	LTR-UNRES	TBD
6	Hunter's Point Naval Shipyard* (former Naval shipyard)	San Francisco, CA	N/A	N/A	MOU**	N/A
7	Jefferson Proving Ground	Madison, IN	8/99 revised 6/02	10/02	LTR-RES	TBD
8	McClellan* (former Air Force base)	Sacramento, CA	N/A	N/A	MOU**	N/A
9	Shallow Land Disposal Area (BWX Technologies, Inc.)	Vandergrift, PA	6/01 revised N/A	N/A	LTR-UNRES	TBD

**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	Sigma-Aldrich	Maryland Heights, MO	10/08, revised 11/10	5/09, revised TBD	LTR-UNRES	2019
11	UNC Naval Products	New Haven, CT	8/98, revised 2004,12/06	4/99, revised 10/07	LTR-UNRES	TBD
12	West Valley Demonstration Project	West Valley, NY	Phase 1 3/09	Phase 1 2/10	LTR-UNRES***	TBD
13	Westinghouse Electric-Hematite Facility	Festus, MO	4/04 revised 6/06, 8/09	10/11	LTR-UNRES	TBD

\* 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.

\*\* "Memorandum of Understanding Between the U.S. Nuclear Regulatory Commission and the U.S. Department of Defense for Coordination on CERCLA Response Actions at DoD Sites with Radioactive Materials," dated April 28, 2016 (ADAMS No. ML16092A294).

\*\*\* 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 NRC 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>4</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 NRC's past interpretation of 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 specified the inactive processing sites for remediation and required that DOE remediate these sites. Except at the Atlas Moab site, surface reclamation activities have been completed by DOE 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 as of the date UMTRCA was passed. UMTRCA 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 Environmental Assessments (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, 2016, 11 Title II uranium recovery facilities are undergoing decommissioning. 10 CFR 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,

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<sup>4</sup> This report does not address regulation of new or operating uranium recovery facilities with the exception of a brief discussion on their decommissioning.

after decommissioning is complete. The six Title II sites that have been transferred for 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); or
- 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>5</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. 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>5</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

All uranium recovery facilities currently licensed by the NRC have NRC-approved DP/RPs. 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. Therefore, for existing uranium facilities, NRC 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 NRC staff may be warranted.

### Implementation of the Decommissioning Plan/Reclamation Plan

As the licensee prepares to enter decommissioning, it submits a revised DP/RP. 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.

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). NRC 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), NRC 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 NRC staff determines that the ACLs are protective of public health and the environment, NRC staff may approve the ACLs.

After surface decommissioning/reclamation is completed, the licensee issues a completion report for NRC staff review and approval. As part of this review, NRC 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, NRC staff will issue RAIs to address outstanding issues.

#### License Termination—Conventional Mills

After all reclamation activities have been completed and approved, the licensee, 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 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 NRC 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 2016 Activities

- In March 2016, NRC staff met with New Mexico Senator Heinrichs' staff to brief them on the remediation progress being made at the Homestake site, and NRC's interactions with the EPA and the public. In May 2016, NRC staff concluded a review of records dated from 1998 to 2015 to determine whether Homestake was in compliance with regulatory and license requirements related to groundwater restoration activities at the site. As a result of this review, five apparent violations were identified and are being considered for enforcement action in accordance with the NRC Enforcement Policy (ADAMS No. ML16251A526). NRC staff last performed an inspection of the Homestake site in August 2016.
- NRC staff continued to work with the State of Wyoming to evaluate options for completing decommissioning at the American Nuclear Corporation Gas Hills site, including determining the best use of the amount remaining in the decommissioning fund. At the request of the State of Wyoming, the Confirmatory Order has been revised to allow Wyoming Department of Environmental Quality to use the remaining decommissioning funds to stabilize the site until the decision is made on how best to complete the decommissioning of the site.
- NRC staff continued its participation with other Federal agencies and the Navajo Nation in implementing the Five-Year Plan to Address Uranium Contamination on the Navajo Nation. NRC staff participated in open house meetings at the Tuba City and Monument Valley sites and provided training to the Navajo Outreach Coordinator. NRC staff is also working with the Navajo Nation and Federal agencies to develop training for the Navajo on uranium and its health and environmental impacts. NRC staff continued participation in Navajo Nation/Hopi/DOE Quarterly meetings and community outreach, and worked with the Navajo Nation Environmental Protection Agency and the DOE to address concerns raised by the Navajo Nation regarding the Mexican Hat site in Arizona.
- NRC staff is currently reviewing a license amendment request from Rio Algom Mining, LLC regarding the potential release of a portion of the Ambrosia Lake site. The EPA is evaluating this portion of the site as a potential future repository for uranium mine waste from 12 uranium mines located in the Ambrosia Lake District. The EPA is addressing the mine waste as part of a CERCLA Non-Time Critical removal process as a result of the Tronox Settlement Agreement for mines located on the Navajo Nation.
- NRC staff conducted site inspections or site visits at the UNC Church Rock, Homestake Mining, Pathfinder Shirley Basin, ExxonMobil Highlands, and Rio Algom sites.
- In addition, NRC 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 the Falls City and Tuba City sites.



### **2.4.3 Fiscal Year 2017 Trends and Areas of Focus**

In FY 2017, NRC staff expects the completion of remediation activities at the Sequoyah Fuels site. The transfer of this site and others (e.g., Pathfinder—Lucky Mc) to DOE for long-term surveillance is expected to occur within the next few years. NRC staff will also continue coordinating with other Federal agencies regarding the anticipated license amendment request for mine waste from the Northeast Church Rock Mine Site to be placed in the disposal cells on the UNC Church Rock Mill Site. NRC staff will also continue its participation in the activities associated with the Navajo Nation Five-Year Plan, DOE/Navajo Nation/Hopi quarterly meetings and reviewing DOE reports and plans for the reclamation and management of these sites.

<b>Table 2-4a Decommissioning Title I Uranium Recovery Sites</b>			
	<b>Name</b>	<b>Location</b>	<b>Status</b>
1	Ambrosia Lake	Grants, NM	Monitoring
2	Burrell	Blairsville, PA	Monitoring
3	Canonsburg	Canonsburg, PA	Monitoring
4	Durango	Durango, CO	Monitoring
5	Falls City	Falls City, TX	Monitoring
6	Grand Junction	Grand Junction, CO	Monitoring
7	Green River	Green River, UT	Monitoring
8	Gunnison	Gunnison, CO	Monitoring
9	Lakeview	Lakeview, OR	Monitoring
10	Lowman	Lowman, ID	Monitoring
11	Maybell	Maybell, CO	Monitoring
12	Mexican Hat	Mexican Hat, UT	Monitoring
13	Monument Valley	Monument Valley, AZ	Monitoring
14	Moab Mill	Moab, UT	Active – surface and groundwater remediation
15	Naturita	Naturita, CO	Monitoring
16	Rifle	Rifle, CO	Monitoring
17	Riverton	Riverton, WY	Monitoring
18	Salt Lake City	Salt Lake City, UT	Monitoring

<b>Table 2-4a Decommissioning Title I Uranium Recovery Sites</b>			
19	Shiprock	Shiprock, NM	Active – groundwater remediation
20	Slick Rock	Slick Rock, CO	Monitoring
21	Spook	Converse Co., WY	Monitoring
22	Tuba City	Tuba City, AZ	Active – groundwater remediation (currently suspended)
<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	Gas Hills, WY	10/88, Revision 2006	TBD
2	Bear Creek	Converse County, WY	5/89	2018
3	ExxonMobil Highlands	Converse County, WY	1990	TBD
4	Homestake Mining Company	Grants, NM	Revised plan—3/95	2022
5	Pathfinder—Lucky Mc	Gas Hills, WY	Revised plan—7/98	2017
6	Pathfinder—Shirley Basin	Shirley Basin, WY	Revised plan—12/97	TBD
7	Rio Algom—Ambrosia Lake	Grants, NM	2003 (mill); 2004 (soil)	2018
8	Sequoyah Fuels Corporation	Gore, OK	2008	2020
9	Umetco Minerals Corporation	East Gas Hills, WY	Revised soil plan—4/01	2019
10	United Nuclear Corporation	Church Rock, NM	3/91, Revision 2005	TBD
11	Western Nuclear Inc.—Split Rock	Jeffrey City, WY	1997	2018
TBD to be determined				

<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)	Grants, NM	1997
2	Edgemont	Edgemont, SD	1996
3	L-Bar	Seboyeta, NM	2005
4	Maybell West	Maybell, CO	2010
5	Sherwood	Wellpinit, WA	2001
6	Shirley Basin South	Shirley Basin, WY	2005

## **2.5 Fuel Cycle Facility Decommissioning**

Currently, there are two fuel cycle facilities undergoing partial decommissioning: The Nuclear Fuel Services site in Erwin, TN, in accordance with applicable provisions under 10 CFR 70.38; and the Honeywell site in Metropolis, IL, in accordance with applicable provisions under 10 CFR 40.42. The NRC's public website 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 2016 Activities**

During FY 2016, Honeywell continued decommissioning 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 2016, DUWP staff continued to provide support to FCSE by reviewing FSSRs for several survey units. The FSSRs primarily address subsurface layers of the North Site area, which include former radiological burial areas and ponds that received effluents. Revision 3 to the North Site DP was approved in May 2006.

### 3. GUIDANCE AND RULEMAKING ACTIVITIES

In FY 2016, NRC staff worked to increase the effectiveness of the Decommissioning Program through a rulemaking effort for reactor decommissioning and updates to decommissioning guidance. The Decommissioning Program has also been performing a self-evaluation of dose modeling to help it become more effective in the decommissioning of sites.

#### Decommissioning Rulemaking

With the permanent shutdown of five power reactors in 2013 and 2014, the Commission requested NRC staff to consider rulemaking to expedite the processing of licensing actions necessary to transition power reactors from operation to decommissioning currently accomplished through a series of exemptions. In SRM-SECY-14-0118, the Commission directed NRC staff to proceed with rulemaking on reactor decommissioning and set an objective of early 2019 for its completion. The Commission also stated that this rulemaking should address the following:

- issues discussed in SECY-00-0145 such as the graded approach to emergency preparedness;
- lessons learned from the plants that have already (or are currently) going through the decommissioning process;
- the advisability of requiring a licensee's PSDAR to be approved by the NRC;
- the appropriateness of maintaining the three existing options (DECON, SAFSTOR, and ENTOMB) for decommissioning and the timeframes associated with those options;
- the appropriate role of State and local governments and nongovernmental stakeholders in the decommissioning process; and
- any other issues deemed relevant by NRC staff.

NRR, NMSS, and NSIR continued the process for this rulemaking effort in FY 2016. The NRC's goals in amending these regulations would be to provide an efficient decommissioning process, reduce the need for exemptions from existing regulations, and support the principles of good regulation, including openness, clarity, and reliability. The NRC solicited public comments on the contemplated action via an Advance Notice of Proposed Rulemaking in 2016. In 2017, NRC staff plans to complete the draft regulatory basis and hold a series of public meetings. The current timeline to complete the rule is 2019.

#### 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 NRC staff review of these documents. Some of the revisions are to the as low as reasonably achievable (ALARA) analysis, composite sampling, and decommissioning licensee versus contractor responsibilities. An update to uranium recovery licensing guidance is

also 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.

#### Self-Evaluation of Dose Modeling

DUWP continued an evaluation of the uses and applicability of computer codes employed in carrying out DUWP 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 2017.



## 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, including the upgrade of several codes identified as part of a FY 2015 User's Need request from NMSS. This includes work on RESRAD-OFFSITE and RESRAD-BUILD to update default parameters, modify RESRAD-OFFSITE 3.1 to include solubility and diffusion limited leaching source terms, update and benchmark MILDOS-AREA, and add new features to Visual Sampling Plan (VSP) based on the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) final survey protocols.

Cooperative efforts with DOE, academic, private sector, and international experts continued on the Cementitious Barriers Partnership (CBP). 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.

In FY 2016, RES staff began work on a research program that was created to study the effects of changes in properties of mill tailings engineered covers on the emission of radon. The purpose of this study is to evaluate the effects of soil structure formation by abiotic and biotic processes 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. It is a collaboration between DOE Office of Legacy Management and NRC with investigators at the University of Wisconsin, University of Virginia, and Navarro Engineering (the DOE contractor). Two mill tailing sites have been visited by the research team: Falls City in Texas and Bluewater in New Mexico. A number of pits at each site were excavated into the covers, samples taken for permeability measurements, and soil profiles described. Radon flux measurements were made at the surface of the radon barrier and at the top of the waste using up to 4 different size flux chambers at many locations. The pits have all been backfilled and returned to original specifications. Data are now being prepared and interpreted from these sites and an additional two sites are being selected for field work in FY 2017. The RES staff also continued direct assistance to NMSS efforts through participating in the MARSSIM Interagency Working Group.

## 5. INTERNATIONAL ACTIVITIES

The NRC participates in multiple international activities to fulfill U.S. commitments to international conventions, treaties, and bilateral/multilateral agreements. NRC 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 NRC 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, NRC 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.

- NRC staff participated in the review and development of IAEA Safety Standards, participated in IAEA projects, conferences, and workshops related to decommissioning and waste disposal, and advised on the development of other countries' regulatory programs. For example: (1) NRC staff conducted reviews and updates of 23 IAEA standards related to decommissioning and low-level waste during the Waste Safety Standards Committee (WASSC) 40<sup>th</sup> and 41<sup>st</sup> review cycles; (2) NRC staff participated in planning and organization of the International Forum of Uranium Legacy Sites for remediation, supervision, and regulatory development; (3) NRC staff participated in the update and final development of an IAEA safety standard on the "Decommissioning of Nuclear Power Plants, Research Reactors, and other Nuclear Fuel Cycle Facilities;" (4) NRC staff participated a final consultancy meeting on the development of a technical document on the "Regulatory Aspects and Practical Experiences in the Application of Entombment Decommissioning Strategies;" (5) NRC staff participated in the IAEA project on "Human Intrusion Scenarios Phase II" applicable to waste management and decommissioning; and (6) NRC staff and management participated in an IAEA International Conference on "Advancing the Global Implementation of Decommissioning and Environmental Remediation Programs."
- NRC staff participated in a technical meetings of the International Forum on Regulatory Supervision of Legacy Sites, related to the remediation of legacy nuclear facilities, and delivered a presentation regarding uranium recovery decommissioning and non-military radium programs at a workshop in Oslo, Norway.
- NRC staff supported an IAEA Research Reactor Decommissioning Demonstration Project Workshop on Release and Final Status Surveys at the Humboldt Bay site in California.

- NRC staff supported an IAEA consultancy as a technical expert at a meeting on Entombment as a decommissioning option and worked to finalize a position paper that is consistent with NRC policy.
- NRC staff developed and presented a workshop on the management of legacy uranium recovery sites for staff of the Brazilian National Nuclear Energy Counsel.
- NRC staff participated in the final revision of the IAEA General Safety Requirements Part 6, "Safety Requirements for Decommissioning of Nuclear Facilities."
- NRC staff participated in decommissioning workshops in the context of bilateral agreements with the Republic of Korea and with Taiwan.
- NRC staff continued its participation in the IAEA Project on the Decommissioning and Remediation of Damaged Nuclear Facilities.
- NRC staff participated in a topical meeting of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management in Vienna.
- NRC staff participated in the 17<sup>th</sup> Session of the NEA Radioactive Waste Management Committee Bureau and contributed to the Annual Report for the Radioactive Waste Management Committee.
- NRC staff continued as a U.S. representative and core group member of the NEA Working Party on Decommissioning and Dismantling (WPDD), and participated in WPDD Task Groups meetings.
- NRC staff participated as U.S. representatives 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; (4) Working Group on Decommissioning Funding; (5) Expert Group on Inventorying and Reporting Methodology; and (6) Task Group on Transitioning into Decommissioning After Shutdown.
- NRC staff co-authored two key reports issued by the NEA Organisation for Economic Co-operation and Development: (a) "Nuclear Site Remediation and Restoration During Decommissioning of Nuclear Installations;" and (b) "Radiological Characterization from a Material and Waste End-State Perspective & Evaluation of the Questionnaires by the NEA Task Group on Radiological Characterization and Decommissioning."
- NRC staff and management coordinated a special panel session with international counterparts at Waste Management 2016 Symposia on "International Nuclear Power Plant Decommissioning: Time for Awareness and Planning." The Acting Director of NMSS served as a panel member for this session.
- NRC staff attended the International Workshop on the Use of Robotic Technologies at Nuclear Facilities held at the National Institute of Standards and Technology.

## **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 Improvements

The Decommissioning Program has a history of seeking opportunities to improve its processes in order to accomplish decommissioning activities more effectively. In response to an anticipated increase in workload due to early reactor shutdowns, NMSS staff performed a program evaluation of its power reactor decommissioning regulatory function. The power reactor decommissioning program evaluation was an outgrowth of NRC staff's Integrated Decommissioning Improvement Plan (IDIP) efforts and part of its initiative to foster continuous improvement. The evaluation resulted in a set of recommendations to update guidance and policy documents within the power reactor decommissioning program to capture program improvements and lessons learned. Subsequently, NMSS management reviewed the tasks identified to promote programmatic enhancement and set task priorities. Revisions to a number of NUREG guidance documents and the Reactor Decommissioning Inspection Manual and core inspection procedures that began in FY 2015 continued during FY 2016, and are expected to continue over the next few years.

In response to the four nuclear power plants that permanently ceased operations in 2012, and an announcement that another would also be shutting down soon thereafter, NRC management formed the Reactor Decommissioning Transition Working Group (DTWG) in 2013 to make the licensing process more efficient for reactors transitioning from operations to decommissioning and to address industry issues through an integrated inter-office effort. The DTWG was tasked with identifying and addressing the near-term and long-term challenges and issues that have emerged from regulatory activities associated with recent permanently shut down power reactors as these reactors transition to a decommissioning status. In FY 2016, the DTWG completed a lessons learned report, which includes insights from the power reactors that transitioned from operations to decommissioning in 2013-2015. The report includes a comprehensive examination of transition-related actions to identify regulatory inefficiencies, challenge areas, potential policy issues, and planned and potential future actions to provide for a more consistent and efficient transition process. In addition, the DTWG has established communications and coordination among the involved NRC offices to provide a common understanding and awareness of reactor decommissioning transition activities and issues.

### 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 2016, State contacts continued to provide responses to letter STC-15-059,

“Information Request: Status of Current Complex Decommissioning and Uranium Recovery Sites.” Another annual information request was sent to the State contacts in November 2016 (STC-16-086). This site information was compiled and placed into a database, which can be found 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 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 NRC staff. Seminars were held throughout FY 2016 on a variety of topics, including the power reactor decommissioning process, decommissioning lessons learned, and an overview of DUWP international activities. These knowledge management activities should result in future efficiencies and enhancements in NRC staff’s oversight of sites, particularly with the expected increase in workload with reactors entering decommissioning.

### Uranium Recovery Decommissioning Program Enhancements

Throughout FY 2016, NRC staff continued interactions with DOE for those sites that are generally licensed under 10 CFR 40.27 and 40.28. NRC 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. NRC staff has continued discussions with DOE on developing long-term care fees and post-license termination groundwater monitoring, and has initiated discussions on the transfer of sites that are scheduled for completion and transfer within the next five years. NRC staff has also continued its participation in DOE meetings with the Navajo Nation and Hopi Tribe pertaining to the sites on the Navajo Reservation.

In 2016, 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 the Navajo Nation, on a coordinated Five-Year Plan to address uranium contamination on the Navajo Reservation from past mining and milling activities. The Five-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 Reservation from past mining and milling activities. In 2013, the agencies reported to Congress on the status of activities outlined under the first Five-Year Plan and committed to continuing the work in the future. In 2016, the NRC continued its implementation of the 2014-2019 Five-Year Plan, which 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 2016 included the following:

- DUWP 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 NRC's public website. These summaries are available at <http://www.nrc.gov/info-finder/decommissioning/complex/> and <http://www.nrc.gov/info-finder/decommissioning/uranium/> for complex materials sites and uranium recovery sites, respectively.
- Integrated Materials Performance Evaluation Program reviews that included decommissioning were conducted in several Agreement States.

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	9/89
TX	ExxonMobil	Three Rivers, TX	4/85	9/86
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, revised 5/97	5/97
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 2016 was 75 full-time equivalents (FTE); and for FY 2017 the program has requested 68 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 OGC support. These figures also include nonsupervisory indirect FTE associated with the Decommissioning Program.

## **9. FISCAL YEAR 2017 PLANNED PROGRAMMATIC ACTIVITIES**

NRC staff plans the continued implementation of IDIP and its knowledge management tasks during FY 2017. Specifically, 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, NMSS management reviewed the tasks identified to promote programmatic enhancement and set task priorities. Throughout FY 2017, NRC staff will continue to work on these programmatic enhancement tasks.

In FY 2011, NRC 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 2017, 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 will continue its efforts at identified sites with potential contamination, including contacting site owners and addressing contamination at these sites, as necessary. NRC staff will also continue its monitoring role at additional military MOU sites in FY 2017, as discussed in SECY-14-0082.