
Status of the Decommissioning Program

2021 Annual Report

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

CONTENTS

ABBREVIATIONS	iii
1. INTRODUCTION	1
2. DECOMMISSIONING SITES	2
2.1 Nuclear Power Reactor Decommissioning	3
2.1.1 Summary of Fiscal Year 2021 Reactor Decommissioning Activities	3
2.1.2 Fiscal Year 2022 Areas of Focus.....	5
2.2 Research and Test Reactor Decommissioning	10
2.2.1 Summary of Fiscal Year 2021 Activities	10
2.2.2 Fiscal Year 2022 Areas of Focus.....	10
2.3 Complex Materials Facility Decommissioning	12
2.3.1 Summary of Fiscal Year 2021 Activities	12
2.3.2 Fiscal Year 2022 Areas of Focus.....	16
2.4 Uranium Recovery Facility Decommissioning	20
2.4.1 Summary of Fiscal Year 2021 Activities	20
2.4.2 Fiscal Year 2022 Areas of Focus.....	23
2.5 Fuel Cycle Facility Decommissioning	26
2.5.1 Summary of Fiscal Year 2021 Activities	26
2.5.2 Fiscal Year 2022 Areas of Focus.....	26
3. GUIDANCE AND RULEMAKING ACTIVITIES	27
4. RESEARCH ACTIVITIES.....	29
5. INTERNATIONAL ACTIVITIES	33
6. PROGRAM INTEGRATION AND IMPROVEMENT	35
7. AGREEMENT STATE ACTIVITIES	37
8. FISCAL YEAR 2022 PLANNED PROGRAMMATIC ACTIVITIES.....	40
Table 2.1-a Power and Early Demonstration Reactors Undergoing Decommissioning	7
Table 2.1-b Decommissioned Power Reactors that Have Independent Spent Fuel Storage Installations	9
Table 2.2 Research and Test Reactors Undergoing Decommissioning.....	11
Table 2.3 Complex Decommissioning Sites	17
Table 2.4-a Decommissioning Title I Uranium Recovery Sites.....	23
Table 2.4-b Decommissioning Title II Uranium Recovery Sites.....	24
Table 2.4-c Title II Uranium Recovery Sites - DOE Licensed Under 10 CFR 40.28	24
Table 7.1-a Agreement State Complex Decommissioning Sites	37
Table 7.1-b Agreement State Uranium Recovery Sites.....	38

ABBREVIATIONS

ADAMS	Agencywide Documents Access and Management System
ALARA	As Low as Reasonably Achievable
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	<i>Code of Federal Regulations</i>
COVID-19 PHE	Coronavirus Disease 2019 Public Health Emergency
CRR	Completion Review Report
DandD	Decontamination and Decommissioning
DECON	Power Reactors Undergoing Active Decommissioning
DOE	U.S. Department of Energy
DOE-WVDP	U.S. Department of Energy – West Valley Demonstration Project
DoD	U.S. Department of Defense
DP	Decommissioning Plan
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FSSR	Final Status Survey Report
FUSRAP	Formerly Utilized Sites Remedial Action Program
FY	Fiscal Year
GE	General Electric
GETR	General Electric-Hitachi Test Reactor
IAEA	International Atomic Energy Agency
IMC	Inspection Manual Chapter
ISFSI	Independent Spent Fuel Storage Installation
LTP	License Termination Plan
LTR	License Termination Rule
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MOU	Memorandum of Understanding
MPPB	Main Plant Process Building
N/A	Not Applicable
NEA	Nuclear Energy Agency
NFS	Nuclear Fuel Services
NMSS	Office of Nuclear Material Safety and Safeguards
NOW	New Opportunities of Waterbury, Inc.
NPS	National Park Service
NRC	U.S. Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation
NYSERDA	New York State Energy and Research Development Authority
PSDAR	Post-shutdown Decommissioning Activities Report
RAMP	Radiation Protection Computer Code, Analysis, and Maintenance Program
RDFA	Reactor Decommissioning Financial Assurance
RES	Office of Nuclear Regulatory Research
RESRAD	Residual Radioactivity
RP	Reclamation Plan
SAFSTOR	Power Reactors in Long-Term Safe Storage
SDMP	Site Decommissioning Management Plan
SLDA	Shallow Land Disposal Area
SSSB	Surface Ship Support Barge

TBD	To Be Determined
TCEQ	Texas Commission on Environmental Quality
TRIGA	Training, Research, Isotopes, General Atomics
UMTRCA	Uranium Mill Tailings Radiation Control Act
UNC	United Nuclear Corporation
USACE	U.S. Army Corps of Engineers
WDEQ	Wyoming Department of Environmental Quality
WVDP	West Valley Demonstration Project

1. INTRODUCTION

This report provides a summary of decommissioning activities at nuclear facilities in the United States (U.S.). Its purpose is to provide a reference document that summarizes the U.S. Nuclear Regulatory Commission's (NRC's) decommissioning activities in Fiscal Year (FY) 2021, including the decommissioning of power reactors, research and test reactors, complex materials sites, uranium recovery facilities, and fuel cycle facilities. As such, this report discusses the current progress and accomplishments with respect to the NRC's Decommissioning Program, provides contact information supplied by Agreement States on the decommissioning sites within their States, and identifies key Decommissioning Program activities that the NRC staff will undertake in the coming year. The information contained in this report is current as of September 30, 2021.

As of September 30, 2021, 26 nuclear power and early demonstration reactors, 4 research and test reactors, 9 complex materials facilities¹, 5 Title II² uranium recovery facilities, and part of 1 fuel cycle facility are undergoing decommissioning or are in long-term safe storage under NRC jurisdiction.³ Of the 26 power and early demonstration reactors in decommissioning, 10 have elected the SAFSTOR (long-term storage) option and 16 have elected the DECON (active decommissioning) option. In FY 2020, active decommissioning was completed at Humboldt Bay, LaCrosse, and Zion Unit 1 and Unit 2. The sites subsequently submitted Final Status Survey Reports (FSSRs), which are under staff review. The inventory of decommissioning power reactor sites increased in 2021 as Duane Arnold and Indian Point Unit 3 permanently ceased power operations. Licensees for three additional reactors have announced their intent to shut down by 2025: Palisades (2022), and Diablo Canyon Units 1 and 2 (2024 and 2025, respectively). In addition, 19 of the 22 Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I legacy uranium recovery sites and 6 UMTRCA Title II sites are under general license with the U.S. Department of Energy (DOE).

¹ Complex material sites are defined as sites where the complexity of the decommissioning process will require more than minimal technical and administrative support.

² "Title I" in this report refers to facilities under the UMTRCA of 1978, as amended, that were inactive, unregulated processing sites when the act was passed, while "Title II" refers to facilities that were licensed by the NRC or an Agreement State in 1978 or after UMTRCA was enacted.

³ Two of the 22 Title I sites are former processing sites and general licenses under Title 10 of the *Code of Federal Regulations* (10 CFR) Part 40.27 are not in effect at those sites because UMTRCA only addresses the licensing of mill tailings disposal sites.

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 under NRC authority, 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 decommissioning process, as appropriate. This report summarizes a broad spectrum of activities associated with the program's functions.

Each year, the NRC terminates approximately 100 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.

The NRC public Web site contains status summaries for the facilities managed in the Decommissioning Program (<https://www.nrc.gov/waste/decommissioning.html>). These summaries, which are updated annually or when significant changes in status occur, 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 of 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. The processes for decommissioning reactors, materials facilities and uranium recovery sites can be found at <https://www.nrc.gov/waste/decommissioning/process.html>.

Through the Agreement State Program, 39 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, including the decommissioning of some complex materials sites and uranium recovery sites. Agreement States do not have regulatory authority over nuclear reactors, which are licensed under either 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," or 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," over fuel cycle facilities, or over Federal materials facilities in the state. Section 7 of this report discusses the NRC's coordination with the Agreement States' decommissioning programs.

Response to the COVID-19 Public Health Emergency

In response to the Coronavirus Disease 2019 pandemic (COVID-19), the NRC took several steps to ensure that licensees at sites undergoing decommissioning maintained a safe work environment, while providing relief from certain regulatory requirements.

In May 2021, the NRC issued an exemption to Oyster Creek Nuclear Generating Station regarding certain requirements in 10 CFR Part 73, Appendix B. Additional information can be found at <https://www.nrc.gov/about-nrc/covid-19/materials/decommissioning.html>.

In addition, Regional decommissioning inspectors adapted to the COVID-19 pandemic by modifying the manner in which inspections were conducted. For example, Region I staff coordinated with licensee representatives to perform inspections and communicate via remote means. Staff reviewed procedures and records via remote means (electronic access) in an effort to minimize their time on-site rather than meeting face-to-face with licensee staff thereby reducing direct interactions. The staff also continued inspection activities by leveraging technology (cell phones and tablets) to observe certain evolutions and activities (when possible) and maximizing technology to communicate and hold meetings. When physical restrictions were relaxed and onsite inspections resumed, the inspectors observed strict personal protective equipment protocols and maximized social distancing. These efforts helped to meet the mission objectives and provide efficiencies in travel and inspection hours resulting in time and labor savings while continuing to maintain safety.

Staff also reviewed and concurred on the deferral of groundwater monitoring at the Shiprock, Monument Valley, and Tuba City sites due to the COVID-19 pandemic, after determining that the deferral would not impact the health and safety at the sites.

2.1 Nuclear Power Reactor Decommissioning

The NRC's power reactor decommissioning activities include project management, technical review of licensee submittals in support of decommissioning, core inspections, support for the development of rulemaking and guidance, public outreach efforts, international assistance and cooperation, and participation in industry conferences and workshops. In addition, the NRC staff routinely processes license amendments, exemptions, and programmatic approvals (e.g., for quality assurance) to support the progressive stages of decommissioning. The Decommissioning Program staff regularly coordinates with other offices on issues affecting decommissioning power reactors, and with the Division of Fuel Management in the Office of Nuclear Material Safety and Safeguards (NMSS) regarding the independent spent fuel storage installations (ISFSIs) at reactor sites undergoing decommissioning.

As of September 30, 2021, the 26 nuclear power and early demonstration reactors identified in Table 2.1-a are undergoing decommissioning. Table 2.1-a provides an overview of the status of these nuclear power reactors. Plant status summaries for all decommissioning nuclear power reactors are available at <https://www.nrc.gov/info-finder/decommissioning/power-reactor/index.html>. Table 2.1-b lists the decommissioned power reactors that have ISFSIs onsite.

2.1.1 Summary of Fiscal Year 2021 Reactor Decommissioning Activities

- In January 2021, project management responsibility for the Duane Arnold site transferred from the Office of Nuclear Reactor Regulation (NRR) to NMSS. Indian Point Unit 3 shutdown in April 2021 and was transferred to NMSS in September 2021. Project management responsibility transfers from NRR to NMSS when the plant is permanently defueled.
- In 2021 staff continued to review of the Zion, La Crosse, and Humboldt Bay FSSRs that were submitted in 2019 through 2021.

- In September 2019, an Interagency Agreement between the NRC and DOE-Naval Reactors was approved, commencing NRC technical support services for the decommissioning of nuclear navy surface ships, starting with the Surface Ship Support Barge (SSSB) as a first of a kind project. Naval Reactors awarded a decommissioning contract for the SSSB to APTIM Federal Services, LLC in June 2020. NRC Staff recommended Naval Reactors approval of the SSSB Decommissioning Work Plan (DWP) in June 2021. The SSSB arrived at Alabama Shipyards in Mobile Bay, AL in June 2021. Naval Reactors approved the DWP and commenced decommissioning in June 2021.
- In May 2021, Indian Point Unit 3 permanently ceased operations and transferred to decommissioning status. Region 1 inspection responsibility for Unit 3 was internally transferred from NRR's Division of Reactor Projects to the NMSS's Division of Nuclear Materials Safety in May 2021. The inspection responsibility moves from the Reactor Oversight Process to Inspection Manual Chapter (IMC) 2561 upon permanent defueling of the plant.
- In August 2021, in SECY-21-0033, the Commission voted to deny the request to extend the decommissioning schedule for the reactors at the General Electric (GE) Vallecitos facility. GE is providing a change in decommissioning schedules to meet the 60-year decommissioning completion dates.
- In January 2021, as a follow-up action to aging management issues at GE identified in 2018, staff-initiated changes to the inspection program to focus on aging management and surveillances. These changes were incorporated in IMC 2561 "The Reactor Decommissioning Inspection Program".
- The NRC regional staff held annual assessment meetings for licensees that have announced their intent to shut down within the next 3 years, including Byron 1 and 2, Dresden 2 and 3, and Palisades. NMSS staff supported these assessment meetings. On September 13, 2021, the State of Illinois passed the climate and Equitable Jobs Act, which provides subsidies to Byron and Dresden totaling about \$700M over 5 years. As such, Byron and Dresden will continue operating.
- In July 2021, NRC staff participated in a government-to-government and public meeting related to the Indian Point Post-Shutdown Decommissioning Activities Report (PSDAR) to discuss the planned decommissioning of the Indian Point reactors. Beginning in October 2020, the staff has been holding periodic meetings with Pennsylvania Department of Environmental Protection related to planned decommissioning activities at Three Mile Island (TMI) Units 1 and 2. Beginning in April 2021, staff has observed the first two TMI-2 Citizens Advisory Panel meetings.

Reactor Decommissioning Financial Assurance Working Group

The Reactor Decommissioning Financial Assurance (RDFA) Working Group issued a final report on May 1, 2020, which concluded that the NRC has a robust regulatory, licensing, and oversight framework for power RDFA and that the oversight framework continues to be robust for all current and anticipated approaches for accomplishing decommissioning (Agencywide Document Access and Management System [ADAMS] Accession No. ML20120A550). The RDFA Working Group final report also made nine recommended enhancements to the NRC power RDFA guidance and procedures implementing the licensing and oversight processes to improve program effectiveness, efficiency, and transparency of the RDFA program. These were to:

1. Clarify Oversight of Decommission Trust Fund Expenditures as Part of Reviews of Annual Decommissioning Funding Status Reports;
2. Develop Periodic Cost-Baselining;
3. Develop 30-Day Notification Guidance;
4. Revise Inspection Procedures;
5. Develop RDFA Spot Check Program for Licensees of Power Reactors in Decommissioning;
6. Establish RDFA Training Program;
7. Clarify PSDAR Update Triggers;
8. Clarify the Applicability of the Formula Amount; and,
9. Provide Irradiated Nuclear Fuel Funding Guidance for use of Provisional Trust Funds.

Updates to NRC guidance documents to incorporate these enhancements are ongoing. Changes to Regulatory Guide 1.185 were put on hold due to it being a draft version which was developed as part of the proposed rule entitled “Regulatory Improvements for Production and Utilization facilities Transitioning to Decommissioning.” These changes can be incorporated into a revised draft when the rulemaking effort restarts. The training program has been incorporated into annual decommissioning counterpart meetings.

2.1.2 Fiscal Year 2022 Areas of Focus

The reactor decommissioning program is adapting to the industry trend of license transfer and sale of reactor units from utilities to specialized decommissioning companies. The NRC staff will continue to internally coordinate, as necessary, to provide support with public outreach and ensure high quality safety reviews of submittals consistent with NRC’s mission to protect public health and safety and the environment. The staff will also continue to work toward the termination of licenses at sites where physical decommissioning has been completed such as Humboldt Bay, Zion Units 1 and 2, and La Crosse. In December 2020, the staff approved the Order for the license transfer request for the TMI-2 plant to TMI-2 Solutions, LLC to facilitate the

decommissioning of the damaged reactor and management of the core debris, and in May 2021, NRC approved the Order to transfer the Indian Point site to Holtec Decommissioning International to facilitate the decommissioning of Units 1, 2, and 3. In May 2021, Dominion Energy Kewaunee submitted a request for a license transfer to EnergySolutions to acquire the closed Kewaunee nuclear power plant for prompt decommissioning. The review is expected to be complete in early Calendar Year (CY) 2022. The Omaha Public Power District submitted an LTP for Fort Calhoun in August 2021 for NRC approval. This process normally takes 12-15 months to complete. TMI-2 Solutions is requesting a license amendment to allow removal and storage of core debris material. NRC staff review will be ongoing through FY 2022.

Table 2.1-a Power and Early Demonstration Reactors Undergoing Decommissioning

Reactor	Location	Status	Date of Shutdown	Date PSDAR* Submitted	Date LTP Submitted	Date LTP Approved	Date of Decommissioning Completion**	
1	Crystal River Unit 3	Crystal River, FL	DECON	2/13	12/13****	TBD	TBD	2026-2030
2	Dresden Unit 1	Morris, IL	SAFSTOR	10/78	6/98	TBD	TBD	2036
3	Duane Arnold	Palo, IA	SAFSTOR	8/20	4/20	TBD	TBD	2080
4	Fermi Unit 1	Newport, MI	SAFSTOR	9/72	4/98	2011***	TBD	2032
5	Fort Calhoun	Blair, NE	DECON	10/16	3/17	8/21	TBD	2026
6	GE-EVESR	Sunol, CA	SAFSTOR	2/67	N/A	TBD	TBD	2030
7	GE-Vallecitos Boiling Water Reactor	Sunol, CA	SAFSTOR	12/63	7/66	TBD	TBD	2025
8	Humboldt Bay	Eureka, CA	DECON	7/76	2/98	5/13	5/16	2021
9	Indian Point Unit 1	Buchanan, NY	DECON	10/74	1/96	TBD	TBD	2026
10	Indian Point Unit 2	Buchanan, NY	DECON	2020	12/19/2019	TBD	TBD	2033
11	Indian Point Unit 3	Buchanan, NY	DECON	2021	12/19/2019	TBD	TBD	2033
12	Kewaunee	Kewaunee, WI	SAFSTOR	5/13	5/13	TBD	TBD	2073
13	La Crosse	La Crosse, WI	DECON	4/87	5/91	7/16	5/19	2022
14	Millstone Unit 1	Waterford, CT	SAFSTOR	7/98	6/99	TBD	TBD	2056
15	Nuclear Ship Savannah	Baltimore, MD	DECON	11/70	12/08	TBD	TBD	2031
16	Oyster Creek	Forked River, NJ	DECON	9/18	6/18	TBD	TBD	2025
17	Peach Bottom Unit 1	Delta, PA	SAFSTOR	10/74	6/98	TBD	TBD	2034
18	Pilgrim	Plymouth, MA	DECON	5/19	11/18	TBD	TBD	2027
19	San Onofre Unit 1	San Clemente, CA	DECON	11/92	12/98	TBD	TBD	2030
20	San Onofre Unit 2	San Clemente, CA	DECON	6/13	9/14	TBD	TBD	2031

Table 2.1-a Power and Early Demonstration Reactors Undergoing Decommissioning

Reactor	Location	Status	Date of Shutdown	Date PSDAR* Submitted	Date LTP Submitted	Date LTP Approved	Date of Decommissioning Completion**	
21	San Onofre Unit 3	San Clemente, CA	DECON	6/13	9/14	TBD	TBD	2031
22	Three Mile Island Unit 1	Middletown, PA	SAFSTOR	9/19	4/19	TBD	TBD	2079
23	Three Mile Island Unit 2	Middletown, PA	SAFSTOR	3/79	6/13****	TBD	TBD	2037
24	Vermont Yankee	Vernon, VT	DECON	12/14	4/17	TBD	TBD	2026-30
25	Zion Unit 1	Zion, IL	DECON	2/97	2/00	12/14	9/18	2022
26	Zion Unit 2	Zion, IL	DECON	9/96	2/00	12/14	9/18	2022

GE General Electric
 DECON Power Reactors Undergoing Active Decommissioning
 EVESR ESADA (Empire State Atomic Development Associates) Vallecitos Experimental Superheat Reactor
 SAFSTOR Power Reactors in Long-Term Safe Storage
 TBD To Be Determined

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

** Anticipated year of completion of decommissioning. For decommissioning reactors with no ISFSI or an ISFSI licensed under the specific license provisions of 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 general license provisions of 10 CFR 72.210, 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.

**** The staff expects to receive a revised PSDAR with a new decommissioning schedule, contingent on a license transfer for the site.

Table 2.1-b Decommissioned Power Reactors that have Independent Spent Fuel Storage Installations

	Reactor	Onsite Fuel Status	Cask Vendor	Model
1	Big Rock Point	10 CFR 50 ISFSI	EnergySolutions, 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, technical review of licensee submittals in support of decommissioning, inspections, support for the development of rulemaking and guidance, public outreach, and participation in industry conferences and workshops. In addition, the NRC staff routinely processes license amendments and exemptions to support the progressive stages of decommissioning.

As of September 30, 2021, four research and test reactors were in decommissioning status. The NRC staff expects to terminate the licenses for the two General Atomics “Training, Research, Isotopes General Atomics” (TRIGA) reactors in 2021. Table 2.2 lists the research and test reactors undergoing decommissioning. Plant status summaries for all decommissioning research and test reactors are available at <https://www.nrc.gov/info-finder/decommissioning/research-test/index.html>.

2.2.1 Summary of Fiscal Year 2021 Activities

General Atomics has completed most of the physical decommissioning work at its two research reactors in San Diego, California. In August 2019, independent verification surveys of the site were conducted, and several subsequent NRC inspections supported the final site status conclusions. General Atomics requested license termination of their two TRIGA licenses in January 2021. The NRC staff expects to complete a review of the General Atomics FSSR and approve termination of the TRIGA licenses in CY 2021.

2.2.2 Fiscal Year 2022 Areas of Focus

In FY 2022 the staff will work to complete the reviews of the General Atomics FSSR and approve termination of the TRIGA licenses. The AeroTest Radiography and Research Reactor is expected to be transferred to NMSS after NRR issues the possession-only license and the staff will commence work on it when transferred. The NRC staff anticipates that GE will submit a plan for decommissioning of the GE General Electric Test Reactor (GETR) facility in the near future.

Table 2.2 Research and Test Reactors Undergoing Decommissioning

	Reactor	Location	Date of Shutdown	Status	Date of Decommissioning Completion
1	AeroTest	San Ramon, CA	12/2011	TBD	TBD
2	General Electric-Hitachi GETR	Sunol, CA	1/85	Possession-Only	2025
3	General Atomics TRIGA Mark F	San Diego, CA	9/94	DP Approved	2021
4	General Atomics TRIGA Mark I	San Diego, CA	12/96	DP Approved	2021
GETR: General Electric Test Reactor TRIGA: Training, Research, Isotopes, General Atomics					

2.3 Complex Materials Facility Decommissioning

Decommissioning activities associated with materials facilities 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), DOE, and the U.S. Army Corps of Engineers (USACE); inspecting complex decommissioning sites; conducting public outreach; participating in international decommissioning activities; conducting program evaluations; and participating in industry conferences and workshops. In addition, the 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, 2021, nine complex materials sites are undergoing decommissioning (see Table 2.3).

Complex materials sites are defined as sites where the complexity of the decommissioning process will require more than minimal technical and administrative support. It is expected that for these sites, it 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 DP is required, all fuel cycle facilities undergoing decommissioning, and sites where there is significant public and/or congressional interest.

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

2.3.1 Summary of Fiscal Year 2021 Activities

- The NRC staff continued to coordinate with the USACE Pittsburgh office for the cleanup of the Shallow Land Disposal Area (SLDA) site in Vandergrift, Pennsylvania and approved their draft workplans.
- In 2002, and again in 2016, Fansteel filed for bankruptcy protection under Chapter 11. Fansteel is still in bankruptcy and is still in negotiations with the NRC, the EPA, the U.S. Department of Justice, and the Oklahoma Department of Environmental Quality (ODEQ) to reach a settlement of its decommissioning and other environmental obligations. Fansteel Metals, the current NRC licensee, is a wholly owned subsidiary of Fansteel and was formed in 2004 for the sole purpose of decommissioning the site. Fansteel Metals (formerly FMRI), which was funded by Fansteel prior to Fansteel's 2016 bankruptcy filing, has not itself filed for bankruptcy but is insolvent. Current monthly funding from the Decommissioning Trust is sufficient to assure public health and safety and secure the site through the Fall of 2024.
- In April 2020, Sigma Aldrich (in Missouri) submitted a request for license termination and requested that it be reviewed concurrently with the revised DP. In July 2020, the NRC staff accepted the requests for license termination and the revised DP for a detailed technical review. The NRC staff is coordinating with the State of Missouri on the decommissioning of the Sigma Aldrich Fort Mims Site. The NRC review is planned to be completed by the end of CY 2021.

- In November 2019, the University of Missouri Pickard Hall submitted a DP to the NRC staff for review and approval. The NRC staff determined further characterization of the site is required. Currently, the licensee is performing additional characterization work in support of the DP.
- In February 2021, decommissioning activities were completed at the United Nuclear Corporation (UNC) site in Connecticut, the last formerly licensed non-Agreement State site in the Terminated License Review Project, and the site was released for unrestricted use.

Radium Activities

Activities associated with discrete sources of radium and associated contamination, for which the NRC's authority was established by the Energy Policy Act of 2005, include maintaining various levels of regulatory oversight at sites with identified discrete sources of radium or associated contamination; examining issues and funding options to facilitate remediation of sites in Non-Agreement States; interacting with the states, EPA, the U.S. Department of Defense (DoD), and the National Park Service (NPS) at their respective sites; inspecting service providers at the sites that are subject to exclusive Federal jurisdiction; conducting public outreach; and participating in industry conferences and workshops. NRC staff activities involve varying levels of oversight at both military and non-military sites. The NRC and the DoD finalized a Memorandum of Understanding (MOU) in April 2016, describing roles in the cleanup of radium and other unlicensed radioactive materials at military sites (ADAMS Accession No. ML16092A294). More information on the staff's radium activities is available at <https://www.nrc.gov/materials/radium.html>.

Summary of Fiscal Year 2021 Military Radium Activities

- In FY 2021, the NRC staff initiated monitoring activities of cleanups by the U.S. Air Force at the former Kelly (Lackland) Air Force Base in San Antonio, Texas, and Hill Air Force Base in Ogden, Utah; and the U.S. Navy at China Lake Naval Air Weapons Station in China Lake, California; Imperial Beach Naval Outlying Landing Field in San Diego, California; North Island Naval Air Station in Coronado, California; and Naval Station San Diego in San Diego, California. The NRC staff also continued monitoring activities at the ongoing cleanups by the U.S. Army at Dugway Proving Grounds in Dugway, Utah, and by the U.S. Navy at Long Beach Naval Shipyard in Long Beach, California; Mare Island Naval Shipyard in Vallejo, California; and Treasure Island Naval Station in San Francisco, California. In FY 2021, the NRC completed reviews for military radium cleanup reports, including a proposed plan for Dugway Proving Ground and a remedial investigation report for the Mare Island Naval Shipyard (in January and September, respectively). The NRC staff also held coordination calls with the DoD to determine upcoming activities and schedules at a programmatic and site-specific level. The NRC staff has regular communication with the DoD to ensure that: 1) implementation of the MOU is going well at these sites and 2) that the DoD's remedies will meet the NRC 0.25 millisieverts-per-year (25 millirem-per-year) dose criterion in 10 CFR 20.1402 for sites that will be released for unrestricted use or is consistent with the requirements in 10 CFR 20.1403(b) for sites that will be released for restricted use.

- Throughout FY 2021, the NRC staff held discussions regarding the status of, and issues associated with, site cleanup with the military, EPA, and the States. The staff began implementing the “stay-informed” approach for remediation by the U.S. Air Force at Elmendorf Air Force Base in Anchorage, Alaska, and the U.S. Navy at Brunswick Naval Air Station in Brunswick, Maine; Marine Corps Base Camp LeJeune in Jacksonville, North Carolina; Marine Corps Air Station Cherry Point in Havelock, North Carolina; Naval Weapons Station Concord in Concord, California; Naval Air Station Jacksonville in Jacksonville, Florida; and Naval Weapons Station Yorktown in Yorktown, Virginia. The NRC staff also continued implementing the “stay-informed” approach for remediation by the U.S. Navy at the Hunters Point Shipyard site in San Francisco, California, and the Alameda Naval Air Station in Alameda, California; the U.S. Air Force at the McClellan Air Force Base, in Sacramento, California; and the U.S. Army at the Sharpe Depot in Lathrop, California. The staff plans to continue its reliance on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process and EPA oversight at these sites.
- In December 2019, the NRC responded to Green action for Health and Environmental Justice regarding their 2.206 petition to revoke Tetra Tech’s EC Incorporated’s service provider license due to falsification of records at the Hunters Point Shipyard. The NRC stated that the petition will be held in abeyance and will be reassessed after the legal resolution of the U.S. Department of Justice’s (DOJ’s) civil complaint against Tetra Tech EC Incorporated (ADAMS Accession No. ML19309F257). The Petition Review Board provides an update to status of DOJ’s activities, with respect to the civil complaint against Tetra Tech, to the Petitioner and the Licensee every 4 months. The most recent status was provided in September 2021 (ADAMS Accession No. ML21250A204).

Summary of Fiscal Year 2021 Non-Military Radium Activities

As of September 30, 2021, the NRC staff had dispositioned all the sites⁴ that were identified with potential contamination from historic radium use in non-Agreement States. Five of the sites identified had calculated doses from radium contamination that exceed unrestricted use standards, requiring remediation. Moving forward, the effort has, and will continue to be, focused on working with the site owners on site remediation. Remediation at each of the five sites with contamination levels that exceed the NRC’s unrestricted use standards is at a different stage as discussed below:

- As reported in previous fiscal years, the former Benrus Clock Company, in Waterbury, Connecticut, and the former Sessions Clock Company in Bristol, Connecticut, completed remediation activities, and the NRC staff issued a closeout letter in March and November 2019, respectively (ADAMS Accession Nos. ML19263A650 and ML19077A037, respectively).

⁴ As described in SECY-16-0020, the staff originally identified 29 historic sites in non-Agreement States for follow-up. A site can have multiple property owners, and as such, from these 29 historical sites, there are 47 unique site owners. Subsequently, as part of continuing coordination efforts with the states on naturally occurring and accelerator-produced radioactive material, 11 additional sites with potential radium contamination were identified. State of Michigan officials informed the NRC staff of 9 additional sites, and during preparations for the site visit to a former clock factory in Connecticut, the NRC staff identified 2 additional sites in Connecticut.

- Remediation activities at the former New Haven Clock Company began in August 2018 and are ongoing. Due to funding and COVID-19 pandemic issues, site cleanup is now anticipated to be completed in FY 2022. After the site cleanup is complete, the NRC staff will prepare a closeout letter that will be shared with State of Connecticut's Department of Energy and Environmental Protection prior to issuance.
- The NRC staff approved the Cleanup Plan for New Opportunities of Waterbury, Inc. (NOW), in Waterbury, Connecticut, in April 2019 (ADAMS Accession No. ML19044A522) and met with the site owner and Federal, State, and local partners to discuss the status of remediation planning and funding. In addition, the staff has been exercising a monitoring role at the portion of the NOW site formerly under the EPA's Brownfields program. The State of Connecticut has requested EPA Region I perform an emergency removal action at this site due to structural concerns about portions of the site. In January 2020, EPA Region I staff completed a preliminary assessment of the site and determined that an emergency removal action is not warranted. EPA is continuing to assess the site for listing on the National Priorities List and remedial actions under Superfund.
- The NRC staff received a cleanup plan in November 2019 from the site owner of the former Seth Thomas Clock Company in Thomaston, Connecticut, on remediation planning efforts (ADAMS Accession No. ML19326B980). In January 2020, the staff requested additional information on the cleanup plan (ADAMS Accession No. ML20030A128). In April 2020, at the site owner's request due to the COVID-19 pandemic, staff placed its review of the cleanup plan on hold. The site owner expects to restart remediation activities in FY 2022.
- In FY 2021, the NRC and the NPS staffs continued to coordinate efforts, in accordance with the NRC-NPS MOU (ADAMS Accession No. ML20239A731), for the ongoing environmental response actions at Great Kills Park in Staten Island, New York; Spring Creek Park in Queens, New York; and Dead Horse Bay in Brooklyn, New York, that NPS previously identified with confirmed radium contamination.

The NRC staff continues to coordinate with Agreement State partners as they work to resolve non-military radium issues within their jurisdictions. As of September 30, 2021, 32 of 39 Agreement States have completed their investigation activities, have dispositioned all the sites on their lists, and have no further plans for additional investigations. The remaining Agreement States continued to conduct prioritized reviews of the sites within their jurisdictions, focusing on the most risk-significant sites.

West Valley Demonstration Project

The West Valley Reprocessing Plant licensees' (New York State Energy Research and Development Authority [NYSERDA] and the U.S. Department of Energy – West Valley Demonstration Project [DOE-WVDP]) preferred environmental impact statement (EIS) alternative for decommissioning and long-term stewardship of the WVDP and Western New York Nuclear Service Center near Buffalo, New York, employs a two-phased approach.

Phase 1 involves the decommissioning of most WVDP site facilities, including demolition of the Main Plant Process Building (MPPB) and vitrification facility, clean-up of contaminated soil, and use of site data to inform studies to reduce uncertainties associated with decommissioning the remaining facilities (referred to as Phase 1 studies). Phase 1 of the decommissioning approach is being conducted in accordance with the NRC-approved DP.

Phase 2 involves completion of the decommissioning process and long-term management decision-making for the site. In FY 2021, DOE-WVDP and NYSERDA continued to work toward the Phase 1 decommissioning goals, as well as on the Draft Supplemental EIS for Phase 2 Decommissioning. The State-licensed disposal area will also be included in the Supplemental EIS to allow a comprehensive view of dose contributions from the entire licensed premises.

The DOE-WVDP achieved progress during 2021 overall, despite the work adjustments due to the COVID-19 pandemic. On a limited basis, DOE-WVDP continued its deactivation, characterization, and demolition preparation work in the MPPB, and continued to work toward the deactivation of the MPPB to include the aggressive decontamination of the Product Purification Cell - South. The updated demolition plan for the MPPB was approved by the NRC in March 2021 with caveats for providing additional information related to characterization and modeling assumptions that demonstrate the MPPB will meet the decommissioning criteria.

2.3.2 Fiscal Year 2022 Areas of Focus

In FY 2022, the NRC staff will work with the ODEQ to evaluate funding options for the decommissioning of the Fansteel Metals site and work with the EPA to determine if the site is eligible for cleanup under CERCLA. The staff will continue its review of the new work plans for the SLDA in FY 2022.

The NRC staff will perform the pre-application audit, the acceptance review, and initiate the request for additional information process (if necessary) for the Cimarron Decommissioning Plan, Rev. 3.

The NRC staff intends to continue implementing the MOU with the DoD for military radium by prioritizing its activities based on available resources. Factors for consideration in prioritizing annual monitoring activities include: (1) involvement of other regulatory agencies; (2) use of engineered controls and/or land use controls as remedies; (3) contamination in buildings for reuse; (4) amount or type of material and how transportable it is; and (5) previous monitoring activities.

The NRC staff plans to continue its efforts on non-military radium by working with site owners on risk-informed approaches for site cleanup. Additionally, the staff will continue to implement the MOU with the NPS as remediation activities progress at the parks.

In FY 2022, the NRC staff plans to focus on reviewing the remaining areas of the MPPB decontamination at WVDP: Product Purification Cell – South, Ventilation Wash Room, Off – Gas Cell, Acid Recovery Cell and other preparatory activities before the MPPB demolition can begin. MPPB demolition will start after the preparatory work is complete and is expected to take more than 30 months to complete. The NRC staff will prepare for comments on the draft supplemental EIS and Probabilistic Performance Assessment.

Table 2.3 Complex Decommissioning Sites

	Name	Location	Date DP Submitted	Date DP Approved	Compliance Criteria	Date of Decommissioning Completion
1	Alameda Naval Air Station*	Alameda, CA	N/A	N/A	MOU**	N/A
2	Cimarron (Kerr-McGee)	Cimarron, OK	4/95 revised 11/18	8/99	Action- UNRES***	2039
3	Department of the Army, U.S. Armament Research, Development, and Engineering Center	Picatinny, NJ	11/13 Revised 8/19	04/17	LTR-UNRES	TBD
4	Fansteel Metals (formerly FMRI)	Muskogee, OK	8/99, revised 5/03	12/03	LTR-UNRES	TBD
5	Hunter's Point Naval Shipyard* (former Naval shipyard)	San Francisco, CA	N/A	N/A	MOU**	N/A
6	McClellan* (former Air Force base)	Sacramento, CA	N/A	N/A	MOU**	N/A
7	Shallow Land Disposal Area (BWX Technologies, Inc.)****	Vandergrift, PA	N/A	N/A	LTR-UNRES	TBD
8	Sigma-Aldrich	Maryland Heights, MO	10/08, revision pending	5/09, revised TBD	LTR-UNRES	2021
9	West Valley Demonstration Project	West Valley, NY	Phase 1 3/09	Phase 1 2/10	LTR- UNRES†	TBD

- * The Hunter’s Point Shipyard and Alameda Naval Air Station sites are being remediated by the U.S. Navy, and the McClellan site is being remediated by the U.S. Air Force, under the 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 the NRC staff will rely on the ongoing CERCLA process and EPA oversight. More information is available on this approach in SECY-08-0077, “Options for U.S. Nuclear Regulatory Commission Involvement with the U.S. Navy’s Remediation of the Hunters Point Naval Shipyard Site in California,” (ADAMS Accession No. ML080800110).
- ** “Memorandum of Understanding Between the U.S. Nuclear Regulatory Commission and the DoD for Coordination on CERCLA Response Actions at DoD Sites with Radioactive Materials,” dated April 2016 (ADAMS Accession No. ML16092A294).
- *** 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 Site Decommissioning Management Plan (SDMP) action plan criteria for site remediation.
- **** USACE's remediation approach for the SLDA site is to follow the CERCLA process and adhere to the MOU between the NRC and USACE for coordination, remediation, and decommissioning of Formerly Utilized Sites Remedial Action Program (FUSRAP) sites with NRC-licensed facilities, “Memorandum of Understanding Between the U.S. Nuclear Regulatory Commission and The USACE for Coordination of Cleanup & Decommissioning of the FUSRAP Sites with NRC-Licensed Facilities,” 66 FR 36606. A Supplemental MOU between USACE, DOE, and the NRC was signed in June 2014, and complements the existing MOU by incorporating the relevant requirements of 10 CFR Parts 70, 73, and 74, and stipulates the specific roles of each Federal entity throughout the remainder of the remediation process.
- † 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 reflect the information in the most recent NRC-approved DP or approach. The compliance criteria may change if the NRC approves alternate compliance criteria requested by the licensee.
- Abbreviations used in this table include: “Action” for SDMP action plan criteria, “ADAMS” for Agencywide Documents Access and Management System, “CERCLA” for Comprehensive Environmental Response, Compensation, and Liability Act, “CFR” for *Code of Federal Regulations*, “DP” for decommissioning plan, “DOE” for U.S. Department of Energy, “EPA” for U.S. Environmental Protection Agency, “FY” for Fiscal Year, “FR” for *Federal Register*, “LTR” for License Termination Rule criteria, “MOU” for memorandum of understanding, “N/A” for not applicable, “NRC” for U.S. Nuclear Regulatory Commission, “RES” for restricted use, “TBD” for to be determined, “UNRES” for unrestricted use, and “USACE” for U.S. Army Corps of Engineers.
- Reasons for multiple DP submittals range from changes in the favored decommissioning approach, to the phased implementation of decommissioning, to poor quality submittals.

2.4 Uranium Recovery Facility Decommissioning

In enacting the 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 (Title I). 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) (Title II). Additional information on the UMTRCA can be found at: <https://www.nrc.gov/waste/mill-tailings.html>.

The NRC's uranium recovery decommissioning activities include project management, technical review of licensee and DOE submittals in support of decommissioning or long-term care and maintenance, the development of rulemaking and guidance, public outreach efforts, international assistance and cooperation, and participation in industry conferences and workshops.

Table 2.4-a identifies the 22 Title I sites: 19 that are under general license with the DOE; the Moab, Utah, mill undergoing decommissioning; and the former mill sites at Riverton, Wyoming, and Monument Valley, Utah, which have been designated as Title I sites by Congress. The regulation at 10 CFR 40.27, "General License for Custody and Long-Term Care of Residual Radioactive Material Disposal Sites," governs the long-term care of Title I disposal sites under a general license held by either DOE or the State in which the site is located, after decommissioning is complete. Additional information on the status of Title I sites can be found at <https://www.energy.gov/lm/sites/lm-sites>.

Table 2.4-b identifies the Title II sites that are no longer operating and in decommissioning status. As of September 30, 2021, five Title II uranium recovery facilities are undergoing decommissioning. The regulation at 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 disposal sites under a general license held by either DOE or the State in which the site is located, after decommissioning is complete. The six Title II sites that have been transferred for long-term care to DOE are identified in Table 2.4-c.

Status summaries for the Title II sites undergoing decommissioning are provided at <https://www.nrc.gov/info-finder/decommissioning/uranium/index.html>.

2.4.1 Summary of Fiscal Year 2021 Activities

UMTRCA Title I Sites

- In FY 2021 the NRC staff continued to interact with the DOE on their evaluation of the tailings impoundment cover at the Mexican Hat site and the reviews of the groundwater remedy evaluation for the Monument Valley site. Staff also reviewed and provided comments on the Shiprock Performance report and concurred on the deferral of groundwater monitoring at the Shiprock, Monument Valley, and Tuba City sites due to the COVID-19 pandemic after determining that the deferral would not adversely impact health and safety (ADAMS Accession No. ML20330A262).

- In FY 2021, the NRC staff worked with the DOE on the re-design of the cover system for the Crescent Junction disposal cell. DOE provided a 60 percent design for review and comment by the NRC staff. This effort will continue into FY 2022.
- In 2021 the staff continued its reviews of the Groundwater Corrective Action Plans for the Gunnison and Rifle sites in Colorado and the Green River site in Utah.

The NRC staff, in conjunction with the Navajo Nation, the EPA, DOE, Department of Interior's Bureau of Indian Affairs, Indian Health Service, and Agency for Toxic Substances and Disease Registry, completed the development of a new 10-year plan to address uranium contamination on the Navajo Nation. The NRC staff continued to work with the Navajo Technical University to share NRC courseware in support of expanded Science, Technology, Engineering, and Mathematics offerings at the university. In addition, the staff continued participation in Navajo Nation/Hopi/DOE quarterly meetings and community outreach activities.

UMTRCA Title II Sites

- The NRC staff continued inspection and review of licensee actions at the Homestake Mining Company of California (HMC), Grants Reclamation Project (GRP) in Grants, New Mexico, as required by the confirmatory order (CO) EA-16-114 issued in March 2017 and license SUA-1471. In November 2020, HMC responded to the NRC's June 2020 review of the November 2019 Groundwater Corrective Action Program (GCAP) license amendment request (LAR) and submitted an updated GCAP LAR for NRC review, as required by the CO. In the updated GCAP LAR, HMC stated they intended to submit an Alternate Concentration Limit (ACL) LAR by June 2021. In April 2020, the NRC staff responded to the updated GCAP LAR. The NRC staff did not accept the GCAP LAR for review but did offer comments on the groundwater model presented in the updated GCAP LAR. The NRC staff agreed to suspend the GCAP review until an ACL LAR was submitted and reviewed. In July 2021, HMC proposed a new ACL submission date of December 2021 and the NRC accepted the new date. Evaporation Pond 1 (EP1) relining has been deferred. EP1 is still in use with approximately 5% reduced evaporative capacity. In April 2021, the NRC completed the review of the Land Application Impact Assessment Report and FSSR for compliance with CO Conditions 14 and 15, for release of former groundwater land application irrigation areas. The NRC staff found that HMC demonstrated that the concentrations of constituents of concern in soil across the land application irrigation areas do not exceed the criteria for unrestricted release. The NRC staff participates in monthly site status calls with HMC and other regulators. The staff continues communications between the EPA, DOE, New Mexico Environment Department, and the New Mexico Office of State Engineer through monthly teleconferences to discuss coordination and alignment between the regulatory agencies. The staff also participates in monthly teleconferences with interested members of the community to provide an update on activities at the GRP.
- In August 2021, the NRC staff completed the review of the Wyoming Department of Environmental Quality's (WDEQ) Completion Review Report (CRR) for the Western Nuclear Incorporated (WNI) site in Wyoming. The staff also completed its review of the DOE's draft final Long-Term Surveillance Plan (LTSP) and began its evaluation of the DOE's Long-term Care Fee estimate for the site.

- The NRC staff continued to work with Rio Algom toward the completion of the characterization and subsequent remediation of byproduct surface contamination at their Ambrosia Lake West (ALW) site, which is located in the San Mateo Creek (SMC) Basin. Throughout the SMC basin, EPA is pursuing a CERCLA removal action of surface contamination from historical uranium mines. NRC staff continued to attend regular meetings with EPA staff and larger meetings with Rio Algom, EPA, NRC, and the State of New Mexico to address the overlapping regulatory authority at the site for commingled contamination from the ALW site and historical uranium mines within the SMC Basin.
- In 2021, the NRC staff continued to work with the WDEQ to develop a path forward for completing the decommissioning of the American Nuclear Corporation site in Jeffery City, Wyoming.
- In September 2020, the NRC issued the Safety Evaluation Report (SER) for the LAR for the UNC Church Rock, New Mexico site to construct a disposal cell for mine spoils atop the existing mill tailings cell. The NRC will issue the revised final SER in late Spring 2022, based on comments from DOE and the licensee. In October 2020, the NRC issued the draft EIS for public comment for the UNC Church Rock LAR. At the request of stakeholders, the comment period was extended several times, closing on November 1, 2021. During the extended comment period, the NRC staff engaged in innovative approaches on outreach with the Navajo Nation, which has included, but was not limited to, virtual meetings with the public and specific Navajo communities, newspaper articles, and radio broadcasts in English and Navajo. NRC senior managers also met with Navajo President Nez to discuss the draft EIS and additional ideas to effectively communicate with the Navajo Nation during the comment period. The Final EIS, which is now scheduled for May 2022, will contain an appendix that summarizes and responds to comments from the Navajo Nation and all others who provided comments. The staff expects to complete the concurrence process with the appropriate Federal and State entities and issue the license amendment in June 2022.
- In April 2021, the NRC staff completed its review of Colorado's CRR for the Durita site and continued to review the DOE draft LTSP for the site.
- In August 2020, the NRC staff provided comments to the Texas Commission on Environmental Quality (TCEQ) on the CRR for the Panna Maria site in Hobson, Texas (ADAMS Accession No. ML20225A026). In 2021 the staff continued to work with TCEQ to resolve the comments.

UMTRCA Title II Sites that have been Transferred to DOE for Long-Term Care

- The NRC staff continues to discuss options with DOE to resolve two technical concerns associated with the Bluewater site in Grants, New Mexico, that involve: (1) several feet of subsidence of approximately 40 acres of the cover causing ponding of several acres of water on the tailings impoundment after heavy rains; and (2) contaminants in the groundwater plume from the site that have impacted a portion of a regional drinking water aquifer. The DOE is working cooperatively with the USACE on a solution to the impoundment subsidence and with the DOE National Labs on long-term solutions to groundwater characterization and impacts of contaminated groundwater at the site. The

Bluewater disposal cell project will be a multi-year review, construction, and tailings repair project. The DOE and NRC staff have developed a plan and schedule for review of the disposal cell repair project, including the review duration, meeting/communication points as well as the process for resolution of NRC comments. The DOE continues to maintain a cooperative agreement with the New Mexico Environmental Department to sample groundwater wells outside of the long-term care boundary.

- Throughout FY 2021, the NRC staff continued interactions with DOE regarding those sites that are generally licensed under 10 CFR 40.27 and 40.28. The staff has continued to hold quarterly telephone conference calls with DOE to discuss overarching policy and technical issues associated with managing the generally licensed sites. The staff also continued its participation in DOE meetings with the Navajo Nation and Hopi Tribe pertaining to the sites on the Navajo Nation and Hopi Reservation.

2.4.2 Fiscal Year 2022 Areas of Focus

In FY 2022, the NRC staff will continue its participation in the activities associated with the Navajo Nation 10-year plan and the DOE/Navajo Nation/Hopi quarterly meetings. Additionally, the staff will review DOE reports and plans for the reclamation and management of these sites. The staff will continue its review of the UNC Church Rock LAR and the reviews of the Groundwater Corrective Action Plans for the Gunnison and Rifle sites in Colorado and the Green River site in Utah. The staff will continue to work with DOE to resolve issues associated with the Bluewater site and will work with the State of Wyoming to explore and implement options for decommissioning the ANC site. The staff will also work with Texas to complete the reviews of the CRRs for the Panna Maria site and DOE-LM for the LTSP for the WNI and Durita sites to include review of the long-term care fee and land transfer issues.

Table 2.4-a Decommissioning Title I Uranium Recovery Sites

	Name	Location	Status
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
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>*DOE has suspended active remediation, except for evaporation, and is evaluating several new remediation approaches.</p> <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>			

Table 2.4-b Decommissioning Title II Uranium Recovery Sites

	Name	Location	Date DP/RP Approved	Date of Decomm. Completion
1	American Nuclear Corporation	Gas Hills, WY	10/88, Revision 2006	TBD
2	Homestake Mining Company	Grants, NM	Revised plan – 3/95 Revision pending	TBD
3	Rio Algom–Ambrosia Lake	Grants, NM	2003 (mill); 2004 (soil)	2025
4	Sequoyah Fuels Corporation	Gore, OK	2008	2025
5	United Nuclear Corporation	Church Rock, NM	3/91, Revision 2018	TBD
TBD - to be determined				

Table 2.4-c Title II Uranium Recovery Sites - DOE Licensed Under 10 CFR 40.28

	Name	Location	Date Transferred to DOE
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

There is one fuel cycle facility undergoing partial decommissioning, the Nuclear Fuel Services (NFS) site in Erwin, Tennessee, in accordance with applicable provisions of 10 CFR 70.38. The NRC's public Web site at <https://www.nrc.gov/info-finder/decommissioning/fuel-cycle/index.html> summarizes additional information about the NFS site and other fuel cycle facilities.

2.5.1 Summary of Fiscal Year 2021 Activities

During FY 2021, NFS continued to work toward releasing different areas within its site. Decommissioning activities outside the Protected Area include groundwater remediation of the North Site and the Industrial Park Facility. Decommissioning activities inside the Protected Area include decommissioning of the 234 Excavation Facility and Building 111, decommissioning in support of fuel modernization, groundwater monitoring, groundwater remediation, and miscellaneous decommissioning tasks. The 234 Tent houses facilities and equipment to excavate soil beneath the former 234 Wet Cell and 234B is for storage.

2.5.2 Fiscal Year 2022 Areas of Focus

In FY 2022, the NRC staff expects remediation work to continue at the NFS site.

3. GUIDANCE AND RULEMAKING ACTIVITIES

In FY 2021, the NRC staff worked to increase the effectiveness of the Decommissioning Program through a rulemaking effort for reactor decommissioning and updates to decommissioning guidance.

Decommissioning Rulemaking

In Staff Requirements Memorandum SECY-14-0118, "Request by Duke Energy Florida, Inc., for Exemptions from Certain Emergency Planning Requirements," (ADAMS Accession No. ML14364A111) the Commission directed the staff to proceed with rulemaking on reactor decommissioning.

The NRC's goals in amending these regulations would be to provide a more 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 staff submitted the draft proposed rule package to the Commission for vote in May 2018. If the Commission approves the proposed rule, then any Commission-directed changes will be incorporated, and the proposed rule package, including the draft guidance documents intended to help implement the new rule, will be published for a public comment period. The staff will consider any comments received during this period in developing the draft final rule package.

Decommissioning Guidance

In FY 2021, the NRC staff continued its multi-year effort to update decommissioning guidance documents including Volumes 1 and 2 of the Consolidated Decommissioning Guidance, NUREG-1757.

NUREG-1757, Volume 2, "Consolidated Decommissioning Guidance: Characterization, Survey, and Determination of Radiological Criteria," was last revised in September 2006. The current update includes enhanced guidance and detailed examples of methods used to perform decommissioning dose modeling and radiological surveys and reflects lessons learned from recent decommissioning experience. These updates are expected to improve the quality of licensee DPs and LTPs and improve the efficiency of the staff's review of these documents. Revisions related to dose modeling reviews include additional guidance on topics such as model abstraction and simplification, consideration of uncertainty, use of distribution coefficients, consideration of intrusion scenarios for buried residual radioactivity (RESRAD), and consideration of elevated areas or "hot spots." Revisions related to radiological surveys include new or updated guidance on composite sampling, subsurface surveys (e.g., surveys of excavations and for soil reuse), and an alternate hypothesis assumption for the statistical analysis (Scenario B). Revisions also include updated guidance on conducting "as low as reasonably achievable" reviews. The NUREG was issued for public comment on December 8, 2020, and the comment period closed on April 8, 2021. Over 200 comments in 9 comment letters were received on the draft document. NRC plans to finalize the document and issue it in fall 2022.

Similarly, the NRC staff continued its efforts to update NUREG-1757, Volume 1, “Consolidated Decommissioning Guidance: Decommissioning Process for Materials Licensees,” which was last revised in September 2006. Draft Revision 3 of NUREG-1757, Volume 1 was issued to the Agreement States for review in July 2020. Staff is addressing comments received from the State of New Jersey and the Organization of Agreement States and will publish it for public comment in FY 2022.

Categorical Exclusion Rulemaking

The NRC staff are performing rulemaking to update the list of categorical exclusions (CATXs) in 10 CFR 51.22, “Criterion for categorical exclusion; identification of licensing and regulatory actions eligible for categorical exclusion or otherwise not requiring environmental review.” This rulemaking would establish new and amend existing CATXs for licensing, regulatory, and administrative actions that do not individually or cumulatively have a significant effect on the human environment. This rulemaking would address inconsistencies in the application of CATXs across licensing and regulatory programs. A *Federal Register* Notice (FRN), 86 FRN 24514, dated May 7, 2021, published an advanced notice of proposed rulemaking and a public meeting was held on June 15, 2021, to introduce the proposed changes and solicit public comments on these potential changes as well as specific questions related to CATXs. The NRC staff is currently reviewing and addressing these comments and responses and intends to use this information to inform the rulemaking, which is planned for publication in FY 2022. It is expected that revisions to the list of CATXs would increase efficiency and consistency by reducing the number of environmental assessments performed and by providing the same level of environmental review across regulatory programs.

4. RESEARCH ACTIVITIES

The Office of Nuclear Regulatory Research (RES) and NMSS continue to coordinate activities focusing on key decommissioning issues, including updating computer codes; development of User Need Requests (UNR) and Research Assistance Requests (RAR); implementation of the Radiation Protection Computer Code, Analysis, and Maintenance Program (RAMP); supporting international activities related to decommissioning; studying aging effects of engineered earthen covers; and developing guidance for cover construction and for surveys of subsurface residual contamination.

Computer Codes

In FY 2021, the staff continued activities with DOE National Laboratories for the development or modification of computer codes useful for decommissioning analyses, including the upgrade of several codes. This includes the following activities:

- RESRAD Family of Computer Codes: Funded by the DOE, Argonne National Laboratory (ANL) updated the RESRAD-BUILD code with a new dynamic air quality model that accounts for periodic vacuuming for up to nine rooms. ANL is currently developing a new User's Manual and User's Guide for RESRAD-BUILD to be published as a NUREG/CR report. Additionally, NUREG/CR-7268, Volume 1, "User's Manual for RESRAD-OFFSITE Code Version 4 – Methodology and Models Used in RESRAD-OFFSITE Code and NUREG/CR-7268, Volume 2, "User's Manual for RESRAD-OFFSITE Code Version 4 – User's Guide for RESRAD-OFFSITE" was published in March 2021.
- MILDOS Computer Code: MILDOS version 4.21 was released to users via RAMP. MILDOS version 4.21 was developed with parallel programming algorithms in the area source dispersion calculations and the population dose calculations to realize a reduction in calculation times. The reduction in calculation times is dependent on the executing machine's central processing unit and memory configuration as well as the problem under study. Analyses with larger area sources will receive greater benefit when the full area source calculation is performed. Standard report generation at the end of runs which include population calculations is now faster due to additional code upgrades.
- Visual Sample Plan (VSP) Computer Code: Pacific Northwest National Laboratory (PNNL) added Multi-agency Radiological Survey and Site Investigation Manual (MARSSIM) Scenario B (NUREG-1505) capability and adapted VSP Wilcoxon Rank Sum test algorithm to accept data without spatial coordinates. This also included reviewing and testing the other MARSSIM designs to ensure that they functioned properly for data analysis without a map. PNNL released VSP v7.17 which includes the MARSSIM Scenario B for testing and evaluation by the NRC.
- Decommissioning and Decontamination (DandD) Computer Code: The DandD computer code, which is used by licensees to develop adequate or appropriate Derived Concentration Guideline Levels for cleanup and demonstrate compliance with the dose criteria of 10 CFR Part 20, Subpart E, continues to be distributed and maintained under RAMP.

- **VARSKIN Computer Code:** The VARSKIN plus (VARSKIN+) computer code was released July 2021 and is available on the RAMP website. The VARSKIN+ code includes three new physics dosimetry modules: (1) wound dosimetry; (2) neutron dosimetry; and (3) eye dosimetry. The skin and wound dosimetry modules implement a new alpha dosimetry model for shallow skin assessments. Additionally, the VARSKIN+ code can be used to perform wound dose assessments if the metabolic modeling and dosimetry methods are consistent with NRC regulations (e.g., use of 10 cm² averaging area for skin dose assessments and tissue or organ weighting factors as defined in 10 CFR Part 20.1003).

RAMP continues to provide the nuclear energy, radiation protection, and decommissioning community with access to the distribution, development, and use of radiation protection computer codes, including RESRAD, VSP, DandD, MILDOS, and VARSKIN, while ensuring sustainability of code development. In FY 2021, RES and NMSS developed a new UNR—NMSS-2021-003, “Decommissioning and Uranium Recovery Computer Code (RESRAD, VSP, DandD & MILDOS) Maintenance,” (ADAMS Accession No. ML21083A118) for the support, maintenance, and distribution of these via RAMP. Additionally, RES and NMSS developed a new RAR—NMSS-2021-002, “VSP Code Improvements (GPS/GIS and Scoping Subsurface),” (ADAMS Accession No. ML21076A237) for the development of new features in the VSP code to support Global Positioning System/Geographic Information System (GPS/GIS); autonomous vehicle data analysis tools; and subsurface radiological survey design and analysis tools.

Future Focus Research: Drones used in Decommissioning

The staff is conducting future focus research to transform and innovate decommissioning with state-of-the-art processes and practices with use of autonomous systems (i.e., drones) for:

- improving NRC’s capabilities and applications of drones to meet regulatory limits;
- improving foundational knowledge of the usage of drones in site radiological characterization, surveys, and remediation;
- improving knowledge of scanning systems to update guidance documents;
- gaining efficiencies in the release of large survey areas for unrestricted use; and
- including drone processes in computer codes and tools for confirmatory analysis.

The purpose of this research plan is to demonstrate the ability of drones, coupled with radiation detectors, to support radiological decommissioning surveys. The data collection system will test and evaluate a mock decommissioned site to gain an understanding of how drones can be used to survey and release sites from regulatory control. Drone flight tests are being conducted at the PNNL Large Detector Array Facility, where permits are in place to use radiation sources and Federal Aviation Administration-licensed drones. The technical report comparing drone decommissioning survey results to human decommissioning survey results is expected in Spring of 2022.

Additional Research and Guidance Document Support.

The RES staff continues to work on a research program that was created to study the effects of changes in properties of in-service engineered earthen covers over uranium mill tailings as these covers age. The purpose of this study is to evaluate the impact of aging of the covers (they have a design life of up to 1000 years, consistent with 10 CFR Part 40, Appendix A) on the hydraulic conductivity and gaseous diffusivity of radon barriers, how these properties and soil structure varies with depth and thickness of the radon barrier, and how structure influences transmission of radon and seepage carrying groundwater contaminants. This research is a collaborative effort between the DOE Legacy Management and the NRC. Radon-222 flux measurements were made at the sites and soil samples taken from four mill tailing sites: Falls City in Texas, Bluewater in New Mexico, Shirley Basin South in Wyoming, and Lakeview in Oregon. All were constructed about 20 years ago. Hydraulic conductivity, Soil Water Characteristic Curves, soil texture and chemistry, root counts, and profiles of density, moisture and Pb-210 were determined. The final report, NUREG/CR-7288, is submitted for publication. A paper is in press at the Journal of Environmental Radioactivity titled "Radon Fluxes at Four Uranium Mill Tailings Disposal Sites After About 20 Years of Service".

The DOE Office of Legacy Management is planning to build evapotranspiration (ET) covers over some uranium mill tailings disposal sites and is a likely design for closure of low-level radioactive waste sites. In order to prepare risk-informed, performance-based guidance pertaining to these cover designs, RES has contracted with the U.S. Geological Survey to write a report giving the basis for ET cover design, especially moisture and radon transport within the cover and models that simulate those processes.

The RES staff also continued to provide direct assistance to NMSS efforts through participating in the MARSSIM Interagency Working Group. The Working Group has finished draft revisions to the MARSSIM guidance document. A FRN seeking public comments on the revised document has been released by the EPA. The EPA's Science Advisory Board has reviewed the draft and is preparing comments. At the request of EPA, a contract has been signed by NRC for editorial support for the revised MARSSIM document. An Interagency Agreement has been put in place to support both EPA and NRC funding the contract.

The NRC guidance for characterization and final status surveys of residual radioactive material at surfaces of soils and structures is found in MARSSIM (NUREG-1575) and in NUREG-1757, "NMSS Consolidated Decommissioning Guidance". This guidance is only for contaminants in surficial materials (e.g., the top 15 cm of soils) and is not appropriate for use on subsurface soils (below 15 cm). However, an increasing number of complex decommissioning sites are expected to become active soon, and they can be expected to contain areas of RESRAD in subsurface soils. RES has contracted with experts to provide a report that details approaches that can be taken to provide high-quality surveys of the subsurface (i.e., a survey consistent with the requirements of 10 CFR Subpart F). One key question is what physical and then statistical approach(es) should be used to evaluate the distribution of contaminants in the subsurface and the methods that could be applied to determine the number and spacing of samples for characterization and the final status surveys. A virtual public workshop was held on July 14 - 15, 2021, to gather information and opinions of various stakeholders on approaches to these surveys. Over 195 people registered to attend this workshop with approximately 67 from state agencies, 48 from industry and commercial companies, 36 from non-NRC federal organizations, 33 NRC staff, 8 from the general public, and 3 from international organizations. The RES staff intends to publish a Research Information Letter report that summarizes this event. Workshop materials are available at ADAMS Accession No. ML21208A206.

Collaboration and Outreach.

The RES staff supports international activities through participation in the Information System on Occupational Exposure management board via the North American Technical Center that oversees the Working Group on Radiological Aspects of Decommissioning Activities in Nuclear Power Plants. This working group's objective is to provide a forum for experts to develop a process to better share operational radiation protection data and experience for nuclear power plants in some stage of decommissioning, or in preparation for decommissioning.

The fifth Domestic RAMP Virtual Users Group Meeting was hosted by the NRC on October 26 – 30 and November 4 – 6, 2020. The NRC welcomed the largest number of RAMP meeting attendees thus far with over 220 registered participants, instructors, and support staff. Numerous international regulators and organizations were represented including Australia, Canada, Ghana, South Africa, South Korea, Spain, United Arab Emirates, United Kingdom, Singapore, Ukraine, and Taiwan. The meeting featured training sessions and discussions for RASCAL⁵, NRC Dose3, RADTRAD⁶, IMBA⁷, RESRAD⁸, NRC-RADTRAN⁹, GENII¹⁰, Radiological Toolbox, Turbo FRMAC¹¹, and the Atmospheric Codes (PAVAN¹² & ARCON¹³).

The fifth International RAMP Virtual Users Group Meeting was virtually held on April 12 – 16, 2021. The meeting was co-hosted by the NRC, the State Nuclear Regulatory Inspectorate of the Ukraine, and the Ukrainian State Scientific and Technical Center for Nuclear and Radiation Safety. The RAMP team welcomed over 160 registered participants, instructors, and support staff. Numerous international regulators and organizations were represented including Ukraine, Cyprus, Italy, South Africa, South Korea, Spain, Taiwan, Ukraine, Australia, Nigeria, United Arab Emirates, and Poland. This was the first RAMP Users meeting that focused on environmental remediation and decommissioning topics. The meeting featured training sessions and discussions on the environmental remediation computer codes (MILDOS and GENII) and the decommissioning computer codes (VSP, DandD, and RESRAD-RDD¹⁴). The meeting also featured two technical symposia: "Regulatory Framework for Decommissioning and Environmental Remediation" and "Transport of Radionuclides in the Environment."

⁵ Radiological Assessment System for Consequence AnaLysis computer code

⁶ RADionuclide Transport, Removal, And Dose estimation computer code

⁷ Integrated Modules for Bioassay Analysis computer code

⁸ RESidual RADioactivity computer code

⁹ NRC RADioactive material TRANsport computer code

¹⁰ Second-generation environmental dosimetry computer code

¹¹ Turbo Federal Radiological Monitoring and Assessment Center computer code

¹² Ground-level X/Q for accidental release computer code

¹³ Atmospheric Relative CONcentrations in building wakes computer code

¹⁴ RESidual RADioactivity – Radiological Dispersal Device computer code

5. INTERNATIONAL ACTIVITIES

The NRC participates in multiple international activities to fulfill U.S. commitments to international conventions, treaties, and bilateral/multilateral agreements. The 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 Organization for Economic Co-operation and Development's Nuclear Energy Agency (NEA), as well as foreign governments. The NRC participates in bilateral and trilateral exchanges with other countries in coordination with the U.S. Department of State and other Federal and State agencies. This is accomplished by hosting foreign assignees and participating in reciprocal assignments, developing, and providing workshops to requesting countries, and providing technical support as needed. The NRC is generally recognized in the international nuclear community as an experienced leader in the regulation and safety of decommissioning, spent fuel management and storage, radioactive waste management and disposal, site remediation, and environmental protection. Interaction with international organizations and governments allows the NRC to share insights about lessons learned and successful, safe, and effective decommissioning approaches. This interaction also allows the NRC staff to provide input for various international guidance documents and standards that benefit the U.S. and other countries in establishing and implementing safe decommissioning strategies. In addition, the staff gains insight into approaches and methodologies, lessons learned, and new technologies used in the international community, and considers these approaches as it continues to risk-inform the NRC Decommissioning Program and gain further insights into the decommissioning process.

In 2021, the NRC staff participated in the review and development of IAEA Safety Standards; participated in multinational projects, conferences, peer reviews, and workshops related to decommissioning and waste disposal; and advised on the development of other countries' regulatory programs for decommissioning. For example, the staff: (1) conducted reviews and updates of IAEA standards related to decommissioning and low-level waste during the Waste Safety Standards Committee 50th and 51st review cycle; (2) participated in the annual meetings of the NEA's Regulators Forum, Committee on Decommissioning and Legacy Management and Radioactive Waste Committee; and (3) participated in development of safety publications relative to uranium production facilities including their operation and decommissioning as well as the decommissioning of small facilities. Additionally, the NRC hosted several technical meetings with international regulatory counterparts and support organizations, as well as supported international workshops hosted by other U.S. Federal agencies and provided opportunities for staff from international regulatory agencies to observe inspections at facilities undergoing decommissioning.

The NRC staff also participated in numerous activities to support the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (Joint Convention). The Joint Convention establishes a peer review process among Contracting Parties and is the only international legally binding instrument to address the safety of spent fuel and radioactive waste management. U.S. participation in the Joint Convention helps demonstrate the importance of having a high level of safety in spent fuel and radioactive waste management, including decommissioning activities. The peer review process culminates in a

triennial Review Meeting of the Contracting Parties. For the current Joint Convention cycle, the Review Meeting originally scheduled for May 2021 was postponed due to impacts from the COVID-19 pandemic and will be held from June 27 – July 8, 2022. The NRC staff remains engaged with partner Federal agencies including the DOE (lead agency for the Joint Convention), the Department of State, and the EPA to conduct peer reviews of other Contracting Parties, answer questions regarding the U.S. spent fuel and radioactive waste management programs, and complete other preparations for the 2022 Review Meeting.

6. PROGRAM INTEGRATION AND IMPROVEMENT

Given the scope of the decommissioning functional area, the Decommissioning Program has undertaken many initiatives to improve its efficiency and effectiveness.

Power Reactor Decommissioning Program Improvements

The Decommissioning Program has historically sought 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, the NMSS staff conducted a program evaluation of its power reactor decommissioning regulatory function. The 2014 Power Reactor Decommissioning Program evaluation (ADAMS Accession No. ML20247J607) was an outgrowth of the NRC staff's Integrated Decommissioning Improvement Plan efforts and part of its initiative to foster continuous improvement to the decommissioning program. 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

During FY 2020, with the COVID-19 pandemic travel restrictions, NMSS staff and regional inspectors continued to risk-inform the IMC 2561 core reactor decommissioning inspection procedures. Staff consolidated three procedures and deleted two and updated the Decommissioning Fire Protection inspection procedure to be consistent with the latest revision of Regulatory Guide 1.91, "Fire Protection Program for Nuclear Power Plants During Decommissioning and Permanent Shutdown." In January 2021, staff completed risk-informing IMC 2561 and the core inspection procedures and held two training sessions for decommissioning inspectors.

In response to an U.S. Government Accountability Office's recommendation, staff is implementing a formal communication with licensees after NMSS financial analysts complete their review of licensee's annual decommissioning trust fund reports.

Materials and Uranium Recovery Decommissioning Program Improvements

The NRC staff has continued with the implementation of an enhanced Comprehensive Decommissioning Program, which allows the staff to compile, in a centralized location, information on the decommissioning status of complex sites and uranium recovery sites in the U.S.

In FY 2021, the NRC staff continued to risk-inform IMC 2801 for uranium recovery and 11e.(2) byproduct materials facilities and IMC 2602 for fuel cycle and materials decommissioning. A revised IMC 2801 and its implementing inspection procedures was issued in the summer 2021. Region IV is leading the IMC 2602 working group to include Agreement State, Headquarter, and other regional representation to further risk-inform the inspections of fuel cycle and materials sites undergoing decommissioning.

Evaluation of Materials and Waste Business Lines

During FY 2021, the NRC staff continued to implement several recommendations from the evaluation of the Materials and Waste Business Lines to improve effectiveness of licensing and oversight. Examples of these improvements include adjustments to the uranium recovery inspection program through the extension of inspection intervals, revisions to inspection procedures for decommissioning power reactors, continuing its updated process for completing financial surety reviews for uranium recovery licenses and streamlining its review processes for new uranium recovery application reviews. For example, the staff used risk insights from existing NRC guidance and first-hand experience to focus uranium recovery facility inspection activities on risk significant activities such as spill response, radiological emergencies, yellowcake dryer operations and accidents, and groundwater contamination. These revisions also enhance the oversight program by adding more performance-based concepts to the inspection guidance and providing more direction to inspectors on where to focus their time.

Terminated License Review Project

In 1989, the U.S. Government Accounting Office (GAO) report GAO/RCED-89-119, "NRC's Decommissioning Procedures Need to Be Strengthened," raised concerns about the NRC's criteria and procedures used for the decommissioning of formerly licensed sites. In 1990, the NRC committed to undertake a review of terminated materials licenses and contracted with the Oak Ridge National Laboratory (ORNL) to review all materials licenses terminated by the NRC or its predecessors to identify sites with potential for meaningful residual contamination and identify sealed sources with incomplete or no accounting that could pose a threat to public health. As part of this effort, ORNL examined in excess of 37,000 terminated license files over several years. From its evaluation of these files, ORNL identified approximately 675 loose materials licenses and 565 sealed source licenses that required further review. The NRC Regional offices either performed a follow-up review or transferred responsibility for the follow-up review to the appropriate Agreement States. Documentation for each license was added to the Terminated License Tracking System maintained by ORNL for reference. As a result of the follow-up review by NRC Regional inspectors, 40 sites were found to have residual contamination in excess of the NRC's criteria for unrestricted release. Many of these sites were added to the SDMP list for tracking, and others were later tracked within the Comprehensive Decommissioning Program as formerly licensed sites. Decommissioning activities at the majority of these sites were completed in the 1990s or 2000s. As new State agreements were authorized, any of these formerly licensed sites still under remediation were transferred to the State, as appropriate. As of 2010, there were only three formerly licensed sites remaining in NRC's inventory: the NWI/Breckenridge site in Michigan; the AAR site in Michigan; and the UNC site in Connecticut. The NRC staff completed action at the NWI/Breckenridge site in 2012 and the AAR site in 2015. In February 2021, decommissioning activities were completed at the UNC site in Connecticut, the last formerly licensed non-Agreement State site in the project, and the site was released for unrestricted use.

In FY 2022, NRC will request a status of sites that were subsequently transferred to the Agreement States. The information will be used to populate a database on NRC's public website providing information on the Terminated License Review Project sites for both public transparency and knowledge management.

7. AGREEMENT STATE ACTIVITIES

In addition to the sites undergoing decommissioning that are regulated by the NRC, many complex materials sites are being decommissioned under the regulatory oversight of Agreement States. Thirty-nine States have signed formal agreements with the NRC and assumed regulatory responsibility over certain byproduct, source, or small quantities of special nuclear material, including the decommissioning of some complex materials sites.

Formal interactions with Agreement States in FY 2021 included the following:

- In September 2021, the NRC staff held a virtual workshop on the development and review of CRRs and SA-900 “Termination of Uranium Milling Licenses in Agreement States.” There was open discussion between the NRC and the States of Colorado, Utah, Washington, Wyoming, and Texas and the DOE Legacy Management on the process for the review of CRRs and the uranium recovery site license termination process. In addition, the staff discussed revisions to SA-900.
- The staff worked with the Agreement States to revise the information on the NRC’s public website about complex materials decommissioning sites that are under the regulatory purview of the Agreement States. Rather than detailed site summaries, a list of decommissioning sites and a site contact in each Agreement State is used so that an interested individual can obtain current, up-to-date information from the Agreement State on a site. The site list is available at <https://www.nrc.gov/info-finder/decommissioning/complex/index.html> and below in Table 7.1-a.
- The staff provides information about decommissioning uranium recovery sites in Agreement States using available public information. Site summaries can be found at <https://www.nrc.gov/info-finder/decommissioning/uranium/index.html>. A list of the sites with a site contact in each Agreement state can be found below in table 7.1-b
- In FY 2021, an Integrated Materials Performance Evaluation Program of the NRC’s Materials Program included a review of the Decommissioning Program. The Decommissioning Program was found to be adequate to protect public health and safety.

Table 7.1-a Agreement State Complex Decommissioning Sites

State	Site Name	Contact	Contact Information
Alabama	Greenfield Environmental Multistate Trust, LLC	Myron Riley	Myron.Riley@adph.state.al.us
Alabama	Kennametal, Inc	Undria McCallum	Undria.Mccallum@adph.state.al.us
Alabama	OSP, LLC	Undria McCallum	Undria.Mccallum@adph.state.al.us
California	Chevron Environmental Management Company	Thomas Moore	Thomas.Moore@cdph.ca.gov
California	MP Mine Operations, LLC	Thomas Moore	Thomas.Moore@cdph.ca.gov
Florida	Iluka Resources Inc.	Kevin Kunder	Kevin.Kunder@flhealth.gov
Illinois	City of Chicago	Kelly Horn	Kelly.Horn@illinois.gov
Illinois	Weston Solutions	Kelly Horn	Kelly.Horn@illinois.gov
Kansas	Beta Chem	Kim Steves	Kim.Steves@ks.gov
Kansas	Raytheon Aircraft Corporation	Kim Steves	Kim.Steves@ks.gov
Kentucky	Clariant	Allyson Stout	Allyson.Stout@ky.gov
Kentucky	Transport Logistics International	Allyson Stout	Allyson.Stout@ky.gov
New Jersey	Shieldalloy Metallurgical Corp.	James McCullough	James.McCullough@dep.nj.gov
New Mexico	Thermo Eberline, LLC	Michael Ortiz	Michael.Ortiz1@state.nm.us
Ohio	Advanced Medical Systems, Inc.	Michael J Rubadue	Michael.Rubadue@odh.ohio.gov
Ohio	Ineos Nitriles USA, LLC	Michael J Rubadue	Michael.Rubadue@odh.ohio.gov
Oklahoma	Haliburton – Osage Road	Michael Reid	Michael.Reid@deq.ok.gov
Pennsylvania	Global Tungsten & Powders Corporation	Bryan Werner	brwerner@pa.gov
Pennsylvania	Westinghouse Electric Company LLC	Bryan Werner	brwerner@pa.gov
Pennsylvania	Whittaker Corporation	Bryan Werner	brwerner@pa.gov
Pennsylvania	Global Advanced Metals USA, Inc	Bryan Werner	brwerner@pa.gov
Pennsylvania	Safety Light Corporation	Bryan Werner	brwerner@pa.gov
Pennsylvania	Remacor	Bryan Werner	brwerner@pa.gov
Pennsylvania	Keystone Metals Reduction	Bryan Werner	brwerner@pa.gov
Pennsylvania	Shallow Land Disposal Area	Bryan Werner	brwerner@pa.gov
Pennsylvania	Superior Steel	Bryan Werner	brwerner@pa.gov
South Carolina	Starmet	Gary Stewart	803-898-0778
Texas	Solvay USA Inc	Gehan Flanders	Gehan.Flanders@tceq.texas.gov
Texas	Kensington Title Service (KTS), Site Owner; formerly U.S. Radiopharmaceuticals (USR), formerly Trace Life Sciences	Gehan Flanders	Gehan.Flanders@tceq.texas.gov
Texas	Thomas Maloney	Gehan Flanders	Gehan.Flanders@tceq.texas.gov
Texas	Pearland-Manvel Landfill	Gehan Flanders	Gehan.Flanders@tceq.texas.gov
Texas	Ascend Performance Materials Texas Inc. (formerly Solutia)	Gehan Flanders	Gehan.Flanders@tceq.texas.gov

Table 7.1-b Agreement State Uranium Recovery Sites

State	Site Name	Contact	Contact Information
Colorado	Former Cotter Mill	Shiya Wang	Shiya.wang@state.co.us
Colorado	Uravan	Shiya Wang	Shiya.wang@state.co.us
Colorado	Durita	Shiya Wang	Shiya.wang@state.co.us
Texas	ExxonMobil Corporation	Gehan Flanders	Gehan.Flanders@tceq.texas.gov
Texas	ConocoPhillips Company	Gehan Flanders	Gehan.Flanders@tceq.texas.gov
Texas	Rio Grande Resources Corporation	Gehan Flanders	Gehan.Flanders@tceq.texas.gov
Texas	Intercontinental Energy Corporation	Gehan Flanders	Gehan.Flanders@tceq.texas.gov
Utah	White Mesa Uranium Mill	Phil Goble	pgoble@utah.gov
Utah	Shootaring Canyon Uranium Mill	Phil Goble	pgoble@utah.gov
Utah	Former Lisbon Valley Uranium Mill	Phil Goble	pgoble@utah.gov
Washington	Dawn Mining Company	Bryony Stastny	bryony.stasney@doh.wa.gov
Wyoming	Anadarko Bear Creek	Omar Nusair	307-777-7057
Wyoming	UMETCO Gas Hills	Brandi O'Brien	307-777-6435
Wyoming	Orano/Areva Lucky Mc	Brandi O'Brien	307-777-6435
Wyoming	ExxonMobil Highland	David Adams	307-777-7757
Wyoming	Western Nuclear Inc	David Adams	307-777-7757
Wyoming	Uranium One Willow (Irigaray)	Reid Brown	307-777-7176
Wyoming	Uranium One (Christiansen Ranch)	Reid Brown	307-777-7176

8. FISCAL YEAR 2022 PLANNED PROGRAMMATIC ACTIVITIES

The Power Reactor Decommissioning Program evaluation resulted in a set of recommendations, including the recommendation to review all guidance and policy documents within the program to identify guidance documents in need of updating as well as other potential improvements. Subsequently, the NMSS management reviewed the tasks identified as part of this program evaluation to promote programmatic enhancement and set task priorities. Throughout FY 2022, the staff will continue to work on these programmatic enhancement tasks and evaluate their applicability to the materials decommissioning program. The staff will also continue its multi-year effort to update decommissioning guidance documents including Volumes 1 and 2 of the Consolidated Decommissioning Guidance, NUREG-1757.

To address recommendations in the U.S. GAO's February 28, 2020, report, "Fee-Setting, Billing, and Budgeting Processes Have Improved, but Additional Actions Could Enhance Efforts" (GAO-20-362, <https://www.gao.gov/assets/gao-20-362.pdf>), in FY 2021, DUWP staff began implementation of a formal communication to licensee's upon completion of annual decommissioning trust fund reports reviews by NRC financial analysts.