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Spent Nuclear Fuel and Reprocessing Waste Inventory

Spent Fuel and Waste Disposition

Prepared for

U.S. Department of Energy

Spent Fuel and Waste Disposition

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SUMMARY

This report provides information on the inventory of commercial spent fuel (SNF) and high-level radioactive waste in the United States, as well as non-commercial SNF and reprocessing waste in the U.S. Department of Energy (DOE) complex. Actual or estimated quantitative values for current inventories are provided along with inventory forecasts derived from examining different future commercial nuclear power generation scenarios. The report also includes select information on the characteristics associated with the wastes examined (e.g., type, packaging, heat generation rate, decay curves).

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ACRONYMS

ATR	Advanced Test Reactor
BFC	Bare Fuel Cask
BWR	Boiling Water Reactor
DOE	Department of Energy
EIA	Energy Information Administration
GTCC	Greater-than-Class-C (category of radioactive waste)
GWd/MT	Gigawatt-days per Metric Ton (of Initial Uranium)
GWSB	Glass Waste Storage Building
HIP	Hot Isostatic Pressing
HLW	High-Level Radioactive Waste
INL	Idaho National Laboratory
ISF	Interim Storage Facility
ISFSI	Independent Spent Fuel Storage Installation
LLRW	Low-Level Radioactive Waste
LWR	Light Water Reactor
MCO	Multi-Canister Overpack
MT	Metric Tons
MTHM	Metric Tons Initial Heavy Metal (typically equivalent to MTU)
MTU	Metric Tons Initial Uranium
NIST	National Institute of Standards and Technology
NNPP	Naval Nuclear Propulsion Program
NPR	nuclear power reactor
NRC	Nuclear Regulatory Commission
NSNFP	National Spent Nuclear Fuel Program
OCRWM	Office of Civilian Radioactive Waste Management
ORNL	Oak Ridge National Laboratory
PWR	Pressurized Water Reactor
R&D	Research and Development
SFD	Spent Fuel Database
SFWD	DOE's Office of Spent Fuel and Waste Disposition
SNF	Spent Nuclear Fuel
SRNL	Savannah River National Laboratory
SRS	Savannah River Site

TREAT	Transient Reactor Test Facility
TMI	Three Mile Island
TRU	Transuranic
UFDC	Used Fuel Disposition Campaign
WEST	Waste Encapsulation and Storage Facility
WTP	Waste Treatment Project

SPENT NUCLEAR FUEL AND REPROCESSING WASTE INVENTORY

1. INTRODUCTION

This report[a] provides information on the inventory of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW) in the United States, as well as non-commercial SNF and reprocessing waste in the U.S. Department of Energy (DOE) complex[b]. Inventory forecasts for commercial SNF were made for a few selected scenarios of future commercial nuclear power generation involving the existing reactor fleet, as well as reactors under construction for one case. This introductory section (Section 1) provides an overview of the commercial SNF inventory and a short description of the types of waste in DOE's inventory. Section 2 presents more detailed information on the commercial SNF and HLW including the inventory forecast information. A more in-depth discussion on the non-commercial SNF and reprocessing waste is provided in Section 3. Additional and supporting information is contained in the appendices, namely information on commercial SNF characteristics; SNF discharges by reactor; and inventory forecast breakouts by reactor, storage location, site, state, U.S. Nuclear Regulatory Commission (NRC) region, and Congressional Districts. This report was sponsored by DOE's Office of Spent Fuel and Waste Disposition (SFWD) within the Office of Nuclear Energy and has been generated for SFWD planning and analysis purposes.

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[a] This is a technical report that does not take into account contractual limitations or obligations under the Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste (Standard Contract) (10 CFR Part 961). For example, under the provisions of the Standard Contract, spent nuclear fuel in multi-assembly canisters is not an acceptable waste form, absent a mutually agreed to contract amendment.

To the extent discussions or recommendations in this report conflict with the provisions of the Standard Contract, the Standard Contract governs the obligations of the parties, and this report in no manner supersedes, overrides, or amends the Standard Contract.

This report reflects technical work which could support future decision making by DOE. No inferences should be drawn from this report regarding future actions by DOE, which are limited both by the terms of the Standard Contract and Congressional appropriations for the Department to fulfill its obligations under the Nuclear Waste Policy Act including licensing and construction of a spent nuclear fuel repository.

[b] This report does not necessarily reflect official classifications for the material being discussed; for example, material referred to as "HLW" or "SNF" may be managed as HLW and SNF, respectively, without having been actually classified as such.

1.1 Inventory Summary

The U.S Inventory of SNF and reprocessing waste is located at 113 sites in 39 states. Figure 1-1 provides the approximate locations for: 96 operating commercial power generating reactors (see Table 2-1), 23 shutdown commercial power generating reactors (See Table 2-1), 1 away from reactor commercial SNF storage facility (see Table 2-3), 31 non-DOE research reactors (see Section 4.0, SNF from these reactors is transferred to DOE and is included in the non-commercial SNF in Section 3.0), 1 commercial HLW storage location (see Section 2.2) and 6 DOE sites with SNF and/or reprocessing waste (see Section 3.0).

The total U.S. SNF inventory is approximately 86,750 metric tons of heavy metal (MTHM) at the end of 2019 and, as indicated by Table 1-1, is comprised of about 84,445 MTHM of commercial SNF and about 2,305 MTHM of non-commercial SNF. The total number of vitrified reprocessing waste canisters at the end of 2019 is 4,488, with DOE vitrified waste canisters constituting the vast majority (4,210) and with commercial vitrified reprocessing waste canisters comprising a much smaller portion (278).

Table 1-1 U.S. SNF and Reprocessing Waste Inventory Summary for 2019

Category	Spent Nuclear Fuel (MTHM) [a]	Vitrified Reprocessing Waste (canisters) [b]
Commercial	84,445 [c]	278 [d]
Non-commercial	2,305 [e]	4,210
Total	86,750 [f]	4,488

[a] Values are rounded to the nearest 5 MTHM.

[b] Accounts only for the current inventory of vitrified reprocessing waste canisters produced through December 31, 2019. Reprocessing waste which has yet to be treated is not included. All canisters produced thus far are 2 feet in diameter × 10 feet tall.

[c] Commercial SNF inventories in this report include: SNF estimated to be discharged through December 31, 2019 from commercial light water reactors listed in Table 2-1 regardless of current SNF storage location; Three Mile Island Unit 2 fuel debris (approximately 82 MTHM); and SNF discharged from the decommissioned Ft. St. Vrain gas-cooled reactor (approximately 24 MTHM). SNF inventories from other reactors, including some early power reactor demonstration program reactors are accounted for in the “Non-commercial SNF” category for the purposes of this report.

[d] West Valley vitrified reprocessing waste canisters, including 2 canisters used to evacuate the melter prior to decommissioning and 1 non-routine (end-of-process) canister.

[e] Includes SNF from research and production activities and Naval SNF.

[f] SNF at sites of research reactors or reactors primarily used for radiography, testing, training, isotope production, or other non-power generation commercial services are not included; neither are small quantities of SNF used for R&D purposes.

Some commercial fuel was reprocessed at an aqueous reprocessing facility at West Valley, New York (See Section 2.2).

Since the inception of nuclear reactors, the DOE and its predecessor agencies operated reactors to produce defense nuclear materials. Some of this SNF remains in storage while most underwent aqueous reprocessing at the Hanford Site, the Idaho National Laboratory (INL), and the Savannah River Site (SRS). The waste from reprocessing is being (or is planned to be) treated prior to disposal. See Section 3.3.

DOE also operated or sponsored a variety of early electric-power generating reactors (see section 2.0) for research, test, and training, as well as other experimental reactors for their own use (see section 3.1) or university programs (see section 4.0). The SNF from these reactors is managed by DOE. The INL is using electro-chemical processing to treat up to 60 MTHM of sodium bonded SNF from one of these electrical-power generating demonstration reactors.

The Naval Nuclear Propulsion Program (NNPP) has generated SNF from operation of nuclear-powered submarines and surface ships, operation of land-based prototype reactor plants, operation of moored training ship reactor plants, early development of commercial nuclear power, and irradiation test programs (see Section 3.2).

1.2 Revision History

This document is expected to be a “living” document with expanded additional information and scenarios to develop a broad range of potential inventory for project planning purposes. A description of the revision history for this report is provided in Appendix G.

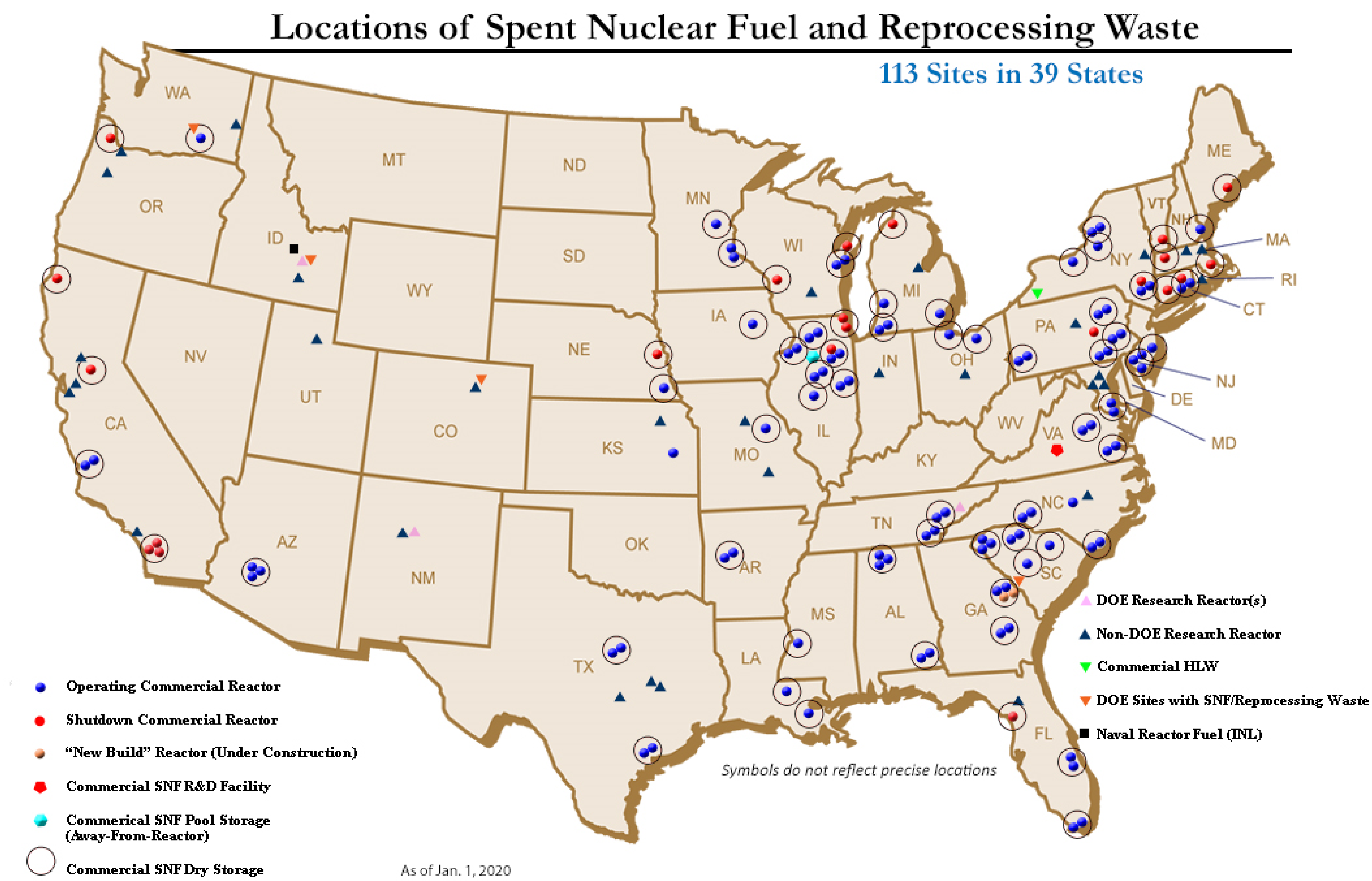


Figure 1-1. Sites Currently Storing Spent Nuclear Fuel and Reprocessing Waste

2. COMMERCIAL SNF AND HLW INVENTORY

Commercial Nuclear Power Reactors (NPRs) have operated in the U.S. since about 1960. Excluding a number of civilian reactors categorized as experimental electric-power reactors (e.g. Vallecitos Boiling Water Reactor, Saxton Nuclear Experimental Reactor Project) or primarily used for purposes other than central-station nuclear power generation (e.g., N.S. Savannah), 131 commercial NPRs have been built for civilian nuclear power generation. Nine of these were early prototype or demonstration reactors which have since been or are in a state of being decommissioned (e.g., Peach Bottom 1 and Shippingport in Pennsylvania and Fermi 1 in Illinois) and for which SNF no longer remains on site (discussed in Section 3). Another was the high temperature gas cooled Fort St. Vrain demonstration reactor in Colorado which was also decommissioned, however SNF discharged from this reactor is currently managed by DOE and stored partly in an Independent Spent Fuel Storage Installation (ISFSI) near the reactor site and partly at the Idaho National Laboratory (INL). Of the remaining 121 NPRs all are light water reactors (LWRS). One LWR (Shoreham in New York) never operated at full power and was decommissioned, the fuel was transferred to another reactor and discharged there. A second (Three Mile Island Unit 2, in Pennsylvania) was disabled, and the vast majority of the fuel debris is managed by the DOE at INL. Another 23 reactors have since shutdown, currently leaving 96 LWRs licensed to operate at the end of 2019.

A simple site grouping structure has been adopted and is used throughout the report. The grouping structure is provided below to provide clarity by discriminating between nuclear power generating sites at which all reactor units are operating and those sites that contain one or more shutdown units.

Commercial Nuclear Power Generation Sites**:**

Group A: sites with all reactors permanently shutdown (**A**ll units shutdown).

Group B: sites with at least one reactor permanently shutdown co-located with at least one reactor continuing to operate (status is **B**etween Group A and Group C sites)

Group C: sites with all reactors operating or expected to resume operation, i.e., none permanently shutdown (**C**ontinuing operations with all reactors)

Other Sites:

Group F: Non-reactor commercial fuel cycle facility sites, e.g., reprocessing, storage, etc. (**F**uel cycle facility)

Within each group, a numeric value of 1 is appended to the site group identifier for a site with only dry fuel storage. A value of 2 is used to identify a site with both wet and dry storage, and a value of 3 is appended to sites with fuel in wet storage only. For example, Yankee Rowe is included in Site Group A and Subgroup A1, since the entire inventory of shutdown reactor SNF is currently in dry storage. Seabrook and Surry are included in Site Group C and Subgroup C2, with both wet and dry stored fuel.

Table 2-1 provides a list of LWR power plants by their assigned Groups/Subgroups. Ninety operating reactors are at Group C sites and six are at Group B sites. Six of the Group C reactors (Duane Arnold in Iowa, Indian Point 2 and 3 in New York, Palisades in Michigan and Diablo Canyon 1 and 2 in California) have utility-announced early shutdown dates before the end of 2025.

Of the 23 shutdown reactors with fuel remaining onsite, 20 are reactors at 17 sites with no continuing nuclear operations (Group A sites). This includes SNF from 10 reactors on 9 sites that ceased operations prior to 2000 and where all SNF is in dry storage and reactor decommissioning is complete or nearing completion. This subgroup is sometimes referred to as "legacy" shutdown reactor sites, since these sites have not had an operating reactor on the site for at least 20 years. Group A also includes SNF from 10 reactors on 8 sites that ceased operations after 2000. This subgroup is sometimes referred to "Early Shutdown Reactors" since operations were halted prior to achieving 60 years of operations. Three of these early shutdown reactors on 3 sites have recently completed moving the SNF into dry storage, bringing the total number of subgroup A1 reactors to 13 reactors on 12 sites. Six reactors on 4 sites in Group A still have SNF both in the pools and in dry storage and one Group A reactor has not yet implemented dry storage by the end of 2019.

In addition to the 20 shutdown reactors at 17 shutdown sites, SNF from 3 shutdown reactors (i.e., Dresden 1 in Illinois, Millstone 1 in Connecticut, and Indian Point 1 in New York) is stored on sites co-located with operating reactors (Group B). Figure 1-1 illustrates the locations of these shutdown commercial power reactors.

For the 119 LWRs with SNF still located at commercial sites, the SNF is currently stored in pools or dry storage casks with disposal in a geologic repository envisioned in a once-through fuel cycle. Some commercial fuel has been transferred to DOE (see Section 2.1.2). The General Electric-Hitachi facility at Morris, Illinois (the lone Group F Site) is currently the only non-DOE operated, NRC licensed storage facility that is not co-located at a reactor site. Two private companies have license applications under review by the NRC for away-from-reactor dry storage of commercial SNF.

Commercial SNF includes irradiated fuel discharged primarily from pressurized water reactors (PWRs) and boiling water reactors (BWRs). The fuel used in these reactors primarily consists of uranium dioxide pellets encased in zirconium alloy (Zircaloy). A small number of early fuel designs used stainless steel cladding. The fuel assemblies vary in physical configuration, depending upon reactor type and manufacturer.

Commercial SNF assemblies are categorized by physical configuration into 22 classes: 16 PWR and 6 BWR fuel assembly classes. Commercial SNF data has been collected by the Energy Information Administration for the Office of Standard Contract Management within the Office of General Counsel (former Office of Civilian Radioactive Waste Management [OCRWM]). Appendix A, Tables A-1 and A-2 present the assembly class, array size, fuel manufacturer, assembly version, assembly type code, length, width, and cladding material of commercial PWR SNF and commercial BWR SNF, respectively. Physical dimensions are those of unirradiated assemblies. Within an assembly class, assembly types are of a similar size. There are 134 individual fuel assembly types in these classes. Appendix A, Table A-3 presents the manufacturer, initial uranium load, enrichment, and burnup characteristics of commercial SNF assembly types in existence at the end of 2002. Some new fuel types have been introduced since 2002, however, similar information to that presented in Appendix A is not available because non-propriety data sources do not exist.

Table 2-1 LWR Nuclear Power Generation Sites by Group/Subgroup (as of December 2019)

Group A: All Units Shutdown Sites (# of Units) – 20 Reactors/17 Sites			
A1 (Dry Storage)		A2 (Dry and Pool Storage)	A3 (Pool Storage)
Reactors Shutdown Prior to 2000		Fort Calhoun (1)	Three Mile Island (1) ††
Big Rock Point (1)	Rancho Seco (1)	Oyster Creek (1)	
Haddam Neck (1)	Trojan (1)	Pilgrim (1)	
Humboldt Bay (1)	Yankee Rowe (1)	San Onofre (3)	
La Crosse (1)	Zion (2)		
Maine Yankee (1)			
Reactors Shutdown After 2000			
Crystal River (1)	Vermont Yankee (1)		
Kewaunee (1)			

Group B: Mixed Status Sites (# of Units) – Total 9 Reactors (6 Operating, 3 Shutdown) /3 Sites		
Currently All Group B Sites have both Dry and Wet Storage Capabilities	B2* (Dry and Pool Storage)	
	Dresden (3)	
	Indian Point (3)	
	Millstone (3)	

Group C: All Units Operating (# of Units)– 90 Reactors /53 Sites (Note: All Group C Sites have Wet Storage Capabilities)			
C2 (Dry and Pool Storage)			C3 (Pool Storage)
Arkansas Nuclear (2)	Fitzpatrick (1)	Point Beach (2)	Shearon Harris (1)
Beaver Valley (2)	Fermi (1) ††	Prairie Island (2)	Wolf Creek (1)
Braidwood (2)	Ginna (1)	Quad Cities (2)	
Browns Ferry (3)	Grand Gulf (1)	River Bend (1)	
Brunswick (2)	Hatch (2)	Robinson (1)	
Byron (2)	Hope Creek (1) ‡‡	Saint Lucie (2)	
Calvert Cliffs (2)	La Salle (2)	Salem (2) ‡‡	
Callaway (1)	Limerick (2)	Seabrook (1)	
Catawba (2)	McGuire (2)	Sequoyah (2)	
Clinton (1)	Monticello (1)	South Texas (2)	
Columbia Generating Station (1)	Nine Mile Point (2)	Summer (1)	
Comanche Peak (2)	North Anna (2)	Surry (2)	
Cooper (1)	Oconee (3)	Susquehanna (2)	
Davis-Besse (1)	Palisades (1)	Turkey Point (2)	
D.C. Cook (2)	Palo Verde (3)	Vogtle (2)	
Diablo Canyon (2)	Peach Bottom (2) ††	Waterford (1)	
Duane Arnold (1)	Perry (1)	Watts Bar (2)	
Farley (2)			

* Each of the three B2 Sites has a single shutdown reactor and 2 operating reactors.
†† Does not include prototype (Fermi 1), experimental (Peach Bottom-1), or disabled (TMI-2) reactors.
‡‡ Hope Creek and Salem are considered as a single site in this report due to proximity and shared ISFSI.

2.1 Current Commercial SNF Inventory

The source of historical inventory data for this study is information collected by the Energy Information Administration (EIA). Information collected from GC-859 forms is available on an assembly basis for SNF discharges from 1968 through June 2013.

To develop an inventory estimate through 2019 and beyond, fuel discharge projections were developed using the U.S. Commercial Spent Fuel Projection tool [Vinson, 2015]. The methodology used by the tool is documented in "Description and Validation of a Revised Tool for Projecting U.S. Commercial Spent Nuclear Fuel Inventory", March 2015 [Vinson, 2015]. The tool allows for multiple methodologies for handling plant capacity factors, reactor uprates, and other operating inputs. Based on the validation report findings, the methodology utilized in this report makes no adjustment for reactor-specific capacity factors or EIA-forecast nuclear energy demand data. This methodology was found to provide the best agreement to preliminary GC-859 data (<1.4% difference between preliminary GC-859 and projected assembly discharged data between the beginning of 2003 and the end of 2012) [Vinson 2015].

The projection method forecasts each LWR individually and these quantities have been adopted for this study except for shutdown reactors that have published the actual quantities of discharged fuel. Actual discharges from reactors shutdown prior to June 2013 are taken from the GC-859 EIA survey. Data for reactors shutdown after this date are a combination of the historical data and the forecast discharges up to the announced shutdown date.

Table 2-2 provides the estimated SNF discharged at the end of 2019 by reactor type. The total projected inventory is more than 84,340 metric tons (MT) of uranium (MTU) contained in approximately 293,100 discharged assemblies. The table is detailed to provide actual discharges through December 31, 2012 from the GC-859 data set and the projected quantities between 1/1/2013 and 12/31/2019[c].

Table 2-2. Estimated Reactor Discharges by Reactor Type, Detailed by GC-859* and Forecast Quantities

	Fuel Discharged through 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2019		Total Estimated Discharged Fuel through 12/31/2019	
Reactor Type	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**
PWR	103,605	44,894	22,175	9,730	125,780	54,624
BWR	136,533	24,293	30,779	5,424	167,312	29,717
Totals	**240,138**	**69,187**	**52,954**	**15,154**	**293,092**	**84,342**

* Excludes SNF that was reprocessed at West Valley in NY, removed from TMI Unit 2, or discharged from the Fort St. Vrain reactor (now decommissioned).

[c] The actual quantities reported by GC-859 are used for the period 1/1/2013 to 6/30/2013. These amounts are included in the forecast discharges to provide "end of year values" for the tables in this report.

2.1.1 Fuel Transfers

The values reported in Table 2-2 indicate reported and forecast discharge quantities by reactor type and do not reflect subsequent transfer of discharged fuel assemblies. Utilities did not report (via GC-859 forms) fuel that was transferred to West Valley, NY for reprocessing. Prior to 2000, some discharged SNF was transferred to other locations. Five reactors transferred some of their discharged fuel to the pool storage facility at Morris, IL. Table 2-3 details the transfers to Morris which totals 3,217 assemblies and approximately 674 MTU.

The EIA survey process (in RW-859 forms data reported in 2002) indicates approximately 70 MT of the SNF from the reactors listed in Table 2-1 was transferred to DOE for research and development purposes such as fuel rod consolidation and dry storage demonstrations. This fuel has been transferred to the DOE and is not stored in NRC licensed facilities. However, this is not a complete listing of the commercial SNF being managed by DOE. Commercial SNF managed by DOE, such as the TMI-2 fuel debris that is stored in an NRC-licensed ISFSI at INL, is discussed in Section 2.1.2.

Since 2000, essentially all fuel generated has remained on the generating reactor sites in either pool or dry storage. Some utilities did transfer some fuel between its operating reactors (see Table 2-4).

Table 2-3. SNF Transferred to Pool Storage at Morris, Illinois

		Discharges as of Dec 2012		Transferred to Morris	
Reactor [Unit] (Site Subgroup)	**Operating Status**	**Assemblies**	**Initial Uranium (MT)**	**Assemblies**	**Initial Uranium (MT)**
Cooper (C2)	Operating	3,604	657.69	1,054	198.02
Dresden 2 (B2)	Operating	5,001	895.48	753	145.19
Monticello (C2)	Operating	3,148	561.19	1,058	198.19
Haddam Neck (A1)	Shutdown	1,102	448.42	82	34.48
San Onofre 1 (A2)	Shutdown	665	244.61	270	98.41
			Totals	**3,217**	**674.29**

Table 2-4. Nuclear Power Reactor SNF Transfers

Discharge Reactor	Transferred Fuel		Transferred to Reactor Site
	Assemblies	Estimated Initial Uranium (MT)	
Robinson	304	132.2	Brunswick
Robinson	504	219.3	Shearon Harris
Brunswick	4,391	784.4	Shearon Harris
Oconee	300	139.8	McGuire

Table 2-5 provides a summary of estimated SNF inventory, by Site Group and storage method, as of December 31, 2019. Table 2-5 excludes discharges that were reprocessed at West Valley, NY, and transfers to DOE for research and development purposes and therefore represents the quantity of fuel stored at the 119 power reactor sites and the away from reactor pool storage location at Morris, IL.

Table 2-6 provides the end of 2019 inventory remaining at the LWR sites by storage method accounting for all known fuel transfers (this does not include the inventory at Morris). The dry storage assembly and canister/cask quantities as of 12/31/2019 have been derived from publicly available sources [Store Fuel, 2020]. The balance of the projected inventory remains in the reactor pools. Appendix B provides additional details on a reactor specific basis and site group basis. Appendix B reflects known transfers.

Figure 2-1 illustrates the current distribution by site group and storage method, and Figure 2-2 illustrates the current distribution of storage casks by site group.

The estimated burn-up (GWd/MTHM) distribution and the initial enrichment (% U-235) distribution for the current inventory (as extracted from the GC-859 and forecast by the projection tool) are shown in Figures 2-3 and 2-4. Similar to the discharge quantities, the enrichment and burn-up is estimated for individual LWRs based on the last 5 discharge cycles reported in the GC-859 database. Adjustments are made for reactor power uprates where applicable. These estimates are also used to generate Figures 2-5 through 2-7, described below.

Figure 2-5 shows the annual average Burn-up (GWd/MT) and the initial enrichment (% U-235) between 1968 and 2019.

Figure 2-6 provides the Burn-up (GWd/MT) distribution based on assembly counts for the PWR and BWRs.

Figure 2-7 provides the Burn-up (GWd/MT) distribution based on the initial uranium mass (MTU) for the PWR and BWRs.

Table 2-5. Spent Nuclear Fuel Inventory by Reactor Group/Subgroup (Estimate as of 12/31/2019)

Site Group/ Subgroup	Dry Inventory**			Pool Inventory		Site Total	
	Assy.	Initial Uranium (MT)	Number of Casks	Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)
Group A Sites							
A1 Pre 2000	7,660	2,815	248	-	-	7,660	2,815
A1 Post 2000	6,458	1,803	135	-	-	6,458	1,803
A2	6,621	1,951	163	7,181	1,656	13,802	3,608
A3	-	-	-	1,678	791	1,678	791
A	**20,739**	**6,569**	**546**	**8,859**	**2,447**	**29,598**	**9,017**
Group B Sites							
B1	-	-	-	-	-	-	-
B2	8,520	2,217	174	12,412	3,209	20,932	5,425
B3	-	-	-	-	-	-	-
B	**8,520**	**2,217**	**174**	**12,412**	**3,209**	**20,932**	**5,425**
Group C Sites							
C1	-	-	-	-	-	-	-
C2	105,048	30,421	2,438	125,929	36,249	230,977	66,670
C3	-	-	-	8,142	2,486	8,142	2,486
C	**105,048**	**30,421**	**2,438**	**134,071**	**38,735**	**239,119**	**69,156**
Group F Sites							
F	**-**	**-**	**-**	**3,217**	**674**	**3,217**	**674**
Total All Sites	**134,307**	**39,207**	**3,158**	**158,559**	**45,065**	**292,866**	**84,272**

* Discharges exclude commercial SNF reprocessed at West Valley in NY, removed from TMI Unit 2, discharged from the decommissioned Fort St. Vrain reactor, or transferred to DOE for R&D purposes.

** Dry storage cask and assembly quantities at the end of 2019 are as reported in Storefuel Vol 22 No. 257, Jan. 7, 2020.

† Mass values for totals were rounded up to the next MTHM.

Table 2-6. Estimated Current Inventory at LWR sites by Storage Method

	Dry Inventory 12/31/2019			Pool Inventory		Total Projected Discharged Fuel 12/31/2019	
Reactor Type	**Assy.**	**Initial Uranium (MT)**	**Fuel Casks**	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**
PWR	60,830	26,169	2,050	68,550	28,917	129,380	55,086
BWR	73,477	13,038	1,108	86,792	15,474	160,269	28,512
Totals	**134,307**	**39,207**	**3,158**	**155,342**	**44,391**	**289,649**	**83,598**

Appendix B, Tables B-1 – B-5 provide additional details of this estimate on a reactor specific basis.

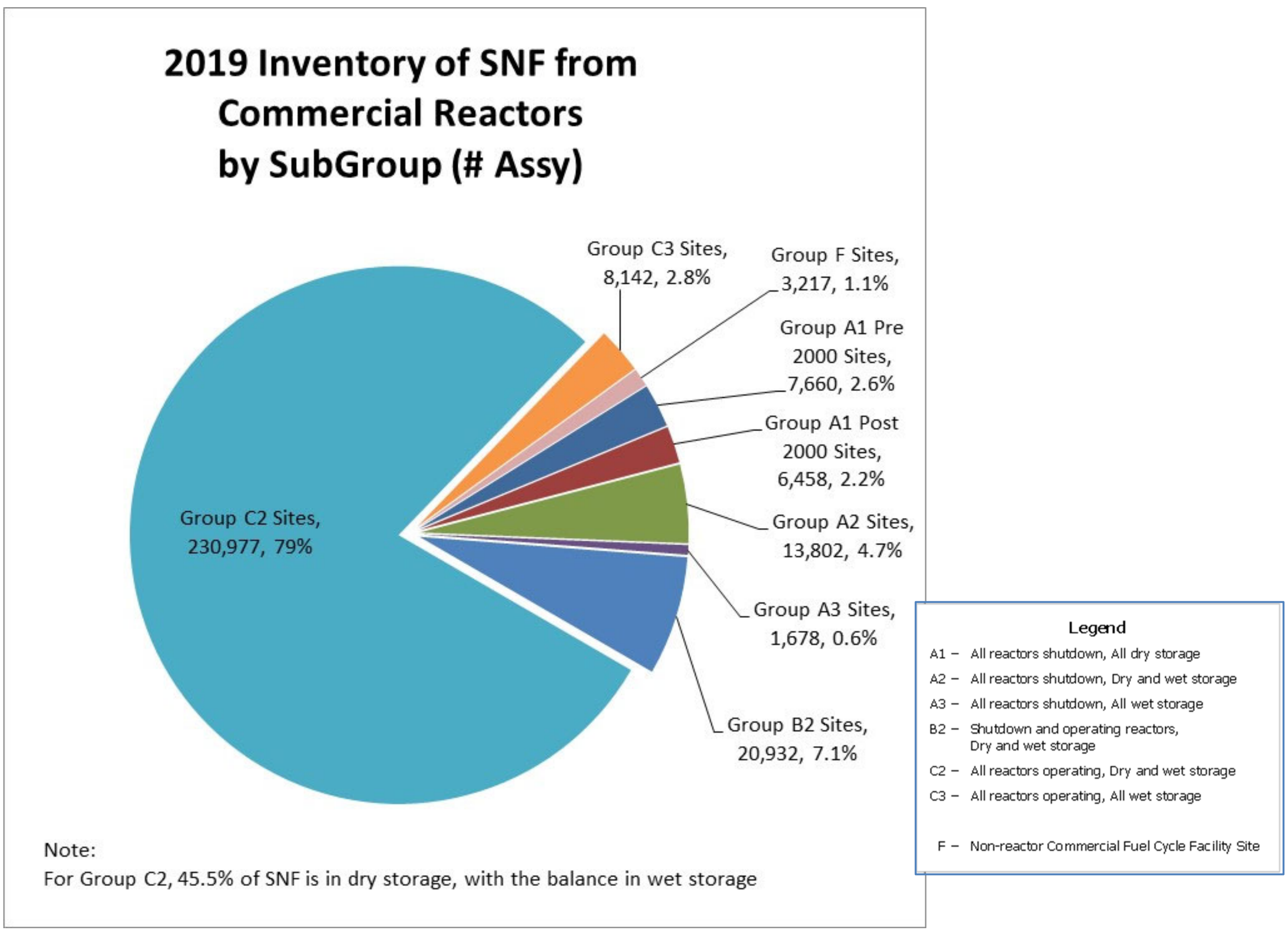


Figure 2-1. Commercial Nuclear Power Reactor Sites Currently Storing Commercial SNF

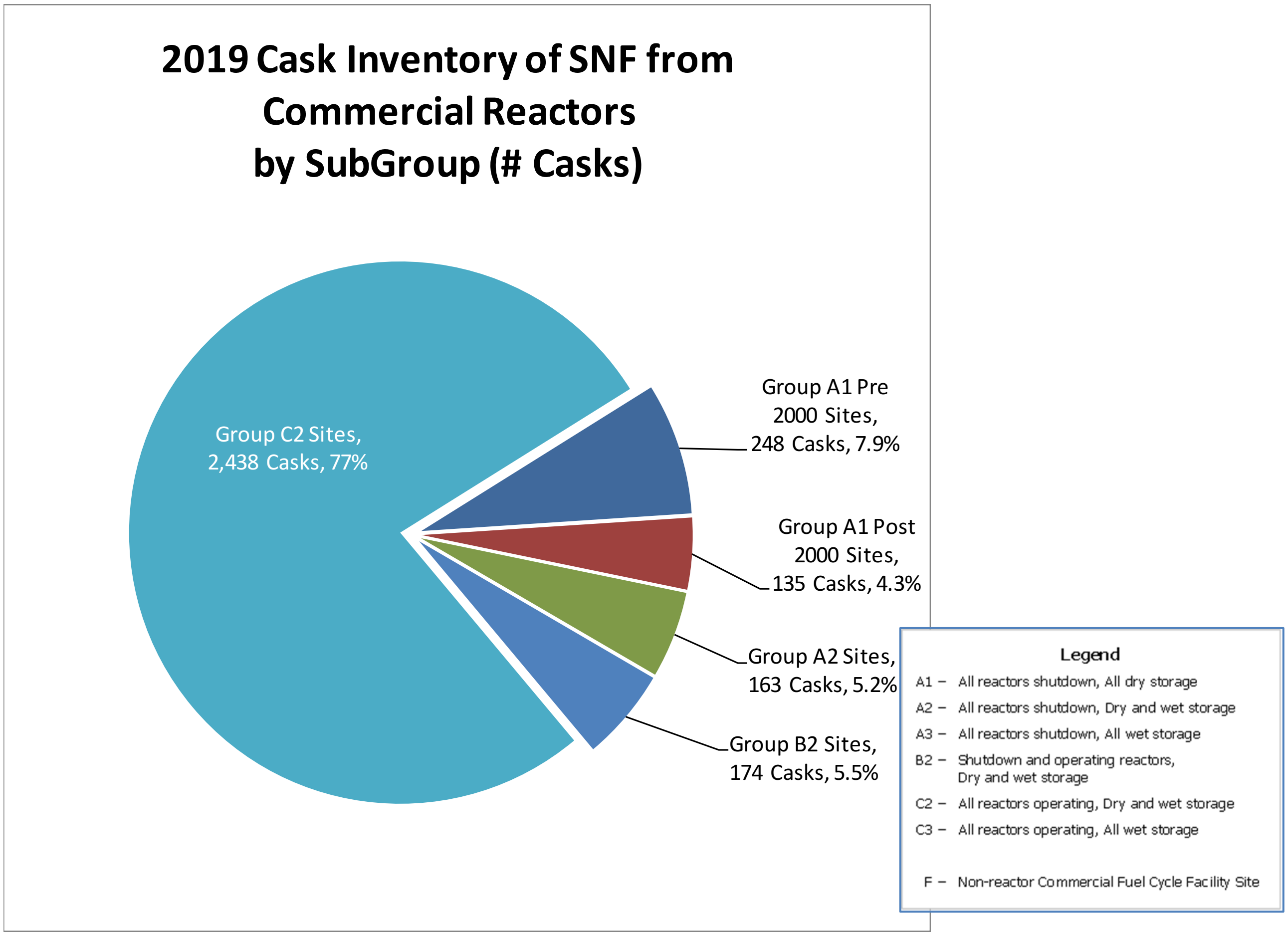


Figure 2-2. Dry SNF Storage at Commercial Nuclear Power Reactor Sites

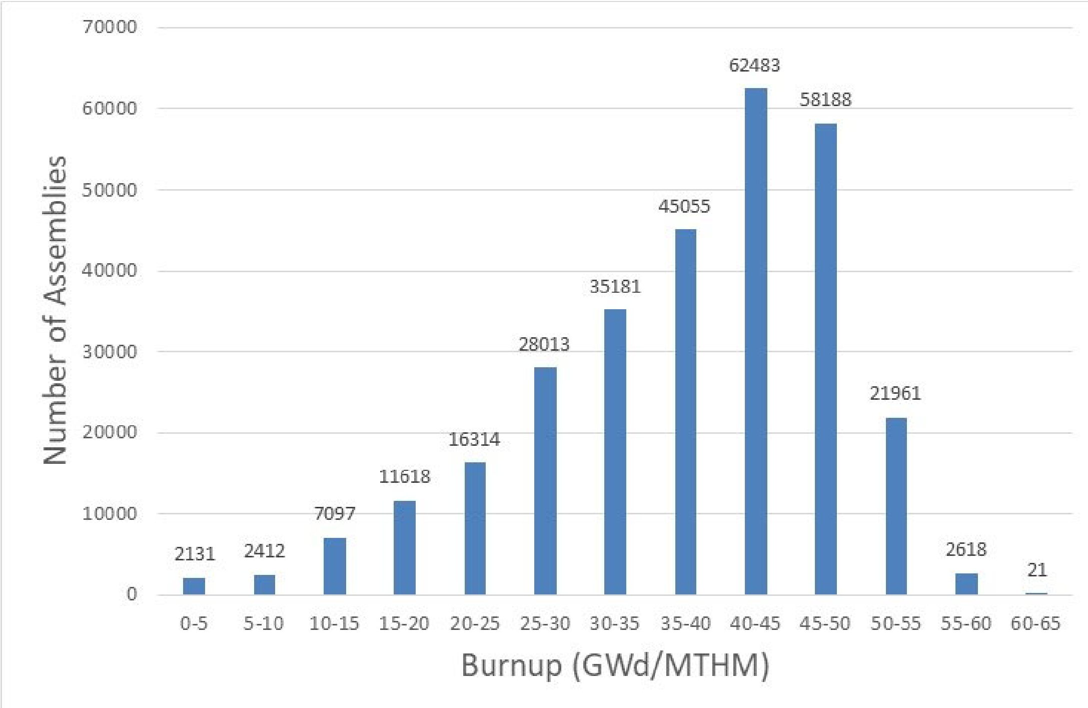


Figure 2-3 Estimated Burn-up (GWd/MTHM) Distribution for SNF Through December 2019

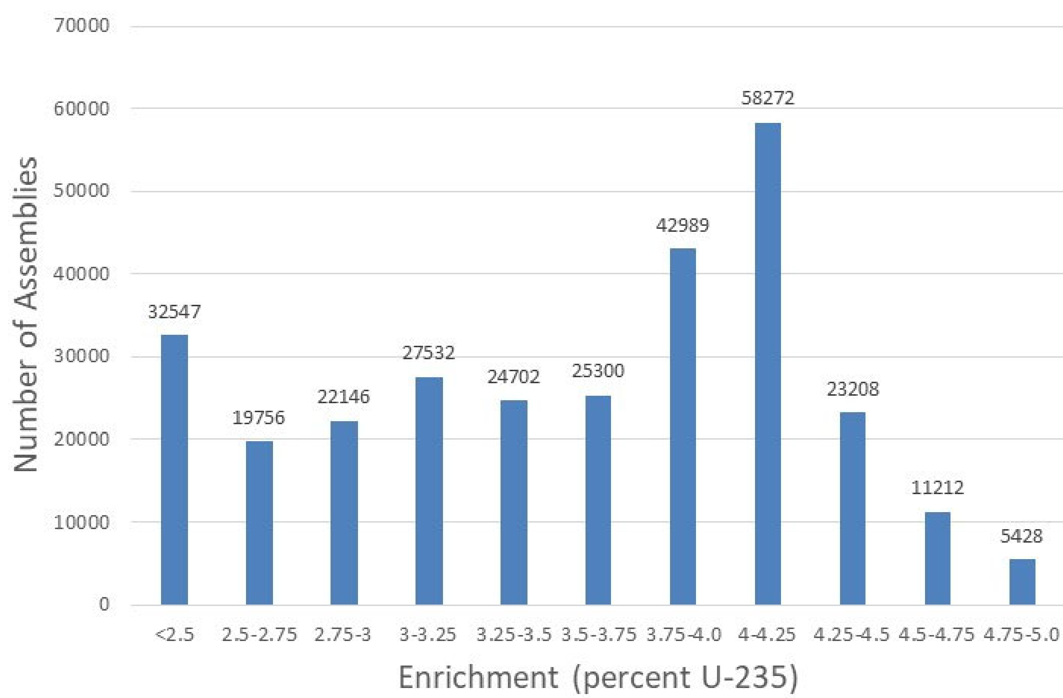
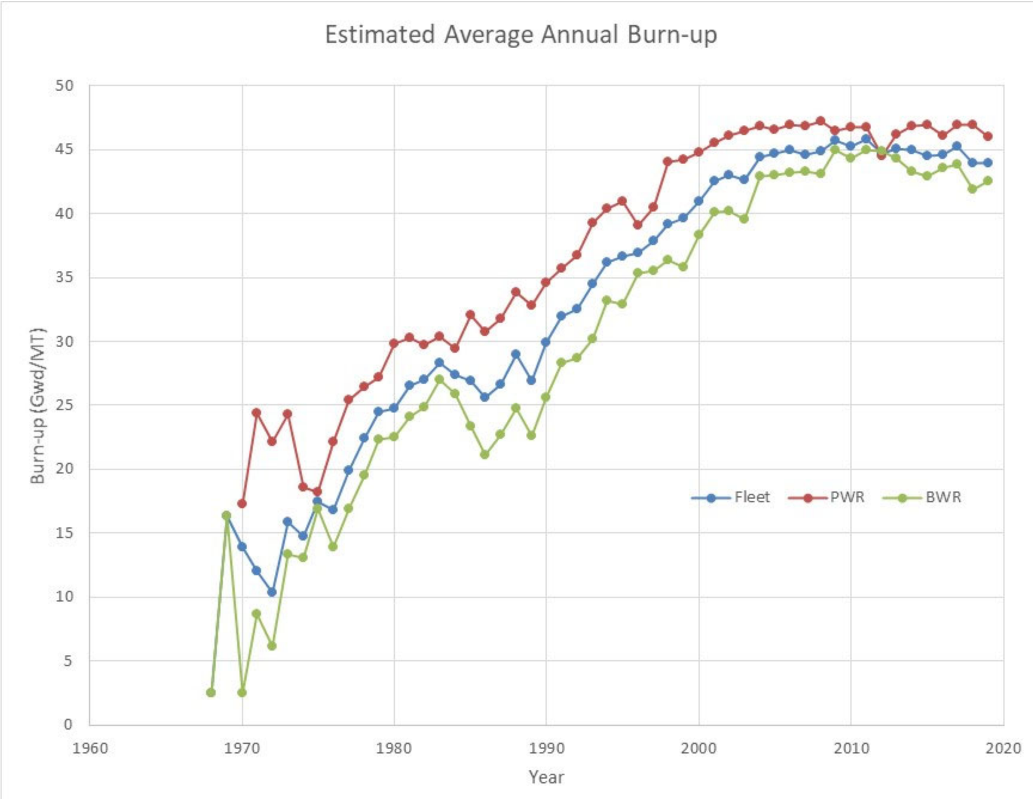


Figure 2-4 Estimated Initial Enrichment (% U-235) Distribution for SNF Through December 2019



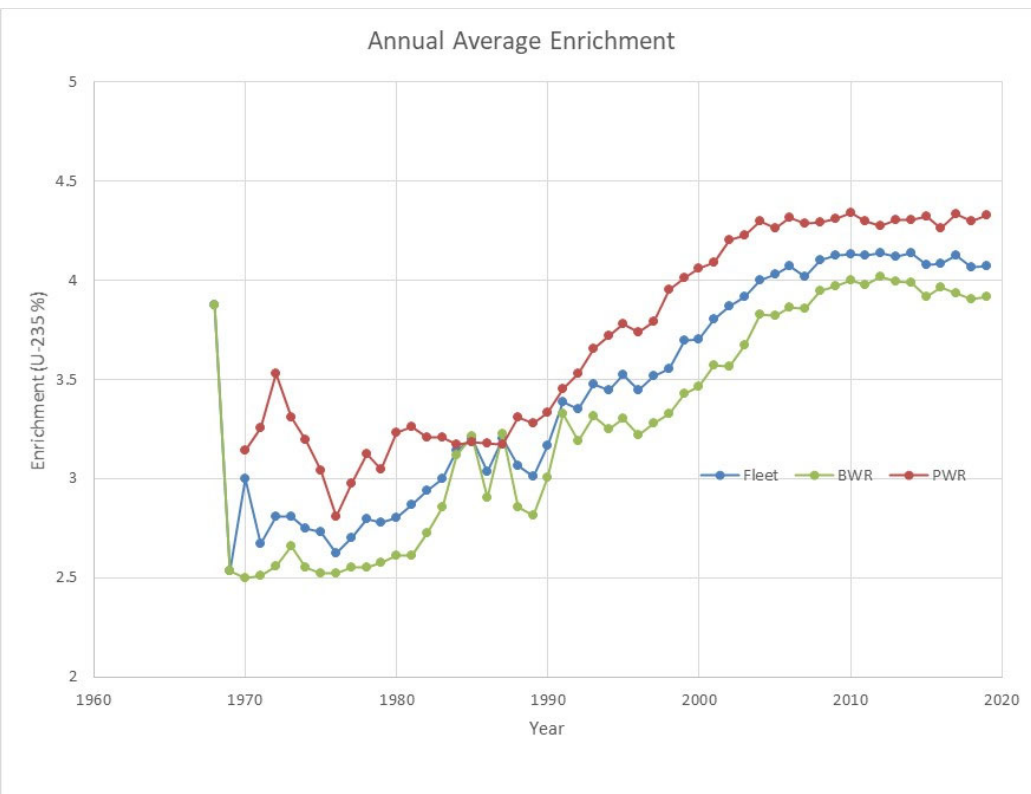


Figure 2-5 Average Annual Burn-up (GWd/MT) and Enrichment (U-235%)

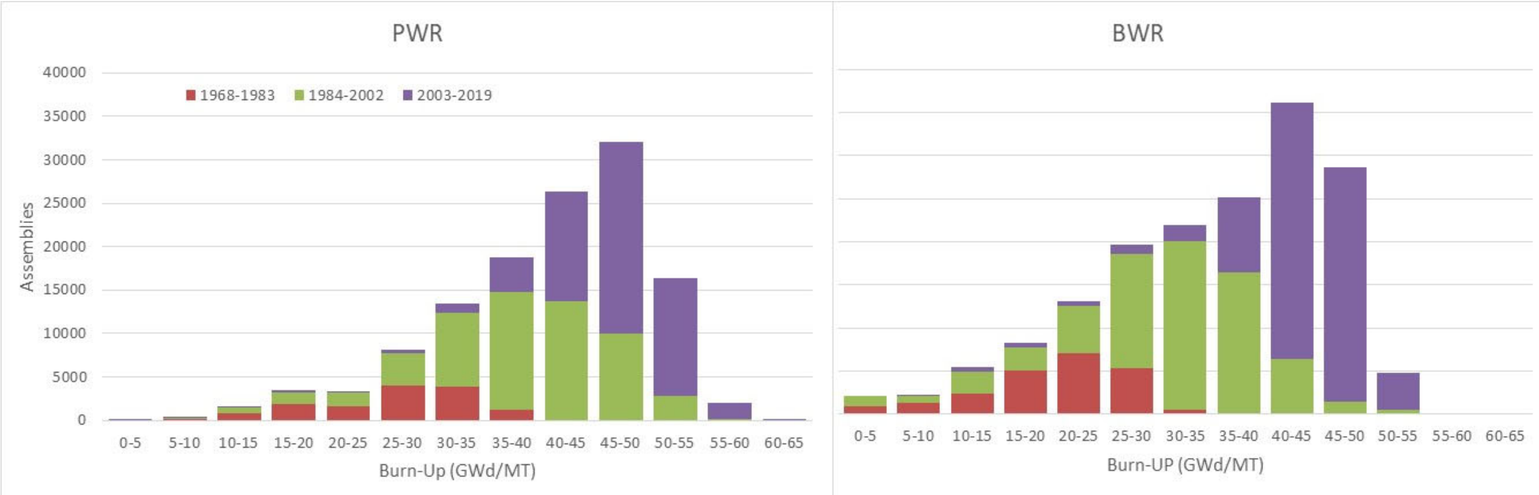


Figure 2-6 Estimated Burn-up (GWd/MTHM) Distribution by Assembly Count for SNF Through December 2019

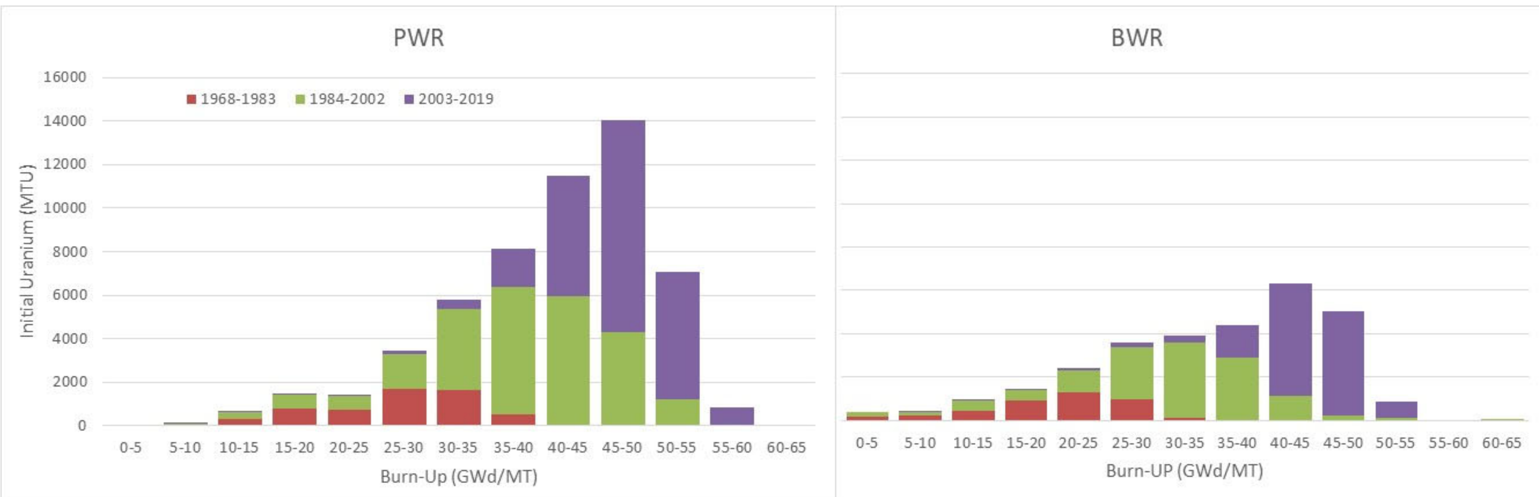


Figure 2-7 Estimated Burn-up (GWd/MTHM) Distribution by Initial Uranium Mass for SNF Through December 2019

2.1.2 Commercial SNF Inventory in DOE Possession

The Spent Fuel Database (SFD) maintained by the National Spent Nuclear Fuel Program at the INL [NSNFP, 2020] tracks spent fuel of commercial origin which is being managed by DOE. For this study, commercial SNF is identified as having been discharged from the reactors listed in Table 2-1 as well as Three Mile Island Unit 2 debris, and Ft. St. Vrain. SNF from early demonstration power reactors is excluded from this section but included in Section 3 as part of the DOE research and development activities.

There is 173.6 MTHM of commercial SNF, as defined in this report, that is currently managed by DOE according to the SFD. The contributors to this total include 81.6 MTHM of Three Mile Island Unit 2 core debris, 23.6 MTHM for Ft St. Vrain SNF (both in Colorado and Idaho), and 68.4 MTHM from other commercial sites (e.g., Surry, Ginna, and Robinson) used in various research and development programs[d].

The intact portion of this fuel could be transported and disposed in six waste packages sized to accommodate 21 PWR assemblies or 44 BWR assemblies. The non-intact portion of this fuel could be loaded into DOE standard canisters (see Section 3.1.3 for a description of the standard canister) before shipment and disposal. The non-intact portion is projected to generate 824 DOE standard canisters. Table 2-7 provides a breakdown of the decay heat characteristics for all 830 canisters containing SNF of commercial origin.

Table 2-7. Canister Decay Heat Characteristics of Commercial-Origin Fuel in DOE Possession

Decay heat per canister (watts)	2030		
	Number of DOE Standard Canisters[e]	Number of Intact Assembly Canisters	Cumulative %
<50	791	0	95.2%
50 - 100	2	0	95.4%
100 - 220	2	0	95.6%
220 - 300	1	0	95.7%
300 - 500	1	0	95.7%
500 - 1000	27	0	99.0%
1000 - 1500	2	0	99.1%
1500 - 2000	0	0	99.1%
>2000	2	6	100.0%
Totals	**830**		

[d] RW-859 (end of 2002) values may differ from those reported here.

[e] The fractional canister counts from the application of a loading algorithm in the SFD database have been rounded up to the next whole canister. These provide a relative comparison for the quantities in each decay heat range and do not represent a future "as loaded" condition. These do not sum to the "Total" provided by the SFD database. Cumulative % is based on the algorithm values.

2.2 Commercial HLW Inventory

A commercial fuel reprocessing plant located at West Valley, New York operated from 1966 through 1972 and reprocessed approximately 640 metric tons of fuel to recover the plutonium and unused uranium [NFS, 1973]. Of the fuel reprocessed at West Valley, about 260 metric tons were commercial fuel and about 380 metric tons were DOE N Reactor fuel. Included in this amount processed were approximately 30 MTHM of unirradiated fuel for the N Reactor and 3 MTHM of unirradiated fuel for the Pathfinder reactor. During operations, about 2,500 m^3 of liquid HLW was generated. The liquid HLW was vitrified between 1996 and 2001 producing 278 canisters, including 275 canisters of vitrified HLW, two additional canisters used to evacuate the melter prior to decommissioning, and one non-routine HLW canister (WV-413), that are stored at West Valley [DOE, 1996]. Appendix F provides the equivalent MTHM contained in these canisters based upon the historical factor of 2.3 MTHM per canister established in DOE/DP 0020/1. This factor is conservative for the West Valley canisters, recognizing that a portion of the fuel processed was unirradiated.

Table 2-8. Current Commercial High-Level Waste Inventory

Site	HLW Canisters[1]	Liquid HLW (m^3)	Dry HLW (m^3)
West Valley	278[2]	N/A	N/A

1. Vitrified HLW in stainless steel canisters.
2. Includes 2 canisters used to evacuate the melter prior to decommissioning in 2002 and 1 non-routine HLW canister (WV-413).

2.3 Future Commercial SNF Inventory Forecast

The methods outlined above (Section 2.1) have been extended to provide the individual NPR forecasts inventory. Such forecasts vary with the estimation method parameters described above, and also with scenario specific details. Multiple scenarios have been included in the current revision of this report, as described herein. The reference projection scenario is described in the next section and assumes no new reactors and 60 or 80 (depending upon the renewal status) years of operation for existing reactors, when early shutdowns have not been announced.

2.3.1 Reference Scenario: No Replacement Nuclear Power Generation

The "No Replacement Nuclear Power Generation" scenario assumes no new NPRs are constructed and operated. This is the Reference Scenario for the purpose of comparison to alternative scenarios. The inventory for this initial scenario includes the fuel discharged from the 23 shutdown LWRs and the 96 currently operating LWRs listed in Table 2-1. Eighty-eight of the 96 operating LWRs are assumed to have one 20 year life extension and will be decommissioned after 60 years of operation.

Two reactors (Turkey Creek Units 3 and 4) have received a "subsequent" or second 20 year license extension and will operate for 80 years.[f]

Six operating LWRs have utility-announced early shutdown dates as indicated:

- Duane Arnold, 2020
- Indian Point Unit 2, 2020
- Indian Point Unit 3, 2021
- Palisades, 2022
- Diablo Canyon Unit 1, 2024
- Diablo Canyon Unit 2, 2025

Applying these assumptions, the last nuclear generator finishes operations in 2075 (Watts Bar Unit 2).

Table 2-9 provides the scenario inventory by reactor type as a function of the estimate phase. Actual quantities are used for discharges through June 2013, forecast discharges are used for the individual reactors for later time periods.

The scenario totals nearly 467,900 assemblies containing nearly 135,900 MTU.

Table 2-10 provides the scenario inventory detailed to provide actual discharges through December 31, 2012 from the GC-859 database, the projected quantities between 1/1/2013 and 12/31/2019, and between 1/1/2020 and the end of the scenario, by major storage location category and by site Group. Table 2-10 excludes discharges that were reprocessed at West Valley, NY, and transfers to DOE for research and development purposes and therefore represents the quantity of fuel stored at the 119 power reactor sites and the away-from-reactor pool storage location at Morris, IL. In addition to the categories previously detailed three additional categories are also included:

- Group A Sites that were shutdown prior to 2000 and where there are no other ongoing nuclear operations. Table 2-11 and Figure 2-8 provides additional details on this category. This fuel (from

[f] The NRC approved the "subsequent" 20 year operating license extension for Peach Bottom Units 2 and 3 on March 5, 2020 (after the 12/31/2019 data date for this report). The net effect of this approval is to increase the reference scenario by approximately 5,460 assemblies and 970 MTU.

10 reactors) is located at nine sites and totals 7,660 assemblies containing 2,815 MTU. Fuel at these sites was discharged prior to 2000, and the quantities are from the GC-859 database. Also shown in the table and figure are the number of storage casks loaded with Greater-than-Class C (GTCC) Low Level Radioactive Waste (LLRW) to provide a complete cask count for these sites, since GTCC casks for sites with shutdown reactors are typically stored at the ISFSI along with the SNF casks[g].

- Early shutdown reactor fuel (from ten reactors) at eight sites are those reactors which have ceased operations since 2000 and prior to reaching the 60-year operating lifetime. These reactors are subdivided by Site Group within Table 2-10. Table 2-12 and Figure 2-9 provides the detailed inventory of each of these ten reactors. There are no nuclear operations on these sites. This category includes:
  - Crystal River was last operated in 2009 and has an official shutdown date of February 20, 2013. Crystal River data are based on the GC-859 database.
  - Kewaunee was shutdown in May of 2013. Kewaunee data are based on the GC-859 database.
  - San Onofre 1 last operated in 1992 (shutdown 11/30/1992). San Onofre 2 and 3 last operated in 2012 and were officially shutdown on 6/12/2013. The inventory is based on the GC-859 database.
  - Vermont Yankee shutdown on December 29, 2014. The inventory estimate is based on quantity of SNF in dry storage provided in [Storefuel 2020].
  - Fort Calhoun was shutdown in October of 2016. Fort Calhoun data are based on the GC-859 database and the forecast for the time period after 12/31/2012.
  - Oyster Creek last operated 9/17/2018. The inventory is based on the GC-859 database and the forecast beyond 12/31/2012.
  - Pilgrim last operated 5/31/2019. The inventory is based on the GC-859 database and the forecast beyond 12/31/2012.
  - Three Mile Island Unit 1 last operated 9/20/2019. The inventory is based on the GC-859 database and the forecast beyond 12/31/2012.
- Recently several utilities have announced their intentions to shutdown six additional reactors on four sites prior to reaching the 60-year operating lifetime. Table 2-13 and Figure 2-10 details the scenario inventory based on GC-859 and forecast discharges from these reactors. Once shutdown, there will be no other nuclear operations on these sites.
- Shutdown reactor fuel discharged by three permanently shutdown reactors at sites with continued nuclear operations (Group B sites) are detailed in Table 2-14 and Figure 2-11. These three reactors shutdown prior to 2000 and the quantities are based on the GC-859 database. These shutdown reactors discharged 3,936 assemblies with three assemblies transferred to DOE. The remaining shutdown reactor inventory is 3,933 assemblies containing approximately 646.8 MTU.

The Group A reactors include thirteen reactors on twelve sites that have only dry storage capabilities (A1); six reactors on four sites with fuel in both wet and dry storage (A2); and one reactor which has only pool

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[g] This report does not provide an over-arching estimate for GTCC LLRW associated with decommissioning the U.S. fleet of current and future commercial reactors. For estimates of GTCC LLRW and information on the characteristics of this type of waste and its disposal, the reader is referred to Final Environmental Impact Statement for the Disposal of GTCC LLRW and GTCC-Like Waste [DOE, 2016].

storage (A3) at the end of 2019. All the Group A sites that shutdown prior to 2000 (10 reactors on 9 sites) are Subgroup A1 sites. Three of the Group A sites shutdown after 2000 (Crystal River, Kewaunee and Vermont Yankee) recently completed fuel pool de-inventory as part of the decommissioning process and become Subgroup A1 sites[h]. The Group A sites now total approximately 25,600 assemblies containing approximately 9,000 MTU which is forecast to be stored in 728 SNF canisters/casks.

By 2025, combining the existing Group A inventory with the announced shutdown reactor inventory will bring the total Group A site inventory to over 43,800 assemblies containing approximately 14,220 MTU in approximately 1,123 fuel canisters/casks.

Figure 2-12 provides the reference scenario quantities at two points in time assuming a consolidated interim storage facility and/or repository is not available before 2045.

Figure 2-13 provides the Reference Scenario including the historical and forecast SNF discharges and the historical and forecast dry storage canister/casks assuming a consolidated interim storage facility and/or repository is not available before the end of the scenario.

Figures 2-14 and 2-15 provide the burn-up distribution and initial enrichment distribution, respectively, for the Reference Scenario.

Figure 2-16 shows the estimated annual average Burn-up (GWd/MT) and the initial enrichment (% U-235) between 1968 and 2060.

Figure 2-17 provides the estimated Burn-up (GWd/MT) distribution based on assembly counts for the PWR and BWRs.

Figure 2-18 provides the estimated Burn-up (GWd/MT) distribution based on the initial uranium mass(MTU) for the PWR and BWRs.

Appendix C, Tables C-1 through C-5 provides additional details for this Reference Scenario on a reactor specific basis. Appendix C is discharged SNF information and does not reflect transfers.

Appendices D and E provide summary information for the Reference Scenario by state, and by NRC Region, respectively.

Appendix F and H provides additional congressional district and state detail for the reference scenario and also non-commercial SNF and reprocessing waste, see Section 3 for additional discussion of these non-commercial materials. Appendix H also provides SNF discharges by reactor before and after transfers reflecting the actual or estimated quantities in storage for a given site, Congressional District or state.

[h] Editors note: On May 18, 2020 Ft. Calhoun also completed the transfer of all remaining SNF into dry storage.

Table 2-9. Projected Commercial LWR SNF Inventory for the Reference Scenario by Reactor Type*

	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/13 to 12/31/19		Forecast Discharges 1/1/20 to 12/31/75		Total Projected Discharged Fuel	
Reactor Type	Assemblies	Initial Uranium (MT)	Assemblies	Initial Uranium (MT)	Assemblies	Initial Uranium (MT)	Assemblies	Initial Uranium (MT)
PWR	103,605	44,894	22,175	9,730	78,151	34,455	203,931	89,079
BWR	136,533	24,293	30,779	5,424	96,660	17,084	263,972	46,801
Totals	**240,138**	**69,187**	**52,954**	**15,154**	**174,811**	**51,539**	**467,903**	**135,880**

*Includes Commercial LWR inventory at Morris and DOE sites, other than TMI-2 fuel debris.

Table 2-10. Projected SNF Inventory at Commercial LWRs and Morris for the Reference Scenario by Site Group (Group Status as of 12/31/2019)

Description	Site Group	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2019		Forecast Discharges 1/1/2020 to 12/31/2075		Total Projected Discharged Fuel	
		Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)
Operating Reactors at Group C Sites (86 Rx/50 Sites)*	C	185,323	53,305	45,110	12,964	166,761	49,105	397,194	115,374
Operating Reactors at Group C Sites with Announced Shutdown Date (4 Rx/4 Sites)	C	7,091	2,320	1,595	566	1,486	541	10,172	3,427
Operating Reactors at Group B Sites (4 Rx/2 Sites)*	B	11,098	2,606	2,438	599	6,178	1,718	19,714	4,923
Operating Reactors at Group B Sites with Announced Shutdown Date (2 Rx/1 Site)	B	2,815	1,280	648	293	386	175	3,849	1,748
Shutdown Reactors at Group B Sites (3 Rx/3 Sites)	B	3,933	647	-	-	-	-	3,933	647
Reactors Shutdown Since 2000 (10 Rx/8 Sites)	A	18,775	5,470	3,163	732	-	-	21,938	6,202
Reactors Shutdown Prior to 2000 (10 Rx/9 Sites)	A	7,660	2,815	-	-	-	-	7,660	2,815
Away From Reactor Wet Storage	F	3,217	674	-	-	-	-	3,217	674
Totals		**239,912**	**69,117**	**52,954**	**15,154**	**174,811**	**51,538**	**467,677**	**135,809**

* Excludes reactors with announced early shutdowns.

Table 2-11. SNF and Stored GTCC LLRW at Group A Sites Shutdown Prior to 2000

		Discharges		Transferred		Remaining Inventory at the end of 2019				
Reactor	Shutdown Date	Assemblies	Initial Uranium (MT)	Assemblies	Initial Uranium (MT)	Assemblies	Initial Uranium (MT)	Fuel Casks Loaded /	Estimated	GTCC LLRW Casks Loaded
Big Rock Point	8/29/1997	526	69.40	85	11.48	441	57.92	7	7	1
Haddam Neck	12/5/1996	1,102	448.42	83	34.89	1,019	413.53	40	40	3
Humboldt Bay 3	7/2/1976	390	28.94	-	-	390	28.94	5	5	1
La Crosse	4/30/1987	334	38.09	1	0.12	333	37.97	5	5	-
Maine Yankee	12/6/1996	1,434	542.26	0	0	1,434	542.26	60	60	4
Rancho Seco	6/7/1989	493	228.38	0	0	493	228.38	21	21	1
Trojan	11/9/1992	791	359.26	0	0	791	359.26	34	34	-
Yankee Rowe	10/1/1991	533	127.13	0	0	533	127.13	15	15	1
Zion 1	2/21/1997	1,143	523.94	0	0	1,143	523.94	-	-	2
Zion 2	9/19/1996	1,083	495.47	0	0	1,083	495.47	-	-	2
Zion Totals	-	2,226	1,019.41	0	0	2,226	1,019.41	61	61	4
Totals	**-**	**7,829**	**2,861.28**	**169**	**46.49**	**7,660**	**2,814.79**	**248**		**15**

* One assembly at Big Rock Point was consolidated into other assemblies.

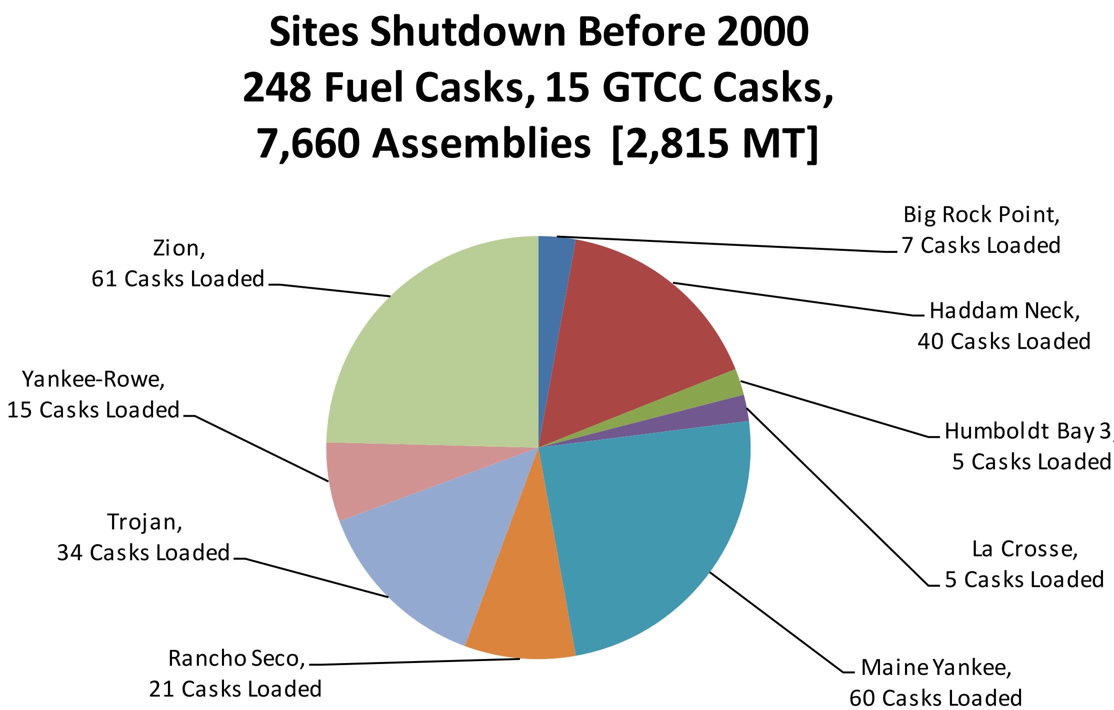


Figure 2-8. Dry SNF Storage at Group A Sites Shutdown Before 2000

Table 2-12. SNF and Stored GTCC LLRW from Group A Sites Shutdown After 2000

		Discharges as of 12/31/2012†		Forecast Discharges 1/1/2013 to 12/31/2019		Total Projected Discharged Fuel through 12/31/2019†					
Reactor [Unit]	Shutdown Date	Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)	Fuel Casks Loaded / Estimated		GTCC LLRW Casks Loaded / Estimated**	
Crystal River 3	2/20/2013	1,243	582	-	-	1,243	582	39	39	-	2
Fort Calhoun	10/24/2016	1,091	399	175	66	1,266	465	18	40	-	2
Kewaunee	5/7/2013	1,214	471	121	48	1,335	519	38	38	-	2
Oyster Creek	9/17/2018	3,644	649	898	153	4,542	803	34	75	-	2
Pilgrim	5/31/2019	3,069	547	1,070	183	4,139	731	17	61	-	2
San Onofre 1	11/30/1992	395	146	-	-	395	146	-	-	1	1
San Onofre 2	6/12/2013	1,726	730.	-	-	1,726	730	-	-	-	2
San Onofre 3	6/12/2013	1,734	733	-	-	1,734	733	-	-	-	2
San Onofre Totals*	-	3,855	1,609	-	-	3,855	1,609	94	123	1	5
Three Mile Island 1	9/20/2019	1,270	596	408	196	1,678	791	-	46	-	2
Vermont Yankee	12/29/2014	3,389	616	491	86	3,880	702	58	58	-	2
Totals		**18,775**	**5,470**	**3,136**	**732**	**21,938**	**6,202**	**298**	**480**	**1**	**19**

† These inventory data reflect fuel assembly transfers.

* San Onofre 1 shutdown in 1992. San Onofre 2 & 3 shutdown in 2013 (last operated in 2012).

**For simplicity GTCC Casks are estimated at 2 per reactor unless decommissioning is complete. More detailed information on estimates of GTCC LLRW can be found in [DOE, 2016] and supporting documentation.

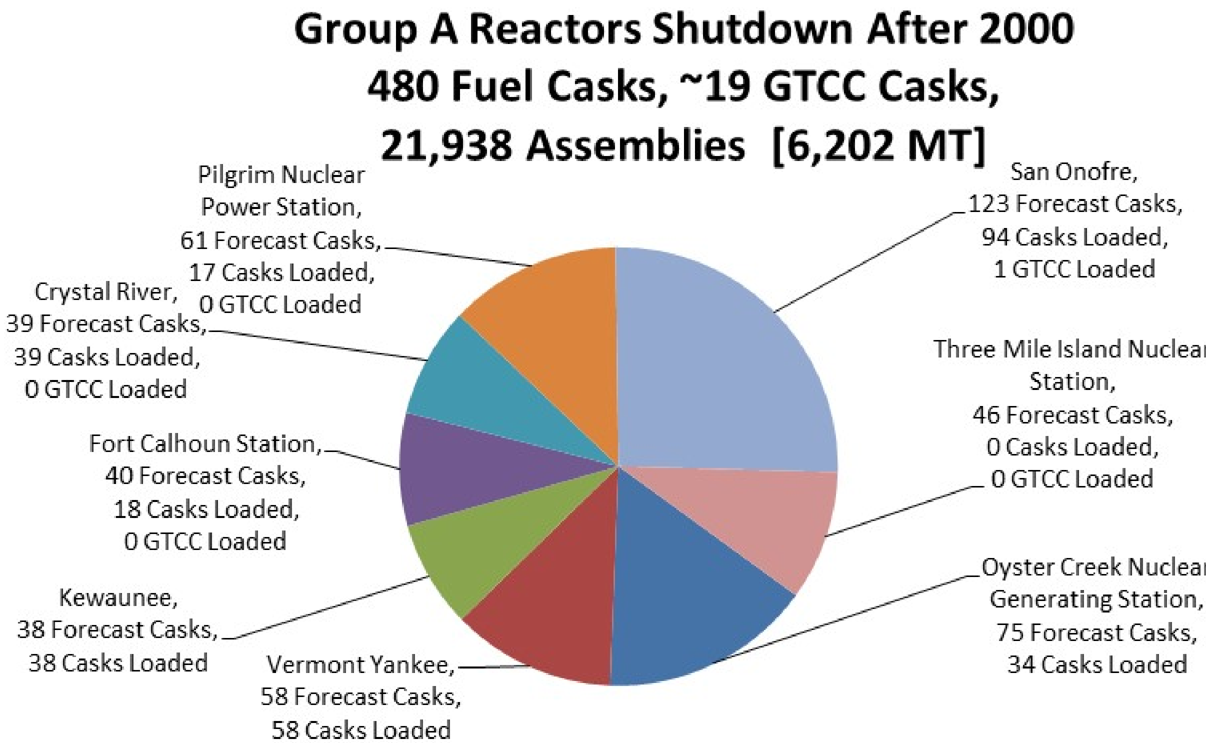


Figure 2-9. Dry SNF Storage at Group A Sites Shutdown After 2000

Table 2-13. SNF and Stored GTCC LLRW from Groups B&C Sites with Announced Early Shutdown Dates

		Discharges as of 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2019		Total Projected Discharged Fuel through the Announced Shutdown date					
Reactor [Unit]	Announced Shutdown Date	Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)	Fuel Casks Loaded / Estimated		GTCC LLRW Casks Loaded / Estimated*	
Indian Point 2	4/30/2020	1,517	688	270	122	1,980	897	46**	62	-	2
Duane Arnold	10/31/2020	2,824	511	456	82	3,648	659	20	60	-	2
Indian Point 3	4/30/2021	1,298	592	378	171	1,869	851	-	59	-	2
Palisades	4/30/2022	1,509	617	300	129	2,073	860	49	69	-	2
Diablo Canyon 1	11/2/2024	1,412	610	470	199	2,357	1,010	58**	74	-	2
Diablo Canyon 2	8/26/2025	1,346	582	369	156	2,094	898	-	66	-	2
	Totals	**9,906**	**3,600**	**2,243**	**859**	**14,021**	**5,175**	**173**	**390**	**-**	**12**

* For simplicity GTCC Casks are estimated at 2 per reactor unless decommissioning is complete. More detailed information on estimates of GTCC LLRW can be found in [DOE, 2016] and supporting documentation.

** Site total canisters from both units included.

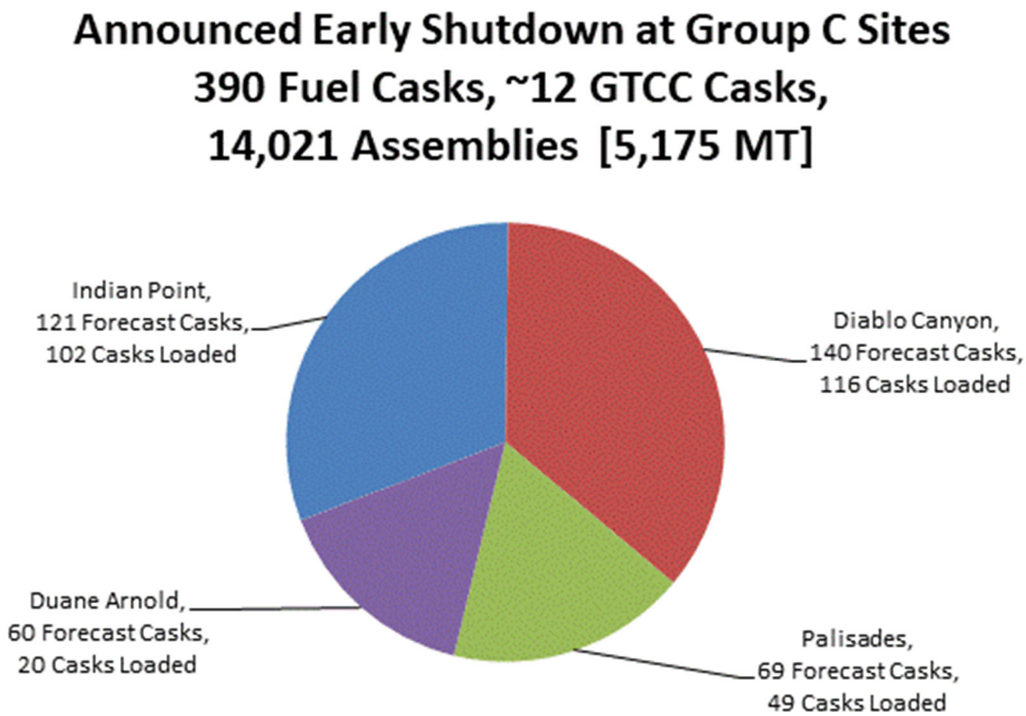


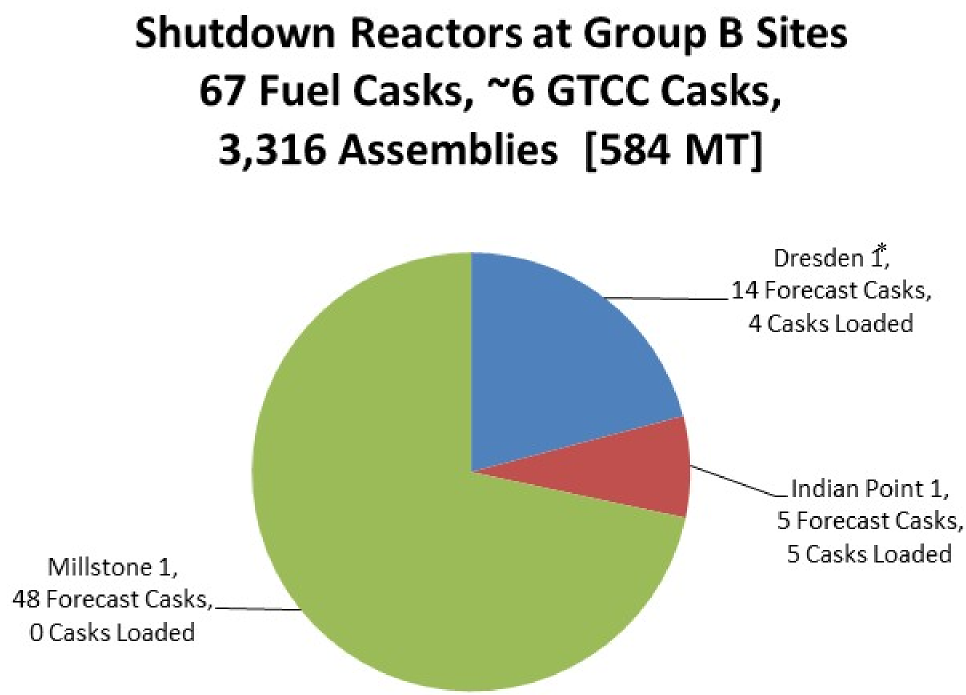
Figure 2-10. Dry SNF Storage at Group C Sites with Announced Early Shutdown Dates

Table 2-14. SNF and Stored GTCC LLRW from Shutdown Reactors at Group B Sites

		Discharges as of 12/31/2012		Transferred to Morris (Group F Site)		Projected Remaining Onsite Inventory at the end of 2019					
Reactor [Unit]	**Shutdown Date**	**Assemblies**	**Initial Uranium (MT)**	**Assemblies**	**Initial Uranium (MT)**	**Assemblies**	**Initial Uranium (MT)**	**Fuel Casks Loaded /**	**Estimated**	**GTCC LLRW Casks** Loaded /**	**Estimated**
Dresden 1*	10/31/1978	892	90.87	3	0.26	889	90.60	4	14	-	2
Indian Point 1	10/31/1974	160	30.58	-	-	160	30.58	5	5	-	2
Millstone 1	7/21/1998	2,884	525.62	-	-	2,884	525.62	-	48	-	2
Totals		**3,936**	**647.07**	**3**	**0.26**	**3,933**	**646.81**		**67**		**6**

* 617 Dresden 1 assemblies (~63.2MTU) are co-mingled with unit 2 and 3 fuel. This SNF is being moved to dry canister storage in a co-mingled fashion.

** For simplicity GTCC Casks are estimated at 2 per reactor unless decommissioning is complete. More detailed information on estimates of GTCC LLRW can be found in [DOE, 2016] and supporting documentation.



* 617 Dresden 1 assemblies (~63.2MTU) are co-mingled with unit 2 and 3 fuel are excluded from this Figure.

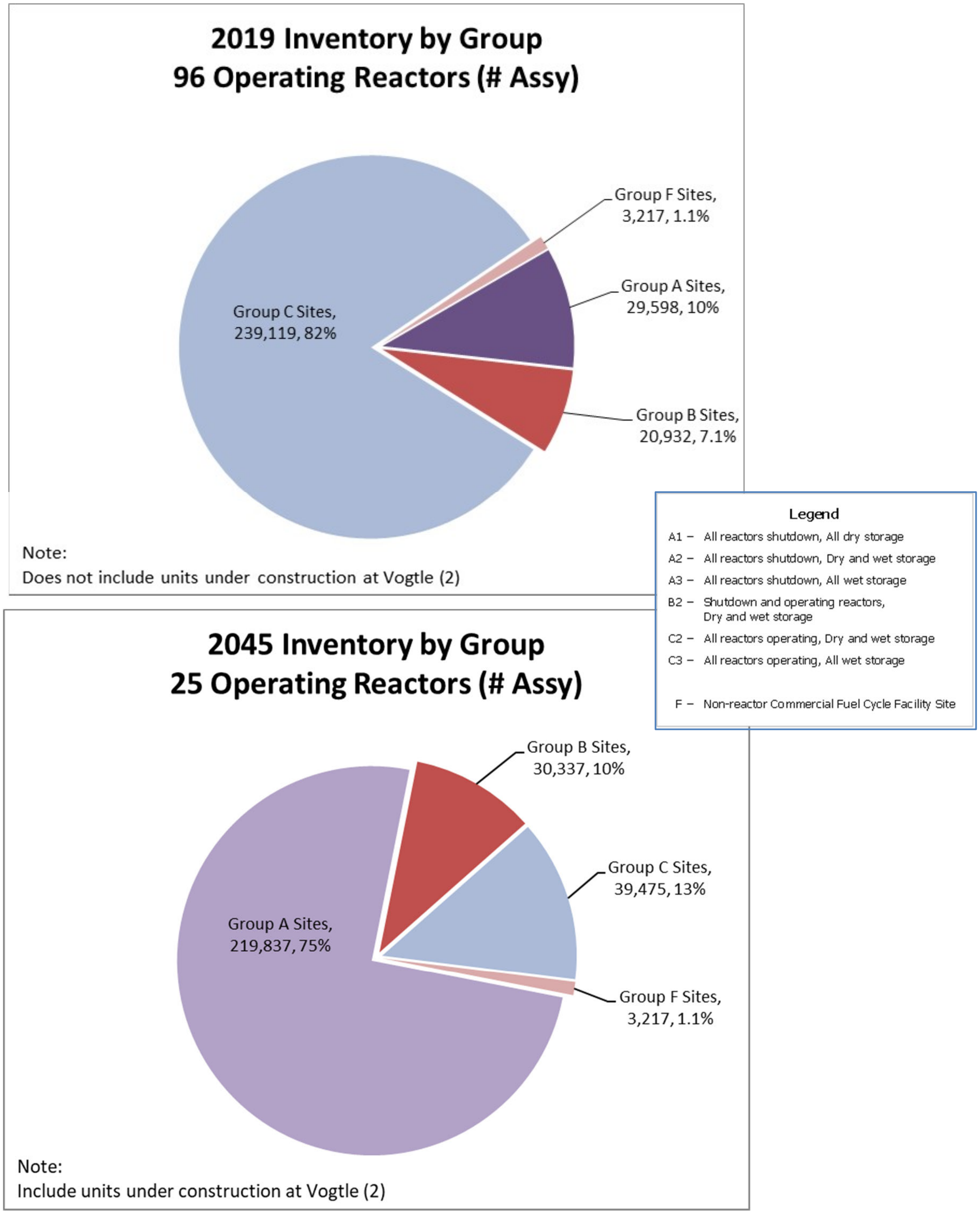


Figure 2-12. Projected Change in Distribution of Commercial Reactor SNF by Group with Time (without interim storage facility or repository available before 2045)

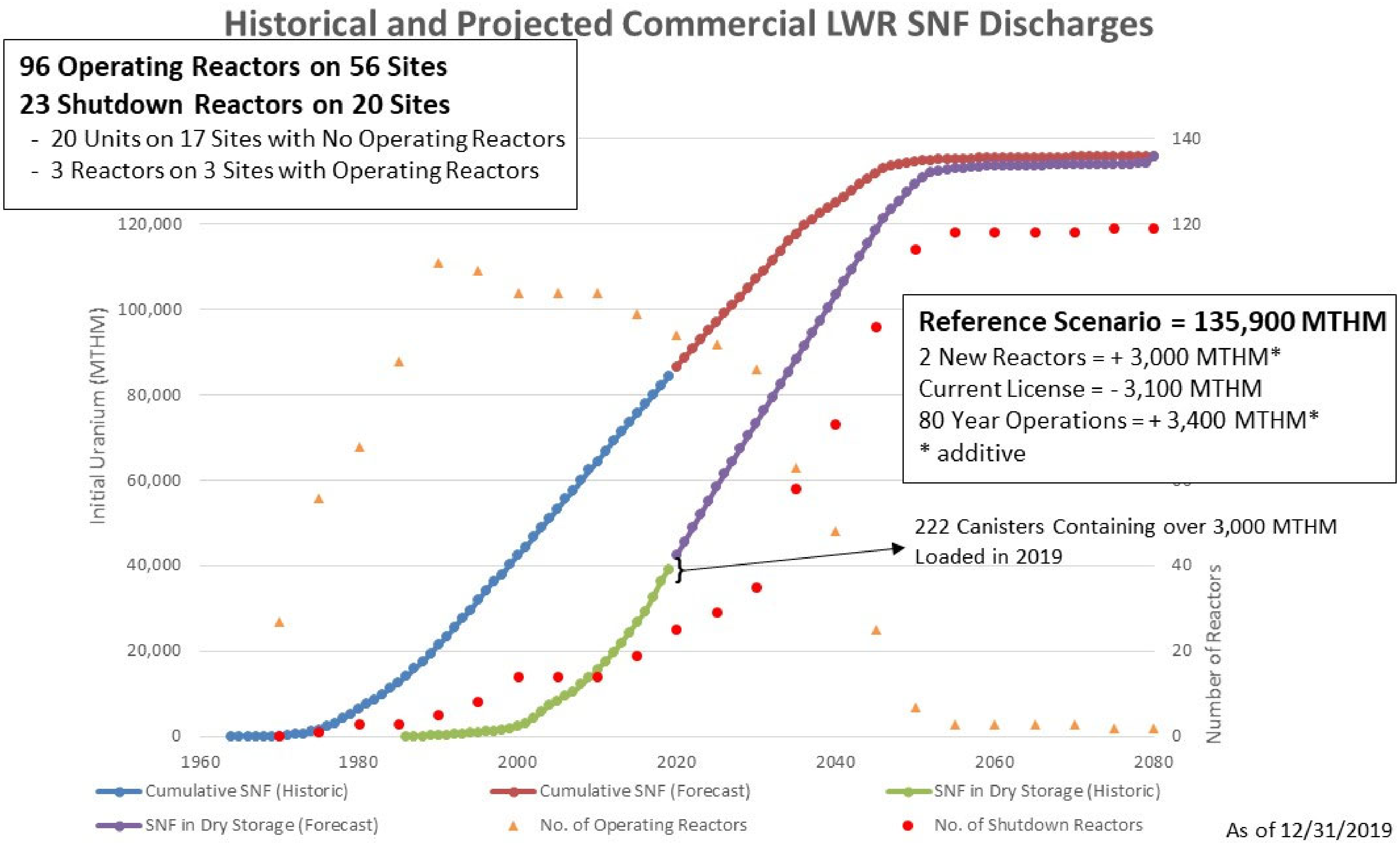


Figure 2-13 Reference Scenario Commercial SNF Forecast

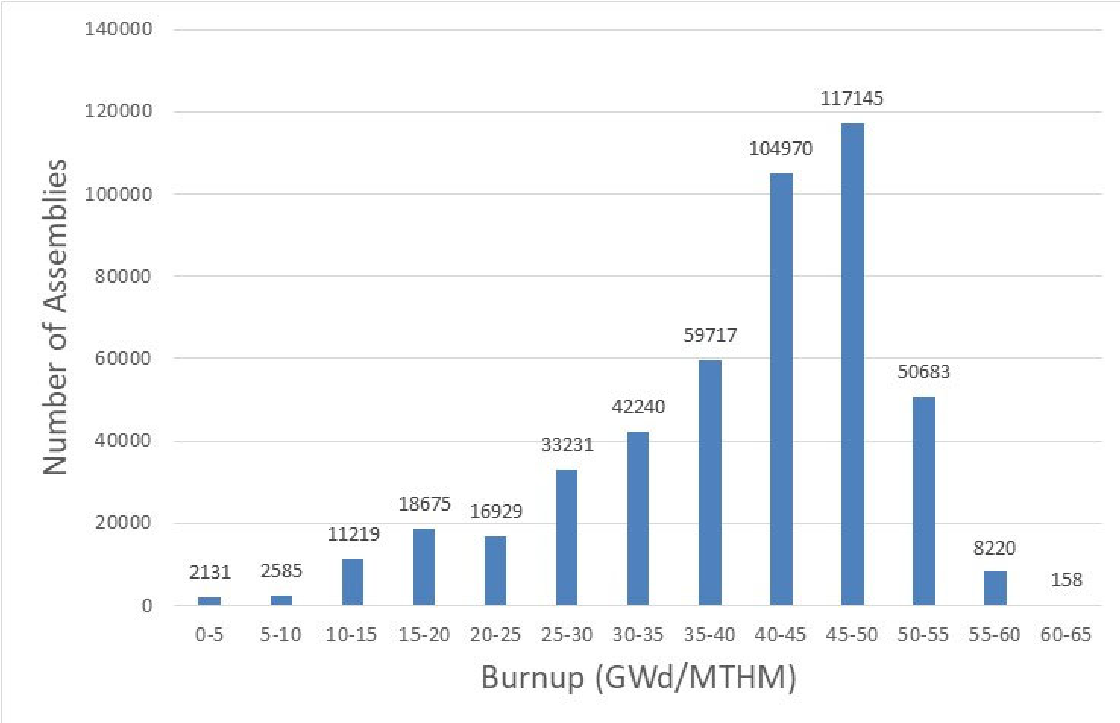


Figure 2-14 Reference Scenario SNF Burn-up Distribution

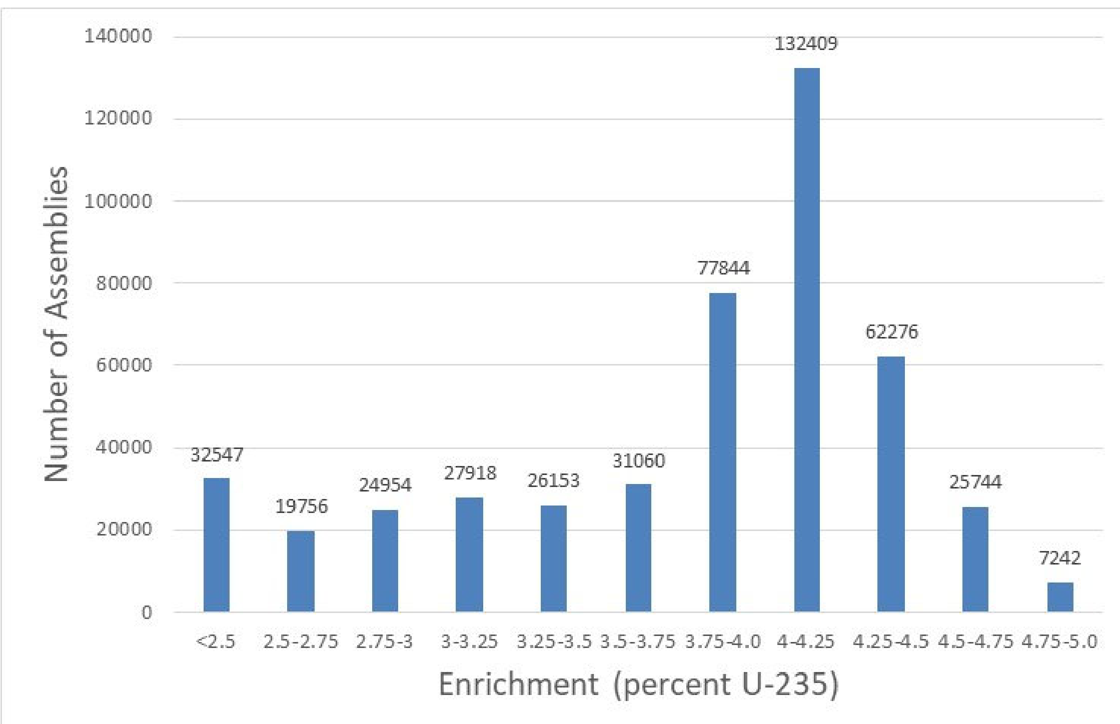
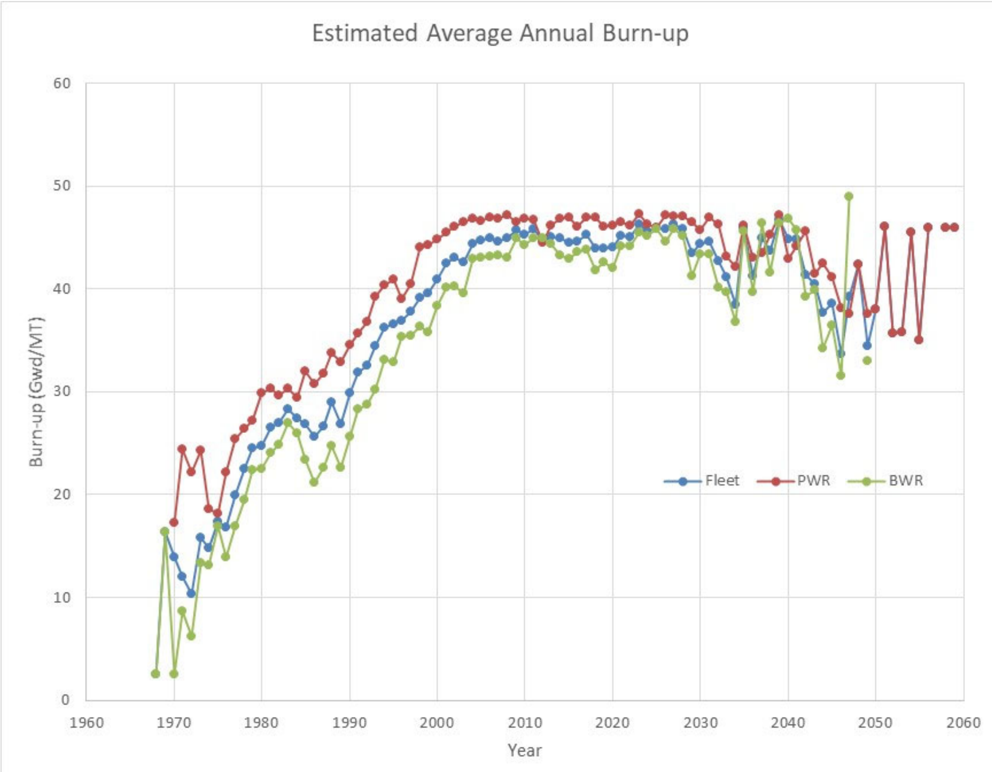


Figure 2-15 Reference Scenario Initial Enrichment Distribution for SNF Assemblies



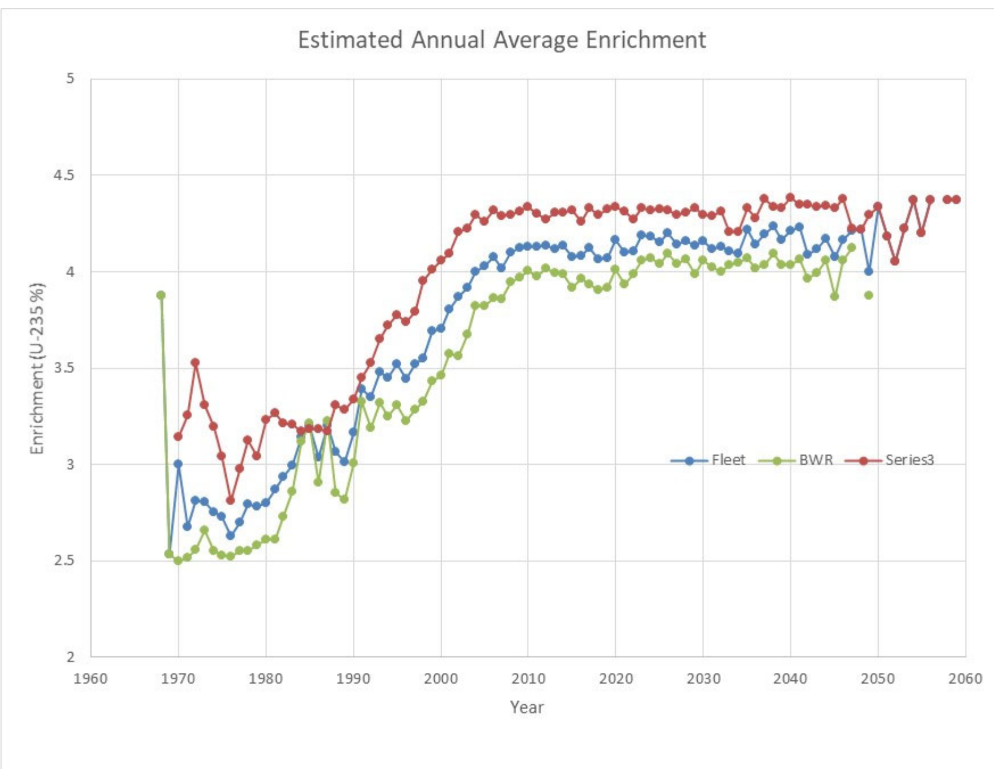


Figure 2-16 Estimated Average Annual Burn-up (GWd/MT) and Enrichment (U-235%) Through 2075

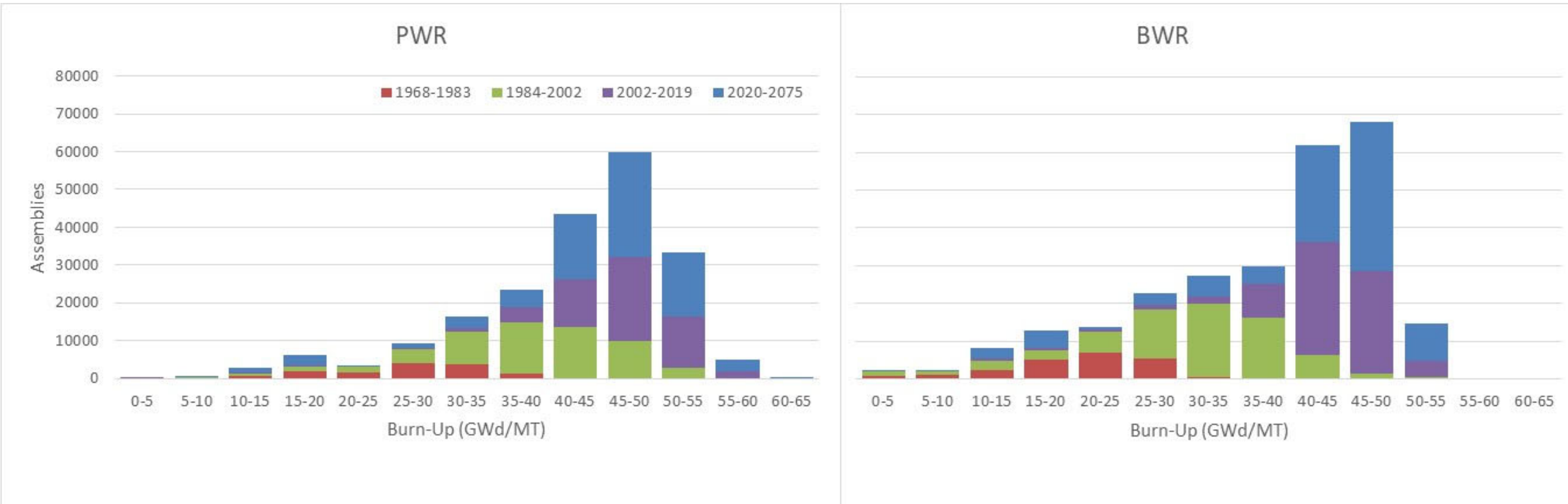


Figure 2-17 Estimated Burn-up (GWd/MTHM) Distribution by Assembly Count for SNF Through December 2075

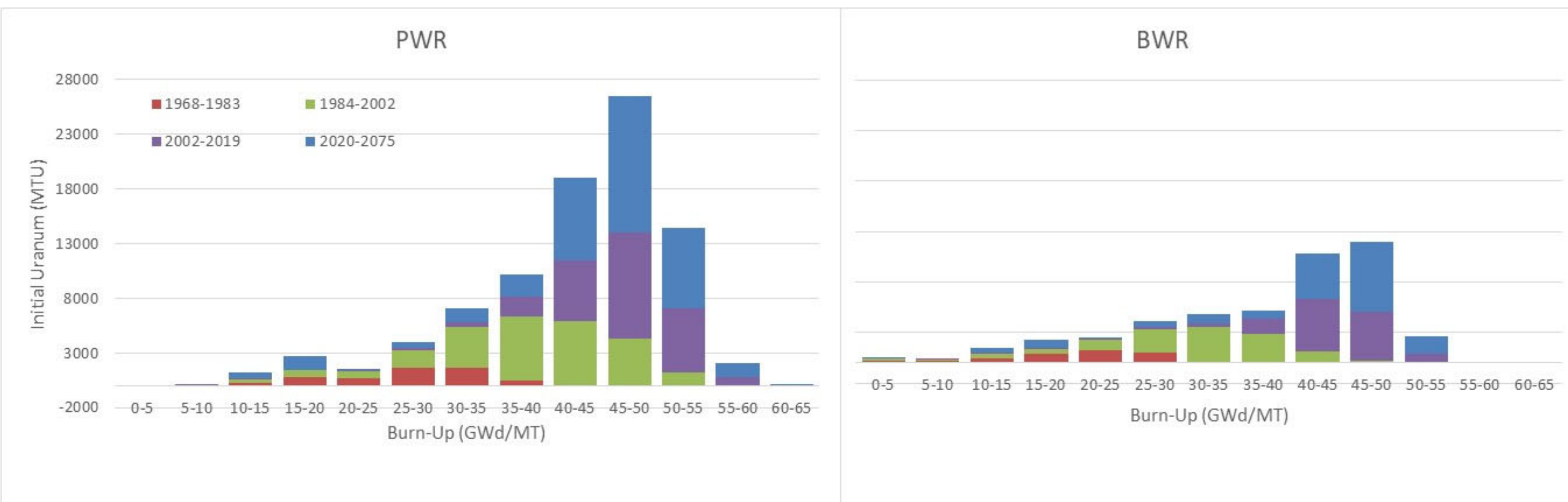


Figure 2-18 Estimated Burn-up (GWd/MTHM) Distribution by Initial Uranium Mass for SNF Through December 2075

2.3.2 Alternative Scenario 1: Addition of "New Builds"

Alternative Scenario 1 is based on the Reference Scenario with the addition of two "New Builds". This scenario has the same underlying assumptions that characterize the Reference Scenario with the additional assumption that two reactors that are currently under construction come online and begin discharging fuel over the next three years. For the purpose of the current revision to this report, these reactors, Vogtle, Units 3 & 4, are assumed to operate for 60 years. No other modifications to the Reference Scenario assumptions are made for this alternative scenario.

Table 2-15 provides the scenario inventory by reactor type as a function of the estimate phase. Actual quantities are used for discharges prior to 2013. Forecast discharges are used for the individual reactors for later time periods.

Table 2-16 provides the scenario inventory detailed to provide actual discharges through December 31, 2012 from the GC-859 database and the projected quantities between 1/1/2013 and 12/31/2019, and between 1/1/2020 and the end of the scenario (2082), by major storage location category and by site Group. One additional category beyond the Reference Scenario is included:

- "New Builds" includes two new reactors at an existing site in Georgia. Table 2-17 provides details of the projected discharges from these reactors.

The scenario totals approximately 475,080 assemblies containing approximately 138,910 MTU. The assumptions in this scenario are projected to generate an additional 7,172 SNF assemblies and approximately 3,030 MTU beyond that of the Reference Scenario.

Table 2-15. Projected Commercial LWR SNF Inventory for Alternative Scenario 1 by Reactor Type*

	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/13 to 12/31/19		Forecast Discharges 1/1/20 to 12/31/82		Total Projected Discharged Fuel	
Reactor Type	**Assemblies**	**Initial Uranium (MT)**	**Assemblies**	**Initial Uranium (MT)**	**Assemblies**	**Initial Uranium (MT)**	**Assemblies**	**Initial Uranium (MT)**
PWR	103,605	44,894	22,175	9,730	85,323	37,489	211,103	92,113
BWR	136,533	24,293	30,779	5,424	96,660	17,084	263,972	46,801
Totals	**240,138**	**69,187**	**52,954**	**15,154**	**181,983**	**54,573**	**475,075**	**138,914**

*Includes Commercial LWR inventory at Morris and DOE sites, other than TMI-2 fuel debris.

Table 2-16. Projected SNF Inventory at Commercial LWRs and Morris for Alternative Scenario 1 by Site Group (Group Status as of 12/31/2019)

Description	Site Group	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2019		Forecast Discharges 1/1/2020 to 12/31/2082		Total Projected Discharged Fuel	
		Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)
Operating Reactors at Group C Sites (86 Rx/50 Sites)*	C	186,323	53,305	45,110	12,964	166,761	49,105	397,194	115,374
Operating Reactors at Group C Sites with Announced Shutdown Date (4 Rx/4 Sites)	C	7,091	2,320	1,595	566	1,486	541	10,172	3,427
Operating Reactors at Group B Sites (4 Rx/2 Sites)	B	11,098	2,606	2,438	599	6,178	1,718	19,714	4,923
Operating Reactors at Group B Sites with Announced Shutdown Date (2 Rx/1 Site)	B	2,815	1,280	648	293	386	175	3,849	1,748
Shutdown Reactors at Group B Sites (3 Rx/3 Sites)	B	3,933	647	-	-	-	-	3,933	647
Reactors Shutdown Since 2000 (10 Rx/8 Sites)	A	18,775	5,470	3,163	732	-	-	21,938	6,202
Reactors Shutdown Prior to 2000 (10 Rx/9 Sites)	A	7,660	2,815	-	-	-	-	7,660	2,815
Away From Reactor Wet Storage	F	3,217	674	-	-	-	-	3,217	674
New Builds (4 Rx/2 Sites)		-	-	-	-	7,172	3,034	7,172	3,034
Totals		**239,912**	**69,117**	**52,954**	**15,154**	**181,983**	**54,572**	**474,849**	**138,843**

* Excludes reactors with announced early shutdowns.

Table 2-17. Projected SNF Inventory for Assumed "New Builds"

Reactor [Unit]	Assumed Startup Year	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2019		Forecast Future Discharges 1/1/2020 to 12/31/2082		Total Projected Discharged Fuel	
		Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Initial Uranium (MT)
Vogtle 3	2021	-	-	-	-	3,586	1,517	3,586	1,517
Vogtle 4	2022	-	-	-	-	3,586	1,517	3,586	1,517
Totals		**-**	**-**	**-**	**-**	**7,172**	**3,034**	**7,172**	**3,034**

2.3.3 Alternative Scenario 2: Shutdown of all Reactors after Current License

Alternative Scenario 2 assumes that all reactors are shutdown at the end of their current license period. This is in contrast to the Reference Scenario which assumes a twenty-year license extension is obtained by all reactors that have not announced intentions otherwise.

Table 2-18 provides the scenario inventory by reactor type as a function of the estimate phase. Actual quantities are used for discharges to June 30, 2013. Forecast discharges are used for the individual reactors for later time periods.

Table 2-19 provides the scenario inventory detailed to provide actual discharges through December 31, 2012 from the GC-859 database and the projected quantities between 1/1/2013 and 12/31/2019, and between 1/1/2020 and the end of the scenario (2075), by major storage location category and by site Group.

The scenario totals approximately 457,460 assemblies containing 132,770 MTU. The assumptions in this scenario are projected to result in a reduction of 10,450 SNF assemblies totaling 3,100 MTU relative to the projections of the Reference Scenario.

This difference has been reduced compared to previous revisions due to the completion of several license renewals. Only 6 reactors (Clinton, Comanche Peak Units 1 and 2, Perry, and Watts Bar 1 and 2) do not have license extensions. Note: Diablo Canyon Units 1 and 2 do not have extended operating licenses but have announced shutdown dates coincident with the 40 year license expiration.

Table 2-18. Projected Commercial LWR SNF Inventory for Alternative Scenario 2 by Reactor Type*

Reactor Type	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/13 to 12/31/19		Forecast Discharges 1/1/20 to 12/31/75		Total Projected Discharged Fuel	
	Assemblies	Initial Uranium (MT)	Assemblies	Initial Uranium (MT)	Assemblies	Initial Uranium (MT)	Assemblies	Initial Uranium (MT)
PWR	103,605	44,894	22,175	9,730	73,379	32,361	199,159	86,986
BWR	136,533	24,293	30,779	5,424	90,990	16,070	258,302	45,787
Totals	**240,138**	**69,187**	**52,954**	**15,154**	**164,369**	**48,431**	**457,461**	**132,772**

*Includes Commercial LWR inventory at Morris and DOE sites, other than TMI-2 fuel debris.

Table 2-19. Projected SNF Inventory at Commercial LWRs and Morris for Alternative Scenario 2 by Site Group (Group Status as of 12/31/2019)

Description	Site Group	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2019		Forecast Discharges 1/1/2020 to 12/31/2075		Total Projected Discharged Fuel	
		Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)
Operating Reactors at Group C Sites (86 Rx/50 Sites)*	C	185,323	53,505	45,110	12,964	156,319	45,998	386,752	112,267
Operating Reactors at Group C Sites with Announced Shutdown Date (4 Rx/4 Sites)	C	7,091	2,320	1,595	566	1,486	541	10,172	3,427
Operating Reactors at Group B Sites (4 Rx/2 Sites)	B	11,098	2,606	2,438	599	6,178	1,718	19,714	4,923
Operating Reactors at Group B Sites with Announced Shutdown Date (2 Rx/1 Site)	B	2,815	1,280	648	293	386	175	3,849	1,748
Shutdown Reactors at Group B Sites (3 Rx/3 Sites)	B	3,933	647	-	-	-	-	3,933	647
Reactors Shutdown Since 2000 (10 Rx/8 Sites)	A	18,775	5,470	3,163	732	-	-	21,938	6,202
Reactors Shutdown Prior to 2000 (10 Rx/9 Sites)	A	7,660	2,815	-	-	-	-	7,660	2,815
Away From Reactor Wet Storage	F	3,217	674	-	-	-	-	3,217	674
Totals		**239,912**	**69,117**	**52,954**	**15,154**	**164,369**	**48,431**	**457,235**	**132,702**

* Excludes reactors with announced early shutdowns.

2.3.4 Alternative Scenario 3: New Reactors and a "Subsequent" License Renewal

Alternative Scenario 3 provides a reasonable, bounding inventory estimate by combining the additional inventory from new reactor operations (Vogtle Units 3 and 4, Scenario 1 above) and the additional inventory from nine reactors which have applications pending with the NRC for approval of a "subsequent" or an additional 20 year operating license renewal. These nine reactors are:

- Peach Bottom 2[i]
- Peach Bottom 3[j]
- Surry 1
- Surry 2
- North Anna 1
- North Anna 2
- Oconee 1
- Oconee 2
- Oconee 3

Table 2-20 provides the scenario inventory by reactor type as a function of the estimate phase. Actual quantities are used for discharges to June 30, 2013. Forecast discharges are used for the individual reactors for later time periods.

Table 2-21 provides the scenario inventory detailed for actual discharges through December 31, 2012 from the GC-859 database; the projected quantities between 1/1/2013 and 12/31/2019; and the projected quantities between 1/1/2020 and the end of the scenario (2082), by major storage location category and by site Group.

The scenario totals approximately 485,680 assemblies containing 142,270 MTU. The assumptions in this scenario are projected to result in a increase of 17,800 SNF assemblies totaling 6,390 MTU relative to the projections of the Reference Scenario.

The impact of the nine additional license renewals (subtracting the impact of the new reactors) is approximately 10,600 additional assemblies containing 3,350 MTU.

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[i] The NRC approved the "subsequent" or second 20 year operating license extension for Peach Bottom Units 2 and 3 on March 5, 2020 (after the 12/31/2019 data date for this report). The net effect of this approval is to increase the reference scenario by approximately 5,460 assemblies and 970 MTU, while decreasing this scenario impact (or delta) by the same amount.

[j] See footnote above.

Table 2-20. Projected Commercial LWR SNF Inventory for Alternative Scenario 3 by Reactor Type*

	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/13 to 12/31/19		Forecast Discharges 1/1/20 to 12/31/82		Total Projected Discharged Fuel	
Reactor Type	Assemblies	Initial Uranium (MT)	Assemblies	Initial Uranium (MT)	Assemblies	Initial Uranium (MT)	Assemblies	Initial Uranium (MT)
PWR	103,605	44,894	22,175	9,730	90,467	39,873	216,247	94,497
BWR	136,533	24,293	30,779	5,424	102,120	18,054	269,432	47,772
Totals	**240,138**	**69,187**	**52,954**	**15,154**	**192,587**	**57,928**	**485,679**	**142,269**

*Includes Commercial LWR inventory at Morris and DOE sites, other than TMI-2 fuel debris.

Table 2-21. Projected SNF Inventory at Commercial LWRs and Morris for Alternative Scenario 3 by Site Group (Group Status as of 12/31/2019)

Description	Site Group	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2019		Forecast Discharges 1/1/2020 to 12/31/2082		Total Projected Discharged Fuel	
		Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)
Operating Reactors at Group C Sites (86 Rx/50 Sites)*	C	185,323	53,505	45,110	12,964	177,365	52,461	407,798	118,730
Operating Reactors at Group C Sites with Announced Shutdown Date (4 Rx/4 Sites)	C	7,091	2,320	1,595	566	1,486	541	10,172	3,427
Operating Reactors at Group B Sites (4 Rx/2 Sites)	B	11,098	2,606	2,438	599	6,178	1,718	19,714	4,923
Operating Reactors at Group B Sites with Announced Shutdown Date (2 Rx/1 Site)	B	2,815	1,280	648	293	386	175	3,849	1,748
Shutdown Reactors at Group B Sites (3 Rx/3 Sites)	B	3,933	647	-	-	-	-	3,933	647
Reactors Shutdown Since 2000 (10 Rx/8 Sites)	A	18,775	5,470	3,163	732	-	-	21,938	6,202
Reactors Shutdown Prior to 2000 (10 Rx/9 Sites)	A	7,660	2,815	-	-	-	-	7,660	2,815
Away From Reactor Wet Storage	F	3,217	674	-	-	-	-	3,217	674
New Builds Under Construction		-	-	-	-	7,172	3,034	7,172	3,034
Totals		**239,912**	**69,117**	**52,954**	**15,154**	**192,587**	**57,928**	**485,453**	**142,199**

* Excludes reactors with announced early shutdowns.

2.3.5 Scenario Comparison Summary

The methods described previously have been extended to provide the forecast inventory based on a number of scenarios. Three alternative scenarios, in addition to the Reference Scenario have been included in the current report. A summary and comparison are provided in Table 2-22 to illustrate the impact of the scenario assumptions for each alternative scenario, relative to the Reference Scenario. The results of the alternative scenarios considered in this revision of the report indicate a potential inventory that may vary from the Reference Scenario by a reduction of over 10,000 assemblies (~3,100 MTU), in the case where all reactors shutdown after their current license period, to an increase of approximately 17,800 assemblies (~6,400 MTU), in the case where the two new reactors are added to the fleet and ten operating reactors (two approved, and 8 pending[k]) obtain a subsequent 20-years license extension.

[k] The NRC approved the "subsequent" or second 20 year operating license extension for Peach Bottom Units 2 and 3 on March 5, 2020 (after the 12/31/2019 data date for this report). The net effect of this approval is to increase the reference scenario by approximately 5,460 assemblies and 970 MTU, while decreasing this scenario impact (or delta) by the same amount.

Table 2-22. Summary Table of Projected Commercial LWR SNF Inventory at NPR Sites and Morris for Reference and Alternative Scenarios*

	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2019		Forecast Future Discharges 1/1/2020 to 12/31/2082		Total Projected Discharged Fuel		Delta from Reference	
Scenario	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Est. Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**
Reference Scenario 60 Year Operation unless Announced Otherwise	240,138	69,187	52,954	15,154	174,811	51,539	467,903	135,880	-	-
Scenario 1 Addition of 2 New Builds	240,138	69,187	52,954	15,154	181,983	54,573	475,075	139,914	**7,172**	**3,034**
Scenario 2 Shutdown at end of Current License Period	240,138	69,187	52,954	15,154	164,369	48,431	457,461	132,772	**(10,442)**	**(3,108)**
Scenario 3 Addition of 2 New Builds and 8 Additional Reactors Obtaining a Second 20 year License Renewal[1]	240,138	69,187	52,954	15,154	192,587	57,928	485,679	142,269	**17,776**	**6,389**

* Includes Commercial LWR inventory at Morris and DOE sites, other than TMI-2 fuel debris.

[1] The NRC approved the "subsequent" or second 20 year operating license extension for Peach Bottom Units 2 and 3 on March 5, 2020 (after the 12/31/2019 data date for this report). The net effect of this approval is to increase the reference scenario by approximately 5,460 assemblies and 970 MTU, while decreasing this scenario impact (or delta) by the same amount.

2.4 Commercial SNF Dry Storage Systems

SNF is initially stored at the nuclear plants in water-filled pools. Most of these pools were not designed for long term storage and many facilities have run out of capacity to store all the SNF in their pools. At these facilities, dry storage systems are utilized to store the SNF. As more facilities run out of pool storage and as reactors continue to generate SNF, the amount of dry storage is increasing. As of December 31, 2019, 3,158 dry storage fuel casks have been loaded at commercial reactor sites containing 134,307 SNF assemblies (~39,200 MT) (Table 2-6 and Appendix B). The distribution of SNF by storage method is provided in Figure 2-12, over 45% of the SNF assemblies are now in dry storage.

As of the end of 2019, only three sites (Three Mile Island [the only subgroup A3 site], Shearon Harris, and Wolf Creek) do not have dry storage capabilities. Dry storage operations at the South Texas Project began in early 2019. Three Mile Island and Wolf Creek have selected their dry storage technologies and initiated project activities.

In 2019, utilities loaded 222 dry storage canisters containing 9,400 assemblies, and over 3,100 MT of fuel. This compares favorably with prior year loadings, each of which set annual records (261 canisters in 2018, and 249 canisters in 2017). The amount of commercial SNF loaded exceeds the amount discharged by about 900 MT. This is likely due to the activities at power plants to accelerate spent pool fuel decommissioning.

SNF storage methods have changed since its inception and today there are three broad categories of storage methods: fuel assemblies in heavy composite wall casks which provide integral confinement and shielding (often called bare fuel casks), SNF in welded steel canisters loaded into storage/transportation overpacks and SNF in welded steel canisters stored in vented concrete storage overpacks which provide shielding for the SNF canister pending transportation. Table 2-23 provides the distribution by storage method.

Table 2-23 Dry Storage Method Distribution

Storage Method	Canisters/Casks	Assemblies
Bare Fuel Casks	229	10,702
Welded Canister in Storage/Transportation Overpacks	12	866
Weld Canisters in Concrete Storage Overpacks/Modules	2,917	122,739
Total	**3,158**	**134,307**

Only 12 welded canisters already loaded in storage/transportation overpacks are in use at 3 sites. These systems are no longer being loaded. See Table 2-24.

Table 2-24 Welded SNF Canisters in Storage/Transportation Overpacks

Reactor, Unit	Canisters	Assemblies
Humbolt Bay	5	390
Dresden, 1	4	272
Hatch	3	204
Total	**12**	**866**

Bare Fuel Casks (BFCs) are still in use and are being routinely loaded at Prairie Island and Peach Bottom. Table 2-25 provides details on these canisters. There are currently 229 BFCs in use containing 10,702 assemblies.

Table 2-25 Bare Fuel Casks by Reactor Site and Cask Vendor/Model

Reactor, Vendor/Model	Canisters	Assemblies
Surry Castor	26	558
Surry MC-10	1	24
Surry NAC 128S/T	2	56
Surry TN-32	26	832
McGuire TN-32	10	320
North Anna TN-32	28	896
Prairie Island TN-40	29	1,160
Prairie Island TN-40HT	15	600
Peach Bottom TN-68	92	6,256
Total	**229**	**10,702**

The majority (over 91%) of the SNF in dry storage is in welded canisters stored in concrete overpacks. These dry storage systems are referred to as vented concrete casks or modules. Table 2-26 provides the vendor distribution.

Figure 2-19 summarizes the current composition of SNF dry storage systems.

Table 2-26 Welded Canisters in Concrete Storage Overpacks by Vendor

Vendor	Canisters	Assemblies
Holtec	1,312	65,750
NAC	455	13,031
Transnuclear	1,085	42,126
Westinghouse/other	65	1,832
Total	**2,917**	**122,739**

Table 2-27 to 2-29 provides the storage systems used at the Group A and Group B shutdown sites [Leduc, 2012 updated to reflect current knowledge]. These tables also provide the transportation cask status for the anticipated storage cask [Leduc, 2012 updated to reflect current knowledge]. Except for Millstone 1, all the reactor sites listed in these tables have implemented a dry storage system. All fuel from the shutdown Millstone 1 reactor is currently still in wet storage. Dry storage operations at Millstone have thus far been limited to discharges from the two operating PWRs at this site.

An additional six casks are currently stored on the cask pad and two casks containing SNF from West Valley are stored on rail cars at CPP-2707 at INL. The TMI-2 core debris is currently stored in 29 casks at the TMI-2 ISFSI, also at INL. The Fort St. Vrain ISFSI stores 1,464 SNF elements in 244 canisters in a vault type storage system near Platteville, Colorado.

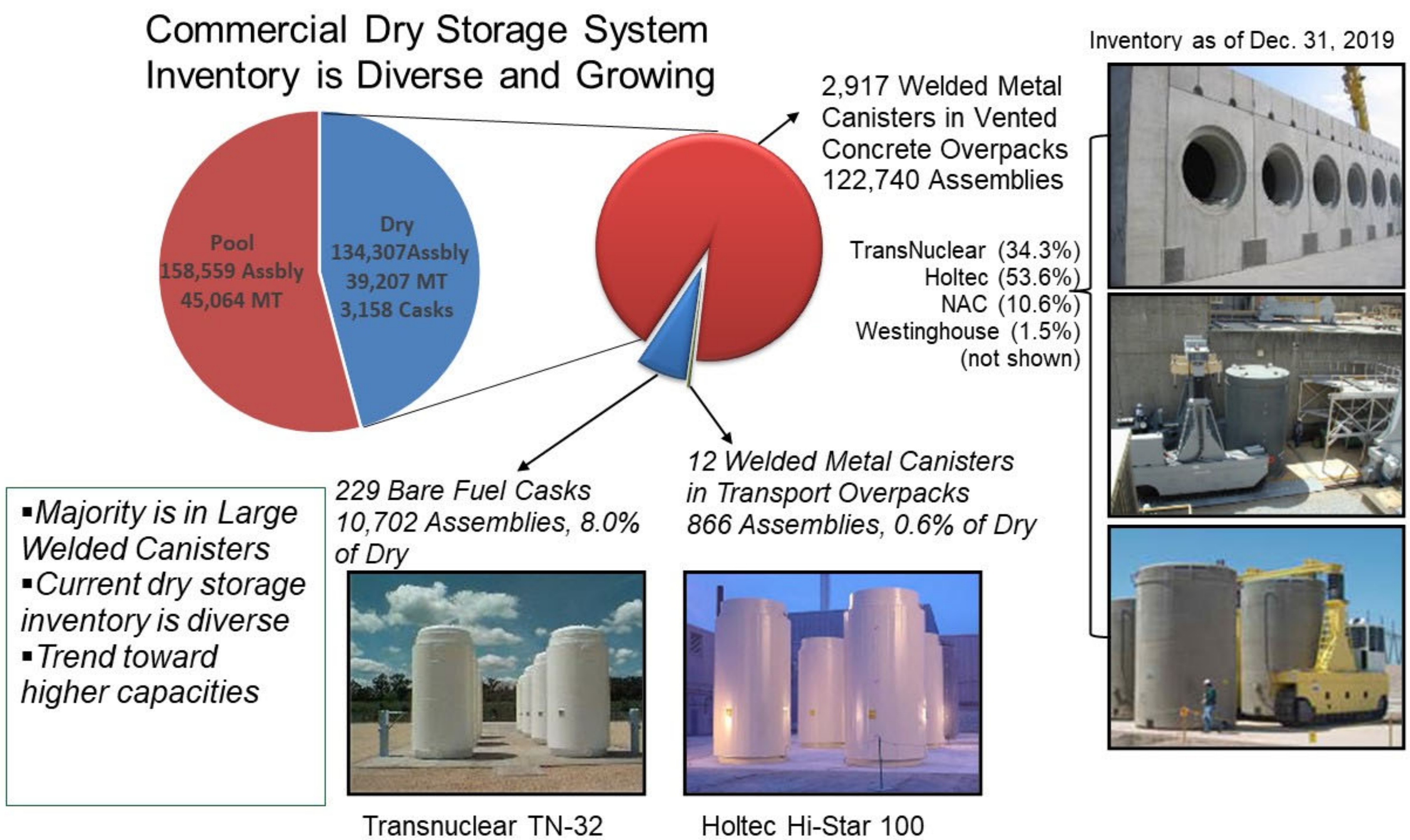

Figure 2-19 SNF Dry Storage Summary

Table 2-27. Cask Systems Used at Group A Sites Shutdown Prior to 2000

Reactor [Unit]	Type	ISFSI Load Dates[a]	Storage System/Canisters	Transport Cask Status
Big Rock Point	BWR	12/2002-03/2003	Fuel Solutions W150 Storage Overpack W74 Canister	TS-125 (Docket No. 71-9276); Certificate expires 10/31/2022 None fabricated
Haddam Neck	PWR	05/2004-03/2005	NAC-MPC/CY-MPC (26 Assy) canister	NAC-STC (Docket No. 71-9235); Certificate expires 5/31/2024. Foreign use versions fabricated.
Humboldt Bay 3	BWR	08/2008-12/2008	Holtec HI-STAR HB/MPC-HB canister	HI-STAR HB (Docket No. 71-9261); Certificate expires 4/30/2024. Fuel in canisters in fabricated casks. No impact limiters.
La Crosse	BWR	07/2012-09/2012	NAC MPC/LACBWR canister	NAC-STC (Docket No. 71-9235); Certificate expires 5/31/2024. Foreign use versions fabricated.
Maine Yankee	PWR	08/2002-03/2004	NAC-UMS/UMS-24 canister	NAC-UMS Universal Transport Cask (Docket No. 71-9270); Certificate expires 10/31/2020. None fabricated
Rancho Seco	PWR	04/2001-08/2002	TN Standardized NUHOMS/FO-DSC, FC-DSC, and FF DSC canisters	NUHOMS MP187 (Docket No. 71-9255); Certificate expires 11/30/2023. One cask fabricated. No impact limiters.
Trojan	PWR	12/2002-09/2003	TranStor Storage Overpack/Holtec MPC-24E and MPC-24EF canisters	HI-STAR 100 (Docket No. 71-9261) Certificate expires 4/30/2024. Units fabricated but dedicated to storage at other sites. No impact limiters
Yankee Rowe	PWR	06/2002-06/2003	NAC-MPC/Yankee-MPC canister	NAC-STC (Docket No. 71-9235); Certificate expires 05/31/2024. Foreign use versions fabricated
Zion 1 & 2	PWR	2013-2016	NAC MAGNASTOR/TSC 37 canister	NAC MAGNATRAN (Docket No. 71-9356); Certificate expires 4/30/2024. No units fabricated.

a. Dates represent the dates that the spent nuclear fuel was transferred to the ISFSI.

Table 2-28. Cask Systems Used at Group A Sites Shutdown After 2000

Reactor [Unit]	Type	ISFSI Load Dates[a]	Storage System/Canisters	Transport Cask Status
Crystal River 3	PWR	2017-2018	TransNuclear, Standardized NUHOMS 32PTH1 storage canister, in a Horizontal Concrete Overpack	TN MP197HB (Docket No. 71-9302) Certificate expires 8/31/2022. One unit started fabrication which has resumed.
Fort Calhoun	PWR	2006-??	TransNuclear, Standardized NUHOMS 32PT-S100 storage canister, in a Horizontal Concrete Overpack	TN MP197 (Docket No. 71-9302); Certificate expires 8/31/2022. None available. The TN MP197HB may be used if available.
Kewaunee	PWR	2009-2017	TransNuclear, Standardized NUHOMS 32PT-S100 storage canister, in a Horizontal Concrete Overpack Kewaunee also loaded the NAC MAGNASTOR 37 PWR assembly canister	TN MP197HB (Docket No. 71-9302); Certificate expires 8/31/2022. One unit started fabrication which has resumed. NAC MAGNATRAN (Docket 71-9356) license issued 4/5/2019. None fabricated
Oyster Creek	BWR	2002-??	TransNuclear, Standardized NUHOMS 61BT and 61BTH canisters	TN MP197HB (Docket No. 71-9302); Certificate expires 8/31/2022. One unit started fabrication which has resumed
Pilgrim	BWR	2015-?	HI-STORM 100 Vertical Concrete Storage Cask containing MPC-68 Canisters	HI-STAR 100 (Docket No. 71-9261) Certificate expires 4/30/2024. No impact limiters
San Onofre	PWR	2003-??	TransNuclear, Advanced NUHOMS 24PT1 and 24 PT4 storage canister, in a Horizontal Concrete Overpack SONGS is currently loading the Holtec UMAX MPC-37 canister	NUHOMS MP187 (Docket No. 71-9255); Certificate expires 11/30/2023. One cask fabricated. No impact limiters. TN MP197HB (Docket No. 71-9302); Certificate expires 8/31/2022. One unit started fabrication which has resumed. HI-STAR 190 (Docket No. 71-9373), Certificate expires 8/31/2022. None fabricated.
Vermont Yankee	BWR	2008-2018	HI-STORM 100 Vertical Concrete Storage Cask containing MPC-68 and MPC-68M DSC canisters	HI-STAR 100 (Docket No. 71-9261) Certificate expires 4/30/2024. No impact limiters

a. Dates represent the dates that the spent nuclear fuel was transferred to the ISFSI.

Table 2-29. Cask Systems Used at Shutdown Reactors at Group B Sites

Reactor [Unit]	Type	ISFSI Load Dates[a]	Storage System/Canisters	Transport Cask Status
Dresden 1	BWR	2000-ongoing	HI-STORM Vertical Concrete Storage Cask containing MPC-68 canisters. Four HI-STAR 100 casks are used to store some fuel from Dresden 1.	HI-STAR 100 (Docket No. 71-9261) Certificate expires 4/30/2024. No impact limiters fabricated
Indian Point 1	PWR	2008	HI-STORM Vertical Concrete Storage Cask containing MPC-32 canisters	HI-STAR 100 (Docket No. 71-9261) Certificate expires 4/30/2024. No impact limiters fabricated
Millstone 1	BWR	N/A	All BWR fuel at the Millstone is currently in pool storage.	N/A

a. Dates represent the dates that the spent nuclear fuel was transferred to the ISFSI.

2.5 Commercial Spent Nuclear Fuel Characteristics

To date SNF has been discharged with burnup ranging from less than 20 gigawatt-days per metric ton (GWd/MT) and projected to approach 60 GWd/MT. Tables 2-30 through 2-33 and Figures 2-20 to 2-23 present the radionuclide decay heat for the 40 and 60 GWd/MT burnup PWR and 30 and 50 GWd/MT BWR as representative fuels. The figures and tables provide the total decay heat and decay heat by isotopic groups with similar isotopic parameters. Discharged fuel compositions (in g/MT) for representative fuels are available in Appendix C of the Used Fuel Disposition Campaign (UFDC) Inventory report [Carter, 2013].

Table 2-30. PWR 40 GWd/MT Spent Fuel Decay Heat

Elements	Decay Heat (Watts/MT)							
	Time (years)							
	1	10	30	50	70	100	300	500
Gases H, C, Xe, Kr, I	0	0	0	0	0	0	0	0
Cs/Sr/Ba/Rb/Y	2,765	1,054	566	354	222	110	1	0
Noble Metals Ag, Pd, Ru, Rh	2,752	11	0	0	0	0	0	0
Lanthanides La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Ho, Tm	3,593	64	10	2	0	0	0	0
Actinides Ac, Th, Pa, U	0	0	0	0	0	0	0	0
Transuranic Np, Pu, Am, Cm, Bk, Cf, Es	819	348	332	309	287	258	159	116
Others	515	15	2	1	0	0	0	0
Totals	**10,444**	**1,492**	**910**	**666**	**509**	**368**	**160**	**116**

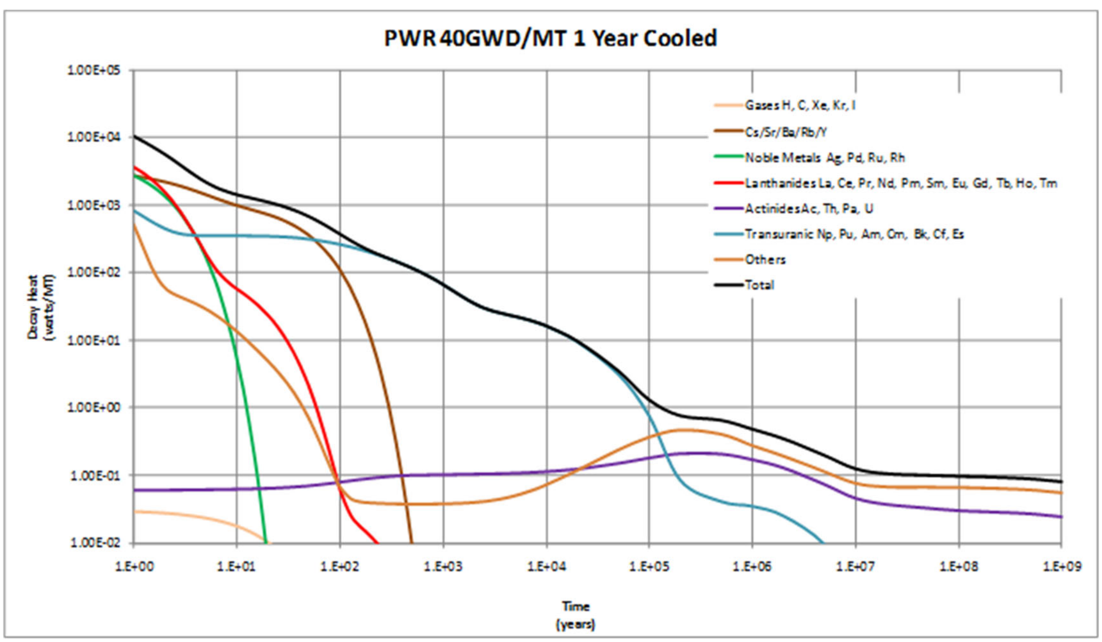

Figure 2-20. PWR 40 GWd/MT Spent Fuel Decay Heat.

Table 2-31. PWR 60 GWd/MT Spent Fuel Decay Heat

Elements	Decay Heat (Watts/MT)							
	Time (years)							
	1	10	30	50	70	100	300	500
Gases H, C, Xe, Kr, I	0	0	0	0	0	0	0	0
Cs/Sr/Ba/Rb/Y	4,608	1,576	824	516	323	160	1	0
Noble Metals Ag, Pd, Ru, Rh	3,447	14	0	0	0	0	0	0
Lanthanides La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Ho, Tm	3,843	109	17	3	1	0	0	0
Actinides Ac, Th, Pa, U	0	0	0	0	0	0	0	0
Transuranic Np, Pu, Am, Cm, Bk, Cf, Es	1,515	785	613	516	449	381	199	139
Others	522	21	3	1	0	0	0	0
Totals	**13,936**	**2,505**	**1,458**	**1,036**	**773**	**541**	**201**	**139**

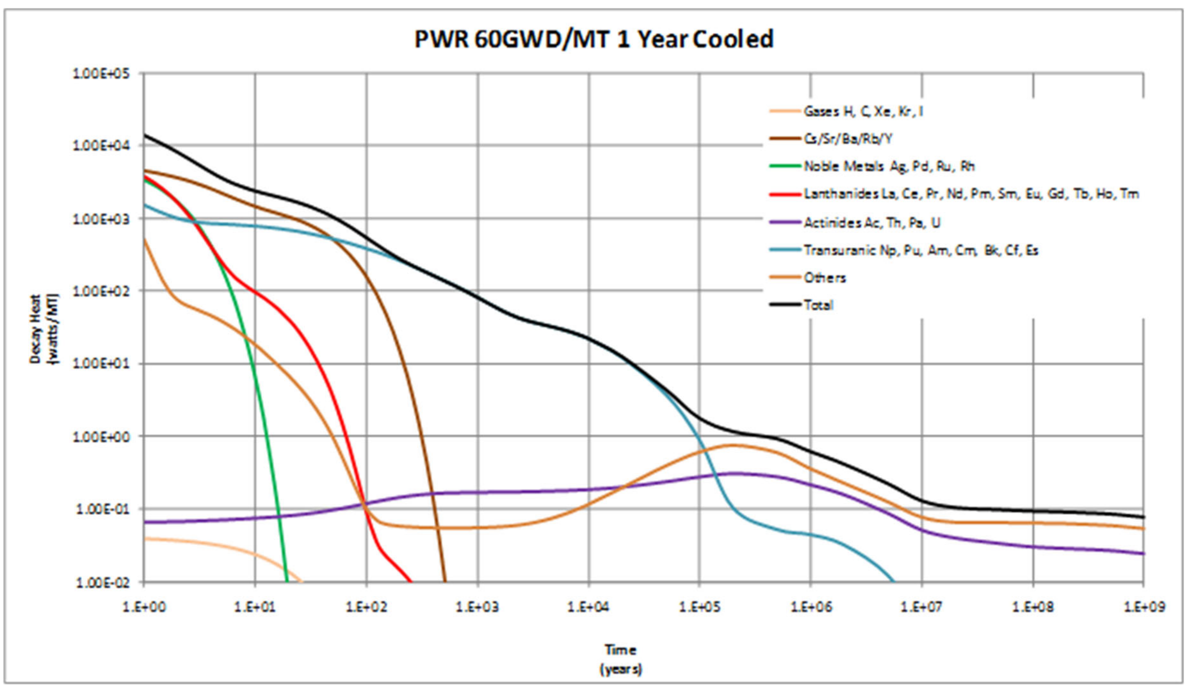

Figure 2-21. PWR 60 GWd/MT Spent Fuel Decay Heat.

Table 2-32. BWR 30 GWd/MT Spent Fuel Decay Heat

Elements	Decay Heat (Watts/MT)							
	Time (years)							
	1	10	30	50	70	100	300	500
Gases H, C, Xe, Kr, I	0	0	0	0	0	0	0	0
Cs/Sr/Ba/Rb/Y	1,895	778	425	266	166	82	1	0
Noble Metals Ag, Pd, Ru, Rh	2,042	8	0	0	0	0	0	0
Lanthanides La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Ho, Tm	2,675	43	6	1	0	0	0	0
Actinides Ac, Th, Pa, U	0	0	0	0	0	0	0	0
Transuranic Np, Pu, Am, Cm, Bk, Cf, Es	588	225	234	225	213	196	127	94
Others	403	12	2	0	0	0	0	0
Totals	**7,603**	**1,067**	**667**	**493**	**380**	**278**	**128**	**94**

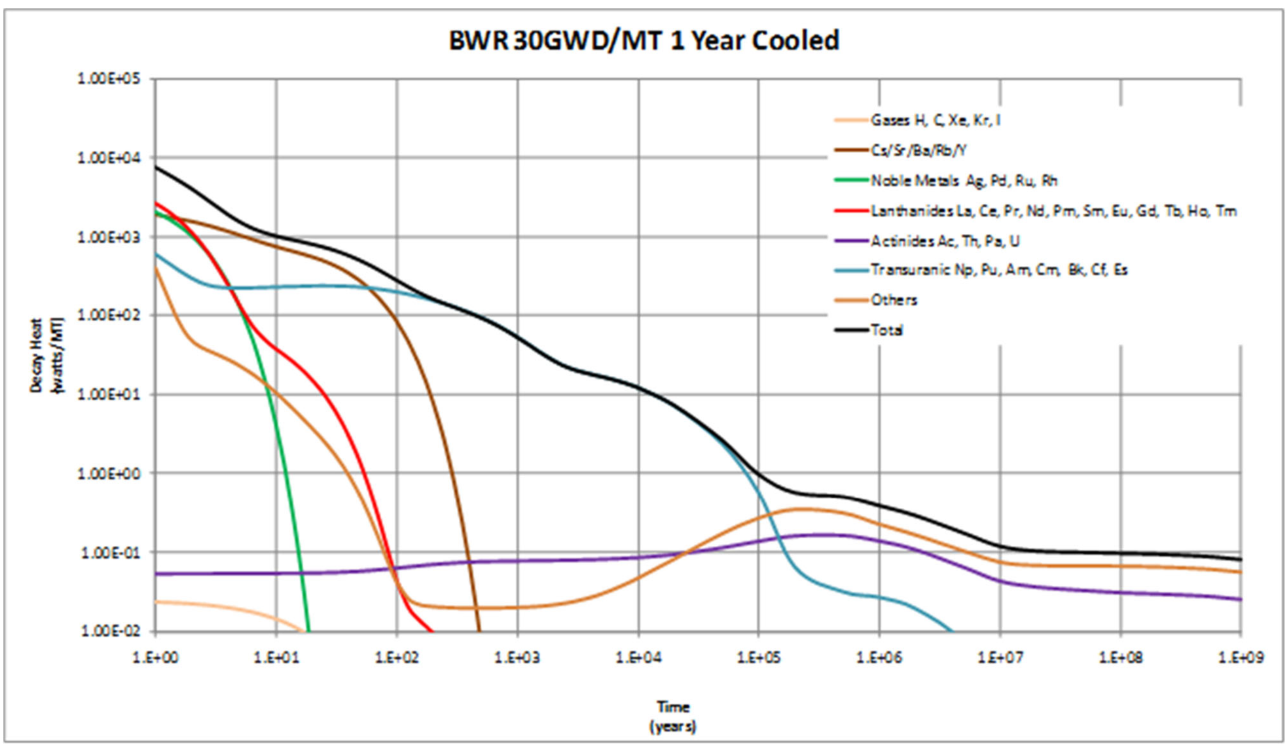

Figure 2-22. BWR 30 GWd/MT Spent Fuel Decay Heat.

Table 2-33. BWR 50 GWd/MT Spent Fuel Decay Heat

Elements	Decay Heat (Watts/MT)							
	Time (years)							
	1	10	30	50	70	100	300	500
Gases H, C, Xe, Kr, I	0	0	0	0	0	0	0	0
Cs/Sr/Ba/Rb/Y	3,558	1,257	662	414	259	128	1	0
Noble Metals Ag, Pd, Ru, Rh	2,669	11	0	0	0	0	0	0
Lanthanides La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Ho, Tm	2,734	92	14	3	1	0	0	0
Actinides Ac, Th, Pa, U	0	0	0	0	0	0	0	0
Transuranic Np, Pu, Am, Cm, Bk, Cf, Es	1,627	760	591	496	433	369	199	139
Others	420	17	2	1	0	0	0	0
Totals	**11,008**	**2,137**	**1,271**	**914**	**693**	**498**	**200**	**139**

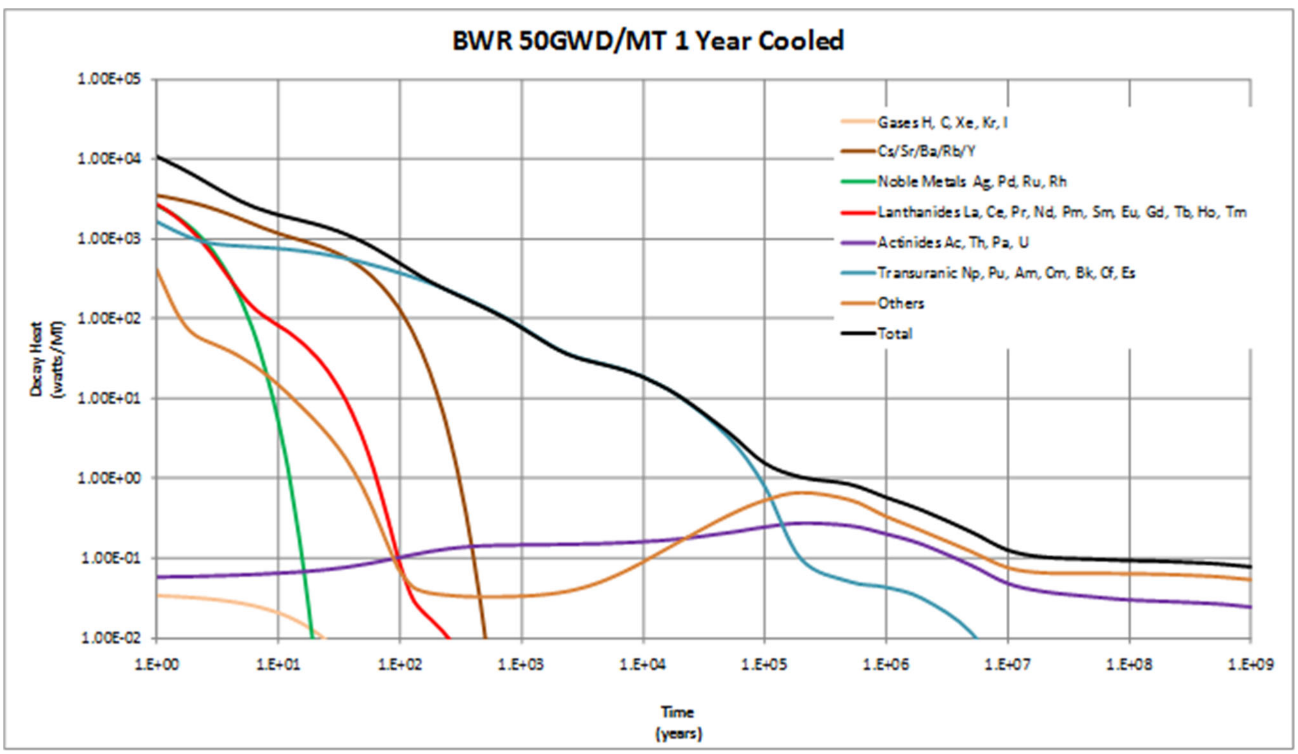

Figure 2-23. BWR 50 GWd/MT Spent Fuel Decay Heat.

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3. NON-COMMERCIAL SNF AND REPROCESSING WASTE

Since the inception of nuclear reactors, the DOE and its predecessor agencies operated or sponsored a variety of production, research, test, training, and other experimental reactors both domestically and overseas. The Naval Nuclear Propulsion Program (NNPP) has generated SNF from operation of nuclear-powered submarines and surface ships, operation of land-based prototype reactor plants, operation of moored training ship reactor plants, early development of commercial nuclear power, and irradiation test programs. Aqueous reprocessing of SNF has occurred at the Hanford Site, the INL, and the SRS. The INL is using electro-chemical processing to treat up to 60 MTHM of sodium bonded SNF.

The waste requiring disposition from these activities are fairly well understood and documented. This section summarizes these radioactive materials summarized as follows:

- Non-Commercial SNF (aside from Naval SNF discussed in Section 3.2),
- Naval SNF,
- Defense waste from fuel processing in liquid and dry waste forms, including vitrified reprocessing waste in canisters.

3.1 Non-Commercial Spent Nuclear Fuel

Since the inception of nuclear reactors, the DOE and its predecessor agencies operated or sponsored a variety of research, test, training, and other experimental reactors with different characteristics from the commercial power reactors of today. SNF generated in production reactors supported defense programs and other isotope production programs. An example of SNF existing today from production reactors is the N Reactor SNF stored at Hanford.

DOE has sponsored nuclear research activities in the U.S. and overseas. There are numerous university and government research reactor sites within the United States (See Section 4). SNF from research reactors is stored primarily at the INL and SRS. Examples of research reactor SNF being stored within the DOE complex include the High-Flux Beam Reactor SNF stored at the SRS; the Fast Flux Test Facility SNF stored at Hanford and the INL; training, research, and isotope reactors (built by General Atomics) SNF stored at Hanford and the INL; and the Advanced Test Reactor SNF stored at the INL. Additional research reactor SNF is being returned to the U.S. from foreign research reactors as part of the DOE Foreign Research Reactor Spent Nuclear Fuel Return Program.

3.1.1 Non-Commercial SNF Inventory

The source of current inventory data for this study is the Spent Fuel Database (SFD) maintained by the National Spent Nuclear Fuel Program at the INL [NSNFP, 2020]. The current total inventory of non-commercial SNF is approximately 2,273 MTHM. This quantity does not include any Naval spent nuclear fuel (see section 3.2) nor the 174 MTHM of spent fuel of commercial origin (See Section 2.1.2). DOE continues to operate several research reactors and will be receiving SNF from universities and the foreign research reactor return program. Projected material amounts (out to 2035) are relatively small (about 14 MTHM) and there is some uncertainty as to the total amount that will be generated or received.

Non-commercial SNF comes from a wide range of reactor types, such as light- and heavy-water-moderated reactors, graphite-moderated reactors, and breeder reactors, with various cladding materials and enrichments, varying from depleted uranium to over 93% enriched ^{235}U. Many of these reactors, now decommissioned, had unique design features, such as core configuration, fuel element and assembly geometry, moderator and coolant materials, operational characteristics, and neutron spatial and spectral properties.

As described below, there is a large diversity of reactor and fuel designs. In addition, there is a relatively large number (over 215,000) of fuel pieces or assemblies, which range from many pieces for some reactors (N Reactor) to a few individual pieces for other unique reactors (Chicago Pile-5 converter cylinders).

There are several hundred distinct types of non-commercial SNF. This SNF inventory was reduced to 34 groups based on fuel matrix, cladding, cladding condition, and enrichment. These parameters were selected because of their potential relevance to supporting system-level evaluations.

A discussion of each of the 34 groupings is presented in Appendix D of UFDC Inventory [Carter, 2013]. The discussions of each of the 34 groups provide a description of the fuel group and an example of fuel that makes up the group. When appropriate, a more detailed description of a fuel with the largest percentage of MTHM within each group is provided. This discussion is not intended to address each fuel in the group.

Appendix D Table D-1 of UFDC Inventory [Carter, 2013] describes the typical ranges of the nominal properties for non-commercial SNF in the 34 groups.

3.1.2 Non-Commercial SNF Radionuclide Inventory

Process knowledge and the best available information regarding fuel fabrication, operations, and storage for DOE SNF are used to develop a conservative source-term estimate. The DOE SNF characterization process relies on pre-calculated results that provide radionuclide inventories for typical SNF at a range of decay times. These results are used as templates that are scaled to estimate radionuclide inventories for other similar fuels.

To estimate an SNF source term, the appropriate template is selected to model the production of activation products and transuranics by matching the reactor moderator and fuel cladding, constituents, and beginning-of-life enrichment. Pre-calculated radionuclide inventories are extracted from the appropriate template at the desired decay period and then scaled to account for differences in fuel mass and specific burnup. Appendix A of "DOE Managed Waste" [Wilson, 2016] lists the projected radionuclide inventory of non-commercial SNF for the nominal and bounding cases as of 2010. The nominal case is the expected or average inventory. The bounding case represents the highest burnup assembly or accounts for uncertainties if fuel burnup is not known.

From the SFD [NSNFP, 2020], the total estimated nominal radionuclide inventory is 110 million Ci for the year 2030. The estimated bounding radionuclide inventory is 224 million Ci for the year 2030. The nominal case is the expected or average inventory. The bounding case represents the highest burnup assembly or accounts for uncertainties if fuel burnup is not known.

3.1.3 Non-Commercial SNF Storage/Canisters

Non-commercial SNF has been stored throughout the U.S. at numerous facilities. A decision was made in 1995 to consolidate the material at three existing DOE sites; Hanford Site in Washington (2,127 MT), the INL in Idaho (114 MT), and the SRS in South Carolina (27 MT). The vast majority of non-commercial SNF is currently stored at these three sites. The storage configurations vary for each of the sites and include both dry and wet storage. On a MTHM basis, a large portion (~2,100 MT) of the SNF is contained in about 388 Multicanister Overpacks (MCO) at the Hanford site. The MCO is a sealed, stainless steel canister which is about 24 inches in diameter and about 14 feet long.

For the remaining non-commercial SNF, a standard disposal canister design was developed which included canisters of 18- and 24-inch diameters and 10- and 15-foot lengths. Because of uncertainty in disposal and packaging efficiencies, the total number of canisters to be generated ranged from about 50% to 160% of a point estimate of 2,524. Currently, no SNF has been packaged into the standardized disposal canister design.

The radionuclide inventory and resulting decay heat was calculated for the year 2030 based on the estimated radionuclide inventory as described in Section 3.1.2. The decay heat per canister is calculated as the estimated decay heat associated with each fuel record divided by the number of canisters (unrounded) required for the fuel (based on volume). These values are considered adequate for this scoping evaluation.

Table 3-1 provides the distribution of standard canisters based on the 2030 nominal decay heat using the 2,524 nominal total canister count. Table 3-1 provides detail for the non-commercial SNF. The 2030 data indicate over 60% of the DOE SNF canisters will be generating decay heat of less than 100 watts. About 95% of the DOE SNF canisters will be generating decay heat less than 300 watts. Nearly all the DOE SNF canisters (>99%) will be generating less than 1 kW. Since the methodology used to calculate the radionuclide inventory is very conservative, some fuels have radionuclide amounts based on bounding assumptions resulting in extreme decay heat values.

Table 3-1. Non-Commercial Spent Nuclear Fuel* Canister Decay Heat in 2030 [NSNFP, 2020]

	Non-Commercial SNF	
Decay heat per canister (watts)	**Number of canisters[m]**	**Cumulative %**
<50	1,134	44.9%
50 - 100	492	64.4%
100 - 220	675	91.1%
220 - 300	105	95.2%
300 - 500	96	99.0%
500 - 1000	15	99.6%
1000 - 1500	3	99.7%
1500 - 2000	1	99.7%
>2000	7	100.0%
Total	**2,524**	

[m] [m] The fractional canister counts from the application of a loading algorithm in the SFD database have been rounded up to the whole canister. These provide a relative comparison for the quantities in each decay heat range and do not represent a future "as loaded" condition. These do not sum to the "Total" provided by the SFD database. The Cumulative percentages use the algorithm values.

3.2 Naval SNF

The NNPP has generated SNF from operation of nuclear-powered submarines and surface ships, operation of land-based prototype reactor plants, operation of moored training ship reactor plants, early development of commercial nuclear power, and irradiation test programs. The source of naval SNF information for this report is the unclassified portion of the Yucca Mountain Repository License Application [DOE, 2008] and an evaluation report on options for permanent geologic disposal of spent nuclear fuel and HLW [SNL, 2014]. Since most details regarding naval SNF are classified, only limited information is presented herein.[n]

3.2.1 Naval SNF Inventory

Naval SNF consists of solid metal and metallic components that are nonflammable, highly corrosion-resistant, and neither pyrophoric, explosive, combustible, chemically reactive, nor subject to gas generation by chemical reaction or off-gassing. Approximately 37 MTHM of Naval SNF currently exists with a projected inventory of less than 65 MTHM in 2035.

New naval nuclear fuel is highly enriched uranium. As a result of the high uranium enrichment, very small amounts of transuranics (TRU) are generated by end of life when compared to commercial SNF.

3.2.1.1 *Naval SNF Radionuclide Inventory*

Each naval SNF canister is loaded such that thermal, shielding, criticality, and other characteristics of the received waste will be within the proposed repository waste acceptance requirement limits. As a result, a radionuclide inventory for a representative naval SNF canister, five years after reactor shutdown, was developed for use in the repository source term analyses (UFD Inventory Appendix E, Table E-1 [Carter, 2013]). Different packaging designs may be needed dependent upon the future disposal options.

3.2.1.2 *Naval SNF Storage/Canisters*

SNF from the NNPP is temporarily stored at the INL. To accommodate different naval fuel assembly designs, naval SNF is loaded in either a naval short SNF canister or a naval long SNF canister. Both were sized to fit within the proposed design for the Yucca Mountain repository waste package.

The outer diameter of the naval SNF canister is 66 in. nominal (66.5 inches maximum). The maximum external dimensions ensure naval SNF canisters fit into the waste packages. The naval short SNF canister is 185.5 inches (nominal) in length (187 inches maximum), and the naval long SNF canister is 210.5 inches (nominal) in length (212 inches maximum). Except for length, the geometry of the naval SNF canisters are identical.

Approximately 400 naval SNF canisters (310 long and 90 short) are currently planned to be packaged and temporarily stored pending shipment. The average thermal load is 4,250 watts/container. The maximum heat load of all containers will be under the 11,800 watts/container limit established for Yucca Mountain. The NNPP is responsible for preparing and loading naval SNF canisters and began canister loading operations in 2002. As of December 31, 2019, 177 naval SNF canisters have been loaded and are being temporarily stored at INL. Table 3-2 provides the distribution of Naval SNF canisters based on nominal decay heat. [SNL, 2014]

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[n] Before using the information in this section for studies involving naval SNF, contact the NNPP Program Manager, Naval Spent Nuclear Fuel at (202) 781-5903.

Table 3-2. Naval SNF Canister Decay Heat

Decay heat per canister (watts)	Number of canisters	Cumulative %
500 to 1000	13	3.3%
1000 to 2500	36	12.3%
2500 to 5000	94	35.8%
>5000	257	100.0%
Total	**400**	

3.3 Defense Reprocessing Waste

High-level radioactive waste[o] is the highly radioactive material resulting from the reprocessing of SNF including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations; and other highly radioactive material that is determined, consistent with existing law, to require permanent isolation. Aqueous reprocessing waste is in a liquid form and historically has been stored in underground metal storage tanks. Long term storage of reprocessing waste requires stabilization of the wastes into a form that will not react, nor degrade, for an extended period of time. Two treatment methods used for stabilization of the waste are vitrification or calcination. Vitrification is the transition of the reprocessing waste into a glass by mixing with a combination of silica sand and other constituents or glass forming chemicals that are melted together and poured into stainless steel canisters. Glass canisters have a nominal diameter of 2 feet and have heights of 10 or 15 feet. Calcination of reprocessing waste is accomplished by injecting the waste with calcining additives into a fluidized bed to evaporate the water and decompose the remaining constituents into a granular solid material.

In addition to aqueous reprocessing, the INL is using electro-chemical processing to treat up to 60 MTHM of sodium bonded SNF. The process converts the bond sodium into sodium chloride and separates the SNF into a uranium product and reprocessing waste. The reprocessing waste is produced in two forms, ceramic and metal. The ceramic waste form primarily contains the salt electrolyte with active metal fission products and the metal waste is primarily the cladding hulls and undissolved noble metals. The process has been demonstrated and used to treat about 4 MTHM of sodium bonded SNF to date.

3.3.1 Current Defense Reprocessing Waste Inventory

The sources of inventory data for this report includes information collected by the Department's OCRWM for the Yucca Mountain License Application [DOE, 2008] and recent site treatment plans. [DOE, 2017; Chew, 2019]

The INL reprocessed SNF from naval propulsion reactors, test reactors, and research reactors to recover uranium and generated approximately 30,000 m^3 of liquid reprocessing waste. Between 1960 and 1997, the INL converted all of their liquid reprocessing waste into about 4,400 m^3 of a solid waste form called calcine (a granular solid with the consistency of powder laundry soap). These solids are stored retrievably on-site in stainless steel bins (like grain silos but smaller) within concrete vaults.

[o] This report does not necessarily reflect official classifications for the material being discussed; for example, material referred to as "HLW" or "SNF" may be managed as HLW and SNF, respectively, without having been actually classified as such.

The SRS has reprocessed defense reactor SNF and nuclear targets to recover valuable isotopes since 1954 producing more than 600,000 m^3 of liquid reprocessing waste. Through evaporation and vitrification of the waste, SRS has reduced this inventory to the current level about 133,000 m^3 of liquid reprocessing waste. [Chew, 2016] SRS began vitrifying reprocessing waste in 1996 and through December 31, 2019 has produced 4,210 vitrified waste canisters (2 feet × 10 feet).

The Hanford Site reprocessed defense reactor SNF since the 1940s and has generated about 220,000 m^3 of liquid reprocessing waste to recover the plutonium, uranium, and other elements for defense and other federal programs. Construction of a vitrification facility is currently underway. Table 3-3 summarizes the current reprocessing inventory.

Table 3-3. Current Reprocessing Waste Inventory

Site	Vitrified Waste Canisters[1]	Liquid Reprocessing Waste[2] (m^3)	Dry Reprocessing Waste[3] (m^3)
Hanford	N/A	220,000	N/A
INL	N/A	N/A	4,400
SRS	4,210[4]	133,000	N/A

1. Vitrified Reprocessing Waste in stainless steel canisters.
2. Reprocessing Waste stored in tanks.
3. Calcined reprocessing waste stored in bins.
4. Produced through December 31, 2019. Source: "DWPF Operations Summary Report" SRR-RP-2019-00003-246, December 27, 2019 05:00 hrs to December 30, 2019 05:00.

The Hanford Site encapsulated Cs and Sr separated from the liquid waste between 1974 and 1985. Some of these capsules were leased to companies as radiation sources. After one of the capsules developed a microscopic leak, the capsules were recalled. Hanford is storing 1,335 Cs capsules and 601 Sr capsules, which contained approximately 109 million curies at the time of production. Table 3-4 provides the capsule inventory broken down by decay heat load. Decay heat continues to decrease and as of 1/1/2020 the total radioactivity has been reduced to approximately 42M Ci with decay continuing to approximately 24 million curies by January 2043 [Covey, 2002].

The Hanford Tank Closure and Waste Management FEIS evaluated selected disposition pathways for the capsule contents. One alternative evaluated was conversion to glass. In this scenario, the capsule contents have potential to generate an additional 340 vitrified reprocessing waste canisters.

No decision has been made on the disposition of the Cs/Sr capsules. At present, DOE is working to construct a dry storage facility to replace wet storage in Waste Encapsulation and Storage Facility (WESF). After transferring the 1,936 capsules to dry storage, they would be safely stored until a future decision on disposition is made.

Table 3-4. Hanford Site Encapsulated Cs and Sr Inventory Distribution as of 1/1/2020

Decay heat per canister (watts)	Cs Capsules		Sr Capsules		Total Capsules	
	Number of canisters	Cumulative %	Number of canisters	Cumulative %	Number of canisters	Cumulative %
<50	3	0.2%	64	10.6%	67	3.5%
50 – 100	232	17.6%	125	31.4%	357	21.9%
100 – 200	1,100	100.0%	298	81.0%	1,398	94.1%
200 - 300	-	100.0%	105	98.5%	105	99.5%
300 - 500	-	100.0%	9	100.0%	9	100.0%
500 - 1000	-	100.0%	-	100.0%	-	100.0%
1000 - 1500	-	100.0%	-	100.0%	-	100.0%
1500 - 2000	-	100.0%	-	100.0%	-	100.0%
>2000	-	100.0%	-	100.0%	-	100.0%
Total Canisters	**1,335**		**601**		**1,936**	
Total Decay Heat (watts)	**144,421**		**85,508**		**229,930**	

3.3.2 Projected Defense Reprocessing Waste Inventory

SRS currently has the only operating reprocessing facility in the United States, H Canyon. It is estimated that an additional 12,000 m^3 of liquid reprocessing waste may be generated with continued canyon operations [Chew, 2019] (approximately 2026, including H-Canyon shutdown flows).

The projected number of vitrified reprocessing waste canisters to be generated at each site will be dependent on actual loading and final waste form. Because of this uncertainty, the actual number of reprocessing waste canisters produced may vary significantly from what is anticipated today.

SRS began conversion of the liquid defense waste into borosilicate glass in 1996 and is the only DOE site with vitrified waste in a packaged configuration. A total of 4,210 canisters have been produced through December 31, 2019. Therefore, the SRS inventory can be described as those canisters in the current inventory and those projected from future operations. Decay heat of the current inventory is based on radiological inventories contained in the production records for those canisters. The decay heat of future canisters is estimated based on the radionuclide composition of the reprocessing waste inventory remaining in the liquid waste storage tanks. The radionuclide and resulting decay heat is calculated based on the year the canister is/will be produced. The total Savannah River canister count is based on information supporting Savannah River Liquid Waste Disposition Plan revision 21 which assumes a Salt Waste Processing Facility start-up date of FY-20.

Table 3-5 provides the projected canister distribution of SRS canisters based on the nominal decay heat at the time of production. The data indicate: about 33% of the Savannah River canisters will be generating less than 50 watts; 96% of the Savannah River canisters will be generating less than 300 watts; all the SRS canisters will be generating less than 500 watts.

Table 3-5. Savannah River Canister Decay Heat Distribution (projected)

Savannah River		
Decay heat per canister (watts)	**Number of canisters**	**Cumulative %**
<50	2,625	32.3%
50 – 100	984	44.4%
100 – 200	3,664	89.6%
200 – 300	540	96.2%
300 – 500	308	100.0%
500 – 1000	0	100.0%
1000 – 1500	0	100.0%
1500 – 2000	0	100.0%
>2000	0	100.0%
Totals	**8,121**	
Total Decay Heat (watts)	**846,926**	

The Hanford Waste Treatment Project (WTP) is currently under construction and therefore the Hanford borosilicate glass canisters are based on a reference baseline inventory for their future production taken from *River Protection Project System Plan*, Revision 8 [DOE, 2017] as 7,800 canisters of glass and 8,400 TRU waste drums. System Plan Revision 8 includes 11 different scenarios with glass canister production ranging from 7,200 (Scenario 4) to 63,600 (Scenario 3). Scenario 2 assumes DOE does not elect to pursue Contact-Handled Transuranic (CH-TRU) waste treatment which results in an estimated 11,400 canisters.

Scenario 2 is similar to 11,079 canisters estimated by the January 2011 Waste Treatment Plant document titled "2010 Tank Utilization Assessment". This tank utilization assessment includes individual canister specific decay heat values which are summarized in Table 3-6 indicating 85% of the Hanford canisters will be generating less than 50 watts; and 100% of the Hanford canisters will be generating less than 300 watts. Since the Hanford system plan baseline (Scenario 1[p]) results in about 3,279 fewer canisters (29.6%) and the CH-TRU waste drums will not contain significant decay heat products, the decay heat values resulting from the current Hanford baseline will result in approximately 30% increase in each decay heat value group in Table 3-6.

At INL several options were considered for ultimate disposal of the calcine. Alternatives included direct disposal, vitrification, or hot isostatic pressing (HIP) to compress the calcine into a volume-reduced monolithic waste form. A Record of Decision issued December 2009 determined that DOE will use the HIP technology to treat the calcine.

[p] Specific canister decay heat projections are not available for the current Hanford reference baseline scenario

Decay heat of DOE calcined waste currently stored at the Idaho site is taken from the October 2005 Idaho Cleanup Project document titled "Decay Heat and Radiation from Direct Disposed Calcine", EDF-6258 revision 0. EDF-6258 provides this data for direct disposal of the calcine waste. The current Record of Decision for disposal of the calcine is for it to be treated using HIP, which will result in an approximate 50% increase in the volume of calcine material (due to additives) followed by about 30% decrease in the volume as a result of the HIP process. The size of the final HIP container and final packaged canister remains under investigation. The current estimate is 3700 canisters.

Table 3-6 provides the projected distribution of DOE calcine canisters based on the nominal decay heat in the year 2017. The data indicates that 100% of calcine canisters will be less than 50 watts.

Table 3-6. Hanford and Idaho Waste Inventory (projected)

	Hanford Borosilicate Glass[a]		Idaho Calcine[b]	
Decay heat per canister (watts)	**Number of canisters**	**Cumulative %**	**Number of canisters**	**Cumulative %**
<50	9,291	83.9%	3,700	100.0%
50 - 100	1,237	95.0%		
100 - 200	523	99.7%		
200 - 300	28	100.0%		
300 - 500	0	100.0%		
500 - 1000	0	100.0%		
1000 - 1500	0	100.0%		
1500 - 2000	0	100.0%		
>2000	0	100.0%		
Totals	**11,079**		**3,700**	
Total Decay Heat (watts)	**304,904**		**92,674**	

[a] Projected based on future waste vitrification operations.
[b] Projected based on future waste treatment which may change.

Table 3-7 shows the estimated number of vitrified reprocessing waste canisters to be produced. The current best estimate and a potential range are provided. [Marcinowski memo to Kouts, 2008; EIS, 2002; Chew, 2019, DOE-2017] Table 1-1 and Appendix F provides the equivalent MTHM using the "Best Estimate" canisters count and using the historical factor of 0.5 MTHM per canister established in DOE/DP 0020/1 [DOE, 1985].

Table 3-7. Projected Total Number of DOE Vitrified Reprocessing Waste Canisters

	Canisters[1] Best Estimate	Canister Range
Hanford	7,800	7,200-63,600
INL (Calcine)	3,700	1,190 - 11,200
INL (Electro-chemical processing)	102	82-135
SRS	8,121	8,000 - 8,300
Totals	**19,723**	**~16,500 - ~83,200[2]**

1. With the exception of Hanford, all canisters are 2 feet × 10 feet, Hanford canisters are 2 feet × 15 feet

2. Rounded to nearest 100 canisters

3.3.3 Defense Reprocessing Waste Radionuclide Inventory

"DOE Managed Waste" [Wilson, 2016 Appendix B] lists the total reprocessing waste radionuclide inventory for each of the generating sites decayed to 2017. Although there may be some variation in the number of canisters produced for the sites that have not completed waste treatment, the total amount of radionuclide will not change except by radioactive decay. The combined inventory from all three sites is aproximately1.3 million watts.

OCRWM used the "projected maximum" inventory on a per canister basis for the vitrified reprocessing waste curie content supplied by SRS. The use of the "projected maximum" on a per canister basis resulted in a conservative total curie content for SRS that is approximately twice the actual SRS tank farm inventory. The expected curie content of SRS reprocessing waste is presented in DOE Managed Waste [Wilson, 2016 Appendix B].

SRS is also the only DOE site continuing reprocessing, and the DOE-EM program periodically processes excess special isotopes via the reprocessing facility and the vitrification process. The potential for future EM special isotope disposal campaigns has not been assessed in this study.

The total radionuclide inventory for treatment of sodium bonded SNF is shown in UFD Inventory Table F3. [Carter, 2013]

3.3.4 Defense Vitrified Reprocessing Waste Storage

The vitrified reprocessing waste canisters at SRS is stored in below grade concrete vaults, called Glass Waste Storage Buildings (GWSB), containing support frames for vertical storage of 2,262 canisters. SRS currently has two GWSBs. The first GWSB is being modified such that canisters can be stacked two high, doubling the capacity of this building and delaying the need for a third GWSB. As of January 2020, one thousand additional storage positions have been recovered by the double stack modifications.

4. RESEARCH REACTORS

4.1 Non-DOE Research Reactors

Non-DOE research reactors operate at power levels that range from around 0.005 kW (AGN-201) up to 20 MW (NIST). Spent nuclear fuel from these reactors is generally sent to either SRS or INL, after discharge and the fuel is managed by DOE and included in the inventory discussed in Section 3.1. There are thirty-one non-DOE research reactors in operation at thirty sites (2 reactors collocated at Texas A&M University). Most of the non-DOE reactors are operating at universities and are used for research and for educational purposes. Additional information regarding research reactors at universities and other non-DOE sites is included in the listing by state and congressional district (Appendix F) and the state-by-state maps (Appendix G).

4.2 DOE Research Reactors

There are four main DOE research reactors; the Advanced Test Reactor (ATR) and the Transient Reactor Test (TREAT) Facility at Idaho National Laboratory (INL), the Annular Core Research Reactor (SNL) and the High Flux Isotope Reactor (HFIR) at Oak Ridge National Laboratory (ORNL). In addition to these there is also the Advanced Test Reactor Critical Facility (a low-power version of the higher-powered ATR core) and the Neutron Radiography (NRAD) Reactor (a TRIGA-type reactor), both at INL. Spent nuclear fuel from ATR is stored in the ATR canal prior to transfer to wet storage at INL's CPP-603 facility, while spent nuclear fuel from HFIR is stored in storage racks within the HFIR pool outside the core zone awaiting shipment to Savannah River Site. Additional information regarding DOE-Research Reactors can be found in Appendices F and H, the listing by state and congressional district and the state-by-state maps, respectively.

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Appendix A

Commercial Nuclear Fuel Characteristics

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Table A-1. Physical characteristics of pressurized water reactor assembly class

Assembly Class	Array Size	Manufacturer Code	Version	Assembly Code	Length (in.)	Width (in.)	Clad Material
B&W 15 × 15	15 × 15	B&W	B&W Mark B	B1515B	165.7	8.54	Zircaloy-4
			B&W Mark B10	B1515B10	165.7	8.54	Zircaloy-4
			B&W Mark B3	B1515B3	165.7	8.54	Zircaloy-4
			B&W Mark B4	B1515B4	165.7	8.54	Zircaloy-4
			B&W Mark B4Z	B1515B4Z	165.7	8.54	Zircaloy-4
			B&W Mark B5	B1515B5	165.7	8.54	Zircaloy-4
			B&W Mark B5Z	B1515B5Z	165.7	8.54	Zircaloy-4
			B&W Mark B6	B1515B6	165.7	8.54	Zircaloy-4
			B&W Mark B7	B1515B7	165.7	8.54	Zircaloy-4
			B&W Mark B8	B1515B8	165.7	8.54	Zircaloy-4
			B&W Mark B9	B1515B9	165.7	8.54	Zircaloy-4
			B&W Mark BGD	B1515BGD	165.7	8.54	Zircaloy-4
			B&W Mark BZ	B1515BZ	165.7	8.54	Zircaloy-4
		WE	WE	B1515W	165.7	8.54	not available
B&W 17 × 17	17 × 17	B&W	B&W Mark C	B1717B	165.7	8.54	Zircaloy-4
CE 14 × 14	14 × 14	ANF	ANF	C1414A	157.0	8.10	Zircaloy-4
		CE	CE	C1414C	157.0	8.10	Zircaloy-4
		WE	WE	C1414W	157.0	8.10	Zircaloy-4
CE 16 × 16	16 × 16	CE	CE	C1616CSD	176.8	8.10	Zircaloy-4
CE System 80	16 × 16	CE	CE System 80	C8016C	178.3	8.10	Zircaloy-4
WE 14 × 14	14 × 14	ANF	ANF	W1414A	159.8	7.76	Zircaloy-4
		ANF	ANF Top Rod	W1414ATR	159.8	7.76	Zircaloy-4
		B&W	B&W	W1414B	159.8	7.76	not available
		WE	WE LOPAR	W1414WL	159.8	7.76	Zircaloy-4
		WE	WE OFA	W1414WO	159.8	7.76	Zircaloy-4
		WE	WE Std	W1414W	159.8	7.76	Zircaloy-4

Table A-1 (continued)

Assembly Class	Array Size	Manufacturer Code	Version	Assembly Code	Length (in.)	Width (in.)	Clad Material
WE 15 × 15	15 × 15	ANF	ANF	W1515A	159.8	8.44	Zircaloy-4
			ANF HT	W1515AHT	159.8	8.44	not available
			ANF Part Length	W1515APL	159.8	8.44	not available
		WE	LOPAR	W1515WL	159.8	8.44	Zircaloy-4
			OFA	W1515WO	159.8	8.44	Zircaloy-4
			WE Std	W1515W	159.8	8.44	Zircaloy
			WE Vantage 5	W1515WV5	159.8	8.44	not available
WE 17 × 17	17 × 17	ANF	ANF	W1717A	159.8	8.44	Zircaloy-4
		B&W	B&W Mark B	W1717B	159.8	8.44	not available
		WE	WE	W1717WRF	159.8	8.44	not available
			WE	W1717WVJ	159.8	8.44	not available
			WE LOPAR	W1717WL	159.8	8.44	Zircaloy-4
			WE OFA	W1717WO	159.8	8.44	Zircaloy-4
			WE Pressurized	W1717WP	159.8	8.44	not available
			WE Vantage	W1717WV	159.8	8.44	not available
			WE Vantage +	W1717WV+	159.8	8.44	ZIRLO
			WE Vantage 5	W1717WV5	159.8	8.44	Zircaloy-4
			WE Vantage 5H	W1717WVH	159.8	8.44	not available
South Texas	17 × 17	WE	WE	WST17W	199.0	8.43	Zircaloy-4
Ft. Calhoun	14 × 14	ANF	ANF	XFC14A	146.0	8.10	not available
		CE	CE	XFC14C	146.0	8.10	Zircaloy-4
		WE	WE	XFC14W	146.0	8.10	not available

Table A-1 (continued)

Assembly Class	Array Size	Manufacturer Code	Version	Assembly Code	Length (in.)	Width (in.)	Clad Material
Haddam Neck	15 × 15	B&W	B&W SS	XHN15B	137.1	8.42	SS-304
			B&W Zir	XHN15BZ	137.1	8.42	Zircaloy
		GA	Gulf SS	XHN15HS	137.1	8.42	SS
			Gulf Zir	XHN15HZ	137.1	8.42	Zircaloy
		NU	NUM SS	XHN15MS	137.1	8.42	SS
			NUM Zir	XHN15MZ	137.1	8.42	Zircaloy
		WE	WE	XHN15W	137.1	8.42	SS-304
			WE Zir	XHN15WZ	137.1	8.42	not available
Indian Point-1	13 × 14	WE	WE	XIP14W	138.8	6.27	SS
Palisades	15 × 15	ANF	ANF	XPA15A	147.5	8.20	Zircaloy-4
		CE	CE	XPA15C	147.5	8.20	Zircaloy-4
St. Lucie-2	16 × 16	CE	CE	XSL16C	158.2	8.10	Zircaloy-4
San Onofre-1	14 × 14	WE	WE	XSO14W	137.1	7.76	SS-304
			WE D	XSO14WD	137.1	7.76	not available
			WE M	XSO14WM	137.1	7.76	not available
Yankee Rowe	15 × 16	ANF	ANF	XYR16A	111.8	7.62	Zircaloy-4
		CE	CE	XYR16C	111.8	7.62	Zircaloy-4
		UNC	UNC	XYR16U	111.8	7.62	not available
	17 × 18	WE	WE	XYR18W	111.8	7.62	SS

NOTE: Some characteristics of more recently discharged SNF (post-2002) have not yet been provided

Table A-2. Physical characteristics of boiling water reactor assembly classes

Assembly Class	Array Size	Manufacturer Code	Version	Assembly Code	Length (in.)	Width (in.)	Clad Material
GE BWR/ 2,3	7 × 7	ANF	ANF	G2307A	171.2	5.44	Zircaloy-2
	8 × 8	ANF	ANF	G2308A	171.2	5.44	Zircaloy-2
	9 × 9	ANF	ANF	G2309A	171.2	5.44	Zircaloy-2
			ANF IX	G2309AIX	171.2	5.44	Zircaloy-2
	8 × 8	ANF	ANF Pressurized	G2308AP	171.2	5.44	Zircaloy-2
		GE	GE-10	G2308G10	171.2	5.44	Zircaloy-2
	9 × 9	GE	GE-11	G2309G11	171.2	5.44	Zircaloy-2
	7 × 7	GE	GE-2a	G2307G2A	171.2	5.44	Zircaloy-2
			GE-2b	G2307G2B	171.2	5.44	Zircaloy-2
			GE-3	G2307G3	171.2	5.44	Zircaloy-2
	8 × 8	GE	GE-4	G2308G4	171.2	5.44	Zircaloy-2
			GE-5	G2308G5	171.2	5.44	Zircaloy-2
			GE-7	G2308G7	171.2	5.44	NA
			GE-8a	G2308G8A	171.2	5.44	Zircaloy-2
			GE-8b	G2308G8B	171.2	5.44	Zircaloy-2
			GE-9	G2308G9	171.2	5.44	Zircaloy-2
			GE-Barrier	G2308GB	171.2	5.44	Zircaloy-2
			GE-Pressurized	G2308GP	171.2	5.44	Zircaloy-2
	not available	not available	not available	9X9IXQFA	171.2	5.44	not available
GE BWR/ 4-6	9 × 9	ANF	ANF	G4609A	176.2	5.44	Zircaloy-2
	10 × 10	ANF	ANF	G4610A	176.2	5.44	NA
	9 × 9	ANF	ANF 9-5	G4609A5	176.2	5.44	Zircaloy-2
			ANF 9X	G4609A9X	176.2	5.44	Zircaloy-2
			ANF IX	G4609AIX	176.2	5.44	Zircaloy-2
	10 × 10	ANF	ANF IX	G4610AIX	176.2	5.44	not available
	9 × 9	ANF	ANF X+	G4609AX+	176.2	5.44	not available
	8 × 8	ANF	ANF-Pressurized	G4608AP	176.2	5.44	Zircaloy-2

Table A-2 (continued)

	not available	AREVA	not available	ATRIUM10	176.2	5.44	Zircaloy-2
GE BWR/ 4-6 (Continued)	10 × 10	ABB	CE	G4610C	176.2	5.44	not available
	8 × 8	GE	GE-10	G4608G10	176.2	5.44	Zircaloy-2
			GE-11	G4608G11	176.2	5.44	not available
	9 × 9	GE	GE-11	G4609G11	176.2	5.44	Zircaloy-2
	8 × 8	GE	GE-12	G4608G12	176.2	5.44	not available
	10 × 10	GE	GE-12	G4610G12	176.2	5.44	Zircaloy-2
	9 × 9	GE	GE-13	G4609G13	176.2	5.44	Zircaloy-2
	10 × 10	GE	GE-14	G4610G14	176.2	5.44	not available
	7 × 7	GE	GE-2	G4607G2	176.2	5.44	Zircaloy-2
			GE-3a	G4607G3A	176.2	5.44	Zircaloy-2
			GE-3b	G4607G3B	176.2	5.44	Zircaloy-2
	8 × 8	GE	GE-4a	G4608G4A	176.2	5.44	Zircaloy-2
			GE-4b	G4608G4B	176.2	5.44	Zircaloy-2
			GE-5	G4608G5	176.2	5.44	Zircaloy-2
			GE-8	G4608G8	176.2	5.44	Zircaloy-2
			GE-9	G4608G9	176.2	5.44	Zircaloy-2
			GE-Barrier	G4608GB	176.2	5.44	Zircaloy-2
			GE-Pressurized	G4608GP	176.2	5.44	Zircaloy-2
		WE	WE	G4608W	176.2	5.44	Zircaloy-2
Big Rock Point	9 × 9	ANF	ANF	XBR09A	84	6.52	Zircaloy-2
	11 × 11	ANF	ANF	XBR11A	84	6.52	Zircaloy-2
	7 × 7	GE	GE	XBR07G	84	6.52	not available
	8 × 8	GE	GE	XBR08G	84	6.52	not available
	9 × 9	GE	GE	XBR09G	84	6.52	Zircaloy-2
	11 × 11	GE	GE	XBR11G	84	6.52	Zircaloy-2
		NFS	NFS	XBR11N	84	6.52	not available
Dresden-1	6 × 6	ANF	ANF	XDR06A	134.4	4.28	Zircaloy-2
		GE	GE	XDR06G	134.4	4.28	Zircaloy-2

Table A-2 (continued).

	7 × 7	GE	GE SA-1	XDR07GS	134.4	4.28	not available
	8 × 8	GE	GE PF Fuels	XDR08G	134.4	4.28	not available
	6 × 6	GE	GE Type III-B	XDR06G3B	134.4	4.28	not available
			GE Type III-F	XDR06G3F	134.4	4.28	not available
			GE Type V	XDR06G5	134.4	4.28	not available
		UNC	UNC	XDR06U	134.4	4.28	not available
Humboldt Bay	6 × 6	ANF	6 × 6 ANF	XHB06A	95	4.67	Zircaloy
		GE	GE	XHB06G	95	4.67	Zircaloy-2
	7 × 7	GE	GE Type II	XHB07G2	95	4.67	Zircaloy
La Crosse	10 × 10	AC	AC	XLC10L	102.5	5.62	SS348H
		ANF	ANF	XLC10A	102.5	5.62	SS348H

NOTE: Some characteristics of more recently discharged SNF (post-2002) have not yet been provided.

Table A-3. Assembly types and their main characteristics as of December 31, 2002

Reactor Type	Manufacturer Code	Assembly Code	Initial Uranium Loading (kg/assembly)		Enrichment (U^{235} wt %)			Burnup (MWd/MTU)	
			Avg.	Max.	Min.	Avg.	Max.	Avg.	Max.
BWR	not available	9X9IXQFA	170.713	170.800	3.25	3.25	3.25	39,166	39,248
BWR	AC	XLC10L	120.160	121.034	3.63	3.77	3.94	14,419	21,532
BWR	ANF	G2307A	181.574	183.797	2.56	2.64	2.65	24,256	27,826
BWR	ANF	G2308A	174.624	184.355	2.39	2.66	3.13	28,814	36,826
BWR	ANF	G2308AP	172.753	173.132	2.82	2.83	2.83	34,366	34,826
BWR	ANF	G2309A	168.097	169.520	2.78	3.10	3.15	35,941	40,818
BWR	ANF	G2309AIX	169.185	170.059	3.25	3.31	3.82	39,151	43,778
BWR	ANF	G4608AP	176.175	176.800	2.62	2.88	3.40	31,248	35,518
BWR	ANF	G4609A	172.970	174.700	0.72	3.42	3.73	36,933	47,000
BWR	ANF	G4609A5	176.147	177.000	2.90	3.28	3.55	36,536	43,555
BWR	ANF	G4609A9X	169.155	176.800	2.53	2.87	3.11	36,880	43,330
BWR	ANF	G4609AIX	174.788	177.000	3.00	3.58	3.94	24,156	36,777
BWR	ANF	G4609AX+	167.264	167.277	3.13	3.14	3.15	39,239	40,457
BWR	ANF	G4610A	176.900	176.900	3.94	3.94	3.94	38,207	39,000
BWR	ANF	G4610AIX	175.000	175.000	3.39	3.39	3.39	37,706	38,009
BWR	ANF	XBR09A	127.687	131.406	3.45	3.48	3.52	20,981	22,811
BWR	ANF	XBR11A	130.237	133.174	3.13	3.42	3.82	22,716	34,212
BWR	ANF	XDR06A	95.206	95.478	2.23	2.23	2.24	4,907	5,742
BWR	ANF	XHB06A	69.734	73.800	2.35	2.40	2.41	9,037	22,377
BWR	ANF	XLC10A	108.657	109.609	3.68	3.69	3.71	15,017	20,126
BWR	AREVA	ATRIUM10	176.900	176.900	3.94	3.94	3.94	38,406	39,000
BWR	ABB	G4610C	175.683	176.300	2.51	3.29	3.62	38,133	42,640
BWR	GE	G2307G2A	194.902	197.604	2.07	2.10	2.11	16,775	24,902
BWR	GE	G2307G2B	193.203	197.400	1.65	2.15	2.62	16,384	29,728

Table A-3 (continued).

Reactor Type	Manufacturer Code	Assembly Code	Initial Uranium Loading (kg/assembly)		Enrichment (U^{235} wt %)			Burnup (MWd/MTU)	
			Avg.	Max.	Min.	Avg.	Max.	Avg.	Max.
BWR	GE	G2307G3	187.419	189.105	1.96	2.41	2.60	25,420	38,861
BWR	GE	G2308G10	172.225	173.512	3.10	3.25	3.56	33,988	43,977
BWR	GE	G2308G4	183.991	185.496	2.19	2.51	2.76	26,087	40,523
BWR	GE	G2308G5	176.971	177.628	2.39	2.66	2.82	29,009	33,597
BWR	GE	G2308G7	178.520	179.400	2.96	2.97	2.99	31,570	35,894
BWR	GE	G2308G8A	175.695	179.584	2.55	3.09	3.40	34,848	44,933
BWR	GE	G2308G8B	172.590	178.000	2.96	3.19	3.39	36,400	42,518
BWR	GE	G2308G9	172.017	173.108	2.85	3.18	3.48	37,268	42,295
BWR	GE	G2308GB	177.983	180.060	2.62	2.80	3.39	32,014	43,381
BWR	GE	G2308GP	177.145	179.200	2.08	2.77	3.01	29,317	38,139
BWR	GE	G2309G11	165.650	169.500	3.10	3.56	3.78	40,522	45,117
BWR	GE	G4607G2	194.729	197.334	1.09	1.56	2.50	9,362	11,829
BWR	GE	G4607G3A	187.455	189.141	1.10	2.33	2.51	21,058	32,188
BWR	GE	G4607G3B	189.925	191.542	1.10	2.31	2.51	21,948	30,831
BWR	GE	G4608G10	177.778	186.094	2.63	3.24	3.70	36,695	44,343
BWR	GE	G4608G11	170.786	171.000	3.38	3.38	3.38	35,194	42,551
BWR	GE	G4608G12	180.873	181.484	3.69	3.71	3.99	32,069	34,462
BWR	GE	G4608G4A	183.931	185.221	2.19	2.62	2.99	24,931	43,430
BWR	GE	G4608G4B	186.709	187.900	2.10	2.31	2.76	21,362	32,941
BWR	GE	G4608G5	183.007	185.366	0.70	2.36	3.01	23,964	38,224
BWR	GE	G4608G8	179.801	185.854	2.95	3.19	3.40	34,905	44,640
BWR	GE	G4608G9	177.738	185.789	1.51	3.23	3.88	36,492	47,062
BWR	GE	G4608GB	184.636	186.653	0.71	2.53	3.25	26,297	45,986
BWR	GE	G4608GP	183.195	186.888	0.70	2.38	3.27	23,112	42,428
BWR	GE	G4609G11	170.123	178.136	1.46	3.56	4.14	40,351	65,149

Table A-3 (continued).

Reactor Type	Manufacturer Code	Assembly Code	Initial Uranium Loading (kg/assembly)		Enrichment (U^{235} wt %)			Burnup (MWd/MTU)	
			Avg.	Max.	Min.	Avg.	Max.	Avg.	Max.
BWR	GE	G4609G13	171.417	172.912	3.24	3.85	4.17	42,045	53,636
BWR	GE	G4610G12	176.100	182.141	3.12	3.98	4.20	44,175	52,735
BWR	GE	G4610G14	179.127	180.402	4.01	4.11	4.24	5,868	8,915
BWR	GE	XBR07G	131.500	133.000	2.88	2.88	2.88	1,643	1,690
BWR	GE	XBR08G	112.500	113.000	2.85	2.85	2.85	4,546	7,027
BWR	GE	XBR09G	137.088	141.000	3.51	3.58	3.62	15,092	22,083
BWR	GE	XBR11G	124.500	132.000	3.11	3.46	3.63	22,802	24,997
BWR	GE	XDR06G	111.352	111.352	1.47	1.47	1.47	23,522	23,522
BWR	GE	XDR06G3B	101.610	102.520	1.83	1.83	1.83	18,632	27,106
BWR	GE	XDR06G3F	102.049	102.876	2.25	2.25	2.25	22,132	28,138
BWR	GE	XDR06G5	105.857	112.257	2.26	2.26	2.26	21,095	25,886
BWR	GE	XDR07GS	59.000	59.000	3.10	3.10	3.10	29,000	29,000
BWR	GE	XDR08G	99.714	99.714	1.95	1.95	1.95	25,287	25,287
BWR	GE	XHB06G	76.355	77.000	2.35	2.43	2.52	17,170	22,876
BWR	GE	XHB07G2	76.325	77.100	2.08	2.11	2.31	18,187	20,770
BWR	NFS	XBR11N	128.991	134.414	2.16	2.83	3.51	18,940	21,850
BWR	UNC	XDR06U	102.021	103.441	1.83	2.24	2.26	17,685	26,396
BWR	WE	G4608W	156.696	171.403	2.69	2.85	3.01	28,041	33,140
PWR	ANF	C1414A	380.870	400.000	0.30	3.50	4.32	38,899	50,871
PWR	ANF	W1414A	378.274	406.840	0.71	3.42	4.50	37,500	56,328
PWR	ANF	W1414ATR	362.788	368.011	2.39	3.38	3.57	38,168	46,000
PWR	ANF	W1515A	428.888	434.792	2.01	3.00	3.60	33,344	49,859
PWR	ANF	W1515AHT	434.546	438.074	3.51	4.08	4.59	45,441	56,922
PWR	ANF	W1515APL	307.361	310.073	1.23	1.55	1.88	27,971	37,770
PWR	ANF	W1717A	413.845	460.540	2.43	4.19	4.77	45,291	53,958

Table A-3 (continued).

Reactor Type	Manufacturer Code	Assembly Code	Initial Uranium Loading (kg/assembly)		Enrichment (U^{235} wt %)			Burnup (MWd/MTU)	
			Avg.	Max.	Min.	Avg.	Max.	Avg.	Max.
PWR	ANF	XFC14A	353.345	358.811	3.50	3.57	3.80	37,205	46,048
PWR	ANF	XPA15A	396.674	408.040	1.50	3.17	4.05	34,362	51,486
PWR	ANF	XYR16A	233.555	237.300	3.49	3.78	4.02	29,034	35,088
PWR	B&W	B1515B	463.398	465.480	2.74	3.57	3.62	40,407	50,128
PWR	B&W	B1515B10	476.778	489.299	3.24	3.90	4.73	44,417	56,880
PWR	B&W	B1515B3	463.845	465.830	1.08	2.42	2.84	21,036	32,267
PWR	B&W	B1515B4	464.285	474.853	0.90	2.91	4.06	29,534	57,000
PWR	B&W	B1515B4Z	463.735	466.305	3.22	3.84	3.95	39,253	51,660
PWR	B&W	B1515B5	468.250	468.250	3.13	3.13	3.13	38,017	39,000
PWR	B&W	B1515B5Z	464.421	465.176	3.20	3.22	3.23	36,016	42,328
PWR	B&W	B1515B6	462.495	464.403	3.22	3.47	3.66	41,790	49,383
PWR	B&W	B1515B7	463.244	464.513	3.48	3.51	3.55	42,059	48,738
PWR	B&W	B1515B8	464.864	468.560	3.29	3.65	4.01	42,692	54,000
PWR	B&W	B1515B9	463.566	467.566	3.29	3.96	4.76	44,097	53,952
PWR	B&W	B1515BGD	429.552	430.255	3.92	3.92	3.92	49,027	58,310
PWR	B&W	B1515BZ	463.410	466.279	3.05	3.47	4.68	37,441	54,023
PWR	B&W	B1717B	456.722	457.929	2.64	2.84	3.04	29,517	33,904
PWR	B&W	W1414B	383.157	383.157	3.22	3.22	3.22	24,398	24,465
PWR	B&W	W1717B	455.799	466.688	2.00	3.84	4.60	40,741	54,014
PWR	B&W	XHN15B	409.913	415.060	3.00	3.99	4.02	33,776	37,833
PWR	B&W	XHN15BZ	363.921	368.072	3.40	3.80	3.91	34,278	42,956
PWR	CE	C1414C	382.437	408.508	1.03	3.20	4.48	33,597	56,000
PWR	CE	C1616CSD	413.912	442.986	1.87	3.62	4.63	37,916	63,328
PWR	CE	C8016C	421.468	442.000	1.92	3.57	4.27	38,490	56,312
PWR	CE	XFC14C	362.313	376.842	1.39	2.96	3.95	32,130	52,125

Table A-3 (continued).

Reactor Type	Manufacturer Code	Assembly Code	Initial Uranium Loading (kg/assembly)		Enrichment (U^{235} wt %)			Burnup (MWd/MTU)	
			Avg.	Max.	Min.	Avg.	Max.	Avg.	Max.
PWR	CE	XPA15C	412.442	416.780	1.65	2.47	3.06	16,020	33,630
PWR	CE	XSL16C	381.018	394.400	1.72	3.44	4.28	38,807	54,838
PWR	CE	XYR16C	228.766	233.400	3.51	3.80	3.92	24,282	35,999
PWR	GA	XHN15HS	406.163	406.163	3.99	3.99	3.99	32,151	32,151
PWR	GA	XHN15HZ	362.863	362.863	3.26	3.26	3.26	18,546	18,546
PWR	NU	XHN15MS	405.979	406.992	3.66	3.66	3.66	28,324	28,324
PWR	NU	XHN15MZ	370.776	371.039	2.95	2.95	2.95	25,643	25,643
PWR	UNC	XYR16U	238.573	241.300	3.96	3.99	4.02	27,461	31,986
PWR	WE	B1515W	461.819	464.763	3.90	4.06	4.22	36,993	49,075
PWR	WE	C1414W	403.483	411.719	2.70	3.15	3.76	30,039	37,781
PWR	WE	W1414W	393.896	403.683	2.26	3.04	3.47	27,315	39,723
PWR	WE	W1414WL	399.092	405.809	2.27	3.07	3.41	31,940	47,932
PWR	WE	W1414WO	355.724	369.265	0.99	3.92	4.95	44,730	69,452
PWR	WE	W1515W	451.193	458.091	2.21	3.00	3.35	29,324	41,806
PWR	WE	W1515WL	455.236	465.600	1.85	2.98	3.80	30,874	55,385
PWR	WE	W1515WO	460.764	465.747	1.91	3.53	4.60	39,071	56,138
PWR	WE	W1515WV5	457.793	462.934	2.99	3.92	4.80	37,556	53,056
PWR	WE	W1717WL	461.323	469.200	1.60	3.12	4.40	32,340	58,417
PWR	WE	W1717WO	425.107	459.433	1.60	3.05	4.02	32,690	53,000
PWR	WE	W1717WP	417.069	417.878	3.73	4.59	4.81	50,707	58,237
PWR	WE	W1717WRF	455.497	456.735	4.00	4.18	4.42	45,530	48,037
PWR	WE	W1717WV	425.399	426.042	4.21	4.38	4.41	44,263	48,385
PWR	WE	W1717WV+	424.010	465.469	1.61	4.16	4.66	45,430	61,685
PWR	WE	W1717WV5	424.269	430.925	1.49	4.01	4.95	43,872	56,570
PWR	WE	W1717WVH	461.954	473.962	2.11	3.87	4.95	41,081	55,496

Table A-3 (continued).

Reactor Type	Manufacturer Code	Assembly Code	Initial Uranium Loading (kg/assembly)		Enrichment (U^{235} wt %)			Burnup (MWd/MTU)	
			Avg.	Max.	Min.	Avg.	Max.	Avg.	Max.
PWR	WE	W1717WVJ	461.518	465.200	3.71	3.99	4.40	43,922	46,847
PWR	WE	WST17W	540.480	546.600	1.51	3.38	4.41	35,926	54,399
PWR	WE	XFC14W	374.055	376.000	0.27	3.75	4.25	38,521	51,971
PWR	WE	XHN15W	415.557	421.227	3.02	3.59	4.00	27,922	35,196
PWR	WE	XHN15WZ	384.894	386.689	4.20	4.39	4.60	14,321	19,376
PWR	WE	XIP14W	191.152	200.467	2.83	4.12	4.36	16,471	27,048
PWR	WE	XSO14W	368.153	374.885	3.16	3.87	4.02	27,232	39,275
PWR	WE	XSO14WD	373.323	373.643	4.01	4.01	4.02	18,259	18,424
PWR	WE	XSO14WM	311.225	311.225	0.71	0.71	0.71	19,307	19,636
PWR	WE	XYR18W	273.350	274.100	4.94	4.94	4.94	25,484	31,755

Appendix B

December 2019 Projected Inventory by Reactor

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Table B-1. Estimated Inventory at Operating Reactors by Storage Type and Site (Group B & C Sites)

Reactor	Dry Inventory 12/31/2019			Pool Inventory 12/31/2019		Site Inventory 12/31/2019	
	Assy.	Estimated Initial Uranium (MT)	Fuel Casks	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)
Arkansas Nuclear One (2)	2,464	1,087	92	1,223	539	3,687	1,626
Beaver Valley Power Station (2)	370	171	10	2,518	1,163	2,888	1,334
Braidwood Station (2)	928	390	29	2,641	1,110	3,569	1,501
Browns Ferry Nuclear Plant (3)	5,997	1,082	78	7,469	1,347	13,466	2,429
Brunswick Steam Electric Plant (2)	2,440	480	40	2,275	448	4,715	928
Byron Station (2)	1,184	498	37	2,553	1,074	3,737	1,573
Callaway Plant (1)	666	282	18	1,431	606	2,097	888
Calvert Cliffs Nuclear Power Plant (2)	2,624	1,030	94	1,289	506	3,913	1,536
Catawba Nuclear Station (2)	1,316	589	44	2,202	986	3,518	1,574
Clinton Power Station (1)	979	177	11	3,153	569	4,132	745
Columbia Generating Station (1)	3,060	539	45	1,532	270	4,592	810
Comanche Peak Steam Electric Station (2)	1,344	565	42	1,935	813	3,279	1,378
Cooper Nuclear Station (1)	1,830	330	30	1,137	205	2,967	534
Davis-Besse Nuclear Station (1)	496	235	15	842	400	1,338	635
Diablo Canyon Nuclear Power Plant (2)	1,856	798	58	1,741	749	3,597	1,547
Donald C. Cook Nuclear Power Plant (2)	1,408	617	44	2,798	1,226	4,206	1,843
Dresden Nuclear Power Station (2)	5,304	932	78	5,530	927	10,834	1,859
Duane Arnold Energy Center (1)	1,220	221	20	2,060	372	3,280	593
Edwin I. Hatch Nuclear Plant (2)	5,780	1,039	85	3,878	697	9,658	1,736
Fermi (1)	1,564	275	23	2,330	410	3,894	685
Grand Gulf Nuclear Station (1)	2,448	432	36	3,132	553	5,580	986
H.B. Robinson Steam Electric Plant (1)	608	263	31	404	175	1,012	437
Hope Creek Generating Station (1)	1,972	353	29	2,965	531	4,937	884
Indian Point Nuclear Generating (2)	1,472	669	46	1,991	905	3,463	1,573
James A. FitzPatrick Nuclear Power Plant (1)	2,176	393	32	2,088	378	4,264	771
Joseph M. Farley Nuclear Plant (2)	1,632	715	51	1,916	839	3,548	1,554
LaSalle County Station (2)	2,788	499	41	6,563	1,175	9,351	1,674
Limerick Generating Station (2)	3,111	554	51	6,178	1,100	9,289	1,655
McGuire Nuclear Station (2)	1,954	881	64	2,044	922	3,998	1,804
Millstone Power Station (2)	1,312	557	41	2,007	852	3,319	1,409
Monticello Nuclear Generating Plant (1)	1,830	317	30	865	150	2,695	467
Nine Mile Point Nuclear Station (2)	2,440	430	40	5,784	1,020	8,224	1,451
North Anna Power Station (2)	2,176	1,009	68	1,192	553	3,368	1,562
Oconee Nuclear Station (3)	3,816	1,778	159	1,295	603	5,111	2,382
Palisades Nuclear Plant (1)	1,355	559	49	454	187	1,809	746
Palo Verde Nuclear Generating Station (3)	3,648	1,569	152	2,551	1,097	6,199	2,666

Table B-1 (continued)

Reactor	Dry Inventory 12/31/2019			Pool Inventory 12/31/2019		Site Inventory 12/31/2019	
	Assy.	Estimated Initial Uranium (MT)	Fuel Casks	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)
Peach Bottom Atomic Power Station (2)	6,256	1,123	92	5,329	956	11,585	2,079
Perry Nuclear Power Plant (1)	1,360	245	20	3,273	589	4,633	834
Point Beach Nuclear Plant (2)	1,472	565	50	1,114	428	2,586	993
Prairie Island Nuclear Generating Plant (2)	1,760	641	44	1,047	381	2,807	1,022
Quad Cities Nuclear Power Station (2)	3,740	664	55	6,513	1,156	10,253	1,819
River Bend Station (1)	2,108	374	31	2,276	403	4,384	777
R.E. Ginna Nuclear Power Plant (1)	320	118	10	1,149	423	1,469	540
St. Lucie Plant (2)	1,312	511	41	2,631	1,024	3,943	1,535
Salem Nuclear Generating Station (2)	1,120	514	35	2,367	1,086	3,487	1,600
Seabrook Station (1)	704	322	22	832	381	1,536	703
Sequoyah Nuclear Plant (2)	1,963	898	59	1,630	745	3,593	1,643
Shearon Harris Nuclear Power Plant (1)	0	0	0	6,297	1,638	6,297	1,638
South Texas Project (2)	444	238	12	2,497	1,338	2,941	1,576
Surry Nuclear Power Station (2)	2,686	1,233	93	717	329	3,403	1,562
Susquehanna Steam Electric Station (2)	6,528	1,153	111	4,127	729	10,655	1,882
Turkey Point Nuclear Generating (2)	896	409	28	2,253	1,027	3,149	1,436
Virgil C. Summer Nuclear Station (1)	296	126	8	1,280	547	1,576	673
Vogtle Electric Generating Plant (2)	1,312	565	41	2,288	986	3,600	1,551
Waterford Steam Electric Station (1)	736	310	23	1,321	557	2,057	867
Watts Bar Nuclear Plant (2)	555	255	15	847	390	1,402	645
Wolf Creek Generating Station (1)	0	0	0	1,845	847	1,845	847
Totals (96 reactors)	**113,136**	**32,579**	**2,603**	**143,599**	**41,418**	**256,735**	**73,997**

*Note: This Table does reflect fuel transfers.
Dresden quantities include 617 Dresden Unit 1 assemblies (~63.2MTU) which are co-mingled with unit 2 and 3 fuel and which are being moved to dry canister storage in a co-mingled fashion.

Table B-2. Estimated Inventory by Storage Type and Site (Group A Sites Shutdown before 2000)

	Dry Inventory 12/31/2019			Pool Inventory 12/31/2019		Site Inventory 12/31/2019	
Reactor	**Assy.**	**Initial Uranium (MT)**	**Fuel Casks**	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**
Big Rock Point	441	57.92	7	-	-	441	57.92
Haddam Neck	1,019	413.53	40	-	-	1,019	413.53
Humboldt Bay	390	28.94	5	-	-	390	28.94
La Crosse	333	37.97	5	-	-	333	37.97
Maine Yankee	1,434	542.26	60	-	-	1,434	542.26
Rancho Seco	493	228.38	21	-	-	493	228.38
Trojan	791	359.26	34	-	-	791	359.26
Yankee Rowe	533	127.13	15	-	-	533	127.13
Zion	2,226	1,019.41	61	-	-	2,226	1,019.41
Totals	**7,660**	**2,814.79**	**248**	**-**	**-**	**7,660**	**2,814.79**

*Note: This Table **does** reflect fuel transfers.

Table B-3. Estimated Inventory by Storage Type and Site (Shutdown Reactors at Group B Sites)

	Dry Inventory 12/31/2019			Pool Inventory 12/31/2019		Site Inventory 12/31/2019	
Reactor [Unit]	**Assy.**	**Initial Uranium (MT)**	**Fuel Casks**	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**
Dresden 1	272	27.72	4	Pool Empty	Remaining Inventory with Units 2 and 3**	272	27.71
Indian Point 1	160	30.58	5	-	-	160	30.58
Millstone 1	-	-	-	2,884	525.62	2,884	525.62
Totals	**432**	**58.30**	**9**	**2,884**	**525.62**	**3,316**	**583.93**

*Note: This Table **does** reflect fuel transfers.

** 617 Dresden 1 assemblies (~63.2MTU) are co-mingled with unit 2 and 3 fuel. This SNF is being moved to dry canister storage in a co-mingled fashion.

Table B-4. Estimated Inventory by Storage Type and Site (Group A Sites Shutdown after 2000)

	Dry Inventory 12/31/2019			Pool Inventory 12/31/2019		Site Inventory 12/31/2019	
Reactor [Unit]	**Assy.**	**Initial Uranium (MT)**	**Fuel Casks**	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**
Vermont Yankee	3,880	702	58	-	-	3,880	702
Crystal River 3	1,243	582	39	-	-	1,243	582
Kewaunee	1,335	519	38	-	-	1,335	519
Fort Calhoun	576	212	18	690	254	1,266	465
Oyster Creek Nuclear Generating Station	2,074	367	34	2,468	436	4,542	803
Pilgrim Nuclear Power Station	1,156	204	17	2,983	527	4,139	731
San Onofre	2,815	1,169	94	1,040	440	3,855	1,609
Three Mile Island	-	-	-	1,678	791	1,678	791
Totals	**13,079**	**3,754**	**298**	**8,859**	**2,447**	**21,938**	**6,202**

*Note: This Table **does** reflect fuel transfers.

Table B-5. Estimated Inventory Totals

	Dry Inventory 12/31/2019			Pool Inventory 12/31/2019		Site Inventory 12/31/2019	
Reactor Group	**Assy.**	**Initial Uranium (MT)**	**Fuel Casks**	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**
Operating Sites	113,136	32,579	2,603	143,599	41,418	256,735	73,997
Group A Pre-2000 All Dry Storage	7,660	2,815	248	-	-	7,660	2,815
Group A Post-2000 All Dry Storage	6,458	1,803	135	-	-	6,458	1,803
Group A Post 2000 All Pool Storage	-	-	-	1,678	791	1,678	791
Group A Post 2000 Pool and Dry Storage	6,621	1,952	163	7,181	1,657	13,802	3,608
Shutdown Group B	432	58	9	2,884	526	3,316	584
Grand Total	**134,307**	**39,207**	**3,158**	**155,342**	**44,392**	**289,649**	**83,598**

*Note: This Table **does** reflect fuel transfers.

Appendix C

Reference Scenario: No Replacement Nuclear Generation Forecast – Discharged Fuel by Reactor

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Table C-1. No Replacement Nuclear Generation Fuel Forecast: Discharges by Operating Reactor

	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2019		Forecast Future Discharges 1/1/2020 to 12/31/2075		Total Projected Discharged Fuel	
Reactor [Unit]	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**
Arkansas Nuclear One, Unit 1	1,397	649	300	143	717	338	2,414	1,130
Arkansas Nuclear One, Unit 2	1,634	684	356	150	1,245	527	3,235	1,361
Beaver Valley Power Station, Unit 1	1,310	605	320	147	797	367	2,427	1,119
Beaver Valley Power Station, Unit 2	1,010	467	248	115	1,273	587	2,531	1,169
Braidwood Station, Unit 1	1,334	563	445	186	1,706	713	3,485	1,462
Braidwood Station, Unit 2	1,402	590	388	162	2,036	848	3,826	1,600
Browns Ferry Nuclear Plant, Unit 1	2,444	449	876	158	2,808	509	6,128	1,116
Browns Ferry Nuclear Plant, Unit 2	4,441	802	1,190	212	2,801	499	8,432	1,513
Browns Ferry Nuclear Plant, Unit 3	3,630	652	885	155	3,124	547	7,639	1,354
Brunswick Steam Electric Plant, Unit 1	3,580	644	735	130	2,520	444	6,835	1,218
Brunswick Steam Electric Plant, Unit 2	3,552	640	935	167	2,212	393	6,699	1,200
Byron Station, Unit 1	1,546	652	356	148	1,706	710	3,608	1,510
Byron Station, Unit 2	1,387	585	448	188	1,813	760	3,648	1,533

Table C-1 (continued)

	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2019		Forecast Future Discharges 1/1/2020 to 12/31/2075		Total Projected Discharged Fuel	
Reactor [Unit]	Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)
Callaway Plant	1,648	700	449	187	1,617	675	3,714	1,562
Calvert Cliffs Nuclear Power Plant, Unit 1	1,707	666	276	112	861	351	2,844	1,129
Calvert Cliffs Nuclear Power Plant, Unit 2	1,545	601	385	156	985	400	2,915	1,157
Catawba Nuclear Station, Unit 1	1,456	650	308	140	1,425	647	3,189	1,437
Catawba Nuclear Station, Unit 2	1,364	607	390	178	1,363	621	3,117	1,406
Clinton Power Station, Unit 1	2,996	542	1,136	203	4,316	772	8,448	1,517
Columbia Generating Station, Unit 2	3,584	631	1,008	179	3,580	633	8,172	1,443
Comanche Peak Steam Electric Station, Unit 1	1,285	545	465	195	2,053	857	3,803	1,597
Comanche Peak Steam Electric Station, Unit 2	1,165	485	364	153	2,195	920	3,724	1,558
Cooper Nuclear Station	3,604	658	417	75	1,521	271	5,542	1,004
Davis-Besse Nuclear Power Station, Unit 1	1,116	528	222	107	843	405	2,181	1,040
Diablo Canyon Nuclear Power Plant, Unit 1	1,412	610	470	199	475	201	2,357	1,010
Diablo Canyon Nuclear Power Plant, Unit 2	1,346	582	369	156	379	160	2,094	898

Table C-1 (continued)

	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2019		Forecast Future Discharges 1/1/2020 to 12/31/2075		Total Projected Discharged Fuel	
Reactor [Unit]	Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)
Donald C. Cook Nuclear Power Plant, Unit 1	1,734	781	453	204	1,113	503	3,300	1,488
Donald C. Cook Nuclear Power Plant, Unit 2	1,584	674	435	182	1,150	483	3,169	1,339
Dresden Nuclear Power Station, Unit 2	5,001	895	1,008	173	1,732	298	7,741	1,366
Dresden Nuclear Power Station, Unit 3	4,220	746	741	127	1,959	336	6,920	1,209
Duane Arnold Energy Center	2,824	511	456	82	368	66	3,648	659
Edwin I. Hatch Nuclear Plant, Unit 1	4,197	758	672	118	2,128	373	6,997	1,249
Edwin I. Hatch Nuclear Plant, Unit 2	3,892	700	897	160	2,576	461	7,365	1,321
Fermi, Unit 2	3,004	528	890	156	3,612	635	7,506	1,319
Grand Gulf Nuclear Station, Unit 1	4,788	846	792	140	4,232	749	9,812	1,735
H. B. Robinson Steam Electric Plant, Unit 2	1,506	653	315	137	598	259	2,419	1,049
Hope Creek Generating Station, Unit 1	3,832	689	1,105	195	4,521	799	9,458	1,683
Indian Point Nuclear Generating, Unit 2	1,517	688	270	122	193	87	1,980	897
Indian Point Nuclear Generating, Unit 3	1,298	592	378	171	193	88	1,869	851

Table C-1 (continued)

	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2019		Forecast Future Discharges 1/1/2020 to 12/31/2075		Total Projected Discharged Fuel	
Reactor [Unit]	Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)
James A. FitzPatrick Nuclear Power Plant	3,664	663	600	108	1,960	352	6,224	1,123
Joseph M. Farley Nuclear Plant, Unit 1	1,517	671	335	142	894	378	2,746	1,191
Joseph M. Farley Nuclear Plant, Unit 2	1,360	599	336	142	1,095	463	2,791	1,204
LaSalle County Station, Unit 1	3,703	665	906	161	4,086	724	8,695	1,550
LaSalle County Station, Unit 2	3,515	630	1,227	218	4,448	790	9,190	1,638
Limerick Generating Station, Unit 1	3,970	707	840	149	4,404	779	9,214	1,635
Limerick Generating Station, Unit 2	3,385	603	1,094	196	4,600	821	9,079	1,620
McGuire Nuclear Station, Unit 1	1,517	680	369	168	1,229	561	3,115	1,409
McGuire Nuclear Station, Unit 2	1,528	685	284	130	1,258	577	3,070	1,392
Millstone Power Station, Unit 2	1,506	595	280	112	917	368	2,703	1,075
Millstone Power Station, Unit 3	1,124	515	409	187	1,570	716	3,103	1,418
Monticello Nuclear Generating Plant, Unit 1	3,148	561	605	104	1,239	211	4,992	876
Nine Mile Point Nuclear Station, Unit 1	3,340	597	624	106	1,172	200	5,136	903

Table C-1 (continued)

Reactor [Unit]	Fuel Discharges as of 12/31/2012 Assy.	Fuel Discharges as of 12/31/2012 Initial Uranium (MT)	Forecast Discharges 1/1/2013 to 12/31/2019 Assy.	Forecast Discharges 1/1/2013 to 12/31/2019 Initial Uranium (MT)	Forecast Future Discharges 1/1/2020 to 12/31/2075 Assy.	Forecast Future Discharges 1/1/2020 to 12/31/2075 Initial Uranium (MT)	Total Projected Discharged Fuel Assy.	Total Projected Discharged Fuel Initial Uranium (MT)
Nine Mile Point Nuclear Station, Unit 2	3,396	598	864	149	4,508	779	8,768	1,526
North Anna Power Station, Unit 1	1,367	633	330	154	949	442	2,646	1,229
North Anna Power Station, Unit 2	1,351	626	320	149	989	459	2,660	1,234
Oconee Nuclear Station, Unit 1	1,628	758	201	93	579	266	2,408	1,117
Oconee Nuclear Station, Unit 2	1,540	718	284	133	603	283	2,427	1,134
Oconee Nuclear Station, Unit 3	1,554	725	204	95	653	304	2,411	1,124
Palisades Nuclear Plant	1,509	617	300	129	264	114	2,073	860
Palo Verde Nuclear Generating Station, Unit 1	1,539	658	497	217	1,907	832	3,943	1,707
Palo Verde Nuclear Generating Station, Unit 2	1,660	711	408	178	2,077	906	4,145	1,795
Palo Verde Nuclear Generating Station, Unit 3	1,575	676	520	227	2,113	921	4,208	1,824
Peach Bottom Atomic Power Station, Unit 2	4,968	893	819	146	2,675**	477**	8,462**	1,516**
Peach Bottom Atomic Power Station, Unit 3	4,708	848	1,092	194	2,675**	473**	8,475**	1,515**
Perry Nuclear Power Plant, Unit 1	3,502	632	1,131	202	4,427	792	9,060	1,626

Table C-1 (continued)

Reactor [Unit]	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2019		Forecast Future Discharges 1/1/2020 to 12/31/2075		Total Projected Discharged Fuel	
	Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)
Point Beach Nuclear Plant, Unit 1	1,142	437	213	85	401	159	1,756	681
Point Beach Nuclear Plant, Unit 2	1,081	413	156	62	472	186	1,709	661
Prairie Island Nuclear Generating Plant, Unit 1	1,200	439	153	54	478	168	1,831	661
Prairie Island Nuclear Generating Plant, Unit 2	1,204	441	250	88	621	218	2,075	747
Quad Cities Nuclear Power Station, Unit 1	4,337	773	991	172	2,194	382	7,522	1,327
Quad Cities Nuclear Power Station, Unit 2	4,184	747	741	127	2,453	420	7,378	1,294
River Bend Station, Unit 1	3,460	612	924	165	3,312	589	7,696	1,366
R.E. Ginna Nuclear Power Plant	1,325	488	184	67	397	146	1,906	701
St. Lucie Plant, Unit 1	1,813	701	410	163	1,037	413	3,260	1,277
St. Lucie Plant, Unit 2	1,420	550	300	121	1,417	569	3,137	1,240
Salem Nuclear Generating Station, Unit 1	1,444	664	385	176	1,040	475	2,869	1,315
Salem Nuclear Generating Station, Unit 2	1,350	620	308	140	1,271	577	2,929	1,337
Seabrook Station, Unit 1	1,204	552	332	151	1,853	845	3,389	1,548

Table C-1 (continued)

	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2019		Forecast Future Discharges 1/1/2020 to 12/31/2075		Total Projected Discharged Fuel	
Reactor [Unit]	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**
Sequoyah Nuclear Plant, Unit 1	1,378	631	410	185	1,259	570	3,047	1,386
Sequoyah Nuclear Plant, Unit 2	1,461	670	344	157	1,397	638	3,202	1,465
Shearon Harris Nuclear Power Plant, Unit 1	1,052	476	350	159	1,347	612	2,749	1,247
South Texas Project, Unit 1	1,172	630	308	164	1,579	841	3,059	1,635
South Texas Project, Unit 2	1,076	578	385	205	1,656	882	3,117	1,665
Surry Nuclear Power Station, Unit 1	1,444	662	315	146	661	306	2,420	1,114
Surry Nuclear Power Station, Unit 2	1,453	667	260	119	742	340	2,455	1,126
Susquehanna Steam Electric Station, Unit 1	4,463	787	909	161	4,097	727	9,469	1,675
Susquehanna Steam Electric Station, Unit 2	4,073	718	1,210	215	4,400	781	9,683	1,714
Turkey Point Nuclear Generating, Unit 3	1,326	605	270	123	1,291	588	2,887	1,316
Turkey Point Nuclear Generating, Unit 4	1,343	612	228	104	1,411	643	2,982	1,359
Virgil C. Summer Nuclear Station, Unit 1	1,304	559	272	114	1,177	494	2,753	1,167
Vogtle Electric Generating Plant, Unit 1	1,519	659	364	155	1,831	777	3,714	1,591

Table C-1 (continued)

Reactor [Unit]	Fuel Discharges as of 12/31/2012 Assy.	Fuel Discharges as of 12/31/2012 Initial Uranium (MT)	Forecast Discharges 1/1/2013 to 12/31/2019 Assy.	Forecast Discharges 1/1/2013 to 12/31/2019 Initial Uranium (MT)	Forecast Future Discharges 1/1/2020 to 12/31/2075 Assy.	Forecast Future Discharges 1/1/2020 to 12/31/2075 Initial Uranium (MT)	Total Projected Discharged Fuel Assy.	Total Projected Discharged Fuel Initial Uranium (MT)
Vogtle Electric Generating Plant, Unit 2	1,261	544	456	193	1,922	813	3,639	1,550
Waterford Steam Electric Station, Unit 3	1,661	697	396	170	1,900	815	3,957	1,682
Watts Bar Nuclear Plant, Unit 1	892	411	340	156	2,233	1,025	3,465	1,592
Wolf Creek Generating Station, Unit 1	1,420	653	425	194	1,587	725	3,432	1,572
Watts Bar Nuclear Plant, Unit 2	0	0	170	78	3,338	1,532	3,508	1,610
Totals**	**209,328**	**60,111**	**49,791**	**14,422**	**174,811**	**51,539**	**433,930**	**126,072**

*Note: This table **does not** reflect fuel transfers.

** Editors note: The NRC approved the "subsequent" or second 20 year operating license extension for Peach Bottom Units 2 and 3 on March 5, 2020 (after the 12/31/2019 data date for this report). The net effect of this approval is to increase the reference scenario by approximately 5,460 assemblies and 970 MTU.

Table C-2. No Replacement Nuclear Generation Fuel Discharges by Reactor (Group A Sites Shutdown before 2000)

	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2019		Forecast Future Discharges 1/1/2020 to 12/31/2075		Total Projected Discharged Fuel	
Reactor [Unit]	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**
Big Rock Point	526	69.40	-	-	-	-	526	69.40
Haddam Neck	1,102	448.42	-	-	-	-	1,102	448.42
Humboldt Bay	390	28.94	-	-	-	-	390	28.94
La Crosse	334	38.09	-	-	-	-	334	38.09
Maine Yankee	1,434	542.26	-	-	-	-	1,434	542.26
Rancho Seco	493	228.38	-	-	-	-	493	228.38
Trojan	791	359.26	-	-	-	-	791	359.26
Yankee Rowe	533	127.13	-	-	-	-	533	127.13
Zion 1	1,143	523.94	-	-	-	-	1,143	523.94
Zion 2	1,083	495.47	-	-	-	-	1,083	495.47
Totals	**7,829**	**2,861.28**	**-**	**-**	**-**	**-**	**7,829**	**2,861.28**

*Note: This table **does not** reflect fuel transfers.

Table C-3. No Replacement Nuclear Generation Fuel Discharges by Reactor (Shutdown Reactors at Group B Sites)

	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2019		Forecast Future Discharges 1/1/2020 to 12/31/2075		Total Projected Discharged Fuel	
Reactor [Unit]	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**
Dresden 1	892	90.87	-	-	-	-	892	90.87
Indian Point 1	160	30.58	-	-	-	-	160	30.58
Millstone 1	2,884	525.62	-	-	-	-	2,884	525.62
Totals	**3,936**	**647.07**	**-**	**-**	**-**	**-**	**3,936**	**647.07**

*Note: This table **does not** reflect fuel transfers.

Table C-4. No Replacement Nuclear Generation Fuel Discharges by Reactor Site (Group A Sites Shutdown after 2000)

	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2019		Forecast Future Discharges 1/1/2020 to 12/31/2075		Total Projected Discharged Fuel	
Reactor [Unit]	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**
Vermont Yankee	3,389	615.97	491	86.08	-	-	3,880	702.05
Crystal River 3	1,243	582.23	-	-	-	-	1,243	582.23
Kewaunee	1,214	470.97	121	47.73	-	-	1,335	518.70
Fort Calhoun	1,091	399.38	175	65.97	-	-	1,266	465.35
Oyster Creek Nuclear Generating Station	3,644	649.27	898	153.38	-	-	4,542	802.64
Pilgrim Nuclear Power Station	3,069	547.42	1,070	183.34	-	-	4,139	730.76
San Onofre 1	665	244.61	-	-	-	-	665	244.61
San Onofre 2	1,726	730.00	-	-	-	-	1,726	730.00
San Onofre 3	1,734	732.61	-	-	-	-	1,734	732.61
Three Mile Island 1	1,270	595.51	408	195.56	-	-	1,678	791.07
Totals	**19,045**	**5,567.98**	**3,163**	**732.05**	**-**	**-**	**22,208**	**6,300.03**

*Note: This table **does not** reflect fuel transfers.

Table C-5. No Replacement Nuclear Generation Fuel Discharges by Reactor Site (Totals)

	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2019		Forecast Future Discharges 1/1/2020 to 12/31/2075		Total Projected Discharged Fuel	
Reactor [Unit]	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**
Operating Reactors	209,328	60,111	49,791	14,422	174,811	51,539	433,930	126,072
Group A Pre-2000	7,829	2,861	0	0	0	0	7,829	2,861
Shutdown Group B	3,936	647	0	0	0	0	3,936	647
Group A Post-2000	19,045	5,568	3,163	732	0	0	22,208	6,300
Grand Total	**240,138**	**69,187**	**52,954**	**15,154**	**174,811**	**51,539**	**467,903**	**135,880**

*Note: This table **does not** reflect fuel transfers.

Appendix D

Reference Scenario: No Replacement Nuclear Generation Forecast – Discharged Fuel by State

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Table D-1. Estimated and Projected Inventory at Commercial LWR Sites and Morris Site by State

State	Fuel Discharged Prior to 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2019		Forecast Future Discharges 1/1/2020 to 12/31/2075		Total Projected Discharged Fuel		Past Inter-State Transfer Adjustments		State's Forecasted Remaining Inventory	
	Assy.	Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Initial Uranium (MT)	Assy.	Estimate d Initial Uranium (MT)
Alabama	13,392	3,174	3,622	809	10,722	2,395	27,736	6,378	-	-	27,736	6,378
Arizona	4,774	2,045	1,425	622	6,097	2,659	12,296	5,325	-	-	12,296	5,325
Arkansas	3,031	1,333	656	293	1,962	865	5,649	2,491	-	-	5,649	2,491
California	7,766	3,156	839	355	854	361	9,459	3,873	(270)	(98)	9,189	3,774
Connecticut	6,616	2,084	689	299	2,487	1,084	9,792	3,467	(83)	(35)	9,709	3,432
Florida	7,145	3,051	1,208	511	5,156	2,213	13,509	5,774	(18)	(8)	13,491	5,766
Georgia	10,869	2,662	2,389	626	8,457	2,423	21,715	5,711	-	-	21,715	5,711
Illinois	36,743	8,498	8,387	1,864	28,449	6,753	73,579	17,116	2,461	529	76,040	17,645
Iowa	2,824	511	456	82	368	66	3,648	659	-	-	3,648	659
Kansas	1,420	653	425	194	1,587	725	3,432	1,572	-	-	3,432	1,572
Louisiana	5,121	1,309	1,320	334	5,212	1,405	11,653	3,049	-	-	11,653	3,049
Maine	1,434	542	0	0	0	0	1,434	542	-	-	1,434	542
Maryland	3,252	1,267	661	269	1,846	750	5,759	2,286	-	-	5,759	2,286
Massachusetts	3,602	675	1,070	183	0	0	4,672	858	-	-	4,672	858
Michigan	8,357	2,670	2,078	673	6,139	1,732	16,574	5,075	(85)	(11)	16,489	5,064
Minnesota	5,552	1,442	1,008	245	2,338	597	8,898	2,284	(1,058)	(198)	7,840	2,086
Mississippi	4,788	846	792	140	4,232	750	9,812	1,735	-	-	9,812	1,735
Missouri	1,648	700	449	187	1,617	675	3,714	1,562	-	-	3,714	1,562
Nebraska	4,695	1,057	592	141	1,521	272	6,808	1,470	(1,054)	(198)	5,754	1,272
New Hampshire	1,204	552	332	151	1,853	845	3,389	1,548	-	-	3,389	1,548
New Jersey	10,270	2,623	2,696	664	6,832	1,850	19,798	5,137	-	-	19,798	5,137

Table D-1 (continued)

State	Fuel Discharged Prior to 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2019		Forecast Future Discharges 1/1/2020 to 12/31/2075		Total Projected Discharged Fuel		Past Inter-State Transfer Adjustments		State's Forecasted Remaining Inventory	
	Assy.	Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Initial Uranium (MT)	Assy.	Estimate d Initial Uranium (MT)
New York	14,700	3,657	2,920	724	8,423	1,650	26,043	6,031	(40)	(15)	26,003	6,016
North Carolina	11,229	3,125	2,673	754	8,566	2,588	22,468	6,467	1,108	491	23,576	6,958
Ohio	4,618	1,160	1,353	309	5,270	1,197	11,241	2,667	-	-	11,241	2,667
Oregon	791	359	0	0	0	0	791	359	-	-	791	359
Pennsylvania	29,157	6,224	6,940	1,517	24,921**	5,014**	61,018**	12,755**	(2)	(0)	61,016**	12,755**
South Carolina	10,352	4,670	1,974	889	6,398	2,875	18,724	8,434	(1,109)	(492)	17,616	7,942
Tennessee	3,731	1,712	1,264	577	8,227	3,765	13,222	6,053	-	-	13,222	6,053
Texas	4,698	2,238	1,522	716	7,483	3,501	13,703	6,455	-	-	13,703	6,455
Vermont	3,389	616	491	86	0	0	3,880	702	-	-	3,880	702
Virginia	5,615	2,588	1,225	567	3,341	1,547	10,181	4,702	(69)	(31)	10,112	4,671
Washington	3,584	631	1,008	179	3,580	634	8,172	1,443	-	-	8,172	1,443
Wisconsin	3,771	1,358	490	194	873	346	5,134	1,899	(7)	(2)	5,127	1,896
Totals	**240,138**	**69,187**	**52,954**	**15,154**	**174,811**	**51,538**	**467,903**	**135,880**	**-226***	**-70***	**467,678**	**135,810**

* Total Interstate Transfer reflects the amount of SNF reported in GC-859 as being transferred to DOE, this is not the total quantity of Commercial SNF in DOE possession, see Section 2.1.2.

** Editors note: The NRC approved the "subsequent" or second 20 year operating license extension for Peach Bottom Units 2 and 3 on March 5, 2020 (after the 12/31/2019 data date for this report). The net effect of this approval is to increase the reference scenario by approximately 5,460 assemblies and 970 MTU.

Table D-2. Estimated Inventory at Commercial LWR Sites and Morris Site by State and by Storage Configuration at the end of 2019

	Dry Inventory			Pool Inventory		Site Inventory	
State	Assy.	Estimated Initial Uranium (MT)	Fuel Casks	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)
Alabama	7,629	1,797	129	9,385	2,186	17,014	3,983
Arizona	3,648	1,569	152	2,551	1,097	6,199	2,666
Arkansas	2,464	1,087	92	1,223	539	3,687	1,626
California	5,554	2,225	178	2,781	1,188	8,335	3,413
Connecticut	2,331	971	81	4,891	1,378	7,222	2,348
Florida	3,451	1,502	108	4,884	2,052	8,335	3,553
Georgia	7,092	1,604	126	6,166	1,683	13,258	3,288
Illinois	17,421	4,207	316	30,170	6,685	47,591	10,892
Iowa	1,220	221	20	2,060	372	3,280	593
Kansas	0	0	0	1,845	847	1,845	847
Louisiana	2,844	684	54	3,597	960	6,441	1,644
Maine	1,434	542	60	0	0	1,434	542
Maryland	2,624	1,030	94	1,289	506	3,913	1,536
Massachusetts	1,689	331	32	2,983	527	4,672	858
Michigan	4,768	1,509	123	5,582	1,823	10,350	3,331
Minnesota	3,590	958	74	1,912	531	5,502	1,489
Mississippi	2,448	432	36	3,132	553	5,580	986
Missouri	666	282	18	1,431	606	2,097	888
Nebraska	2,406	541	48	1,827	458	4,233	1,000
New Hampshire	704	322	22	832	381	1,536	703
New Jersey	5,166	1,234	98	7,800	2,053	12,966	3,287
New York	6,568	1,641	133	11,012	2,725	17,580	4,366
North Carolina	4,394	1,362	104	10,616	3,008	15,010	4,370
Ohio	1,856	480	35	4,115	989	5,971	1,469
Oregon	791	359	34	0	0	791	359
Pennsylvania	16,265	3,001	264	19,830	4,740	36,095	7,741
South Carolina	6,036	2,756	242	5,182	2,311	11,218	5,067
Tennessee	2,518	1,153	74	2,477	1,135	4,995	2,288
Texas	1,788	803	54	4,432	2,151	6,220	2,954
Vermont	3,880	702	58	0	0	3,880	702
Virginia	4,862	2,242	161	1,909	882	6,771	3,123
Washington	3,060	539	45	1,532	270	4,592	810
Wisconsin	3,140	1,122	93	1,114	428	4,254	1,550
Totals	**134,307**	**39,207**	**3,158**	**158,560**	**45,065**	**292,867**	**84,272**

Excludes SNF from TMI Unit 2 (in ID) and Fort St. Vrain (in ID and CO).

Table D-3. Estimated Pool Inventory by Current Group and by State at the end of 2019

State	A		B		C		F		Totals	
	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)
Alabama	-	-	-	-	9,385	2,186	-	-	9,385	2,186
Arizona	-	-	-	-	2,551	1,097	-	-	2,551	1,097
Arkansas	-	-	-	-	1,223	539	-	-	1,223	539
California	1,040	440	-	-	1,741	749	-	-	2,781	1,188
Connecticut	-	-	4,891	1,378	-	-	-	-	4,891	1,378
Florida	-	-	-	-	4,884	2,052	-	-	4,884	2,052
Georgia	-	-	-	-	6,166	1,683	-	-	6,166	1,683
Illinois	-	-	5,530	927	21,423	5,084	3,217	674	30,170	6,685
Iowa	-	-	-	-	2,060	372	-	-	2,060	372
Kansas	-	-	-	-	1,845	847	-	-	1,845	847
Louisiana	-	-	-	-	3,597	960	-	-	3,597	960
Maryland	-	-	-	-	1,289	506	-	-	1,289	506
Massachusetts	2,983	527	-	-	-	-	-	-	2,983	527
Michigan	-	-	-	-	5,582	1,823	-	-	5,582	1,823
Minnesota	-	-	-	-	1,912	531	-	-	1,912	531
Mississippi	-	-	-	-	3,132	553	-	-	3,132	553
Missouri	-	-	-	-	1,431	606	-	-	1,431	606
Nebraska	690	254	-	-	1,137	205	-	-	1,827	458
New Hampshire	-	-	-	-	832	381	-	-	832	381
New Jersey	2,468	436	-	-	5,332	1,617	-	-	7,800	2,053
New York	-	-	1,991	905	9,021	1,820	-	-	11,012	2,725
North Carolina	-	-	-	-	10,616	3,008	-	-	10,616	3,008
Ohio	-	-	-	-	4,115	989	-	-	4,115	989

Table D-3 (continued)

State	A		B		C		F		Totals	
	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)
Pennsylvania	1,678	791	-	-	18,152	3,949	-	-	19,830	4,740
South Carolina	-	-	-	-	5,181	2,310	-	-	5,181	2,310
Tennessee	-	-	-	-	2,477	1,135	-	-	2,477	1,135
Texas	-	-	-	-	4,432	2,151	-	-	4,432	2,151
Virginia	-	-	-	-	1,909	882	-	-	1,909	882
Washington	-	-	-	-	1,532	270	-	-	1,532	270
Wisconsin	-	-	-	-	1,114	428	-	-	1,114	428
Totals	**8,859**	**2,447**	**12,412**	**3,209**	**134,071**	**38,734**	**3,217**	**674**	**158,559**	**45,065**

Table D-4. Estimated Dry Inventory by Current Group and by State at the end of 2019

State	A			B			C			Totals		
	Assy.	Estimated Initial Uranium (MT)	Fuel Casks	Assy.	Estimated Initial Uranium (MT)	Fuel Casks	Assy.	Estimated Initial Uranium (MT)	Fuel Casks	Assy.	Estimated Initial Uranium (MT)	Fuel Casks
Alabama	-	-	-	-	-	-	7,629	1,797	129	7,629	1,797	129
Arizona	-	-	-	-	-	-	3,648	1,569	152	3,648	1,569	152
Arkansas	-	-	-	-	-	-	2,464	1,087	92	2,464	1,087	92
California	3,698	1,427	120	-	-	-	1,856	798	58	5,554	2,225	178
Connecticut	1,019	414	40	1,312	557	41	-	-	-	2,331	971	81
Florida	1,243	582	39	-	-	-	2,208	919	69	3,451	1,502	108
Georgia	-	-	-	-	-	-	7,092	1,604	126	7,092	1,604	126
Illinois	2,226	1,019	61	5,576	960	82	9,619	2,228	173	17,421	4,207	316
Iowa	-	-	-	-	-	-	1,220	221	20	1,220	221	20
Louisiana	-	-	-	-	-	-	2,844	684	54	2,844	684	54
Maine	1,434	542	60	-	-	-	-	-	-	1,434	542	60
Maryland	-	-	-	-	-	-	2,624	1,030	94	2,624	1,030	94
Massachusetts	1,689	331	32	-	-	-	-	-	-	1,689	331	32
Michigan	441	58	7	-	-	-	4,327	1,451	116	4,768	1,509	123
Minnesota	-	-	-	-	-	-	3,590	958	74	3,590	958	74
Mississippi	-	-	-	-	-	-	2,448	432	36	2,448	432	36
Missouri	-	-	-	-	-	-	666	282	18	666	282	18
Nebraska	576	212	18	-	-	-	1,830	330	30	2,406	541	48
New Hampshire	-	-	-	-	-	-	704	322	22	704	322	22
New Jersey	2,074	367	34	-	-	-	3,092	867	64	5,166	1,234	98
New York	-	-	-	1,632	699	51	4,936	942	82	6,568	1,641	133
North Carolina	-	-	-	-	-	-	4,394	1,362	104	4,394	1,362	104
Ohio	-	-	-	-	-	-	1,856	480	35	1,856	480	35

Table D-4 (continued)

State	A			B			C			Totals		
	Assy.	Estimated Initial Uranium (MT)	Fuel Casks	Assy.	Estimated Initial Uranium (MT)	Fuel Casks	Assy.	Estimated Initial Uranium (MT)	Fuel Casks	Assy.	Estimated Initial Uranium (MT)	Fuel Casks
Oregon	791	359	34	-	-	-	-	-	-	791	359	34
Pennsylvania	-	-	-	-	-	-	16,265	3,001	264	16,265	3,001	264
South Carolina	-	-	-	-	-	-	6,036	2,756	242	6,036	2,756	242
Tennessee	-	-	-	-	-	-	2,518	1,153	74	2,518	1,153	74
Texas	-	-	-	-	-	-	1,788	803	54	1,788	803	54
Vermont	3,880	702	58	-	-	-	-	-	-	3,880	702	58
Virginia	-	-	-	-	-	-	4,862	2,242	161	4,862	2,242	161
Washington	-	-	-	-	-	-	3,060	539	45	3,060	539	45
Wisconsin	1,668	557	43	-	-	-	1,472	565	50	3,140	1,122	93
Totals	**20,739**	**6,569**	**546**	**8,520**	**2,217**	**174**	**105,048**	**30,421**	**2,438**	**134,307**	**39,207**	**3,158**

Excludes SNF from TMI Unit 2 (in ID) and Fort St. Vrain (in ID and CO).

Table D-5. Estimated Total Inventory of Group A Sites by State at the end of 2019

State	A1		A2		A3		A	
	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)
California	883	257	3,855	1,609	-	-	4,738	1,866
Connecticut	1,019	414	-	-	-	-	1,019	414
Florida	1,243	582	-	-	-	-	1,243	582
Illinois	2,226	1,019	-	-	-	-	2,226	1,019
Maine	1,434	542	-	-	-	-	1,434	542
Massachusetts	533	127	4,139	731	-	-	4,672	858
Michigan	441	58	-	-	-	-	441	58
Nebraska	-	-	1,266	465	-	-	1,266	465
New Jersey	-	-	4,542	803	-	-	4,542	803
Oregon	791	359	-	-	-	-	791	359
Pennsylvania	-	-	-	-	1,678	791	1,678	791
Vermont	3,880	702	-	-	-	-	3,880	702
Wisconsin	1,668	557	0	0	0	0	1,668	557
Totals	**14,118**	**4,618**	**13,802**	**3,608**	**1,678**	**791**	**25,598**	**9,016**

Excludes SNF from Fort St. Vrain at DOE-Managed ISFSI in Colorado.

Table D-6. Estimated Total Inventory of Group B Sites by State at the end of 2019

State	B2		B3		B	
	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)
Connecticut	6,203	1,935	-	-	6,203	1,935
Illinois	11,106	1,887	-	-	11,106	1,887
New York	3,623	1,604	-	-	3,623	1,604
Totals	**20,932**	**5,425**	**-**	**-**	**20,932**	**5,425**

Table D-7. Estimated Total Inventory of Group C Sites by State at the end of 2019

State	C2		C3		C	
	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)
Alabama	17,014	3,983	-	-	17,014	3,983
Arizona	6,199	2,666	-	-	6,199	2,666
Arkansas	3,687	1,626	-	-	3,687	1,626
California	3,597	1,547	-	-	3,597	1,547
Florida	7,092	2,971	-	-	7,092	2,971
Georgia	13,258	3,288	-	-	13,258	3,288
Illinois	31,042	7,311	-	-	31,042	7,311
Iowa	3,280	593	-	-	3,280	593
Kansas	-	-	1,845	847	1,845	847
Louisiana	6,441	1,644	-	-	6,441	1,644
Maryland	3,913	1,536	-	-	3,913	1,536
Michigan	9,909	3,273	-	-	9,909	3,273
Minnesota	5,502	1,489	-	-	5,502	1,489
Mississippi	5,580	986	-	-	5,580	986
Missouri	2,097	888	-	-	2,097	888
Nebraska	2,967	534	-	-	2,967	534
New Hampshire	1,536	703	-	-	1,536	703
New Jersey	8,424	2,484	-	-	8,424	2,484
New York	13,957	2,762	-	-	13,957	2,762
North Carolina	8,713	2,731	6,297	1,638	15,010	4,370
Ohio	5,971	1,469	-	-	5,971	1,469
Pennsylvania	34,417	6,950	-	-	34,417	6,950
South Carolina	11,217	5,067	-	-	11,217	5,067
Tennessee	4,995	2,288	-	-	4,995	2,288
Texas	6,220	2,954	-	-	6,220	2,954
Virginia	6,771	3,123	-	-	6,771	3,123
Washington	4,592	810	-	-	4,592	810
Wisconsin	2,586	993	-	-	2,586	993
Totals	**230,977**	**66,670**	**8,142**	**2,486**	**239,119**	**69,155**

Table D-8. Estimated Total Inventory of Group F Site by State at the end of 2019

State	F	
	Assy.	Estimated Initial Uranium (MT)
Illinois	3,217	674
Totals	**3,217**	**674**

Table D-9. Estimated Total Inventory by Current Group and by State at the end of 2019

State	A		B		C		F		Totals	
	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)
Alabama	-	-	-	-	17,014	3,983	-	-	17,014	3,983
Arizona	-	-	-	-	6,199	2,666	-	-	6,199	2,666
Arkansas	-	-	-	-	3,687	1,626	-	-	3,687	1,626
California	4,738	1,866	-	-	3,597	1,547	-	-	8,335	3,413
Connecticut	1,019	414	6,203	1,935	-	-	-	-	7,222	2,348
Florida	1,243	582	-	-	7,092	2,971	-	-	8,335	3,553
Georgia	-	-	-	-	13,258	3,288	-	-	13,258	3,288
Illinois	2,226	1,019	11,106	1,887	31,042	7,311	3,217	674	47,591	10,892
Iowa	-	-	-	-	3,280	593	-	-	3,280	593
Kansas	-	-	-	-	1,845	847	-	-	1,845	847
Louisiana	-	-	-	-	6,441	1,644	-	-	6,441	1,644
Maine	1,434	542	-	-	-	-	-	-	1,434	542
Maryland	-	-	-	-	3,913	1,536	-	-	3,913	1,536
Massachusetts	4,672	858	-	-	-	-	-	-	4,672	858

Table D-9 (continued)

State	A		B		C		F		Totals	
	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)
Michigan	441	58	-	-	9,909	3,273	-	-	10,350	3,331
Minnesota	-	-	-	-	5,502	1,489	-	-	5,502	1,489
Mississippi	-	-	-	-	5,580	986	-	-	5,580	986
Missouri	-	-	-	-	2,097	888	-	-	2,097	888
Nebraska	1,266	465	-	-	2,967	534	-	-	4,233	1,000
New Hampshire	-	-	-	-	1,536	703	-	-	1,536	703
New Jersey	4,542	803	-	-	8,424	2,484	-	-	12,966	3,287
New York	-	-	3,623	1,604	13,957	2,762	-	-	17,580	4,366
North Carolina	-	-	-	-	15,010	4,370	-	-	15,010	4,370
Ohio	-	-	-	-	5,971	1,469	-	-	5,971	1,469
Oregon	791	359	-	-	-	-	-	-	791	359
Pennsylvania	1,678	791	-	-	34,417	6,950	-	-	36,095	7,741
South Carolina	-	-	-	-	11,217	5,067	-	-	11,217	5,067
Tennessee	-	-	-	-	4,995	2,288	-	-	4,995	2,288
Texas	-	-	-	-	6,220	2,954	-	-	6,220	2,954
Vermont	3,880	702	-	-	-	-	-	-	3,880	702
Virginia	-	-	-	-	6,771	3,123	-	-	6,771	3,123
Washington	-	-	-	-	4,592	810	-	-	4,592	810
Wisconsin	1,668	557	-	-	2,586	993	-	-	4,254	1,550
Totals	**29,598**	**9,016**	**20,932**	**5,425**	**239,119**	**69,155**	**3,217**	**674**	**292,866**	**84,271**

Excludes SNF from TMI Unit 2 (in ID) and Fort St. Vrain (in ID and CO).

Table D-10. Projected Inventory by Current Group and by State through 2075

State	A		B		C		F		Totals	
	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)
Alabama	-	-	-	-	27,736	6,378	-	-	27,736	6,378
Arizona	-	-	-	-	12,296	5,325	-	-	12,296	5,325
Arkansas	-	-	-	-	5,649	2,491	-	-	5,649	2,491
California	4,738	1,866	-	-	4,451	1,908	-	-	9,189	3,774
Connecticut	1,019	414	8,690	3,019	-	-	-	-	9,709	3,432
Florida	1,243	582	-	-	12,248	5,184	-	-	13,491	5,766
Georgia	-	-	-	-	21,715	5,711	-	-	21,715	5,711
Illinois	2,226	1,019	14,797	2,520	55,800	13,431	3,217	674	76,040	17,645
Iowa	-	-	-	-	3,648	659	-	-	3,648	659
Kansas	-	-	-	-	3,432	1,572	-	-	3,432	1,572
Louisiana	-	-	-	-	11,653	3,049	-	-	11,653	3,049
Maine	1,434	542	-	-	-	-	-	-	1,434	542
Maryland	-	-	-	-	5,759	2,286	-	-	5,759	2,286
Massachusetts	4,672	858	-	-	-	-	-	-	4,672	858
Michigan	441	58	-	-	16,048	5,006	-	-	16,489	5,064
Minnesota	-	-	-	-	7,840	2,086	-	-	7,840	2,086
Mississippi	-	-	-	-	9,812	1,735	-	-	9,812	1,735
Missouri	-	-	-	-	3,714	1,562	-	-	3,714	1,562
Nebraska	1,266	465	-	-	4,488	806	-	-	5,754	1,272
New Hampshire	-	-	-	-	3,389	1,548	-	-	3,389	1,548
New Jersey	4,542	803	-	-	15,256	4,335	-	-	19,798	5,137
New York	-	-	4,009	1,778	21,994	4,237	-	-	26,003	6,016
North Carolina	-	-	-	-	23,576	6,958	-	-	23,576	6,958

Table D-10 (continued)

State	A		B		C		F		Totals	
	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)
Ohio	-	-	-	-	11,241	2,667	-	-	11,241	2,667
Oregon	791	359	-	-	-	-	-	-	791	359
Pennsylvania	1,678	791	-	-	59,338*	11,964*	-	-	61,016*	12,755*
South Carolina	-	-	-	-	17,615	7,942	-	-	17,615	7,942
Tennessee	-	-	-	-	13,222	6,053	-	-	13,222	6,053
Texas	-	-	-	-	13,703	6,455	-	-	13,703	6,455
Vermont	3,880	702	-	-	-	-	-	-	3,880	702
Virginia	-	-	-	-	10,112	4,671	-	-	10,112	4,671
Washington	-	-	-	-	8,172	1,443	-	-	8,172	1,443
Wisconsin	1,668	557	-	-	3,459	1,340	-	-	5,127	1,896
Totals	**29,598**	**9,016**	**27,496**	**7,317**	**407,366**	**118,801**	**3,217**	**674**	**467,677**	**135,809**

Excludes SNF from TMI Unit 2 (in ID) and Fort St. Vrain (in ID and CO).

* Editors note: The NRC approved the "subsequent" or second 20 year operating license extension for Peach Bottom Units 2 and 3 on March 5, 2020 (after the 12/31/2019 data date for this report). The net effect of this approval is to increase the reference scenario by approximately 5,460 assemblies and 970 MTU.

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Appendix E

Reference Scenario: No Replacement Nuclear Generation Forecast – Discharged Fuel by NRC Region

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Table E-1. Estimated and Projected Inventory by NRC Region

NRC Region	Fuel Discharged Prior to 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2019		Forecast Future Discharges 1/1/2020 to 12/31/2075		Total Projected Discharged Fuel		Past Inter-Region Transfer Adjustments		Region's Forecasted Remaining Inventory	
	Assy.	Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)
1	73,624	18,240	15,799	3,893	46,362*	11,194*	135,785*	33,327*	(125)	(51)	135,660*	33,277*
2	65,329	21,523	15,491	4,935	55,183	18,578	136,003	45,035	(88)	(40)	135,915	44,995
3	58,869	15,098	12,636	3,164	39,121	9,921	110,626	28,183	1,311	317	111,937	28,500
4	42,316	14,327	9,028	3,162	34,145	11,846	85,489	29,334	(1,324)	(296)	84,165	29,038
Totals*	**240,138**	**69,187**	**52,954**	**15,154**	**174,811**	**51,538**	**467,903**	**135,880**	**(226)**	**(70)**	**467,677**	**135,809**

* Editor's note: The NRC approved the "subsequent" or second 20 year operating license extension for Peach Bottom Units 2 and 3 on March 5, 2020 (after the 12/31/2019 data date for this report). The net effect of this approval is to increase the reference scenario by approximately 5,460 assemblies and 970 MTU.

Table E-2. Estimated Inventory by NRC Region and by Storage Configuration at the end of 2019

	Dry Inventory			Pool Inventory		Site Inventory	
NRC Region	Assy.	Estimated Initial Uranium (MT)	Fuel Casks	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)
1	40,661	9,774	842	48,637	12,309	89,298	22,083
2	36,961	12,592	955	43,771	13,826	80,732	26,418
3	31,016	8,320	650	41,800	10,259	72,816	18,579
4	25,669	8,521	711	24,351	8,671	50,020	17,192
Totals	**134,307**	**39,207**	**3,158**	**158,559**	**45,065**	**292,866**	**84,271**

Table E-3. Estimated Pool Inventory by Current Group and by NRC Region at the end of 2019

	A		B		C		F		Totals	
NRC Region	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)
1	7,129	1,754	6,882	2,282	34,626	8,273	-	-	48,637	12,309
2	-	-	-	-	43,771	13,826	-	-	43,771	13,826
3	-	-	5,530	927	33,053	8,658	3,217	674	41,800	10,259
4	1,730	693	-	-	22,621	7,978	-	-	24,351	8,671
Totals	**8,859**	**2,447**	**12,412**	**3,209**	**134,071**	**38,734**	**3,217**	**674**	**158,559**	**45,065**

Table E-4. Estimated Dry Inventory by Current Group and by NRC Region at the end of 2019

	A			B			C			Totals		
NRC Region	Assy.	Estimated Initial Uranium (MT)	Fuel Casks	Assy.	Estimated Initial Uranium (MT)	Fuel Casks	Assy.	Estimated Initial Uranium (MT)	Fuel Casks	Assy.	Estimated Initial Uranium (MT)	Fuel Casks
1	10,096	2,356	224	2,944	1,256	92	27,621	6,162	526	40,661	9,774	842
2	1,243	582	39	-	-	-	35,718	12,010	916	36,961	12,592	955
3	4,335	1,634	111	5,576	960	82	21,105	5,726	457	31,016	8,320	650
4	5,065	1,997	172	-	-	-	20,604	6,524	539	25,669	8,521	711
Totals	**20,739**	**6,569**	**546**	**8,520**	**2,217**	**174**	**105,048**	**30,421**	**2,438**	**134,307**	**39,207**	**3,158**

Table E-5. Estimated Total Inventory by Current Group and by NRC Region at the end of 2019

	A		B		C		F		Totals	
NRC Region	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)
1	17,225	4,109	9,826	3,539	62,247	14,435	-	-	89,298	22,083
2	1,243	582	-	-	79,489	25,835	-	-	80,732	26,418
3	4,335	1,634	11,106	1,887	54,158	14,384	3,217	674	72,816	18,579
4	6,795	2,691	-	-	43,225	14,501	-	-	50,020	17,192
Totals	**29,598**	**9,016**	**20,932**	**5,425**	**239,119**	**69,155**	**3,217**	**674**	**292,866**	**84,271**

Table E-6. Projected Inventory by Current Group and by NRC Region through 2075

	A		B		C		F		Totals	
NRC Region	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)
1	17,225	4,109	12,699	4,797	105,736*	24,370*	-	-	135,660*	33,277*
2	1,243	582	-	-	134,672	44,413	-	-	135,915	44,995
3	4,335	1,634	14,797	2,520	89,588	23,672	3,217	674	111,937	28,500
4	6,795	2,691	-	-	77,370	26,347	-	-	84,165	29,038
Totals*	**29,598**	**9,016**	**27,496**	**7,317**	**407,366**	**118,801**	**3,217**	**674**	**467,677**	**135,809**

* Editor’s note: The NRC approved the “subsequent” or second 20 year operating license extension for Peach Bottom Units 2 and 3 on March 5, 2020 (after the 12/31/2019 data date for this report). The net effect of this approval is to increase the reference scenario by approximately 5,460 assemblies and 970 MTU.

Appendix F

Reference Scenario: No Replacement Nuclear Generation Forecast – Inventory by Congressional District

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Table F-1 Estimated Inventory by State and Congressional District as of December 31, 2019

State	Congressional District	Representative	Senators	Facility Name (Bold = Shutdown)	Type of Facility	Commercial SNF (MTHM)	Non-Commercial SNF (MTHM)	Reprocessing Waste (Equivalent MTHM)**	TOTAL (MTHM)
Alabama (AL)	2	Martha Roby (R)	Richard Shelby (R)	Joseph M. Farley Nuclear Plant	Comm Reactor	1,554	-	-	1,554
Alabama (AL)	5	Mo Brooks (R)	Doug Jones (R)	Browns Ferry Nuclear Plant	Comm Reactor	2,429	-	-	2,429
Arizona (AZ)	3	Raul Grijalva (D)	Martha McSally (R) Kyrsten Sinema (R)	Palo Verde Nuclear Generating Station	Comm Reactor	2,666	-	-	2,666
Arkansas (AR)	3	Steve Womack (R)	John Boozman (R) Tom Cotton (R)	Arkansas Nuclear One	Comm Reactor	1,626	-	-	1,626
California (CA)	2	Jared Huffman (D)	Dianne Feinstein (D)	**Humboldt Bay**	Comm Reactor	29	**-**	**-**	29
California (CA)	6	Doris O. Matsui (D)	Kamala Harris (D)	UC Davis/McClellan Nuclear Research Center	Non DOE Res Reactor	-	-	-	a
California (CA)	7	Ami Bera (D)		**Rancho Seco**	Comm Reactor	228	**-**	**-**	228
California (CA)	13	Barbara Lee (D)		Lawrence Berkeley National Laboratory	DOE National Lab	-	-	-	b
California (CA)	15	Eric Swalwell (D)		Aerotest Research ARRR	Non DOE Res Reactor	-	-	-	a
California (CA)	15	Eric Swalwell (D)		General Electric NTR	Non DOE Res Reactor	-	-	-	a
California (CA)	15	Eric Swalwell (D)		Lawrence Livermore National Laboratory	DOE National Lab	-	-	-	b
California (CA)	18	Anna G. Eshoo (D)		SLAC National Accelerator Laboratory	DOE National Lab	-	-	-	b
California (CA)	24	Salud Carbajal (D)		Diablo Canyon Nuclear Power Plant	Comm Reactor	1,547	-	-	1,547
California (CA)	45	Katie Porter (D)		University of California Irvine	Non DOE Res Reactor	-	-	-	a
California (CA)	49	Mike Levin (D)		**San Onofre**	Comm Reactor	1,609	**-**	**-**	1,609

Table F-1 (continued)

State	Congressional District	Representative	Senators	Facility Name (Bold = Shutdown)	Type of Facility	Commercial SNF (MTHM)	Non-Commercial SNF (MTHM)	Reprocessing Waste (Equivalent MTHM)**	TOTAL (MTHM)
Colorado (CO)	4	Ken Buck (R)	Michael Bennet (D)	Fort St. Vrain	DOE Site	15	-	-	15
Colorado (CO)	7	Ed Perlmutter (D)	Cory Gardner (R)	National Renewable Energy Laboratory	DOE National Lab	-	-	-	b
Colorado (CO)	7	Ed Perlmutter (D)		U.S. Geological Survey GSTR	Non DOE Res Reactor	-	-	-	a
Connecticut (CT)	2	Joe Courtney (D)	Richard Blumenthal (D)	**Haddam Neck**	Comm Reactor	414	-	-	414
Connecticut (CT)	2	Joe Courtney (D)	Chris Murphy (D)	Millstone Power Station	Comm Reactor	1,935	-	-	1,935
Florida (FL)	3	Ted Yoho (R)	Rick Scott (R)	University of Florida UFTR	Non DOE Res Reactor	-	-	-	a
Florida (FL)	11	Daniel Webster (R)	Marco Rubio (R)	**Crystal River**	Comm Reactor	582	-	-	582
Florida (FL)	18	Brian Mast (R)		St. Lucie Plant	Comm Reactor	1,535	-	-	1,535
Florida (FL)	27	Donna E. Shalala (D)		Turkey Point Nuclear Generating	Comm Reactor	1,436	-	-	1,436
Georgia (GA)	1	Buddy Carter (R)	Kelly Loeffler (R)	Edwin I. Hatch Nuclear Plant	Comm Reactor	1,736	-	-	1,736
Georgia (GA)	12	Rick Allen (R)	David Perdue (R)	Vogtle Electric Generating Plant	Comm Reactor	1,551	-	-	1,551
Idaho (ID)	2	Mike Simpson (R)	Mike Crapo (R)	Idaho National Laboratory	DOE National Lab w/ Reactor	156	114	1,900	2,170
Idaho (ID)	2	Mike Simpson (R)	Jim Risch (R)	Idaho State University AGN-201	Non DOE Res Reactor	-	-	-	a
Idaho (ID)	2	Mike Simpson (R)		Naval Reactors Storage Facility	DOE National Lab	-	37	-	37

Table F-1 (continued)

State	Congressional District	Representative	Senators	Facility Name (Bold = Shutdown)	Type of Facility	Commercial SNF (MTHM)	Non-Commercial SNF (MTHM)	Reprocessing Waste (Equivalent MTHM)**	TOTAL (MTHM)
Illinois (IL)	3	Daniel Lipinski (D)	Richard Durbin (D) Tammy Duckworth (D)	Argonne National Laboratory	DOE National Lab	-	-	-	b
Illinois (IL)	10	Bradley Schneider (D)		**Zion**	Comm Reactor	1,019	-	-	1,019
Illinois (IL)	13	Rodney Davis (R)		Clinton Power Station	Comm Reactor	746	-	-	746
Illinois (IL)	14	Lauren Underwood (D)		Fermi National Accelerator National Laboratory	DOE National Lab	-	-	-	b
Illinois (IL)	16	Adam Kinzinger (R)		Braidwood Station	Comm Reactor	1,500	-	-	1,500
Illinois (IL)	16	Adam Kinzinger (R)		Byron Station	Comm Reactor	1,572	-	-	1,572
Illinois (IL)	16	Adam Kinzinger (R)		Dresden Nuclear Power Station	Comm Reactor	1,887	-	-	1,887
Illinois (IL)	16	Adam Kinzinger (R)		GE Morris	Comm Reactor	674	-	-	674
Illinois (IL)	16	Adam Kinzinger (R)		LaSalle County Station	Comm Reactor	1,674	-	-	1,674
Illinois (IL)	17	Cheri Bustos (D)		Quad Cities Nuclear Power Station	Comm Reactor	1,820	-	-	1,820
Indiana (IN)	4	James Baird (R)	Todd Young (R) Joe Donnelly (D)	Purdue University PUR-1	Non DOE Res Reactor	-	-	-	a
Iowa (IA)	1	Abby Finkenauer (D)	Charles Grassley (R) Joni Ernst (R)	Duane Arnold Energy Center	Comm Reactor	593	-	-	593
Iowa (IA)	4	Steve King (R)		Ames Laboratory (DOE Site)	DOE National Lab	-	-	-	b
Kansas (KS)	1	Roger Marshall (R)	Pat Roberts (R) Jerry Moran (R)	Kansas State University TRIGA II	Non DOE Res Reactor	-	-	-	**a**
Kansas (KS)	2	Steve Watkins (R)		Wolf Creek Generating Station	Comm Reactor	847	-	-	847

Table F-1 (continued)

State	Congressional District	Representative	Senators	Facility Name (Bold = Shutdown)	Type of Facility	Commercial SNF (MTHM)	Non-Commercial SNF (MTHM)	Reprocessing Waste (Equivalent MTHM)**	TOTAL (MTHM)
Louisiana (LA)	2	Cedric Richmond (D)	John Kennedy (R)	Waterford Steam Electric Station	Comm Reactor	867	-	-	867
Louisiana (LA)	5	Ralph Abraham (R)	Bill Cassidy (R)	River Bend Station	Comm Reactor	777	-	-	777
Maine (ME)	1	Chellie Pingree (D)	Susan Collins (R) Angus King (I)	**Maine Yankee**	Comm Reactor	542	-	-	542
Maryland (MA)	5	Steny H. Hoyer (D)	Chris Van Hollen (D) Ben Cardin (D)	Calvert Cliffs Nuclear Power Plant	Comm Reactor	1,536	-	-	1,536
Maryland (MA)	5	Steny H. Hoyer (D)		University of Maryland MUTR	Non DOE Res Reactor	-	-	-	a
Maryland (MA)	6	David Trone (D)		National Institute of Standards and Technology	Non DOE Res Reactor	-	-	-	a
Maryland (MA)	8	Jamie Raskin (D)		Armed Forces Radiobiology Research Institute TRIGA	Non DOE Res Reactor	-	-	-	a
Massachusetts (MA)	1	Richard E. Neal (D)	Elizabeth Warren (D) Ed Markey (D)	**Yankee-Rowe**	Comm Reactor	127	-	-	127
Massachusetts (MA)	3	Lori Trahan (D)		University of Lowell UMLRR	Non DOE Res Reactor	-	-	-	a
Massachusetts (MA)	7	Ayanna Pressley (D)		Massachusetts Institute of Technology MITR-II	Non DOE Res Reactor	-	-	-	a
Massachusetts (MA)	9	William Keating (D)		**Pilgrim Nuclear Power Station**	Comm Reactor	731	-	-	731
Michigan (MI)	1	Jack Bergman (R)	Debbie Stabenow (D) Gary Peters (D)	**Big Rock Point**	Comm Reactor	58	-	-	58
Michigan (MI)	4	John Moolenaar (R)		DOW Chemical TRIGA	Non DOE Res Reactor	-	-	-	a
Michigan (MI)	6	Fred Upton (R)		Donald C. Cook Nuclear Power Plant	Comm Reactor	1,843	-	-	1,843
Michigan (MI)	6	Fred Upton (R)		Palisades Nuclear Plant	Comm Reactor	746	-	-	746
Michigan (MI)	12	Debbie Dingell (D)		Fermi	Comm Reactor	685	-	-	685

Table F-1 (continued)

State	Congressional District	Representative	Senators	Facility Name (Bold = Shutdown)	Type of Facility	Commercial SNF (MTHM)	Non-Commercial SNF (MTHM)	Reprocessing Waste (Equivalent MTHM)**	TOTAL (MTHM)
Minnesota (MN)	2	Angie Craig (D)	Amy Klobuchar (D)	Prairie Island Nuclear Generating Plant	Comm Reactor	1,022	-	-	1,022
Minnesota (MN)	6	Tom Emmer (R)	Tina Smith (D)	Monticello Nuclear Generating Plant	Comm Reactor	467	-	-	467
Mississippi (MS)	2	Bennie G. Thompson (D)	Cindy Hyde-Smith (R) Roger Wicker (R)	Grand Gulf Nuclear Station	Comm Reactor	985	-	-	985
Missouri (MO)	3	Blaine Luetkemeyer (R)	Joshua Hawley (R)	Callaway Plant	Comm Reactor	888	-	-	888
Missouri (MO)	4	Vicky Hartzler (R)	Roy Blunt (R)	University of Missouri at Columbia	Non DOE Res Reactor	-	-	-	a
Missouri (MO)	8	Jason Smith (R)		Missouri University of Science and Technology	Non DOE Res Reactor	-	-	-	a
Nebraska (NE)	1	Jeff Fortenberry (R)	Deb Fischer (R)	**Fort Calhoun Station**	Comm Reactor	466	-	-	466
Nebraska (NE)	3	Adrian Smith (R)	Benjamin Sasse (R)	Cooper Nuclear Station	Comm Reactor	535	-	-	535
Nevada (NV)	4	Steven Horsford (D)	Catherine Cortez-Masto (D)	Nevada National Security Site	DOE Site	-	-	-	c
Nevada (NV)	4	Steven Horsford (D)	Jacky Rosen (D)	Yucca Mountain	DOE Site	-	-	-	-
New Hampshire (NH)	1	Chris Pappas (D)	Jeanne Shaheen (D) Maggie Hassan (D)	Seabrook Station	Comm Reactor	703	-	-	703
New Jersey (NJ)	2	Jefferson Van Drew (D)	Bob Menendez (D)	Hope Creek Generating Station	Comm Reactor	884	-	-	884
New Jersey (NJ)	2	Jefferson Van Drew (D)	Cory Booker (D)	Salem Nuclear Generating Station	Comm Reactor	1,600	-	-	1,600
New Jersey (NJ)	3	Andy Kim (D)		Oyster Creek Nuclear Generating Station	Comm Reactor	803	-	-	803
New Jersey (NJ)	12	Bonnie Watson Coleman (D)		Princeton Plasma Physics Laboratory	DOE National Lab	-	-	-	b

Table F-1 (continued)

State	Congressional District	Representative	Senators	Facility Name (Bold = Shutdown)	Type of Facility	Commercial SNF (MTHM)	Non-Commercial SNF (MTHM)	Reprocessing Waste (Equivalent MTHM)**	TOTAL (MTHM)
New Mexico (NM)	1	Debra Haaland (D)	Tom Udall (D) Martin Heinrich (D)	University of New Mexico AGN-201	Non DOE Res Reactor	-	-	-	a
New Mexico (NM)	2	Xochitl Torres Small (D)		Eddy-Lea Energy Alliance LLC	Potential SNF Storage Site	-	-	-	-
New Mexico (NM)	2	Xochitl Torres Small (D)		Sandia National Laboratory	DOE National Lab w/ Reactor	-	-	-	a
New Mexico (NM)	2	Xochitl Torres Small (D)		White Sands Missile Range	DOE Site	-	-	-	c
New Mexico (NM)	3	Ben R. Luján (D)		Los Alamos National Laboratory	DOE National Lab	-	-	-	b
New York (NY)	1	Lee Zeldin (R)	Chuck Schumer (D) Kirsten Gillibrand (D)	Brookhaven National Laboratory	DOE National Lab	-	-	-	b
New York (NY)	17	Nita Lowey (D)		Indian Point Nuclear Generating	Comm Reactor	1,604	-	-	1,604
New York (NY)	20	Paul D. Tonko (D)		Rensselaer Polytechnic Institute	Non DOE Res Reactor	-	-	-	a
New York (NY)	21	Elise Stefanik (R)		MARF and S8G Submarine Prototypes	Naval Training Reactor	-	-	-	a
New York (NY)	23	Tom Reed (R)		West Valley Site	DOE Managed Comm HLW Site	-	-	640	640
New York (NY)	24	John Katko (R)		James A. FitzPatrick Nuclear Power Plant	Comm Reactor	771	-	-	771
New York (NY)	24	John Katko (R)		Nine Mile Point Nuclear Station	Comm Reactor	1,450	-	-	1,450
New York (NY)	24	John Katko (R)		R.E. Ginna Nuclear Power Plant	Comm Reactor	541	-	-	541
North Carolina (NC)	4	David Price (D)	Richard Burr (R) Thom Tillis (R)	Shearon Harris Nuclear Power Plant	Comm Reactor	1,638	-	-	1,638
North Carolina (NC)	4	David Price (D)		North Carolina State University PULSTAR	Non DOE Res Reactor	-	-	-	a
North Carolina (NC)	7	David Rouzer (R)		Brunswick Steam Electric Plant	Comm Reactor	928	-	-	928
North Carolina (NC)	9	Dan Bishop (R)		McGuire Nuclear Station	Comm Reactor	1,803	-	-	1,803

Table F-1 (continued)

State	Congressional District	Representative	Senators	Facility Name (Bold = Shutdown)	Type of Facility	Commercial SNF (MTHM)	Non-Commercial SNF (MTHM)	Reprocessing Waste (Equivalent MTHM)**	TOTAL (MTHM)
Ohio (OH)	3	Joyce Beatty (D)	Sherrod Brown (D)	Ohio State University OSURR	Non DOE Res Reactor	-	-	-	a
Ohio (OH)	9	Marcy Kaptur (D)	Rob Portman (R)	Davis-Besse Nuclear Power Station	Comm Reactor	635	-	-	635
Ohio (OH)	14	David Joyce (R)		Perry Nuclear Power Plant	Comm Reactor	834	-	-	834
Oregon (OR)	1	Suzanne Bonamici (D)	Ron Wyden (D)	**Trojan**	Comm Reactor	359	-	-	359
Oregon (OR)	3	Earl Blumenauer (D)	Jeff Merkley (D)	Reed College RRR	Non DOE Res Reactor	-	-	-	a
Oregon (OR)	4	Peter DeFazio (D)		Oregon State University OSTR	Non DOE Res Reactor	-	-	-	a
Pennsylvania (PA)	4	Madeleine Dean (D)	Bob Casey Jr (D)	Peach Bottom	Comm Reactor	2,079	-	-	2,079
Pennsylvania (PA)	5	Mary Gay Scanlon (D)	Pat Toomey (R)	Pennsylvania State University	Non DOE Res Reactor	-	-	-	a
Pennsylvania (PA)	6	Chrissy Houlahan (D)		Limerick Generating Station	Comm Reactor	1,654	-	-	1,654
Pennsylvania (PA)	11	Lloyd Smucker (R)		Susquehanna Steam Electric Station	Comm Reactor	1,882	-	-	1,882
Pennsylvania (PA)	12	Fred Keller (R)		Beaver Valley Power Station	Comm Reactor	1,334	-	-	1,334
Pennsylvania (PA)	14	Guy Reschenthaler (R)		National Energy Technology Laboratory	DOE National Lab	-	-	-	b
Pennsylvania (PA)	15	Glenn Thompson (R)		**Three Mile Island Nuclear Station**	Comm Reactor	791	-	-	791
Rhode Island (RI)	2	Jim Langevin (D)	Jack Reed (D) Sheldon Whitehouse (D)	Rhode Island Atomic Energy Commission Nuclear Science Center	Non DOE Res Reactor	-	-	-	a

Table F-1 (continued)

State	Congressional District	Representative	Senators	Facility Name (Bold = Shutdown)	Type of Facility	Commercial SNF (MTHM)	Non-Commercial SNF (MTHM)	Reprocessing Waste (Equivalent MTHM)**	TOTAL (MTHM)
South Carolina (SC)	1	Joe Cunningham (D)	Lindsey Graham (R)	Moored Training Ship - Unit #1 and Unit 2	Naval Training Reactor	-	-	-	c
South Carolina (SC)	2	Joe Wilson (R)	Tim Scott (R)	Savannah River National Laboratory	DOE National Lab	-	27	4,060	4,087
South Carolina (SC)	3	Jeff Duncan (R)		Oconee Nuclear Station	Comm Reactor	2,381	-	-	2,381
South Carolina (SC)	5	Ralph Norman (R)		Catawba Nuclear Station	Comm Reactor	1,575	-	-	1,575
South Carolina (SC)	5	Ralph Norman (R)		Virgil C. Summer Nuclear Station	Comm Reactor	673	-	-	673
South Carolina (SC)	7	Tom Rice (R)		H. B. Robinson Steam Electric Plant	Comm Reactor	438	-	-	438
Tennessee (TN)	3	Chuck Fleischmann (R)	Lamar Alexander (R)	Oak Ridge National Laboratory	DOE National Lab w/ Reactor	-	-	-	a
Tennessee (TN)	3	Chuck Fleischmann (R)	Marsha Blackburn (R)	Sequoyah Nuclear Plant	Comm Reactor	1,643	-	-	1,643
Tennessee (TN)	4	Scott DesJarlais (R)		Watts Bar Nuclear Plant	Comm Reactor	645	-	-	645
Texas (TX)	10	Michael T. McCaul (R)	John Cornyn (R)	University of Texas TRIGA II	Non DOE Res Reactor	-	-	-	a
Texas (TX)	11	K. Michael Conaway (R)	Ted Cruz (R)	Interim Storage Partners	Potential SNF Storage Site	-	-	-	-
Texas (TX)	17	Bill Flores (R)		Texas A&M University AGN-201	Non DOE Res Reactor	-	-	-	a
Texas (TX)	17	Bill Flores (R)		Texas A&M University NSCR	Non DOE Res Reactor	-	-	-	a
Texas (TX)	25	Roger Williams (R)		Comanche Peak Steam Electric Station	Comm Reactor	1,378	-	-	1,378
Texas (TX)	27	Michael Cloud (R)		South Texas Project	Comm Reactor	1,576	-	-	1,576
Utah (UT)	2	Chris Stewart (R)	Mitt Romney (R) Mike Lee (R)	University of Utah TRIGA	Non DOE Res Reactor	-	-	-	a
Vermont (VT)	1	Peter Welch (D)	Patrick Leahy (D) Bernie Sanders (I)	**Vermont Yankee Nuclear Power Plant**	Comm Reactor	702	-	-	704

Table F-1 (continued)

State	Congressional District	Representative	Senators	Facility Name (Bold = Shutdown)	Type of Facility	Commercial SNF (MTHM)	Non-Commercial SNF (MTHM)	Reprocessing Waste (Equivalent MTHM)**	TOTAL (MTHM)
Virginia (VA)	3	Robert C. Scott (D)	Mark Warner (D) Tim Kaine (D)	Surry Nuclear Power Station	Comm Reactor	1,562	-	-	1,562
Virginia (VA)	3	Robert C. Scott (D)		Thomas Jefferson National Accelerator Facility	DOE National Lab	-	-	-	b
Virginia (VA)	6	Ben Cline (R)		BWXT Technologies	Comm SNF R&D Center	-	-	-	b
Virginia (VA)	7	Abigail Spanberger (D)		North Anna Power Station	Comm Reactor	1,562	-	-	1,562
Washington (WA)	4	Dan Newhouse (R)	Patty Murray (D) Maria Cantwell (D)	Columbia Generating Station	Comm Reactor	809	-	-	809
Washington (WA)	4	Dan Newhouse (R)		Hanford Site	DOE Site	2	2,127	3,900	6,029
Washington (WA)	4	Dan Newhouse (R)		Pacific Northwest	DOE National Lab	-	-	-	b
Washington (WA)	5	Cathy McMorris Rodgers (R)		Washington State University WSUR	Non DOE Res Reactor	-	-	-	a
Wisconsin (WI)	2	Mark Pocan (D)	Ron Johnson (R) Tammy Baldwin (D)	University of Wisconsin UWNR	Non DOE Res Reactor	-	-	-	a
Wisconsin (WI)	3	Ron Kind (D)		**La Crosse**	Comm Reactor	38	-	-	38
Wisconsin (WI)	6	Glenn Grothman (R)		Point Beach Nuclear Plant	Comm Reactor	993	-	-	993
Wisconsin (WI)	8	Mike Gallagher (R)		**Kewaunee Power Station**	Comm Reactor	519	-	-	519
Total[d]						**84,445**	**2,305**	**10,500**	**97,249**

* SNF includes some from commercial sources Naval spent fuel is only stored at the Idaho storage facility

** Equivalent MTHM determined by using the nominal canister counts in Tables 2-8 and 3-7 and applying the historical factors of 2.3 and 0.5 MTU per canister for commercial and defense reprocessing waste respectively from DOE/DP 0020/1 "An Evaluation of Commercial Repository Capacity for the Disposal of Defense High-Level Waste" (DOE 1985). Applying the total radioactivity method for determining equivalent MTHM would result in much lower quantities (INEEL 1999)."

[a] SNF from research reactors primarily used for radiography, testing, training, isotope production or other non-power generating commercial services are not included

[b] Small quantities of SNF or reprocessing waste used for R&D purposes, if any, are not included, e.g. for laboratory analysis work

[c] Nuclear material for critical assembly machines or naval prototypes or moored training ships are not included in this table.

[d] Totals for SNT in MTHM represents rounded sum of pre-rounded site values.

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Appendix G

Revision History

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A general description of the changes made to this document with each revision is provided in this appendix. Some of these revisions were only issued as drafts.

Revision 0 contains a single projection for commercial SNF future inventory based on 1) the discharged fuel at shutdown reactors and 2) on the currently operating reactors all obtaining a license extension and operating for 60 years (Section 2).

Revision 1 constitutes a significant revision with respect to the terminology used to identify site groups and with the respect to the addition of four new projection scenarios for commercial SNF. The new scenarios include: Alternative Scenario 1 – The incorporation of 6 new reactors that are currently under construction at four sites in addition to the assumptions of the Reference Scenario that was developed in Revision 0; Alternative Scenario 2 – The shutdown of all reactors at the end of their respective current operating license; Alternative Scenario 3 – The incorporation of the shutdown of 7 "Most Challenging" reactors as a modification to the Reference Scenario; and Alternative Scenario 4 – The incorporation of the shutdown of 14 "Most Challenging" reactors as a modification to the Reference Scenario. The "Most Challenging" reactors are determined from a number of recent publications indicating reactors with significant fiscal and political challenges. Finally, Revision 1 includes an update to current storage locations for SNF through 2013.

Revision 2 contains some corrections and updates to inventory data with regard to current storage locations for SNF discharged through 2013. The updated inventory is primarily due to the commencement of dry storage operations at Fermi 2, as well ongoing transitions at multiple reactor sites of fuel from wet storage to dry storage. The dry storage inventory data are current as of September 1, 2014.

Revision 3 contains some corrections and updates to inventory data with regard to current storage locations for SNF discharged through 2015. The updated inventory is primarily due to implementation the new spent fuel projection tool [Vinson, 2015]. Also, the current revision reflects commencement of dry storage operations at Pilgrim and Beaver Valley, as well as ongoing transitions at multiple reactor sites of fuel from wet storage to dry storage. The dry storage inventory data are current as of May 5, 2015.

Revision 4 updates the inventory data with regard to current storage locations for SNF discharged through 2016. Revision 4 reflects nine reactors which have had shutdown dates announced by their utilities since the issuance of Revision 3. The updated inventory reflects the new GC-859 utility provided historical inventory thru June 2013 and the new spent fuel projection tool [Vinson, 2015]. Also, commencement of dry storage operations at Calloway, in Missouri, and V.C. Summer, in South Carolina, is reflected in the current revision. The dry storage inventory data are current as of May 3, 2016.

Revision 5 updates the inventory data with regard to current storage locations for SNF discharged through 2017. This revision reflects commencement of commercial operation of Watts Bar, Unit 2. Revision 5 reflects six reactors which have had shutdown dates announced by their utilities since the issuance of Revision 4. The updated inventory reflects the new GC-859 utility provided historical inventory thru June 2013 and the new spent fuel projection tool [Vinson, 2015]. Also, commencement of dry storage operations at Clinton, in Illinois, and Watts Bar, in Tennessee, is reflected in the current revision. The dry storage inventory data are current as of May 2, 2017.

Revision 6 updates the inventory data with regard to current storage locations for SNF discharged through 2018. This revision reflects Oyster Creek moving to a shutdown status. Revision 6 reflects seven reactors which have had shutdown dates announced by their utilities. The updated inventory reflects the GC-859 utility provided historical inventory thru June 2013 and the spent fuel projection tool [Vinson, 2015].

Revision 7 updates the inventory data with regard to current storage locations for SNF discharged through 2019. This revision reflects Three Mile Island Unit 1 and Pilgrim moving to a shutdown status. Revision

7 reflects six reactors which have had shutdown dates announced by their utilities. The updated inventory reflects the GC-859 utility provided historical inventory thru June 2013 and the spent fuel projection tool [Vinson, 2015].

Appendix H

Reference Scenario: No Replacement Nuclear Generation Forecast – State Inventory Data

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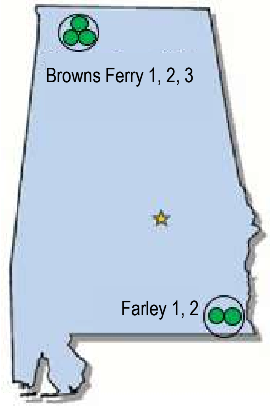
ALABAMA



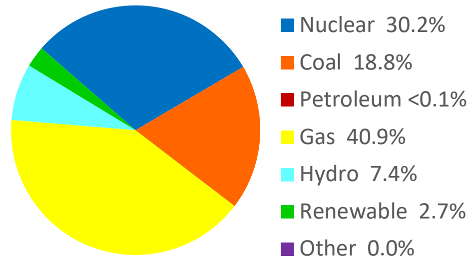
Operating Reactors (5 at 2 sites)
Commercial Dry Storage Sites (2 sites)

Elected Officials as of January 2020[1,2]

Governor:	Kay Ivey (R)
Senators:	Richard Shelby (R)
	Doug Jones (D)
Representatives:	
District 2:	Martha Roby (R)
District 5:	Mo Brooks (R)

Alabama: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

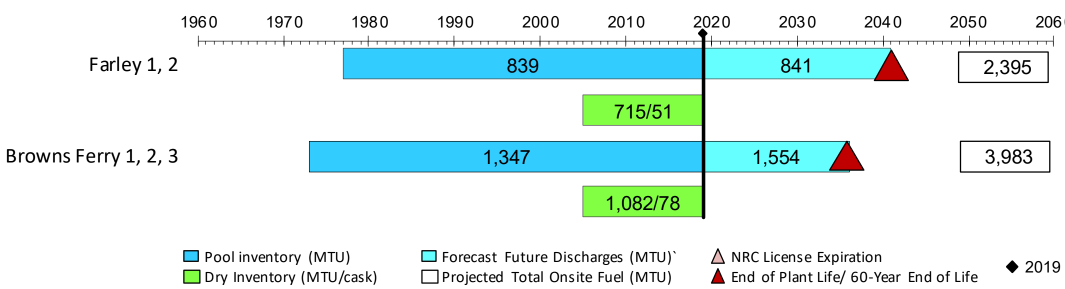


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
2	Farley 1	Southern Nuclear Operating Co.	Martha Roby (R)	1977-2037	PWR/Operating	2005/GL	1,191
	Farley 2			1981-2041	PWR/Operating		1,204
5	Browns Ferry 1	Tennessee Valley Authority	Mo Brooks (R)	1973-2033	BWR/Operating	2005/GL	1,116
	Browns Ferry 2			1974-2034	BWR/Operating		1,513
	Browns Ferry 3			1976-2036	BWR/Operating		1,354

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 1,797 MTU in 129 casks **Pool: 2,186 MTU** **Total: 3,983 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$948.9 million paid	**$0.0 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

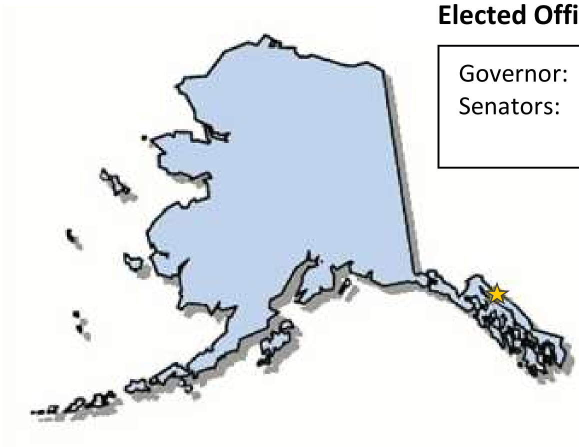
4 Forecast SNF discharges from individual reactors from the Reference Scenario from Appendix C and does not include any applicable transfers. Totals may vary slightly due to rounding.

5 State total estimated SNF in dry and pool storage as of December 31, 2019 from Appendix D. These quantities includes applicable SNF transfers. Totals may vary slightly due to rounding.

6 Current quantities of SNF in dry and pool storage as of December 31, 2019 and forecast SNF discharges from individual reactors from the Reference Scenario in Appendix B and C. Current storage quantities includes applicable transfers. Totals may vary slightly due to rounding.

[7] The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A "one-time fee" was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

ALASKA

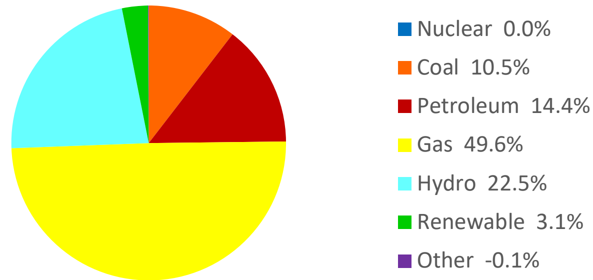


Elected Officials as of January 2020[1,2]

Governor:	Mike Dunleavy (R)
Senators:	Lisa Murkowski (R)
	Dan Sullivan (R)

Alaska: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)



1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

ARIZONA

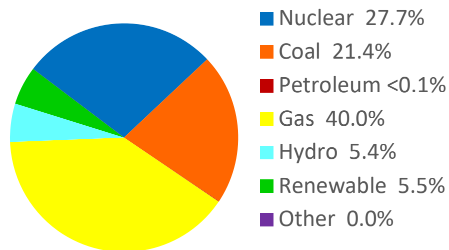
Elected Officials as of January 2020[1,2]

Governor:	Doug Ducey (R)
Senators:	Martha McSally (R)
	Kyrsten Sinema (D)
Representative:	
District 3:	Raúl Grijalva (D)

Operating Reactors (3 at 1 site)
Commercial Dry Storage Site (1 site)

Arizona: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

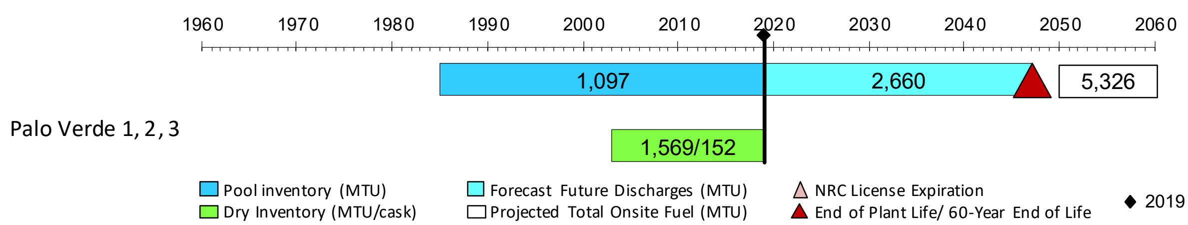


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
3	Palo Verde 1	Arizona Public Service Co.	Raúl Grijalva (D)	1985-2045	PWR/Operating	2003/GL	1,707
	Palo Verde 2			1986-2046	PWR/Operating		1,795
	Palo Verde 3			1987-2047	PWR/Operating		1,824

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 1,569 MTU in 152 casks **Pool: 1,097 MTU** **Total: 2,666 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$686.6 million paid	**$0.0 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

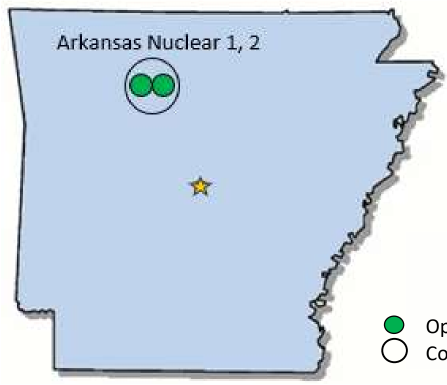
4 Forecast SNF discharges from individual reactors from the Reference Scenario from Appendix C and does not include any applicable transfers. Totals may vary slightly due to rounding.

5 State total estimated SNF in dry and pool storage as of December 31, 2019 from Appendix D. These quantities includes applicable SNF transfers. Totals may vary slightly due to rounding.

6 Current quantities of SNF in dry and pool storage as of December 31, 2019 and forecast SNF discharges from individual reactors from the Reference Scenario in Appendix B and C. Current storage quantities includes applicable transfers. Totals may vary slightly due to rounding.

7 The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A "one-time fee" was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

ARKANSAS



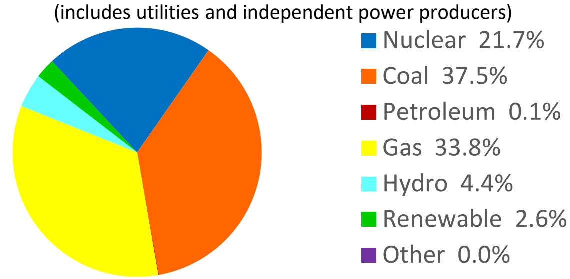
Operating Reactors (2 at 1 site)
Commercial Dry Storage Site (1 site)

Elected Officials as of January 2020[1,2]

Governor:	Asa Hutchinson (R)
Senators:	John Boozman (R)
	Tom Cotton (R)
Representative:	
District 3:	Steve Womack (R)

Arkansas: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

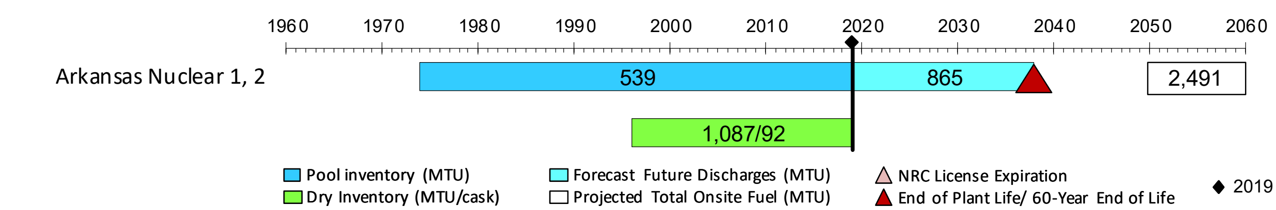


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
3	Arkansas Nuclear 1	Entergy Nuclear Operations, Inc.	Steve Womack (R)	1974-2034	PWR/Operating	1996/GL	1,130
	Arkansas Nuclear 2			1978-2038	PWR/Operating		1,361

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 1,087 MTU in 92 casks **Pool: 539 MTU** **Total: 1,626 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$367.1 million paid	**$191.1 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

4 Forecast SNF discharges from individual reactors from the Reference Scenario from Appendix C and does not include any applicable transfers. Totals may vary slightly due to rounding.

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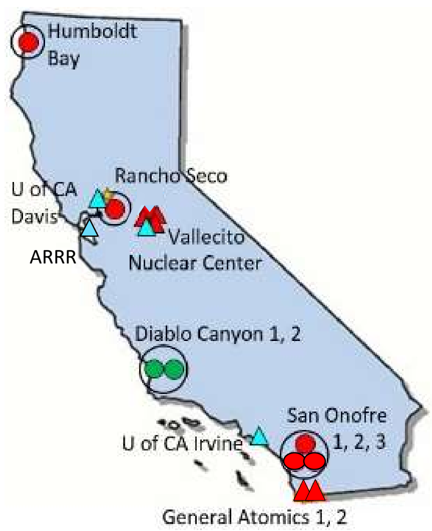
6 Current quantities of SNF in dry and pool storage as of December 31, 2019 and forecast SNF discharges from individual reactors from the Reference Scenario in Appendix B and C. Current storage quantities includes applicable transfers. Totals may vary slightly due to rounding.

7 The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A "one-time fee" was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

CALIFORNIA



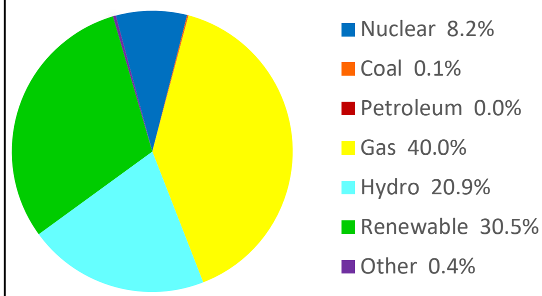
Elected Officials as of January 2020[1,2]

Governor:	Gavin Newsom (D)
Senators:	Dianne Feinstein (D)
	Kamala Harris (D)
Representatives:	
District 2:	Jared Huffman (D)
District 6:	Doris O. Matsui (D)
District 7:	Ami Bera (D)
District 15:	Eric Swalwell (D)
District 24:	Salud Carbajal (D)
District 45:	Katie Porter (D)
District 49:	Mike Levin (D)
District 52:	Scott Peters (D)

Shutdown Reactors (5 at 3 sites)
Operating Reactors (2 at 1 site)
Commercial Dry Storage Site (4 sites)
Operating Research Reactors (4 at 4 sites)
Shutdown Research Reactors (5 at 2 sites)
*no fuel on-site at General Atomics facilities

California: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)



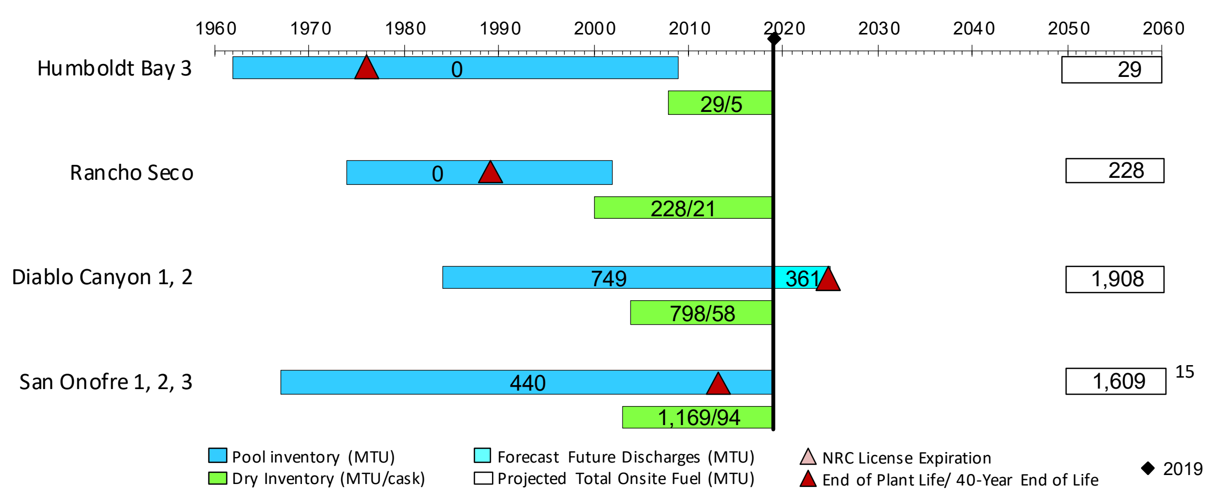
Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
2	Humboldt Bay 3	Pacific Gas & Electric Company	Jared Huffman (D)	1963-1976/ DECON in progress	BWR/ Shutdown	2005/SL	29
6	University of California - Davis	University of California	Doris O. Matsui (D)	1998- License R-130	R&TRF TRIGA Mark II, 2,300kW / Operating		
7	Rancho Seco	Sacramento Municipal Utility District	Ami Bera (D)	1974-1989/ DECON completed	PWR/ Shutdown	2000/SL	228
15	Aerotest Radiography and Research Reactor (ARRR)	Nuclear Labrinith Aerotest[8]	Eric Swalwell (D)	1965- License R-98	R&TRF TRIGA Mark I, 250kW / Operating[8]		
	Vallecitos Boiling Water Reactor (VBWR)	GE Hitachi Nuclear Energy/ Vallecitos Nuclear Center[12]		1957-1963 / SAFSTOR[9] possession only License DPR-1	BWR/ Shutdown		
	General Electric Test Reactor (GETR)			1986-2016/ SAFSTOR[10] possession only License TR-1	R&TRF/ Shutdown[11]		
	Vallecitos Experimental Superheat Reactor (VESR)			1970-2016/ SAFSTOR[10] possession only License DR-10	R&TRF/ Shutdown[11]		
	Nuclear Test Reactor (NTR)			1957-2021 License R-33	R&TRF Nuclear Test, 100kW/ Operating		

CONG. DIST.	FACILITY	NRC LICENSEE	REPRESENTATIVE	OPERATING LICENSE PERIOD/STATUS	FACILITY TYPE/STATUS	ISFSI LICENSE YEAR/TYPE	SNF (MTU) TOTAL PROJECTED[4]
24	Diablo Canyon 1	Pacific Gas & Electric Company	Salud Carbajal (D)	1984-2024[13]	PWR/ Operating	2004/SL	1,010
	Diablo Canyon 2			1985-2025[13]	PWR/ Operating		898
45	University of California - Irvine	University of California	Katie Porter (D)	1969- License R-116	R&TRF TRIGA Mark 1, 250kW/ Operating		
49	San Onofre 1	Southern California Edison Co.	Mike Levin (D)	1968-1992/ DECON SAFSTOR	PWR/ Shutdown	2003/GL	244[14]
	San Onofre 2			1982-2013/ DECON in Progress	PWR/ Early Shutdown		730
	San Onofre 3			1983-2013/ DECON in Progress	PWR/ Early Shutdown		733
52	General Atomics	General Atomics	Scott Peters (D)	1957-1997/ SAFSTOR	R&TRF TRIGA Mark I/ Shutdown		
	General Atomics			1960-1995/ DECON	R&TRF TRIGA Mark F/ Shutdown		

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 2,224 MTU in 178 casks **Pool: 1,189 MTU** **Total: 3,413 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$953.0 million paid[16]	**$0.8 million one-time fee owed[17]**

[1] Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

[2] Governor from https://www.nga.org/governors, Accessed January 31, 2020.

[3] Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

[4] Forecast SNF discharges from individual reactors from the Reference Scenario from Appendix C and does not include any applicable transfers. Totals may vary slightly due to rounding.

[5] State total estimated SNF in dry and pool storage as of December 31, 2019 from Appendix D. These quantities includes applicable SNF transfers. Totals may vary slightly due to rounding.

[6] Current quantities of SNF in dry and pool storage as of December 31, 2019 and forecast SNF discharges from individual reactors from the Reference Scenario in Appendix B and C. Current storage quantities includes applicable transfers. Totals may vary slightly due to rounding.

[7] The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A "one-time fee" was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees. Includes one time fee paid by Vallecitos.

[8] Ownership issues have been resolved and Nuclear Labyrinth is now the parent company of ARRR, the license renewal is under NRC review Source: ADAMS ML17277B261.

[9] No fuel on site. The licensee plans to maintain the facility in SAFSTOR until ongoing site nuclear activities are terminated and the entire site can be decommissioned in an integrated fashion. Estimated date of closure is 2025.

[10] NRC issued a possession-only license for GETR and VESR on February 5, 1986. The license was renewed on September 30, 1992; licensee requested continuation of their current license 12/15/15.

[11] Expected closure in 2025.

[12] There are also hot cells that are used for power reactor fuel post irradiation examination.

[13] Shutdown announced for the end of initial license period.

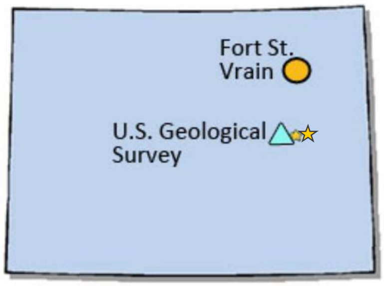
[14] Includes 98 MTU transferred to Morris, Illinois.

[15] Does not include 98 MTU from San Onofre 1 transferred to Morris, Illinois.

[16] Includes one-time fee paid by GE for Vallecitos.

[17] Includes one-time fee owed by Aerotest.

COLORADO



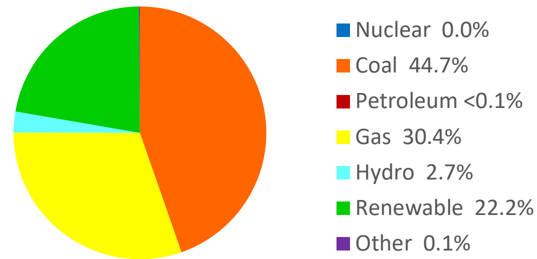
△ Operating Research Reactor (1 at 1 site)
● DOE owned SNF (1 site)

Elected Officials as of January 2020[1,2]

Governor:	Jared Polis(D)
Senators:	Michael Bennet (D)
	Cory Gardner (R)
Representatives:	
District 4:	Ken Buck (R)
District 7:	Ed Perlmutter (D)

Colorado: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

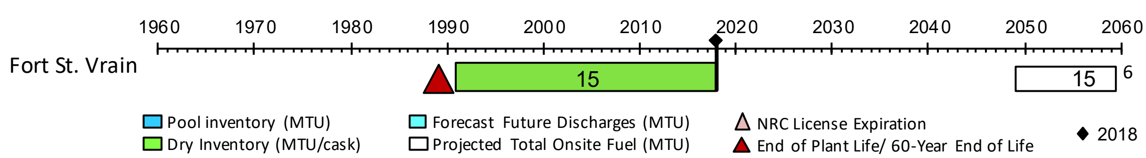


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
4	Fort St. Vrain	DOE	Ken Buck (R)	1973-1989/ DECON completed	HTGR/ Shutdown	1991-2031/ SL	24
7	US Geological Survey (USGS)	USGS	Ed Perlmutter (D)	1969- License R-113	R&TRF TRIGA Mark I, 1,000kW/ Operating		

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 15 MTHM in 244 canisters (vault) **Pool: 0 MTHM** **Total: 15 MTHM**

SPENT NUCLEAR FUEL STORAGE STATUS



NUCLEAR WASTE FUND[7]	
$0.2 million paid	**$0.0 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

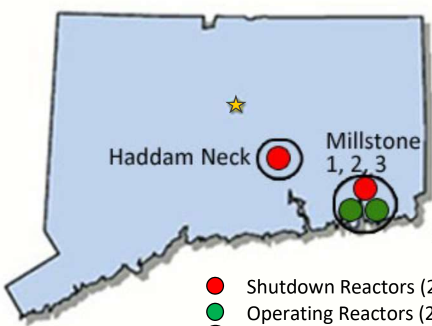
4 Actual SNF discharges Includes 8.6 MTU transferred to INL.

5 State total SNF in dry a storage as of December 31, 2019. *Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report* [FCRD-NFST-2013-000263, Rev 7]. This quantities excludes 8.6 MTU transferred to INL.

6 State total SNF in dry a storage as of December 31, 2019. *Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report* [FCRD-NFST-2013-000263, Rev 7]. This quantities excludes 8.6 MTU transferred to INL.

7 The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A "one-time fee" was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

CONNECTICUT

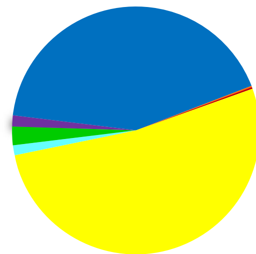


Elected Officials as of January 2020[1,2]

Governor:	Ned Lamont (D)
Senators:	Richard Blumenthal (D)
	Christopher Murphy (D)
Representative:	
District 2:	Joe Courtney (D)

Connecticut: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

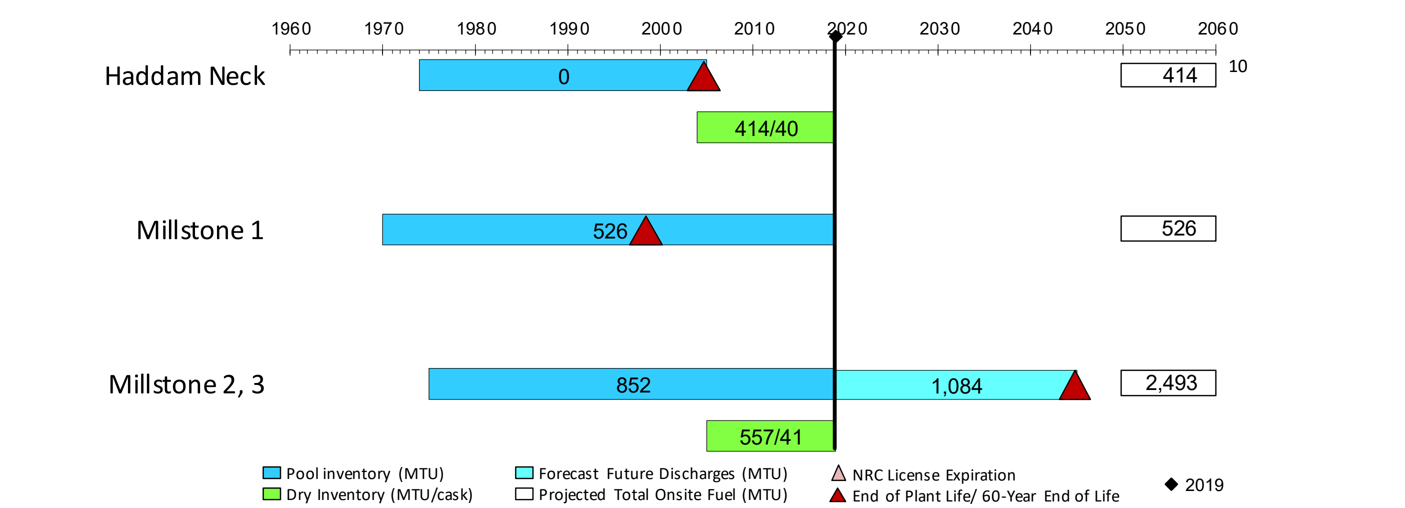


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
2	Haddam Neck	Connecticut Yankee Atomic Power	Joe Courtney (D)	1967-1996 DECON completed	PWR/Shutdown	2004/GL	448[8-9]
	Millstone 1	Dominion Nuclear Conneticut, Inc		1970-1998 SAFSTOR	BWR/Shutdown	2005/GL	526
	Millstone 2			1975-2035	PWR/Operating		1,075
	Millstone 3			1986-2045	PWR/Operating		1,418

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 971 MTU in 81 casks **Pool: 1,378 MTU** **Total: 2,348 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]

$923.9 million paid	**$11.6 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

[3] Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

[4] Forecast SNF discharges from individual reactors from the Reference Scenario from Appendix C and does not include any applicable transfers. Totals may vary slightly due to rounding.

[5] State total estimated SNF in dry and pool storage as of December 31, 2019 from Appendix D. These quantities includes applicable SNF transfers. Totals may vary slightly due to rounding.

[6] Current quantities of SNF in dry and pool storage as of December 31, 2019 and forecast SNF discharges from individual reactors from the Reference Scenario in Appendix B and C. Current storage quantities includes applicable transfers. Totals may vary slightly due to rounding.

[7] The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A "one-time fee" was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

[8] Total reactor discharges includes 34 MTU transferred to Morris, Illinois.

[9] Total reactor discharges includes 0.41 MTU transferred to Idaho National Laboratory.

[10] SNF in storage does not include 34 MTU transferred to Morris, Illinois.

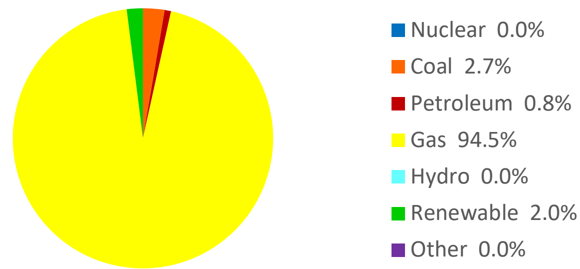
DELAWARE

Elected Officials as of January 2020[1,2]

Governor:	John Carney (D)
Senators:	Tom Carper (D)
	Chris Coons (D)

Delaware:2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)



1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

FLORIDA

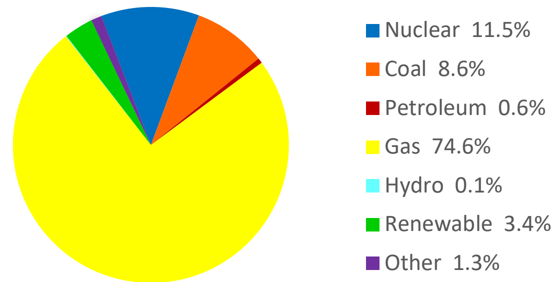
- Shutdown Reactor (1 at 1 site)
- Operating Reactors (4 at 2 sites)
- Commercial Dry Storage Sites (2 sites)
- Operating Research Reactor (1 at 1 site)

Elected Officials as of January 2020[1,2]

Governor:	Ron Desantis (R)
Senators:	Rick Scott (R)
	Marco Rubio (R)
Representatives:	
District 3:	Ted Yoho (R)
District 11:	Daniel Webster (R)
District 18:	Brian Mast (R)
District 27:	Donna Shalala (D)

Florida: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

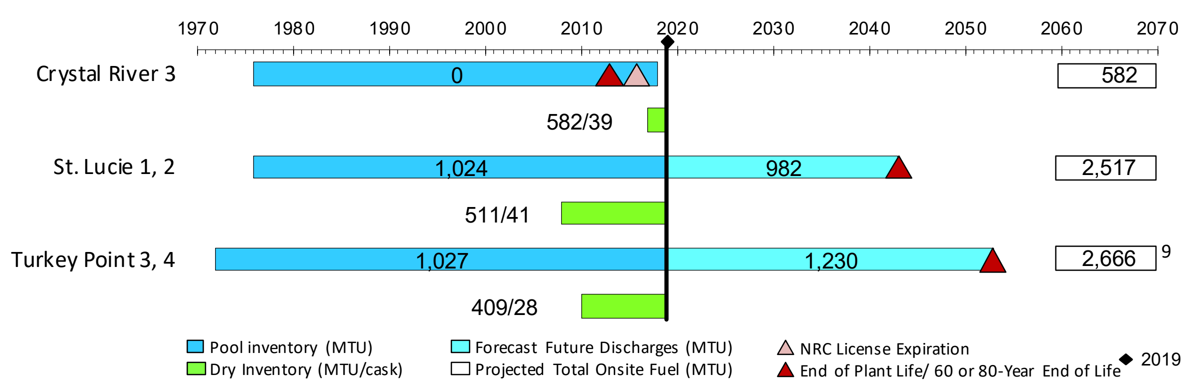


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
3	University of Florida	University of Florida	Ted Yoho (R)	1959- License R-56	R&TRF Argonaut, 100Kw/ Operating		
11	Crystal River 3	Duke Energy Florida, Inc.	Daniel Webster (R)	1977-2016[7] SAFSTOR in progress	PWR/ Shutdown 2013	2017/GL	582
18	St. Lucie 1	Florida Power & Light Co.	Brian Mast (R)	1976-2036	PWR/Operating	2008/GL	1,277
	St. Lucie 2			1983-2043	PWR/Operating		1,240
27	Turkey Point 3		Donna Shalala (D)	1972-2052[10]	PWR/Operating	2010/GL	1,307[8]
	Turkey Point 4			1973-2053[10]	PWR/Operating		1,359[8]

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 1,502 MTU in 108 casks **Pool: 2,051 MTU** **Total: 3,553 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$887.0 million paid	**$0.0 million one-time fee owed**

[1] Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

[2] Governor from https://www.nga.org/governors, Accessed January 31, 2020.

[3] Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 20189. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

[4] Forecast SNF discharges from individual reactors from the Reference Scenario from Appendix C and does not include any applicable transfers. Totals may vary slightly due to rounding.

[5] State total estimated SNF in dry and pool storage as of December 31, 2019 from Appendix D. These quantities includes applicable SNF transfers. Totals may vary slightly due to rounding.

[6] Current quantities of SNF in dry and pool storage as of December 31, 2019 and forecast SNF discharges from individual reactors from the Reference Scenario in Appendix B and C. Current storage quantities includes applicable transfers. Totals may vary slightly due to rounding.

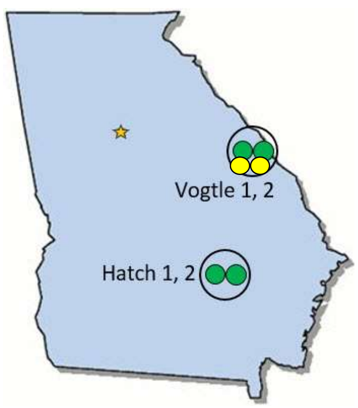
[7] The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A "one-time fee" was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

[8] Discharges includes 8 MTU transferred to Idaho National Lab.

[9] SNF in storage does not include 8 MTU transferred to Idaho National Lab.

[10] Turkey Point Units 3 and 4 were the first reactors in the United States to receive a subsequent (or second) 20 year operating license extension. These units are now licensed to operate a total of 80 years. This operational period is reflected in the reference scenario and this table.

GEORGIA



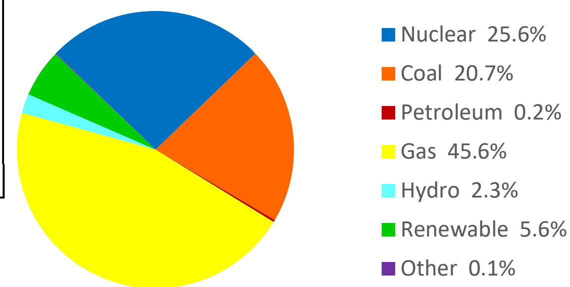
Elected Officials as of January 2020[1,2]

Governor:	Brian Kemp (R)
Senators:	Kelly Loeffler (R)
	David Perdue (R)
Representatives:	
District 1:	Buddy Carter (R)
District 12:	Rick Allen (R)

Reactors Under Construction (2 at 1 site)
Operating Reactors (4 at 2 sites)
Commercial Dry Storage Site (2 sites)

Georgia: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

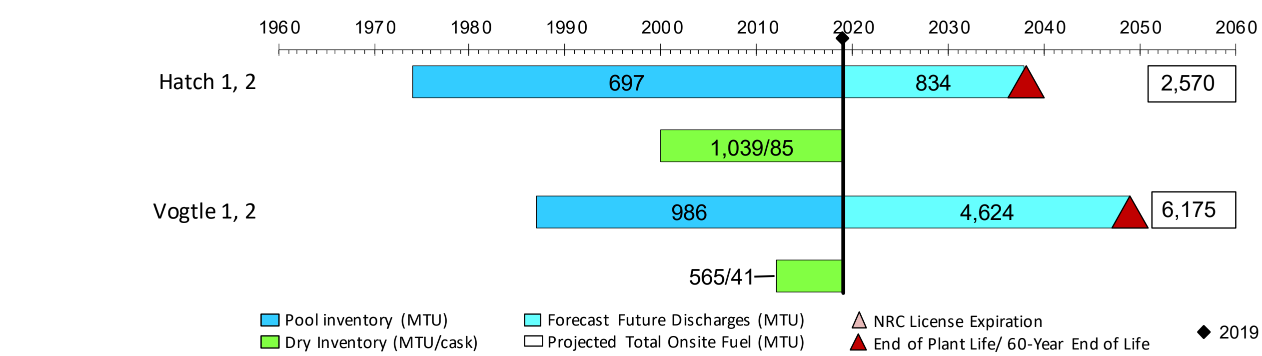


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
1	Hatch 1	Southern Nuclear Operating Co.	Buddy Carter (R)	1974-2034	BWR/Operating	2000/GL	1,249
	Hatch 2			1978-2038	BWR/Operating		1,321
12	Vogtle 1		Rick Allen (R)	1987-2047	PWR/Operating	2012/GL	1,591
	Vogtle 2			1989-2049	PWR/Operating		1,550
	Vogtle 3			2021/Planned	PWR/Under Construction		
	Vogtle 4			2022/Planned	PWR/Under Construction		

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 1,604 MTU in 126 casks **Pool: 1,683 MTU** **Total: 3,287 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$846.1 million paid	**$0.0 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

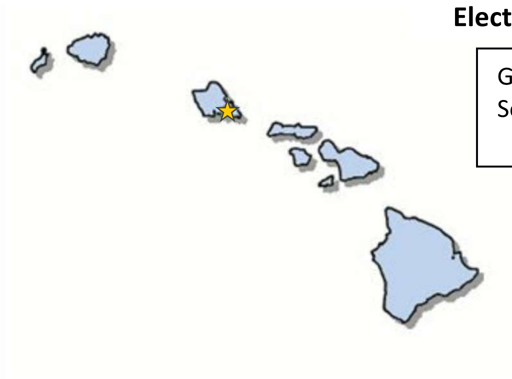
[4] Forecast SNF discharges from individual reactors from the Reference Scenario from Appendix C and does not include any applicable transfers. Totals may vary slightly due to rounding.

[5] State total estimated SNF in dry and pool storage as of December 31, 2019 from Appendix D. These quantities includes applicable SNF transfers. Totals may vary slightly due to rounding.

[6] Current quantities of SNF in dry and pool storage as of December 31, 2019 and forecast SNF discharges from individual reactors from the Reference Scenario in Appendix B and C. Current storage quantities includes applicable transfers. Totals may vary slightly due to rounding.

[7] The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A "one-time fee" was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

HAWAII

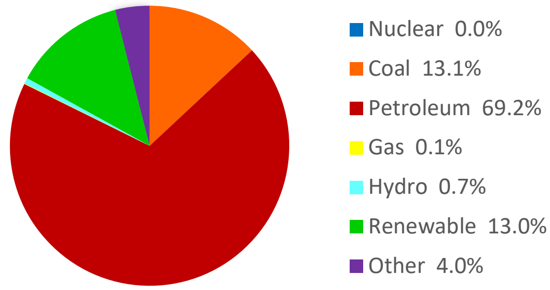


Elected Officials as of January 2020[1,2]

Governor:	David Ige (D)
Senators:	Brian Schatz (D)
	Mazie Hirono (D)

Hawaii: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

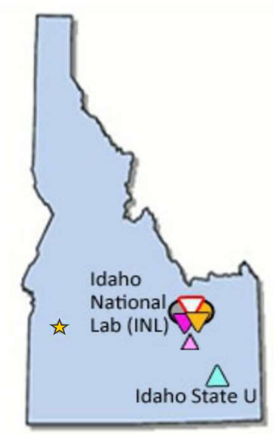


1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

IDAHO



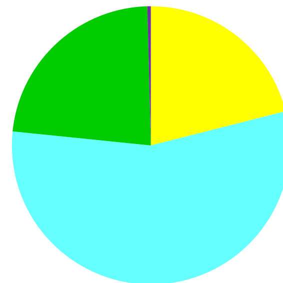
Elected Officials as of January 2020[1,2]

Governor:	Brad Little (R)
Senators:	Mike Crapo (R)
	Jim Risch (R)
Representative:	
District 2:	Mike Simpson (R)

- △ Operating Reactor (1 at 1 site)
- ● DOE owned ISFSI at INL, licensed but not constructed
- ● DOE owned TMI-2 ISFSI at INL
- ▽ DOE owned SNF and Reprocessing Waste at INL
- ▽ Surplus Plutonium at INL
- ▼ Naval SNF
- △ DOE Research Reactor

Idaho: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

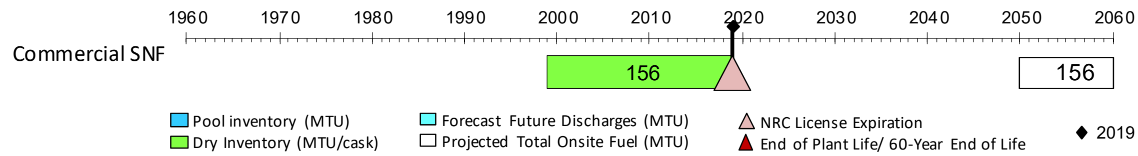


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/ Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
	Idaho State Univ.	Idaho State Univ.		1967- License R-110	AGN-201 #103, 0.005kW/ Operating		
	Idaho National Laboratory (INL)[5-7]			1948-	National Laboratory		
	Advanced Test Reactor Critical Facility			1964-	Test reactor		
	Neutron Radiography Facility			mid-1970s	R&TRF TRIGA		
	INL: Advanced Test Reactor (ATR)[8]			1967-	Test reactor		
	Transient Test Reactor (TREAT)			1959-	Test Reactor		
2	INL: Materials and Fuels Complex[9]	DOE[16]	Mike Simpson (R)			See Note [11]	See Note [10]
	INL: CPP-603, Irradiated Fuel Storage Basins			1974-2035[11]	Dry storage	See Note [11]	See Note[12]
	INL: CPP-666 Fuel Storage Basins			1984-2035[11]	Pool storage	See Note [11]	See Note [8]
	INL: CPP-749, Underground Storage Vaults			1971-2035[11]	Dry storage	See Note [11]	
	INL: CPP-2707, Cask Pad and Rail Car			2003-2035[11]	Dry storage	See Note [11]	See note[13]
	INL TMI-2			1999-2019[13]	Dry storage	1999/SL	See Note[14]
	INL Idaho Spent Fuel Facility (ISFF)			Licensed, but not yet constructed[15]	Dry storage	2004/SL	
	Naval Reactors Facility	NNSA[16]			Various		

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

Dry: 156 MTU **Pool: 0 MTU** **Total: 156 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[17]	
$0.0 million paid	**$0.0 million one-time fee owed**

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1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

4 Values are for commercial SNF as identified in Section 2.1.2 of *Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report* [FCRD-NFST-2013-000263, Rev 7]. Commercial SNF at INL includes 81.6 MTHM from TMI-2 core debris, 8.6 MTHM transferred from Ft. St. Vrain, and the balance from various R&D programs. INL also has approximately 114 MTHM of SNF from DOE and other sources for a total of 271 MTHM of DOE-Managed SNF, excluding Navy SNF.

5 Since 1951, 52 reactors have been built on the grounds of what was originally the Atomic Energy Commission's National Reactor Testing Station, currently the location of Idaho National Laboratory. Only 3 reactors continue to operate. The 49 other experimental test reactors have been decommissioned.

6 The INL received SNF and debris from Three Mile Island 2 (Pennsylvania).

7 The INL receives SNF from foreign research reactors (FRR) and domestic research reactors (DRR).

8 SNF removed from ATR is temporarily maintained in the reactor canal before it is transferred to CPP-666 (basins) for storage.

9 Materials and Fuels Complex, formerly Argonne West, was part of Argonne National Laboratory (Illinois) until 2004 when it was incorporated into the INL.

10 SNF from Experimental Breeder Reactor-II (EBR-2) is stored in cylinders in the Radioactive Scrap and Waste Facility. SNF from the Hanford Fast Flux Test Facility (HFFTF) is stored in the Hot Fuel Examination Facility.

11 DOE regulated facility. The DOE Authorization Basis for all DOE-regulated SNF facilities assumes operations through 2035.

12 Receipt of approximately 14 MTU of Foreign Research Reactor (FRR) and Domestic Research Reactor (DRR) SNF is expected through 2035.

13 Includes 6 casks containing fuel from the Test Area North Fuel Examination Facility plus a rail car holding 2 casks from West Valley (New York) containing SNF of commercial origin.

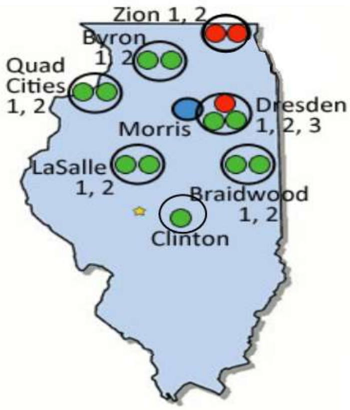
14 Contains Three Mile Island 2 fuel debris.

15 Not yet constructed. Purpose is to receive INL SNF.

16 DOE Regulated Facilities.

17 The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A "one-time fee" was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

ILLINOIS



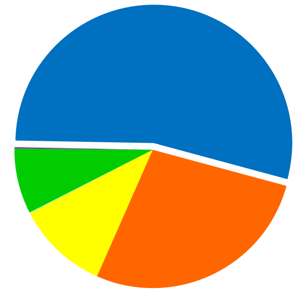
- Shutdown Reactors (3 at 2 sites)
- Operating Reactors (11 at 6 sites)
- Commercial Dry Storage Sites (7 sites)
- Commercial Pool Storage Site (1 site)

Elected Officials as of January 2020[1,2]

Governor:	J. B. Pritzker (R)
Senators:	Richard Durbin (D)
	Tammy Duckworth (D)
Representatives:	
District 10:	Bradley Schneider (D)
District 13:	Rodney Davis (R)
District 16:	Adam Kinzinger (R)
District 17:	Cheri Bustos (D)

Illinois: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

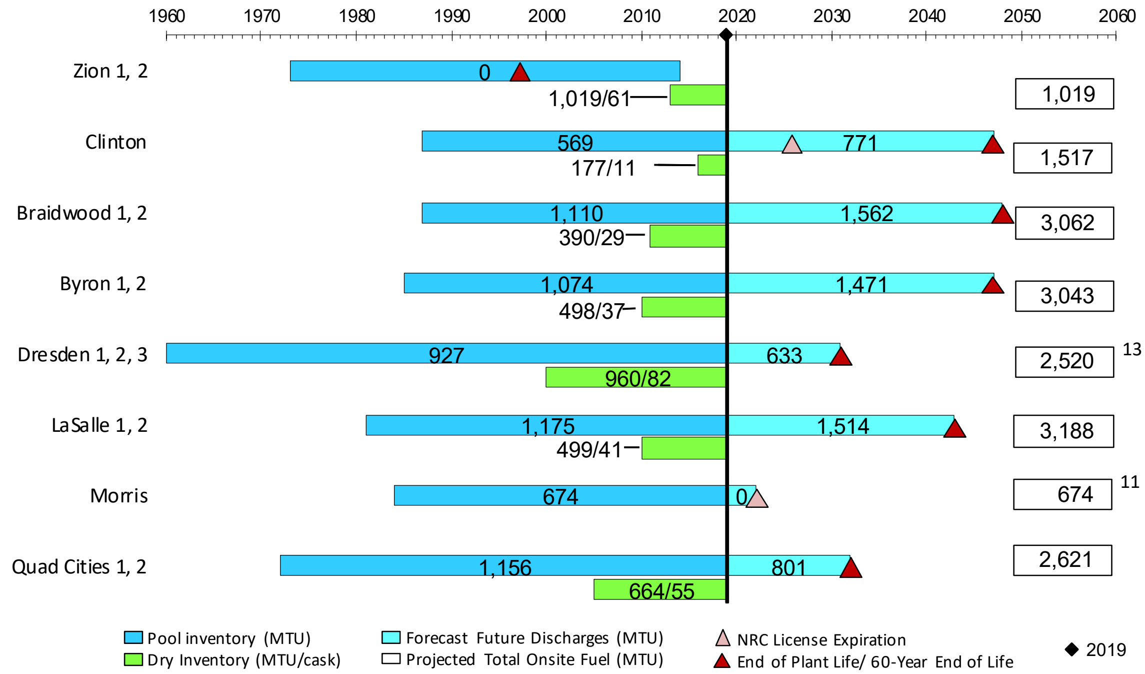


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
10	Zion 1	Zion Solutions	Bradley Schneider (D)	1973-1997/ DECON in progress	PWR/Shutdown[8]	2014/GL	524
	Zion 2			1973-1996/ DECON in progress	PWR/Shutdown[8]		495
13	Clinton	Exelon Generation Co., LLC	Rodney Davis (R)	1987-2027[15]	BWR/Operating	2016/GL	1,517
16	Braidwood 1		Adam Kinzinger (R)	1987-2046	PWR/Operating	2011/GL	1,462
	Braidwood 2			1988-2047	PWR/Operating		1,600
	Byron 1			1985-2044	PWR/Operating	2010/GL	1,510
	Byron 2			1987-2046	PWR/Operating		1,533
	Dresden 1			1959-1978 SAFSTOR	BWR/Shutdown	2000/GL	91[9]
	Dresden 2			1991-2029	BWR/Operating		1,366[10]
	Dresden 3			1971-2031	BWR/Operating		1,209
	LaSalle 1			1982-2042	BWR/Operating	2010/GL	1,550
	LaSalle 2			1983-2043	BWR/Operating		1,638
	Morris	GE-Hitachi Nuclear Energy Americas LLC		1984-2022	SNF Storage	1982/SL	674[11,12]
17	Quad Cities 1	Exelon Generation Co., LLC	Cheri Bustos (D)	1972-2032	BWR/Operating	2005/GL	1,327
	Quad Cities 2			1972-2032	BWR/Operating		1,294

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 4,207 MTU in 316 casks **Pool: 6,685 MTU** **Total: 10,892 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$2,261.2 million paid[14]	**$1,075.3 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

4 Forecast SNF discharges from individual reactors from the Reference Scenario from Appendix C and does not include any applicable transfers. Totals may vary slightly due to rounding.

5 State total estimated SNF in dry and pool storage as of December 31, 2019 from Appendix D. These quantities includes applicable SNF transfers. Totals may vary slightly due to rounding.

6 Current quantities of SNF in dry and pool storage as of December 31, 2019 and forecast SNF discharges from individual reactors from the Reference Scenario in Appendix B and C. Current storage quantities includes applicable transfers. Totals may vary slightly due to rounding.

7 The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A "one-time fee" was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

8 Permanently shutdown February 13, 1998.

9 Discharges includes 0.26 MTU transferred to Idaho National Laboratory.

10 Discharges includes 145 MTU transferred to Morris.

11 Morris received SNF from the following facilities.

State	Facility	MTU to Morris
California	San Onofre 1	98.41
Connecticut	Haddam Neck	34.48
Illinois	Dresden 2	145.19
Minnesota	Monticello	198.19
Nebraska	Cooper	198.02
	Total	674.29

[12] On this table, the Total Projected SNF at Morris includes all SNF transferred from other facilities to Morris, including 145 MTU transferred from Dresden 2 to Morris. The Total Projected SNF from Dresden 2 also includes this 145 MTU which is consistent with how quantities are reported in this column. The result is that 145 MTU from Dresden 2 shows up twice on this Table, whereas on the Commercial Nuclear Fuel Onsite Inventory Figure, it shows up only once – in the Morris onsite inventory.

[13] Does not include 145 MTU transferred to Morris or 0.26 MTU transferred to Idaho National Laboratory.

[14] Includes one-time fee paid by GE for Morris.

[15] Clinton has not applied for an operating license extension.

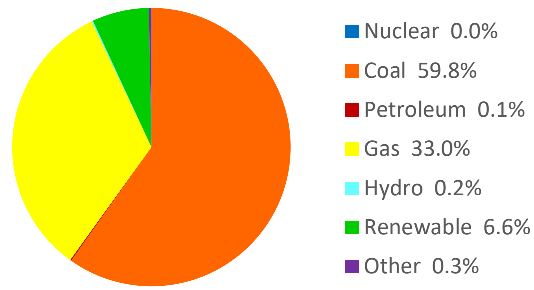
INDIANA

Elected Officials as of January 2020[1,2]

Governor:	Eric Holcomb (R)
Senators:	Todd Young (R)
	Joe Donnelly (D)
Representative:	
District 4:	James Baird (R)

Indiana: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)



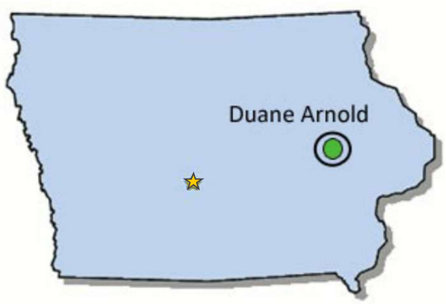
Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected
4	Purdue University	Purdue University	James Baird (R)	1962- License R-87	R&TRF Lockheed, 1kW/ Operating		

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

IOWA

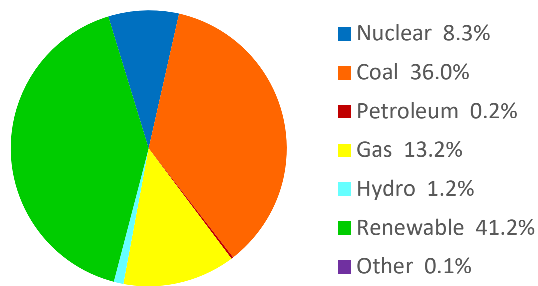


Operating Reactor (1 at 1 site)
Commercial Dry Storage Site (1 site)

Elected Officials as of January 2020[1,2]

Governor:	Kim Reynolds (R)
Senators:	Charles Grassley (R)
	Joni Ernst (R)
Representative:	
District 1:	Abby Finkenauer (D)

Iowa: 2019 Electricity Generation Mix[3]
(includes utilities and independent power producers)

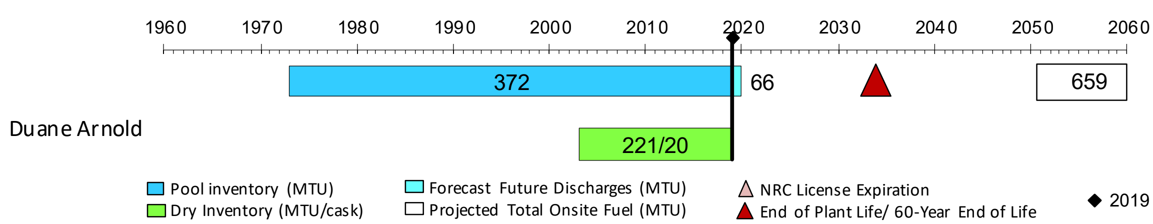


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
1	Duane Arnold	NextEra Energy Duane Arnold, LLC	Abby Finkenauer (D)	1974-2034	BWR/Operating	2003/GL	659

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 221 MTU in 20 casks **Pool: 372 MTU** **Total: 593 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$137.1 million paid	**$0.0 million one-time fee owed**

[1] Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

[2] Governor from https://www.nga.org/governors, Accessed January 31, 2020.

[3] Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

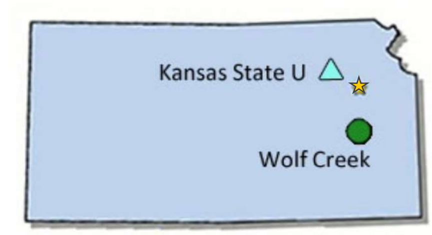
[4] Forecast SNF discharges from individual reactors from the Reference Scenario from Appendix C and does not include any applicable transfers. Totals may vary slightly due to rounding.

[5] State total estimated SNF in dry and pool storage as of December 31, 2019 from Appendix D. These quantities includes applicable SNF transfers. Totals may vary slightly due to rounding.

[6] Current quantities of SNF in dry and pool storage as of December 31, 2019 and forecast SNF discharges from individual reactors from the Reference Scenario in Appendix B and C. Current storage quantities includes applicable transfers. Totals may vary slightly due to rounding.

[7] The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A "one-time fee" was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

KANSAS



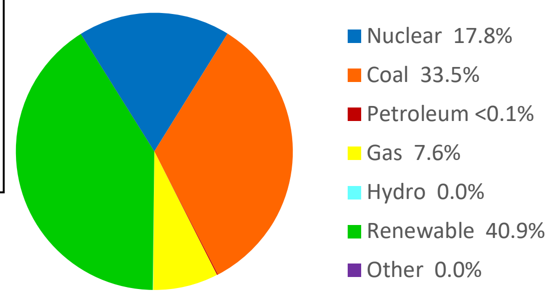
Operating Reactor (1 at 1 site)
Operating Research Reactor (1 at 1 site)

Elected Officials as of January 2020[1,2]

Governor:	Jeff Colyer (R)
Senators:	Pat Roberts (R)
	Jerry Moran (R)
Representatives:	
District 1:	Roger Marshall (R)
District 2:	Steven Watkins (R)

Kansas: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

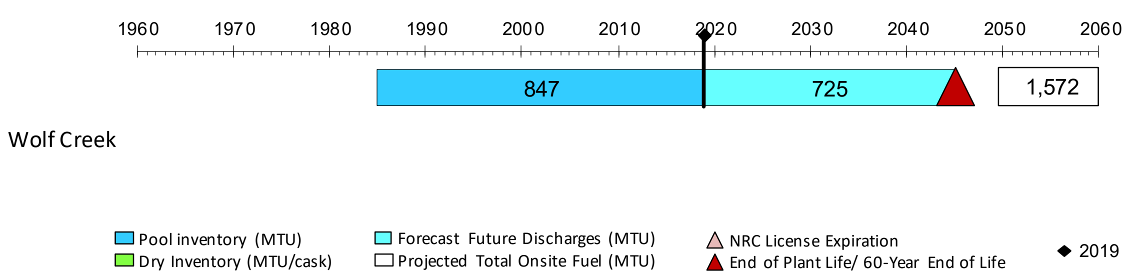


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
1	Kansas State University	Kansas State University	Roger Marshall (R)	1962- License R-88	R&TRF TRIGA Mark II, 1,250kW/ Operating		
2	Wolf Creek	Wolf Creek Nuclear Operating Co.	Steven Watkins (R)	1985-2045	PWR/Operating		1,572

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 0 MTU **Pool: 847 MTU** **Total: 847 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$225.3 million paid	**$0.0 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

4 Forecast SNF discharges from individual reactors from the Reference Scenario from Appendix C and does not include any applicable transfers. Totals may vary slightly due to rounding.

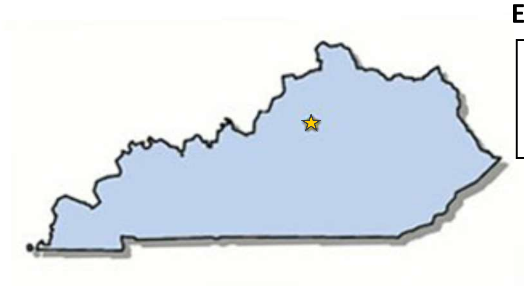
5 State total estimated SNF in dry and pool storage as of December 31, 2019 from Appendix D. These quantities includes applicable SNF transfers. Totals may vary slightly due to rounding.

6 Current quantities of SNF in dry and pool storage as of December 31, 2019 and forecast SNF discharges from individual reactors from the Reference Scenario in Appendix B and C. Current storage quantities includes applicable transfers. Totals may vary slightly due to rounding.

7 The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A "one-time fee" was

established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

KENTUCKY

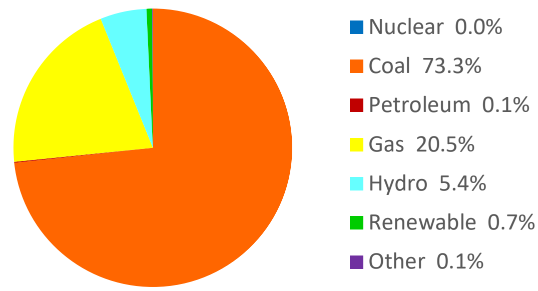


Elected Officials as of January 2020[1,2]

Governor:	Andy Beshear (R)
Senators:	Mitch McConnell (R)
	Rand Paul (R)

Kentucky: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)



1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

LOUISIANA

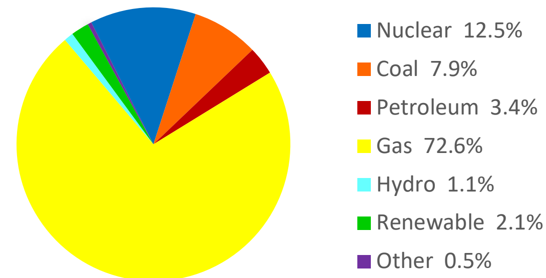
Elected Officials as of January 2020[1,2]

Governor:	John Edwards (D)
Senators:	John N. Kennedy (R)
	Bill Cassidy (R)
Representatives:	
District 2:	Cedric Richmond (D)
District 5:	Ralph Abraham (R)

● Operating Reactors (2 at 2 sites)
○ Commercial Dry Storage Sites (2 sites)

Louisiana: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

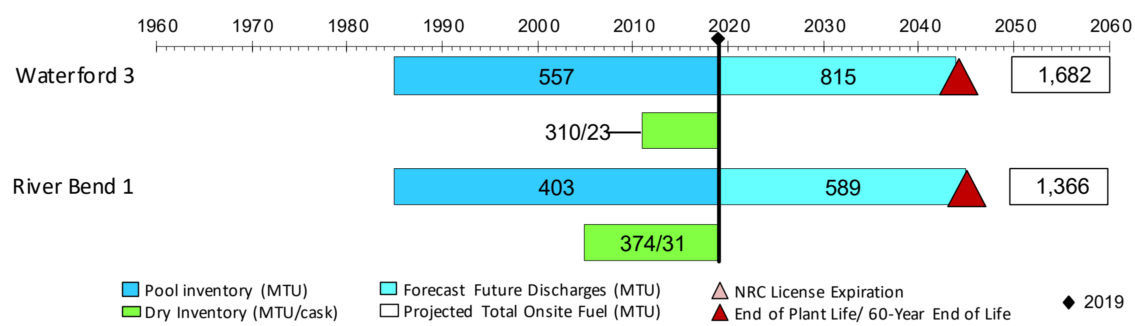


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
2	Waterford 3	Entergy Nuclear Operations, Inc.	Cedric Richmond (D)	1985-2044	PWR/Operating	2011/GL	1,682
5	River Bend 1		Ralph Abraham (R)	1985-2045	BWR/Operating	2005/GL	1,366

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 684 MTU in 54 casks **Pool: 960 MTU** **Total: 1,644 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$407.4 million paid	**$0.0 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

4 Forecast SNF discharges from individual reactors from the Reference Scenario from Appendix C and does not include any applicable transfers. Totals may vary slightly due to rounding.

5 State total estimated SNF in dry and pool storage as of December 31, 2019 from Appendix D. These quantities includes applicable SNF transfers. Totals may vary slightly due to rounding.

6 Current quantities of SNF in dry and pool storage as of December 31, 2019 and forecast SNF discharges from individual reactors from the Reference Scenario in Appendix B and C. Current storage quantities includes applicable transfers. Totals may vary slightly due to rounding.

7 The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A “one-time fee” was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and

amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

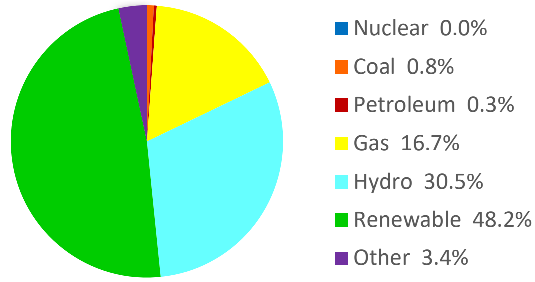
MAINE

Elected Officials as of January 2020[1,2]

Governor:	Janet Mills (D)
Senators:	Susan Collins (R)
	Angus King (I)
Representative:	
District 1:	Chellie Pingree (D)

Maine: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

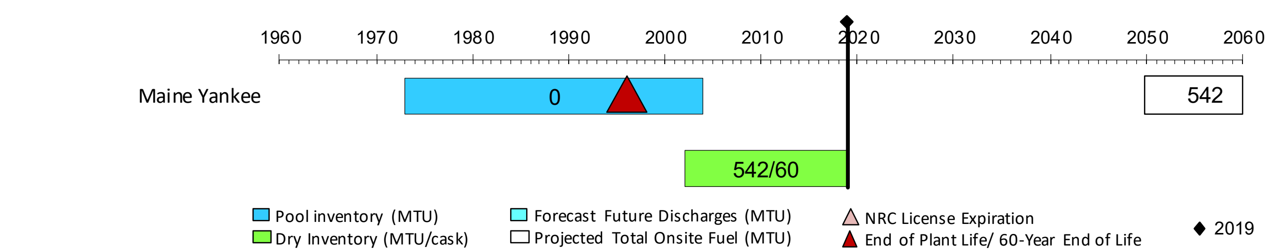


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
1	Maine Yankee	Maine Yankee Atomic Power Co.	Chellie Pingree (D)	1973-1996/ DECON completed	PWR/Shutdown	2002/GL	542

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 542 MTU in 60 casks **Pool: 0 MTU** **Total: 542 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$251.9 million paid	**$0.0 million one-time fee owed**

[1] Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

[2] Governor from https://www.nga.org/governors, Accessed January 31, 2020.

[3] Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

[4] Forecast SNF discharges from individual reactors from the Reference Scenario from Appendix C and does not include any applicable transfers. Totals may vary slightly due to rounding.

[5] State total estimated SNF in dry and pool storage as of December 31, 2019 from Appendix D. These quantities includes applicable SNF transfers. Totals may vary slightly due to rounding.

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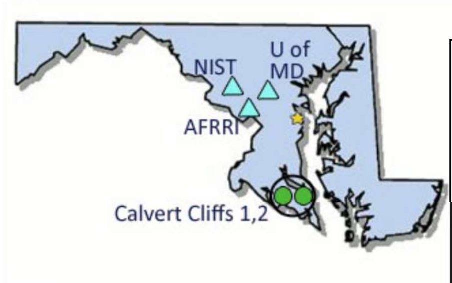
amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

MARYLAND



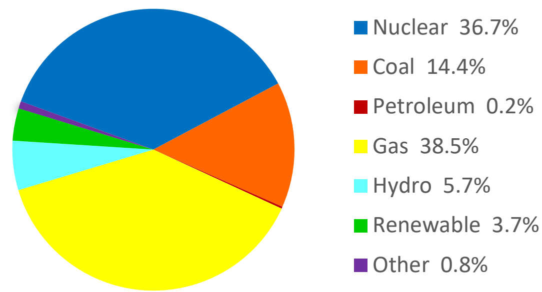
- Operating Reactors (2 at 1 site)
- Commercial Dry Storage Site (1 site)
- Operating Research Reactors (3 at 3 sites)

Elected Officials as of January 2020[1,2]

Governor:	Larry Hogan (R)
Senators:	Chris Van Hollen Jr. (D)
	Benjamin Cardin (D)
Representatives:	
District 5:	Steny H. Hoyer (D)
District 6:	David Trone (D)
District 8:	Jamie Raskin (D)

Maryland: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

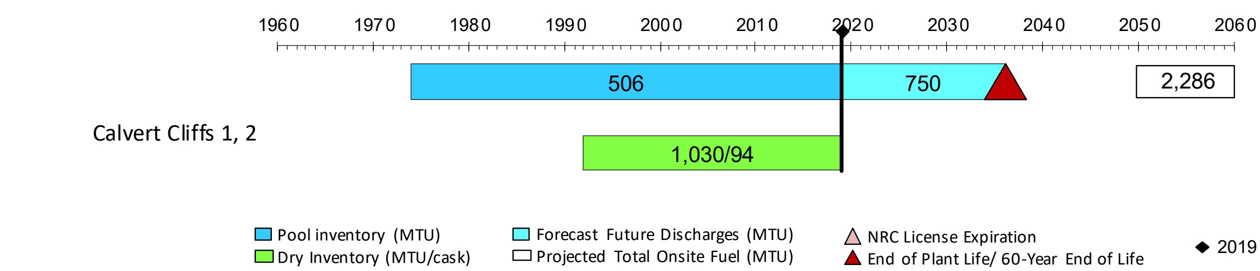


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
5	Calvert Cliffs 1	Calvert Cliffs Nuclear Power Plant inc.[8]	Steny H. Hoyer (D)	1974-2034	PWR/Operating	1992/SL	1,129
5	Calvert Cliffs 2	Calvert Cliffs Nuclear Power Plant inc.[8]	Steny H. Hoyer (D)	1976-2036	PWR/Operating	1992/SL	1,157
5	University of Maryland	University of Maryland	Steny H. Hoyer (D)	1960- License R-70	R&TRF TRIGA Mark 1, 250kW / Operating		
6	National Institute of Standards and Technology (NIST)	Commerce Department	David Trone (D)	1970- License TR-5	R&TRF Nuclear Test, 20,000kW / Operating		
8	Armed Forces Radiobiology Research Institute (AFRRI)	DOD	Jamie Raskin (D)	1962- License R-84	R&TRF TRIGA Mark F, 1,100kW/ Operating		

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 1,030 MTU in 94 casks **Pool: 506 MTU** **Total: 1,4536 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$426.4 million paid	**$0.0 million one-time fee owed**

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1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

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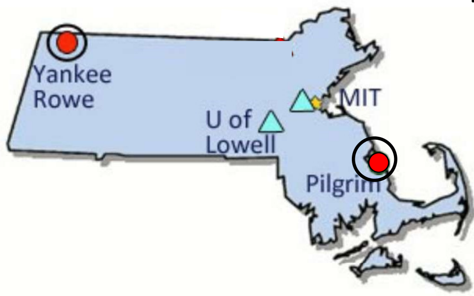
8 A subsidiary of Exelon.

MASSACHUSETTS



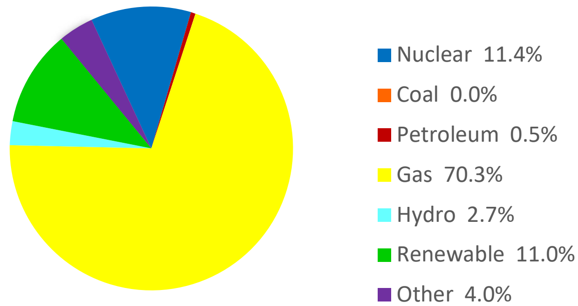
△ Operating Research Reactors (2 at 2 sites)
● Shutdown Reactor (2 at 2 site)
○ Commercial Dry Storage Site (2 sites)

Elected Officials as of January 2020[1,2]

Governor:	Charlie Baker (R)
Senators:	Elizabeth Warren (D)
	Edward Markey (D)
Representatives:	
District 1:	Richard E. Neal (D)
District 3:	Lori Trahan (D)
District 7:	Ayanna Pressley (D)
District 9:	William Keating (D)

Massachusetts: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

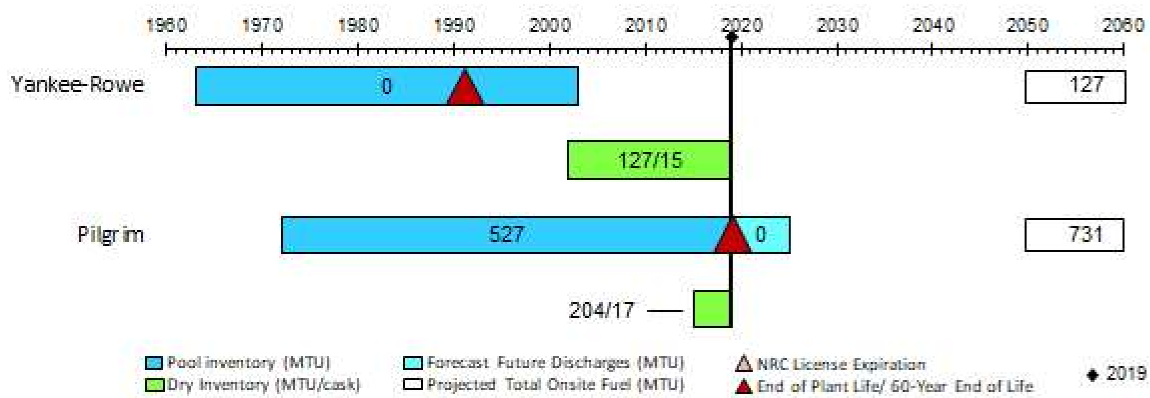


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
1	Yankee-Rowe	Yankee Atomic Electric Co.	Richard E. Neal (D)	1960-1991/ DECON completed	PWR/Shutdown	2002/GL	127
3	Univ. of Mass.-Lowell	Univ. of Mass.-Lowell	Lori Trahan (D)	1974- License R-125	R&TRF GE Pool, 1,000kW/ Operating		
7	Massachusetts Institute of Technology	Massachusetts Institute of Technology	Ayanna Pressley (D)	1958- License R-37	R&TRF HWR Reflected, 6,000kW/ Operating		
9	Pilgrim	Holtec Pilgrim, LLC[9]	William Keating (D)	1972-2019[8] SAFSTOR	BWR/Early Shutdown	2015/GL	798

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 331 MTU in 32 casks **Pool: 527 MTU** **Total: 858 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$188.4 million paid	**$0.0 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

4 Forecast SNF discharges from individual reactors from the Reference Scenario from Appendix C and does not include any applicable transfers. Totals may vary slightly due to rounding.

5 State total estimated SNF in dry and pool storage as of December 31, 2019 from Appendix D. These quantities includes applicable SNF transfers. Totals may vary slightly due to rounding.

6 Current quantities of SNF in dry and pool storage as of December 31, 2019 and forecast SNF discharges from individual reactors from the Reference Scenario in Appendix B and C. Current storage quantities includes applicable transfers. Totals may vary slightly due to rounding.

7 The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A “one-time fee” was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

8 Pilgram ceased operations on May 31, 2019 prior to the end of the extended license.

9 Ownership changed to Holtec Pilgrim, LLC with Holtec Decommissioning Intenational, LLC as the decommissioning operator. Both are Holtec International subsidiaries.

MICHIGAN

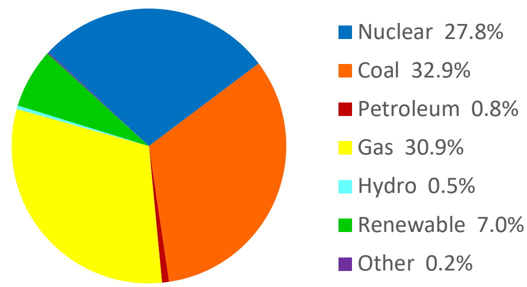
Elected Officials as of January 2020[1,2]

Governor:	Gretchen Whitmer (D)
Senators:	Debbie Stabenow (D)
	Gary Peters (D)
Representatives:	
District 1:	Jack Bergman(R)
District 4:	John Moolenaar (R)
District 6:	Fred Upton (R)
District 12:	Debbie Dingell (D)

- Shutdown Reactor (1 at 1 site)
- Operating Reactors (4 at 3 sites)
- Commercial Dry Storage Sites (4 sites)
- Operating Research Reactor (1 at 1 site)

Michigan: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

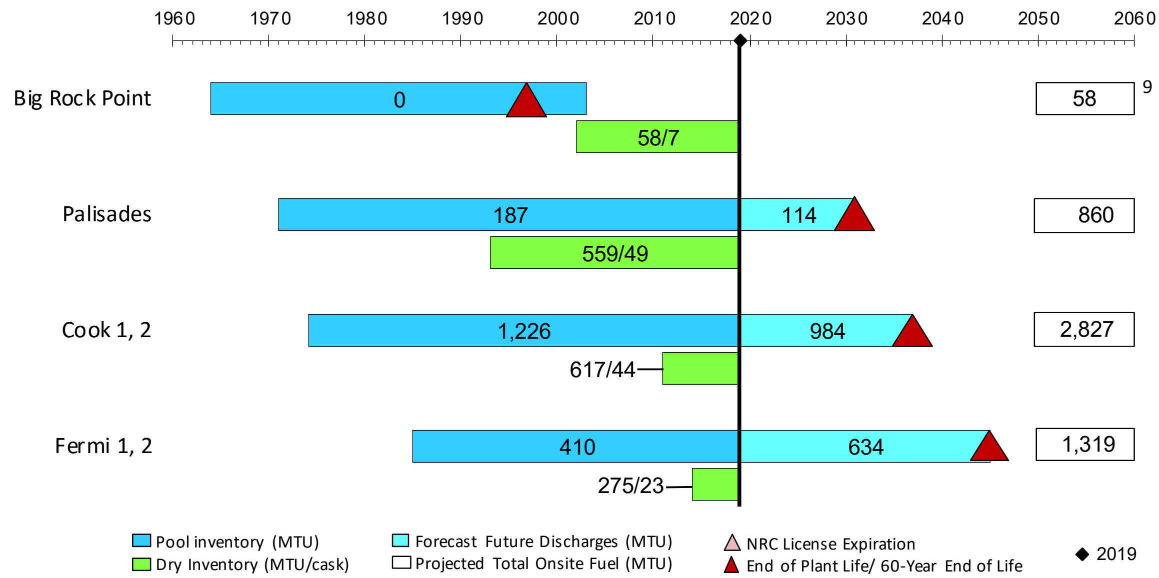


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
1	Big Rock Point	Entergy Nuclear Operations, Inc.	Jack Bergman (R)	1962-1997/ DECON completed	BWR/Shutdown	2002/GL	69[8]
4	Dow Chemical Co.	Dow Chemical Co.	John Moolenaar (R)	1967- License R-108	R&TRF TRIGA Mark 1, 300kW/ Operating		
6	Palisades	Entergy Nuclear Operations, Inc.	Fred Upton (R)	1971-2031	PWR/Operating	1993/GL	860
	Cook 1	Indiana Michigan Power Co.		1974-2034	PWR/Operating	2011/GL	1,488
	Cook 2			1977-2037	PWR/Operating		1,339
12	Fermi 1	DTE Electric Co.	Debbie Dingell (D)	1963-1972 SAFSTOR	Fast Breeder Reactor/ Shutdown	No SNF on site	See Note [11]
	Fermi 2			1985-2045	BWR/ Operating	2016/GL	1,319

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 1,509 MTU in 123 casks **Pool: 1,823 MTU** **Total: 3,332 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$829.0 million paid	**$279.8 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

4 Forecast SNF discharges from individual reactors from the Reference Scenario from Appendix C and does not include any applicable transfers. Totals may vary slightly due to rounding.

5 State total estimated SNF in dry and pool storage as of December 31, 2019 from Appendix D. These quantities includes applicable SNF transfers. Totals may vary slightly due to rounding.

6 Current quantities of SNF in dry and pool storage as of December 31, 2019 and forecast SNF discharges from individual reactors from the Reference Scenario in Appendix B and C. Current storage quantities includes applicable transfers. Totals may vary slightly due to rounding.

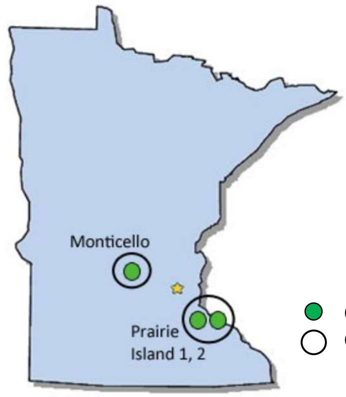
7 The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A "one-time fee" was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

8 Discharges includes 11 MTU transferred to Idaho National Laboratory.

9 SNF in storage does not include 11 MTU transferred to Idaho National Laboratory.

11 Remianing Fermi Unit 1 SNF has been transferred to DOE.

MINNESOTA



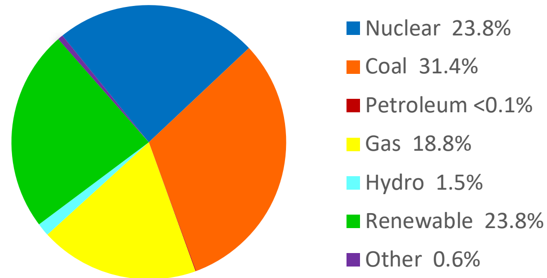
Elected Officials as of January 2020[1,2]

Governor:	Tim Walz (D)
Senators:	Amy Klobuchar (D)
	Tina Smith (D)
Representatives:	
District 2:	Angie Craig (D)
District 6:	Tom Emmer (R)

● Operating Reactors (3 at 2 sites)
○ Commercial Dry Storage Sites (2 at 2 sites)

Minnesota: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

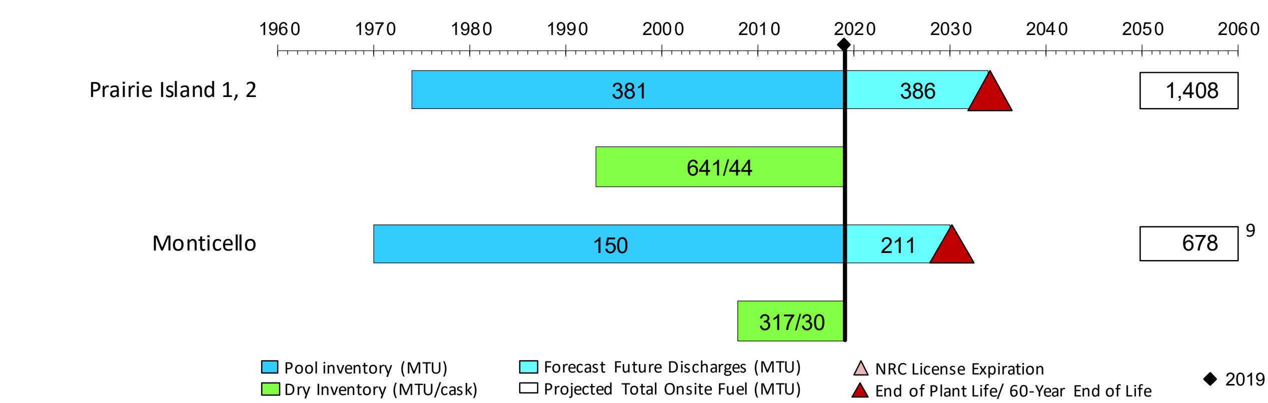


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
2	Prairie Island 1	Northern States Power Co. Minnesota	Angie Craig (D)	1974-2033	PWR/Operating	1993/SL	661
2	Prairie Island 2	Northern States Power Co. Minnesota	Angie Craig (D)	1974-2034	PWR/Operating	1993/SL	747
6	Monticello	Northern States Power Co. Minnesota	Tom Emmer (R)	1970-2030	BWR/Operating	2008/GL	876[8]

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 958 MTU in 74 casks **Pool: 531 MTU** **Total: 1,489 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$449.2 million paid	**$0.0 million one-time fee owed**

[1] Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

[2] Governor from https://www.nga.org/governors, Accessed January 31, 2020.

[3] Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

[4] Forecast SNF discharges from individual reactors from the Reference Scenario from Appendix C and does not include any applicable transfers. Totals may vary slightly due to rounding.

[5] State total estimated SNF in dry and pool storage as of December 31, 2019 from Appendix D. These quantities includes applicable SNF transfers. Totals may vary slightly due to rounding.

[6] Current quantities of SNF in dry and pool storage as of December 31, 2019 and forecast SNF discharges from individual reactors from the Reference Scenario in Appendix B and C. Current storage quantities includes applicable transfers. Totals may vary slightly due to rounding.

[7] The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A "one-time fee" was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

[8] Discharges includes 198 MTU transferred to Morris (Illinois).

[9] SNF in storage does not include 198 MTU transferred to Morris (Illinois).

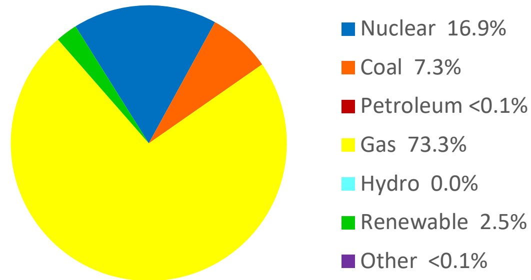
MISSISSIPPI

Elected Officials as of January 2020[1,2]

Governor:	Tate Reeves (R)
Senators:	Cindy Hyde-Smith (R)
	Roger Wicker (R)
Representative:	
District 2:	Bennie Thompson (D)

● Operating Reactor (1 at 1 site)
○ Commercial Dry Storage Site (1 site)

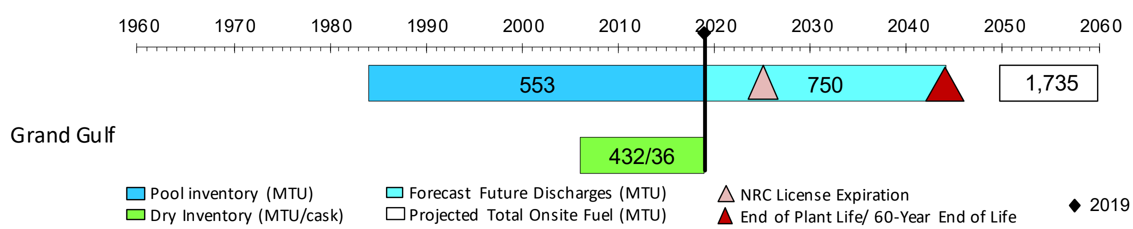
Mississippi: 2019 Electricity Generation Mix[3]
(includes utilities and independent power producers)



Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
2	Grand Gulf	Entergy Operations, Inc.	Bennie Thompson (D)	1984-2044	BWR/Operating	2006/GL	1,735

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]
Dry: 432 MTU in 36 casks **Pool: 553 MTU** **Total: 985 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$250.4 million paid	**$0.0 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

4 Forecast SNF discharges from individual reactors from the Reference Scenario from Appendix C and does not include any applicable transfers. Totals may vary slightly due to rounding.

5 State total estimated SNF in dry and pool storage as of December 31, 2019 from Appendix D. These quantities includes applicable SNF transfers. Totals may vary slightly due to rounding.

6 Current quantities of SNF in dry and pool storage as of December 31, 2019 and forecast SNF discharges from individual reactors from the Reference Scenario in Appendix B and C. Current storage quantities includes applicable transfers. Totals may vary slightly due to rounding.

7 The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A "one-time fee" was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

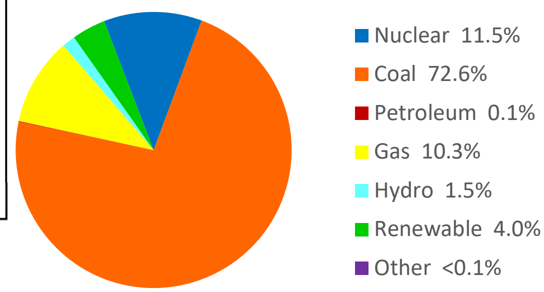
MISSOURI

Elected Officials as of January 2020[1,2]

Governor:	Mike Parson (R)
Senators:	Joshua Hawley (R)
	Roy Blunt (R)
Representatives:	
District 3:	Blaine Luetkemeyer (R)
District 4:	Vicky Hartzler (R)
District 8:	Jason Smith (R)

Commercial Dry Storage Site (1 at 1 site)
Operating Reactor (1 at 1 site)
Operating Research Reactors (2 at 2 sites)

Missouri: 2019 Electricity Generation Mix[3]
(includes utilities and independent power producers)

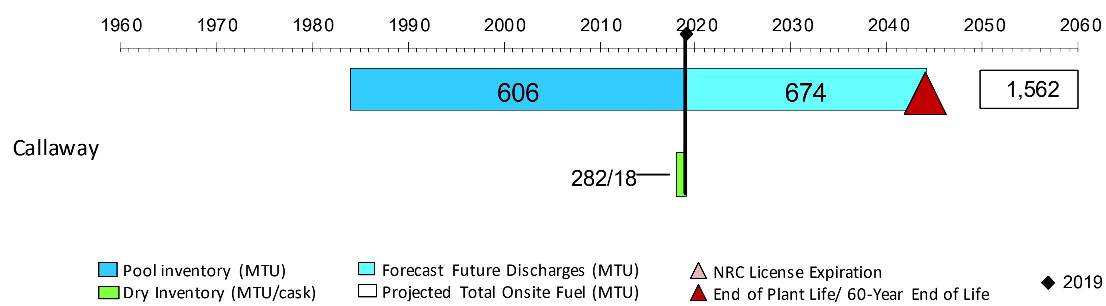


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
3	Callaway	Union Electric Co.	Blaine Luetkemeyer (R)	1984-2044	PWR/Operating	2015/GL	1,562
4	University of Missouri - Columbia	University of Missouri System	Vicky Hartzler (R)	1966- License R-103	R&TRF Tank, 10,000kW/ Operating		
8	Missouri University of Science and Technology	University of Missouri	Jason Smith (R)	1961- License R-79	R&TRF Pool, 200kW/ Operating		

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 282 MTU in 18 casks **Pool: 606 MTU** **Total: 888 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$243.1 million paid	**$0.0 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

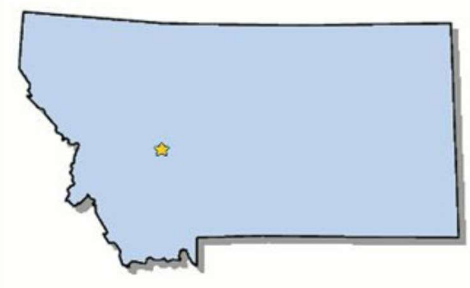
4 Forecast SNF discharges from individual reactors from the Reference Scenario from Appendix C and does not include any applicable transfers. Totals may vary slightly due to rounding.

[5] State total estimated SNF in dry and pool storage as of December 31, 2019 from Appendix D. These quantities includes applicable SNF transfers. Totals may vary slightly due to rounding.

[6] Current quantities of SNF in dry and pool storage as of December 31, 2019 and forecast SNF discharges from individual reactors from the Reference Scenario in Appendix B and C. Current storage quantities includes applicable transfers. Totals may vary slightly due to rounding.

[7] The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A "one-time fee" was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

MONTANA

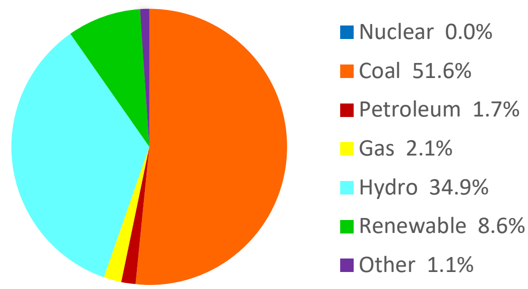


Elected Officials as of January 2020[1,2]

Governor:	Steve Bullock (D)
Senators:	Jon Tester (D)
	Steve Daines (R)

Montana: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)



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1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed J January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

NEBRASKA

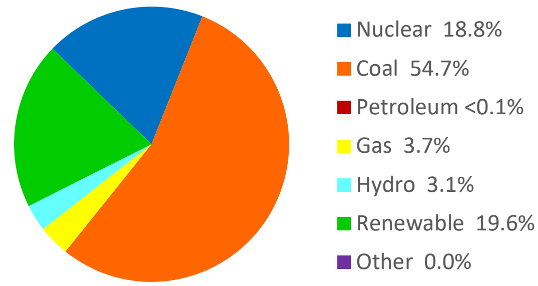
- Shutdown Reactor (1 at 1 site)
- Operating Reactors (1 at 1 site)
- Commercial Dry Storage Sites (2 sites)

Elected Officials as of January 2020[1,2]

Governor:	Pete Ricketts (R)
Senators:	Deb Fischer (R)
	Benjamin Sasse (R)
Representatives:	
District 1:	Jeff Fortenberry (R)
District 3:	Adrian Smith (R)

Nebraska: 2019 Electricity Generation Mix[3]

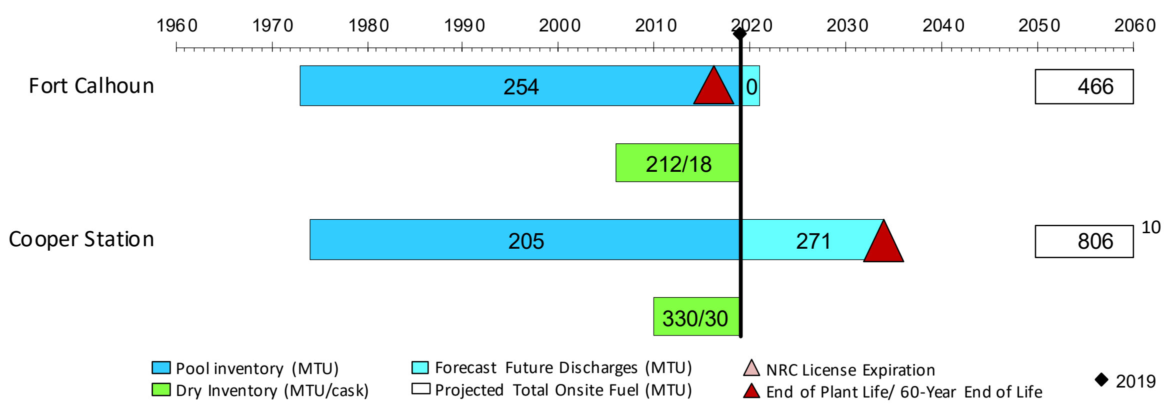
(includes utilities and independent power producers)



Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
1	Fort Calhoun	Omaha Public Power District[8]	Jeff Fortenberry (R)	1973-2016 Shutdown	SAFSTORE/Early Shutdown	2006/GL	465
3	Cooper Station	Nebraska Public Power District[8]	Adrian Smith (R)	1974-2034	BWR/Operating	2010/GL	1,079[9]

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]		
Dry: 542 MTU in 48 casks	**Pool: 459 MTU**	**Total: 1,001 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$300.2 million paid	**$0.0 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

4 Forecast SNF discharges from individual reactors from the Reference Scenario from Appendix C and does not include any applicable transfers. T otals may vary slightly due to rounding.

5 State total estimated SNF in dry and pool storage as of December 31, 2019 from Appendix D. These quantities includes applicable SNF transfers. Totals may vary slightly due to rounding.

6 Current quantities of SNF in dry and pool storage as of December 31, 2019 and forecast SNF discharges from individual reactors from the Reference Scenario in Appendix B and C. Current storage quantities includes applicable transfers. Totals may vary slightly due to rounding.

[7] The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A "one-time fee" was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

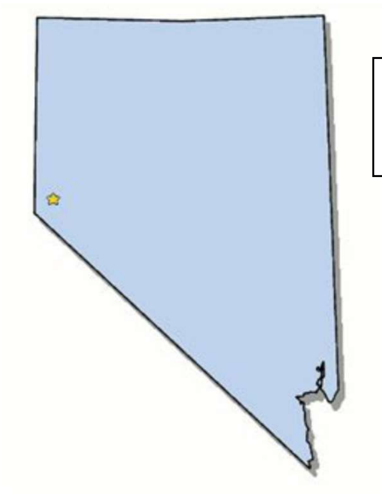
[8] Operated by Exelon Nuclear Partners.

[9] Support services provided by Entergy Nuclear Nebraska through 2029.

[9] Discharges includes 198 MTU transferred to Morris (Illinois).

[10] SNF in storage does not include 198 MTU transferred to Morris (Illinois).

NEVADA

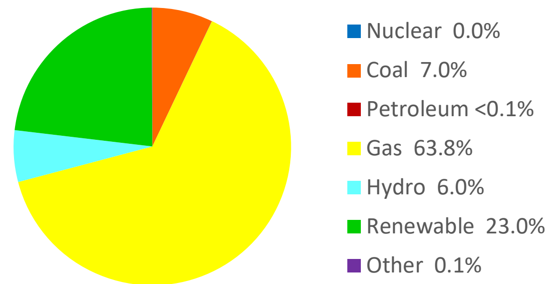


Elected Officials as of January 2020[1,2]

Governor:	Steve Sisolak (R)
Senators:	Catherine Cortez Masto (D)
	Jacky Rosen (D)

Nevada: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)



1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

NEW HAMPSHIRE

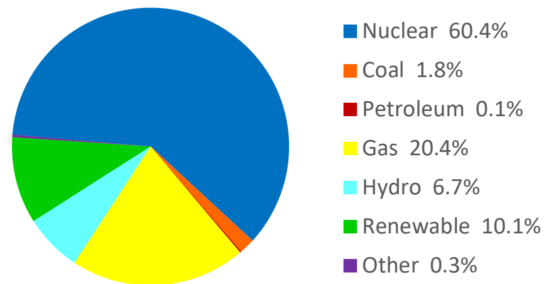
Elected Officials as of January 2020[1,2]

Governor:	Chris Sununu (R)
Senators:	Jeanne Shaheen (D)
	Margaret Hassan (D)
Representative:	
District 1:	Chris Pappas (D)

Operating Reactor (1 at 1 site)
Commercial Dry Storage Site (1 site)

New Hampshire: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

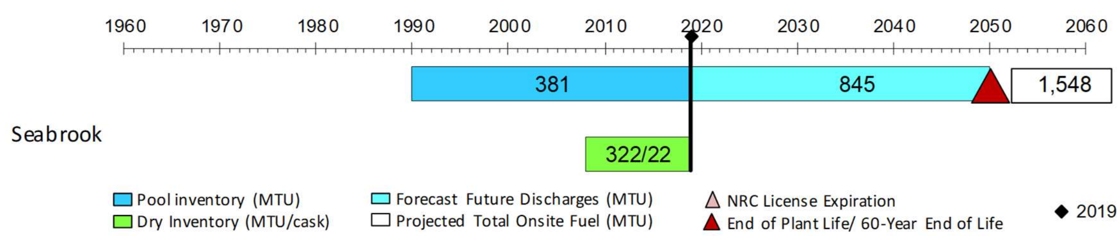


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
1	Seabrook	NextEra Energy Seabrook, LLC	Chris Pappas (D)	1990-2050	PWR/Operating	2008/GL	1,548

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 322 MTU in 22 casks **Pool: 381 MTU** **Total: 703 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$201.2 million paid	**$0.0 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

4 Forecast SNF discharges from individual reactors from the Reference Scenario from Appendix C and does not include any applicable transfers. Totals may vary slightly due to rounding.

5 State total estimated SNF in dry and pool storage as of December 31, 2019 from Appendix D. These quantities includes applicable SNF transfers. Totals may vary slightly due to rounding.

6 Current quantities of SNF in dry and pool storage as of December 31, 2019 and forecast SNF discharges from individual reactors from the Reference Scenario in Appendix B and C. Current storage quantities includes applicable transfers. Totals may vary slightly due to rounding.

7 The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A "one-time fee" was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and

amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

NEW JERSEY

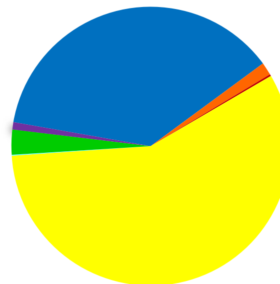
Elected Officials as of January 2020[1,2]

Governor:	Phil Murphy (D)
Senators:	Robert Menendez (D)
	Cory Booker (D)
Representatives:	
District 2:	Jefferson Van Drew (D)
District 3:	Andy Kim (D)

Shutdown Reactor (1 at 1 site)
Operating Reactors (3 at 1 site)
Commercial Dry Storage Sites (2 sites)

New Jersey: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

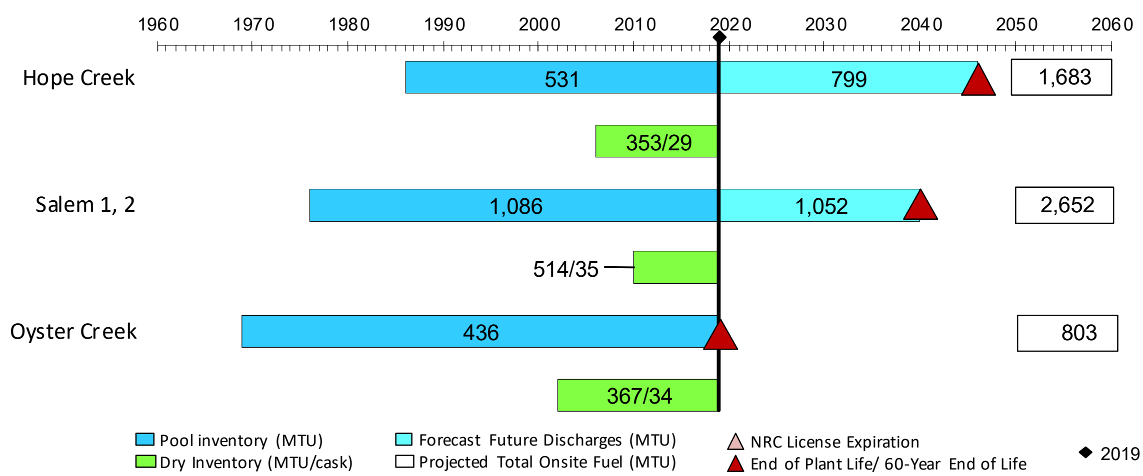


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
2	Hope Creek	PSEG Nuclear LLC	Jefferson Van Drew (D)	1986-2046	BWR/Operating	2006/GL	1,683
	Salem 1			1976-2036	PWR/Operating	2010/GL	1,315
	Salem 2			1981-2040	PWR/Operating		1,337
3	Oyster Creek	Oyster Creek Environmental Protection[8].	Andy Kim (D)	1991-2018 SAFSTOR	BWR/ Early Shutdown[5]	2002/GL	803

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 1,234 MTU in 98 casks **Pool: 2,053 MTU** **Total: 3,287 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$769.6 million paid	**$184.4 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

[3] Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

[4] Forecast SNF discharges from individual reactors from the Reference Scenario from Appendix C and does not include any applicable transfers. Totals may vary slightly due to rounding.

[5] State total estimated SNF in dry and pool storage as of December 31, 2019 from Appendix D. These quantities includes applicable SNF transfers. Totals may vary slightly due to rounding.

[6] Current quantities of SNF in dry and pool storage as of December 31, 2019 and forecast SNF discharges from individual reactors from the Reference Scenario in Appendix B and C. Current storage quantities includes applicable transfers. Totals may vary slightly due to rounding.

[7] The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A “one-time fee” was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

[8] A Holtec subsidiary.

NEW MEXICO

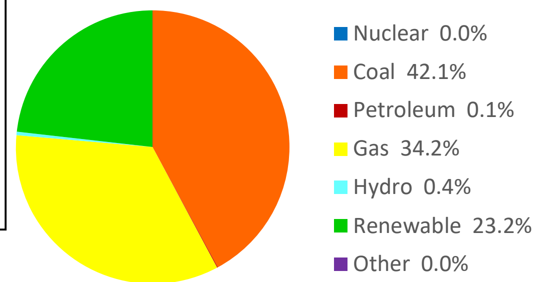
△ Operating Research Reactors (2 at 2 sites)
▽ Sandia National Laboratory
▽ Surplus Plutonium at Los Alamos National Laboratory
△ DOE Research Reactor

Elected Officials as of January 2020[1,2]

Governor:	Michelle lujan Grisham (D)
Senators:	Tom Udall (D)
	Martin Heinrich (D)
Representatives:	
District 1:	Debra Haaland (D)
District 2:	Xochitl Torres Small (D)
District 3:	Ben R. Luján (D)

New Mexico: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)



Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected
1	University of New Mexico	Univ. of New Mexico	Debra Haaland (D)	1966- License R-102	R&TRF AGN-201M #112, 0.005kW/ Operating		
	Sandia National Lab	DOE[4]		None	Various		
	SNL: Annular Core Research Reactor (ACRR)			1979-	Test reactor		
2	White Sands Missile Range	U.S. Air Force[4]	Xochitl Torres Small (D)	None	R&TRF FBR/ Operating		
3	Los Alamos National Lab	DOE[4]	Ben R. Luján (D)	None	Various		

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

4 DOE Regulated Facilities.

NEW YORK

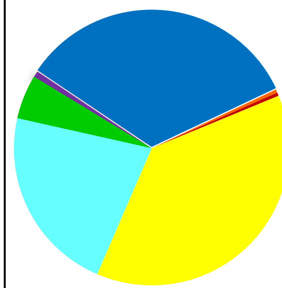
- Shutdown Reactor (1 at 1 site)
- Operating Reactors (6 at 4 sites)
- Commercial Dry Storage Sites (4 sites)
- Operating Research Reactor (1 at 1 site)
- Commercial HLW at West Valley
- Brookhaven National Laboratory

Elected Officials as of January 2020[1,2]

Governor:	Andrew Cuomo (D)
Senators:	Chuck Schumer (D)
	Kirsten Gillibrand (D)
Representatives:	
District 1:	Lee Zeldin (R)
District 17:	Nita Lowey (D)
District 20:	Paul D. Tonko (D)
District 23:	Tom Reed (R)
District 24:	John Katko (R)
District 26:	Brian Higgins (D)

New York: 2019 Electricity Generation Mix[3]

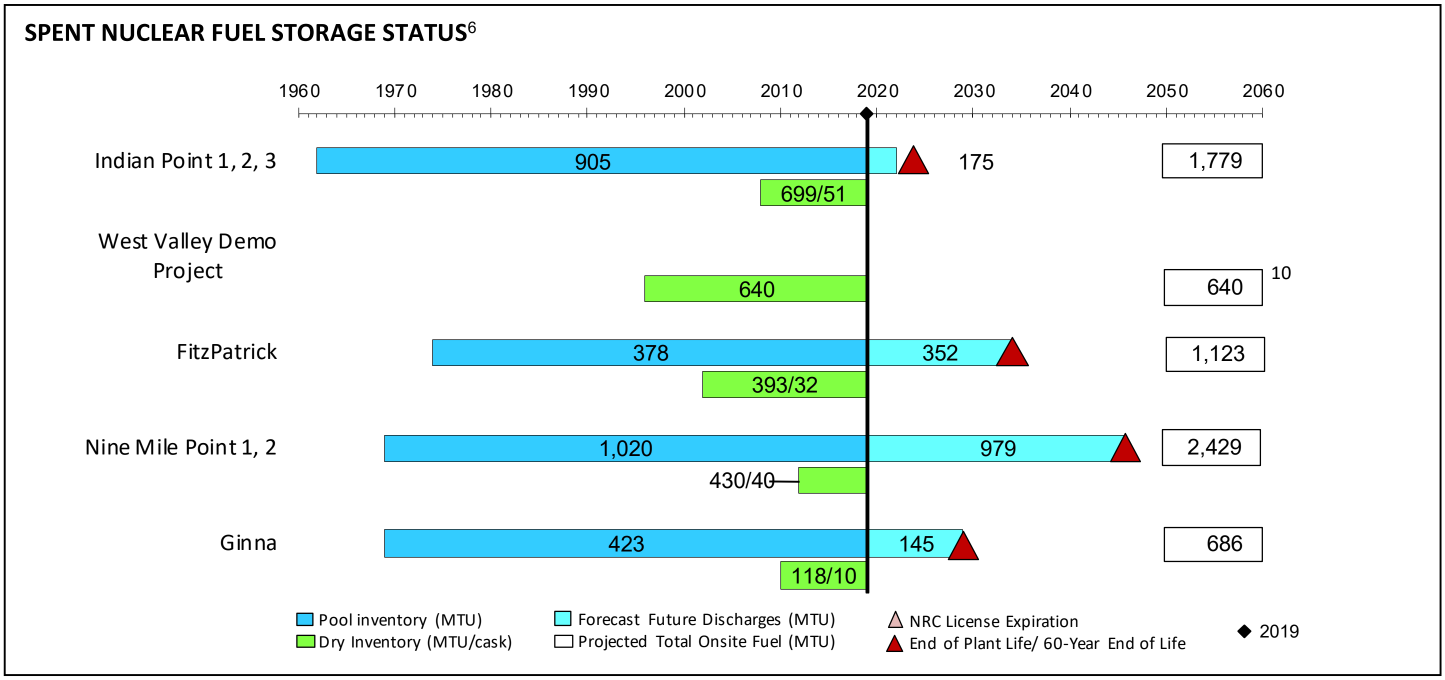
(includes utilities and independent power producers)



Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
1	Brookhaven National Lab	DOE[8]	Lee Zeldin (R)	None	Various		
17	Indian Point 1	Entergy Nuclear Operations, Inc.	Nita Lowey (D)	1962-1974/ SAFSTOR	PWR/Shutdown	2008/GL	31
	Indian Point 2			1973-2024[9]	PWR/Operating		897
	Indian Point 3			1975-2025[9]	PWR/Operating		851
20	Rensselaer Polytechnic Institute (RPI)	Rensselaer Polytechnic Institute	Paul D. Tonko (D)	1964- License CX-22	R&TRF Critical Assembly, 0.1kW / Operating		
23	West Valley Demonstration Project	New York State Energy Research and Development Authority (NYSERDA)	Tom Reed II (R)	1966-1972/ DECON	Reprocessing Plant/Shutdown		See Note [10]
24	Fitzpatrick	Exelon Generation Company, LLC	John Katko (R)	1974-2034	BWR/Operating	2002/GL	1,123
	Nine Mile Point 1	Nine Mile Point Nuclear Station, LLC[14]		1974-2029	BWR/Operating	2012/GL	903
	Nine Mile Point 2			1987-2046	BWR/Operating		1,526
	Ginna	R. E. Ginna Nuclear Power plant., LLC[14]		1969-2029	PWR/Operating	2010/GL	701[11]

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 1,640 MTU in 133 casks **Pool: 2,726MTU** **Total: 4,366 MTU**



NUCLEAR WASTE FUND[7]	
$1,011.8 million paid[13]	**$534.1 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

4 Forecast SNF discharges from individual reactors from the Reference Scenario from Appendix C and does not include any applicable transfers. Totals may vary slightly due to rounding.

5 State total estimated SNF in dry and pool storage as of December 31, 2019 from Appendix D. These quantities includes applicable SNF transfers. Totals may vary slightly due to rounding.

6 Current quantities of SNF in dry and pool storage as of December 31, 2019 and forecast SNF discharges from individual reactors from the Reference Scenario in Appendix B and C. Current storage quantities includes applicable transfers. Totals may vary slightly due to rounding.

7 The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A "one-time fee" was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

8 DOE Regulated Facility.

9 License was extended to the indicated dates which was not a full 20 year extension.

10 About 640 MTU were reprocessed producing about 2,500 m^3 of liquid high-level waste (HLW). The liquid was vitrified between 1996 and 2001 producing 278 HLW canisters. These canisers have been moved to 56 canisters in concrete vented overpacks, similar to SNF storage, to allow facility decomissionng to continue.

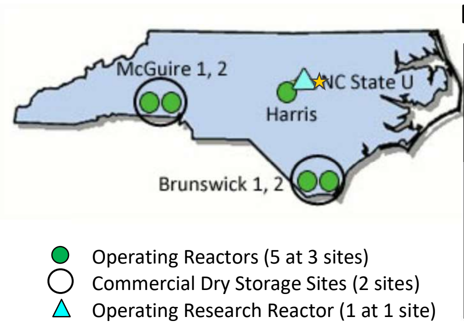
11 Discharges includes 15 MTU transferred to the Idaho National Lab.

12 SNF in storage does not include 15 MTU transferred to the Idaho National Lab.

13 Includes One-Time fee paid by Nuclear Fuel Services (NFS) for West Valley.

14 An Exelon subsidiary.

NORTH CAROLINA

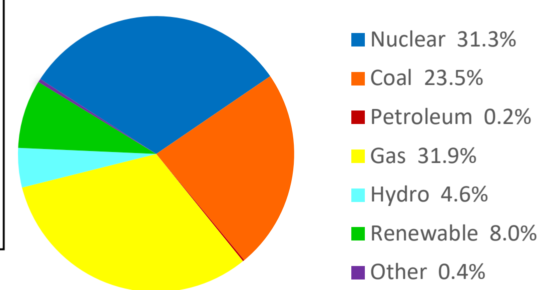


Elected Officials as of January 2020[1,2]

Governor:	Roy Cooper (D)
Senators:	Richard Burr (R)
	Thom Tillis (R)
Representatives:	
District 4:	David Price (D)
District 7:	David Rouzer (R)
District 9:	Dan Bishop (R)

North Carolina: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

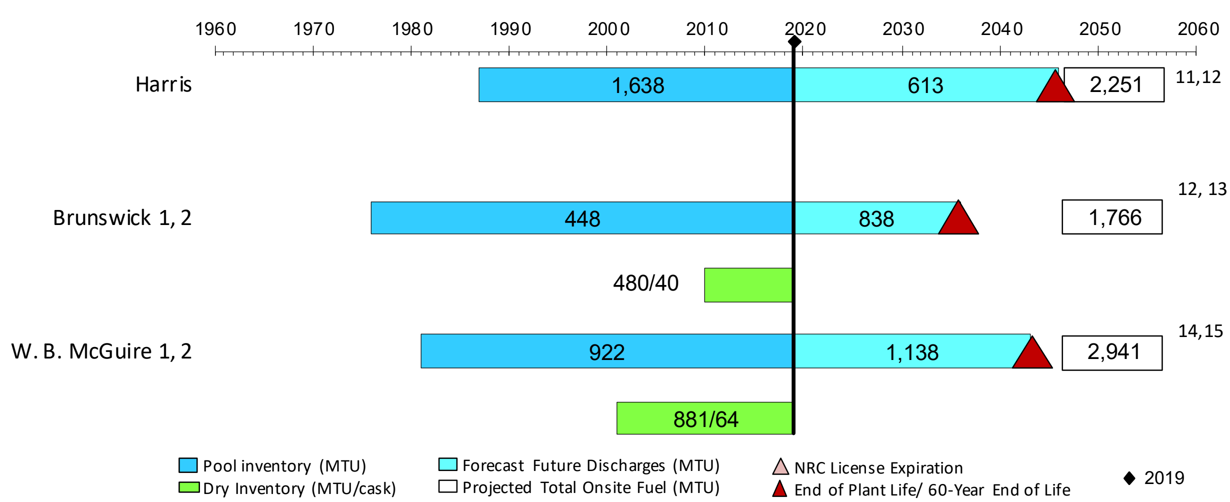


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
4	Harris	Duke Energy Progress, LLC	David Price (D)	1986-2046	PWR/Operating		1,247[8]
7	Brunswick 1		David Rouzer (R)	1976-2036	BWR/Operating	2010/GL	1,218[9]
	Brunswick 2			1974-2034	BWR/Operating		1,200[9]
4	North Carolina State University	North Carolina State University	David Price (R)	1972- License R-120	R&TRF Pulstar, 1,000kW/ Operating		
9	W. B. McGuire 1	Duke Energy Carolinas, LLC	Dan Bishop (R)	1981-2041	PWR/ Operating	2001/GL	1,409[10]
	W. B. McGuire 2			1983-2043	PWR/Operating		1,392[10]

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 1,361 MTU in 104 casks **Pool: 3,008 MTU** **Total: 4,369 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$1,034.6 million paid	$0.0 million one-time fee owed

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

4 Forecast SNF discharges from individual reactors from the Reference Scenario from Appendix C and does not include any applicable transfers. Totals may vary slightly due to rounding.

5 State total estimated SNF in dry and pool storage as of December 31, 2019 from Appendix D. These quantities includes applicable SNF transfers. Totals may vary slightly due to rounding.

6 Current quantities of SNF in dry and pool storage as of December 31, 2019 and forecast SNF discharges from individual reactors from the Reference Scenario in Appendix B and C. Current storage quantities includes applicable transfers. Totals may vary slightly due to rounding.

7 The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A "one-time fee" was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

8 Total Harris Discharges excludes 784 MTU transferred from Brunswick and 219 MTU transferred from Robinson (South Carolina)

9 Total Brunswick 1 and 2 projected discharged fuel includes 784 MTU that was transferred from Brunswick to Harris and is no longer at the site.

10 Total McGuire 1 and 2 projected discharged fuel excludes 140 MTU that was transferred from Oconee (South Carolina).

11 SNF in storage includes the transfer of 784 MTU in from Brunswick and 219 MTU in from Robinson 2 (South Carolina).

12 SNF was transferred between Harris, Brunswick, and Robinson (South Carolina). The following table provides the SNF inventories at Harris and Brunswick, including transfers. Forecasted future discharges are not included. Transfer data is from Table 2-4.

Onsite SNF at Harris (MTU) as of 12/31/2019		Onsite SNF at Brunswick (MTU) as of 12/31/2019	
Fuel discharges onsite as of 12/31/2012	476	Fuel discharges onsite as of 12/31/2012	1284
Forecast fuel discharges, 1/1/2013 to 12/31/2017	159	Forecast fuel discharges, 1/1/2013 to 12/31/2017	297
SNF transferred in from Robinson 2	219	SNF transferred in from Robinson 2	132
SNF transferred in from Brunswick	784	SNF transferred out to Harris	-784
Total Forecasted SNF Onsite	**1,638**	**Total Forecasted SNF Onsite**	**929**

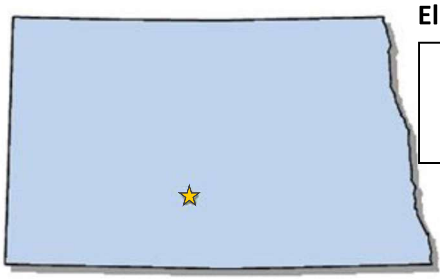
13 Reflects the transfer of 784 MTU out to Harris and 132 MTU in from Robinson 2 (South Carolina).

14 Reflects the transfer of 140 MTU in from Oconee (South Carolina).

15 SNF was transferred between W. B. McGuire (North Carolina) and Oconee (South Carolina). The following table provides the SNF inventories at McGuire, including transfers. Forecasted future discharges are not included. Transfer data is from Table 2-4.

Onsite SNF at McGuire as of 12/31/2019	
Fuel discharges onsite as of 12/31/2012	1365
Forecast fuel discharges, 1/1/2013 to 12/31/2017	298
SNF transferred in from Oconee	140
Total Forecasted SNF Onsite	**1,803**

NORTH DAKOTA

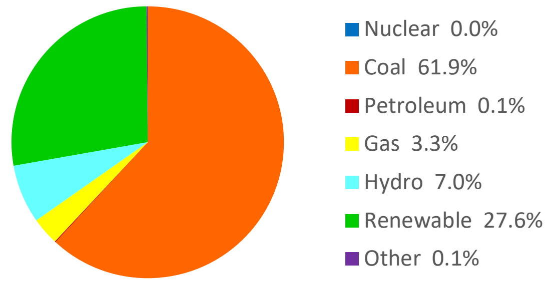


Elected Officials as of January 2020[1,2]

Governor:	Doug Burgum (R)
Senators:	John Hoeven (R)
	Kevin Cramer (R)

North Dakota: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

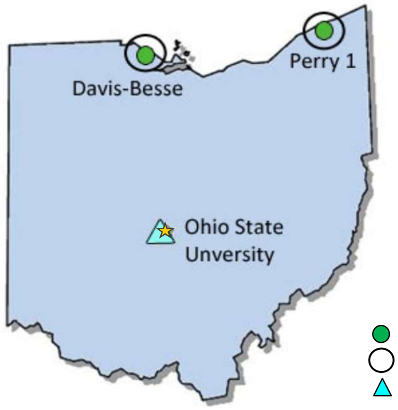


1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

OHIO



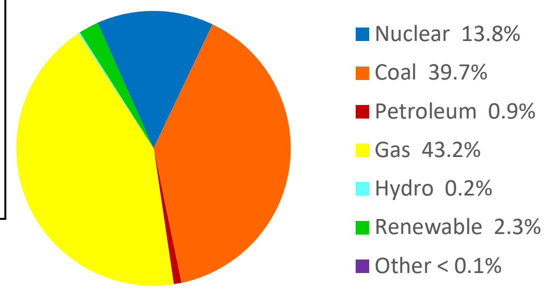
Operating Reactors (2 at 2 sites)
Commercial Dry Storage Sites (2 sites)
Operating Research Reactor (1 at 1 site)

Elected Officials as of January 2020[1,2]

Governor:	Mike DeWine (R)
Senators:	Sherrod Brown (D)
	Robert Portman (R)
Representatives:	
District 3:	Joyce Beatty (D)
District 9:	Marcy Kaptur (D)
District 14:	David Joyce (R)

Ohio: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

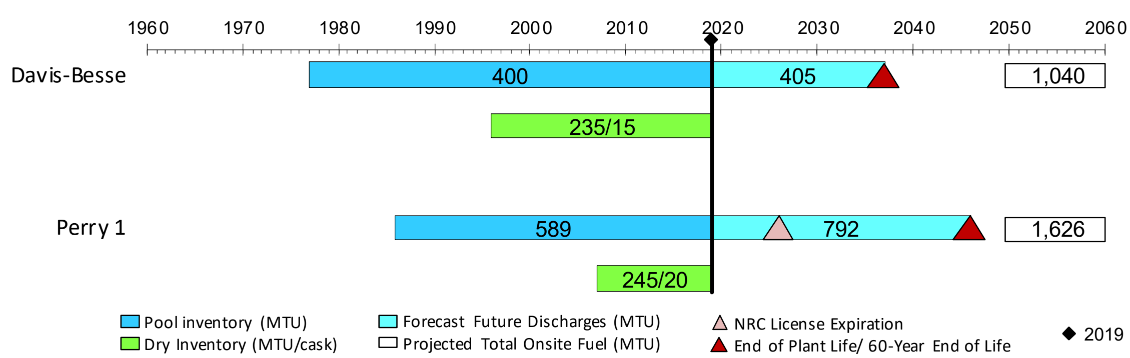


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
3	Ohio State University	Ohio State University	Joyce Beatty (D)	1961- License R-75	R&TRF Pool, 500kW/ Operating		
9	Davis-Besse	Energy Harbor Nuclear Corp.	Marcy Kaptur (D)	1977-2037	PWR/Operating	1996/GL	1,040
14	Perry 1		David Joyce (R)	1986-2026	BWR/Operating	2007/GL	1,626

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 480 MTU in 27 casks | **Pool: 1989 MTU** | **Total: 1,469 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$381.5 million paid	**$34.5 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

4 Forecast SNF discharges from individual reactors from the Reference Scenario in Appendix C and does not include any applicable transfers. Totals may vary slightly due to rounding.

[5] State total estimated SNF in dry and pool storage as of December 31, 2019 in Appendix D. These quantities includes applicable SNF transfers. Totals may vary slightly due to rounding.

[6] Current quantities of SNF in dry and pool storage as of December 31, 2019 and forecast SNF discharges from individual reactors from the Reference Scenario in Appendix B and C. Current storage quantities includes applicable transfers. Totals may vary slightly due to rounding.

[7] The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A "one-time fee" was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

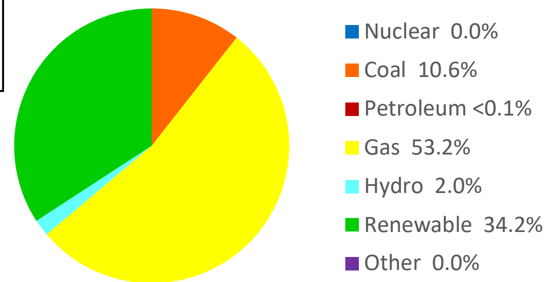
OKLAHOMA

Elected Officials as of January 2020[1,2]

Governor:	Kevin Stitt (R)
Senators:	James Inhofe (R)
	James Lankford (R)

Oklahoma: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

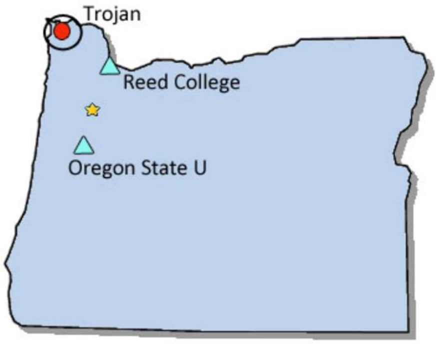


1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

OREGON



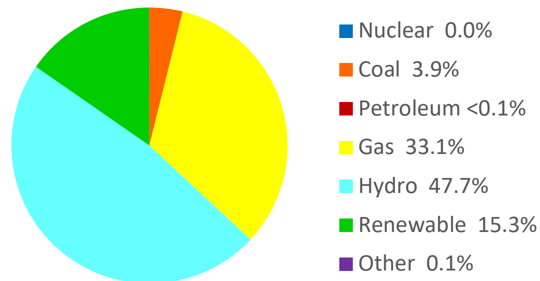
Elected Officials as of January 2020[1,2]

Governor:	Kate Brown (D)
Senators:	Ron Wyden (D)
	Jeff Merkley (D)
Representatives:	
District 1:	Suzanne Bonamici (D)
District 3:	Earl Blumenauer (D)
District 4:	Peter DeFazio (D)

Shutdown Reactor (1 at 1 site)
Commercial Dry Storage Site (1 site)
Operating Research Reactors (2 at 2 sites)

Oregon: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

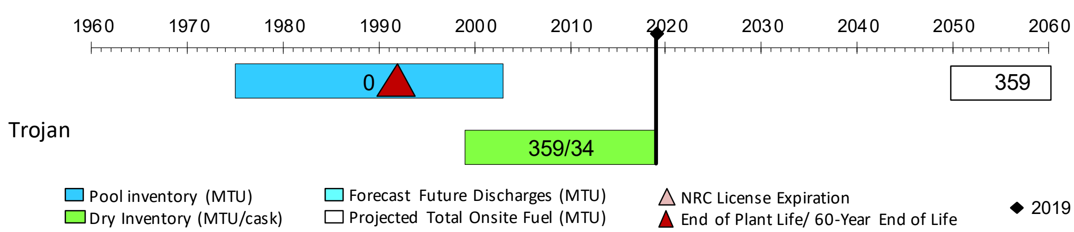


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
1	Trojan	Portland General Electric Corp.	Suzanne Bonamici (D)	1975-1992 DECON Completed	PWR/ DECON Completed	1999/SL	359
3	Reed College	Reed College	Earl Blumenauer (D)	1968- License R-112	R&TRF TRIGA Mark I, 250kW/ Operating		
4	Oregon State University	Oregon State University	Peter DeFazio (D)	1967- License R-106	R&TRF TRIGA Mark II, 1,100kW/ Operating		

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 359 MTU in 34 casks **Pool: 0 MTU** **Total: 359 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$75.5 million paid	**$0.0 million one-time fee owed**

[1] Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

[2] Governor from https://www.nga.org/governors, Accessed January 31, 2020.

[3] Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

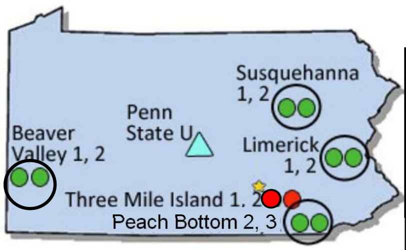
[4] Forecast SNF discharges from individual reactors from the Reference Scenario in Appendix C and does not include any applicable transfers. Totals may vary slightly due to rounding.

[5] State total estimated SNF in dry and pool storage as of December 31, 2019 in Appendix D. These quantities includes applicable SNF transfers. Totals may vary slightly due to rounding.

[6] Current quantities of SNF in dry and pool storage as of December 31, 2019 and forecast SNF discharges from individual reactors from the Reference Scenario in Appendix B and C. Current storage quantities includes applicable transfers. Totals may vary slightly due to rounding.

[7] The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A "one-time fee" was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

PENNSYLVANIA



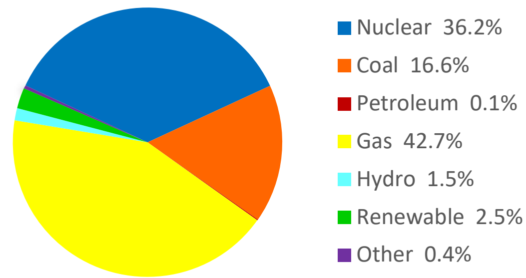
Shutdown Reactor (2 at 1 site)
Operating Reactors (8 at 4 sites)
Commercial Dry Storage Sites (4 sites)
Operating Research Reactor (1 at 1 site)

Elected Officials as of January 2020[1,2]

Governor:	Tom Wolf (D)
Senators:	Robert Casey, Jr. (D)
	Patrick Toomey (R)
Representatives:	
District 4:	Madeleine Dean (D)
District 5:	Mary Scanlon (D)
District 6:	Chrissy Houlahan (D)
District 11:	Lloyd Smucker (R)
District 12:	Tom Marino (R)
District 15:	Glenn Thompson (R)

Pennsylvania: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

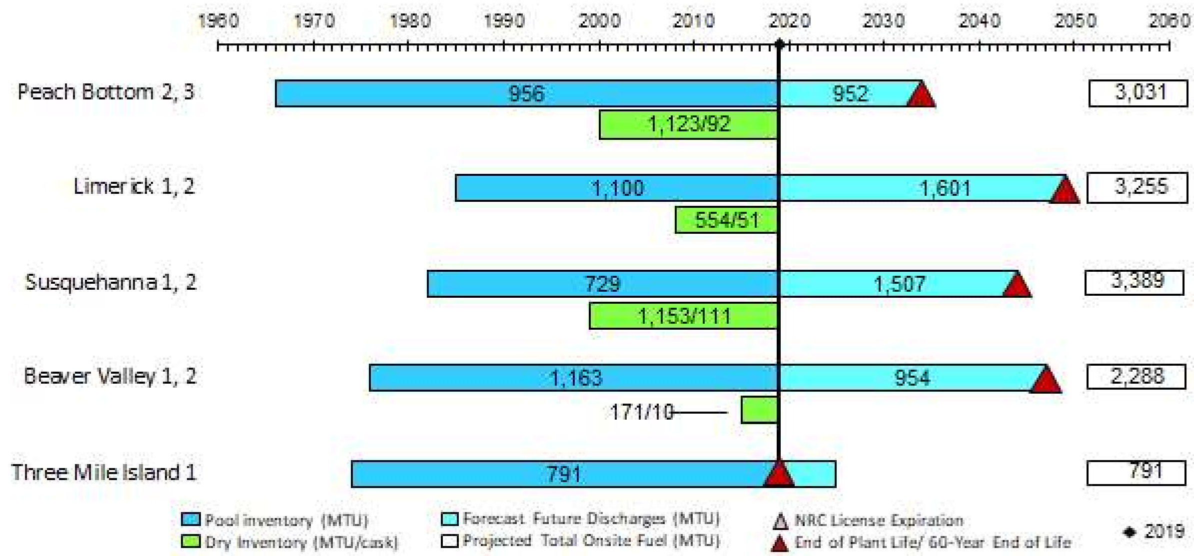


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
4	Peach Bottom 1	Exelon Generation Co., LLC	Madeleine Dean (D)	1967-1974/ SAFSTOR	BWR/Shutdown	No SNF on Site	
	Peach Bottom 2			1973-2053[11]	BWR/Operating	2000/GL	1,516[8]
	Peach Bottom 3			1974-2054[11]	BWR/Operating		1,515
5	Pennsylvania State University	Pennsylvania State University	Mary Scanlon (D)	1955- License R-2	R&TRF TRIGA BNR/ Operating		
6	Limerick 1	Exelon Generation Co., LLC	Chrissy Houlahan (D)	1985-2044	BWR/Operating	2008/GL	1,635
	Limerick 2			1989-2049	BWR/Operating		1,620
11	Susquehanna 1	Susquehanna Nuclear, LLC	Lloyd Smucker (R)	1982-2042	BWR/Operating	1999/GL	1,675
	Susquehanna 2			1984-2044	BWR/Operating		1,714
12	Beaver Valley 1	Energy Harbor Nuclear Corp.	Fred Keller (R)	1976-2036	PWR/Operating	2015/GL	1,119
	Beaver Valley 2			1987-2047	PWR/Operating		1,169
15	Three Mile Island 1	Exelon Generation Co., LLC	Glenn Thompson (R)	1974-2019	PWR/Shutdown		835
	Three Mile Island 2			1978-1979[9] SAFSTORE	PWR//Shutdown	No SNF on Site	See Note[10]

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 3,001 MTU in 264 casks **Pool: 4,740 MTU** **Total: 7,741 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$1,946.9 million paid	**$93.9 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

4 Forecast SNF discharges from individual reactors from the Reference Scenario in Appendix C and does not include any applicable transfers. Totals may vary slightly due to rounding.

5 State total estimated SNF in dry and pool storage as of December 31, 2019 in Appendix D. These quantities includes applicable SNF transfers. Totals may vary slightly due to rounding.

6 Current quantities of SNF in dry and pool storage as of December 31, 2019 and forecast SNF discharges from individual reactors from the Reference Scenario in Appendix B and C. Current storage quantities includes applicable transfers. Totals may vary slightly due to rounding.

7 The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A "one-time fee" was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

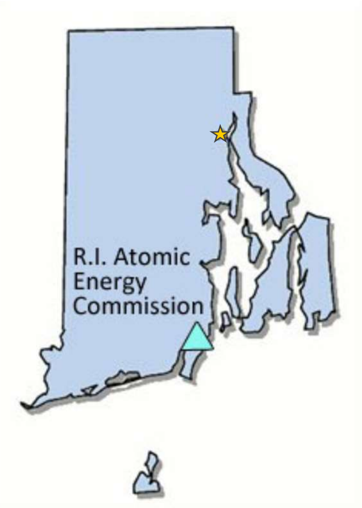
8 Includes 0.38 MTU transferred to Idaho National Laboratory.

9 Unit 2 in post-defueling monitored storage mode until both units are ready for decommissioning.

10 Three Mile Island Unit 2 fuel shipped to Idaho National Laboratory.

11 Date include the "subsequent" or second 20 year license renewal grated March 5, 2020.

RHODE ISLAND



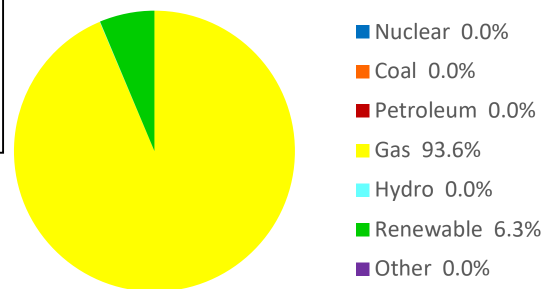
Elected Officials as of January 2020[1,2]

Governor:	Gina Raimondo (D)
Senators:	John Reed (D)
	Sheldon Whitehouse (D)
Representative:	
District 2:	James Langevin (D)

△ Operating Research Reactor (1 at 1 site)

Rhode Island: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)



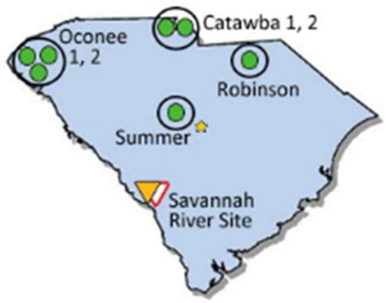
Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected
2	RI Atomic Energy Commission	RI Atomic Energy Commission	James Langevin (D)	1964- License R-95	R&TRF GE Pool, 2,000kW / Operating		

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

SOUTH CAROLINA

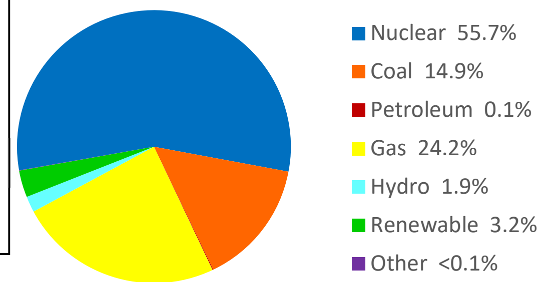


Elected Officials as of January 2020[1,2]

Governor:	Henry McMaster (R)
Senators:	Lindsey Graham (R)
	Tim Scott (R)
Representatives:	
District 2:	Joe Wilson (R)
District 3:	Jeff Duncan (R)
District 5:	Ralph Norman (R)
District 7:	Tom Rice (R)

South Carolina: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)



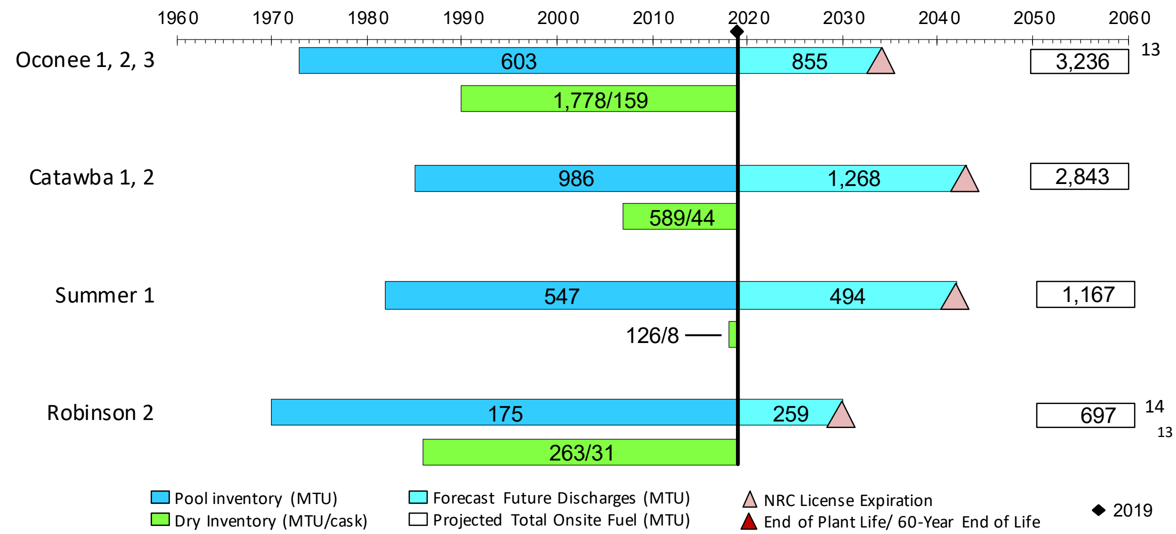
- Operating Reactors (7 at 4 sites)
- Commercial Dry Storage Sites (4 sites)
- DOE owned SNF and Reprocessing Waste at Savannah River Site
- Surplus Plutonium at Savannah River Site

Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
2	Savannah River Site	DOE[8]	Joe Wilson (R)		Various		See Note [15]
3	Oconee 1	Duke Energy Carolinas	Jeff Duncan (R)	1973-2033	PWR/Operating	1990/SL 1999/GL	1,117[9]
	Oconee 2			1973-2033	PWR/Operating		1,134[9]
	Oconee 3			1974-2034	PWR/Operating		1,124[9]
5	Catawba 1		Ralph Norman (R)	1985-2043	PWR/Operating	2007/GL	1,437
	Catawba 2			1986-2043	PWR/Operating		1,406
	Summer 1	Dominion Energy South Carolina		1982-2042	PWR/Operating	2016/GL	1,167
7	Robinson 2	Duke Energy Progress, LLC	Tom Rice (R)	1970-2030	PWR/Operating	1986/SL 2005/GL	1,049[10-12]

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 2,532 MTU in 226 casks **Pool: 2,535 MTU** **Total: 5,067 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$1,498.7 million paid	**$0.0 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

4 Forecast SNF discharges from individual reactors from the Reference Scenario from Appendix C and does not include any applicable transfers. Totals may vary slightly due to rounding.

5 State total estimated SNF in dry and pool storage as of December 31, 2019 from Appendix D. These quantities includes applicable SNF transfers. Totals may vary slightly due to rounding.

6 Current quantities of SNF in dry and pool storage as of December 31, 2019 and forecast SNF discharges from individual reactors from the Reference Scenario in Appendix B and C. Current storage quantities includes applicable transfers. Totals may vary slightly due to rounding.

7 The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A "one-time fee" was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

8 DOE Regulated Facility.

9 Total Oconee 1,2, and 3 total projected discharged fuel includes 140 MT transferred to McGuire and is no longer at the site.

10 Discharges includes 0.44 MTU transferred to Idaho National Laboratory.

11 Discharges includes 132 MTU transferred to Brunswick (North Carolina).

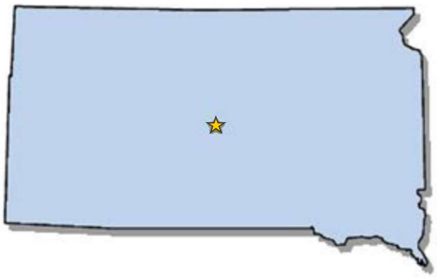
12 Discharges includes 219 MTU transferred to Harris (North Carolina).

13 SNF in storage reflects the transfer of 140 MTU to McGuire (North Carolina).

14 SNF in storage reflects the transfer of 132 MTU to Brunswick (North Carolina) and 219 MTU to Harris (North Carolina).

15 SRS has approximately 29 MT from DOE sources.

SOUTH DAKOTA

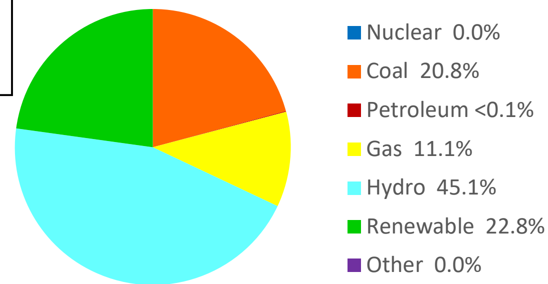


Elected Officials as of January 2020[1,2]

Governor:	Kristi Noem (R)
Senators:	Mike Rounds (R)
	John Thune (R)

South Dakota:2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

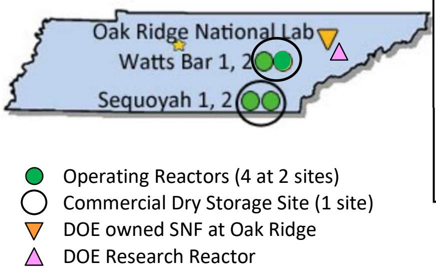


1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

TENNESSEE

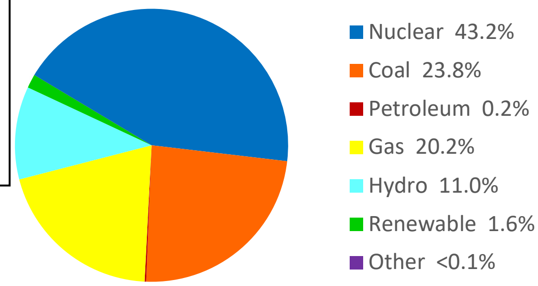


Elected Officials as of January 2020[1,2]

Governor:	Bill Lee (R)
Senators:	Lamar Alexander (R)
	Marsha Blackburn (R)
Representatives:	
District 3:	Chuck Fleischmann (R)
District 4:	Scott DesJarlais (R)

Tennessee: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

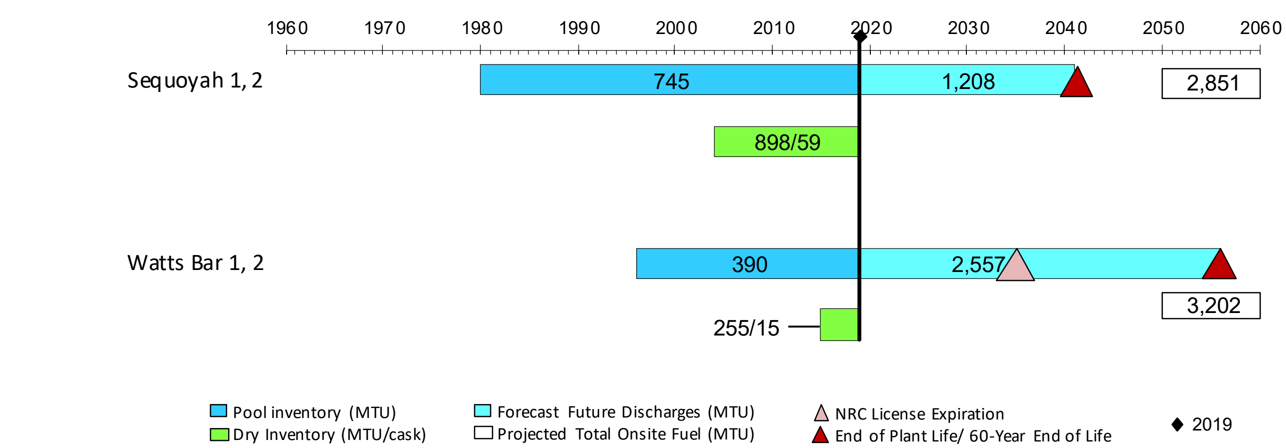


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
3	Sequoyah 1	Tennessee Valley Authority	Chuck Fleischmann (R)	1980-2040	PWR/Operating	2004/GL	1,386
	Sequoyah 2			1981-2041	PWR/Operating		1,465
	Oak Ridge National Lab	DOE[8]		None	Various		
	ORNL: High Flux Isotope Reactor (HFIR)			mid-1960s	Test reactor		See Note [9]
4	Watts Bar 1	Tennessee Valley Authority	Scott DesJarlais (R)	1996-2035	PWR/Operating	2016/GL	1,592
	Watts Bar 2			2015-2055	PWR/Operating		1,610

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 1,153 MTU in 74 casks **Pool: 1,135 MTU** **Total: 2,288 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$596.9 million paid	**$0.0 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

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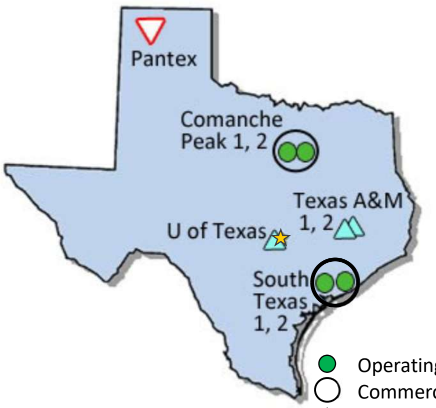
7 The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A "one-time fee" was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

8 DOE Regulated Facility.

9 DOE Operates the High-Flux Isotope Reactor (HFIR) at ORNL, some of the SNF is storred on-site awaiting transfer to SRS in South Carolina.

TEXAS



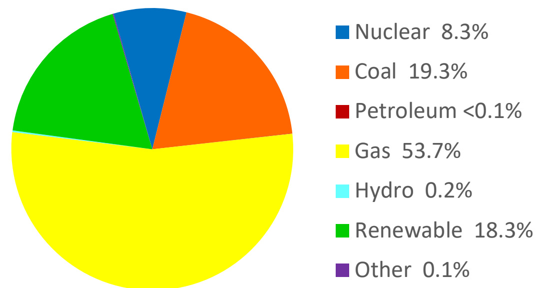
● Operating Reactors (4 at 2 sites)
○ Commercial Dry Storage Site (1 site)
△ Operating Research Reactors (3 at 2 sites)
▽ Surplus Plutonium at Pantex

Elected Officials as of January 2020[1,2]

Governor:	Greg Abbott (R)
Senators:	John Cornyn (R)
	Ted Cruz (R)
Representatives:	
District 10:	Michael McCaul (R)
District 13:	Mac Thornberry (R)
District 17:	Bill Flores (R)
District 25:	Roger Williams (R)
District 27:	Michael Cloud (R)

Texas: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

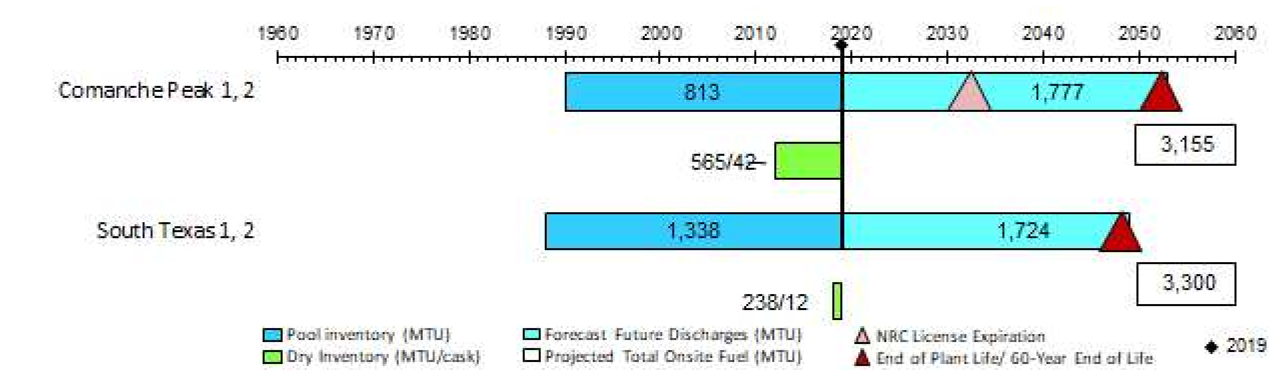


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
10	University of Texas	University of Texas	Michael McCaul (R)	1992- License R-129	R&TRF TRIGA Mark II, 1,100kW/ Operating		
13	Pantex Plant	DOE-NNSA[8]	Mac Thornberry (R)		Operating		
17	Texas A&M 1	Texas A&M	Bill Flores (R)	1957- License R-23	R&TRF AGN-201M #106, 0.005kW/ Operating		
	Texas A&M 2			1961- License R-83	R&TRF TRIGA Mark I, 1,000kW/Operating		
25	Comanche Peak 1	TEX Operations Company, LLC	Roger Williams (R)	1990-2030	PWR/Operating	2012/GL	1,597
	Comanche Peak 2			1993-2033	PWR/Operating		1,558
27	South Texas 1	STP Nuclear Operating Co.	Michael Cloud (R)	1988-2047	PWR/Operating	2019/GL	1,635
	South Texas 2			1989-2048	PWR/Operating		1,665

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 803 MTU in 54 casks **Pool: 2,151 MTU** **Total: 2,954 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$812.3 million paid	**$0.0 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

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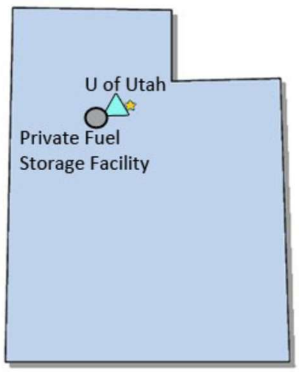
6 Current quantities of SNF in dry and pool storage as of December 31, 2019 and forecast SNF discharges from individual reactors from the Reference Scenario in Appendix B and C. Current storage quantities includes applicable transfers. Totals may vary slightly due to rounding.

7 The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A “one-time fee” was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

8 DOE regulated facility.

UTAH

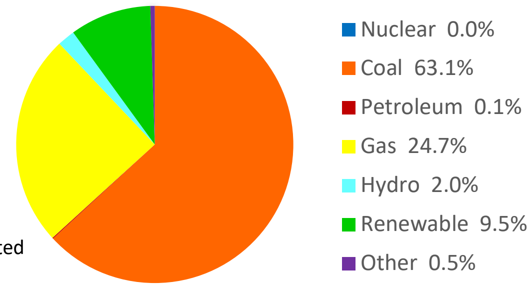


Elected Officials as of January 2020[1,2]

Governor:	Gary Herbert (R)
Senators:	Mitt Romney (R)
	Mike Lee (R)
Representative:	
District 2:	Chris Stewart (R)

△ Operating Research Reactor (1 at 1 site)
● Commercial Dry Storage Site, permitted but not constructed

Utah: 2019 Electricity Generation Mix[3]
(includes utilities and independent power producers)



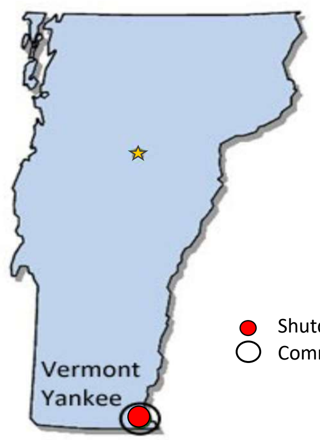
Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected
2	University of Utah	University of Utah	Chris Stewart (R)	1975- License R-126	R&TRF TRIGA Mark I, 100kW/ Operating		

[1] Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

[2] Governor from https://www.nga.org/governors, Accessed January 31, 2020.

[3] Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

VERMONT



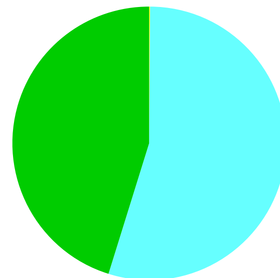
Shutdown Reactor (1 at 1 site)
Commercial Dry Storage Site (1 site)

Elected Officials as of January 2020[1,2]

Governor:	Phil Scott (R)
Senators:	Patrick Leahy (D)
	Bernie Sanders (I)
Representatives:	
District At-Large:	Peter Welch (D)

Vermont: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)



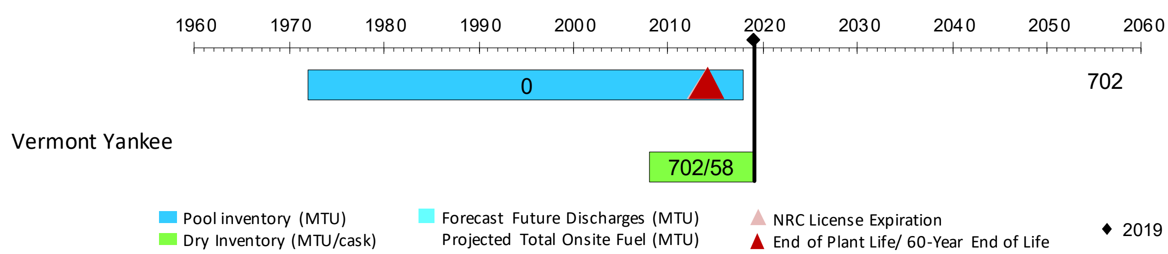
- Nuclear 0.0%
- Coal 0.0%
- Petroleum 0.0%
- Gas 0.1%
- Hydro 54.7%
- Renewable 45.2%
- Other 0.0%

Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
1	Vermont Yankee	NorthStar Vermont Yankee	Peter Welch (D)	1973-2014 DECON in Progress	BWR/ Early Shutdown	2008/GL	702

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 702 MTU in 58 casks **Pool: 0 MTU** **Total: 702 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$118.9 million paid	**$152.8 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors,Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

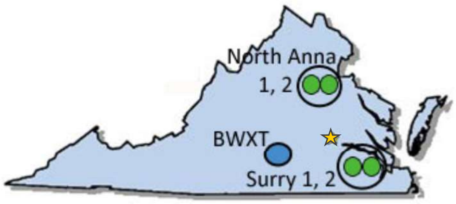
4 Forecast SNF discharges from individual reactors from the Reference Scenario from Appendix C and does not include any applicable transfers. Totals may vary slightly due to rounding.

5 State total estimated SNF in dry and pool storage as of December 31, 2019 from Appendix D. These quantities includes applicable SNF transfers. Totals may vary slightly due to rounding.

6 Current quantities of SNF in dry and pool storage as of December 31, 2019 and forecast SNF discharges from individual reactors from the Reference Scenario in Appendix B and C. Current storage quantities includes applicable transfers. Totals may vary slightly due to rounding.

7 The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A "one-time fee" was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

VIRGINIA

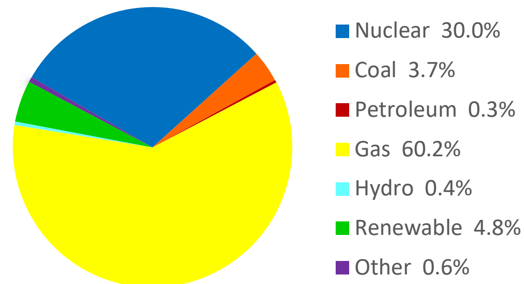


Operating Reactors (4 at 2 sites)
Commercial Dry Storage Sites (2 sites)
Commercial Research and Development Site (1 site)

Elected Officials as of January 2020[1,2]

Governor:	Ralph Northam (D)
Senators:	Mark Warner (D)
	Timothy Kaine (D)
Representatives:	
District 3:	Robert C. Scott (D)
District 6:	Ben Cline (R)
District 7:	Abigail Spanberger (D)

Virginia: 2019 Electricity Generation Mix[3]
(includes utilities and independent power producers)

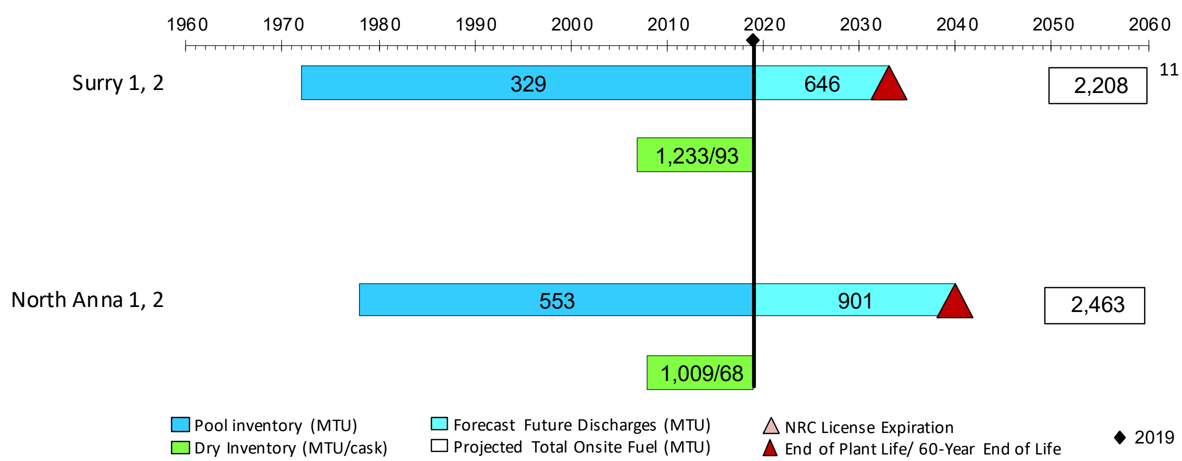


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
3	Surry 1	Virginia Electric & power Co.	Robert C. Scott (D)	1972-2032	PWR/Operating	1986/SL 2007/GL	1,113[8]
	Surry 2			1973-2033	PWR/Operating		1,095[8]
6	BWX Technologies	BWX Technologies	Ben Cline (R)	SNM-42[9]	Dry and pool storage/ Operating[10]	See Note[9]	
7	North Anna 1	Dominion Generation	Abigail Spanberger (D)	1978-2038	PWR/Operating	1998/SL 2008/GL	1,229
	North Anna 2			1980-2040	PWR/Operating		1,234

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 2,123 MTU in 153 casks **Pool: 911 MTU** **Total: 3,034 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$837.0 million paid[12]	**$0.0 million one-time fee owed**

[1] Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

[2] Governor from https://www.nga.org/governors, Accessed January 31, 2020.

[3] Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

[4] Forecast SNF discharges from individual reactors from the Reference Scenario from Appendix C and does not include any applicable transfers. Totals may vary slightly due to rounding.

[5] State total estimated SNF in dry and pool storage as of December 31, 2019 from Appendix D. These quantities includes applicable SNF transfers. Totals may vary slightly due to rounding.

[6] Current quantities of SNF in dry and pool storage as of December 31, 2019 and forecast SNF discharges from individual reactors from the Reference Scenario in Appendix B and C. Current storage quantities includes applicable transfers. Totals may vary slightly due to rounding.

[7] The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A "one-time fee" was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

[8] Surry 1 and Surry 2 discharges includes 31 MTU transferred to Idaho National Laboratory for examination and testing.

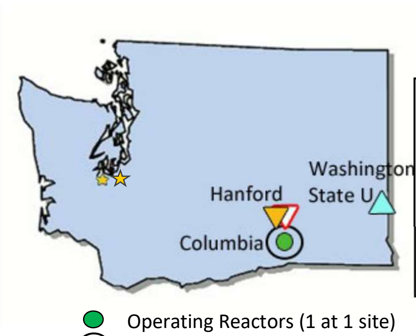
[9] [Federal Register Volume 72, Number 235 [Notices] Pages 69234-69236] Renewed license for Mt. Athos facility in Lynchburg, Virginia was issued on March 29, 2007.

[10] Facility manufactures nuclear fuel elements. Dry and wet storage of SNF is included in the operating license.

[11] SNF in storage does not include 31 MTU transferred to Idaho National Laboratory.

[12] Includes one-time fee paid by B&W.

WASHINGTON



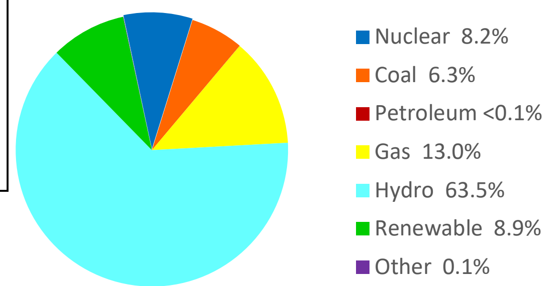
- Operating Reactors (1 at 1 site)
- Commercial Dry Storage Site (1 site)
- Operating Research Reactor (1 at 1 site)
- DOE owned SNF and Reprocessing Waste at Hanford
- Surplus Plutonium at Hanford

Elected Officials as of January 2020[1,2]

Governor:	Jay Inslee (D)
Senators:	Patty Murray (D)
	Maria Cantwell (D)
Representatives:	
District 4:	Dan Newhouse (R)
District 5:	Cathy McMorris Rodgers (R)

Washington: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

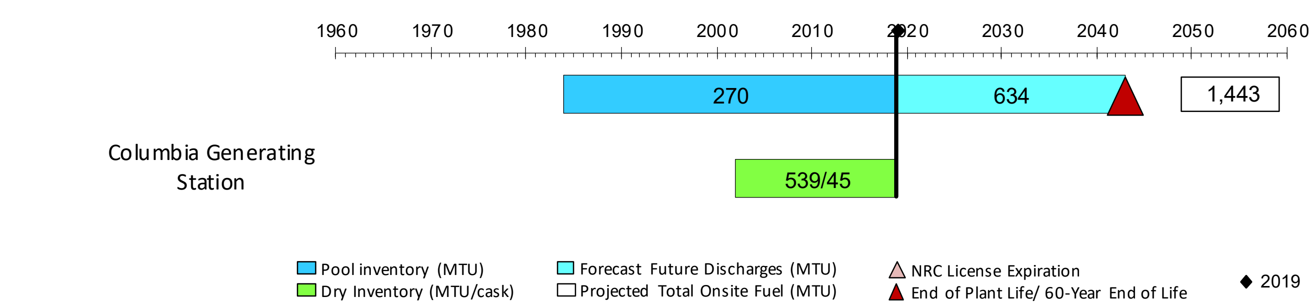


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
4	Columbia Generating Station	Energy Northwest	Dan Newhouse (R)	1984-2043	BWR/ Operating	2002/GL	1,443
4	Hanford Reservation	DOE[8]	Dan Newhouse (R)	None	Various/ Shutdown		
5	Washington State University	Washington State University	Cathy McMorris Rodgers (R)	1961- License R-76	R&TRF TRIGA, 1,000kW/ Operating		

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 539 MTU in 45 casks **Pool: 270 MTU** **Total: 809 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$198.9 million paid	**$0.0 million one-time fee owed**

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1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

4 Forecast SNF discharges from individual reactors from the Reference Scenario from Appendix C and does not include any applicable transfers. Totals may vary slightly due to rounding.

[5] State total estimated SNF in dry and pool storage as of December 31, 2019 from Appendix D. These quantities includes applicable SNF transfers. Totals may vary slightly due to rounding.

[6] Current quantities of SNF in dry and pool storage as of December 31, 2019 and forecast SNF discharges from individual reactors from the Reference Scenario in Appendix B and C. Current storage quantities includes applicable transfers. Totals may vary slightly due to rounding.

[7] The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A "one-time fee" was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

[8] DOE Regulated Facility

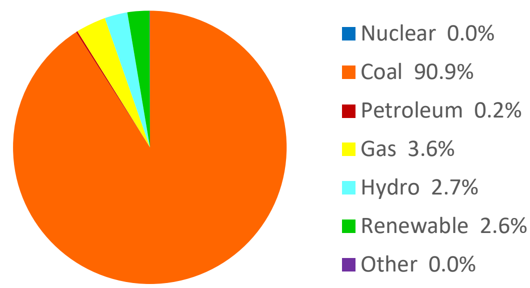
WEST VIRGINIA

Elected Officials as of January 2020[1,2]

Governor:	: Jim Justice (D)
Senators:	Shelley Capito (R)
	Joe Manchin (D)

West Virginia: 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

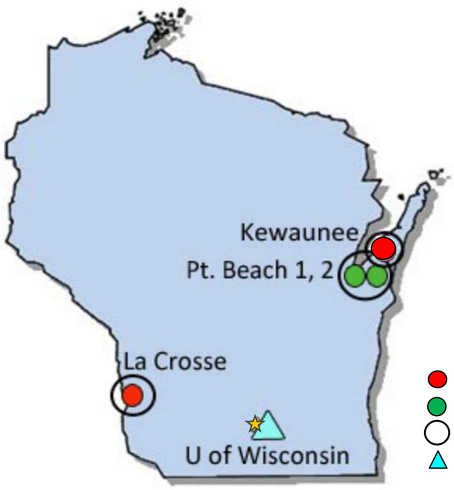


1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

WISCONSIN



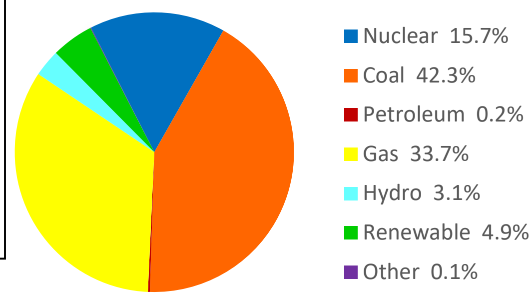
Shutdown Reactor (2 at 2 sites)
Operating Reactors (2 at 1 site)
Commercial Dry Storage Sites (3 sites)
Operating Research Reactor (1 at 1 site)

Elected Officials as of January 2020[1,2]

Governor:	Tony Evers (D)
Senators:	Ron Johnson (R)
	Tammy Baldwin (D)
Representatives:	
District 2:	Marc Pocan (D)
District 3:	Ron Kind (D)
District 6:	Glenn Grothman (R)
District 8:	Mike Gallagher (R)

Wisconsin 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)

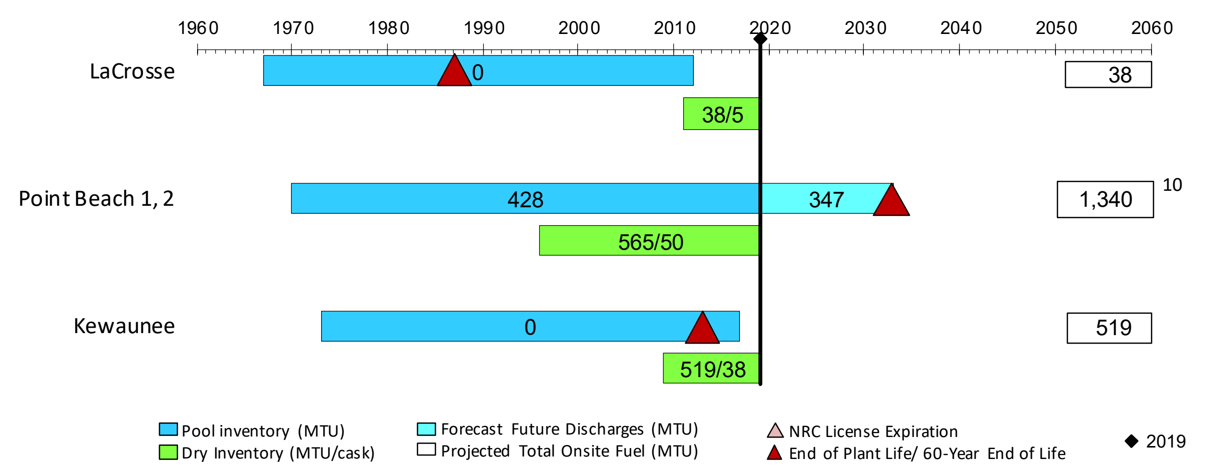


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
2	University. of Wisconsin	University of Wisconsin	Marc Pocan (D)	1960- License R-74	R&TRF TRIGA Mark 1, 1,000kW/ Operating		
3	LaCrosse	Dairyland Power Cooperative	Ron Kind (D)	1967-1987/ DECON in progress	BWR/Shutdown	2011/GL	38[8]
6	Point Beach 1	NextEra Energy Point Beach LLC	Glenn Grothman (R)	1970-2030	PWR/Operating	1996/GL	679[9]
	Point Beach 2			1973-2033	PWR/Operating		661
8	Kewaunee	Dominion Generation	Mike Gallagher (R)	1973-2013[9] SAFSTOR	PWR/ Early Shutdown	2009/GL	519

COMMERCIAL SPENT FUEL ONSITE INVENTORY[5]

Dry: 1,122 MTU in 93 casks **Pool: 428 MTU** **Total: 1,550 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[6]



NUCLEAR WASTE FUND[7]	
$416.4 million paid	**$0.0 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases..

4 Forecast SNF discharges from individual reactors from the Reference Scenario from Appendix C and does not include any applicable transfers. Totals may vary slightly due to rounding.

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6 Current quantities of SNF in dry and pool storage as of December 31, 2019 and forecast SNF discharges from individual reactors from the Reference Scenario in Appendix B and C. Current storage quantities includes applicable transfers. Totals may vary slightly due to rounding.

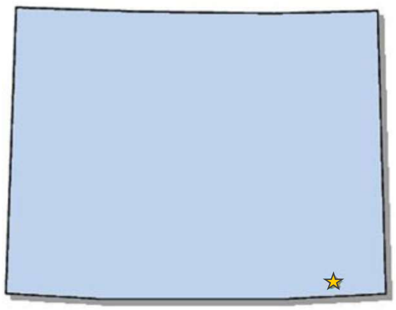
7 The Nuclear Waste Policy Act established the Federal Government's responsibility to provide permanent disposal of commercial spent nuclear fuel (SNF) and high-level radioactive waste (HLW), and the Nuclear Waste Fund, composed of payments made by the generators and owners of SNF (primarily nuclear utilities) and HLW, to ensure that the costs of carrying out activities relating to the disposal be borne by the generators and owners of the SNF and HLW. A "one-time fee" was established for SNF created before April 7, 1983, and an ongoing quarterly fee based on electricity generated and sold from April 7, 1983 forward. Payments and amounts owed are as of December 31, 2019 using the Department of Energy Consolidated Accounting & Investment System (CAIS) data. Paid amounts are net of fee and interest credits/refunds. One-time fee owed includes both fees and interest on fees.

8 Discharges includes 0.12 MTU transferred to Savannah River Site.

9 Discharges includes 2 MTU transferred to Idaho National Laboratory.

10 SNF in storage does not include 2 MTU transferred to Idaho National Laboratory.

WYOMING

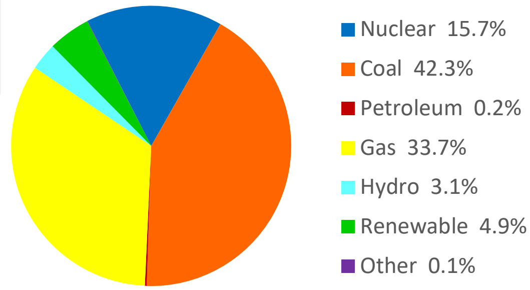


Elected Officials as of January 2020[1,2]

Governor:	Mark Gordon (R)
Senators:	Mike Enzi (R)
	John Barrasso (R)

Wisconsin 2019 Electricity Generation Mix[3]

(includes utilities and independent power producers)



1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed January 31, 2020.

2 Governor from https://www.nga.org/governors, Accessed January 31, 2020.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly - December 2019. Year-to-Date Data through October 2019. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

35 States with Commercial SNF from Nuclear Power Reactors

4 States with Research Reactors Only

Approximate Amounts in Metric Tons Heavy Metal (Estimated 12/31/19)

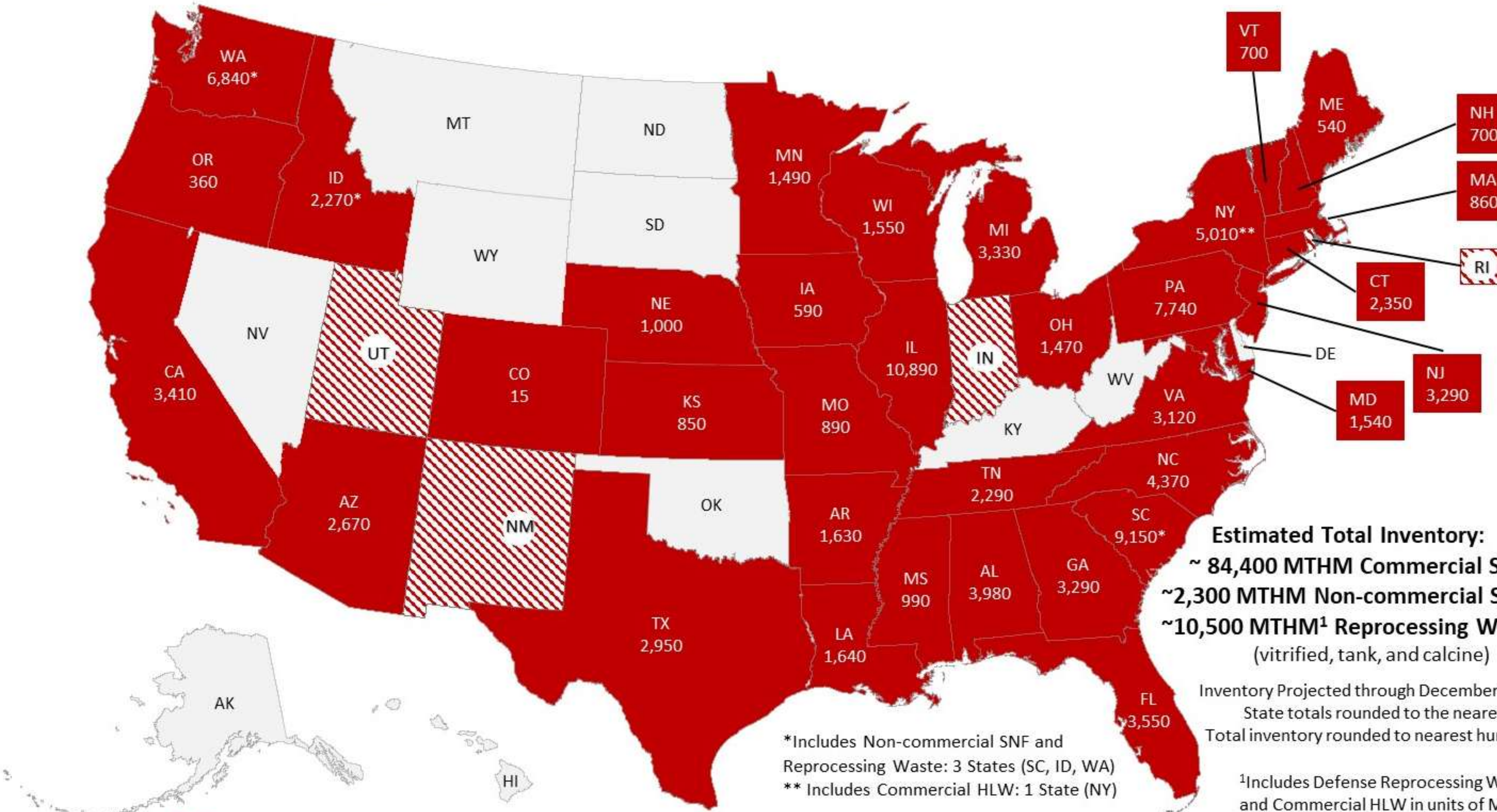
SNF at DOE-Managed, NRC Regulated Facilities (CO, ID)

Research reactors only (IN, NM, RI, UT)

Note: Quantities of SNF from research and defense programs and additional commercial-origin SNF stored under DOE authority are not included.

39 States with SNF/Reprocessing Waste

Approximate amounts shown in Metric Tons Heavy Metal (MTHM)



Estimated Total Inventory:
~ 84,400 MTHM Commercial SNF
~2,300 MTHM Non-commercial SNF
~10,500 MTHM[1] Reprocessing Waste
(vitrified, tank, and calcine)

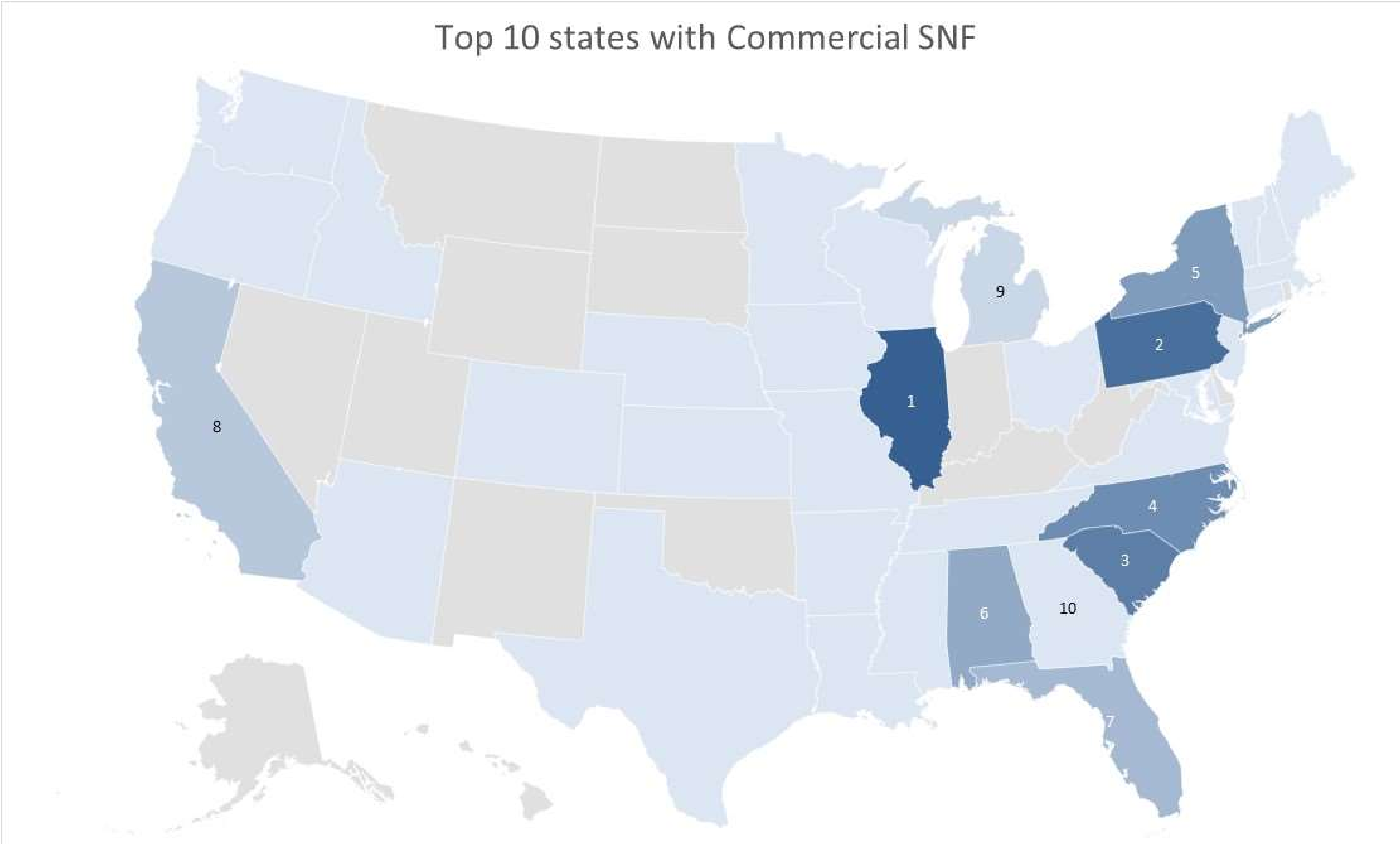
Inventory Projected through December 2019
State totals rounded to the nearest ten
Total inventory rounded to nearest hundred

[1]Includes Defense Reprocessing Waste and Commercial HLW in units of MTHM based on historical conversion factors.

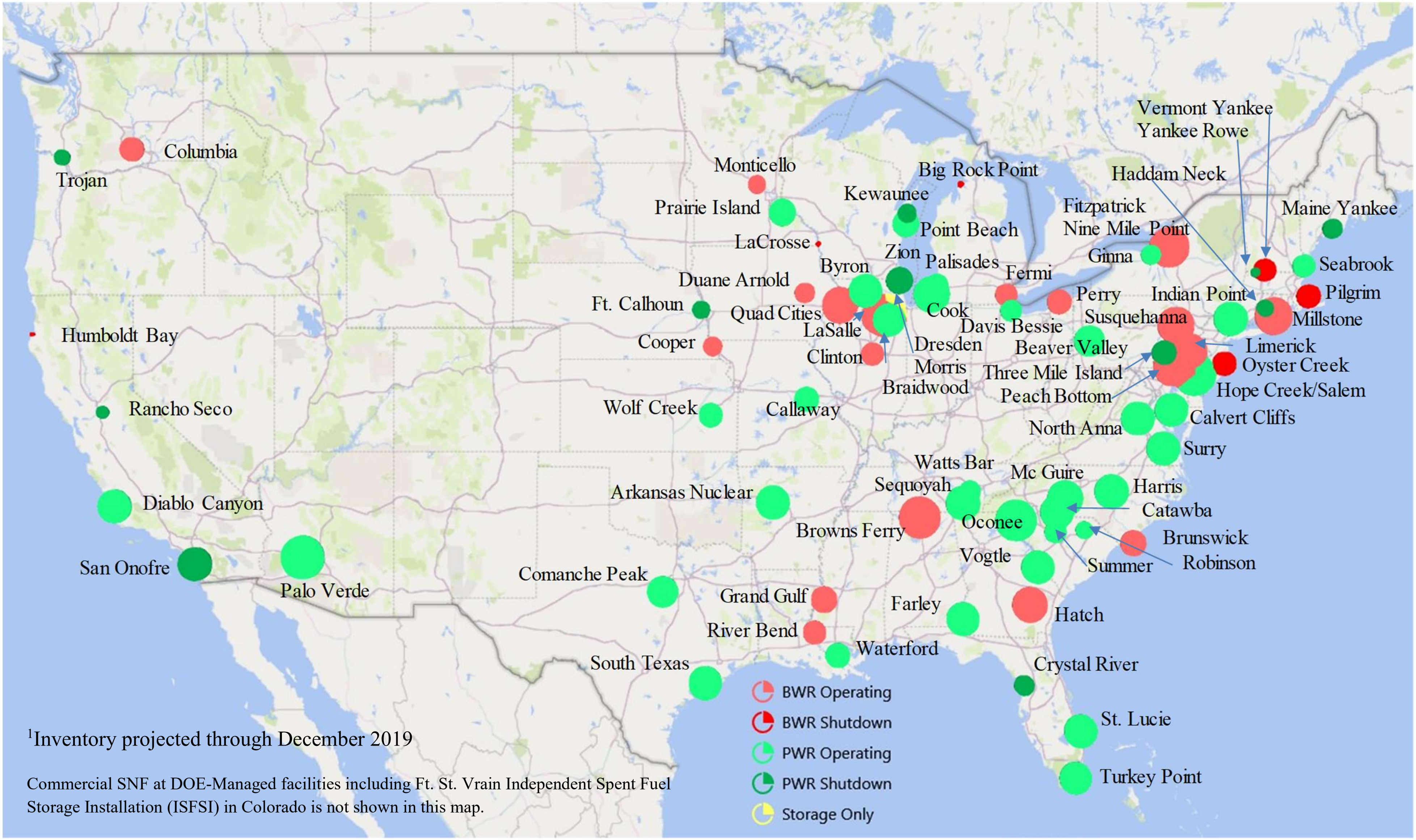
*Includes Non-commercial SNF and Reprocessing Waste: 3 States (SC, ID, WA)
** Includes Commercial HLW: 1 State (NY)

Research Reactors Only: 4 States (RI, IN, NM, UT)

No waste: 11 States (DE, WV, KY, OK, SD, ND, WY, MT, NV, AK, HI)


Top 10 states with Commercial SNF
1
2
3
4
5
6
7
8
9
10

Commercial SNF at U.S. Nuclear Power Reactor Sites[1]



[1]Inventory projected through December 2019

Commercial SNF at DOE-Managed facilities including Ft. St. Vrain Independent Spent Fuel Storage Installation (ISFSI) in Colorado is not shown in this map.