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Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report

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 nuclear fuel (SNF), as well as Government-managed SNF and high-level radioactive waste (HLW). 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). This report was produced for the U.S. Department of Energy (DOE) to support various analyses on options for storage and transport of SNF and HLW, and was sponsored by DOE's Office of Spent Fuel and Waste Disposition (SFWD). The report draws from and complements a previously issued report, *Fuel Cycle Potential Waste Inventory for Disposition* [Carter, 2013], developed for DOE's Used Nuclear Fuel Research & Development Campaign. The current report is not intended as a revision to either *Fuel Cycle Potential Waste Inventory for Disposition* [Carter, 2013] or *Evaluation of Options for Permanent Geologic Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste in Support of a Comprehensive National Nuclear Fuel Cycle Strategy* [SNL, 2014] from which some underlying data is used as referenced in the current report. Rather, this report is intended as a stand-alone report providing estimates of current and projected SNF and HLW inventory and has been generated for SFWD planning purposes.

This is a technical report that does not take into account the contractual limitations under the Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste (Standard Contract) (10 CFR Part 961). Under the provisions of the Standard Contract, DOE does not consider spent nuclear fuel in multi-assembly canisters to be an acceptable waste form, absent a mutually agreed upon contract amendment. To the extent discussions or recommendations in this report conflict with the provisions of the Standard Contract, the Standard Contract provisions prevail.

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ACRONYMS

ATR	Advanced Test Reactor
BRC	Blue Ribbon Commission on America's Nuclear Future
BWR	Boiling Water Reactor
CH-TRU	Contact Handled Transuranic Waste
DOE	Department of Energy
EIA	Energy Information Administration
FCRD	Fuel Cycle Research & Development
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
HSM	Horizontal Storage Module
INL	Idaho National Laboratory
ISF	Interim Storage Facility
ISFSI	Independent Spent Fuel Storage Installation
LLRW	Low-Level Radioactive Waste
MCO	Multi-Canister Overpack
MPC	Multi-Purpose Canister (used with HOLTEC and some NAC systems)
MT	Metric Tons
MTHM	Metric Tons Initial Heavy Metal (equivalent to MTU)
MTU	Metric Tons Initial Uranium
NNPP	Naval Nuclear Propulsion Program
NPR	nuclear power reactor
NRC	Nuclear Regulatory Commission
NSNFP	National Spent Nuclear Fuel Program
NUHOMS	NUclear HOrizontal Modular Storage
NWPA	Nuclear Waste Policy Act of 1982, as amended
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
TSC	Transportable Storage Canister (used with certain NAC and BFS/ES systems)
TSL	Transportation Storage Logistics
UFDC	Used Fuel Disposition Campaign
UMS	Universal MPC System (used with certain NAC systems)
VCC	Ventilated Concrete Cask
VCT	Vertical Cask Transporter
VSC	Vertical Storage Cask
WTP	Waste Treatment Project

SPENT NUCLEAR FUEL AND HIGH-LEVEL RADIOACTIVE WASTE INVENTORY REPORT

1. Introduction

This report provides information on the inventory of commercial spent fuel (SNF), as well as Government-managed SNF and HLW in the U.S. Department of Energy (DOE) complex. 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 particular 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 including the inventory forecast information. A more in-depth discussion on the Government-managed SNF and HLW 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 break-outs by reactor, storage location, site, state and U.S. Nuclear Regulatory Commission (NRC) region. This report was sponsored by DOE's Office of Spent Fuel and Waste Disposition (SFWD). It draws from and complements a previously issued report, *Fuel Cycle Potential Waste Inventory for Disposition* [Carter, 2013] developed for DOE's Used Nuclear Fuel Research & Development Campaign. The current report is not intended as a revision to either *Fuel Cycle Potential Waste Inventory for Disposition* [Carter, 2013] or *Evaluation of Options for Permanent Geologic Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste in Support of a Comprehensive National Nuclear Fuel Cycle Strategy* [SNL, 2014] from which some underlying data is used as referenced in the current report. Rather, this report is intended as a stand-alone report providing estimates of current and projected SNF and HLW inventory and has been generated for SFWD planning purposes.

This is a technical report that does not take into account the contractual limitations under the Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste (Standard Contract) (10 CFR Part 961). Under the provisions of the Standard Contract, DOE does not consider spent nuclear fuel in multi-assembly canisters to be an acceptable waste form, absent a mutually agreed upon contract amendment. To the extent discussions or recommendations in this report conflict with the provisions of the Standard Contract, the Standard Contract provisions prevail.

This report is not intended to provide an over-arching estimate for Greater-Than-Class C (GTCC) Low-Level Radioactive Waste (LLRW) associated with decommissioning the U.S. fleet of current and future commercial reactors. For estimates of GTCC LLRW, the reader is referred to Final Environmental Impact

1.1 Inventory Summary

The U.S Inventory of SNF and HLW is located at 113 sites in 39 states. Figure 1-1 provides the approximate locations for: 99 operating commercial power generating reactors (see Table 2-1), 20 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 Government-managed SNF in Section 3.0), 1 commercial HLW storage location (see Section 2.1.3) and 6 DOE sites with SNF and/or HLW (see Section 3.0).

The total U.S. SNF inventory is approximately 82,500 MTHM at the end of 2017 and, as indicated by Table 1-1, is comprised of about 80,000 MTHM of commercial SNF and about 2,500 MTHM of Government-Managed SNF. The total number of HLW canisters at the end of 2017 is 4,440, with DOE HLW canisters constituting the vast majority (4,162) and with commercial HLW canisters comprising a much smaller portion (278). Statement for the Disposal of GTCC LLRW and GTCC-Like Waste [DOE, 2016]

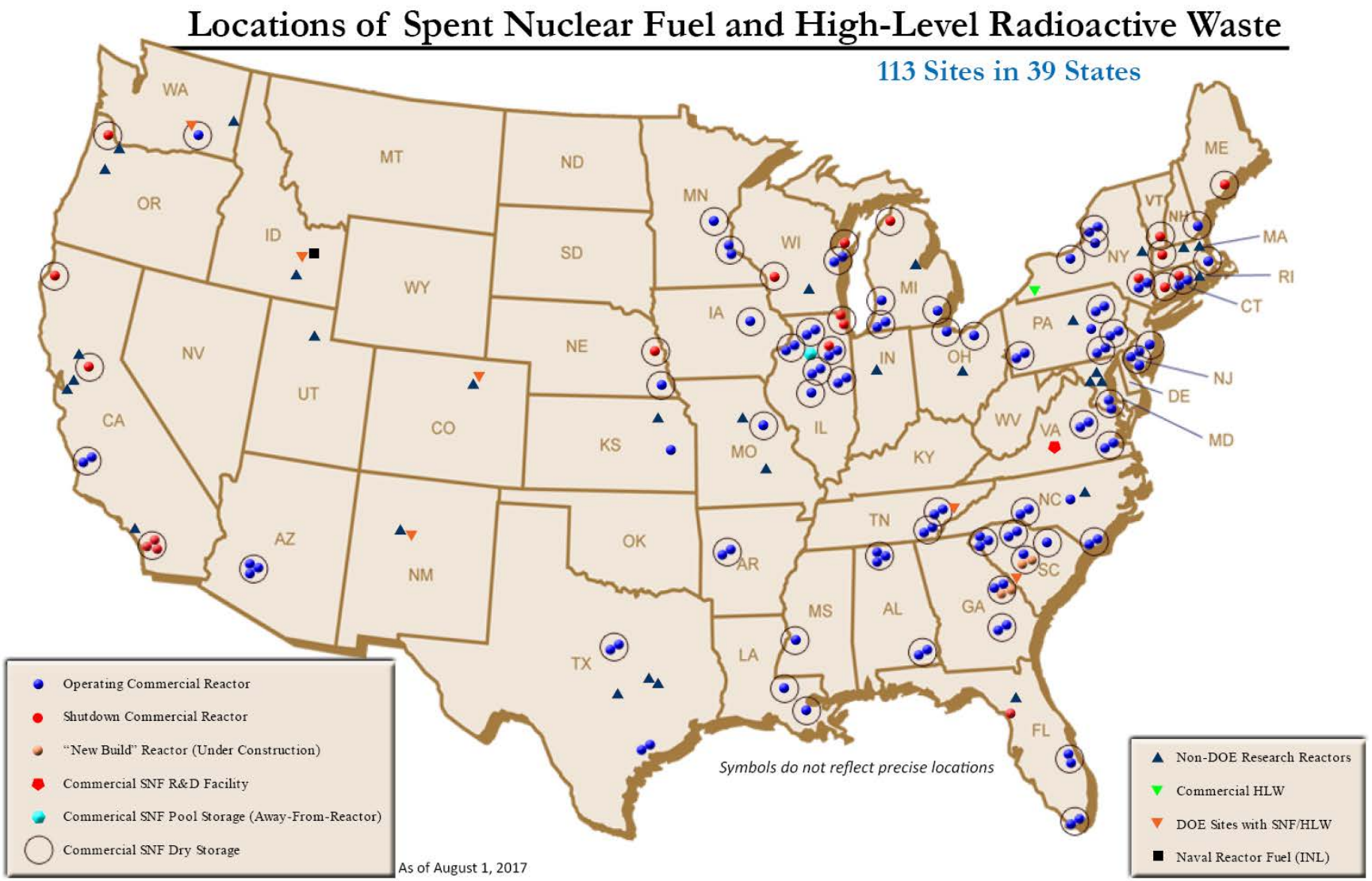

Figure 1-1. Sites Currently Storing Spent Nuclear Fuel and High-Level Radioactive Waste

Table 1-1 U.S. SNF and HLW Inventory Summary for 2017

Material Category	SNF (MTHM)	HLW (canisters) [a]
Commercial SNF and HLW	80,063 [b]	278 [c]
Government Managed SNF and DOE HLW	2,488 [d]	4,162
Total	82,551	4,440

[a] Accounts only for the current inventory of HLW canisters produced through December 31, 2017. HLW which has yet to be processed into canisters is not included. All HLW canisters produced thus far are 2 feet in diameter × 10 feet tall.

[b] Estimated through December 31, 2017.

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

[d] Includes SNF being managed by DOE from research and production activities and from commercial sources and Navy SNF

Some commercial fuel was reprocessed at an aqueous reprocessing facility at West Valley, New York. DOE is responsible for clean-up of the commercial SNF reprocessing site (See Section 2.1.3).

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 resulting High-Level Waste is (or is planned) to be treated prior to disposal. See Section 3.3.

DOE also operated (see section 3.1) or sponsored a variety of research, test, training, and other experimental reactors (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 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 and expand additional information and additional 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 I.

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 1in Illinois) and for which SNF no longer remains on site (remaining SNF from these reactors is managed by DOE and is 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, one (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 fuel debris is managed by the DOE and located at INL. Another 20 reactors have since shutdown, currently leaving 99 NPRs licensed to operate, including the newly operational Watts Bar Unit 2, in Tennessee.

A simple site grouping structure has been adopted and is used throughout the report. The grouping structure is provided below to provide clarity through 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 Group C reactors and Subgroup C2, with both wet and dry stored fuel.

Table 2-1 provides a list of nuclear power plants by their assigned Groups/Subgroups. Ninety-three reactors are at Group C sites and six are at Group B sites. Six reactors (Pilgrim in Massachusetts, Oyster Creek in New Jersey, Indian Point 2 and 3 in New York, and Diablo Canyon 1 and 2 in California) have utility-announced early shutdown dates before the end of 2025.

Of the 20 shutdown reactors with fuel remaining onsite, 17 are reactors at 14 sites with no continuing nuclear operations (Group A sites). This includes SNF from 10 reactors on 9 sites (Subgroup A1) where all SNF is in dry storage and reactor decommissioning is complete or nearing completion as these reactors all ceased operations prior to 2000. 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.

In addition to the 17 shutdown reactors at 14 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). The inventory from these permanently shutdown reactors form the planning basis for an interim storage facility (ISF) that is focused on shutdown reactors. Figure 1-1 illustrates the locations of these shutdown commercial power reactors.

For the 119 NPRs 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 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.

Commercial SNF includes irradiated fuel discharged 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 tubes. 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 from non-propriety data sources.

Table 2-1. Nuclear Power Generation Sites by Group/Subgroup (As of June 2017)

Group A: All Units Shutdown Sites (# of Units) – 17 Reactors/14 Sites			
A1 (Dry Storage)		**A2 (Dry and Pool Storage)**	**A3 (Pool Storage)**
Big Rock Point (1)	Rancho Seco (1)	Fort Calhoun (1)	Crystal River (1)
Haddam Neck (1)	Trojan (1)	Kewaunee (1)	
Humboldt Bay (1)	Yankee Rowe (1)	San Onofre (3)	
La Crosse (1)	Zion (2)	Vermont Yankee (1)	
Maine Yankee (1)			

Group B: Mixed Status Sites (# of Units) – Total 9 Reactors /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)– 93 Reactors /56 Sites (Note: All Group C Sites have Wet Storage Capabilities)			
C2 (Dry and Pool Storage)			**C3 (Pool Storage)**
Arkansas Nuclear (2)	Fitzpatrick (1)	Pilgrim (1)	Shearon Harris (1)
Beaver Valley (2)	Fermi (1)††	Point Beach (2)	South Texas (2)
Braidwood (2)	Ginna (1)	Prairie Island (2)	Three Mile Island (1)††
Browns Ferry (3)	Grand Gulf (1)	Quad Cities (2)	Wolf Creek (1)
Brunswick (2)	Hatch (2)	River Bend (1)	
Byron (2)	Hope Creek (1)‡‡	Robinson (1)	
Calvert Cliffs (2)	La Salle (2)	Saint Lucie (2)	
Callaway (1)	Limerick (2)	Salem (2)‡‡	
Catawba (2)	McGuire (2)	Seabrook (1)	
Clinton (1)	Monticello (1)	Sequoyah (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)	Oyster Creek (1)	Turkey Point (2)	
D.C. Cook (2)	Palisades (1)	Vogtle (2)	
Diablo Canyon (2)	Palo Verde (3)	Waterford (1)	
Duane Arnold (1)	Peach Bottom (2)††	Watts Bar (2)	
Farley (2)	Perry (1)		

‡ 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 2017 and beyond, fuel discharge projections were developed using the U.S. Commercial Spent Fuel Projection tool [Vinson, 2015]. The methodology used by the tool are 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 NPR 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 inventory at the end of 2017 by reactor type. The total projected inventory is more than 80,000 metric tons (MT) of uranium (MTU) contained in approximately 278,000 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 12/31/2017.

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 12/31/2017		Total Estimated Discharged Fuel through 12/31/2017	
Reactor Type	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**
PWR	103,605	44,894	16,222	7,115	119,827	52,009
BWR	136,533	24,293	21,701	3,831	158,234	28,124
Totals	**240,138**	**69,187**	**37,923**	**10,946**	**278,061**	**80,134**

*** Excludes SNF that was reprocessed at West Valley, NY**

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 inventory 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. SNF of commercial origin managed by DOE, such as the TMI-2 fuel 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, 2017 (the dry storage data are current, as of May 2, 2017). 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. 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.

Table 2-6 provides the end of 2017 inventory remaining at the NPR sites (this does not include the inventory at Morris) by storage method accounting for all known fuel transfers. The dry storage quantities as of 5/2/2017 have been derived from publicly available sources [Store Fuel, 2017] and this report assumes these are the quantities in dry storage for the end-of-2017 projections. 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.

Table 2-5. Spent Nuclear Fuel Inventory by Reactor Group/Subgroup (Estimate as of 12/31/2017)

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	7,660	2,815	248	-	-	7,660	2,815
A2	3,431	1,163	103	6,902	2,133	10,333	3,297
A3	-	-	-	1,243	582	1,243	582
A	**11,091**	**3,978**	**351**	**8,145**	**2,716**	**19,236**	**6,694**
Group B Sites							
B1	-	-	-	-	-	-	-
B2	7,040	1,744	139	13,057	3,447	20,097	5,191
B3	-	-	-	-	-	-	-
B	**7,040**	**1,744**	**139**	**13,057**	**3,447**	**20,097**	**5,191**
Group C Sites							
C1	-	-	-	-	-	-	-
C2	84,421	24,213	1,982	138,665	38,709	223,086	62,922
C3	-	-	-	12,199	4,582	12,199	4,582
C	**84,421**	**24,213**	**1,982**	**150,864**	**43,291**	**235,285**	**67,504**
Group F Sites							
F	**-**	**-**	**-**	**3,217**	**674**	**3,217**	**674**
Total All Sites	**102,552**	**29,935**	**2,472**	**175,283**	**50,128**	**277,835**	**80,063**

* Discharges exclude commercial SNF reprocessed at West Valley, NY and transfers to DOE for R&D purposes
** Although the inventory is projected to the end of 2017, the dry storage data are current, as of May 2, 2017.

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

	Dry Inventory 5/2/2017			Pool Inventory		Total Projected Discharged Fuel 12/31/2017	
Reactor Type	**Assy.**	**Initial Uranium (MT)**	**Fuel Casks**	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**
PWR	47,004	20,098	1,632	76,423	32,373	123,427	52,471
BWR	55,548	9,837	840	95,643	17,081	151,191	26,918
Totals	**102,552**	**29,935**	**2,472**	**172,066**	**49,454**	**274,618**	**79,389**

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

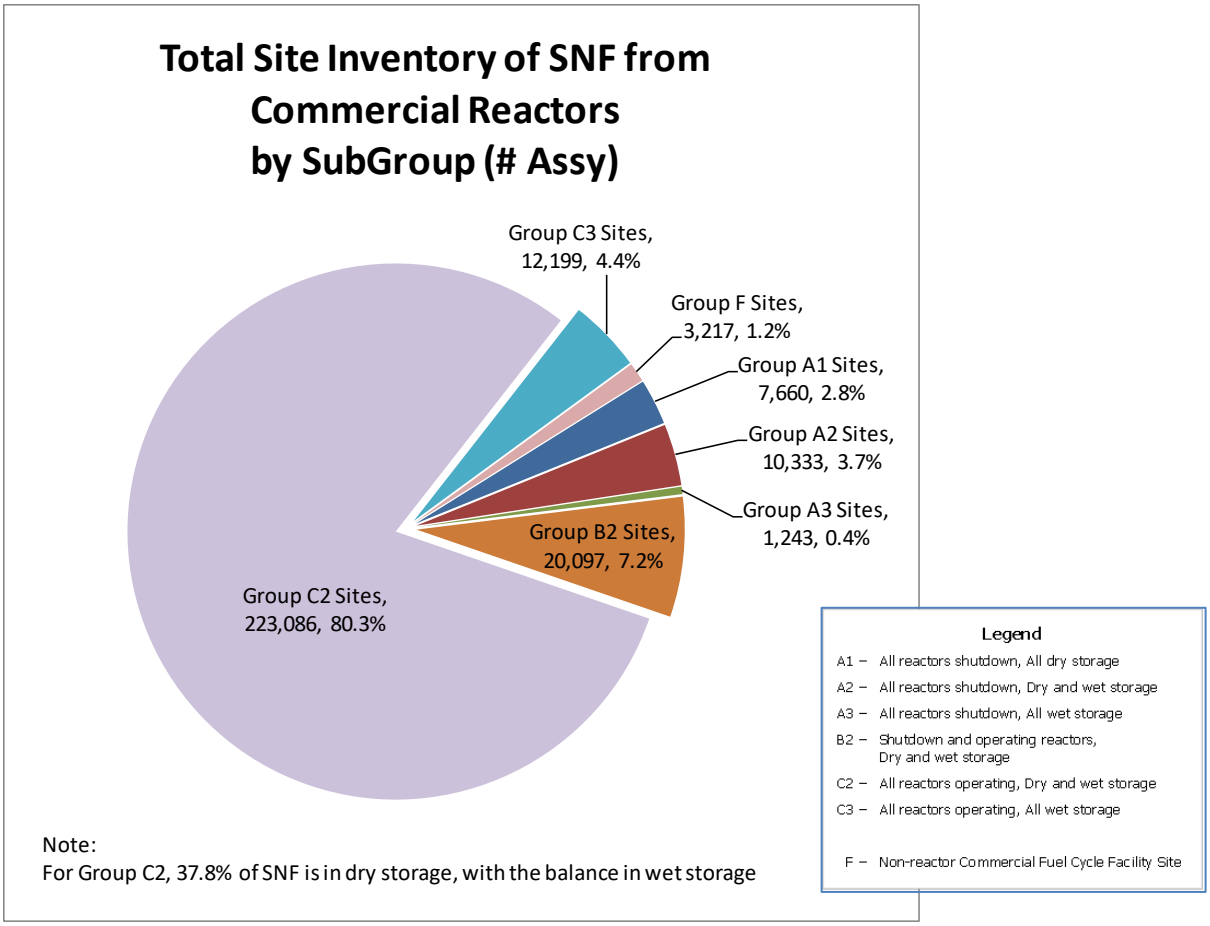

Figure 2-1. Commercial Nuclear Power Reactor Sites Currently Storing Commercial SNF

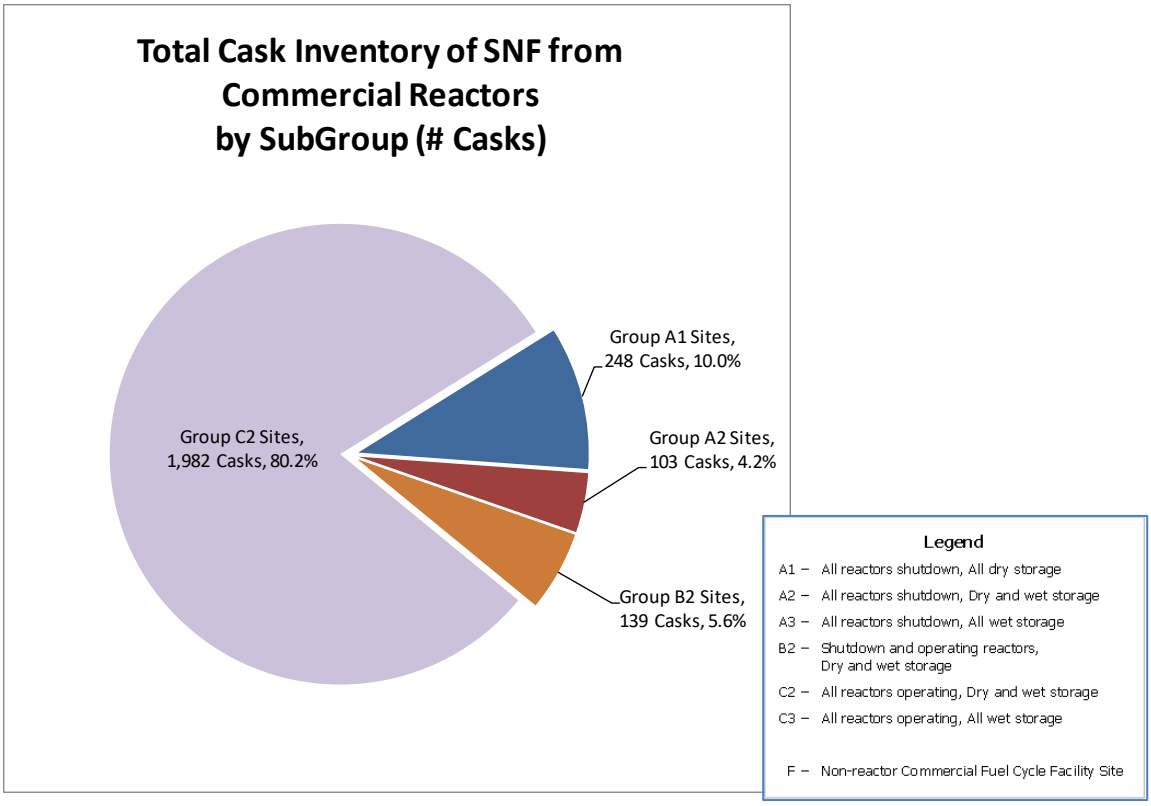

Figure 2-2. Dry SNF Storage at Commercial Nuclear Power Reactor Sites

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, 2018] 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 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 total of 173.6 MTU of SNF of commercial origin that is currently managed by DOE. The major contributors to this total include 81.6 MTU of Three Mile Island Unit 2 core debris, 23.6 MTU for Ft St. Vrain SNF (both in Colorado and Idaho), and 68.4MTU from other commercial sites (e.g., Surry, Ginna, and Robinson) used in various research and development programs. This fuel includes the SNF identified in RW-859 (end of 2002) as being in DOE possession. The current GC-859 survey (2013) did not include fuel transfer information.

The intact portion of this fuel is assumed to be transported and disposed in approximately six 21/44 PWR/BWR waste packages. The non-intact portion of this fuel will be loaded into standard canisters before shipment and disposal. The non intact portion is projected to generate 832 DOE standardized canisters. Table 2-7 provides a breakdown of the decay heat characteristics for all 838 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 canisters	Cumulative %
<50	797.3	95.1%
50 - 100	1.2	95.2%
100 - 220	1.8	95.5%
220 - 300	0.8	95.6%
300 - 500	3.0	95.9%
500 - 1000	25.9	99.0%
1000 - 1500	1.1	99.2%
1500 - 2000	0	99.2%
>2000	7.0	100.0%
Totals	**838**	

2.1.3 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]. Table 1-1 and Appendix F provide 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).

2.2 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 years of operation for existing reactors, when early shutdowns have not been announced.

2.2.1 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 20 shutdown NPRs and the 99 currently operating NPRs. Ninety-three of the 99 operating NPRs are assumed to have one 20 year life extension and will be decommissioned after 60 years of operation. The following operating NPRs have utility-announced early shutdown date as indicated:

- Pilgrim, 2019
- Oyster Creek, 2019
- Indian Point Unit 2, 2020
- Indian Point Unit 3, 2021
- Diablo Canyon Unit 1, 2024
- Diablo Canyon Unit 2, 2025

Applying these assumptions, the last nuclear generator finishes operations in 2075.

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 470,600 assemblies containing nearly 136,400 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 12/31/2017, and between 1/1/2018 and the end of the scenario, by major storage location category and by site Group. In addition to the categories previously detailed three additional categories are also included:

- Group A Sites that were shutdown prior to 2000 and at which there is no other ongoing nuclear operations (Subgroup A1). Table 2-11 and Figure 2-3 provides additional details on this category. This fuel (from 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.
- Early shutdown reactor fuel (from seven reactors) at five 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 2-4 provides the detailed inventory of each of these seven 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.

  - 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.
  - 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) and the inventory is based on the GC-859 database. 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 has an official shutdown date of December 29, 2014. The inventory estimate 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 2-5 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 2-6. These three reactors shutdown prior to 2000 and the quantities are based on the GC-859 database. The 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 ten reactors on nine sites that have only dry storage capabilities (A1), a single reactor (Crystal River) that currently only has fuel in wet storage (A3) [Editor's note: Crystal River started loading dry canisters in June 2017 and completed loading 39 canisters in January 2018 this loading campaign will be reflected in the next revision] and six reactors on four sites with fuel in both wet and dry storage (A2). All of the Group A sites that shutdown prior to 2000 are Subgroup A1 sites. The Subgroup A2 and A3 sites all shutdown after 2000 and will ultimately become A1 sites following pool de-inventory and reactor decommissioning. Likewise, the shutdown reactors at Group B sites and announced early shutdowns at Group B & C sites will evolve into a Subgroup A1 site with time. This fuel from each of these sites is expected to be migrated to dry storage, although the timetable for movement is uncertain, but expected to be complete for most of the sites prior to 2025. In the future, these categories could be combined. These additional plants will bring the total Group A site inventory to 40,293 assemblies containing approximately 12,554 MTU in 1,013 fuel casks.

Utilities announced Palisades and Three Mile Island (TMI) shutdowns during preparation of this revision and these will be reflected in the report body in the next revision. Appendix H was prepared to provide details on the impacts of tentative shutdowns at Palisades and TMI which are not reflected in other tables and appendix of this report. Assuming all the Group A categories are eventually combined as discussed in the paragraph above, the Group A total inventory increases to 44,035 assemblies containing approximately 14,204 MTU in 1,128 fuel casks.

Table 2-7 provides the reference scenario quantities at two points in time assuming an interim storage facility and/or repository is not available before 2045.

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 G provides additional congressional district and state detail for the reference scenario and also DOE managed SNF and HLW, see Section 3 for additional discussion of these DOE managed materials.

Table 2-9. Projected SNF Inventory at NPR sites and Morris for Reference Scenario by Reactor Type

	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/13 to 12/31/17		Forecast Discharges 1/1/18 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	103,470	44,835	16,222	7,115	84,120	37,097	203,812	89,048
BWR	136,442	24,281	21,701	3,831	108,679	19,202	266,822	47,314
Totals	**239,912**	**69,116**	**37,923**	**10,946**	**192,799**	**56,298**	**470,634**	**136,362**

Table 2-10. Projected SNF Inventory at NPR Sites and Morris for Reference Scenario by Site Group (Group Status as of 12/31/2017)

Description	Site Group	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2017		Forecast Discharges 1/1/2018 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 (89 Rx/53 Sites)*	C	190,926	55,029	33,528	9,714	182,956	53,468	407,410	118,210
Operating Reactors at Group C Sites with Announced Shutdown Date (4 Rx/3 Sites)	C	9,471	2,388	1,360	374	2,444	704	13,275	3,466
Operating Reactors at Group B Sites (6 Rx/3 Sites)	B	11,098	2,606	1,788	448	6,828	1,868	19,714	4,923
Operating Reactors at Group B Sites with Announced Shutdown Date (2 Rx/1 Site)	B	2,815	1,280	463	210	571	258	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 (7 Rx/5 Sites)	A	10,792	3,677	784	201	-	-	11,576	3,879
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**	**69,116**	**37,923**	**10,946**	**192,799**	**56,298**	**470,634**	**136,362**

* 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 2017				
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	0
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.

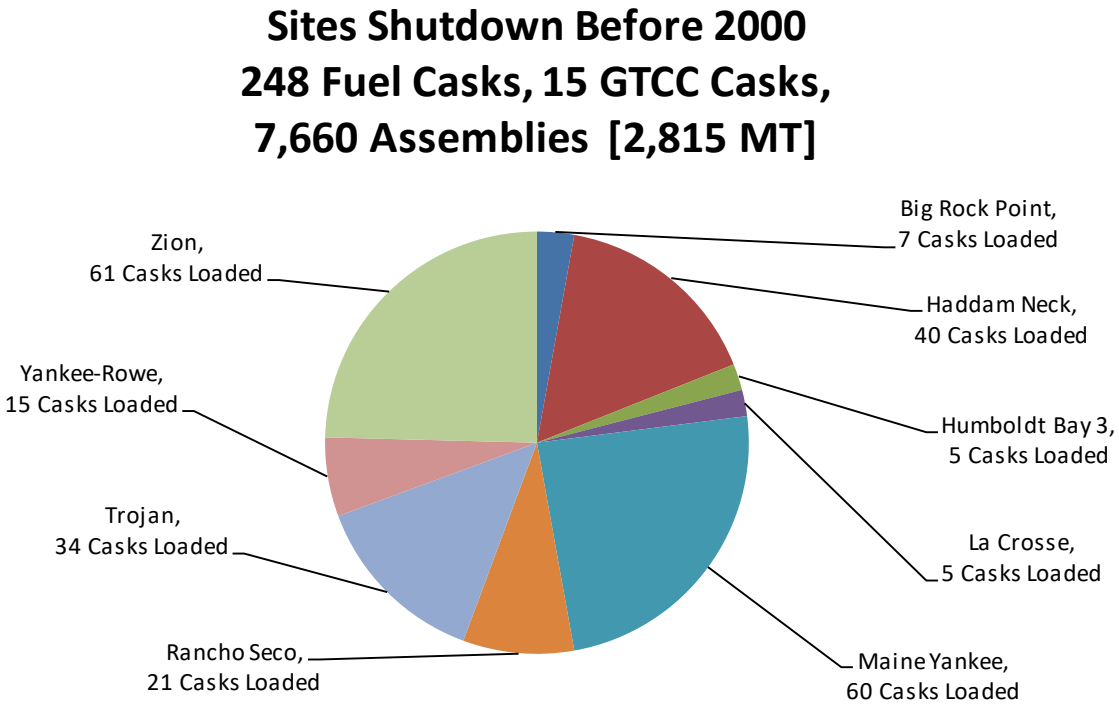

Figure 2-3. Dry SNF Storage at Group A Sites Shutdown Before 2000

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 12/31/2017		Total Projected Discharged Fuel through 12/31/2075†					
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	582.23	-	-	1,243	582.23	0	39	-	2
Fort Calhoun	10/24/2016	1,091	399.38	175	65.97	1,266	465.35	10	40	-	2
Kewaunee	5/7/2013	1,214	470.97	121	47.73	1,335	518.70	30	38	-	2
San Onofre 1	11/30/1992	395	146.20	-	-	395	146.20	-	-	1	1
San Onofre 2	6/12/2013	1,726	730.00	-	-	1,726	730.00	-	-	-	2
San Onofre 3	6/12/2013	1,734	732.61	-	-	1,734	732.61	-	-	-	2
San Onofre Totals**	-	3,855	1,608.82	-	-	3,855	1,608.82	50	123	1	5
Vermont Yankee	12/29/2014	3,389	615.97	488	87.69	3,877	703.66	13	58	0	2
Totals		**10,792**	**3,677.37**	**784**	**201.39**	**11,576**	**3,878.76**	**103**	**298**	**1**	**13**

† These inventory data reflect fuel assembly transfers.

* Crystal River 3 shutdown in 2013 (last operated in 2009). Crystal River completed dry cask loading of this SNF in January 2018 which will be reflected in the next revision.

** 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.

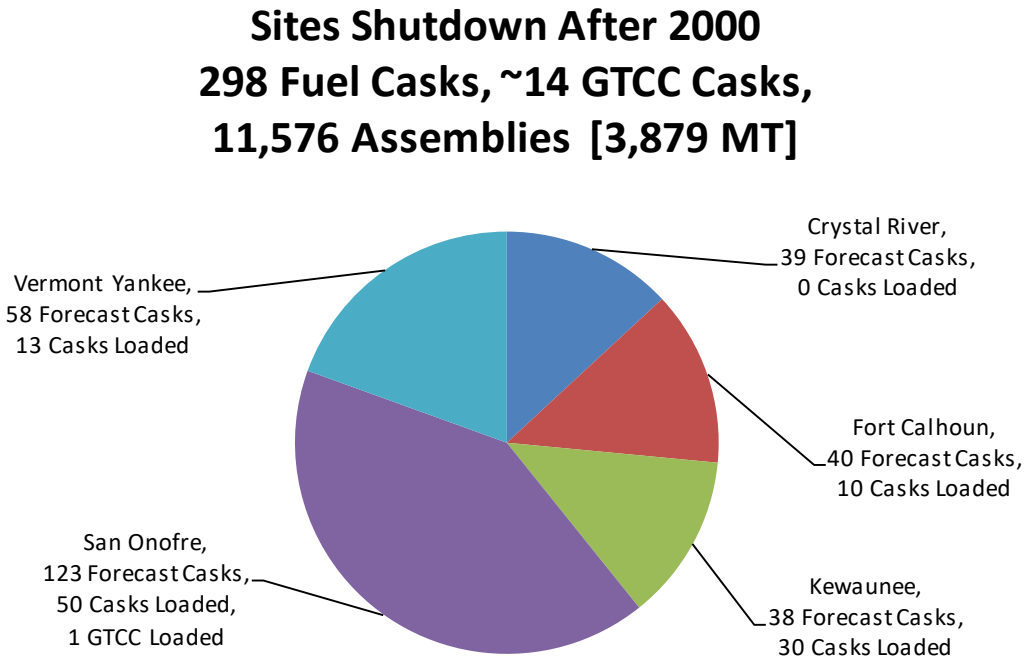

Figure 2-4. Dry SNF Storage at Group A Sites Shutdown After 2000

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 12/31/2017		Total Projected Discharged Fuel through 12/31/2075					
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*	
Diablo Canyon 1	11/2/2024	1,412	610	282	119	2,357	1,010	49	74	-	2
Diablo Canyon 2	8/26/2025	1,346	582	276	117	2,094	898	N/A	66	-	2
Indian Point 2	4/30/2020	1,517	688	180	81	1,980	897	36	62	-	2
Indian Point 3	4/30/2021	1,298	592	283	128	1,869	851	N/A	59	-	2
Oyster Creek	12/31/2019	3,644	649	338	58	4,711	832	27	78	-	2
Pilgrim	5/31/2019	3,069	547	464	80	4,113	726	8	61	-	2
Totals		**12,286**	**3,668**	**1,823**	**583**	**17,124**	**5,214**	**120**	**400**	**-**	**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.

[Editor's note: Utilities announced Palisades and Three Mile Island (TMI) shutdowns during preparation of this revision and these will be reflected in the report body in the next revision. Appendix H was prepared to provide details on the impacts of tentative shutdowns at Palisades and TMI which are not reflected in other tables and appendix of this report.]

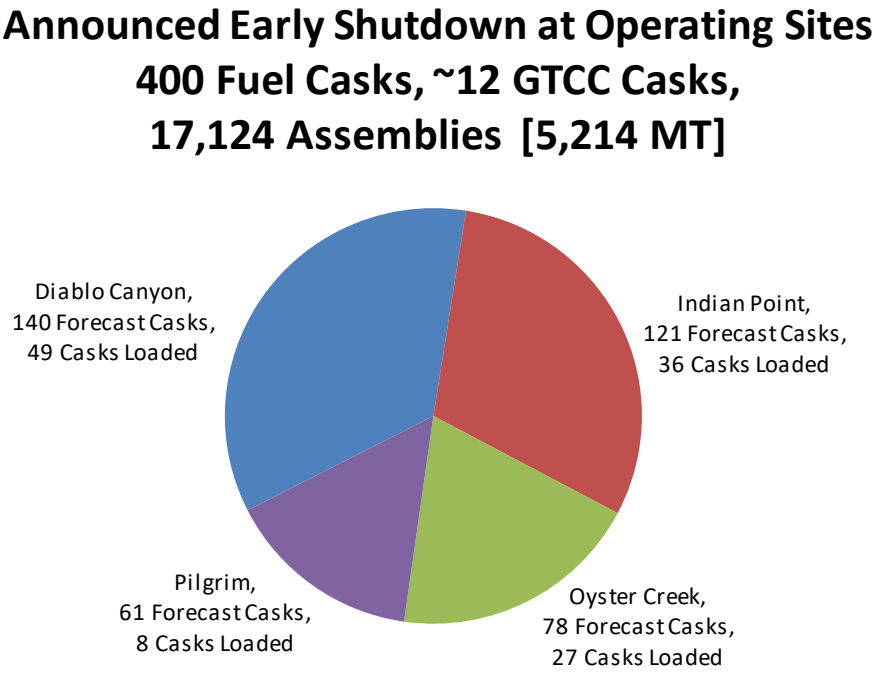

Figure 2-5. Dry SNF Storage at Group C Sites with Announced Early Shutdown Dates

[Editor's note: Utilities announced Palisades and Three Mile Island (TMI) shutdowns during preparation of this revision and these will be reflected in the report body in the next revision. Appendix H was prepared to provide details on the impacts of tentative shutdowns at Palisades and TMI which are not reflected in other tables and appendix of this report.]

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 2017					
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.

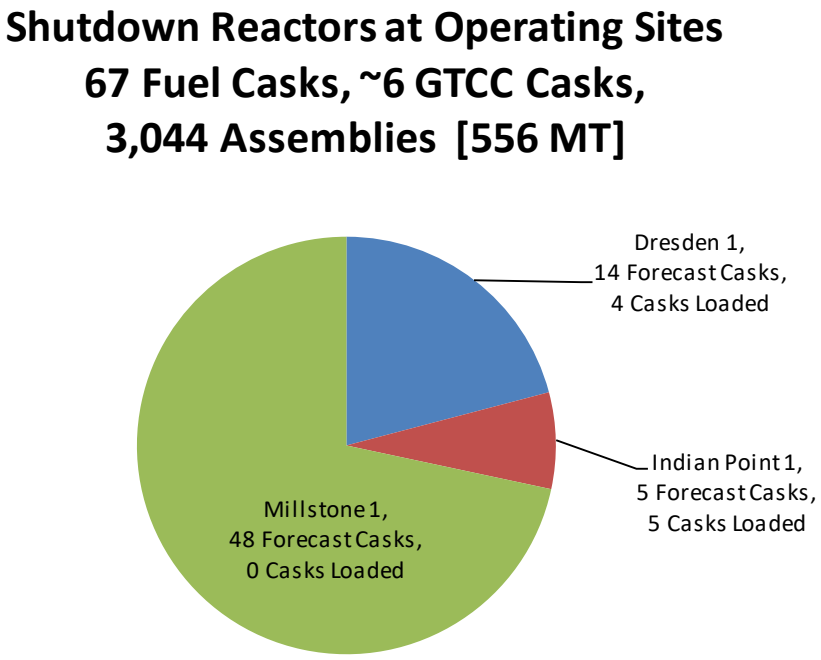

Figure 2-6. Dry SNF Storage from Shutdown Reactors at Group B Sites

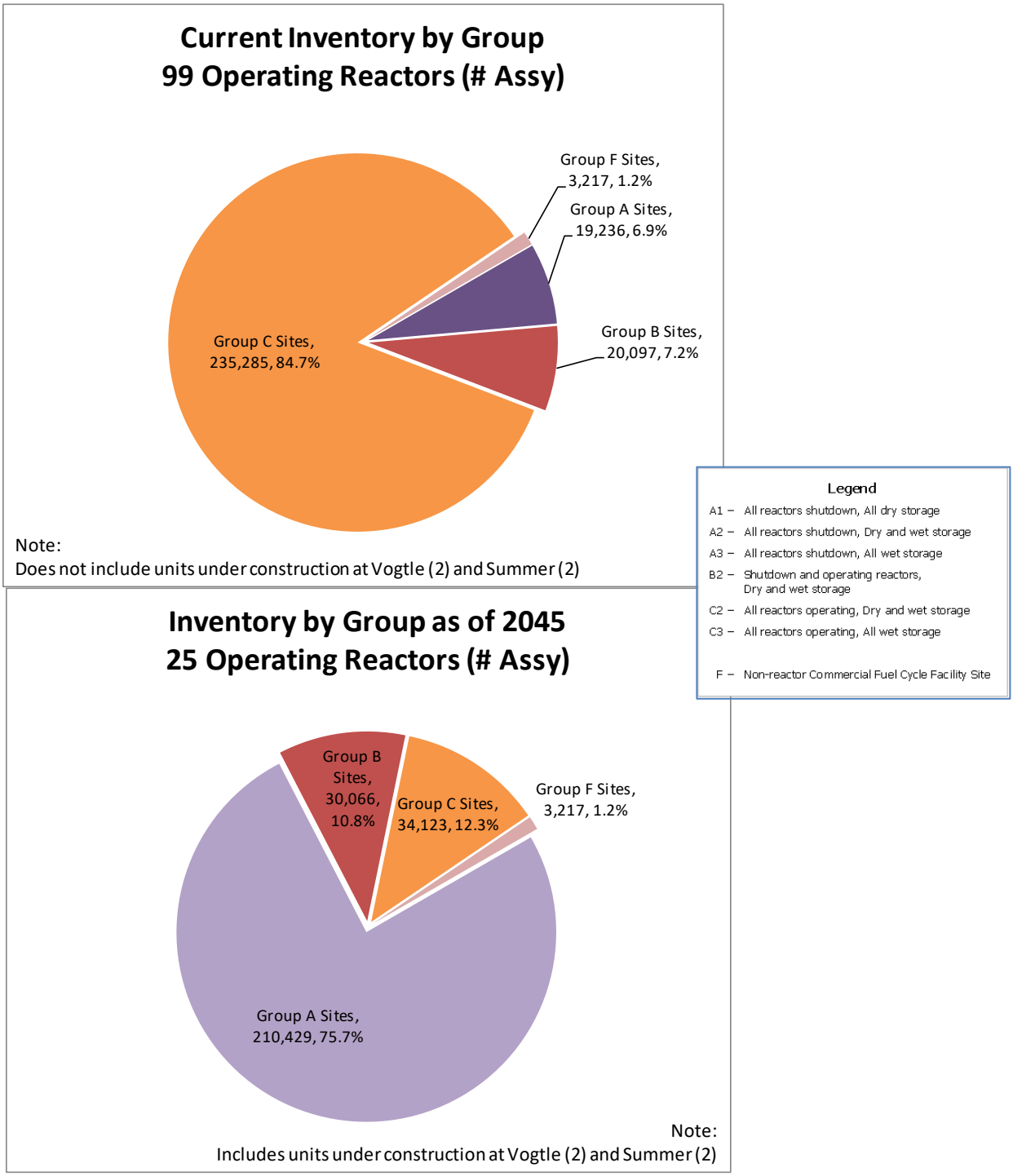

Figure 2-7. Projected Change in Distribution of Commercial Reactor SNF by Group with Time (without interim storage facility or repository available before 2045)

2.2.2 Alternative Scenario 1: Addition of 4 "New Builds"

Alternative Scenario 1 is based on the Reference Scenario with the addition of four "New Builds". This scenario has the same underlying assumptions that characterize the Reference Scenario with the additional assumption that four reactors that are currently under construction come online and begin discharging fuel over the next six years. For the purpose of the current revision to this report, these four reactors are assumed to operate for 60 years. These reactors include Vogtle, Units 3 & 4 and Summer, Units 2 & 3. [Editor's note: After preparation of this draft, Sumner Units 2 and 3 construction was suspended. This scenario will be revised in the next revision.] 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 12/31/2017, and between 1/1/2018 and the end of the scenario, by major storage location category and by site Group. One additional category beyond the Reference Scenario is included:

- "New Builds" includes four new reactors at two existing sites in Georgia and South Carolina. Table 2-17 provides details of the projected discharges from these reactors.

The scenario totals approximately 482,000 assemblies containing approximately 141,200 MTU. The assumptions in this scenario are projected to generate an additional 11,396 SNF assemblies and approximately 4,791 MTU beyond that of the Reference Scenario.

Table 2-15. Projected SNF Inventory at NPR sites and Morris for Alternative Scenario 1 by Reactor Type

	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/13 to 12/31/17		Forecast Discharges 1/1/18 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	103,470	44,835	16,222	7,115	95,516	41,887	215,208	93,839
BWR	136,442	24,281	21,701	3,831	108,679	19,202	266,822	47,314
Totals	**239,912**	**69,116**	**37,923**	**10,946**	**204,195**	**61,089**	**482,030**	**141,153**

Table 2-16. Projected SNF Inventory at NPR sites and Morris for Alternative Scenario 1 by Site Group (Group Status as of 12/31/2017)

Description	Site Group	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2017		Forecast Discharges 1/1/2018 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 (89 Rx/53 Sites)*	C	190,926	55,029	33,528	9,714	182,956	53,468	407,410	118,210
Operating Reactors at Group C Sites with Announced Shutdown Date (4 Rx/3 Sites)	C	9,471	2,388	1,360	374	2,444	704	13,275	3,466
Operating Reactors at Group B Sites (6 Rx/3 Sites)	B	11,098	2,606	1,788	448	6,828	1,868	19,714	4,923
Operating Reactors at Group B Sites with Announced Shutdown Date (2 Rx/1 Site)	B	2,815	1,280	463	210	571	258	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 (7 Rx/5 Sites)	A	10,792	3,677	784	201	-	-	11,576	3,879
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)		-	-	-	-	11,396	4,791	11,396	4,791
Totals		**239,912**	**69,116**	**37,923**	**10,946**	**204,195**	**61,089**	**482,030**	**141,153**

* 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 12/31/2017		Forecast Future Discharges 1/1/2018 to 12/31/2075		Total Projected Discharged Fuel	
		Assy.	Initial Uranium (MT)	Assy.	Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Initial Uranium (MT)
Vogtle 3	2019	-	-	-	-	3,219	1,362	3,219	1,362
Vogtle 4	2020	-	-	-	-	3,219	1,362	3,219	1,362
Summer 2	2019	-	-	-	-	2,479	1,034	2,479	1,034
Summer 3	2020	-	-	-	-	2,479	1,034	2,479	1,034
Totals		**-**	**-**	**-**	**-**	**11,396**	**4,791**	**11,396**	**4,791**

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

Alternative Scenario 2 is based on the assumption that all reactors are shutdown at the end of their current license period. This is in contrast to the assumption made for the Reference Scenario that 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 prior to 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 12/31/2017, and between 1/1/2018 and the end of the scenario, by major storage location category and by site Group. It should be noted that forecast discharges from the beginning of 2013 through 2017 for this scenario are higher than those for the Reference Scenario due to the assumed shutdown of Indian Point Units 2 & 3 in 2017. These two reactors are currently undergoing license renewal.

The scenario totals approximately 427,000 assemblies containing approximately 123,800 MTU. The assumptions in this scenario are projected to result in a reduction of 44,011 SNF assemblies, totaling 12,591 MTU less than the projections of the Reference Scenario.

Table 2-18. Projected SNF Inventory at NPR sites and Morris for Alternative Scenario 2 by Reactor Type

	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/13 to 12/31/17		Forecast Discharges 1/1/18 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	103,470	44,835	16,513	7,247	65,955	29,017	185,938	81,099
BWR	136,442	24,281	21,701	3,831	82,542	14,559	240,685	42,671
Totals	**239,912**	**69,116**	**38,214**	**11,078**	**148,497**	**43,575**	**426,623**	**123,769**

Table 2-19. Projected SNF Inventory at NPR sites and Morris for Alternative Scenario 2 by Site Group (Group Status as of 12/31/2017)

Description	Site Group	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2017		Forecast Discharges 1/1/2018 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 (89 Rx/53 Sites)*	C	190,926	55,029	33,528	9,714	139,225	41,003	363,679	105,746
Operating Reactors at Group C Sites with Announced Shutdown Date (4 Rx/3 Sites)	C	9,471	2,388	1,360	374	2,444	704	13,275	3,466
Operating Reactors at Group B Sites (6 Rx/3 Sites)	B	11,098	2,606	1,788	448	6,828	1,868	19,714	4,923
Operating Reactors at Group B Sites with Announced Shutdown Date (2 Rx/1 Site)	B	2,815	1,280	754	341	-	-	3,569	1,621
Shutdown Reactors at Group B Sites (3 Rx/3 Sites)	B	3,933	647	-	-	-	-	3,933	647
Reactors Shutdown Since 2000 (7 Rx/5 Sites)	A	10,792	3,677	784	201	-	-	11,576	3,879
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**	**69,116**	**38,214**	**11,078**	**148,497**	**43,575**	**426,623**	**123,769**

* Excludes reactors with announced early shutdowns.

2.2.4 Alternative Scenario 3: Shutdown of 3 "Most Challenging" Sites Scenario

Alternative Scenario 3 is based on the Reference Scenario with the additional assumption that three of the "Most Challenging" reactor sites (three reactors) are shutdown by 2024. In July of 2013, Mark Cooper, Senior Fellow for Economic Analysis at the Institute for Energy and the Environment at the Vermont Law School published an analysis detailing the economic, operational, performance, and political issues facing the existing fleet of U.S. nuclear power reactors. The author identified twelve reactor sites that had a number of factors that indicated an increased risk of being shutdown before the ends of their current license periods. This list included Indian Point, Oyster Creek, and Pilgrim, which have already indicated an early shutdown date, and Vermont Yankee and Fort Calhoun, which are currently shutdown.

In November of 2013, Jeff McMahon, a contributing author for Forbes published the results of a similar, but less comprehensive analysis of the U.S. reactor fleet in which six reactor sites were identified as being at risk. Table 2-20 provides the lists published in the two articles. For the purpose of the current alternative scenario, it is assumed that those sites with announced early shutdowns and the three sites listed in both the Forbes article and the Cooper report are shutdown by 2024 or as announced. Because of the announced early shutdown of Indian Point Units 1 & 2, the sites affected by this scenario are shaded blue in Table 2-20 and include three reactors at three sites (Davis Besse, Fitzpatrick, and Ginna).

Table 2-20. List of "Most Challenging" Sites

Forbes (J. McMahon)	Renaissance in Reverse (M. Cooper)	
Indian Point (2021)*	Palisades	Millstone (two units)
Ginna*	Ft. Calhoun (shutdown in 2016)	Clinton
TMI	Nine Mile Point (two units)	Indian Point (2021)*
Fitzpatrick*	Fitzpatrick*	Davis Besse*
Davis Besse*	Ginna*	Pilgrim (mid 2019)*
Pilgrim (mid 2019)*	Oyster Creek (2019)	Vt. Yankee (shutdown in 2014)

* Indicates sites that are represented in multiple lists.

Table 2-21 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 except for reactors for which the actual discharges are known.

Table 2-22 provides the scenario inventory detailed to provide actual discharges through December 31, 2012 from the GC-859 data set and the projected quantities between 1/1/2013 and 12/31/2017, and between 1/1/2018 and the end of the scenario, by major storage location category and by site Group.

The scenario totals nearly 468,700 assemblies containing approximately 136,000 MTU. The assumptions in this scenario are projected to result in a reduction of 1,902 SNF assemblies, totaling 532 MTU less than the projections of the Reference Scenario.

Table 2-21. Projected SNF Inventory at NPR Sites and Morris for Alternative Scenario 3 by Reactor Type

	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/13 to 12/31/17		Forecast Discharges 1/1/18 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	103,470	44,835	16,222	7,115	83,418	36,780	203,110	88,730
BWR	136,442	24,281	21,701	3,831	107,479	18,986	265,622	47,098
Totals	**239,912**	**69,116**	**37,923**	**10,946**	**190,897**	**55,766**	**468,732**	**135,828**

Table 2-22. Projected SNF Inventory at NPR Sites and Morris for Alternative Scenario 3 by Site Group (Group Status as of 12/31/2017)

Description	Site Group	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2017		Forecast Discharges 1/1/2018 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 (89 Rx/53 Sites)*	C	190,926	55,029	33,528	9,714	181,054	52,936	405,508	117,678
Operating Reactors at Group C Sites with Announced Shutdown Date (4 Rx/3 Sites)	C	9,471	2,388	1,360	374	2,444	704	13,275	3,466
Operating Reactors at Group B Sites (6 Rx/3 Sites)	B	11,098	2,606	1,788	448	6,828	1,868	19,714	4,923
Operating Reactors at Group B Sites with Announced Shutdown Date (2 Rx/1 Site)	B	2,815	1,280	463	210	571	258	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 (7 Rx/5 Sites)	A	10,792	3,677	784	201	0	0	11,576	3,879
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**	**69,116**	**37,923**	**10,946**	**190,897**	**55,766**	**468,732**	**135,828**

* Excludes reactors with announced early shutdowns.

2.2.5 Alternative Scenario 4: Shutdown of 8 "Most Challenging" Sites Scenario

Alternative Scenario 4 is based on the Reference Scenario with the additional assumption that eight of the "Most Challenging" reactor sites are shutdown by 2024. This is an extension of Alternative Scenario 3 with the additional early shutdown of seven reactors at five sites. Based on the Forbes article and the Cooper report, discussed previously, five sites (in addition to the three sites included in the Alternative Scenario 3) are assumed to be shutdown by 2024. The sites affected by this scenario are shaded blue in Table 2-23 and include three reactors at the three sites assumed to have shutdown early in Alternative Scenario 3 (Davis Besse, Fitzpatrick, and Ginna). An additional seven reactors at five sites (Clinton, Millstone, Nine Mile Point, Palisades, and TMI) are included in this scenario. This makes the scenario consider the closure of ten reactors at eight sites.

Table 2-23. List of "Most Challenging" Sites

Forbes (J. McMahon)	Renaissance in Reverse (M. Cooper)	
Indian Point (2021)*	Palisades	Millstone (two units)
Ginna*	Ft. Calhoun (shutdown in 2016)	Clinton
TMI	Nine Mile Point (two units)	Indian Point (2021)*
Fitzpatrick*	Fitzpatrick*	Davis Besse*
Davis Besse*	Ginna*	Pilgrim (mid 2019)*
Pilgrim (mid 2019)*	Oyster Creek (2019)	Vt. Yankee (late 2014)

* Indicates sites that are represented in multiple lists.

Table 2-24 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 except for reactors for which the actual discharges are known.

Table 2-25 provides the scenario inventory detailed to provide actual discharges through December 31, 2012 from the GC-859 data set and the projected quantities between 1/1/2013 and 12/31/2017, and between 1/1/2018 and the end of the scenario, by major storage location category and by site Group.

The scenario totals approximately 459,500 assemblies containing nearly 133,600 MTU. The assumptions in this scenario are projected to result in a reduction of 11,393 SNF assemblies, totaling 2,856 MTU less than the projections of the Reference Scenario.

Table 2-24. Projected SNF Inventory at NPR sites and Morris for Alternative Scenario 4 by Reactor Type

	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/13 to 12/31/17		Forecast Discharges 1/1/18 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	103,470	44,835	16,222	7,115	80,983	35,694	200,675	87,644
BWR	136,442	24,281	21,701	3,831	100,423	17,748	258,566	45,860
Totals	**239,912**	**69,116**	**37,923**	**10,946**	**181,406**	**53,442**	**459,241**	**133,504**

Table 2-25. Projected SNF Inventory at NPR sites and Morris for Alternative Scenario 4 by Site Group (Group Status as of 12/31/2017)

Description	Site Group	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2017		Forecast Discharges 1/1/2018 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 (89 Rx/53 Sites)*	C	190,926	55,029	33,528	9,714	173,268	51,363	397,722	116,105
Operating Reactors at Group C Sites with Announced Shutdown Date (4 Rx/3 Sites)	C	9,471	2,388	1,360	374	2,444	704	13,275	3,466
Operating Reactors at Group B Sites (6 Rx/3 Sites)	B	11,098	2,606	1,788	448	5,123	1,117	18,009	4,172
Operating Reactors at Group B Sites with Announced Shutdown Date (2 Rx/1 Site)	B	2,815	1,280	463	210	571	258	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 (7 Rx/5 Sites)	A	10,792	3,677	784	201	0	0	11,576	3,879
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**	**69,116**	**37,923**	**10,946**	**181,406**	**53,442**	**459,241**	**133,504**

* Excludes reactors with announced early shutdowns.

2.2.6 Scenario Comparison Summary

The methods described previously have been extended to provide the forecast inventory based on a number of scenarios. Four alternative scenarios, in addition to the Reference Scenario have been included in the current report. A summary and comparison table is provided in Table 2-26 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 nearly 45,000 assemblies (~13,000 MTU), in the case where all reactors shutdown after their current license period, to an increase of approximately 11,400 assemblies (~4,800 MTU), in the case where the four new reactors are added to the fleet and the operating reactors obtain their 20-years license extension.

Table 2-26. Summary Table of Projected SNF Inventory at NPR Sites and Morris for Reference and Alternative Scenarios

Scenario	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2017		Forecast Future Discharges 1/1/2018 to 12/31/2075		Total Projected Discharged Fuel		Delta from Reference	
	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	**239,912**	**69,116**	37,923	10,946	192,799	56,298	470,634	136,362	-	-
Scenario 1 Addition of 4 New Builds	**239,912**	**69,116**	37,923	10,946	204,195	61,089	482,030	141,153	11,396	4,791
Scenario 2 Shutdown at end of Current License Period	**239,912**	**69,116**	38,214	11,078	148,497	43,575	426,623	123,769	(44,011)	(12,591)
Scenario 3 3 “Most Challenging” Shutdown by 2024	**239,912**	**69,116**	37,923	10,946	190,897	55,766	468,732	135,828	(1,902)	(532)
Scenario 4 8 “Most Challenging” Shutdown by 2024	**239,912**	**69,116**	37,923	10,946	181,406	53,442	459,241	133,504	(11,393)	(2,856)

2.3 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 of the SNF in their pools. At these facilities, above ground dry storage systems are utilized to store the SNF. As more facilities run out of pool storage the amount of dry storage is increasing. As of May 2, 2017, 2,472 dry storage fuel casks have been loaded at commercial reactor sites containing 102,552 assemblies (~30,000 MT) of SNF (Table 2-6 and Appendix B). An additional six casks are currently stored on the cask pad and two casks containing SNF from West Valley 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.

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 Crystal River and Millstone 1, all the reactor sites listed in these tables have implemented a dry storage system. Crystal River is in the planning stages for dry fuel storage and is currently planning to use the TransNuclear system indicated, although this is subject to change. [Editor's note: Crystal River completed loading 39 canisters in January 2018 after preparation of this report. This will be reflected in the next revision.] 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.

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 10/31/2017. None fabricated
Haddam Neck	PWR	05/2004-03/2005	NAC-MPC/CY-MPC (26 Assy) canister	NAC-STC (Docket No. 71-9235); Certificate expires 5/31/2019. 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 4/30/2019. 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 5/31/2019. 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 10/31/2017. 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 11/30/2018. 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 4/30/2019. 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 05/31/2019. Foreign use versions fabricated
Zion 1 & 2	PWR	2013-2016	NAC MAGNASTOR/TSC 37 canister	NAC MAGNATRAN (Docket No. 71-9356); License under review. None 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 8/31/2017. One unit started fabrication which was subsequently halted.
Fort Calhoun	PWR	2006-??	TransNuclear, Standardized NUHOMS 32PT-S100 storage canister, in a Horizontal Concrete Overpack	TN MP197 (Docket No. 71-9302); Certificate expires 8/31/2017. 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 has implemented a change in storage system to the NAC MAGNASTOR 37 PWR assembly canister	TN MP197HB (Docket No. 71-9302); Certificate expires 8/31/2017. One unit started fabrication which was subsequently halted. NAC MAGNATRAN (Docket 71-9356) license under review
San Onofre	PWR	2003-??	TransNuclear, Advanced NUHOMS 24PT1 and 24 PT4 storage canister, in a Horizontal Concrete Overpack SONGS has implemented a change in storage system to the Holtec UMAX MPC-37 canister	NUHOMS MP187 (Docket No. 71-9255); Certificate expires 11/30/2018. One cask fabricated. No impact limiters. TN MP197HB (Docket No. 71-9302); Certificate expires 8/31/2017. One unit started fabrication which was subsequently halted. HI-STAR 190 application under review.
Vermont Yankee	BWR	2008-??	HI-STORM 100 Vertical Concrete Storage Cask containing MPC-68 DSC canisters	HI-STAR 100 (Docket No. 71-9261) Certificate expires 4/30/2019. 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 4/30/2019. 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 4/30/2019. No impact limiters fabricated
Millstone 1	BWR	N/A	All BWR fuel at the Millstone is currently in pool storage. For planning purposes, we have assumed 61 assemblies per canister.	N/A

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

2.4 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 2-8 to 2-11 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**

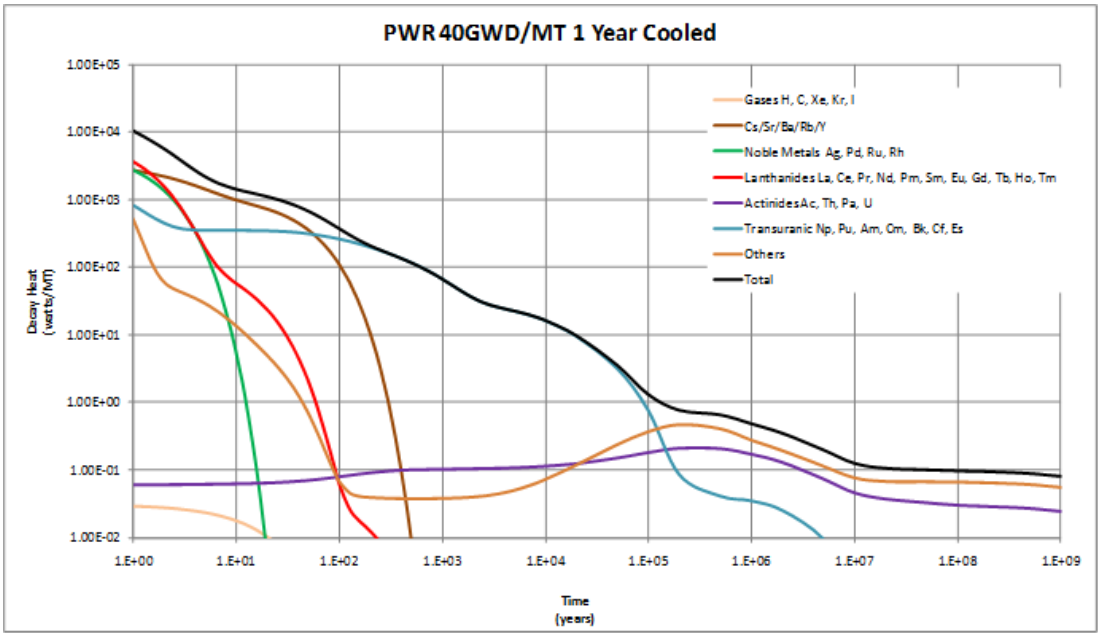

Figure 2-8. PWR 40 GWd/MT Spent Fuel Decay Heat.

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**

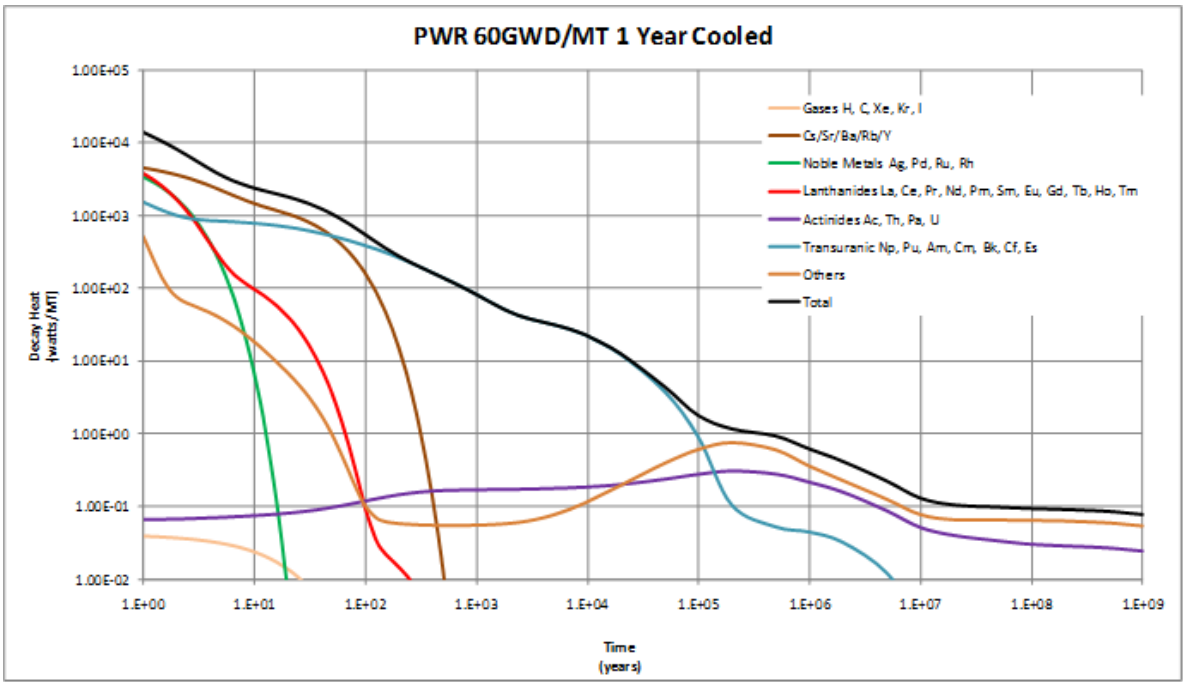

Figure 2-9. PWR 60 GWd/MT Spent Fuel Decay Heat.

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**

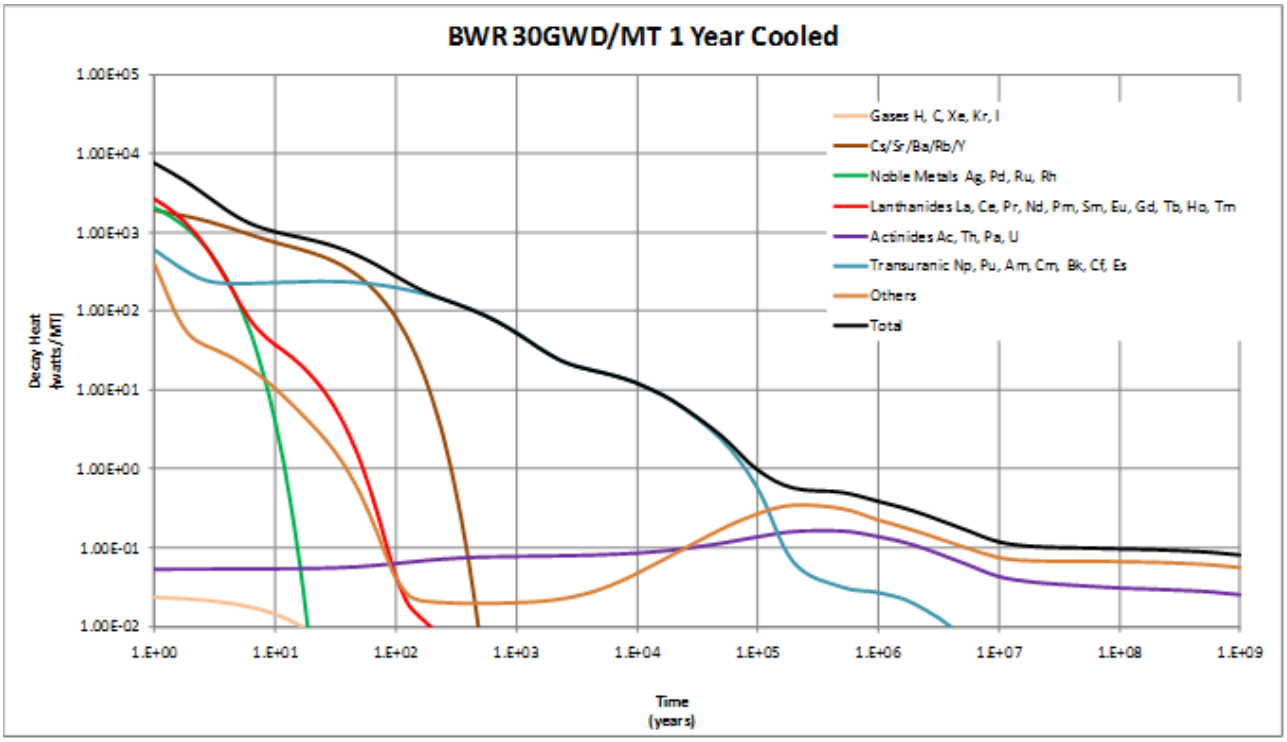

Figure 2-10. BWR 30 GWd/MT Spent Fuel Decay Heat.

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**

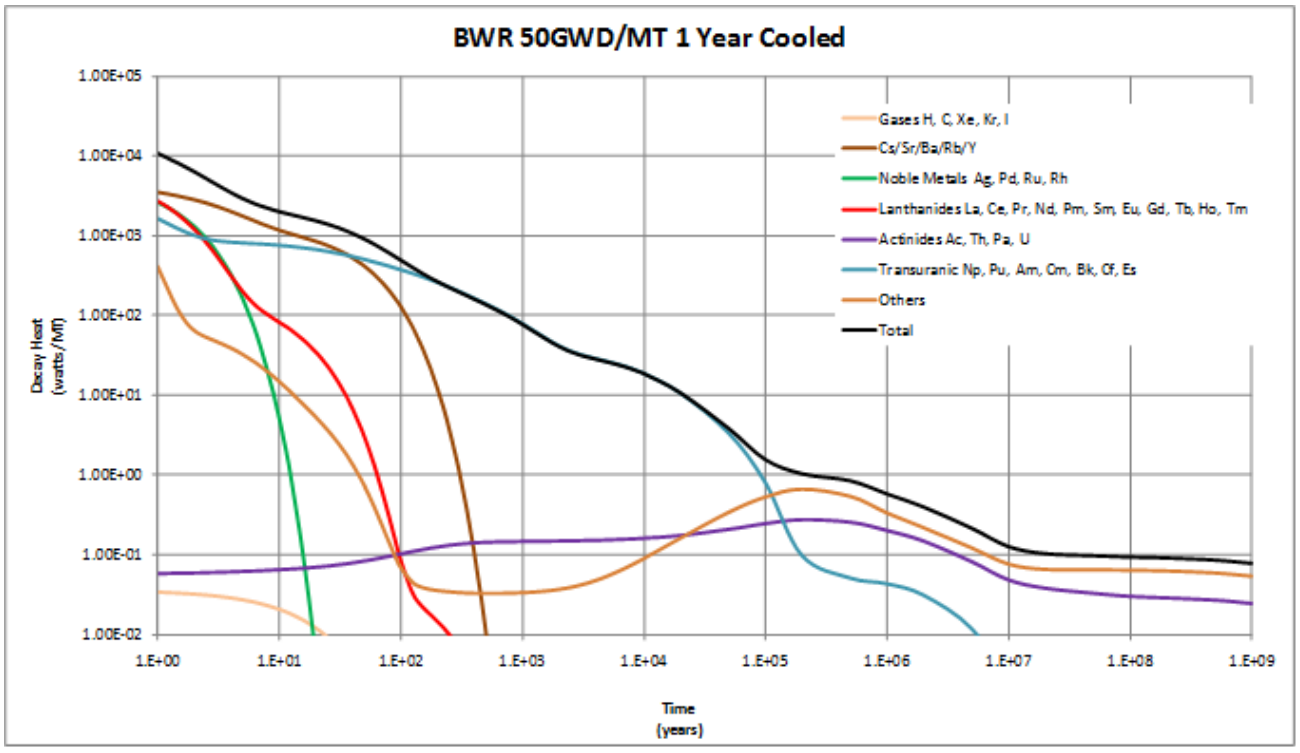

Figure 2-11. BWR 50 GWd/MT Spent Fuel Decay Heat.

3. Government-Managed SNF and DOE HLW

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 DOE SNF has occurred at the Hanford Site, the INL, and the SRS. The INL is pursuing the use of electro-chemical processing to treat up to 60 MTHM of sodium bonded SNF.

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

- DOE SNF
- Navy SNF
- DOE HLW from fuel processing in liquid and dry waste forms, including glass logs in canisters

3.1 DOE 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. DOE SNF generated in production reactors supported weapons 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. 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 Idaho National Laboratory. 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 DOE 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, 2018]. The current total inventory of DOE SNF is approximately 2,459 MTHM. This inventory in the SFD does not include any Naval spent nuclear fuel (see section 3.2) but does include approximately 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 16 MTHM) and there is some uncertainty as to the total amount that will be generated or received.

DOE 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 230,000) of fuel pieces or assemblies, which range from a large number of 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 DOE SNF. The DOE SNF inventory was reduced to 34 DOE SNF 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 DOE SNF in the 34 groups.

3.1.2 DOE 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 DOE 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, 2018], the total estimated nominal radionuclide inventory for all of the DOE SNF is 130 million Ci for the year 2030. The estimated bounding radionuclide inventory is 250 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 DOE SNF Storage/Canisters

Although DOE SNF is stored throughout the U.S. at numerous facilities, a decision was made in 1995 to consolidate DOE SNF at three existing DOE sites; Hanford Site in Washington (2,129 MT), the INL in Idaho (280 MT), and the SRS in South Carolina (29 MT). The vast majority of DOE 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 DOE SNF, a standardized disposal canister design was developed which included canisters of 18 and 24 inch diameter and 10 and 15 feet length. 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 3,462. 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 DOE SNF canisters based on the 2030 nominal decay heat using the 3,462 nominal total canister count. Table 3-1 provides detail for the DOE defense production reactor, DOE research reactor, DOE domestic and foreign research reactor SNF returns (see Section 4) and SNF from commercial reactors (section 2.1.2) The 2030 data indicate approximately 50% of the DOE SNF canisters will be generating decay heat of less than 100 watts. Nearly 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. DOE Spent Nuclear Fuel* Canister Decay Heat in 2030 [NSNFP, 2018]

	DOE Production Reactor, Test Reactor and Foreign and Domestic Research Reactor SNF		Commercial Power Reactor SNF managed by DOE**		Total DOE Managed SNF	
Decay heat per canister (watts)	**Number of canisters**	**Cumulative %**	**Number of canisters**	**Cumulative %**	**Number of canisters**	**Cumulative %**
<50	973.5	37.1%	797.3	95.1%	1,770.8	51.1%
50 - 100	306.5	48.8%	1.2	95.2%	307.7	60.0%
100 - 220	695.2	75.3%	1.8	95.5%	697.0	80.2%
220 - 300	509.3	94.7%	0.8	95.6%	510.1	94.9%
300 - 500	108.8	98.8%	3.0	95.9%	111.8	98.1%
500 - 1000	16.8	99.5%	25.9	99.0%	42.7	99.4%
1000 - 1500	2.6	99.8%	1.1	99.2%	3.7	99.5%
1500 - 2000	5.1	100.0%	0.0	99.2%	5.1	99.6%
>2000	6.6	100.0%	7.0	100.0%	13.6	100.0%
Total	**2,624**		**838**		**3,462**	

* Does not include materials planned for reprocessing

** Includes Fuel from some commercial reactors in Table 2-1, Three Miles Island Unit 2 debris, and Ft. St. Vrain

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.[a]

[a] Before using the information in this section for studies involving naval SNF, contact the NNPP Program Manager, Navy Spent Nuclear Fuel at (202) 781-6214.

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 30.4 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*

Three different methods for packaging naval SNF into naval SNF canisters have been developed; however, the design of the naval SNF canister is the same irrespective of packaging method. These packaging methods are based on the type of naval SNF assemblies and whether the naval SNF cladding is intact or non-intact. Each naval SNF canister would be loaded such that thermal, shielding, criticality, and other characteristics of the received waste would 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). With the exception of length, the other characteristics of 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 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 June 1, 2017, 137 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]

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 DOE High-Level Radioactive Waste

High-level radioactive waste 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. Following aqueous reprocessing, HLW is in a liquid form and historically has been stored in underground metal storage tanks. Long term storage of HLW 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 HLW 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. HLW canisters have a nominal diameter of 2 feet and have heights of 10 or 15 feet. Calcination of HLW 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 pursuing the use of 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 HLW. The HLW 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 DOE HLW Inventory

The source of inventory data for this study is information collected by the Department's OCRWM [DOE, 2008] as modified by recent site treatment plans. [DOE, 2017; Chew, 2016]

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 HLW. Between 1960 and 1997, the INL converted all of their liquid HLW 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.

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 HLW. Through evaporation and vitrification of the waste, SRS has reduced this inventory to the current level about 136,000 m^3 of liquid HLW. [Chew, 2016] SRS began vitrifying liquid HLW in 1996 and through December 31, 2017 has produced 4,162 HLW 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 HLW 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 HLW inventory.

Table 3-3. Current High-Level Waste Inventory

Site	HLW Canisters[1]	Liquid HLW[2] (m^3)	Dry HLW[3] (m^3)
Hanford	N/A	220,000	N/A
INL	N/A	N/A	4,400
SRS	4,162[4]	136,000	N/A

1. Vitrified HLW in stainless steel canisters.
2. HLW stored in tanks.
3. Calcined HLW stored in bins.
4. Produced through December 31, 2017.

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, approximately 109 million curies (as of 8/8/06) [Fact Sheet, 2006]. Table 3-4 provides the capsule inventory broken down by decay heat load. Decay heat continues to decrease and as of February 2014 the total decay heat has been reduced to approximately 98M Ci [CHPRC-00248] with decay continuing to 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 and screened out was conversion to glass. In this scenario, the capsule contents have potential to generate an additional 340 HLW glass 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 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 based on the 2006 Factsheet

	Cs Capsules		Sr Capsules		Total Capsules	
Decay heat per canister (watts)	**Number of canisters**	**Cumulative %**	**Number of canisters**	**Cumulative %**	**Number of canisters**	**Cumulative %**
<50	4	0.3%	43	7.2%	47	2.4%
50 - 100	12	1.2%	107	25.0%	119	8.6%
100 - 200	1,319	100.0%	240	64.9%	1,559	89.1%
200 - 300	-	100.0%	122	85.2%	122	95.4%
300 - 500	-	100.0%	89	100.0%	89	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)	**178,299**		**107,121**		**285,419**	

3.3.2 Projected DOE HLW Inventory

SRS currently has the only operating reprocessing facility in the United States, H Canyon. It is estimated that an additional 17,000 m^3 of liquid HLW may be generated with continued canyon operations (approximately 2019).

The projected number of HLW 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 HLW 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 HLW in a packaged configuration. A total of 4,162 canisters have been produced through December 31, 2017. 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 the on radionuclide composition of the HLW inventory remaining in the liquid waste storage tanks. The radionuclide and resulting decay heat was 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 20 Case 2 which assumes a Salt Waste Processing Facility start-up date of January 2021.

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: 35% 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	2,908	35.6%
50 - 100	476	41.4%
100 - 200	3,878	88.8%
200 - 300	578	95.9%
300 - 500	330	100.0%
500 - 1000	0	100.0%
1000 - 1500	0	100.0%
1500 - 2000	0	100.0%
>2000	0	100.0%
Totals	**8,170**	
Total Decay Heat (watts)	**804,560**	

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 (to be disposed at WIPP). 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 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[b]) 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.

Decay heat of DOE HLW that has been calcined and is 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. Report 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.

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

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 by 2017.

Table 3-7 shows the estimated number of HLW canisters to be produced. The current best estimate and a potential range are provided. [Marcinowski memo to Kouts, 2008; EIS, 2002; see also Chew, 2013, 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 High-Level Waste Canisters

	HLW Canisters[1] Best Estimate	HLW 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	8,170	8,000 - 8,300
Totals	**19,772**	**~16,500 - ~83,200[2]**

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

2. Rounded to nearest 100 canisters

3.3.3 DOE HLW Radionuclide Inventory

DOE Managed Waste [Wilson, 2016 Appendix B] lists the total HLW 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. 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 HLW 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 HLW 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 F-3. [Carter, 2013]

3.3.4 DOE HLW Storage

The HLW vitrified glass at SRS is stored in below grade concrete vaults, called Glass Waste Storage Buildings (GWSB), containing support frames for vertical storage of 2,262 HLW 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.

The HLW canisters at West Valley have been moved from a shielded cell in the former reprocessing plant to outside cask storage.

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 three DOE research reactors; the Advanced Test Reactor (ATR) and the Transient Reactor Test (TREAT) Facility at Idaho National Laboratory (INL) and the High Flux Isotope Reactor (HFIR) at Oak Ridge National Laboratory (ORNL). 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 G, the listing by state and congressional district and the state-by-state maps, respectively.

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Appendix A
Commercial Nuclear Fuel Characteristics

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

Table A-1 (continued).

Assembly Class	Array Size	Manufacturer Code	Version	Assembly Code	Length (in.)	Width (in.)	Clad Material
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
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

Table A-1 (continued).

Assembly Class	Array Size	Manufacturer Code	Version	Assembly Code	Length (in.)	Width (in.)	Clad Material
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
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
	not available	AREVA	not available	ATRIUM10	176.2	5.44	Zircaloy-2

Table A-2 (continued).

Assembly Class	Array Size	Manufacturer Code	Version	Assembly Code	Length (in.)	Width (in.)	Clad Material
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

Table A-2 (continued).

Assembly Class	Array Size	Manufacturer Code	Version	Assembly Code	Length (in.)	Width (in.)	Clad Material
Dresden-1	6 × 6	ANF	ANF	XDR06A	134.4	4.28	Zircaloy-2
		GE	GE	XDR06G	134.4	4.28	Zircaloy-2
	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 (MW/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
BWR	GE	G2307G3	187.419	189.105	1.96	2.41	2.60	25,420	38,861

Table A-3 (continued).

Reactor Type	Manufacturer Code	Assembly Code	Initial Uranium Loading (kg/assembly)		Enrichment (U^{235} wt %)			Burnup (MW/MTU)	
			Avg.	Max.	Min.	Avg.	Max.	Avg.	Max.
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
BWR	GE	G4609G13	171.417	172.912	3.24	3.85	4.17	42,045	53,636

Table A-3 (continued).

Reactor Type	Manufacturer Code	Assembly Code	Initial Uranium Loading (kg/assembly)		Enrichment (U^{235} wt %)			Burnup (MW/MTU)	
			Avg.	Max.	Min.	Avg.	Max.	Avg.	Max.
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
PWR	ANF	XFC14A	353.345	358.811	3.50	3.57	3.80	37,205	46,048

Table A-3 (continued).

Reactor Type	Manufacturer Code	Assembly Code	Initial Uranium Loading (kg/assembly)		Enrichment (U^{235} wt %)			Burnup (MW/MTU)	
			Avg.	Max.	Min.	Avg.	Max.	Avg.	Max.
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
PWR	CE	XPA15C	412.442	416.780	1.65	2.47	3.06	16,020	33,630

Table A-3 (continued).

Reactor Type	Manufacturer Code	Assembly Code	Initial Uranium Loading (kg/assembly)		Enrichment (U^{235} wt %)			Burnup (MW/MTU)	
			Avg.	Max.	Min.	Avg.	Max.	Avg.	Max.
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
PWR	WE	W1717WVJ	461.518	465.200	3.71	3.99	4.40	43,922	46,847

Table A-3 (continued).

Reactor Type	Manufacturer Code	Assembly Code	Initial Uranium Loading (kg/assembly)		Enrichment (U^{235} wt %)			Burnup (MW/MTU)	
			Avg.	Max.	Min.	Avg.	Max.	Avg.	Max.
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

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Appendix B
December 2017 Projected Inventory by Reactor

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

	Dry Inventory 5/2/2017			Pool Inventory		Site Inventory 12/31/2017	
Reactor	**Assy.**	**Initial Uranium (MT)**	**Fuel Casks**	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**
Arkansas Nuclear One (2)	2,096	924	79	1,442	636	3,538	1,560
Beaver Valley Power Station (2)	148	68	4	2,550	1,178	2,698	1,246
Braidwood Station (2)	576	242	18	2,718	1,143	3,294	1,386
Browns Ferry Nuclear Plant (3)	4,751	858	64	7,837	1,415	12,588	2,273
Brunswick Steam Electric Plant (2)	1,708	340	28	2,526	503	4,234	843
Byron Station (2)	832	350	26	2,726	1,148	3,558	1,498
Callaway Plant (1)	222	94	6	1,786	756	2,008	850
Calvert Cliffs Nuclear Power Plant (2)	2,208	865	81	1,517	594	3,725	1,459
Catawba Nuclear Station (2)	946	423	34	2,339	1,046	3,285	1,468
Clinton Power Station (1)	534	96	6	3,314	598	3,848	694
Columbia Generating Station (1)	2,448	431	36	1,888	333	4,336	764
Comanche Peak Steam Electric Station (2)	928	390	29	2,167	911	3,095	1,301
Cooper Nuclear Station (1)	1,098	198	18	1,869	337	2,967	534
Davis-Besse Nuclear Power Station (1)	72	34	3	1,192	565	1,264	600
Diablo Canyon Nuclear Power Plant (2)	1,568	675	49	1,748	753	3,316	1,428
Donald C. Cook Nuclear Power Plant (2)	896	393	28	3,044	1,335	3,940	1,728
Dresden Nuclear Power Station (2)	4,624	814	68	5,711	959	10,607	1,801

Table B-1 (continued).

	Dry Inventory 5/2/2017			Pool Inventory		Site Inventory 12/31/2017	
Reactor	**Assy.**	**Initial Uranium (MT)**	**Fuel Casks**	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**
Duane Arnold Energy Center (1)	1,220	221	20	1,908	345	3,128	566
Edwin I. Hatch Nuclear Plant (2)	4,964	893	73	4,246	764	9,210	1,657
Fermi (1)	816	143	12	2,722	479	3,538	622
Grand Gulf Nuclear Station (1)	1,904	336	28	3,676	649	5,580	986
H. B. Robinson Steam Electric Plant (1)	608	263	31	278	120	886	383
Hope Creek Generating Station (1)	1,972	354	29	2,523	453	4,495	806
Indian Point Nuclear Generating (2)	992	451	31	2,286	1,039	3,278	1,490
James A. FitzPatrick Nuclear Power Plant (1)	1,428	258	21	2,636	477	4,064	735
Joseph M. Farley Nuclear Plant (2)	1,344	590	42	2,003	879	3,347	1,469
LaSalle County Station (2)	1,632	292	24	7,110	1,273	8,742	1,566
Limerick Generating Station (2)	2,196	391	36	6,539	1,165	8,735	1,556
McGuire Nuclear Station (2)	1,584	714	54	2,269	1,023	3,853	1,737
Millstone Power Station (Units 2&3)	992	421	31	2,176	923	3,168	1,344
Monticello Nuclear Generating Plant (1)	976	169	16	1,568	272	2,544	441
Nine Mile Point Nuclear Station (2)	1,464	259	24	6,312	1,115	7,776	1,374
North Anna Power Station (2)	1,856	860	58	1,316	610	3,172	1,471
Oconee Nuclear Station (3)	3,384	1,577	141	1,727	805	5,111	2,382

Table B-1 (continued).

	Dry Inventory 5/2/2017			Pool Inventory		Site Inventory 12/31/2017	
Reactor	**Assy.**	**Initial Uranium (MT)**	**Fuel Casks**	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**
Oyster Creek Nuclear Generating Station (1)	1,647	292	27	2,335	415	3,982	707
Palisades Nuclear Plant (1)	1,244	511	46	445	183	1,689	694
Palo Verde Nuclear Generating Station (3)	3,456	1,485	144	2,335	1,003	5,791	2,488
Peach Bottom Atomic Power Station (2)	5,440	977	80	5,599	1,005	11,039	1,982
Perry Nuclear Power Plant (1)	1,360	245	20	2,990	539	4,350	784
Pilgrim Nuclear Power Station (1)	544	97	8	2,989	531	3,533	627
Point Beach Nuclear Plant (2)	1,280	491	44	1,227	471	2,507	962
Prairie Island Nuclear Generating Plant (2)	1,600	583	40	1,106	403	2,706	987
Quad Cities Nuclear Power Station (2)	3,264	580	48	6,497	1,154	9,761	1,734
River Bend Station (1)	1,564	277	23	2,596	460	4,160	737
R.E. Ginna Nuclear Power Plant (1)	320	118	10	1,103	406	1,423	523
St. Lucie Plant (2)	832	324	26	2,954	1,149	3,786	1,473
Salem Nuclear Generating Station (2)	864	397	27	2,469	1,133	3,333	1,530
Seabrook Station (1)	448	205	14	1,005	460	1,453	665
Sequoyah Nuclear Plant (2)	1,593	729	49	1,750	801	3,343	1,530
Shearon Harris Nuclear Power Plant (1)	-	-	-	6,157	1,575	6,157	1,575
South Texas Project (2)	-	-	-	2,787	1,494	2,787	1,494

Table B-1 (continued).

	Dry Inventory 5/2/2017			Pool Inventory		Site Inventory 12/31/2017	
Reactor	**Assy.**	**Initial Uranium (MT)**	**Fuel Casks**	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**
Surry Nuclear Power Station (2)	2,398	1,100	84	814	373	3,212	1,474
Susquehanna Steam Electric Station (2)	5,674	1,002	97	4,375	773	10,049	1,774
Three Mile Island Nuclear Station (1)	-	-	-	1,492	703	1,492	703
Turkey Point Nuclear Generating (2)	576	263	18	2,408	1,098	2,984	1,361
Virgil C. Summer Nuclear Station (1)	148	63	4	1,360	582	1,508	645
Vogtle Electric Generating Plant (2)	832	359	26	2,586	1,115	3,418	1,474
Waterford Steam Electric Station (1)	736	310	23	1,222	515	1,958	825
Watts Bar Nuclear Plant (2)	222	102	6	1,004	462	1,226	564
Wolf Creek Generating Station (1)	-	-	-	1,763	810	1,763	810
Totals (99)	**91,029**	**25,899**	**2,112**	**161,037**	**46,213**	**252,338**	**72,139**

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

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

	Dry Inventory 5/2/2017			Pool Inventory		Site Inventory 12/31/2017	
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 5/2/2017			Pool Inventory		Site Inventory 12/31/2017	
Reactor [Unit]	**Assy.**	**Initial Uranium (MT)**	**Fuel Casks**	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**
Dresden 1	272	27.71	4	Pool Empty		Remaining Inventory with Units 2 and 3**	
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**	**3,044**	**556.21**

*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 5/2/2017			Pool Inventory		Site Inventory 12/31/2017	
Reactor [Unit]	**Assy.**	**Initial Uranium (MT)**	**Fuel Casks**	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**
Crystal River 3	-	-	-	1,243	582.23	1,243	582.23
Fort Calhoun	320	118	10	946	348	1,266	465
Kewaunee	1,040	404	30	295	115	1,335	519
San Onofre	1,187	481	50	2,668	1,128	3,855	1,609
Vermont Yankee	884	160	13	2,993	543	3,877	704
Totals	**3,431**	**1,163**	**103**	**8,145**	**2,716**	**11,576**	**3,879**

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

Table B-5. Estimated Inventory Totals

	Dry Inventory 5/2/2017			Pool Inventory		Site Inventory 12/31/2017	
Reactor Group	**Assy.**	**Initial Uranium (MT)**	**Fuel Casks**	**Assy.**	**Initial Uranium (MT)**	**Assy.**	**Initial Uranium (MT)**
Operating Sites	91,029	25,899	2,112	161,037	46,213	252,338	72,139
Group A Pre-2000	7,660	2,815	248	-	-	7,660	2,815
Shutdown Group B	432	58	9	2,884	526	3,044	556
Group A Post-2000	3,431	1,163	103	8,145	2,716	11,576	3,879
Grand Total	**102,552**	**29,935**	**2,472**	**172,066**	**49,454**	**274,618**	**79,389**

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

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

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 12/31/2017		Forecast Future Discharges 1/1/2018 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 1	1,397	649	240	114	777	367	2,414	1,130
Arkansas Nuclear 2	1,634	684	267	113	1,334	564	3,235	1,361
Beaver Valley 1	1,310	605	192	88	925	425	2,427	1,119
Beaver Valley 2	1,010	467	186	86	1,335	617	2,531	1,169
Braidwood 1	1,334	563	267	112	1,884	788	3,485	1,462
Braidwood 2	1,402	590	291	121	2,133	888	3,826	1,600
Browns Ferry 1	2,444	449	584	106	3,100	561	6,128	1,116
Browns Ferry 2	4,441	802	899	160	3,092	551	8,432	1,513
Browns Ferry 3	3,630	652	590	103	3,419	598	7,639	1,354
Brunswick 1	3,580	644	490	87	2,765	488	6,835	1,218
Brunswick 2	3,552	640	699	125	2,448	436	6,699	1,200
Byron 1	1,546	652	267	111	1,795	747	3,608	1,510
Byron 2	1,387	585	358	150	1,903	798	3,648	1,533
Callaway	1,648	700	360	150	1,706	712	3,714	1,562
Calvert Cliffs 1	1,707	666	184	75	953	388	2,844	1,129
Calvert Cliffs 2	1,545	601	289	117	1,081	439	2,915	1,157
Catawba 1	1,456	650	231	105	1,502	682	3,189	1,437
Catawba 2	1,364	607	234	107	1,519	693	3,117	1,406
Clinton	2,996	542	852	152	4,600	822	8,448	1,517
Columbia Generating Station	3,584	631	752	133	3,836	679	8,172	1,443
Comanche Peak 1	1,285	545	372	156	2,146	896	3,803	1,597
Comanche Peak 2	1,165	485	273	114	2,286	959	3,724	1,558
Cooper	3,604	658	417	75	1,938	347	5,959	1,079

Table C-1 (continued).

	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2017		Forecast Future Discharges 1/1/2018 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)**
Davis-Besse	1,116	528	148	71	917	441	2,181	1,040
Diablo Canyon 1	1,412	610	282	119	663	281	2,357	1,010
Diablo Canyon 2	1,346	582	276	117	472	200	2,094	898
D.C. Cook 1	1,734	781	361	163	1,205	544	3,300	1,488
D.C. Cook 2	1,584	674	261	109	1,324	555	3,169	1,339
Dresden 2	5,001	895	756	130	1,984	340	7,741	1,366
Dresden 3	4,220	746	494	85	2,206	379	6,920	1,209
Duane Arnold	2,824	511	304	54	1,584	284	4,712	850
Hatch 1	4,197	758	448	79	2,352	412	6,997	1,249
Hatch 2	3,892	700	673	120	2,800	500	7,365	1,321
Fermi 2	3,004	528	534	94	3,968	696	7,506	1,319
Grand Gulf 1	4,788	846	792	140	5,552	983	11,132	1,969
Robinson 2	1,506	653	189	82	724	314	2,419	1,049
Hope Creek 1	3,832	689	663	117	4,963	876	9,458	1,683
Indian Point 2	1,517	688	180	81	283	128	1,980	897
Indian Point 3	1,298	592	283	128	288	131	1,869	851
Fitzpatrick	3,664	663	400	72	2,160	388	6,224	1,123
Farley 1	1,517	671	201	85	1,028	435	2,746	1,191
Farley 2	1,360	599	269	114	1,162	491	2,791	1,204
La Salle 1	3,703	665	604	107	4,388	778	8,695	1,550
La Salle 2	3,515	630	920	163	4,755	844	9,190	1,638
Limerick 1	3,970	707	560	99	4,684	829	9,214	1,635
Limerick 2	3,385	603	820	147	4,874	871	9,079	1,620
McGuire 1	1,517	680	295	135	1,303	595	3,115	1,409

Table C-1 (continued).

	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2017		Forecast Future Discharges 1/1/2018 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)**
McGuire 2	1,528	685	213	98	1,329	609	3,070	1,392
Millstone 2	1,506	595	210	84	987	396	2,703	1,075
Millstone 3	1,124	515	328	150	1,651	754	3,103	1,418
Monticello	3,148	561	454	78	1,390	237	4,992	876
Nine Mile Point 1	3,340	597	464	79	1,332	227	5,136	903
Nine Mile Point 2	3,396	598	576	99	4,796	828	8,768	1,526
North Anna 1	1,367	633	198	92	1,081	503	2,646	1,229
North Anna 2	1,351	626	256	119	1,053	489	2,660	1,234
Oconee 1	1,628	758	201	93	847	390	2,676	1,241
Oconee 2	1,540	718	284	133	887	416	2,711	1,267
Oconee 3	1,554	725	204	95	925	430	2,683	1,250
Oyster Creek	3,644	649	338	58	729	125	4,711	832
Palisades	1,509	617	180	78	744	321	2,433	1,016
Palo Verde 1	1,539	658	399	174	2,005	874	3,943	1,707
Palo Verde 2	1,660	711	306	133	2,179	950	4,145	1,795
Palo Verde 3	1,575	676	312	136	2,321	1,012	4,208	1,824
Peach Bottom 2	4,968	893	546	97	2,948	526	8,462	1,516
Peach Bottom 3	4,708	848	819	145	2,948	522	8,475	1,515
Perry 1	3,502	632	848	152	4,710	843	9,060	1,626
Pilgrim 1	3,069	547	464	80	580	99	4,113	726
Point Beach 1	1,142	437	173	69	441	176	1,756	681
Point Beach 2	1,081	413	117	46	511	202	1,709	661
Prairie Island 1	1,200	439	102	36	529	186	1,831	661
Prairie Island 2	1,204	441	200	70	671	236	2,075	747

Table C-1 (continued).

	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2017		Forecast Future Discharges 1/1/2018 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)**
Quad Cities 1	4,337	773	746	130	2,439	425	7,522	1,327
Quad Cities 2	4,184	747	494	85	2,700	462	7,378	1,294
River Bend 1	3,460	612	700	125	3,536	629	7,696	1,366
Ginna	1,325	488	138	51	443	162	1,906	701
Saint Lucie 1	1,813	701	328	131	1,119	445	3,260	1,277
Saint Lucie 2	1,420	550	225	90	1,492	599	3,137	1,240
Salem 1	1,444	664	308	141	1,117	510	2,869	1,315
Salem 2	1,350	620	231	105	1,348	612	2,929	1,337
Seabrook 1	1,204	552	249	114	1,936	883	3,389	1,548
Sequoyah 1	1,378	631	246	111	1,423	643	3,047	1,386
Sequoyah 2	1,461	670	258	118	1,483	677	3,202	1,465
Shearon Harris 1	1,052	476	210	95	1,487	676	2,749	1,247
South Texas 1	1,172	630	231	123	1,656	882	3,059	1,635
South Texas 2	1,076	578	308	164	1,733	923	3,117	1,665
Surry 1	1,444	662	189	87	787	364	2,420	1,114
Surry 2	1,453	667	195	89	807	370	2,455	1,126
Susquehanna 1	4,463	787	606	107	4,400	780	9,469	1,675
Susquehanna 2	4,073	718	907	161	4,703	835	9,683	1,714
Three Mile Island 1	1,270	596	222	108	695	338	2,187	1,041
Turkey Point 3	1,326	605	162	74	697	317	2,185	996
Turkey Point 4	1,343	612	171	78	727	331	2,241	1,022
Summer	1,304	559	204	86	1,245	523	2,753	1,167
Vogtle 1	1,519	659	273	116	1,922	816	3,714	1,591
Vogtle 2	1,261	544	365	154	2,013	851	3,639	1,550

Table C-1 (continued).

	Fuel Discharges as of 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2017		Forecast Future Discharges 1/1/2018 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)**
Waterford 3	1,661	697	297	127	1,999	858	3,957	1,682
Watts Bar 1	892	411	255	117	2,318	1,064	3,465	1,592
Watts Bar 2	-	-	79	36	3,195	1,470	3,274	1,506
Wolf Creek 1	1,420	653	343	157	1,669	762	3,432	1,572
Totals	**217,311**	**61,903**	**37,139**	**10,745**	**192,799**	**56,298**	**447,249**	**128,946**

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

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 12/31/2017		Forecast Future Discharges 1/1/2018 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 12/31/2017		Forecast Future Discharges 1/1/2018 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 12/31/2017		Forecast Future Discharges 1/1/2018 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)**
Crystal River 3	1,243	582.23	-	-	-	-	1,243	582.23
Fort Calhoun	1,091	399.38	175	65.97	-	-	1,266	465.35
Kewaunee	1,214	470.97	121	47.73	-	-	1,335	518.70
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
Vermont Yankee	3,389	615.97	488	87.69	-	-	3,877	703.66
Totals	**11,062**	**3,775.78**	**784**	**201.39**	**-**	**-**	**11,846**	**3,977.17**

*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 12/31/2017		Forecast Future Discharges 1/1/2018 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	217,311	61,903	37,139	10,745	192,799	56,298	447,249	128,946
Group A Pre-2000	7,829	2,861	-	-	-	-	7,829	2,861
Shutdown Group B	3,936	647	-	-	-	-	3,936	647
Group A Post-2000	11,062	3,776	784	201	-	-	11,846	3,977
Grand Total	**240,138**	**69,187**	**37,923**	**10,946**	**192,799**	**56,298**	**470,860**	**136,432**

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

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

Table D-1. Estimated and Projected Inventory at NPR Sites and Morris by State

State	Fuel Discharged Prior to 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2017		Forecast Future Discharges 1/1/2018 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.	Estimated Initial Uranium (MT)
Alabama	13,392	3,174	2,543	568	11,801	2,636	27,736	6,378	-	-	27,736	6,378
Arizona	4,774	2,045	1,017	444	6,505	2,837	12,296	5,325	-	-	12,296	5,325
Arkansas	3,031	1,333	507	227	2,111	931	5,649	2,491	-	-	5,649	2,491
California	7,766	3,156	558	236	1,135	480	9,459	3,873	(270)	(98)	9,189	3,774
Connecticut	6,616	2,084	538	234	2,638	1,149	9,792	3,467	(83)	(35)	9,709	3,432
Florida	7,145	3,051	886	373	4,035	1,693	12,066	5,117	(18)	(8)	12,048	5,109
Georgia	10,869	2,662	1,759	469	9,087	2,580	21,715	5,711	-	-	21,715	5,711
Illinois	36,743	8,498	6,049	1,345	30,787	7,272	73,579	17,116	2,461	529	76,040	17,645
Iowa	2,824	511	304	54	1,584	284	4,712	850	-	-	4,712	850
Kansas	1,420	653	343	157	1,669	762	3,432	1,572	-	-	3,432	1,572
Louisiana	5,121	1,309	997	252	5,535	1,487	11,653	3,049	-	-	11,653	3,049
Maine	1,434	542	-	-	-	-	1,434	542	-	-	1,434	542
Maryland	3,252	1,267	473	192	2,034	827	5,759	2,286	-	-	5,759	2,286
Massachusetts	3,602	675	464	80	580	99	4,646	853	-	-	4,646	853
Michigan	8,357	2,670	1,336	444	7,241	2,117	16,934	5,231	(85)	(11)	16,849	5,219
Minnesota	5,552	1,442	756	184	2,590	659	8,898	2,284	(1,058)	(198)	7,840	2,086
Mississippi	4,788	846	792	140	5,552	983	11,132	1,969	-	-	11,132	1,969
Missouri	1,648	700	360	150	1,706	712	3,714	1,562	-	-	3,714	1,562
Nebraska	4,695	1,057	592	141	1,938	347	7,225	1,544	(1,054)	(198)	6,171	1,346
New Hampshire	1,204	552	249	114	1,936	883	3,389	1,548	-	-	3,389	1,548
New Jersey	10,270	2,623	1,540	420	8,157	2,123	19,967	5,167	-	-	19,967	5,167

Table D-1 (continued).

State	Fuel Discharged Prior to 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2017		Forecast Future Discharges 1/1/2018 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.	Estimated Initial Uranium (MT)
New York	14,700	3,657	2,041	510	9,302	1,863	26,043	6,031	(40)	(15)	26,003	6,016
North Carolina	11,229	3,125	1,907	539	9,332	2,803	22,468	6,467	1,108	491	23,576	6,958
Ohio	4,618	1,160	996	223	5,627	1,284	11,241	2,667	-	-	11,241	2,667
Oregon	791	359	-	-	-	-	791	359	-	-	791	359
Pennsylvania	29,157	6,224	4,858	1,039	27,512	5,742	61,527	13,005	(2)	(0.38)	61,525	13,005
South Carolina*	10,352	4,670	1,547	700	7,649	3,448	19,548	8,817	(1,109)	(492)	18,440	8,326
Tennessee	3,731	1,712	838	382	8,419	3,854	12,988	5,948	-	-	12,988	5,948
Texas	4,698	2,238	1,184	557	7,821	3,660	13,703	6,455	-	-	13,703	6,455
Vermont	3,389	616	488	88	-	-	3,877	704	-	-	3,877	704
Virginia	5,615	2,588	838	388	3,728	1,726	10,181	4,702	(69)	(31)	10,112	4,671
Washington	3,584	631	752	133	3,836	679	8,172	1,443	-	-	8,172	1,443
Wisconsin	3,771	1,358	411	163	952	378	5,134	1,899	(7)	(2)	5,127	1,896
Totals	**240,138**	**69,187**	**37,923**	**10,946**	**192,799**	**56,298**	**470,860**	**136,432**	**(226)-**	**(70)-**	**470,634**	**136,362**

Table D-2. Estimated Inventory by State and by Storage Configuration at the end of 2017

State	Dry Inventory			Pool Inventory		Site Inventory	
	Assy.	Estimated Initial Uranium (MT)	Fuel Casks	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)
Alabama	6,095	1,448	106	9,840	2,294	15,935	3,742
Arizona	3,456	1,485	144	2,335	1,003	5,791	2,488
Arkansas	2,096	924	79	1,442	636	3,538	1,560
California	3,638	1,413	125	4,416	1,880	8,054	3,294
Connecticut	2,011	834	71	5,060	1,449	7,071	2,283
Florida	1,408	586	44	6,605	2,829	8,013	3,416
Georgia	5,796	1,252	99	6,832	1,879	12,628	3,131
Illinois	13,960	3,422	255	31,293	6,951	45,253	10,373
Iowa	1,220	221	20	1,908	345	3,128	566
Kansas	-	-	-	1,763	810	1,763	810
Louisiana	2,300	587	46	3,818	975	6,118	1,562
Maine	1,434	542	60	-	-	1,434	542
Maryland	2,208	865	81	1,517	594	3,725	1,459
Massachusetts	1,077	224	23	2,989	531	4,066	754
Michigan	3,397	1,106	93	6,211	1,997	9,608	3,103
Minnesota	2,576	753	56	2,674	675	5,250	1,428
Mississippi	1,904	336	28	3,676	649	5,580	986
Missouri	222	94	6	1,786	756	2,008	850
Nebraska	1,418	315	28	2,815	684	4,233	1,000
New Hampshire	448	205	14	1,005	460	1,453	665
New Jersey	4,483	1,043	83	7,327	2,000	11,810	3,043
New York	4,364	1,116	91	12,337	3,036	16,701	4,152
North Carolina	3,292	1,054	82	10,952	3,101	14,244	4,155
Ohio	1,432	279	23	4,182	1,104	5,614	1,383
Oregon	791	359	34	-	-	791	359
Pennsylvania	13,458	2,438	217	20,555	4,824	34,013	7,262
South Carolina	5,086	2,326	210	5,705	2,552	10,791	4,878
Tennessee	1,815	831	55	2,754	1,263	4,569	2,094
Texas	928	390	29	4,954	2,405	5,882	2,795
Vermont	884	160	13	2,993	543	3,877	704
Virginia	4,254	1,961	142	2,130	984	6,384	2,944
Washington	2,448	431	36	1,888	333	4,336	764
Wisconsin	2,653	933	79	1,522	585	4,175	1,519
Totals	**102,552**	**29,935**	**2,472**	**175,283**	**50,128**	**277,835**	**80,063**

* Although the inventory is projected to the end of 2017, the dry storage data are current, as of May 2, 2017.

Table D-3. Estimated Pool Inventory by Current Group and by State at the end of 2017

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	-	-	-	-	9,840	2,294	-	-	9,840	2,294
Arizona	-	-	-	-	2,335	1,003	-	-	2,335	1,003
Arkansas	-	-	-	-	1,442	636	-	-	1,442	636
California	2,668	1,128	-	-	1,748	753	-	-	4,416	1,880
Connecticut	-	-	5,060	1,449	-	-	-	-	5,060	1,449
Florida	1,243	582	-	-	5,362	2,247	-	-	6,605	2,829
Georgia	-	-	-	-	6,832	1,879	-	-	6,832	1,879
Illinois	-	(0)	5,711	959	22,365	5,317	3,217	674	31,293	6,951
Iowa	-	-	-	-	1,908	345	-	-	1,908	345
Kansas	-	-	-	-	1,763	810	-	-	1,763	810
Louisiana	-	-	-	-	3,818	975	-	-	3,818	975
Maryland	-	-	-	-	1,517	594	-	-	1,517	594
Massachusetts	-	-	-	-	2,989	531	-	-	2,989	531
Michigan	-	-	-	-	6,211	1,997	-	-	6,211	1,997
Minnesota	-	-	-	-	2,674	675	-	-	2,674	675
Mississippi	-	-	-	-	3,676	649	-	-	3,676	649
Missouri	-	-	-	-	1,786	756	-	-	1,786	756
Nebraska	946	348	-	-	1,869	337	-	-	2,815	684
New Hampshire	-	-	-	-	1,005	460	-	-	1,005	460
New Jersey	-	-	-	-	7,327	2,000	-	-	7,327	2,000
New York	-	-	2,286	1,039	10,051	1,998	-	-	12,337	3,036
North Carolina	-	-	-	-	10,952	3,101	-	-	10,952	3,101
Ohio	-	-	-	-	4,182	1,104	-	-	4,182	1,104

(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	-	-	-	-	20,555	4,824	-	-	20,555	4,824
South Carolina*	-	-	-	-	5,704	2,552	-	-	5,705	2,552
Tennessee	-	-	-	-	2,754	1,263	-	-	2,754	1,263
Texas	-	-	-	-	4,954	2,405	-	-	4,954	2,405
Vermont	2,993	543	-	-	-	-	-	-	2,993	543
Virginia	-	-	-	-	2,130	984	-	-	2,130	984
Washington	-	-	-	-	1,888	333	-	-	1,888	333
Wisconsin	295	115	-	-	1,227	471	-	-	1,522	585
Totals	**8,145**	**2,716**	**13,057**	**3,447**	**150,864**	**43,291**	**3,217**	**674**	**175,283**	**50,128**

Table D-4. Estimated Dry Inventory by Current Group and by State at the end of 2017

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	-	-	-	-	-	-	6,095	1,448	106	6,095	1,448	106
Arizona	-	-	-	-	-	-	3,456	1,485	144	3,456	1,485	144
Arkansas	-	-	-	-	-	-	2,096	924	79	2,096	924	79
California	2,070	738	76	-	-	-	1,568	675	49	3,638	1,413	125
Connecticut	1,019	414	40	992	421	31	-	-	-	2,011	834	71
Florida	-	-	-	-	-	-	1,408	586	44	1,408	586	44
Georgia	-	-	-	-	-	-	5,796	1,252	99	5,796	1,252	99
Illinois	2,226	1,019	61	4,896	842	72	6,838	1,561	122	13,960	3,422	255
Iowa	-	-	-	-	-	-	1,220	221	20	1,220	221	20
Louisiana	-	-	-	-	-	-	2,300	587	46	2,300	587	46
Maine	1,434	542	60	-	-	-	-	-	-	1,434	542	60
Maryland	-	-	-	-	-	-	2,208	865	81	2,208	865	81
Massachusetts	533	127	15	-	-	-	544	97	8	1,077	224	23
Michigan	441	58	7	-	-	-	2,956	1,048	86	3,397	1,106	93
Minnesota	-	-	-	-	-	-	2,576	753	56	2,576	753	56
Mississippi	-	-	-	-	-	-	1,904	336	28	1,904	336	28
Missouri	-	-	-	-	-	-	222	94	6	222	94	6
Nebraska	320	118	10	-	-	-	1,098	198	18	1,418	315	28
New Hampshire	-	-	-	-	-	-	448	205	14	448	205	14
New Jersey	-	-	-	-	-	-	4,483	1,043	83	4,483	1,043	83
New York	-	-	-	1,152	481	36	3,212	635	55	4,364	1,116	91
North Carolina	-	-	-	-	-	-	3,292	1,054	82	3,292	1,054	82
Ohio	-	-	-	-	-	-	1,432	279	23	1,432	279	23

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	-	-	-	-	-	-	13,458	2,438	217	13,458	2,438	217
South Carolina	-	-	-	-	-	-	5,086	2,326	210	5,086	2,326	210
Tennessee	-	-	-	-	-	-	1,815	831	55	1,815	831	55
Texas	-	-	-	-	-	-	928	390	29	928	390	29
Vermont	884	160	13	-	-	-	-	-	-	884	160	13
Virginia	-	-	-	-	-	-	4,254	1,961	142	4,254	1,961	142
Washington	-	-	-	-	-	-	2,448	431	36	2,448	431	36
Wisconsin	1,373	442	35	-	-	-	1,280	491	44	2,653	933	79
Totals	**11,091**	**3,978**	**351**	**7,040**	**1,744**	**139**	**84,421**	**24,213**	**1,982**	**102,552**	**29,935**	**2,472**

Table D-5. Estimated Total Inventory of Group A Sites by State at the end of 2017

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	-	-	-	-	533	127
Michigan	441	58	-	-	-	-	441	58
Nebraska	-	-	1,266	465	-	-	1,266	465
Oregon	791	359	-	-	-	-	791	359
Vermont	-	-	3,877	704	-	-	3,877	704
Wisconsin	333	38	1,335	519	-	-	1,668	557
Totals	**7,660**	**2,815**	**10,333**	**3,297**	**1,243**	**582**	**19,236**	**6,694**

Table D-6. Estimated Total Inventory of Group B Sites by State at the end of 2017

State	B2		B3		B	
	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)
Connecticut	6,052	1,870	-	-	6,052	1,870
Illinois	10,607	1,801	-	-	10,607	1,801
New York	3,438	1,520	-	-	3,438	1,520
Totals	**20,097**	**5,191**	**-**	**-**	**20,097**	**5,191**

Table D-7. Estimated Total Inventory of Group C Sites by State at the end of 2017

State	C2		C3		C	
	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)
Alabama	15,935	3,742	-	-	15,935	3,742
Arizona	5,791	2,488	-	-	5,791	2,488
Arkansas	3,538	1,560	-	-	3,538	1,560
California	3,316	1,428	-	-	3,316	1,428
Florida	6,770	2,833	-	-	6,770	2,833
Georgia	12,628	3,131	-	-	12,628	3,131
Illinois	29,203	6,878	-	-	29,203	6,878
Iowa	3,128	566	-	-	3,128	566
Kansas	-	-	1,763	810	1,763	810
Louisiana	6,118	1,562	-	-	6,118	1,562
Maryland	3,725	1,459	-	-	3,725	1,459
Massachusetts	3,533	627	-	-	3,533	627
Michigan	9,167	3,045	-	-	9,167	3,045
Minnesota	5,250	1,428	-	-	5,250	1,428
Mississippi	5,580	986	-	-	5,580	986
Missouri	2,008	850	-	-	2,008	850
Nebraska	2,967	534	-	-	2,967	534
New Hampshire	1,453	665	-	-	1,453	665
New Jersey	11,810	3,043	-	-	11,810	3,043
New York	13,263	2,632	-	-	13,263	2,632
North Carolina	8,087	2,580	6,157	1,575	14,244	4,155
Ohio	5,614	1,383	-	-	5,614	1,383
Pennsylvania	32,521	6,559	1,492	703	34,013	7,262
South Carolina	10,790	4,878	-	-	10,790	4,878

(Table D-7 Continued)

Tennessee	4,569	2,094	-	-	4,569	2,094
Texas	3,095	1,301	2,787	1,494	5,882	2,795
Virginia	6,384	2,944	-	-	6,384	2,944
Washington	4,336	764	-	-	4,336	764
Wisconsin	2,507	962	-	-	2,507	962
Totals	**223,086**	**62,922**	**12,199**	**4,582**	**235,285**	**67,504**

Table D-8. Estimated Total Inventory of Group F Site by State at the end of 2017

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 2017

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	-	-	-	-	15,935	3,742	-	-	15,935	3,742
Arizona	-	-	-	-	5,791	2,488	-	-	5,791	2,488
Arkansas	-	-	-	-	3,538	1,560	-	-	3,538	1,560
California	4,738	1,866	-	-	3,316	1,428	-	-	8,054	3,294
Connecticut	1,019	414	6,052	1,870	-	-	-	-	7,071	2,283
Florida	1,243	582	-	-	6,770	2,833	-	-	8,013	3,416
Georgia	-	-	-	-	12,628	3,131	-	-	12,628	3,131
Illinois	2,226	1,019	10,607	1,801	29,203	6,878	3,217	674	45,253	10,373
Iowa	-	-	-	-	3,128	566	-	-	3,128	566
Kansas	-	-	-	-	1,763	810	-	-	1,763	810
Louisiana	-	-	-	-	6,118	1,562	-	-	6,118	1,562
Maine	1,434	542	-	-	-	-	-	-	1,434	542
Maryland	-	-	-	-	3,725	1,459	-	-	3,725	1,459
Massachusetts	533	127	-	-	3,533	627	-	-	4,066	754

(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	-	-	9,167	3,045	-	-	9,608	3,103
Minnesota	-	-	-	-	5,250	1,428	-	-	5,250	1,428
Mississippi	-	-	-	-	5,580	986	-	-	5,580	986
Missouri	-	-	-	-	2,008	850	-	-	2,008	850
Nebraska	1,266	465	-	-	2,967	534	-	-	4,233	1,000
New Hampshire	-	-	-	-	1,453	665	-	-	1,453	665
New Jersey	-	-	-	-	11,810	3,043	-	-	11,810	3,043
New York	-	-	3,438	1,520	13,263	2,632	-	-	16,701	4,152
North Carolina	-	-	-	-	14,244	4,155	-	-	14,244	4,155
Ohio	-	-	-	-	5,614	1,383	-	-	5,614	1,383
Oregon	791	359	-	-	-	-	-	-	791	359
Pennsylvania	-	-	-	-	34,013	7,262	-	-	34,013	7,262
South Carolina*	-	-	-	-	10,790	4,878	-	-	10,791	4,878
Tennessee	-	-	-	-	4,569	2,094	-	-	4,569	2,094
Texas	-	-	-	-	5,882	2,795	-	-	5,882	2,795
Vermont	3,877	704	-	-	-	-	-	-	3,877	704
Virginia	-	-	-	-	6,384	2,944	-	-	6,384	2,944
Washington	-	-	-	-	4,336	764	-	-	4,336	764
Wisconsin	1,668	557	-	-	2,507	962	-	-	4,175	1,519
Totals	**19,236**	**6,694**	**20,097**	**5,191**	**235,285**	**67,504**	**3,217**	**674**	**277,835**	**80,063**

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	-	-	10,805	4,527	-	-	12,048	5,109
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	-	-	-	-	4,712	850	-	-	4,712	850
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	533	127	-	-	4,113	726	-	-	4,646	853
Michigan	441	58	-	-	16,408	5,161	-	-	16,849	5,219
Minnesota	-	-	-	-	7,840	2,086	-	-	7,840	2,086
Mississippi	-	-	-	-	11,132	1,969	-	-	11,132	1,969
Missouri	-	-	-	-	3,714	1,562	-	-	3,714	1,562
Nebraska	1,266	465	-	-	4,905	881	-	-	6,171	1,346
New Hampshire	-	-	-	-	3,389	1,548	-	-	3,389	1,548
New Jersey	-	-	-	-	19,967	5,167	-	-	19,967	5,167
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	-	-	-	-	61,525	13,005	-	-	61,525	13,005
South Carolina*	-	-	-	-	18,439	8,326	-	-	18,439	8,326
Tennessee	-	-	-	-	12,988	5,948	-	-	12,988	5,948
Texas	-	-	-	-	13,703	6,455	-	-	13,703	6,455
Vermont	3,877	704	-	-	-	-	-	-	3,877	704
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	**19,236**	**6,694**	**27,496**	**7,317**	**420,685**	**121,676**	**3,217**	**674**	**470,634**	**136,362**

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

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 12/31/2017		Forecast Future Discharges 1/1/2018 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	10,651	2,677	52,159	12,686	136,434	33,603	(125)	(51)	136,309	33,552
2	65,329	21,523	11,170	3,571	58,651	19,564	135,150	44,657	(88)	(40)	135,062	44,617
3	58,869	15,098	9,000	2,261	44,181	11,170	112,050	28,529	1,311	317	113,361	28,846
4	42,316	14,327	7,102	2,438	37,808	12,878	87,226	29,643	(1,324)	(296)	85,902	29,346
Totals	**240,138**	**69,187**	**37,923**	**10,946**	**192,799**	**56,298**	**470,860**	**136,432**	**(226)**	**(70)-**	**470,634**	**136,362**

Table E-2. Estimated Inventory by NRC Region and by Storage Configuration at the end of 2017

NRC Region	Dry Inventory			Pool Inventory		Site Inventory	
	Assy.	Estimated Initial Uranium (MT)	Fuel Casks	Assy.	Estimated Initial Uranium (MT)	Assy.	Estimated Initial Uranium (MT)
1	30,367	7,428	653	53,783	13,438	84,150	20,866
2	28,280	9,554	744	48,131	15,500	76,411	25,053
3	24,704	6,617	520	44,476	11,059	69,180	17,676
4	19,201	6,336	555	28,893	10,132	48,094	16,468
Totals	**102,552**	**29,935**	**2,472**	**175,283**	**50,128**	**277,835**	**80,063**

Table E-3. Estimated Pool Inventory by Current Group and by NRC Region at the end of 2017

NRC Region	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)
1	2,993	543	7,346	2,488	43,444	10,407	-	-	53,783	13,438
2	1,243	582	-	-	46,888	14,917	-	-	48,131	15,500
3	295	115	5,711	959	35,253	9,310	3,217	674	44,476	11,059
4	3,614	1,476	-	-	25,279	8,656	-	-	28,893	10,132
Totals	**8,145**	**2,716**	**13,057**	**3,447**	**150,864**	**43,291**	**3,217**	**674**	**175,283**	**50,128**

Table E-4. Estimated Dry Inventory by Current Group and by NRC Region at the end of 2017

NRC Region	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
1	3,870	1,243	128	2,144	902	67	24,353	5,282	458	30,367	7,428	653
2	-	-	-	-	-	-	28,280	9,554	744	28,280	9,554	744
3	4,040	1,519	103	4,896	842	72	15,768	4,256	345	24,704	6,617	520
4	3,181	1,215	120	-	-	-	16,020	5,121	435	19,201	6,336	555
Totals	**11,091**	**3,978**	**351**	**7,040**	**1,744**	**139**	**84,421**	**24,213**	**1,982**	**102,552**	**29,935**	**2,472**

Table E-5. Estimated Total Inventory by Current Group and by NRC Region at the end of 2017

	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	6,863	1,787	9,490	3,390	67,797	15,690	-	-	84,150	20,866
2	1,243	582	-	-	75,168	24,471	-	-	76,411	25,053
3	4,335	1,634	10,607	1,801	51,021	13,567	3,217	674	69,180	17,676
4	6,795	2,691	-	-	41,299	13,777	-	-	48,094	16,468
Totals	**19,236**	**6,694**	**20,097**	**5,191**	**235,285**	**67,504**	**3,217**	**674**	**277,835**	**80,064**

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	6,863	1,787	12,699	4,797	116,747	26,969	-	-	136,309	33,552
2	1,243	582	0	0	133,819	44,035	-	-	135,062	44,617
3	4,335	1,634	14,797	2,520	91,012	24,018	3,217	674	113,361	28,846
4	6,795	2,691	0	0	79,107	26,655	-	-	85,902	29,346
Totals	**19,236**	**6,694**	**27,496**	**7,317**	**420,685**	**121,676**	**3,217**	**674**	**470,634**	**136,362**

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

Table F-1. Estimated and Projected Inventory by State and Congressional District

State	Cong District	Representative	Senators	Facility Name (Bold = Shutdown)	Type of Facility	Commercial Spent Fuel (MTU)	DOE/Navy* SNF (MTU)	HLW (Equivalent MTHM)**	Commercial+ DOE/Navy SNF+ HLW TOTAL (MTU)
Alabama (AL)	2	Martha Roby (R)	Doug Jones (D), Richard C. Shelby (R)	Farley	Comm Reactor	1,469	-	-	1,469
Alabama (AL)	5	Mo Brooks (R)		Browns Ferry	Comm Reactor	2,273	-	-	2,273
Arizona (AZ)	3	Raúl Grijalva (D)	Jeff Flake (R), John McCain (R)	Palo Verde	Comm Reactor	2,488	-	-	2,488
Arkansas (AR)	3	Steve Womack (R)	Jon Boozman (R), Tom Cotton (R)	Arkansas Nuclear	Comm Reactor	1,560	-	-	1,560
California (CA)	2	Jared Huffman (D)	Dianne Feinstein (D), Kamala D. Harris (D)	**Humboldt Bay**	Comm Reactor	29	-	-	29
California (CA)	6	Doris Matsui (D)		UC Davis/McClellan N. Research Center	Non DOE Res Reactor	-	-	-	-
California (CA)	7	Ami Bara (D)		**Rancho Seco**	Comm Reactor	228	-	-	228
California (CA)	13	Barbara Lee (D)		Lawrence Berkeley National Laboratory	DOE National Lab	-	-	-	-
California (CA)	15	Eric Swalwell (D)		Aerotest Research ARRR	Non DOE Res Reactor	-	-	-	-
California (CA)	15	Eric Swalwell (D)		General Electric NTR	Non DOE Res Reactor	-	-	-	-
California (CA)	15	Eric Swalwell (D)		Lawrence Livermore National Laboratory	DOE National Lab	-	-	-	-
California (CA)	18	Anna Eshoo (D)		SLAC National Accelerator Laboratory	DOE National Lab	-	-	-	-
California (CA)	24	Salud Carbajal (D)		Diablo Canyon	Comm Reactor	1,428	-	-	1,428
California (CA)	45	Mimi Walters (R)		University of California Irvine	Non DOE Res Reactor	-	-	-	-
California (CA)	49	Darrell Issa (R)		**San Onofre**	Comm Reactor	1,609	-	-	1,609
Colorado (CO)	4	Ken Buck (R)	Michael F. Bennet (D), Cory Gardner (R)	Fort St. Vrain	DOE National Lab	-	15	-	15
Colorado (CO)	7	Ed Perlmutter (D)		National Renewable Energy Laboratory	DOE National Lab	-	-	-	-
Colorado (CO)	7	Ed Perlmutter (D)		U.S. Geological Survey GSTR	Non DOE Res Reactor	-	-	-	-
Connecticut (CT)	2	Joe Courtney (D)	Richard Blumenthal (D), Christopher Murphy (D)	**Haddam Neck/Connecticut Yankee**	Comm Reactor	414	-	-	414
Connecticut (CT)	2	Joe Courtney (D)		Millstone	Comm Reactor	1,870	-	-	1,870
Florida (FL)	3	Ted Yoho (R)	Bill Nelson (D), Marco Rubio (R)	University of Florida UFTR	Non DOE Res Reactor	-	-	-	-
Florida (FL)	11	Daniel Webster (R)		**Crystal River**	Comm Reactor	582	-	-	582
Florida (FL)	18	Brian Mast (R)		St. Lucie	Comm Reactor	1,473	-	-	1,473
Florida (FL)	27	Ileana Ros-Lehtinen (R)		Turkey Point	Comm Reactor	1,361	-	-	1,361
Georgia (GA)	1	Buddy Carter (R)	Johnny Isakson (R), David Perdue (R)	Hatch	Comm Reactor	1,657	-	-	1,657
Georgia (GA)	12	Rick Allen (R)		Vogtle	Comm Reactor	1,474	-	-	1,474

Table F-1 (continued).

State	Cong District	Representative	Senators	Facility Name (Bold = Shutdown)	Type of Facility	Commercial Spent Fuel (MTU)	DOE/Navy* SNF (MTU)	HLW (Equivalent MTHM)**	Commercial+ DOE/Navy SNF+ HLW TOTAL (MTU)
Idaho (ID)	2	Mike Simpson (R)	Mike Crapo (R), James E. Risch (R)	Idaho National Laboratory	DOE National Lab	-	280	1,850	2,527
Idaho (ID)	2	Mike Simpson (R)		Idaho State University AGN-201	Non DOE Res Reactor	-	-	-	-
Idaho (ID)	2	Mike Simpson (R)		Naval Reactors Storage Facility	DOE National Lab	-	30	-	30
Illinois (IL)	3	Dan Lipinski (D)	Tammy Duckworth (D), Richard J. Durbin (D)	Argonne National Laboratory	DOE National Lab	-	-	-	-
Illinois (IL)	10	Brad Schneider (D)		**Zion**	Zion	1,019	-	-	1,019
Illinois (IL)	13	Rodney Davis (R)		Clinton	Comm Reactor	694	-	-	694
Illinois (IL)	14	Randy Hultgren (R)		Fermi National Accelerator National Laboratory	DOE National Lab	-	-	-	-
Illinois (IL)	16	Adam Kinzinger (R)		Braidwood	Comm Reactor	1,386	-	-	1,386
Illinois (IL)	16	Adam Kinzinger (R)		Byron	Comm Reactor	1,498	-	-	1,498
Illinois (IL)	16	Adam Kinzinger (R)		Dresden	Comm Reactor	1,801	-	-	1,801
Illinois (IL)	16	Adam Kinzinger (R)		GE Morris Storage Facility	Comm Reactor	675	-	-	675
Illinois (IL)	16	Adam Kinzinger (R)		LaSalle County	Comm Reactor	1,566	-	-	1,566
Illinois (IL)	17	Cheri Bustos (D)		Quad Cities	Comm Reactor	1,734	-	-	1,734
Indiana (IN)	4	Todd Rokita (R)	Todd Young (R), Joe Donnelly (D)	Purdue University PUR-1	Non DOE Res Reactor	-	-	-	-
Iowa (IA)	1	Rod Blum (R)	Joni Ernst (R), Chuck Grassley (R)	Duane Arnold	Comm Reactor	566	-	-	566
Iowa (IA)	4	Steve King (R)		Ames Laboratory (DOE Site)	DOE National Lab	-	-	-	-
Kansas (KS)	1	Roger Marshall (R)	Jerry Moran (R), Pat Roberts (R)	Kansas State University TRIGA II	Non DOE Res Reactor	-	-	-	-
Kansas (KS)	2	Lynn Jenkins (R)		Wolf Creek	Comm Reactor	810	-	-	810
Louisiana (LA)	2	Cedric Richmond (D)	Bill Cassidy (R), John Kennedy (R)	Waterford	Comm Reactor	825	-	-	825
Louisiana (LA)	5	Ralph Abraham (R)		River Bend	Comm Reactor	737	-	-	737
Maine (ME)	1	Chellie Pingree (D)	Susan M. Collins (R), Angus S. King, Jr (I)	**Maine Yankee**	Comm Reactor	542	-	-	542
Maryland (MA)	5	Steny H. Hoyer (D)	Benjamin L. Cardin (D), Chris Van Hollen (D)	Calvert Cliffs	Comm Reactor	1,459	-	-	1,459
Maryland (MA)	5	Steny H. Hoyer (D)		University of Maryland MUTR	Non DOE Res Reactor	-	-	-	-
Maryland (MA)	6	John Delaney (D)		National Institute of Standards and Technology	Non DOE Res Reactor	-	-	-	-
Maryland (MA)	8	Jamie Raskin (D)		Armed Forces Radiobiology Research Institute TRIGA	Non DOE Res Reactor	-	-	-	-

Table F-1 (continued).

State	Cong District	Representative	Senators	Facility Name (Bold = Shutdown)	Type of Facility	Commercial Spent Fuel (MTU)	DOE/Navy* SNF (MTU)	HLW (Equivalent MTHM)**	Commercial+ DOE/Navy SNF+ HLW TOTAL (MTU)
Massachusetts (MA)	1	Richard E. Neal (D)	Edward J. Markey (D), Elizabeth Warren (D)	**Yankee Rowe**	Comm Reactor	127	-	-	127
Massachusetts (MA)	3	Niki Tsongas (D)		University of Lowell UMLRR	Non DOE Res Reactor	-	-	-	-
Massachusetts (MA)	7	Mike Capuano (D)		Massachusetts Institute of Technology MITR-II	Non DOE Res Reactor	-	-	-	-
Massachusetts (MA)	9	William Keating (D)		Pilgrim	Comm Reactor	627	-	-	627
Michigan (MI)	1	Jack Bergman (R)	Gary C. Peters (D), Debbie Stabenow (D)	**Big Rock Point**	Comm Reactor	58	-	-	58
Michigan (MI)	4	John Moolenaar (R)		DOW Chemical TRIGA	Non DOE Res Reactor	-	-	-	-
Michigan (MI)	6	Fred Upton (R)		Cook	Comm Reactor	1,728	-	-	1,728
Michigan (MI)	6	Fred Upton (R)		Palisades	Comm Reactor	694	-	-	694
Michigan (MI)	12	Debbie Dingell (D)		Enrico Fermi	Comm Reactor	622	-	-	622
Minnesota (MN)	2	Jason Lewis (R)	Tina Smith (D), Amy Klobuchar (D)	Prairie Island	Comm Reactor	987	-	-	987
Minnesota (MN)	6	Tom Emmer (R)		Monticello	Comm Reactor	441	-	-	441
Mississippi (MS)	2	Bennie Thompson (D)	Thad Cochran (R), Roger F. Wicker (D)	Grand Gulf	Comm Reactor	986	-	-	986
Missouri (MO)	3	Blaine Luetkemeyer (R)	Roy Blunt (R), Claire McCaskill (D)	Callaway	Comm Reactor	850	-	-	850
Missouri (MO)	4	Vicky Hartzler (R)		University of Missouri at Columbia	Non DOE Res Reactor	-	-	-	-
Missouri (MO)	8	Jason T. Smith (R)		Missouri University of Science and Technology	Non DOE Res Reactor	-	-	-	-
Nebraska (NE)	1	Jeff Fortenberry (R)	Deb Fischer (R), Ben Sasse (R)	**Fort Calhoun**	Comm Reactor	465	-	-	465
Nebraska (NE)	3	Adrian Smith (R)		Cooper Station	Comm Reactor	534	-	-	534
Nevada (NV)	4	Ruben Kihuen (D)	Dean Heller (R), Catherine Cortez-Masto (D)	Nevada National Security Site	DOE National Lab	-	-	-	-
Nevada (NV)	4	Ruben Kihuen (D)		Yucca Mountain	Potential DOE SNF/ HLW Repository	-	-	-	-
New Hampshire (NH)	1	Carol Shea-Porter (D)	Margaret Wood Hassan (D), Jeanne Shaheen(D)	Seabrook	Comm Reactor	665	-	-	665
New Jersey (NJ)	2	Frank LoBiondo (R)	Cory A Booker (D), Robert Menendez (R)	Hope Creek	Comm Reactor	806	-	-	806
New Jersey (NJ)	2	Frank LoBiondo (R)		Salem	Comm Reactor	1,530	-	-	1,530
New Jersey (NJ)	3	Tom MacArthur (R)		Oyster Creek	Comm Reactor	707	-	-	707
New Jersey (NJ)	12	Bonnie Watson Coleman (D)		Princeton Plasma Physics Laboratory	DOE National Lab	-	-	-	-
New Mexico (NM)	1	Michelle Lujan Grisham (D)		University of New Mexico AGN-201	Non DOE Res Reactor	-	-	-	-

Table F-1 (continued).

State	Cong District	Representative	Senators	Facility Name (Bold = Shutdown)	Type of Facility	Commercial Spent Fuel (MTU)	DOE/Navy* SNF (MTU)	HLW (Equivalent MTHM)**	Commercial+ DOE/Navy SNF+ HLW TOTAL (MTU)
New Mexico (NM)	2	Stevan Pearce (R)	Martin Heinrich (D), Tom Udall (D)	Eddy-Lea Energy Alliance LLC	Potential SNF Storage Site				
New Mexico (NM)	2	Steve Pearce (R)		Sandia National Laboratory	DOE National Lab	-	-	-	-
New Mexico (NM)	2	Steve Pearce (R)		White Sands Missile Range	DOE National Lab	-	-	-	-
New Mexico (NM)	3	Ben Ray Lujan (D)		Los Alamos National Laboratory	DOE National Lab	-	-	-	-
New York (NY)	1	Lee M. Zeldin (R)	Chuck Schumer (D), Kristen Gillibrand (D)	Brookhaven National Laboratory	DOE National Lab	-	-	-	-
New York (NY)	17	Nita Lowey (D)		Indian Point	Comm Reactor	1,520	-	-	1,520
New York (NY)	20	Paul Tonko (D)		Rensselaer Polytechnic Institute	Non DOE Res Reactor	-	-	-	-
New York (NY)	21	Elise Stefanik (R)		MARF	Naval Training Reactor	-	-	-	-
New York (NY)	21	Elise Stefanik (R)		S8G Submarine Prototype	Naval Training Reactor	-	-	-	-
New York (NY)	23	Tom Reed II (R)		West Valley Site	DOE National Lab	-	-	640	640
New York (NY)	24	John Katko (R)		Fitzpatrick	Comm Reactor	735	-	-	735
New York (NY)	24	John Katko (R)		Nine Mile Point	Comm Reactor	1,374	-	-	1,374
New York (NY)	24	John Katko (R)		R. E. Ginna	Comm Reactor	523	-	-	523
North Carolina (NC)	4	David Price (D)	Richard Burr (R), Thom Tillis (R)	Harris	Comm Reactor	1,575	-	-	1,575
North Carolina (NC)	4	David Price (D)		North Carolina State University PULSTAR	Non DOE Res Reactor	-	-	-	-
North Carolina (NC)	7	David Rouzer (D)		Brunswick	Comm Reactor	843	-	-	843
North Carolina (NC)	9	Robert Pittenger (R)		McGuire	Comm Reactor	1,597	-	-	1,597
Ohio (OH)	3	Joyce Beatty (D)	Sherrod Brown (D), Rob Portman (R)	Ohio State University OSURR	Non DOE Res Reactor	-	-	-	-
Ohio (OH)	9	Marcy Kaptur (D)		Davis-Besse	Comm Reactor	600	-	-	600
Ohio (OH)	14	David Joyce (R)		Perry 1	Comm Reactor	784	-	-	784
Oregon (OR)	1	Suzanne Bonamici (D	Jeff Merkley (D), Ron Wyden (D)	**Trojan**	Comm Reactor	359	-	-	359
Oregon (OR)	3	Earl Blumenauer (D)		Reed College RRR	Non DOE Res Reactor	-	-	-	-
Oregon (OR)	4	Peter DeFazio (D)		Oregon State University OSTR	Non DOE Res Reactor	-	-	-	-
Pennsylvania (PA)	4	Scott Perry (R)	Robert P. Casey, Jr (D), Patrick Toomey (R)	Peach Bottom	Comm Reactor	1,982	-	-	1,982
Pennsylvania (PA)	5	Glenn Thompson (R)		Pennsylvania State University	Non DOE Res Reactor	-	-	-	-
Pennsylvania (PA)	6	Ryan Costello (R)		Limerick	Comm Reactor	1,556	-	-	1,556

Table F-1 (continued).

State	Cong District	Representative	Senators	Facility Name (Bold = Shutdown)	Type of Facility	Commercial Spent Fuel (MTU)	DOE/Navy* SNF (MTU)	HLW (Equivalent MTHM)**	Commercial+ DOE/Navy SNF+ HLW TOTAL (MTU)
Pennsylvania (PA)	11	Lou Barletta (R)		Susquehanna	Comm Reactor	1,774	-	-	1,774
Pennsylvania (PA)	12	Keith Rothfus (R)		Beaver Valley	Comm Reactor	1,246	-	-	1,246
Pennsylvania (PA)	14	Michael F. Doyle (D)		National Energy Technology Laboratory	DOE National Lab	-	-	-	-
Pennsylvania (PA)	15	Charles W. Dent (R)		Three Mile Island	Comm Reactor	703	-	-	703
Rhode Island (RI)	2	James Langevin (D)	Jack Reed (D), Sheldon Whitehouse (D)	Rhode Island Atomic Energy Commission Nuclear Science Center	Non DOE Res Reactor	-	-	-	-
South Carolina (SC)	1	G. K. Butterfield (D)	Lindsey Graham (R), Tim Scott (R)	Moored Training Ship - Unit #1	Naval Training Reactor	-	-	-	-
South Carolina (SC)	1	G. K. Butterfield (D)		Moored Training Ship - Unit #2	Naval Training Reactor	-	-	-	-
South Carolina (SC)	2	Joe Wilson (R)		Savannah River National Laboratory	DOE National Lab	-	29	4,085	4,114
South Carolina (SC)	3	Jeff Duncan (R)		Oconee	Comm Reactor	2,521	-	-	2,521
South Carolina (SC)	5	Ralph Norman (R)		Catawba	Comm Reactor	1,468	-	-	1,468
South Carolina (SC)	5	Ralph Norman (R)		Summer	Comm Reactor	645	-	-	645
South Carolina (SC)	7	Tom Rice (R)		HB Robinson	Comm Reactor	383	-	-	383
Tennessee (TN)	3	Chuck Fleischmann (R)	Lamar Alexander (R), Bob Corker (R)	Oak Ridge National Laboratory	DOE National Lab	-	-	-	-
Tennessee (TN)	3	Chuck Fleischmann (R)		Sequoyah	Comm Reactor	1,530	-	-	1,530
Tennessee (TN)	4	Scott DesJarlais (R)		Watts Bar	Comm Reactor	564	-	-	564
Texas (TX)	10	Michael McCaul (R)	John Cornyn (R), Ted Cruz (R)	University of Texas TRIGA II	Non DOE Res Reactor	-	-	-	-
Texas (TX)	11	K. Micheal Conoway (R)		Waste Control Specialists	Potential SNF Storage Site				
Texas (TX)	17	Bill Flores (R)		Texas A&M University AGN-201	Non DOE Res Reactor	-	-	-	-
Texas (TX)	17	Bill Flores (R)		Texas A&M University NSCR	Non DOE Res Reactor	-	-	-	-
Texas (TX)	25	Roger Williams (R)		Comanche Peak	Comm Reactor	1,301	-	-	1,301
Texas (TX)	27	Blake Farenthold (R)		South Texas	Comm Reactor	1,494	-	-	1,494
Utah (UT)	2	Chris Stewart (R)	Orrin Hatch (R), Mike Lee (R)	University of Utah TRIGA	Non DOE Res Reactor	-	-	-	-
Vermont (VT)	1	Peter Welch (D)	Patrick J. Leahy (D), Bernard Sanders (I)	**Vermont Yankee**	Comm Reactor	704	-	-	704
Virginia (VA)	3	Robert C. Scott (D)	Time Kaine (D), Mark R. Warner (D)	Surry	Comm Reactor	1,474	-	-	1,474
Virginia (VA)	3	Robert C. Scott (D)		Thomas Jefferson National Accelerator Facility	DOE National Lab	-	-	-	-

Table F-1 (continued).

State	Cong District	Representative	Senators	Facility Name (Bold = Shutdown)	Type of Facility	Commercial Spent Fuel (MTU)	DOE/Navy* SNF (MTU)	HLW (Equivalent MTHM)**	Commercial+ DOE/Navy SNF+ HLW TOTAL (MTU)
Virginia (VA)	7	David Brat (R)		North Anna	Comm Reactor	1,471	-	-	1,471
Washington (WA)	4	Dan Newhouse (R)	Patty Murray (D), Maria Cantwell (D),	Columbia	Comm Reactor	764	-	-	764
Washington (WA)	4	Dan Newhouse (R)		Hanford Site (DOE Site)	DOE National Lab	-	2,129	3,900	6,029
Washington (WA)	4	Dan Newhouse (R)		Pacific Northwest	DOE National Lab	-	-	-	-
Washington (WA)	5	Cathy McMorris Rodgers (R)		Washington State University WSUR	Non DOE Res Reactor	-	-	-	-
Wisconsin (WI)	2	Mark Pocan (D)	Tammy Baldwin (D), Ron Johnson (R)	University of Wisconsin UWNR	Non DOE Res Reactor	-	-	-	-
Wisconsin (WI)	3	Ron Kind (D)		**La Crosse**	Comm Reactor	38	-	-	38
Wisconsin (WI)	6	Glenn Grothman (R)		Point Beach	Comm Reactor	962	-	-	962
Wisconsin (WI)	8	Mike Gallagher (R)		**Kewaunee**	Comm Reactor	519	-	-	519
Total						**80,063**	**2,488**	**10,475**	**93,423**

* DOE managed SNF includes some from commercial sources Navy spent fuel is only stored at the Idaho storage facility
** Equivalent MTU determined by using the nominal HLW 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 HLW respectively from DOE/DP 0020/1 “An Evaluation of Commercial Repository Capacity for the Disposal of Defense High-Level Waste”

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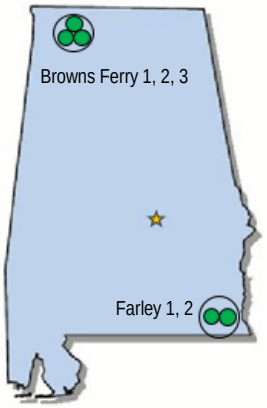
Appendix G
Reference Scenario: No Replacement
Nuclear Generation Forecast – State Inventory Data

ALABAMA



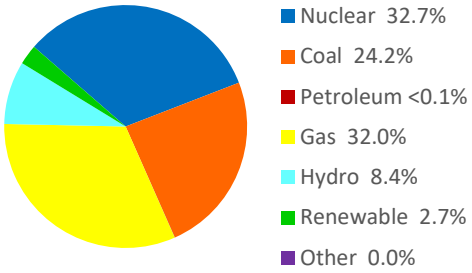
Elected Officials as of January 2018[1,2]

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

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

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)

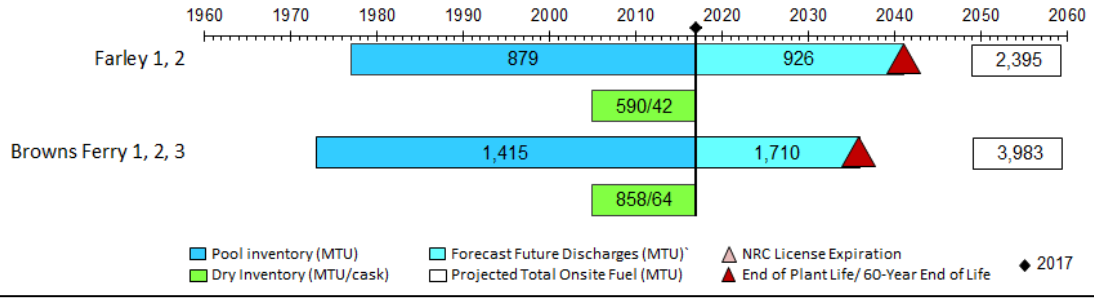


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
2	Farley 1	Southern Nuclear Operating Co.	Martha Roby (R)	1977-2037	PWR/Operating	2005/GL	1,191
	Farley 2			1981-2041	PWR/Operating		1,204
5	Browns 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[4]

Dry: 1,448 MTU in 106 casks **Pool: 2,294 MTU** **Total: 3,742 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[5]	
$948.9 million paid	**$0.0 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

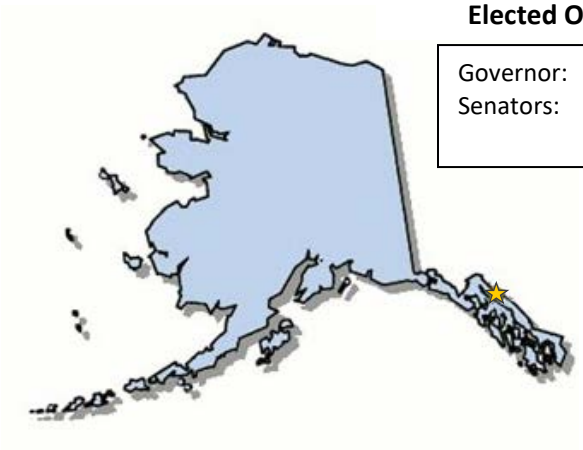
2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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 SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

5 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, 2016 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.

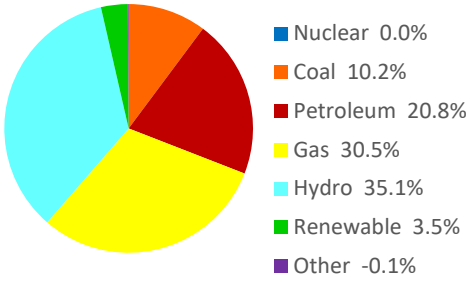
ALASKA



Elected Officials as of January 2018[1,2]

Governor:	Bill Walker (R)
Senators:	Lisa Murkowski (R)
	Dan Sullivan (R)

2017 Electricity Generation Mix[3]
(includes utilities and independent power producers)



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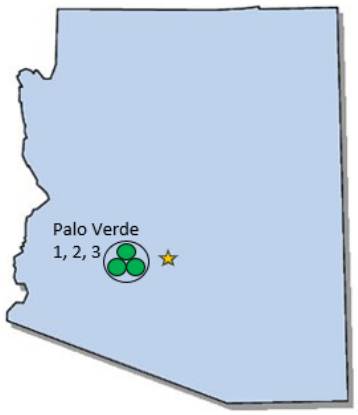
1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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



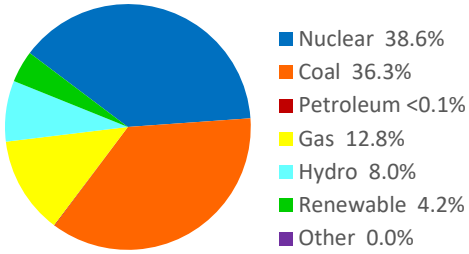
Elected Officials as of January 2018[1,2]

Governor:	Doug Ducey (R)
Senators:	John McCain (R)
	Jeff Flake(R)
Representative:	
District 3:	Raúl Grijalva (D)

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

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)

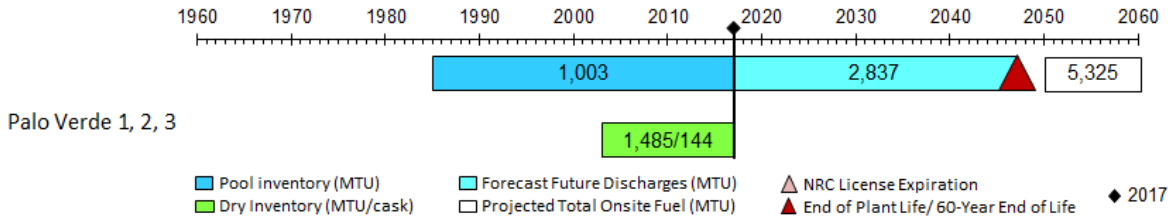


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
3	Palo Verde 1	Arizona Public Service Co.[5]	Raúl Grijalva (D)	1985-2044	PWR/Operating	2003/GL	1,707
	Palo Verde 2			1986-2046	PWR/Operating		1,795
	Palo Verde 3			1987-2047	PWR/Operating		1,824

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

Dry: 1,485 MTU in 144 casks **Pool: 1,003 MTU** **Total: 2,488 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[6]	
$686.6 million paid	**$0.0 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

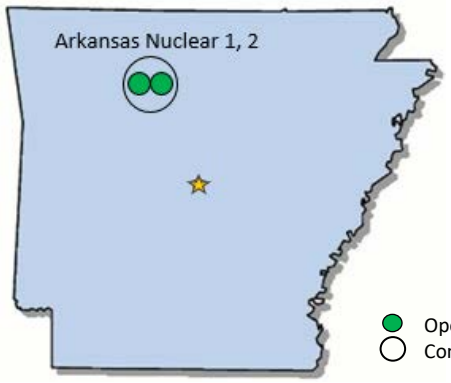
3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

4 SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

5 Subsidiary of Pinnacle West Capital Corp.

6 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, 2016 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

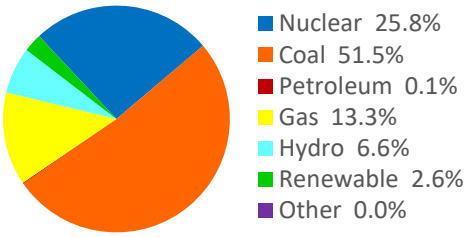


Elected Officials as of January 2018[1,2]

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

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)

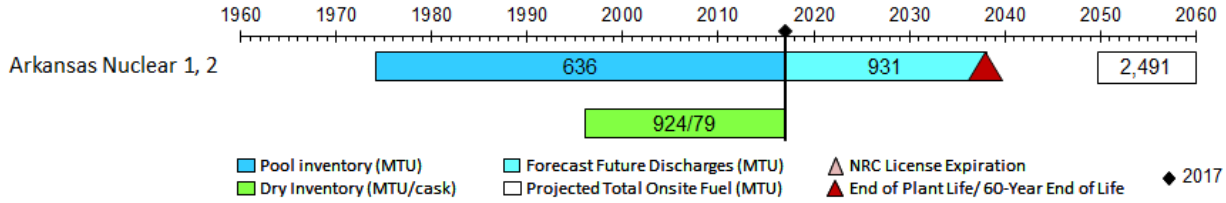


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
3	Arkansas Nuclear 1	Entergy Nuclear Operations, Inc.	Steve Womack (R)	1974-2034	PWR/Operating	1996/GL	1,130
	Arkansas Nuclear 2			1978-2038	PWR/Operating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

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

Dry: 924 MTU in 79 casks **Pool: 636 MTU** **Total: 1,560 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[5]	
$367.1 million paid	**$181.9 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

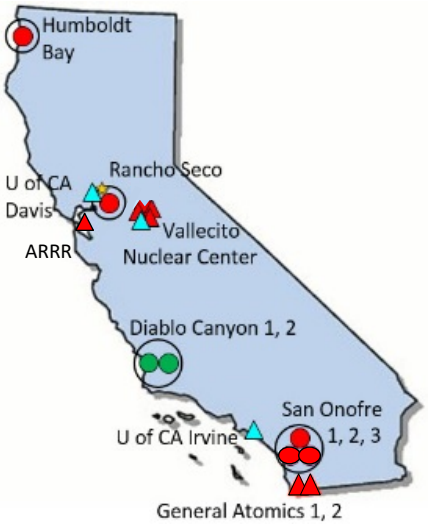
2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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 SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

5 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, 2016 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 2018[1,2]

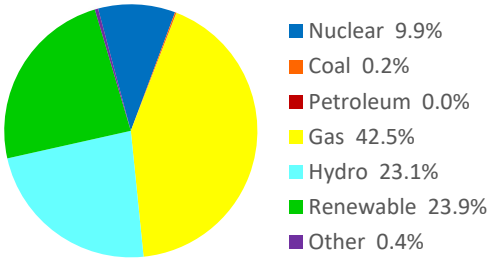
Governor:	Jerry Brown (D)
Senators:	Dianne Feinstein (D)
	Kamala Harris (D)
Representatives:	
District 2:	Jared Huffman (D)
District 6:	Doris Matsui (D)
District 7:	Ami Bera (D)
District 15:	Eric Swalwell (D)
District 24:	Salud Carbajal (D)
District 45:	Mimi Walters (R)
District 49:	Darrell Issa (R)
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 (3 at 3 sites)
- Shutdown Research Reactors (6 at 3 sites)

*no fuel on-site at General Atomics facilities

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)



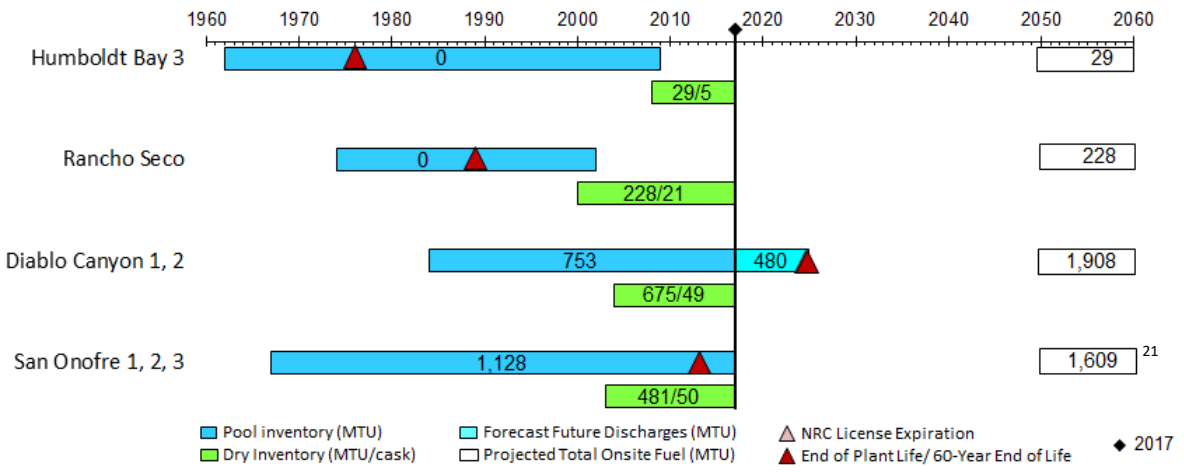
Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
2	Humboldt Bay 3[5]	Pacific Gas & Electric Company	Jared Huffman (D)	1963-1976/ DECON in progress[6]	BWR/ Shutdown	2005/SL Stranded[7]	29
6	University of California - Davis	University of California	Doris Matsui (D)	1998-	R&TRF TRIGA/ Operating		
7	Rancho Seco	Sacramento Municipal Utility District	Ami Bera (D)	1974-1989/ DECON completed	PWR/ Shutdown	2000/SL Stranded[7]	228
15	Aerotest Radiography and Research Reactor (ARRR)	Autoliv, Inc. Aerotest[8]	Eric Swalwell (D)	1965-2013	R&TRF TRIGA (Indus)/ Shutdown[8]		
	Vallecitos Boiling Water Reactor (VBWR)	GE Hitachi Nuclear Energy/ Vallecitos Nuclear Center		1957-1963/ SAFSTOR[9] possession only	BWR/ Shutdown		
	General Electric Test Reactor (GETR)			1986-2016/ SAFSTOR[10] possession only	R&TRF/ Shutdown[11]		
	Vallecitos Experimental Superheat Reactor (VESR)			1970-2016/ SAFSTOR[10] possession only	R&TRF/ Shutdown[11]		
	Nuclear Test Reactor (NTR)			1957-2021	R&TRF Nuclear Test/ Operating[12]		
24	Diablo Canyon 1	Pacific Gas & Electric Company	Salud Carbajal (D)	1984-2024[13]	PWR/ Operating	2004/SL	1010
	Diablo Canyon 2			1985-2025[13]	PWR/ Operating		898
45	University of California - Irvine	University of California	Mimi Walters (R)	1969-[14]	R&TRF TRIGA Mark 1/ Operating		

Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
49	San Onofre 1	Southern California Edison Co.	Darrell Issa (R)	1968-1992/ DECON[15,16]	PWR/ Shutdown	2003/GL	245[17]
	San Onofre 2			1982-2013/ DECON[16]	PWR/ Early Shutdown[18,19]		730
	San Onofre 3			1983-2013/ DECON[17]	PWR/ Early Shutdown[18,19]		733
52	General Atomics	General Atomics	Scott Peters (D)	1957-1997/ SAFSTOR[20]	R&TRF TRIGA Mark I/ Shutdown		
	General Atomics			1960-1995/ DECON[20]	R&TRF TRIGA Mark F/ Shutdown		

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

Dry: 1,413 MTU in 125 casks **Pool: 1,880 MTU** **Total: 3,294 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[22]	
$953.0 million paid[23]	**$0.7 million one-time fee owed[24]**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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 SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

5 Humboldt Bay Units 1 and 2 were non-nuclear.

6 Humboldt Bay Unit 3's estimated date for closure is December 31, 2017. Transfer of SNF from fuel storage pool to ISFSI completed December 2008.

7 A stranded ISFSI does not have an active nuclear reactor on site.

8 Aerotest has been out of compliance with Section 104d of the AEA and 10 CFR 50.38 since Autoliv, Inc. took control in 2000. The NRC could not renew the Aerotest license because Autoliv, Inc. is not authorized to hold a 10 CFR part 50 license because of the foreign ownership issue. Aerotest notified NRC of its intent to sell ARRR to X-Ray Industries, Inc. in 2009-2010. NRC approved license transfer, but order expired without transfer of the license. Aerotest's requested ARRR license renewal and transfer to Nuclear Labyrinth, LLC in 2012. NRC denied the license renewal request and ordered shutdown on July 24, 2013. Facility has been

voluntarily shutdown since 2010. (Federal Register Volume 78, Number 148 August 1, 2013 [Notices: pages 46618-46621], Federal Register Volume 79, Number 77 April 22, 2014 [Notice: page 22555), www.nrc.gov/docs/ML1315/ML13158A164.pdf).

[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 at end of initial license period.

[14] Being evaluated by NRC for license renewal.

[15] Estimated date of closure is December 30, 2030.

[16] The fuel from Unit 1 was transferred to Phase 1 of the ISFSI. The ISFSI will be expanded onto the area previously occupied by Unit 1 as needed in order to store all Unit 2 and Unit 3 spent fuel. In late 2008, license completed Phase 2 of planned ISFSI.

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

[18] Power operations ceased permanently on June 12, 2013.

[19] Company submitted decommissioning plans in September 2014, estimating completion in about 20 years (2032).

[20] Consistent with the NRC Order dated November 4, 2008, this SNF was shipped to and is in storage at INL; however, General Atomics continues to have title to the SNF. Estimated date of closure is 2019.

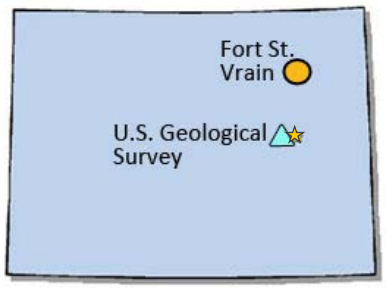
[21] Does not include 98 MTU from San Onofre 1 transferred to Morris, Illinois.

[22] 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, 2016 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.

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

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

COLORADO



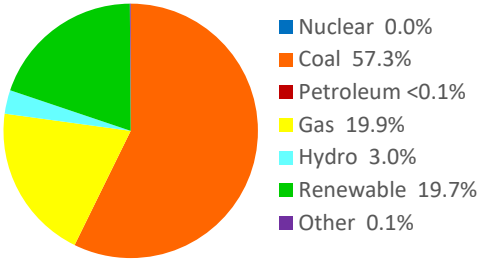
Operating Research Reactor (1 at 1 site)
DOE owned SNF (1 site)

Elected Officials as of January 2018[1,2]

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

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)

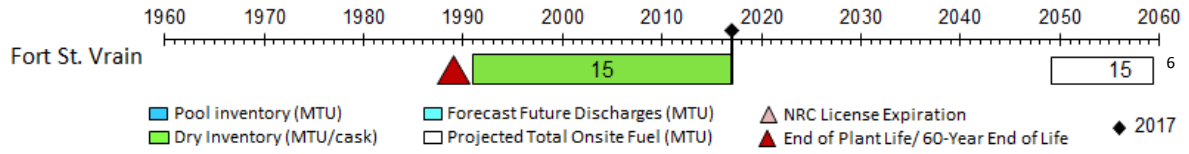


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected
4	Fort St. Vrain	DOE	Ken Buck (R)	1973-1989/ DECON completed	HTGR/ Shutdown	1991-2031/ SL	23[4]
7	US Geological Survey (USGS)	USGS	Ed Perlmutter (D)	1969- [5]	R&TRF TRIGA Mark I/ Operating		

COMMERCIAL SPENT FUEL ONSITE INVENTORY[6]

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

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 May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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.

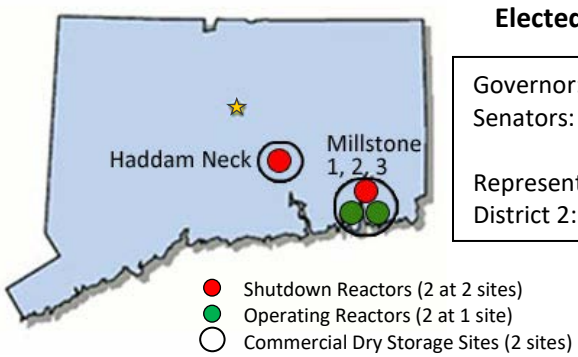
4 Includes 8.6 MTU transferred to INL.

5 Being evaluated by NRC for license renewal.

6 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, 2016 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.

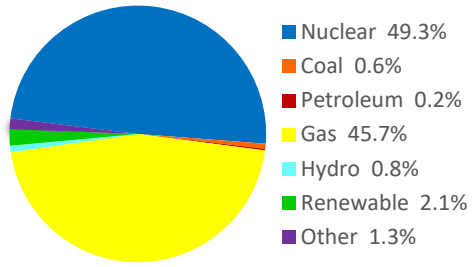
CONNECTICUT



Elected Officials as of January 2018[1,2]

Governor:	Dan Malloy (D)
Senators:	Richard Blumenthal (D)
	Chris Murphy (D)
Representative:	
District 2:	Joe Courtney (D)

2017 Electricity Generation Mix[3]
(includes utilities and independent power producers)

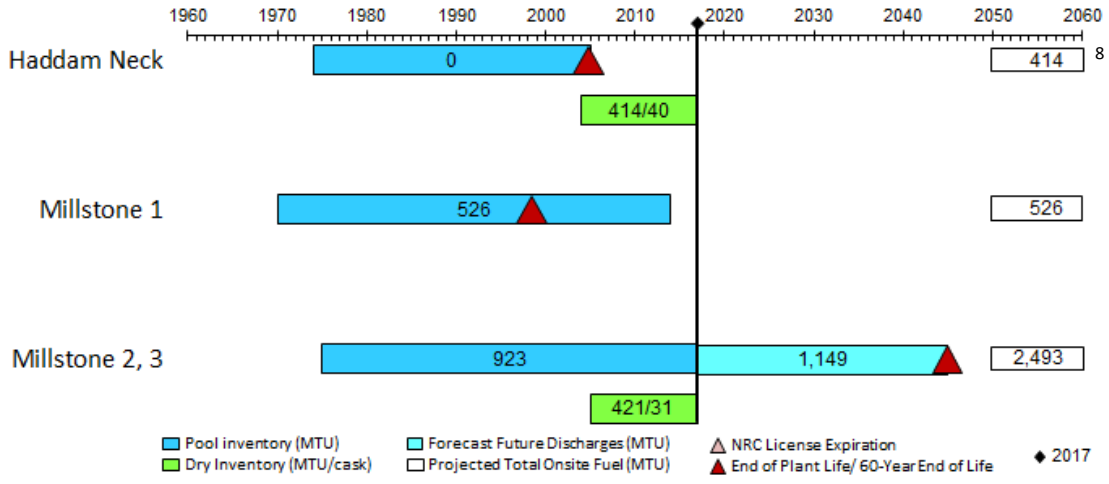


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
2	Haddam Neck	Connecticut Yankee Atomic Power	Joe Courtney (D)	1967-1996 DECON completed	PWR/Shutdown	2004/GL Stranded	448[5-6]
	Millstone 1	Dominion Generation		1970-1998 SAFSTOR[7]	BWR/Shutdown		526
	Millstone 2			1975-2035	PWR/Operating	2005/GL	1,075
	Millstone 3			1986-2045	PWR/Operating		1,418

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

Dry: 834 MTU in 71 casks **Pool: 1,449 MTU** **Total: 2,283 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[9]	
$749.9 million paid	**$180.0 million one-time fee owed**

[1] Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

[2] Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

[3] Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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] SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

[5] Includes 34 MTU transferred to Morris, Illinois.

[6] Includes 0.41 MTU transferred to Idaho National Laboratory.

[7] Estimated date for closure is December 31, 2056.

[8] Does not include 34 MTU transferred to Morris, Illinois.

[9] 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, 2016 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.

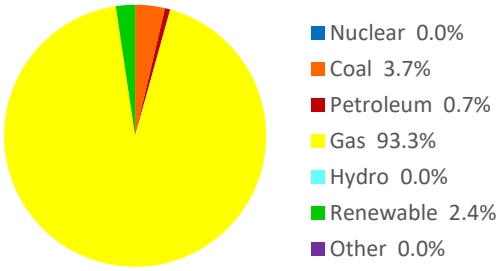
DELAWARE

Elected Officials as of January 2018[1,2]

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

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)



1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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

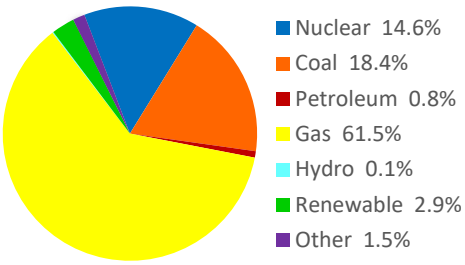
Shutdown Reactor (1 at 1 site)
Operating Reactors (4 at 2 sites)
Commercial Dry Storage Sites (2 sites)
Operating Research Reactor (1 at 1 site)

Elected Officials as of January 2018[1,2]

Governor:	Rick Scott (R)
Senators:	Bill Nelson (D)
	Marco Rubio (R)
Representatives:	
District 3:	Ted Yoho (R)
District 11:	Dan Webster (R)
District 18:	Brian Mast (R)
District 27:	Ileana Ros-Lehtinen (R)

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)

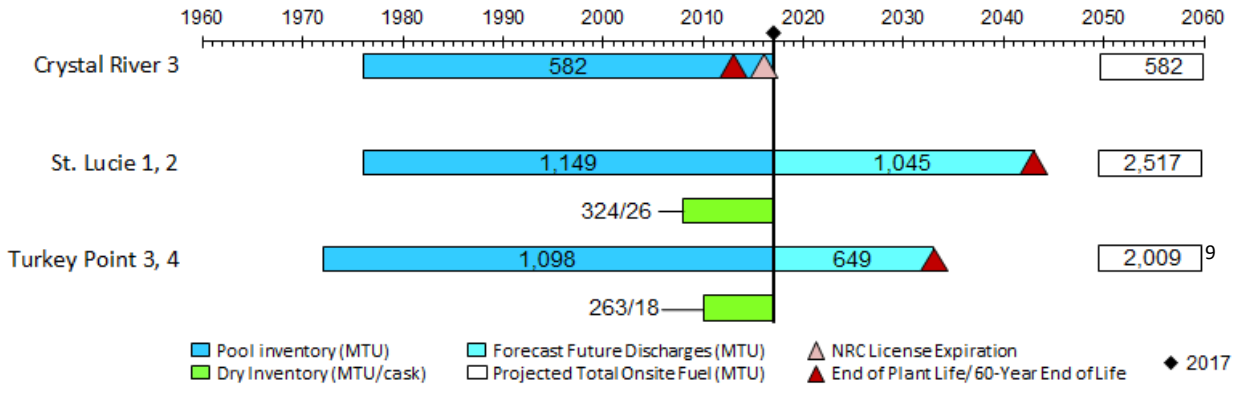


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
3	University of Florida	University of Florida	Ted Yoho (R)	1959- [5]	R&TRF Argonaut/ Operating		
11	Crystal River 3[6]	Duke Energy Florida, Inc.	Dan Webster (R)	1977-2016[7] SAFSTOR in progress	PWR/ Early shutdown		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		Ileana Ros-Lehtinen (R)	1972-2032	PWR/Operating	2010/GL	996[8]
	Turkey Point 4			1973-2033	PWR/Operating		1,022

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

Dry: 586 MTU in 44 casks **Pool: 2,829 MTU** **Total: 3,416 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[10]	
$887.0 million paid	**$0.0 million one-time fee owed**

[1] Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

[2] Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

[3] Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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] SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

[5] Being evaluated by NRC for license renewal.

[6] This was the third plant built as part of the 4,700-acrew Crystal River Energy Complex. There are also four fossil fuel power plants on the site.

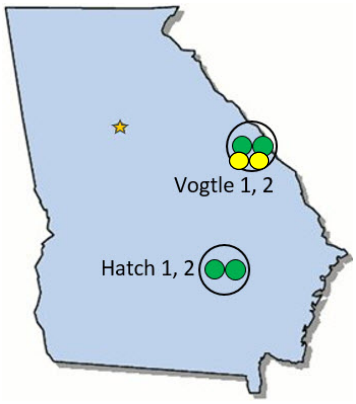
[7] Crystal River has been offline since 2009 and was permanently shutdown February 20, 2013. Its NRC operating license was to have expired in 2016. Estimated date for closure is 2074, at which time the site will be available for unrestricted use.

[8] Includes 8 MTU transferred to Idaho National Lab.

[9] Does not include 8 MTU transferred to Idaho National Lab.

[10] 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, 2016 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.

GEORGIA



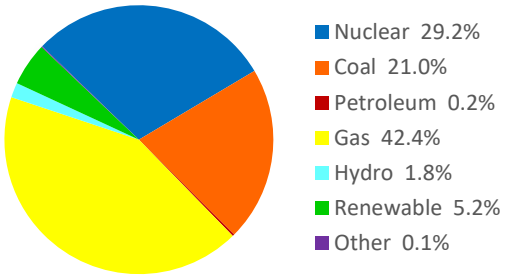
Reactors Under Construction (2 at 1 site)
Operating Reactors (4 at 2 sites)
Commercial Dry Storage Site (2 sites)

Elected Officials as of January 2018[1,2]

Governor:	Nathan Deal (R)
Senators:	John Isakson (R)
	David Perdue (R)
Representatives:	
District 1:	Buddy Carter (R)
District 12:	Rick Allen (R)

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)

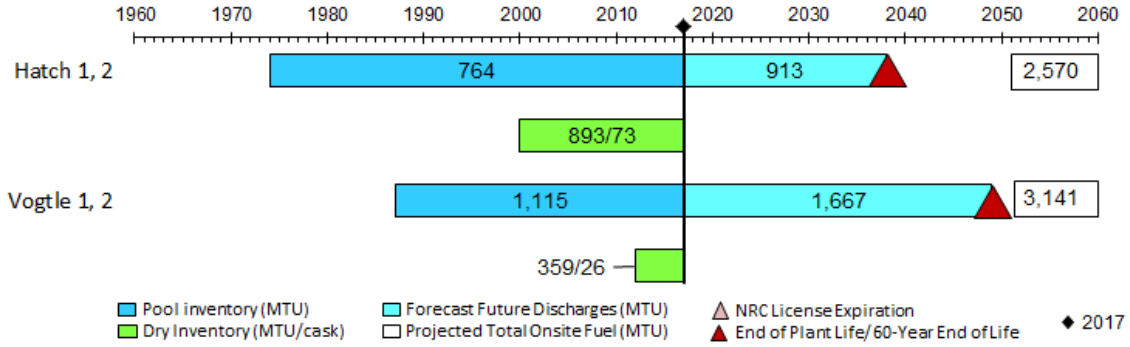


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
1	Hatch 1	Southern Nuclear Operating Co.	Buddy Carter (R)	1974-2034	BWR/Operating	2000/GL	1,249
	Hatch 2			1978-2038	BWR/Operating		1,321
12	Vogtle 1		Rick Allen (R)	1987-2047	PWR/Operating	2012/GL	1,591
	Vogtle 2			1989-2049	PWR/Operating		1,550
	Vogtle 3			2019/Planned	PWR/Under Construction		
	Vogtle 4			2020/Planned	PWR/Under Construction		

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

Dry: 1,252 MTU in 99 casks **Pool: 1,879 MTU** **Total: 3,131 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[5]	
$846.1 million paid	**$0.0 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

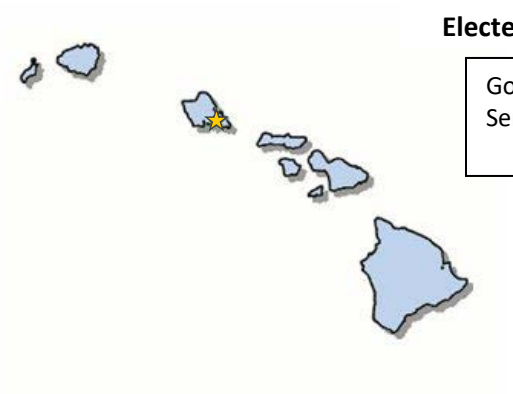
2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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] SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

[5] 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, 2016 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

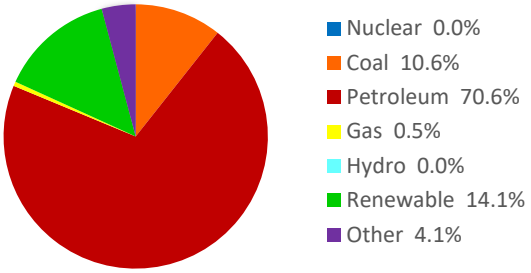


Elected Officials as of January 2018[1,2]

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

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)



1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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

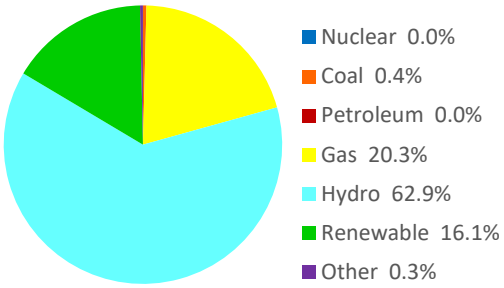
Elected Officials as of January 2018[1,2]

Governor:	Butch Otter (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 HLW at INL
- Surplus Plutonium at INL
- Navy owned SNF at INL

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)

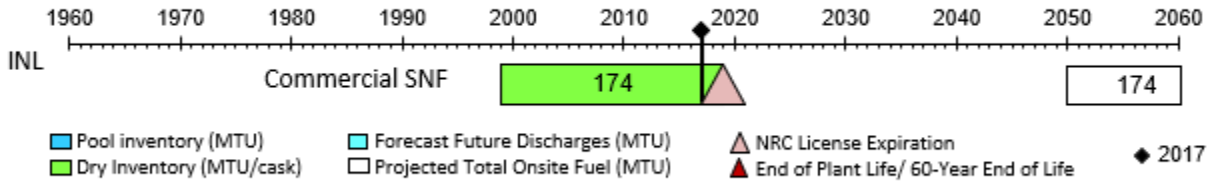


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/ Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
2	Idaho State Univ.	Idaho State Univ.	Mike Simpson (R)	1967-	AGN-201 #103		
	Idaho National Laboratory (INL)[5-7]	DOE[17]		1948-	National Laboratory		
	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		
	INL: Materials and Fuels Complex[9]					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	DOE		1999-2019[13]	Dry storage	1999/SL[14]	See Note[15]
	INL Idaho Spent Fuel Facility (ISFF)			Licensed, but not yet constructed[16]	Dry storage	2004/SL	0
	Naval Reactors Facility	NNSA[17]			Various		

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

Dry: 174 MTU **Pool: 0 MTU** **Total: 174 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[18]	
$0.0 million paid	**$0.0 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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 this report. 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 123 MTHM of SNF from DOE and other sources for a total of 280 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 16 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 DOE submitted an application for license renewal March 2017.

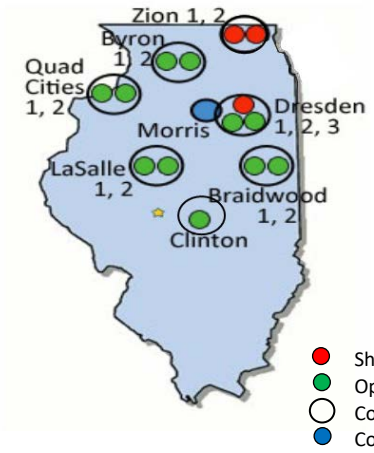
15 Contains Three Mile Island 2 fuel debris.

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

17 DOE Regulated Facilities.

18 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, 2016 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



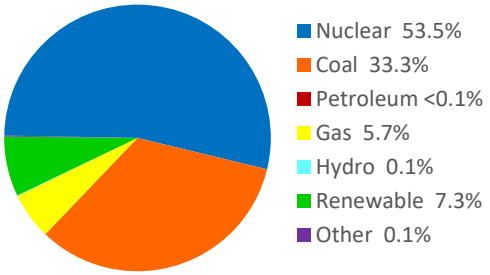
Shutdown Reactors (3 at 2 sites)
Operating Reactors (11 at 6 sites)
Commercial Dry Storage Sites (7 sites)
Commercial Pool Storage Site (1 site)

Elected Officials as of January 2018[1,2]

Governor:	Bruce Rauner (R)
Senators:	Richard Durbin (D)
	Tammy Duckworth (D)
Representatives:	
District 10:	Brad Schneider (D)
District 13:	Rodney Davis (R)
District 16:	Adam Kinzinger (R)
District 17:	Cheri Bustos (D)

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)

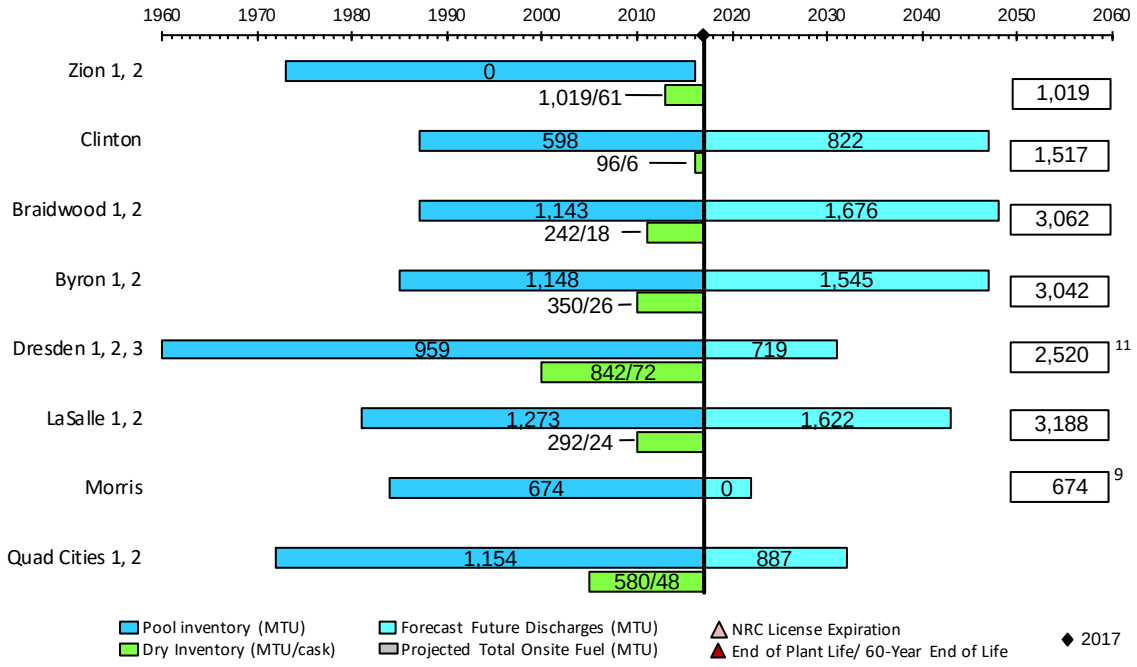


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
10	Zion 1	Zion Solutions	Brad Schneider (D)	1973-1997/ DECON in progress	PWR/Shutdown[5]	2014/GL Stranded	524
	Zion 2			1973-1996/ DECON in progress	PWR/Shutdown[5]		495
13	Clinton	Exelon Generation Co., LLC	Rodney Davis (R)	1987-2026	BWR/Operating	2016/GL[6]	1,517
16	Braidwood 1		Adam Kinzinger (R)	1987-2026	PWR/Operating	2011/GL	1,462
	Braidwood 2			1988-2027	PWR/Operating		1,600
	Byron 1			1985-2024	PWR/Operating	2010/GL	1,510
	Byron 2			1987-2026	PWR/Operating		1,533
	Dresden 1			1959-1978 SAFSTOR, DECON in progress	BWR/Shutdown	2000/GL	91[7]
	Dresden 2			1991-2029	BWR/Operating		1,366[8]
	Dresden 3			1971-2031	BWR/Operating		1,209
	LaSalle 1			1982-2022	BWR/Operating	2010/GL	1,550
	LaSalle 2			1983-2023	BWR/Operating		1,638
	Morris	GE-Hitachi Nuclear Energy Americas LLC		1984-2022	SNF Storage		674[9-10]
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[4]

Dry: 3,422 MTU in 255 casks **Pool: 6,951 MTU** **Total: 10,373 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[12]	
$2,261.2 million paid[13]	**$1,024.3 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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 SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

5 Permanently shutdown February 13, 1998. Estimated date for closure 2020.

6 The Clinton IFSI began operating after the Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)] was issued.

7 Includes 0.26 MTU transferred to Idaho National Laboratory.

8 Includes 145 MTU transferred to Morris.

9 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**

10 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.

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

[12] 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, 2016 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.

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

INDIANA

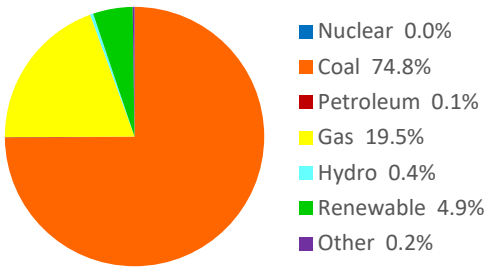
Operating Research Reactor (1 at 1 site)

Elected Officials as of January 2018[1,2]

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

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)



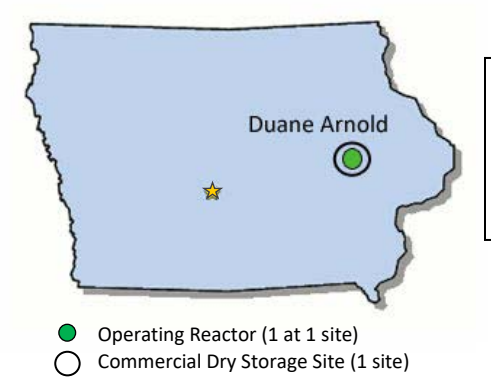
Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected
4	Purdue University	Purdue University	Todd Rokita (R)	1962-	R&TRF Lockheed/ Operating		

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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



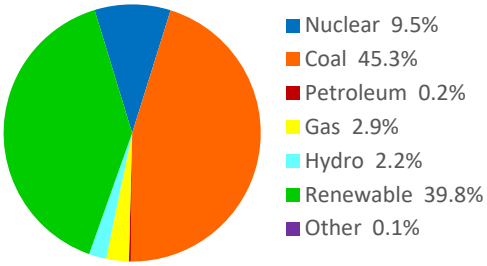
Operating Reactor (1 at 1 site)
Commercial Dry Storage Site (1 site)

Elected Officials as of January 2018[1,2]

Governor:	Kim Reynolds (R)
Senators:	Charles Grassley (R)
	Joni Ernst (R)
Representative:	
District 1:	Rod Blum (R)

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)

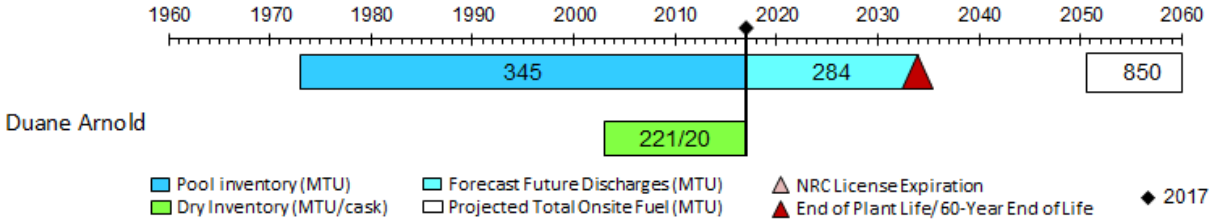


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
1	Duane Arnold	NextEra Energy Duane Arnold, LLC	Rod Blum (R)	1974-2034	BWR/Operating	2003/GL	850

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

Dry: 221 MTU in 20 casks **Pool: 345 MTU** **Total: 566 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[5]	
$137.1 million paid	**$0.0 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

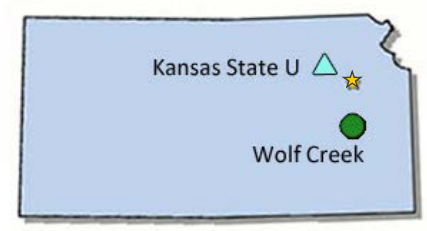
2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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 SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

5 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, 2016 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



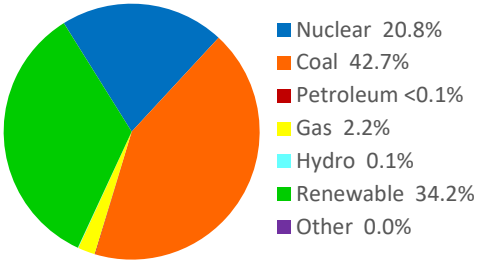
Operating Reactor (1 at 1 site)
Operating Research Reactor (1 at 1 site)

Elected Officials as of January 2018[1,2]

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

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)

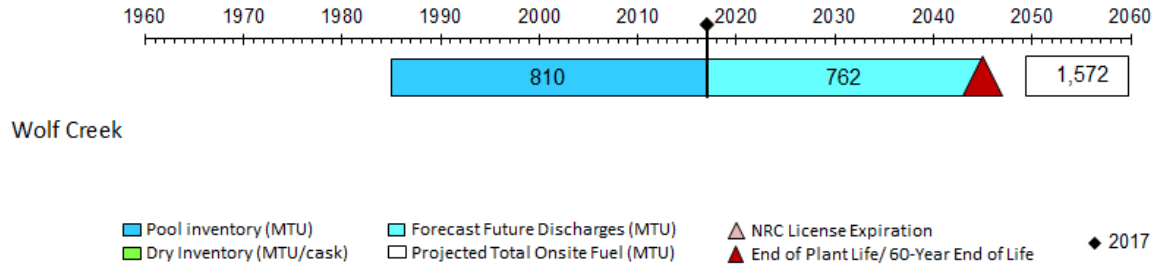


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
1	Kansas State University	Kansas State University	Roger Marshall (R)	1962-	R&TRF TRIGA/Operating		
2	Wolf Creek	Wolf Creek Nuclear Operating Co.	Lynn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

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

Dry: 0 MTU **Pool: 810 MTU** **Total: 810 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[5]	
$225.3 million paid	**$0.0 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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 SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

5 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, 2016 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.

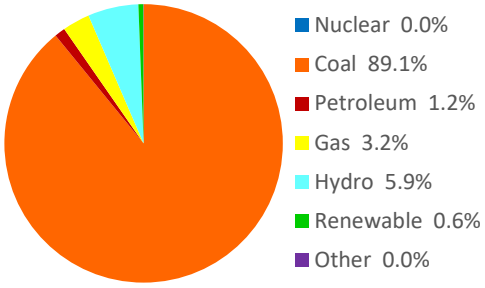
KENTUCKY

Elected Officials as of January 2018[1,2]

Governor:	Matt Bevin (R)
Senators:	Mitch McConnell (R)
	Rand Paul (R)

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)



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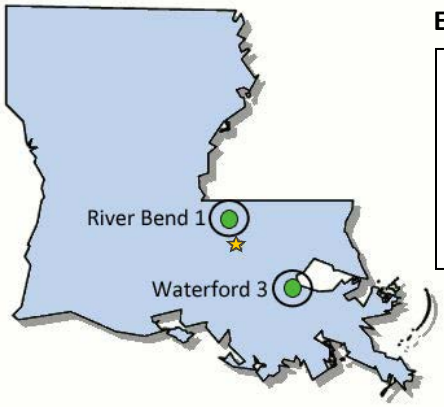
1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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

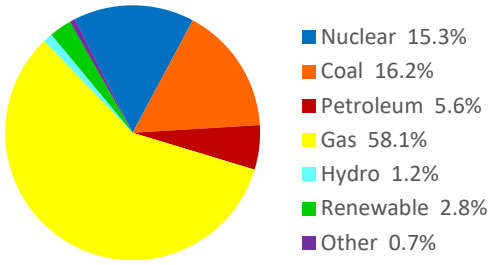


Operating Reactors (2 at 2 sites)
Commercial Dry Storage Sites (2 sites)

Elected Officials as of January 2018[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)

2017 Electricity Generation Mix[3]
(includes utilities and independent power producers)

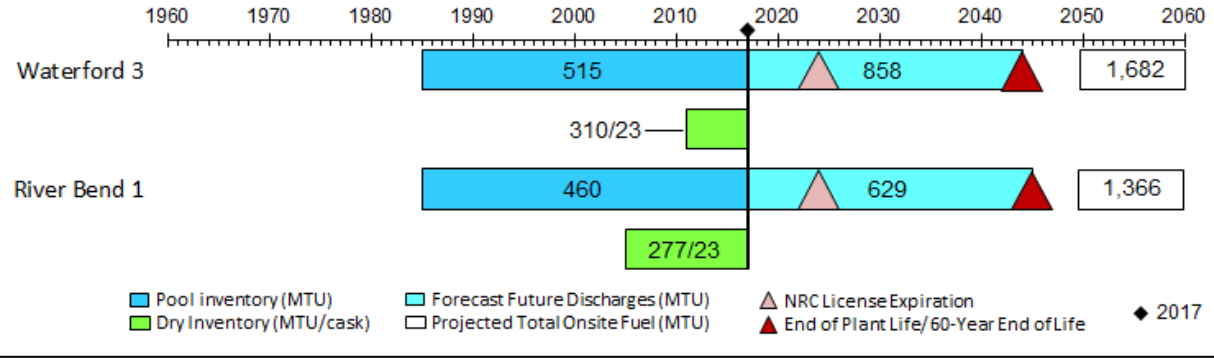


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
2	Waterford 3	Entergy Operations, Inc.	Cedric Richmond (D)	1985-2024	PWR/Operating	2011/GL	1,682
5	River Bend 1		Ralph Abraham (R)	1985-2025	BWR/Operating	2005/GL	1,366

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

Dry: 587 MTU in 46 casks **Pool: 975 MTU** **Total: 1,562 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[5]	
$407.4 million paid	**$0.0 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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 SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

5 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, 2016 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

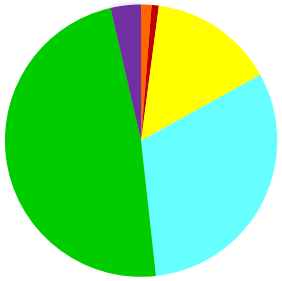
Shutdown Reactor (1 at 1 site)
Commercial Dry Storage Site (1 site)

Elected Officials as of January 2018[1,2]

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

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)

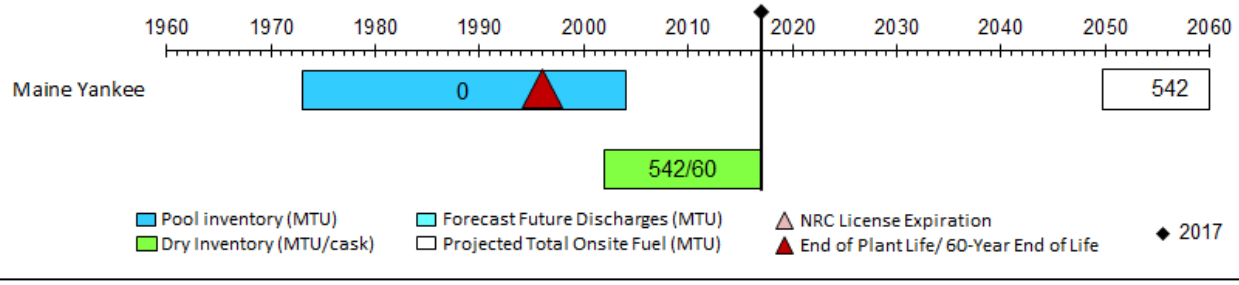


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
1	Maine Yankee	Maine Yankee Atomic Power Co.	Chellie Pingree (D)	1973-1996/ DECON completed	PWR/Shutdown	2002/GL Stranded[5]	542

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

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

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[6]	
$251.9 million paid	**$0.0 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

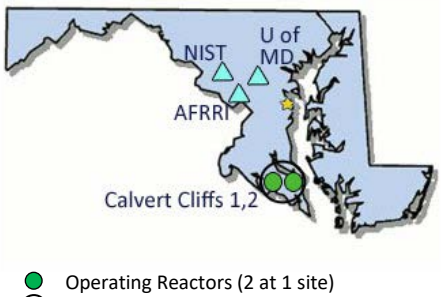
3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

4 SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

5 A stranded ISFSI does not have an active reactor on site.

6 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, 2016 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



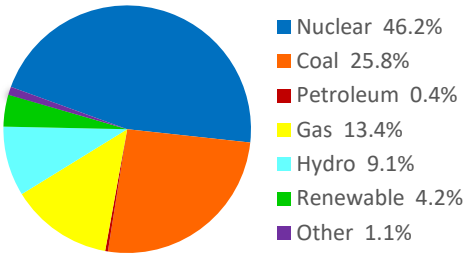
Operating Reactors (2 at 1 site)
Commercial Dry Storage Site (1 site)
Operating Research Reactors (3 at 3 sites)

Elected Officials as of January 2018[1,2]

Governor:	Larry Hogan (R)
Senators:	Chris Van Hollen (D)
	Ben Cardin (D)
Representatives:	
District 5:	Steny H. Hoyer (D)
District 6:	John Delaney (D)
District 8:	Jamie Raskin (D)

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)

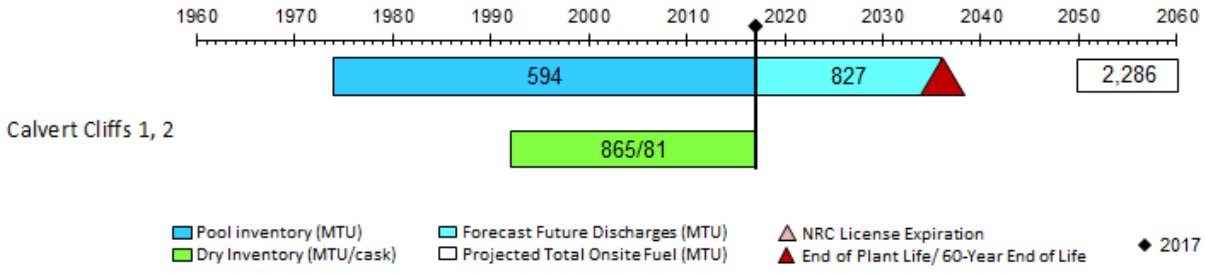


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
5	Calvert Cliffs 1	Constellation Energy	Steny H. Hoyer (D)	1974-2034	PWR/Operating	1992/SL	1,129
	Calvert Cliffs 2			1976-2036	PWR/Operating		1,157
	University of Maryland	University of Maryland		1960- [5]	R&TRF TRIGA/Operating		
6	National Institute of Standards and Technology (NIST)	Commerce Department	John Delaney (D)	1970-	R&TRF Nuclear Test/ Operating		
8	Armed Forces Radiobiology Research Institute (AFRRI)	DOD	Jamie Raskin (D)	1962- [5]	R&TRF TRIGA/Operating		

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

Dry: 865 MTU in 81 casks **Pool: 594 MTU** **Total: 1,459 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[6]	
$426.4 million paid	**$0.0 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

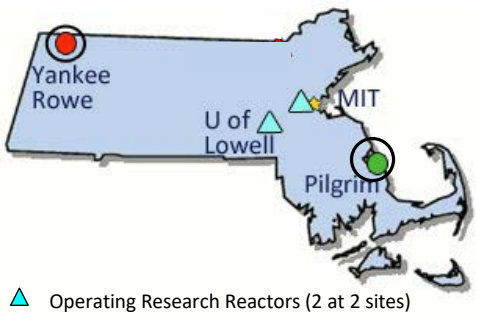
3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

4 SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

5 Additional 20 year license renewal issued on January 4, 2017 and July 23, 2018.

[6] 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, 2016 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.

MASSACHUSETTS



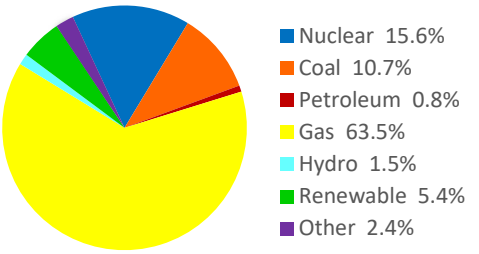
△ Operating Research Reactors (2 at 2 sites)
● Shutdown Reactor (1 at 1 site)
○ Commercial Dry Storage Site (2 sites)
● Operating Reactor (1 at 1 site)

Elected Officials as of January 2018[1,2]

Governor:	Charlie Baker (R)
Senators:	Elizabeth Warren (D)
	Ed Markey (D)
Representatives:	
District 1:	Richard E. Neal (D)
District 3:	Niki Tsongas (D)
District 7:	Mike Capuano (D)
District 9:	William Keating (D)

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)

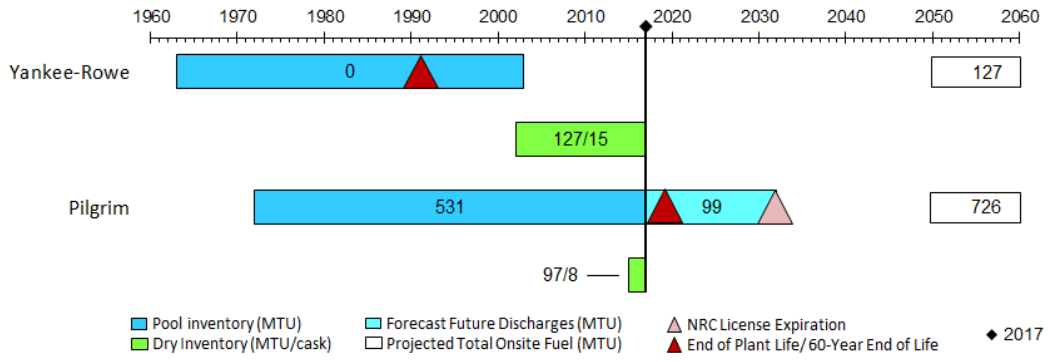


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
1	Yankee-Rowe	Yankee Atomic Electric Co.	Richard E. Neal (D)	1960-1991/ DECON completed	PWR/Shutdown	2002/GL Stranded[5]	127
3	Univ. of Mass.-Lowell	Univ. of Mass.-Lowell	Niki Tsongas (D)	1974- [6]	R&TRF GE Pool/ Operating		
8	Massachusetts Institute of Technology	Massachusetts Institute of Technology	Mike Capuano (D)	1958-	R&TRF HWR Reflected/ Operating		
9	Pilgrim	Entergy Nuclear Operations, Inc.	William Keating (D)	1972-2032[7]	BWR/Operating, Planned early shutdown	2015/GL	726

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

Dry: 224 MTU in 23 casks **Pool: 531 MTU** **Total: 754 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[8]	
$188.4 million paid	**$0.0 million one-time fee owed**

[1] Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

[2] Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

[3] Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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] SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

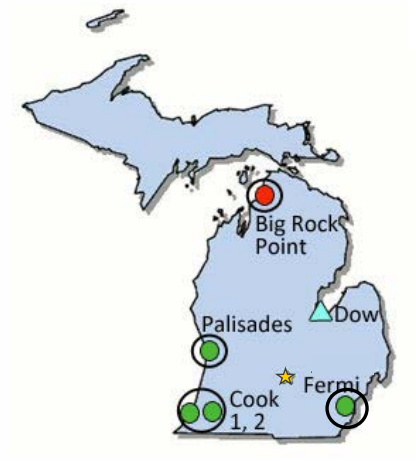
[5] A stranded ISFSI does not have an active reactor on site.

[6] Being evaluated by NRC for license renewal.

[7] Entergy announced on October 13, 2015 that Pilgrim will close no later than June 2019.

[8] 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, 2016 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.

MICHIGAN

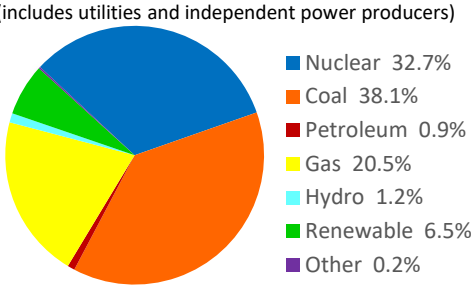


Shutdown Reactor (1 at 1 site)
Operating Reactors (4 at 3 sites)
Commercial Dry Storage Sites (4 sites)
Operating Research Reactor (1 at 1 site)

Elected Officials as of January 2018[1,2]

Governor:	Rick Snyder (R)
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)

2017 Electricity Generation Mix[3]
(includes utilities and independent power producers)

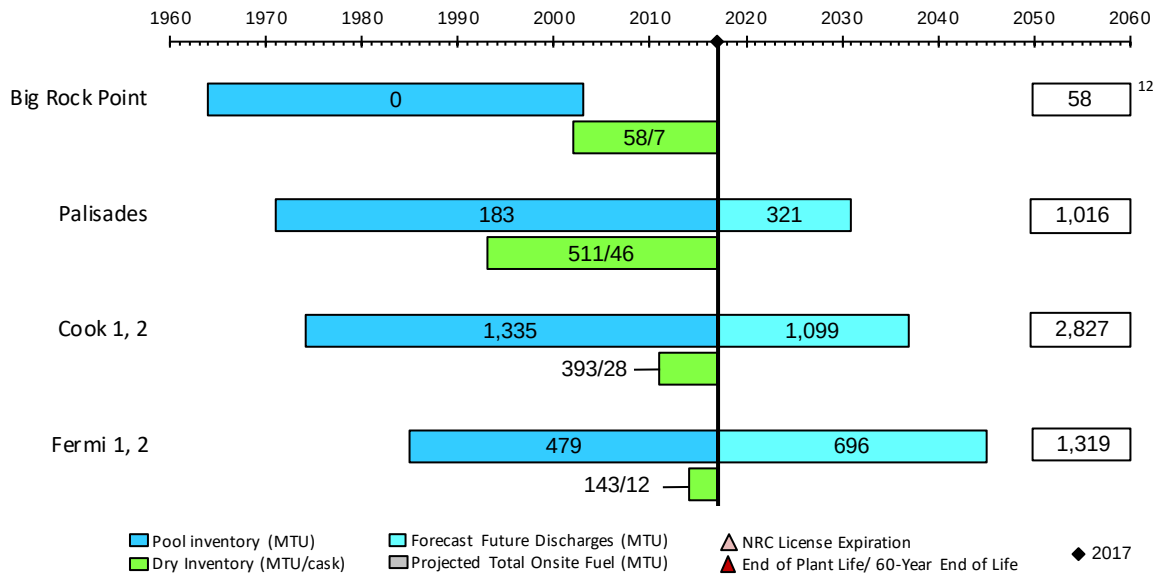


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
1	Big Rock Point	Entergy Nuclear Operations, Inc.	Jack Bergman (R)	1962-1997/ DECON completed	BWR/Shutdown	2002/GL Stranded[5]	69[6]
4	Dow Chemical Co.	Dow Chemical Co.	John Moolenaar (R)	1967- [7]	R&TRF TRIGA Mark 1/ Operating		
6	Palisades	Entergy Nuclear Operations, Inc.	Fred Upton (R)	1971-2031	PWR/Operating	1993/GL	1,016
	Cook 1	Indiana Michigan Power Co.[8]		1974-2034	PWR/Operating	2011/GL	1,488
	Cook 2			1977-2037	PWR/Operating		1,339
12	Fermi 1	DTE Electric Co.[9]	Debbie Dingell (D)	1963-1972/ DECON	SCF/Shutdown[10]		0
	Fermi 2			1985-2025	BWR/ Operating[11]	2016/GL	1,319

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

Dry: 1,106 MTU in 93 casks **Pool: 1,997 MTU** **Total: 3,103 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[13]	
$829.0 million paid	**$266.3 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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 SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

5 A stranded ISFSI does not have an active reactor on site.

6 Includes 11 MTU transferred to Idaho National Laboratory.

7 Reactor ceased operations on July 3, 2003 and fuel was removed in December 2003. Decommissioning plan was approved on June 26, 2006. Decommissioning activities took place 2006-2012.

8 Subsidiary of AEP.

9 Formerly Detroit Edison Company.

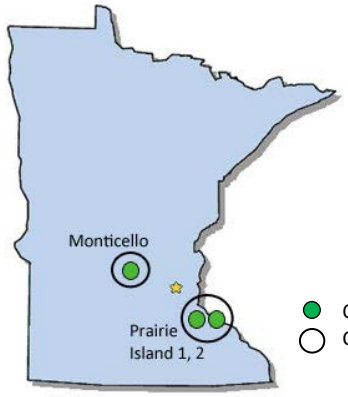
10 Being evaluated by NRC for license renewal.

11 License expires in 2025. Expected closure in 2032.

12 Does not include 11 MTU transferred to Idaho National Laboratory.

13 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, 2016 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.

MINNESOTA



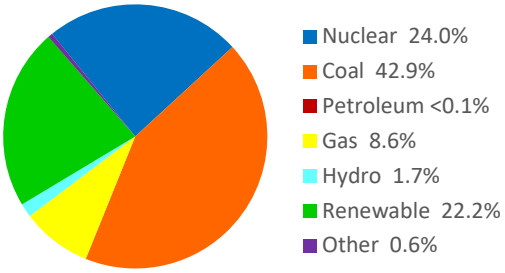
Elected Officials as of January 2018[1,2]

Governor:	Mark Dayton (D)
Senators:	Amy Klobuchar (D)
	Tina Smith (D)
Representatives:	
District 2:	Jason Lewis (R)
District 6:	Tom Emmer (R)

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

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)

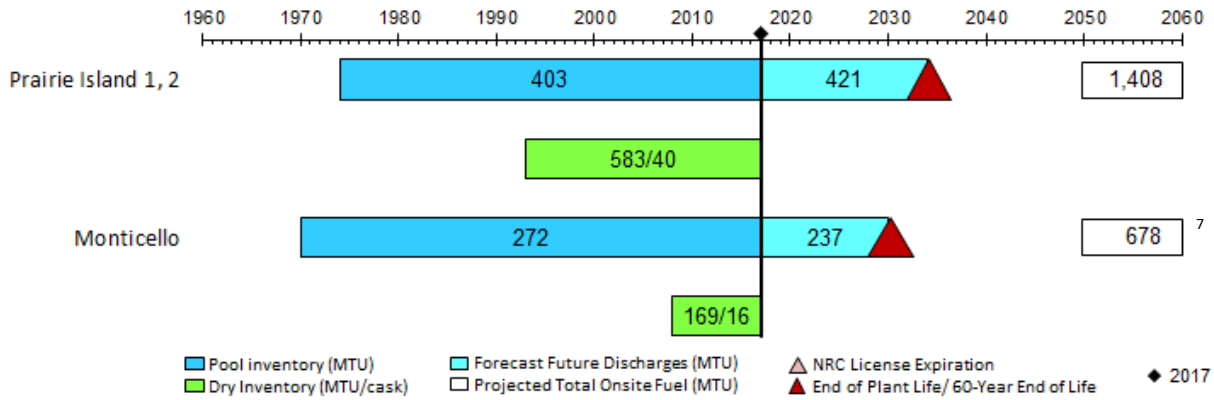


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
2	Prairie Island 1	Northern States Power Co. Minnesota	Jason Lewis (R)	1974-2033	PWR/Operating	1993/SL[5]	661
	Prairie Island 2			1974-2034	PWR/Operating		747
6	Monticello		Tom Emmer (R)	1970-2030	BWR/Operating	2008/GL	876[6]

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

Dry: 753 MTU in 56 casks **Pool: 675 MTU** **Total: 1,428 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[8]	
$449.2 million paid	**$0.0 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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] SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

[5] Northern States Power Company, a Minnesota Corporation, (NSPM), doing business as Xcel Energy, submitted an application to the NRC requesting renewal of Special Nuclear Materials (SNM) license number SNM-2506 for the Prairie Island Nuclear Generating Plant (PINGP) site-specific Independent Spent Fuel Storage Installation (ISFSI) located in Red Wing, Goodhue County.

[6] Includes 198 MTU transferred to Morris (Illinois).

[7] Does not include 198 MTU transferred to Morris (Illinois).

[8] 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, 2016 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.

MISSISSIPPI

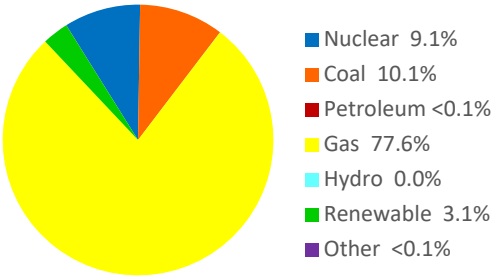
Elected Officials as of January 2018[1,2]

Governor:	Phil Bryant (R)
Senators:	Thad Cochran (R)
	Roger Wicker (R)
Representative:	
District 2:	Bennie Thompson (D)

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

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)

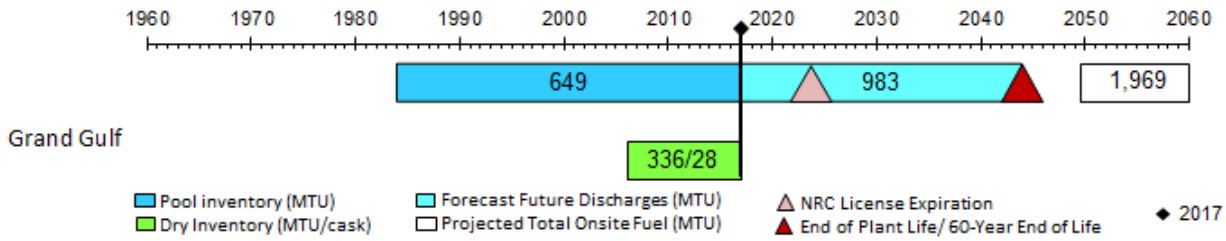


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
2	Grand Gulf	Entergy Operations, Inc.	Bennie Thompson (D)	1984-2024	BWR/Operating	2006/GL	1,969

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

Dry: 336 MTU in 28 casks **Pool: 649 MTU** **Total: 986 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[5]	
$250.4 million paid	**$0.0 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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 SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

5 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, 2016 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

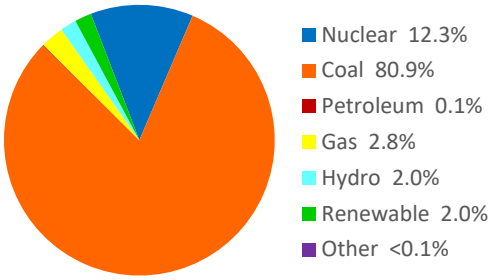
Elected Officials as of January 2018[1,2]

Governor:	Eric Geritens (D)
Senators:	Claire McCaskill (D)
	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)

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)

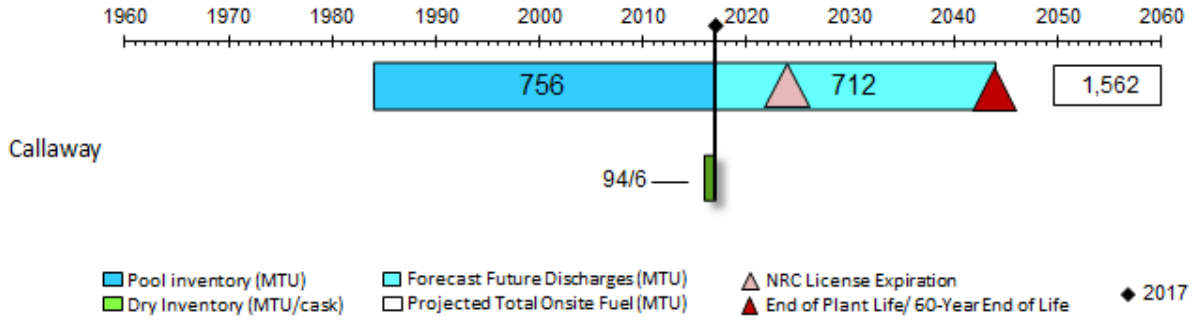


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
3	Callaway	Ameren UE	Blaine Luetkemeyer (R)	1984-2024	PWR/Operating	2015/GL	1,562
4	University of Missouri - Columbia	University of Missouri System	Vicky Hartzler (R)	1966-[5]	R&TRF Tank/ Operating		
8	Missouri University of Science and Technology	University of Missouri	Jason Smith (R)	1961-	R&TRF Pool/Operating		

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

Dry: 94 MTU in 6 casks **Pool: 756 MTU** **Total: 850 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[6]	
$243.1 million paid	**$0.0 million one-time fee owed**

[1] Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

[2] Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

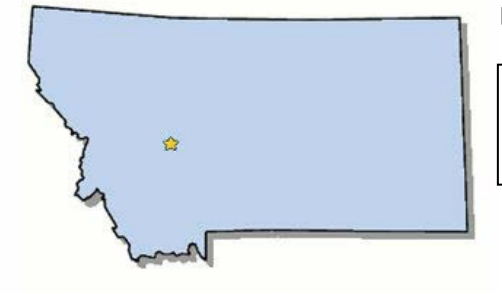
[3] Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

[4] SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

[5] In 2006 applied for license extension to 2026. As of January 5, 2016, being evaluated by NRC for license renewal.

[6] 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, 2016 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

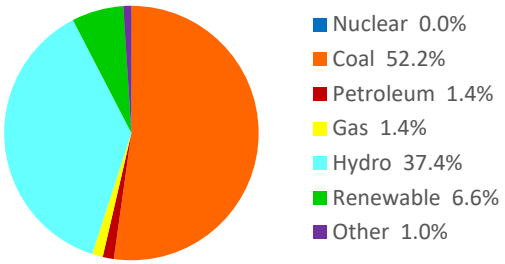


Elected Officials as of January 2018[1,2]

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

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)

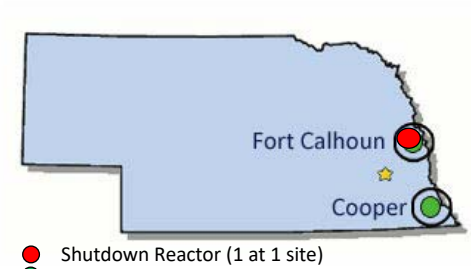


1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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



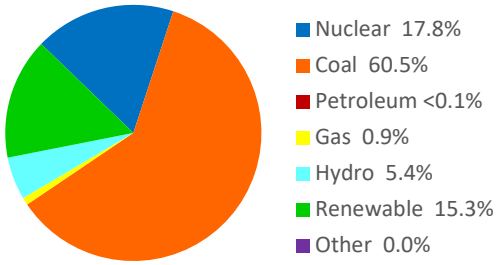
Shutdown Reactor (1 at 1 site)
Operating Reactors (1 at 1 site)
Commercial Dry Storage Sites (2 sites)

Elected Officials as of January 2018[1,2]

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

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)

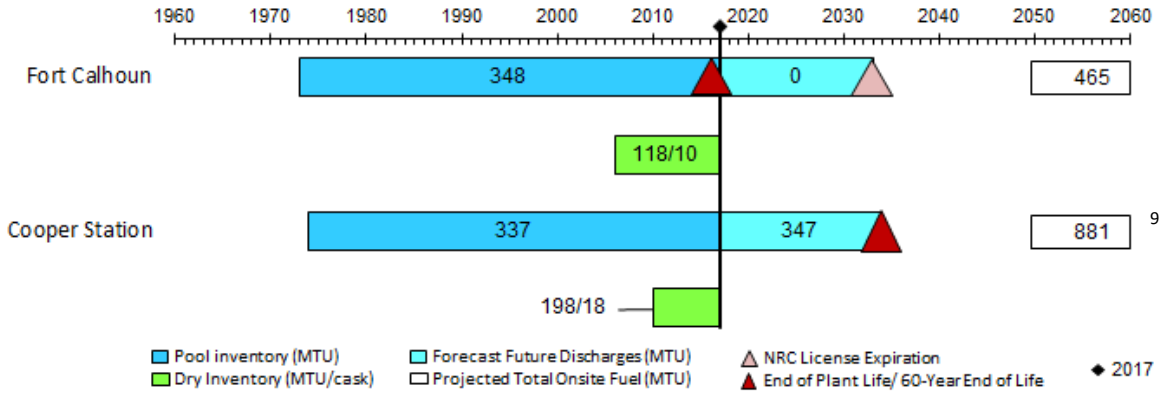


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
1	Fort Calhoun	Omaha Public Power District[5]	Jeff Fortenberry (R)	1973-2033	PWR/Shutdown[6]	2006/GL	465
3	Cooper Station	Nebraska Public Power District[7]	Adrian Smith (R)	1974-2034	BWR/Operating	2010/GL	1,079[8]

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

Dry: 315 MTU in 28 casks **Pool: 684 MTU** **Total: 1,000 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[10]	
$300.2 million paid	**$0.0 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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 SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

5 Operated by Exelon Nuclear Partners.

[6] Operating status deviates from that reported because shutdown occurred after the Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)] was issued. On November 13, 2016 Omaha Public Power district provided the NRC with a Certification of Permanent Removal of Fuel from the Reactor Vessel.

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

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

[9] Does not include 198 MTU transferred to Morris (Illinois).

[10] 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, 2016 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.

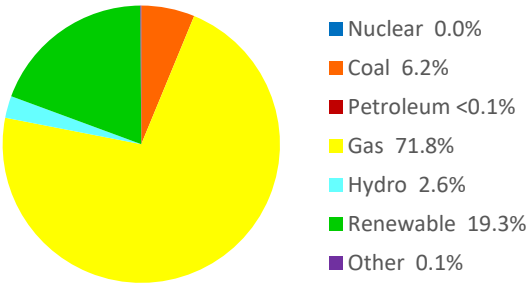
NEVADA

Elected Officials as of January 2018[1,2]

Governor:	Brian Sandoval (R)
Senators:	Catherine Cortez Masto (D)
	Dean Heller (R)

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)

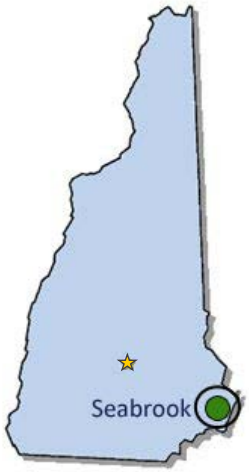


[1] Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

[2] Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

[3] Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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



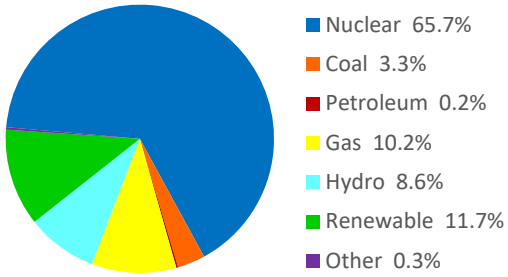
Operating Reactor (1 at 1 site)
Commercial Dry Storage Site (1 site)

Elected Officials as of January 2018[1,2]

Governor:	Chris Sununu (R)
Senators:	Jeanne Shaheen (D)
	Maggie Hassan (D)
Representative:	
District 1:	Carol Shea-Porter

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)

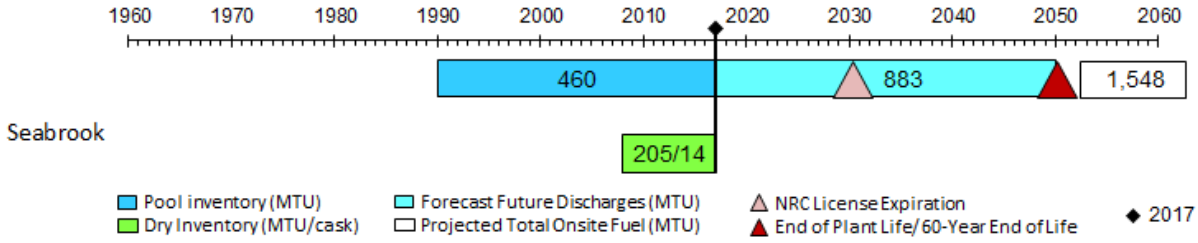


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
1	Seabrook	NextEra Energy Seabrook, LLC	Carol Shea-Porter (D)	1990-2030	PWR/Operating	2008/GL	1,548

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

Dry: 205 MTU in 14 casks **Pool: 460 MTU** **Total: 665 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[5]	
$201.2 million paid	**$0.0 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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 SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

5 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, 2016 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.

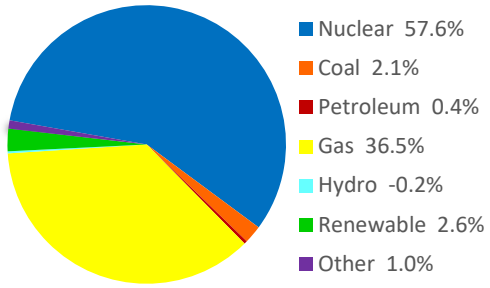
NEW JERSEY

Operating Reactors (4 at 2 sites)
Commercial Dry Storage Sites (2 sites)

Elected Officials as of January 2018[1,2]

Governor:	Phil Murphy (D)
Senators:	Bob Menendez (D)
	Cory Booker (D)
Representatives:	
District 2:	Frank LoBiondo (R)
District 3:	Tom MacArthur (R)

2017 Electricity Generation Mix[3]
(includes utilities and independent power producers)

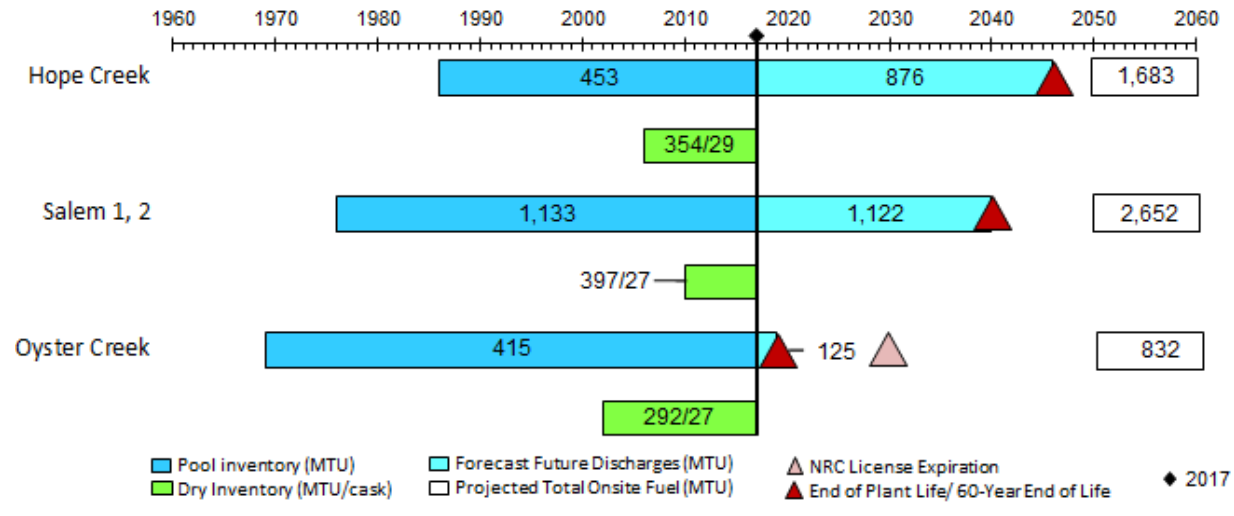


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
2	Hope Creek	PSEG Nuclear LLC	Frank LoBiondo (R)	1986-2046	BWR/Operating	2006/GL	1,683
	Salem 1			1976-2036	PWR/Operating	2010/GL	1,315
	Salem 2			1981-2040	PWR/Operating		1,337
3	Oyster Creek	Exelon Generation Co.	Tom MacArthur (R)	1991-2029[5]	BWR/Operating, Planned early shutdown[5]	2002/GL	832

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

Dry: 1,043 MTU in 83 casks **Pool: 2,000 MTU** **Total: 3,043 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[6]	
$769.6 million paid	**$175.4 million one-time fee owed**

[1] Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

[2] Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

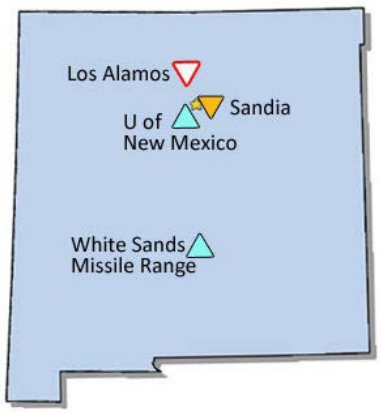
[3] Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

[4] SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

[5] Planned early shutdown at the end of 2019.

[6] 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, 2016 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 MEXICO



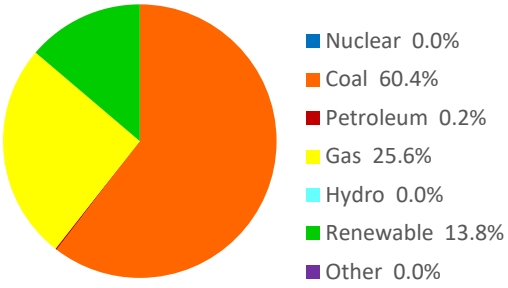
△ Operating Research Reactors (2 at 2 sites)
▽ Sandia National Laboratory
▽ Surplus Plutonium at Los Alamos National Laboratory

Elected Officials as of January 2018[1,2]

Governor:	Susana Martinez (R)
Senators:	Tom Udall (D)
	Martin Heinrich (D)
Representatives:	
District 1:	Michelle Lujan Grisham (D)
District 2:	Steve Pearce (R)
District 3:	Ben R. Luján (D)

2017 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	Michelle Lujan Grisham (D)	1966-	R&TRF AGN-201M #112/ 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]	Steve Pearce (R)	None	R&TRF FBR/ Operating		
3	Los Alamos National Lab	DOE[4]	Ben R. Luján (D)	None	Various		

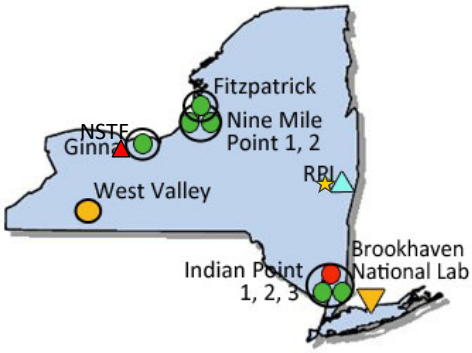
1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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



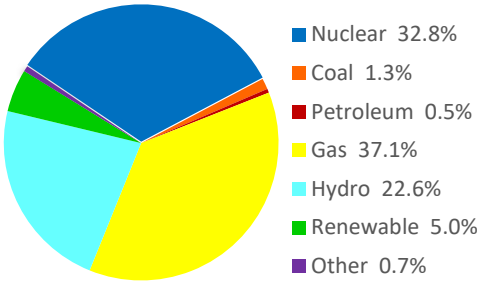
- Shutdown Reactor (1 at 1 site)
- Operating Reactors (6 at 4 sites)
- Commercial Dry Storage Sites (4 sites)
- Operating Research Reactor (1 at 1 site)
- Commercial HLW at West Valley
- Brookhaven National Laboratory
- Shutdown Research Reactor (1 at 1 site)

Elected Officials as of January 2018[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)

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)

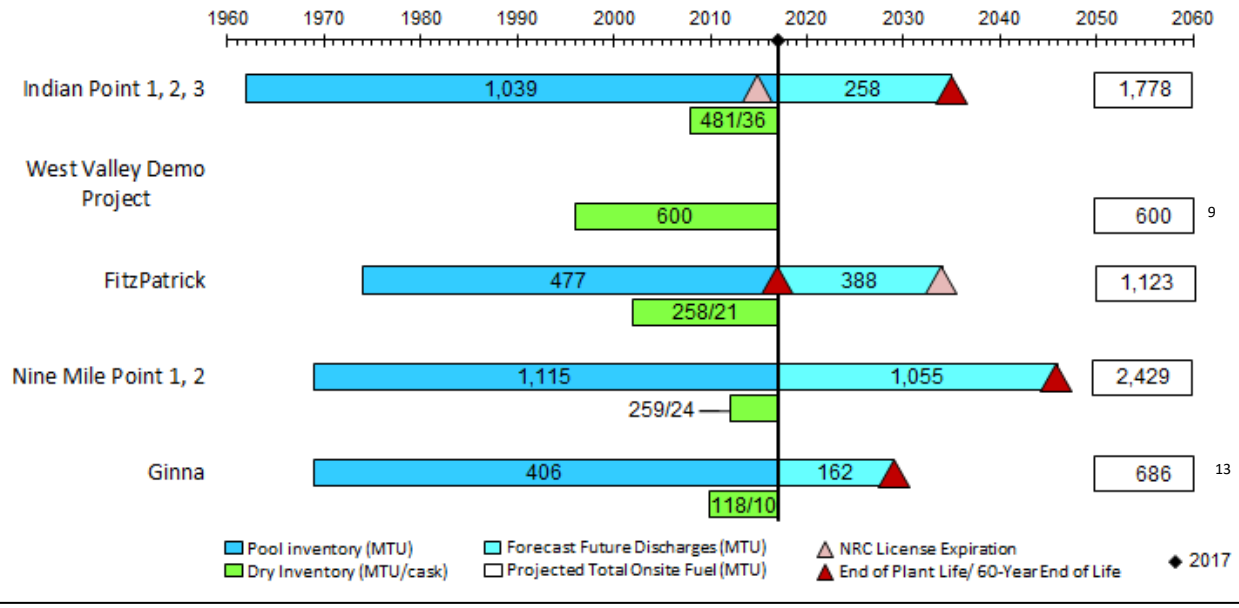


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
1	Brookhaven National Lab	DOE[5]	Lee Zeldin (R)	None	Various		
17	Indian Point 1	Entergy Nuclear Operations, Inc.	Nita Lowey (D)	1962-1974/ SAFSTOR[6]	PWR/Shutdown	2008/GL	31
	Indian Point 2			1973-2013[7-8]	PWR/Operating		897
	Indian Point 3			1975-2015[7-8]	PWR/Operating		851
20	Rensselaer Polytechnic Institute (RPI)	Rensselaer Polytechnic Institute	Paul D. Tonko (D)	1964-	R&TRF Critical Assembly/ 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[9]
24	Fitzpatrick	Exelon Generation Company, LLC [10]	John Katko (R)	1974-2034	BWR/Operating	2002/GL	1,123
	Nine Mile Point 1	Constellation Energy		1974-2029	BWR/Operating	2012/GL	903
	Nine Mile Point 2			1987-2046	BWR/Operating		1,526
	Ginna	Constellation Energy		1969-2029	PWR/Operating	2010/GL	701[11]
26	Nuclear Science and Technology Facility (NSTF)	State Univ. of NY/SUNY-Buffalo Medical Research Center	Brian Higgins (D)	1964-1994 Possession only[12]	R&TRF/ PULSTAR/ Shutdown		

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

Dry: 1,116 MTU in 91 casks **Pool: 3,036 MTU** **Total: 4,152 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[14]	
$1,011.8 million paid[15]	**$508.2 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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 SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

5 DOE Regulated Facility.

6 Estimated date for closure is 2026.

7 License renewal application submitted 2007.

8 In his January 9, 2017 State of the State Address in NYC, NY Governor Cuomo announced that the state had reached an agreement with Entergy to close the operating reactors at Indian Point in four years.

9 About 600 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. According to the DOE Environmental Management, http://www.wv.doe.gov/website in 2015, the first 20 canisters of HLW were placed in vertical storage canisters and 4 of these were then moved to the outdoor onsite storage pad. The transfer process for the remaining canisters of HLW is ongoing.

10 On March 31, 2017, the NRC amended the license to reflect Exelon's new plant ownership.

11 Includes 15 MTU transferred to the Idaho National Lab.

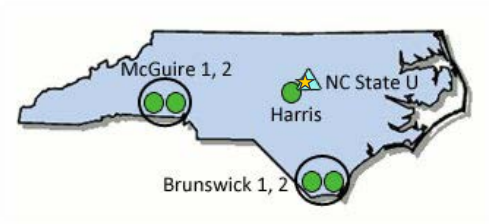
12 Fuel was removed in 2005; closure expected in 2017.

13 Does not include 15 MTU transferred to the Idaho National Lab.

14 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, 2016 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.

15 Does not include fee for Long Island Lighting (Shoreham). Includes One-Time fee paid by Nuclear Fuel Services (NFS) for West Valley.

NORTH CAROLINA

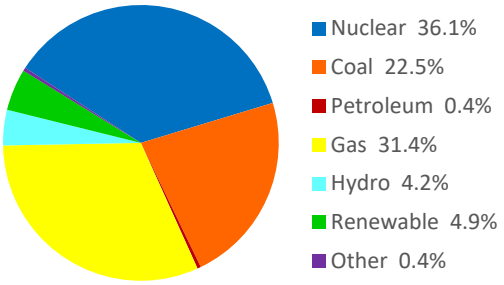


Operating Reactors (5 at 3 sites)
Commercial Dry Storage Sites (2 sites)
Operating Research Reactor (1 at 1 site)

Elected Officials as of January 2018[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:	Robert Pittenger (R)

2017 Electricity Generation Mix[3]
(includes utilities and independent power producers)

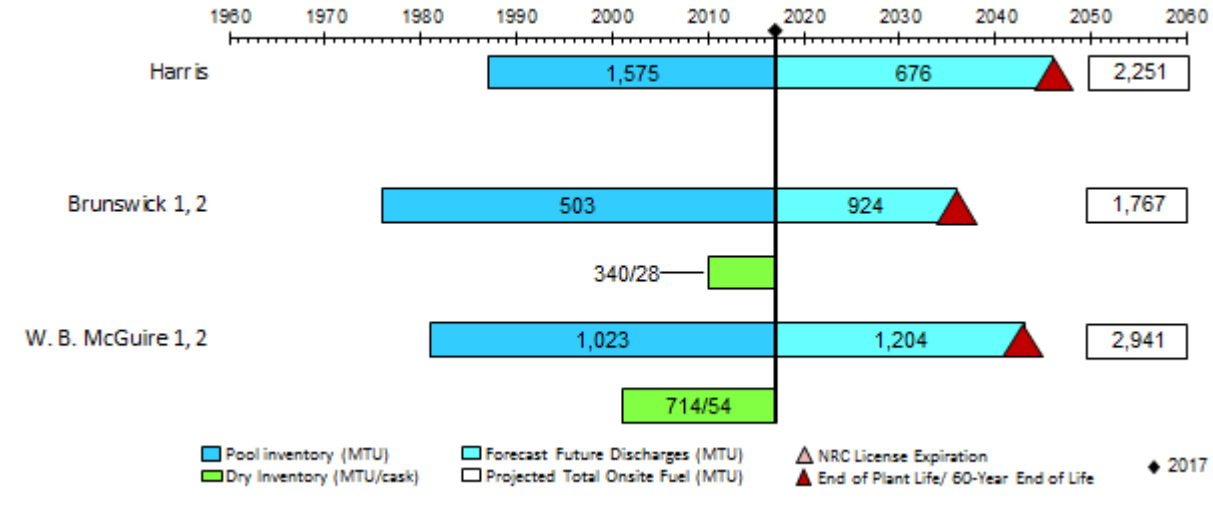


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
4	Harris	Duke Energy Progress, LLC[5]	David Price (D)	1987-2046	PWR/Operating		1,247
7	Brunswick 1		David Rouzer (R)	1976-2036	BWR/Operating	2010/GL	1,218[6]
	Brunswick 2			1974-2034	BWR/Operating		1,200[6]
4	North Carolina State University	North Carolina State University	David Price (R)	1972-	R&TRF Pulstar/ Operating		
9	W. B. McGuire 1	Duke Energy Carolinas, LLC[5]	Robert Pittenger (R)	1981-2041	PWR/ Operating	2001/GL	1,409[7]
	W. B. McGuire 2			1983-2043	PWR/Operating		1,392[7]

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

Dry: 1,054 MTU in 82 casks **Pool: 3,101 MTU** **Total: 4,155 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[13]	
$1,034.6 million paid	**$0.0 million one-time fee owed**

[1] Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

[2] Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

[3] Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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] SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

[5] Subsidiary of Duke Energy Corp.

[6] Total Brunswick 1 and 2 total projected discharged fuel includes 784 MTU that was transferred from Brunswick to Harris and is no longer at the site.

[7] Total McGuire 1 and 2 total projected discharged fuel includes 140 MTU that was transferred to Oconee and is no longer at the site.

[8] Reflects the transfer of 784 MTU in from Brunswick and 219 MTU in from Robinson 2 (South Carolina).

[9] SNF was transferred between Harris, Brunswick, and Robinson 2 (South Carolina). The following table provides the forecasted SNF inventories at Harris and Brunswick, including transfers. Forecasted future discharges are not included. Transfer data is from Table 2-5, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)].

Onsite SNF at Harris (MTU) as of 12/31/2017		Onsite SNF at Brunswick (MTU) as of 12/31/2017	
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	95	Forecast fuel discharges, 1/1/2013 to 12/31/2017	212
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	**1,575**	**Total Forecasted SNF Onsite**	**843**

[10] Reflects the transfer of 784 MTU out to Harris (South Carolina) and 132 MTU in from Robinson 2 (South Carolina).

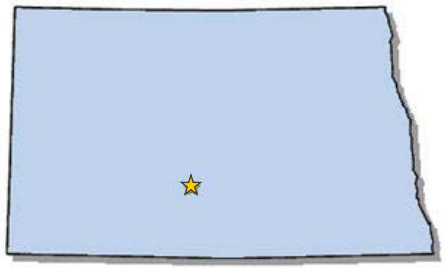
[11] Reflects the transfer of 140 MTU in from Oconee (South Carolina).

[12] SNF was transferred between W. B. McGuire (North Carolina) and Oconee (South Carolina). The following table provides the forecasted SNF inventories at Harris and Brunswick, including transfers. Forecasted future discharges are not included. Transfer data is from Table 2-5, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)].

Onsite SNF at McGuire as of 12/31/2017	
Fuel discharges onsite as of 12/31/2012	1365
Forecast fuel discharges, 1/1/2013 to 12/31/2017	233
SNF transferred in from Oconee	140
Total Forecasted SNF Onsite	**1,737**

[13] 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, 2016 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.

NORTH DAKOTA

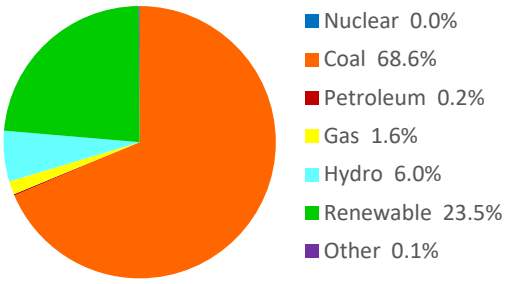


Elected Officials as of January 2018[1,2]

Governor:	Doug Burgum (R)
Senators:	John Hoeven (R)
	Heidi Heitkamp (D)

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)



1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

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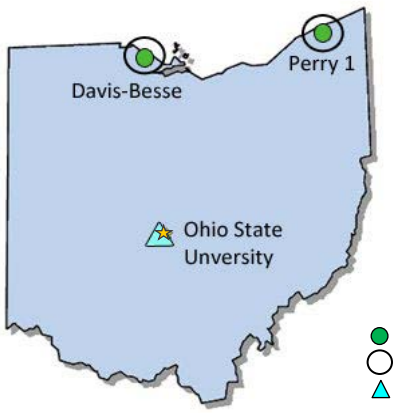
OHIO



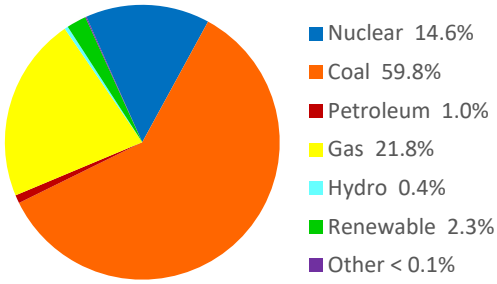
Operating Reactors (2 at 2 sites)
Commercial Dry Storage Sites (2 sites)
Operating Research Reactor (1 at 1 site)

Elected Officials as of January 2018[1,2]

Governor:	John Kasich (R)
Senators:	Sherrod Brown (D)
	Rob Portman (R)
Representatives:	
District 3:	Joyce Beatty (D)
District 9:	Marcy Kaptur (D)
District 14:	David Joyce (R)

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)

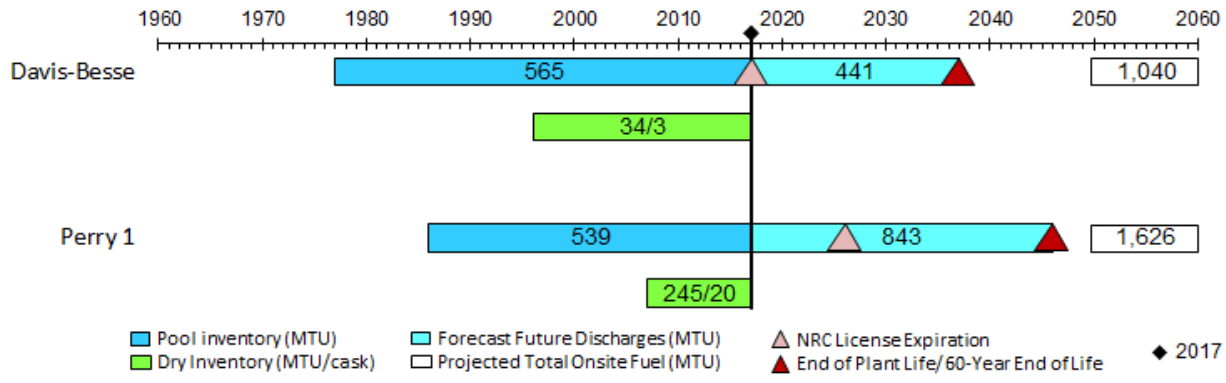


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
3	Ohio State University	Ohio State University	Joyce Beatty (D)	1961-	R&TRF Pool/Operating		
9	Davis-Besse	First Energy Nuclear Operating Co.	Marcy Kaptur (D)	1977-2037[5]	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[4]

Dry: 279 MTU in 23 casks **Pool: 1,104 MTU** **Total: 1,383 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[6]	
$381.5 million paid	**$32.8 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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] SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

[5] Twenty-year license extension approved 12/08/2015.

[6] 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, 2016 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.

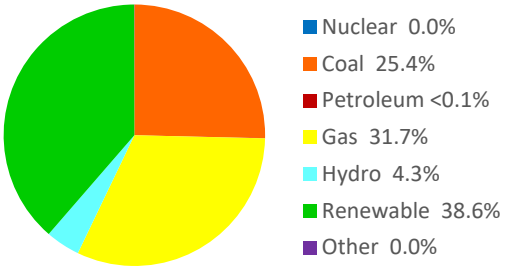
OKLAHOMA

Elected Officials as of January 2018[1,2]

Governor:	Mary Fallin (R)
Senators:	James Inhofe (R)
	James Lankford (R)

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)

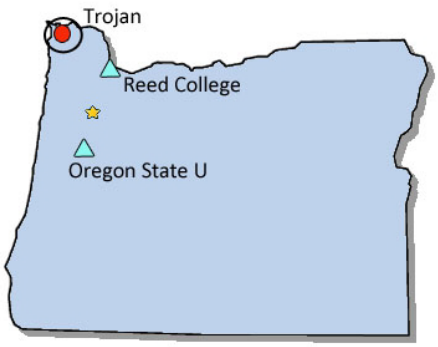


1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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



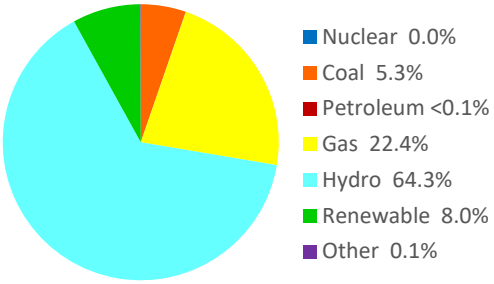
Elected Officials as of January 2018[1,2]

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)

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)

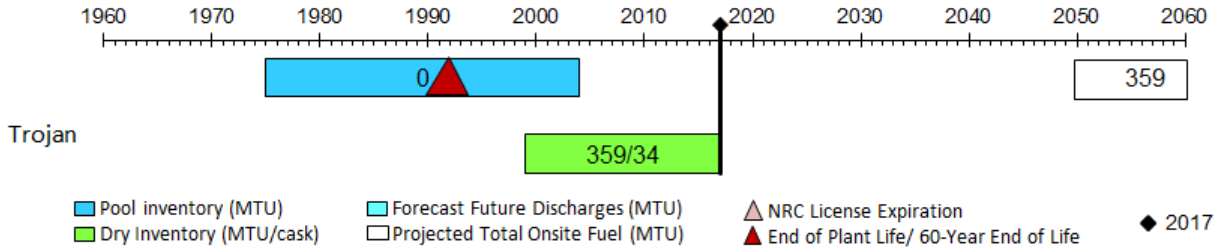


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
1	Trojan	Portland General Electric Corp.	Suzanne Bonamici (D)	1975-1992 Terminated[5]	PWR/ Decommissioned	1999/SL Stranded[6]	359
3	Reed College	Reed College	Earl Blumenauer (D)	1968-	R&TRF TRIGA Mark I/ Operating		
4	Oregon State University	Oregon State University	Peter DeFazio (D)	1967-	R&TRF TRIGA Mark II/ Operating		

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

Dry: 359 MTU in 34 casks **Pool: 0 MTU** **Total: 359 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



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 May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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.

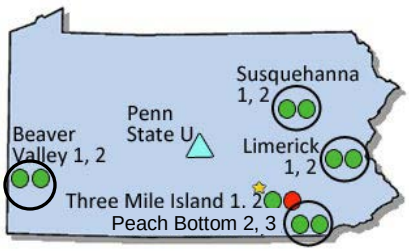
4 SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

5 NRC license is terminated when all decommissioning activities have been completed and the site is released for unrestricted use.

[6] A stranded ISFSI does not have an active reactor on site.

[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, 2016 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

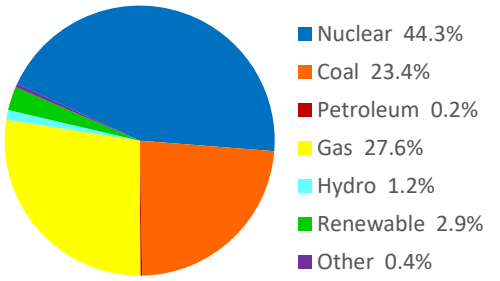


- Shutdown Reactor (1 at 1 site)
- Operating Reactors (9 at 5 sites)
- Commercial Dry Storage Sites (4 sites)
- Operating Research Reactor (1 at 1 site)

Elected Officials as of January 2018[1,2]

Governor:	Tom Wolf (D)
Senators:	Bob Casey, Jr. (D)
	Pat Toomey (R)
Representatives:	
District 4:	Scott Perry (R)
District 5:	Glenn W. Thompson (R)
District 6:	Ryan Costello (R)
District 11:	Lou Barletta (R)
District 12:	Keith Rothfus (R)
District 15:	Charles W. Dent (R)

2017 Electricity Generation Mix[3]
(includes utilities and independent power producers)

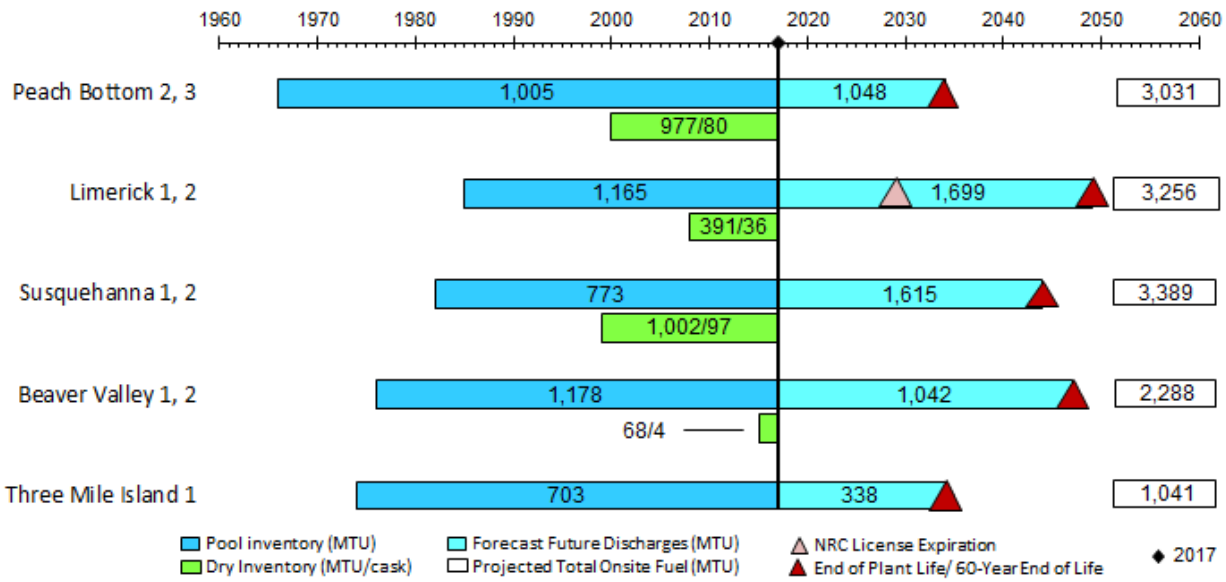


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
4	Peach Bottom 1	Exelon Generation Co., LLC	Scott Perry (R)	1967-1974/ SAFSTOR	BWR/Shutdown		
	Peach Bottom 2			1973-2033	BWR/Operating	2000/GL	1,516[5]
	Peach Bottom 3			1974-2034	BWR/Operating		1,515
5	Pennsylvania State University	Pennsylvania State University	Glenn W. Thompson (R)	1955-	R&TRF TRIGA/ Operating		
6	Limerick 1	Exelon Generation Co., LLC	Ryan Costello (R)	1985-2024	BWR/Operating	2008/GL	1,635
	Limerick 2			1989-2029	BWR/Operating		1,620
11	Susquehanna 1	Susquehanna Nuclear, LLC	Lou Barletta (R)	1982-2042	BWR/Operating	1999/GL	1,675
	Susquehanna 2			1984-2044	BWR/Operating		1,714
12	Beaver Valley 1	First Energy Nuclear Operating Co.	Keith Rothfus (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	Charles W. Dent (R)	1974-2034	PWR/Operating		1,041
	Three Mile Island 2			1978-1979[6]	PWR//Shutdown		See Note[7]

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

Dry: 2,438 MTU in 217 casks **Pool: 4,824 MTU** **Total: 7,262 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[8]	
$1,946.9 million paid	**$89.4 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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 SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

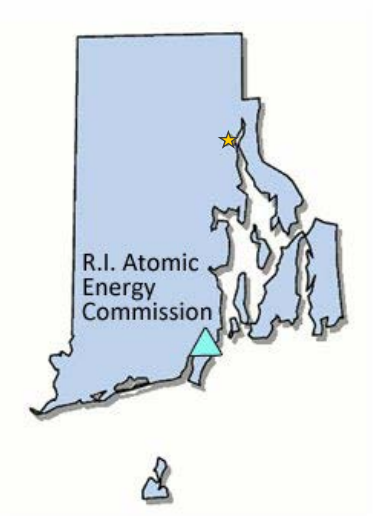
5 Includes 0.38 MTU transferred to Idaho National Laboratory.

6 Unit 2 in post-defueling monitored storage mode until both units are ready for decommissioning.

7 Three Mile Island Unit 2 fuel shipped to Idaho National Laboratory.

8 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, 2016 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.

RHODE ISLAND

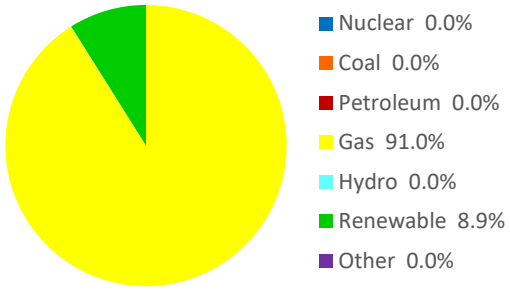


△ Operating Research Reactor (1 at 1 site)

Elected Officials as of January 2018[1,2]

Governor:	Gina Raimondo (R)
Senators:	Jack Reed (D)
	Sheldon Whitehouse (D)
Representative:	
District 2:	Jim Langevin (D)

2017 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	Jim Langevin (D)	1964-[4]	R&TRF GE Pool/ Operating		

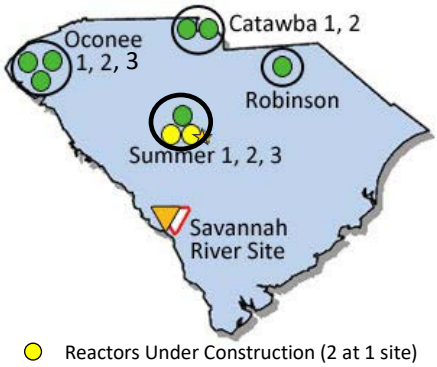
1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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 Being evaluated by NRC for license renewal.

SOUTH CAROLINA

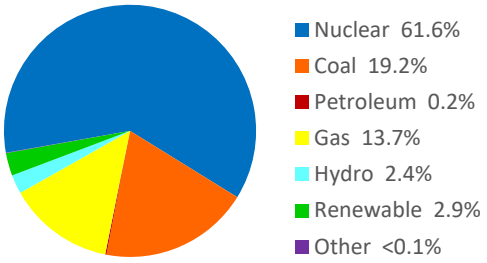


- Reactors Under Construction (2 at 1 site)
- Operating Reactors (7 at 4 sites)
- Commercial Dry Storage Sites (4 sites)
- DOE owned SNF and HLW at Savannah River Site
- Surplus Plutonium at Savannah River Site

Elected Officials as of January 2018[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)

2017 Electricity Generation Mix[3]
(includes utilities and independent power producers)

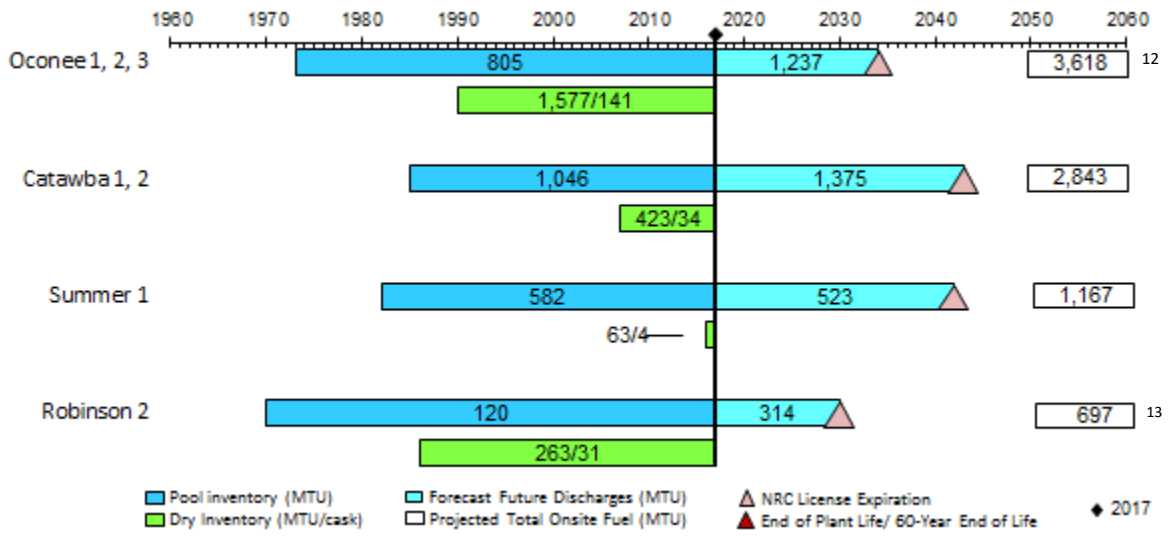


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
2	Savannah River Site	DOE[5]	Joe Wilson (R)		Various		See Note [15]
3	Oconee 1	Duke Energy Carolinas[6]	Jeff Duncan (R)	1973-2033	PWR/Operating	1990/SL 1999/GL	1,241[7]
	Oconee 2			1973-2033	PWR/Operating		1,267[7]
	Oconee 3			1974-2034	PWR/Operating		1,250[7]
5	Catawba 1		Ralph Norman (R)	1985-2043	PWR/Operating	2007/GL	1,437
	Catawba 2			1986-2043	PWR/Operating		1,406
	Summer 1	South Carolina Electric & Gas[8]		1982-2042	PWR/Operating	2016/GL	1,167
	Summer 2			2019/Planned	PWR/Under Construction		
	Summer 3			2020/Planned	PWR/Under Construction		
7	Robinson 2	Duke Energy Progress, LLC[6]	Tom Rice (R)	1970-2030	PWR/Operating	1986/SL 2005/GL	1,049[9-11]

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

Dry: 2,326 MTU in 210 casks **Pool: 2,552 MTU** **Total: 4,878 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[14]	
$1,498.7 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 May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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 SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

5 DOE Regulated Facility.

6 Subsidiary of Duke Energy Corp.

7 Total Oconee 1,2, and 3 total projected discharged fuel includes 140 MT transferred to McGuire and is no longer at the site.

8 Subsidiary of SCANA Corp.

9 Includes 0.44 MTU transferred to Idaho National Laboratory.

10 Includes 132 MTU transferred to Brunswick (North Carolina).

11 Includes 219 MTU transferred to Harris (North Carolina).

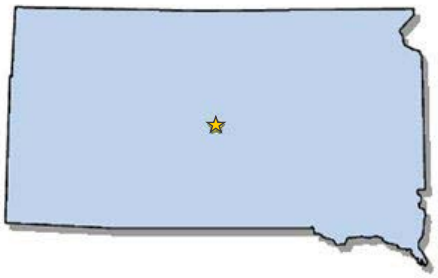
12 Reflects the transfer of 140 MTU to McGuire (North Carolina).

13 Reflects the transfer of 132 MTU to Brunswick (North Carolina) and 219 MTU to Harris (North Carolina).

14 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, 2016 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.

15 SRS has approximately 29 MT from DOE sources.

SOUTH DAKOTA

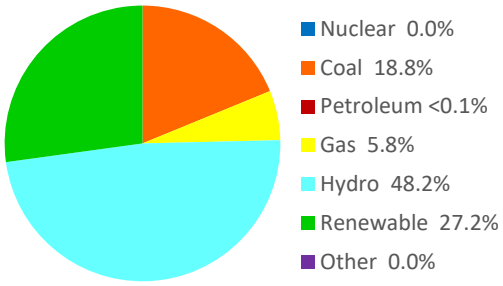


Elected Officials as of January 2018[1,2]

Governor:	Dennis Daughaard (R)
Senators:	Mike Rounds (R)
	John Thune (R)

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)

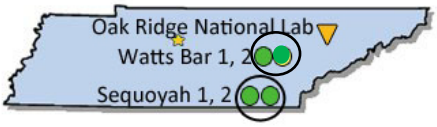


1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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

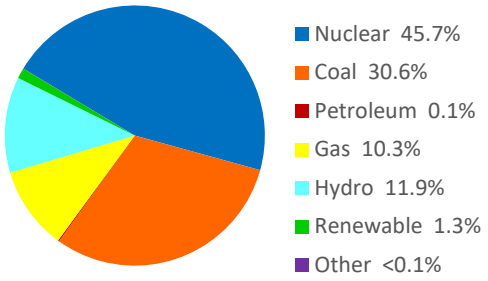


- Operating Reactors (4 at 2 sites)
- Commercial Dry Storage Site (1 site)
- DOE owned SNF at Oak Ridge

Elected Officials as of January 2018[1,2]

Governor:	Bill Haslam (R)
Senators:	Lamar Alexander (R)
	Bob Corker (R)
Representatives:	
District 3:	Chuck Fleischmann (R)
District 4:	Scott DesJarlais (R)

2017 Electricity Generation Mix[3]
(includes utilities and independent power producers)

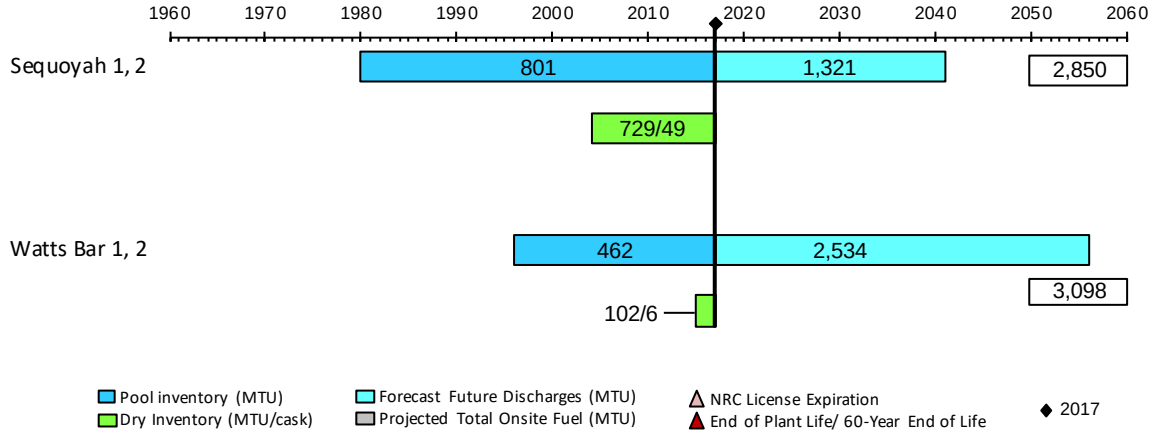


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
3	Sequoyah 1	Tennessee Valley Authority	Chuck Fleischmann (R)	1980-2020	PWR/Operating	2004/GL	1,386
	Sequoyah 2			1981-2021	PWR/Operating		1,465
	Oak Ridge National Lab	DOE[5]		None	Various		
	ORNL: High Flux Isotope Reactor (HFIR)			mid-1960s	Test reactor		See Note [8]
4	Watts Bar 1	Tennessee Valley Authority	Scott DesJarlais (R)	1996-2035	PWR/Operating	2016/GL[6]	1,592
	Watts Bar 2			2015-2055	PWR/Operating		1,506

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

Dry: 831 MTU in 55 casks **Pool: 1,263 MTU** **Total: 2,094 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



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 May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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 SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

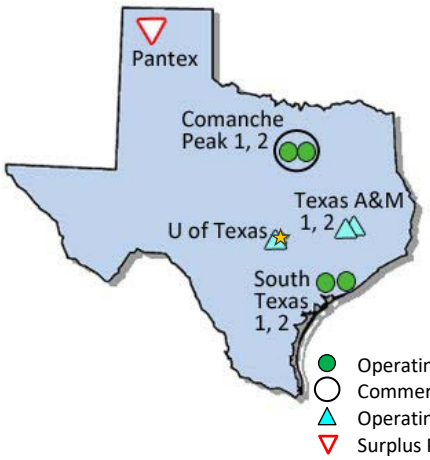
5 DOE Regulated Facility.

6 ISFSI opened after Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2016-000263, Rev 4, DRAFT (2016/06/30) was submitted.

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, 2016 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 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

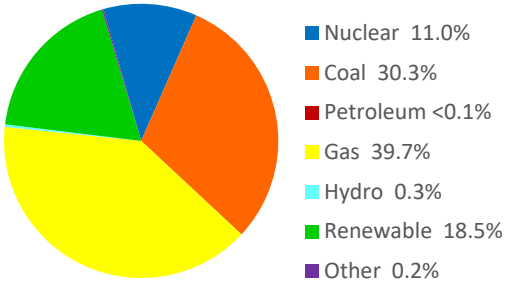


Elected Officials as of January 2018[1,2]

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:	Blake Farenthold (R)

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)

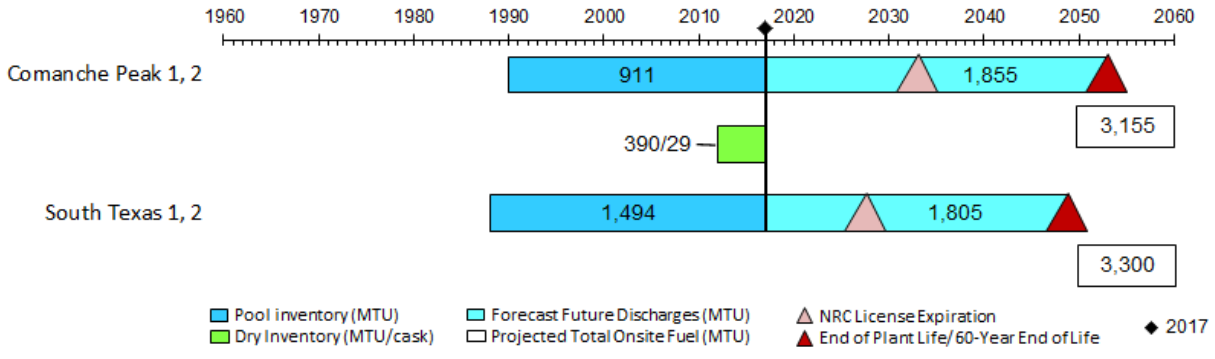


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
10	University of Texas	University of Texas	Michael McCaul (R)	1992-[6]	R&TRF TRIGA Mark II/ Operating		
13	Pantex Plant	DOE-NNSA[5]	Mac Thornberry (R)		Operating		
17	Texas A&M 1	Texas A&M	Bill Flores (R)	1957-[6]	R&TRF AGN-201M #106/ Operating		
	Texas A&M 2			1961-[6]	R&TRF TRIGA/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.	Blake Farenthold (R)	1988-2027	PWR/Operating		1,635
	South Texas 2			1989-2028	PWR/Operating		1,665

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

Dry: 390 MTU in 29 casks **Pool: 2,405 MTU** **Total: 2,795 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



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 May 1, 2017 and July 23, 2018.

[2] Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

[3] Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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.

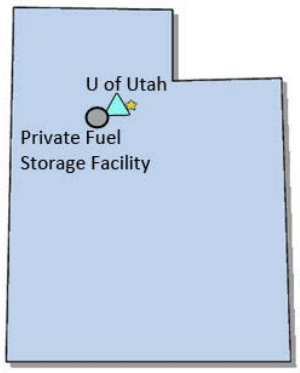
[4] SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

[5] DOE regulated facility.

[6] Being evaluated by NRC for license renewal.

[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, 2016 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.

UTAH

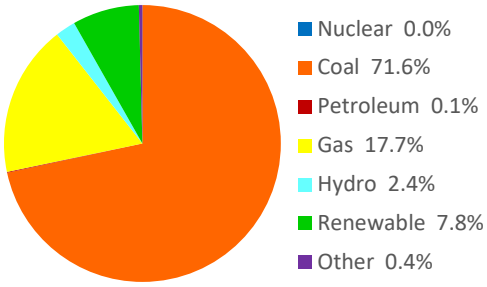


Elected Officials as of January 2018[1,2]

Governor:	Gary Herbert (R)
Senators:	Orrin Hatch (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

2017 Electricity Generation Mix[3]
(includes utilities and independent power producers)



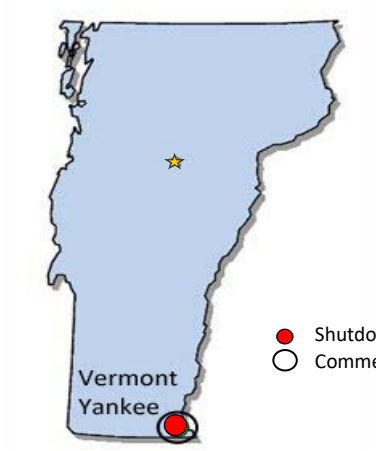
Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected
2	University of Utah	University of Utah	Chris Stewart (R)	1975-	R&TRF TRIGA Mark I/ Operating		

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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

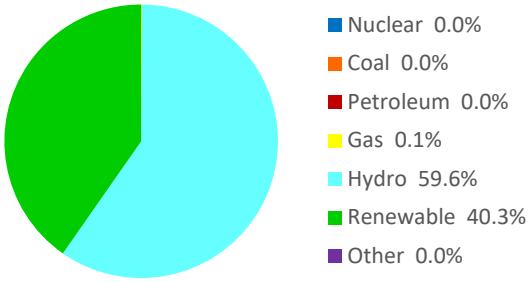


Shutdown Reactor (1 at 1 site)
Commercial Dry Storage Site (1 site)

Elected Officials as of January 2018[1,2]

Governor:	Phil Scott (R)
Senators:	Patrick Leahy (D)
	Bernie Sanders (I)
Representatives:	
District At-Large:	Peter Welch (D)

2017 Electricity Generation Mix[3]
(includes utilities and independent power producers)

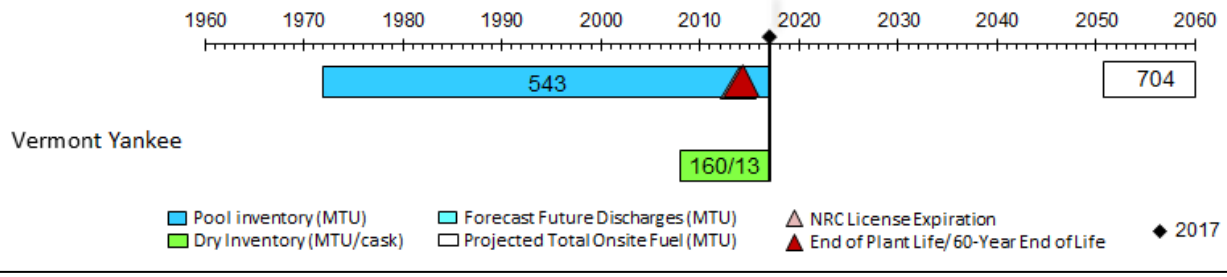


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
1	Vermont Yankee	Entergy Nuclear Operations, Inc.	Peter Welch (D)	1973-2014[5]	BWR/ Early Shutdown	2008/GL	704

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

Dry: 160 MTU in 13 casks **Pool: 543 MTU** **Total: 704 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[6]	
$118.9 million paid	**$145.4 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

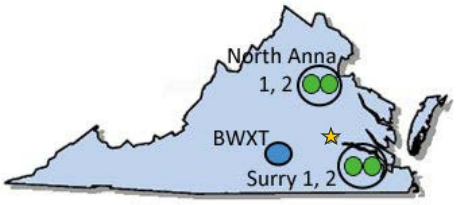
3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. Petroleum includes both liquid and coke. Gas includes both natural gas and other gases. Hydro includes both conventional and pumped storage. Renewable includes wind, biomass, geothermal, and solar. Other includes manufactured, supplemental gaseous fuel, propane, and waste gases.

4 SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

5 On August 27, 2013, Entergy Corporation announced that it planned to shutdown Vermont Yankee. The plant went offline on December 29, 2014.

6 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, 2016 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

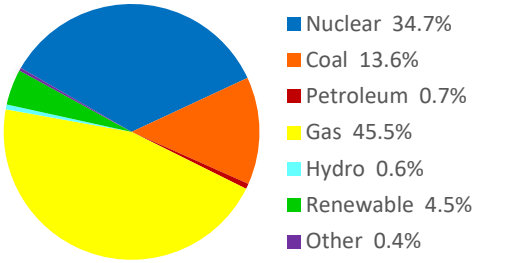


Operating Reactors (4 at 2 sites)
Commercial Dry Storage Sites (2 sites)
Commercial Pool Storage Site (1 site)

Elected Officials as of January 2018[1,2]

Governor:	Ralph Northam (D)
Senators:	Mark Warner (D)
	Tim Kaine (D)
Representatives:	
District 3:	Robert C. Scott (D)
District 6:	Bob Goodlatte (R)
District 7:	Dave Brat (R)

2017 Electricity Generation Mix[3]
(includes utilities and independent power producers)

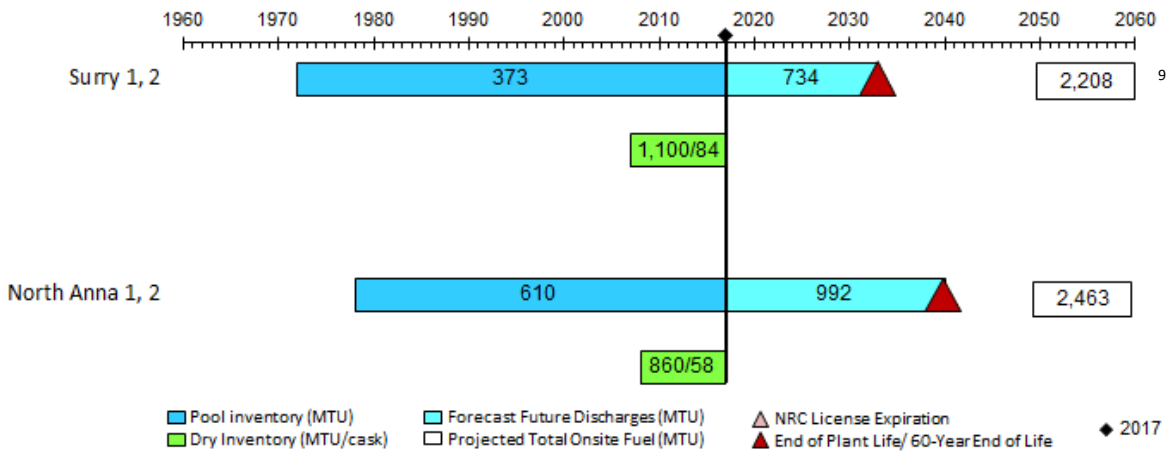


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
3	Surry 1	Dominion Generation.[5]	Robert C. Scott (D)	1972-2032	PWR/Operating	1986/SL 2007/GL	1,114[6]
	Surry 2			1973-2033	PWR/Operating		1,126[6]
6	BWX Technologies	BWX Technologies	Bob Goodlatte (R)	SNM-42[7]	Dry and pool storage/ Operating[8]	See Note[7]	
7	North Anna 1	Dominion Generation [5]	David Brat (R)	1978-2038	PWR/Operating	1998/SL 2008/GL	1,229
	North Anna 2			1980-2040	PWR/Operating		1,234

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

Dry: 1,961 MTU in 142 casks **Pool: 984 MTU** **Total: 2,944 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[10]	
$837.0 million paid[11]	**$0.0 million one-time fee owed**

[1] Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

[2] Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

[3] Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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] SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

[5] Subsidiary of Dominion Resources Co.

[6] Total of Surry 1 and Surry 2 includes 31 MTU transferred to Idaho National Laboratory for examination and testing.

[7] [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.

[8] Facility manufactures nuclear fuel elements. Dry and wet storage of SNF is included in the operating license.

[9] Total does not include 31 MTU transferred to Idaho National Laboratory.

[10] 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, 2016 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.

[11] Includes one-time fee paid by B&W.

WASHINGTON

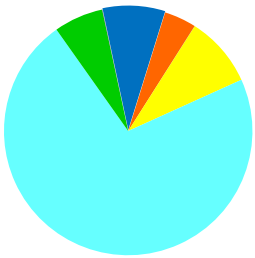
Operating Reactors (1 at 1 site)
Commercial Dry Storage Site (1 site)
Operating Research Reactor (1 at 1 site)
DOE owned SNF and HLW at Hanford
Surplus Plutonium at Hanford

Elected Officials as of January 2018[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)

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)



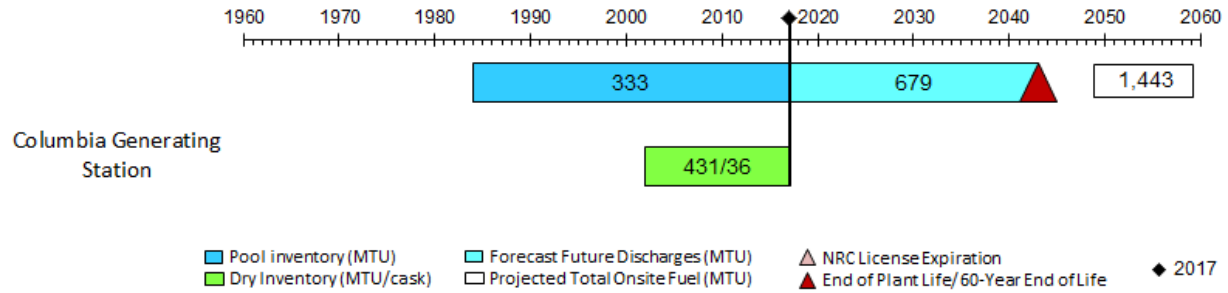
Nuclear 8.1%
Coal 4.2%
Petroleum <0.1%
Gas 9.2%
Hydro 72.0%
Renewable 6.4%
Other 0.0%

Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
4	Columbia Generating Station	Energy Northwest	Dan Newhouse (R)	1984-2043	BWR/ Operating	2002/GL	1,443
	Hanford Reservation	DOE[5]		None	Various/ Shutdown		
5	Washington State University	Washington State University	Cathy McMorris Rodgers (R)	1961-	R&TRF TRIGA/ Operating		

COMMERCIAL SPENT FUEL ONSITE INVENTORY[4]

Dry: 431 MTU in 36 casks **Pool: 333 MTU** **Total: 764 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[6]	
$198.9 million paid	**$0.0 million one-time fee owed**

1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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 SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

[5] DOE Regulated Facility

[6] 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, 2016 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.

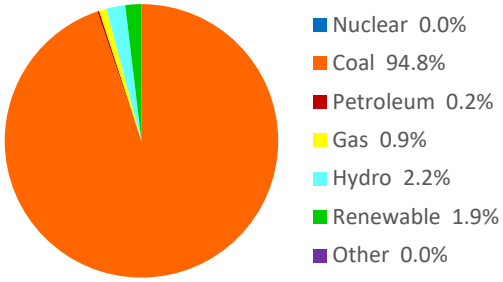
WEST VIRGINIA

Elected Officials as of January 2018[1,2]

Governor:	Jim Justice (D)
Senators:	Shelley Capito (R)
	Joe Manchin (D)

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)

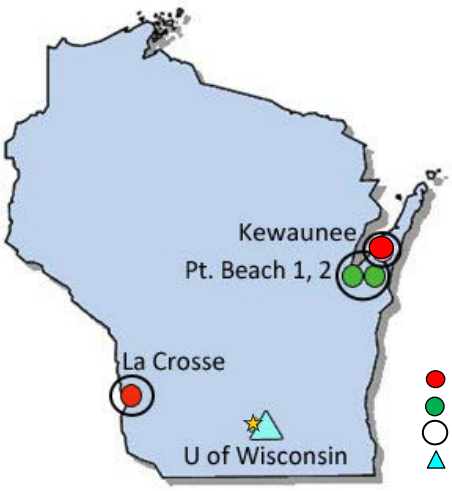


1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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



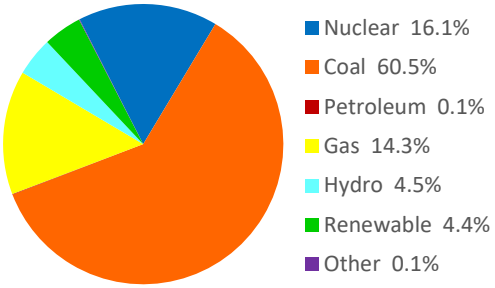
Elected Officials as of January 2018[1,2]

Governor:	Scott Walker (R)
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)

- 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)

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)

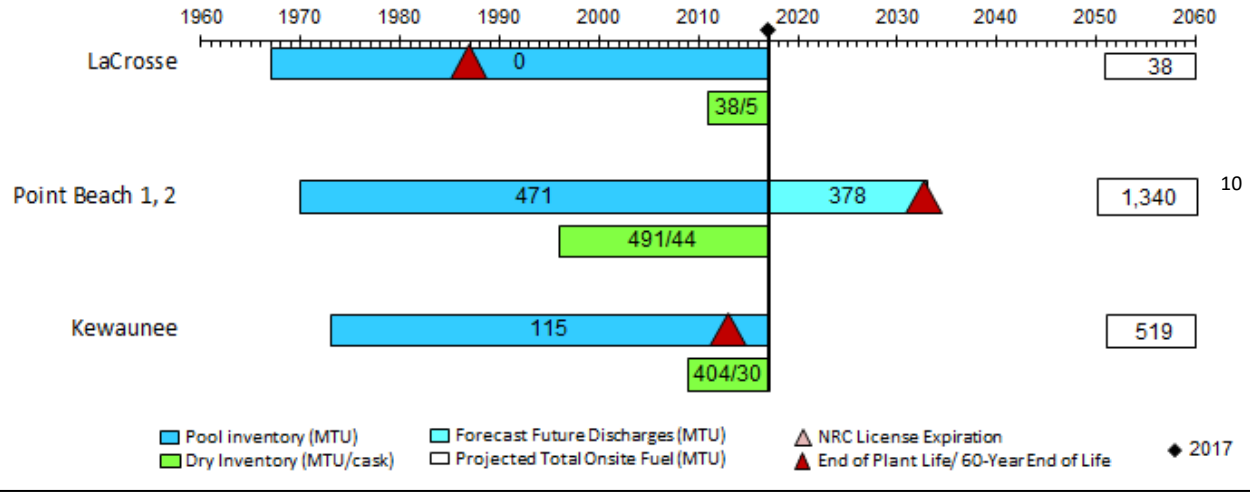


Cong. Dist.	Facility	NRC Licensee	Representative	Operating License Period/Status	Facility Type/Status	ISFSI License Year/Type	SNF (MTU) Total Projected[4]
2	University. of Wisconsin	University of Wisconsin	Marc Pocan (D)	1960-	R&TRF TRIGA/ Operating		
3	LaCrosse	Dairyland Power Cooperative	Ron Kind (D)	1967-1987/ DECON in progress[5]	BWR/Shutdown	2011/GL Stranded[6]	38[7]
6	Point Beach 1	NextEra Energy Point Beach LLC	Glenn Grothman (R)	1970-2030	PWR/Operating	1996/GL	681[8]
	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[4]

Dry: 933 MTU in 79 casks **Pool: 585 MTU** **Total: 1,519 MTU**

SPENT NUCLEAR FUEL STORAGE STATUS[4]



NUCLEAR WASTE FUND[11]	
$416.4 million paid	**$0.0 million one-time fee owed**

[1] Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

[2] Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

[3] Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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] SNF Data estimated as of December 31, 2017 from Table C-1, D-1, Source: Commercial Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report [FCRD-NFST-2013-000263, Rev 5, DRAFT (2017/06/30)]. Total Projected Discharges and Forecast Future Discharges based on 60-Year End-of-Plant Life. Totals may vary slightly due to rounding. NRC License Expiration shown only when different from End-of-Plant Life/60-Year End of Life.

[5] Estimated date of closure is 2019.

[6] A stranded ISFSI does not have an active reactor on site.

[7] Includes 0.12 MTU transferred to Savannah River Site.

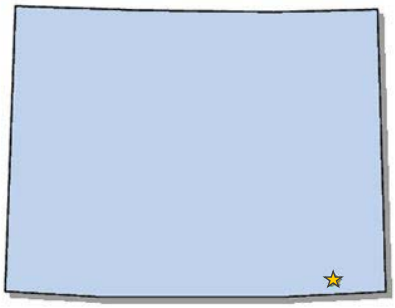
[8] Includes 2 MTU transferred to Idaho National Laboratory.

[9] Operating license previously extended until 2033. On October 22, 2012, Dominion Resources announced early shutdown. The plant came offline on May 7, 2013.

[10] Does not include 2 MTU transferred to Idaho National Laboratory.

[11] 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, 2016 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.

WYOMING

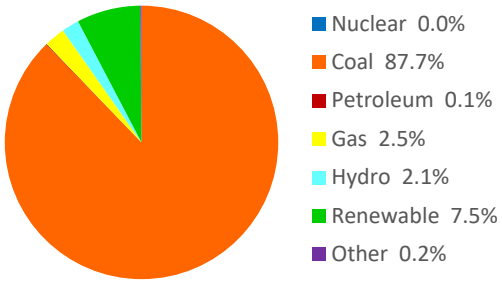


Elected Officials as of January 2018[1,2]

Governor:	Matt Mead (R)
Senators:	Mike Enzi (R)
	John Barrasso (R)

2017 Electricity Generation Mix[3]

(includes utilities and independent power producers)



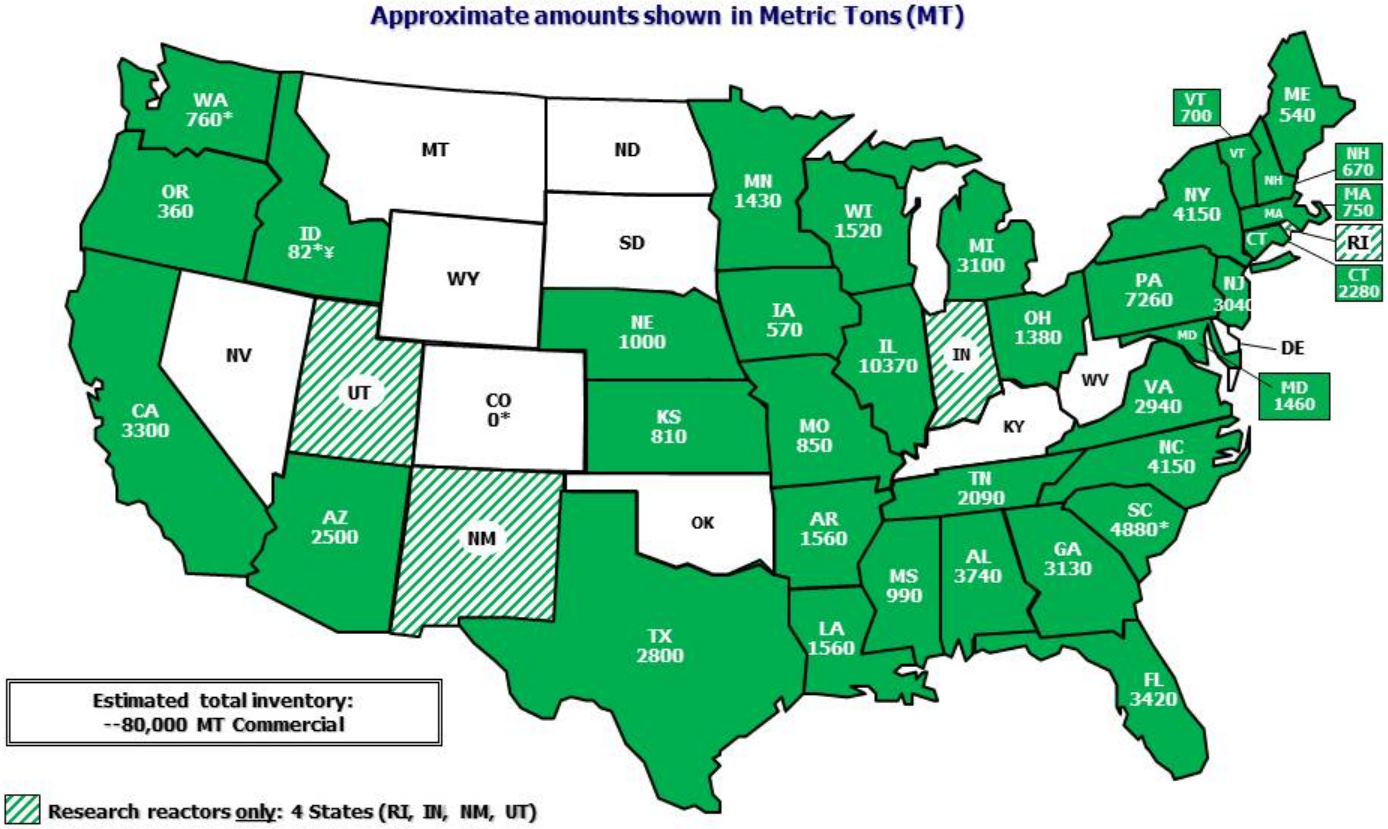
1 Data for Elected Officials from https://www.govtrack.us/congress, Accessed May 1, 2017 and July 23, 2018.

2 Governor from https://www.usa.gov/state-governor, Accessed May 1, 2017 and from https://www.nga.org/governors, Accessed and July 23, 2018.

3 Data for Electricity Generation Mix from Tables 1.4.B-1.13.B, Electric Power Monthly [DOE/EIA-0026 (2017/05)]. Year-to-Date Data through February 2017. 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.

38 States with Commercial SNF

Approximate amounts shown in Metric Tons (MT)



Research reactors only: 4 States (RI, IN, NM, UT)

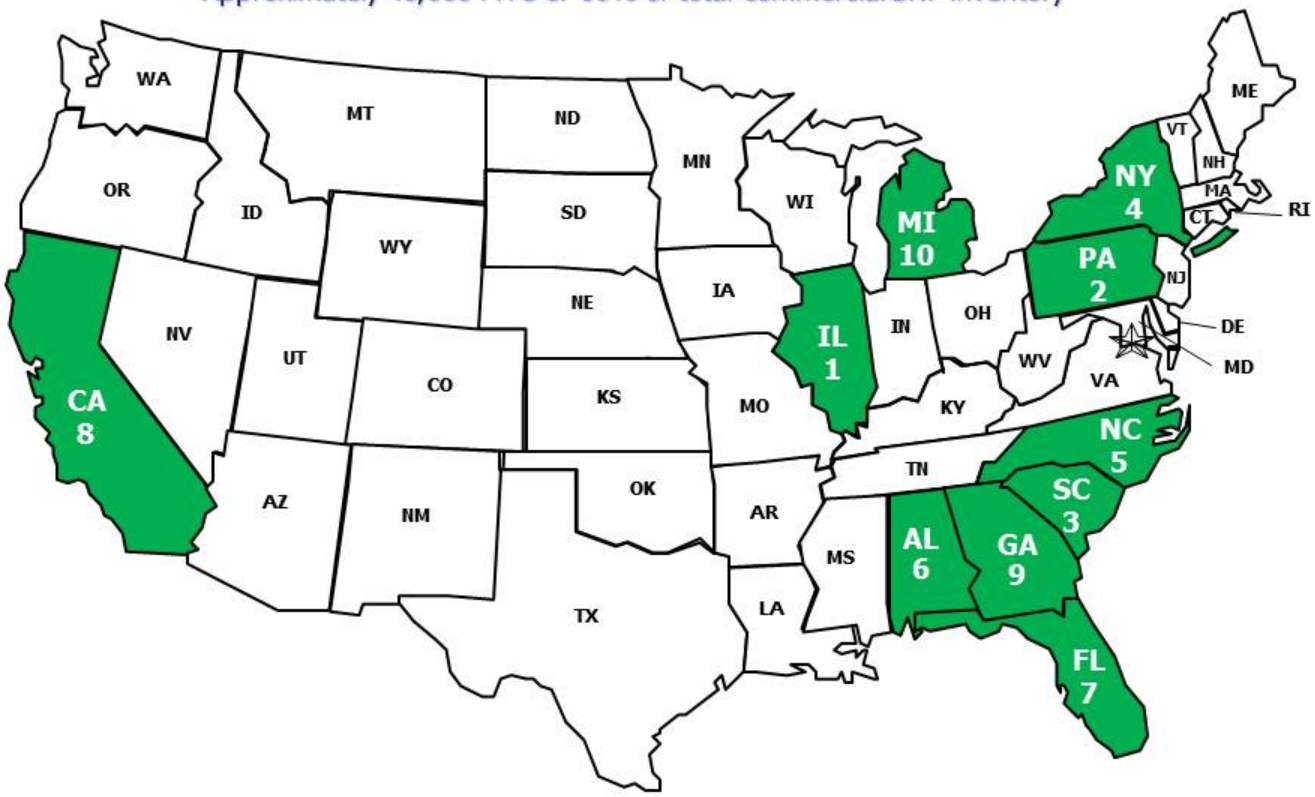
No waste: 11 States (DE, WV, KY, OK, SD, ND, WY, MT, NV, as well as Hawaii and Alaska which are not depicted)

*= Defense/DOE waste NOT included in totals: 4 States (SC, CO, ID, WA)
¥= Only SNF stored at NRC regulated facilities is shown. Additional SNF is stored at INL under DOE authority.

As of 6/30/2017
State total rounded to nearest ten
Total inventory rounded to nearest thousand

Top 10 States with Commercial SNF

Approximately 46,000 MTU or 60% of total commercial SNF inventory



*As of 6/30/2017

Appendix H
Impact of Tentative Early Shutdowns at Palisades and TMI

The operators of Palisades and TMI have announced intentions to cease operations earlier than their current license expiration date. However, these announcements have been offered with caveats relative to proposed or requested legislation changes or to necessary government intervention that would allow continued reactor operation. For this reason, the baseline cases considered in this revision have not considered the early shutdown of these two reactors. This appendix is included to provide an assessment of the contingency in which one or both reactors shutdown early, as suggested by announcements by their respective reactor operators.

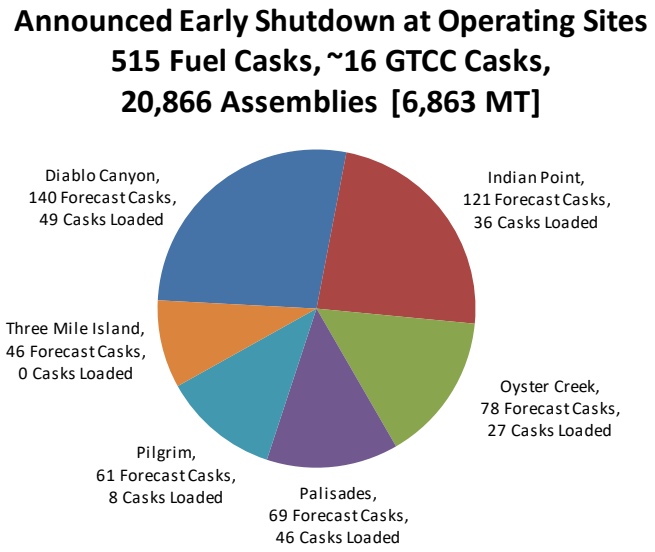


Figure H-1. Dry SNF Storage at Group C Sites with Tentative/Announced Early Shutdown Dates

Table H-1. SNF and Stored GTCC from Groups B&C Sites with Tentative Announced Early Shutdown Dates

		Discharges as of 12/31/2012		Forecast Discharges 1/1/2013 to 12/31/2017		Total Projected Discharged Fuel through 12/31/2075					
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***	
Diablo Canyon 1	11/2/2024	1,412	610	282	119	2,357	1,010	49	74	-	2
Diablo Canyon 2	8/26/2025	1,346	582	276	117	2,094	898	N/A	66	-	2
Indian Point 2	4/30/2020	1,517	688	180	81	1,980	897	36	62	-	2
Indian Point 3	4/30/2021	1,298	592	283	128	1,869	851	N/A	59	-	2
Oyster Creek	12/31/2019	3,644	649	338	58	4,711	832	27	78	-	2
Palisades	4/30/2022	1,509	617	180	78	2,073	860	46	69	-	2
Pilgrim	5/31/2019	3,069	547	464	80	4,113	726	8	61	-	2
TMI 1	10/22/2019	1,270	596	222	108	1,669	789	0	46	-	2
Totals		**15,065**	**4,881**	**2,225**	**769**	**20,866**	**6,863**	**166**	**515**	**-**	**16**

* 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.

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Appendix I
Revision History

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 NPRs or 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.