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Spent Nuclear Fuel Discharges from U.S. Reactors 1992

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Energy Information Administration
Office of Coal, Nuclear, Electric and Alternate Fuels
Survey Management Division
U.S. Department of Energy
Washington, DC 20585

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Preface

Spent Nuclear Fuel Discharges from U.S. Reactors 1992 provides current statistical data on every fuel assembly irradiated in commercial nuclear reactors operating in the United States. It also provides data on the current inventories and storage capacities of those reactors to a wide audience, including Congress, Federal and State agencies, the nuclear and electric industries, and the general public. It uses data from the mandatory, "Nuclear Fuel Data" survey, Form RW-859 for 1992 and historical data collected by the Energy Information Administration (EIA) on previous Form RW-859 surveys. The report was prepared by the EIA under a Memorandum of Understanding with the Office of Civilian Radioactive Waste Management. The EIA is the independent agency for data collection and analysis within the U.S. Department of Energy.

Data collected on the "Nuclear Fuel Data" survey provide a comprehensive statistical characterization of the industry's activities for the survey year and include some information about industry plans and commitments for the future. The methodology used in the survey, including data collection procedures and data editing, analysis, and processing, is described in Appendix A. The quantities and characteristics of each specific fuel assembly type discharged by each reactor is described in Appendix B. A series of pictograms showing storage site and pool configurations, capacities, and inventories, are shown in Appendix C. A description of the EIA Quality Assurance reports and a more detailed discussion of EIA Quality Assurance procedures is included in Appendix D. Appendix E contains technical notes providing further details on information contained in the report.

Data on reactor spent fuel discharges and storage activity for 1992, nuclear power plant data, annual discharges and burnup, cladding, enrichment and burnup, and away-from-reactor storage facilities are presented in Chapter 1. Data on site capacities and inventories at utilities and storage facilities, as well as dry storage at utilities, are presented in Chapter 2. Chapter 3 presents data on assembly type characteristics, their background, fabricator summary, assembly distribution, and assembly identifiers.

The detailed data collected on Form RW-859 and summarized in this report are directly useful for assessing spent fuel storage requirements. They also constitute one of the inputs to the spent fuel Characteristics Data Base (CDB) developed by Oak Ridge National Laboratory (ORNL). The discharge dates, assembly types, burnups, and initial enrichments are used to calculate the gamma, neutron, and thermal source intensities. These radiological characteristics, along with reported fuel quantities and dimensions, are then used by the Civilian Radioactive Waste Management System (CRWMS) designers for shielding design, thermal design, and sizing of facilities and equipment.

The data are also used in the *1993 Acceptance Priority Ranking* (APR) report. The 1993 APR details the order in which DOE will allocate Federal waste acceptance capacity. As required by the Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste (10 CFR 961), the ranking is based on the age of permanently discharged spent nuclear fuel, with the owners of the oldest spent nuclear fuel, on an industry-wide basis, given the highest priority.

The DOE estimates future discharges from U.S. commercial nuclear reactors and the characteristics of those discharges based on trends of historical spent nuclear fuel data provided by the respondents. The need for additional spent fuel storage capacity is based on these estimated cumulative discharges and on the estimated maximum storage capacity of both at-reactor and away-from-reactor storage facilities.

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Questions of a detailed or technical nature should be directed to the Project Leader, Kathy Gibbard (202/254-5559).

Additional copies may be obtained by returning the order form at the back of this report.

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Canisters and Nonfuel Components at Commercial Nuclear Reactors

by

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Introduction

The storage of nonfuel assembly (NFA) hardware and its subsequent impact on a Federal Waste Management System has been the subject of much discussion because of the effect on waste acceptance procedures and transportation and disposal requirements. NFA hardware, if stored or disposed outside of fuel assemblies and in an integral form, would represent a significant addition to the volume of waste required to be handled. NFA hardware, if integral to a fuel assembly, could represent a significant addition to the total weight of each shipment.

The Form RW-859 "Nuclear Fuel Data" survey was revised to collect approximately 30 data elements on canisters and their contents and on nonfuel components (NFC) for each storage pool site. For the past 2 years, the Energy Information Administration (EIA) has collected these data as part of this survey from the operators of 123 commercial nuclear reactors. The purpose of this article is to present the most current data on canisters and NFC stored at these facilities as of December 31, 1992.

Highlights

A total of 286 canisters have been reported as being in storage pools as of December 31, 1992. Because all but one Form RW-859 respondent reported the number of canisters on either the 1991 or 1992 survey, and the one that did not report had no canisters in earlier years, these 286 canisters should represent the total in pools as of the above date. Detailed inventories were not reported, however, for 51 of these canisters, representing 17.8 percent of the total. Additionally, 264 open baskets were also reported to contain miscellaneous spent nuclear fuel (SNF) and nonfuel materials. All of the 286 canisters meet the dimensional envelope requirements specified for disposal of "standard fuel" under the Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste (10 CFR 961); most of the baskets do not.

A total of 40,194 pieces of NFA hardware have been reported as being in storage at reactor sites. This total represents only the NFA hardware reported by the owners of 95 of the 109 reactors in generic assembly classes (e.g., Babcock & Wilcox (B&W) 15X15, Westinghouse (WE) 17X17, General Electric (GE) 4, 5, 6, Combustion Engineering (CE) System 80, etc.). The remaining 14 reactors either did not report nonfuel components data or reported no NFA hardware components. This article does not address the nonfuel components (including NFA hardware) reported by owners of reactors in single-reactor assembly classes (e.g., Dresden 1, Yankee Rowe, Palisades, LaCrosse, etc.).

Canisters

A canister is a container made of stainless steel or an inert alloy which holds SNF, high-level radioactive waste or nonfuel components. A canister may contain an intact spent fuel assembly, consolidated spent fuel assemblies, spent fuel rods or pieces, NFA hardware, nonfuel disassembly hardware, or other fuel and nonfuel material. These canisters are temporarily stored in spent fuel pools at reactor sites and occupy one or more slots in the pool. When full, a container is typically sealed with a lid and welded shut. Waste may also be placed in rodlet or garbage and debris (GAD) baskets, which are also stored in the spent fuel pools, but not necessarily in the pool racks.

Because many utilities face spent fuel storage constraints, the number of canisters stored at these facilities and the contents of these canisters are important concerns. A few utilities have used fuel consolidation campaigns as a means of preserving fuel assemblies and placing them in a canister in a grid storage pool space.

Fuel is consolidated by removing rods with spacing closer than that of an intact assembly. In addition to maximizing density and lowering criticality, heat transfer characteristics are also improved. The empty assembly skeletons from consolidation may be compressed and either stored or disposed as low-level radioactive waste.

Table FE1 presents a summary of data on canisters, baskets, and their contents as reported on the Form RW-859 survey. The data in the table are compiled by storage pool site. Due to different reporting schedules, not all respondents were required to report on the 1992 Form RW-859 survey, so data for 13 storage pool sites have been carried over from 1991. In addition, one site did not report canister data for either survey year. Of the 286 canisters reported, 151 contain spent fuel (intact assemblies, consolidated assemblies, or fuel rods/pieces) and 149 contain nonfuel components (14 contain both fuel and nonfuel). The specific contents of 51 canisters were not reported so these tables should not be considered representative of the complete enumeration of these data. A total of 264 open baskets were also reported, containing miscellaneous fuel and nonfuel materials, garbage and debris.

Data on the contents of canisters containing spent nuclear fuel (intact assemblies, rods and/or pieces, or consolidated assemblies) are summarized in Table FE2. The 151 canisters containing SNF can be further subdivided by whether the fuel was irradiated in a boiling-water reactor (BWR) or pressurized-water reactor (PWR). Of the 42 canisters containing BWR SNF, 21 contain intact spent fuel assemblies, 17 contain fuel rods, and the contents of 4 canisters at one BWR are unknown. No fuel was consolidated at any BWRs. Of the 109 canisters containing PWR SNF, 16 contain intact assemblies, 52 contain fuel rods, and 36 canisters contain a total of 74 consolidated assemblies. These consolidation campaigns took place at Palisades, Oconee 1 & 2, Millstone 2, Prairie Island 1 & 2, and Ginna. The contents of 5 canisters at PWRs were not reported.

Data on the contents of canisters containing nonfuel components are summarized in Table FE3. Of the 149 nonfuel canisters, the majority contained either nonfuel components (67 canisters) and/or disassembly hardware (35 canisters). The contents of 42 canisters were not reported so this table should not be considered representative of the complete enumeration of these data. Nonfuel canisters may include more than one class of components and a few are currently empty.

Table FE4 presents a summary of the dimensions of canisters, in inches, reported on the Form RW-859 survey. As the table shows, the most prevalent sizes of canisters are 157x8x8 and 161x9x9. No canisters were reported as having a length greater than the longest PWR assembly, which is 199 inches. The minimum canister length reported is 84 inches, the size of the shortest BWR assembly. Containers with a reported length of less than 84 inches are classified as baskets. The total column of the table presents the distribution of canister lengths; the rows present the cross-sectional dimensions (width and depth) of canisters reported. Some respondents submitted data on the contents of a particular canister, but did not submit the canister's dimensions. These canisters are represented as having "Missing Dimensions." Other respondents did not file canister-specific data (including dimensions) and fall under the "Data Not Reported" category.

Nonfuel Components

The term "nonfuel components" may be defined broadly to cover all non-fuel-bearing components which receive radiation during power generation. Generally included are:

- The components used to initiate, control, and monitor the chain reaction in the core, often called NFA hardware (neutron sources, control elements, burnable absorbers, incore instrumentation, etc.)
- The nonfuel portion of a fuel assembly, often called disassembly hardware (guide tubes, water rods, grids, nozzles, etc.); and
- Miscellaneous hardware used in the reactor core which is not a part of fuel assemblies (dummy assemblies, coupon trees, etc.).

The Standard Contract has a more limited definition of nonfuel components which includes most NFA hardware. The contract does not explicitly identify BWR control assemblies, which are located between, rather than within, the SNF assemblies. Nor does it mention disassembly hardware and miscellaneous hardware.

In terms of location of each piece of hardware, a non-canistered nonfuel component also can be distinguished by whether it is integral or nonintegral with an assembly. Nonfuel components may be included as an integral part of the SNF assemblies delivered for disposal. Nonfuel components are generally used within or between assemblies but are not necessarily permanently attached to assemblies. These nonfuel components are usually retired from service on a schedule that is different from that of the fuel assemblies.

Because all of the nonfuel components listed in the Standard Contract fall into the NFA hardware grouping, NFA hardware has been the focus of the EIA data collection efforts on nonfuel components. Some utilities have reported nonfuel components which are either disassembly hardware or miscellaneous hardware. However, the reporting and analysis which follow deal primarily with NFA hardware.

Nonfuel Components - NFA Categories by Vendor

Tables FE5, FE6, FE7, and FE8 summarize the responses of the utilities to the Form RW-859 survey section on discharged NFA hardware. These tables do not include either the other nonfuel components reported by these utilities or the nonfuel components (including NFA hardware) reported by owners of reactors in single-reactor assembly classes (e.g., Dresden 1, Yankee Rowe, Palisades, LaCrosse, etc.). Of the 109 generic assembly class reactors, 14 reactors either did not report nonfuel components data or reported no NFA hardware components. The components of NFA hardware which are used at various reactors vary significantly with vendors of the Nuclear Steam Supply System (NSSS), so each of the tables presents the NFA hardware reported for one of the major NSSS vendors (Babcock & Wilcox, Combustion Engineering, General Electric, and Westinghouse).

Storage of Integral NFA hardware

The Form RW-859 survey also requested the quantities of NFA hardware which are stored in or attached to assemblies and the dimensions of those NFA hardware components. NFA hardware may have been integral with an assembly, noncanistered in baskets, destined for disposal as low-level radioactive waste, or stored in canisters. Approximately 85 percent of the 40,194 pieces of NFA hardware reported were integral with an assembly. Reactor-by-reactor percentages of NFA hardware stored in or attached to assemblies are given in Tables FE5, FE6, FE7, and FE8.

NFA Hardware Discharge Rates

The following factors may affect NFA hardware discharge rates:

- Changes in fuel management strategies
- Changeout of infrequently replaced items (control rods, etc)
- Early changeout of hafnium control rod assemblies
- Low-level radioactive waste

Changes in Fuel Management Strategies

Changes in fuel management strategies have impacted discharge rates of NFA hardware, particularly burnable absorber assemblies. Reactors built by Westinghouse and Babcock & Wilcox used one set of burnable absorber assemblies with the initial reactor fuel. The use of burnable absorber assemblies was resumed in later cycles to control the excess reactivity associated with higher initial fuel enrichments. The effect on quantities of NFA hardware was that reactors built by Westinghouse and Babcock & Wilcox typically began to use significantly larger quantities of NFA hardware each cycle; preliminary results indicate nearly a one-to-one ratio of burnable absorber assemblies with fresh fuel assemblies for both vendors.

Newer features, such as the use of integral fuel burnable absorbers by Westinghouse, are intended to once again reduce quantities of NFA hardware discharged by reactors.

Changeout of Infrequently Replaced Items

Many estimates of NFA hardware discharges are related to discharged fuel assemblies because the number of discharged fuel assemblies gives a simple and quantitative measure of a reactor's use. However, NFA hardware is discharged on one schedule, fuel assemblies on another. This may distort estimates of NFA hardware discharges, especially when dealing with infrequently replaced components, such as control element assemblies. For example, operators of reactors in the CE 14 X 14 assembly class report having discharged nearly 500 control element assemblies and slightly over 4,000 fuel assemblies. Operators of reactors in the CE 16 X 16 assembly class report having discharged only 3 control element assemblies and nearly 2,000 fuel assemblies. For CE 14 X 14 reactors, the number of control element assemblies is approximately 12 percent of the number of discharged fuel assemblies; for CE 16 X 16 reactors, the number of control element assemblies is less than 0.2 percent of the discharged fuel assemblies. The explanation is that the older reactors (CE 14 X 14) have completed a changeout of their control element assemblies, whereas the newer reactors (CE 16 X 16) have only discharged defective or damaged control element assemblies. This effect can also be observed between the older and newer Westinghouse assembly classes (e.g., WE 14 X 14 and WE 15 X 15 versus WE 17 X 17). The effect in Westinghouse assembly classes is somewhat obscured by the early changeout of hafnium control rod assemblies from some WE 17 X 17 plants.

Early Changeout of Hafnium Control Rod Assemblies

Several of the WE 17 X 17 plants using hafnium control rod assemblies experienced unexpected hydrating and subsequent control rod swelling. As a result, these assemblies have been replaced at all or nearly all of the plants originally using them, sometimes after as little as a single cycle of use. This development means that the number of control rod assemblies at WE 17 X 17 plants will not be directly correlated to the number of discharged fuel assemblies.

Low-Level Radioactive Waste

When NFA hardware has reached the end of its useful life, it may exceed the Class C limits for disposal established in 10 CFR, Part 61 for low-level radioactive wastes. Hardware which exceeds these limits is referred to as Greater-Than-Class-C wastes. NFA hardware which does not exceed these limits may be disposed as a low-level waste. Some utilities have disposed of NFA hardware in this manner, but the EIA does not collect this data on the Form RW-859 survey.

Conclusion

This information represents the publicly available data on NFA hardware components. The results obtained thus far in the area of canisters and nonfuel components present a framework from which further data may be collected. Because the nonfuel components section of the Form RW-859 is a recent addition to the survey, respondent answers were not always the same even though the reactors are similar. This is particularly apparent with respect to the number of fuel channels reported at BWR reactors. While some reactors report a number of fuel channels which are roughly equivalent to the number of discharged fuel assemblies, other reactors report quantities which are significantly lower and appear to represent the number of fuel channels which are not attached to assemblies. These differences in reporting must be understood in order to accurately estimate quantities which might be designated for disposal. The Form RW-859 survey is currently being redesigned to collect more thorough data in these areas. In particular, data will be collected on the contents of all containers, to include all storage structures into which fuel and nonfuel components may be placed. The need for further information will depend on the level of detail required by designers and systems engineers to plan for the handling and disposition of these components.

Table FE1. Container Data as of December 31, 1992

Electric Utility Name	Reactor Names	Reactor Type	Pool Site ID	Total Canisters	Canisters Fuel	Canisters Nonfuel	Baskets[a]
Alabama Power Company	Farley 1	PWR	0101	1	1	0	0
	Farley 2	PWR	0102	0	0	0	0
Arizona Public Service Company	Palo Verde 1	PWR	0301	8	2	6	0
	Palo Verde 2	PWR	0302	5	1	4	0
	Palo Verde 3	PWR	0303	5	1	4	0
Arkansas Power and Light Company	Arkansas Nuclear 1	PWR	0401	17	1	16	1
	Arkansas Nuclear 2	PWR	0402	14	1	13	1
Baltimore Gas and Electric Company	Calvert Cliffs 1 & 2	PWR	0501	21	0	21	2
Boston Edison Company	Pilgrim 1	BWR	0601	1	1	0	0
Carolina Power and Light Company	Brunswick 1	BWR	0701	0	0	0	0
	Brunswick 2	BWR	0702	1	1	0	1
	Harris 1	PWR	0703	1	1	0	1
	Robinson 2	PWR	0705	3	1	2	0
Cleveland Electric Illuminating Company	Perry 1	BWR	0901	4	4	0	0
Commonwealth Edison Company	Braidwood 1 & 2	PWR	1001	3	1	2	1
	Byron 1 & 2	PWR	1003	2	2	0	1
	Dresden 1	BWR	1005	4	1	3	4
	Dresden 2	BWR	1006	2	2	0	2
	Dresden 3	BWR	1007	2	2	0	2
	LaSalle County 1 & 2	BWR	1008	1	1	0	4
	Quad Cities 1 & 2	BWR	1010	4	4	0	0
	Zion 1 & 2	PWR	1012	3	1	2	5
Consolidated Edison Company of New York	Indian Point 1	PWR	1101	0	0	0	0
	Indian Point 2	PWR	1102	0	0	0	1
Consumers Power Company	Big Rock Point	BWR	1201	2	0	2	11
	Palisades	PWR	1204	6	6	0	0
Dairyland Power Cooperative	LaCrosse	BWR	1301	0	0	0	1

See footnotes at end of table.

Table FE1. Container Data as of December 31, 1992 (Continued)

Electric Utility Name	Reactor Names	Reactor Type	Pool Site ID	Total Canisters	Canisters Fuel	Canisters Nonfuel	Baskets[a]
Detroit Edison Company	Enrico Fermi 2	BWR	1402	0	0	0	0
Duke Power Company	Catawba 1	PWR	1501	0	0	0	0
	Catawba 2	PWR	1502	0	0	0	0
	McGuire 1	PWR	1504	2	2	0	0
	McGuire 2	PWR	1505	1	1	0	0
	Oconee 1 & 2	PWR	1506	4	4	0	0
	Oconee 3	PWR	1508	1	1	0	0
Duquesne Light Company	Beaver Valley 1	PWR	1601	11	3	8	3
	Beaver Valley 2	PWR	1602	1	1	0	1
Florida Power Corporation	Crystal River 3	PWR	1701	2	1	1	2
Florida Power and Light Company	St. Lucie 1	PWR	1801	5	1	4	4
	St. Lucie 2	PWR	1802	2	1	1	2
	Turkey Point 3	PWR	1803	1	1	0	3
	Turkey Point 4	PWR	1804	0	0	0	1
GPU Nuclear Corporation	Three Mile Island 1	PWR	1901	0	0	0	1
	Oyster Creek	BWR	1903	18	18	0	0
Georgia Power Company	Hatch 1 & 2	BWR	2001	0	0	0	5
	Vogtle 1 & 2	PWR	2003	0	0	0	0
Gulf States Utilities Company	River Bend 1	BWR	2101	0	0	0	0
Houston Lighting and Power Company	South Texas 1	PWR	2201	2	0	2	1
	South Texas 2	PWR	2202	2	0	2	2
Illinois Power Company	Clinton 1	BWR	2301	0	0	0	1
Indiana Michigan Power Company	Cook 1	PWR	5801	3	1	2	0
	Cook 2	PWR	5801	3	0	3	0
Iowa Electric Light and Power Company	Duane Arnold	BWR	2401	0	0	0	0

See footnotes at end of table.

Table FE1. Container Data as of December 31, 1992 (Continued)

Electric Utility Name	Reactor Names	Reactor Type	Pool Site ID	Total Canisters	Canisters Fuel	Canisters Nonfuel	Baskets[a]
Kansas Gas and Electric Company	Wolf Creek 1	PWR	2501	0	0	0	3
Long Island Lighting Company	Shoreham	BWR	2601	0	0	0	0
Louisiana Power and Light Company	Waterford 3	PWR	2701	4	2	4	0
Maine Yankee Atomic Power Company	Maine Yankee	PWR	2801	0	0	0	26
Nebraska Public Power District	Cooper Station	BWR	3001	0	0	0	0
New York Power Authority	Fitzpatrick	BWR	3901	0	0	0	1
	Indian Point 3	PWR	3902	0	0	0	1
Niagara Mohawk Power Corporation	Nine Mile Point 1	BWR	3101	0	0	0	0
	Nine Mile Point 2	BWR	3102	0	0	0	0
North Atlantic Energy Service Corporation	Seabrook	PWR	5901	0	0	0	0
Northeast Utilities Service Company	Millstone 1	BWR	3201	1	1	0	0
	Millstone 2	PWR	3202	10	6	4	13
	Millstone 3	PWR	3203	0	0	0	1
	Haddam Neck	PWR	5701	9	5	4	5
Northern States Power Company	Monticello	BWR	3301	0	0	0	0
	Prairie Island 1 & 2	PWR	3302	22	20	2	0
Omaha Public Power District	Fort Calhoun	PWR	3401	0	0	0	0
Pacific Gas and Electric Company	Diablo Canyon 1	PWR	3501	0	0	0	0
	Diablo Canyon 2	PWR	3502	1	1	0	1
	Humboldt Bay	BWR	3503	1	1	0	7
Pennsylvania Power and Light Company	Susquehanna 1 & 2	BWR	3601	1	1	0	0

See footnotes at end of table.

Table FE1. Container Data as of December 31, 1992 (Continued)

Electric Utility Name	Reactor Names	Reactor Type	Pool Site ID	Total Canisters	Canisters Fuel	Canisters Nonfuel	Baskets[a]
Philadelphia Electric Company	Limerick 1 & 2	BWR	3701	5	0	5	8
	Peach Bottom 2	BWR	3704	2	2	0	4
	Peach Bottom 3	BWR	3705	1	1	0	11
Portland General Electric Company	Trojan	PWR	3801	22	12	21	0
Public Service Company of Colorado	Fort St. Vrain	HTGR	4101	0	0	0	0
Public Service Electric and Gas Company	Hope Creek	BWR	4201	0	0	0	0
	Salem 1	PWR	4402	0	0	0	18
	Salem 2	PWR	4203	0	0	0	7
Rochester Gas and Electric Corporation	Ginna	PWR	4401	10	8	2	2
Sacramento Municipal Utility District	Rancho Seco	PWR	4501	0	0	0	0
South Carolina Electric and Gas Company	Summer	PWR	4601	1	1	0	1
Southern California Edison Company	San Onofre 1	PWR	4701	0	0	0	4
	San Onofre 2	PWR	4702	0	0	0	8
	San Onofre 3	PWR	4703	0	0	0	9
System Energy Resources, Inc.	Grand Gulf 1	BWR	2901	1	1	0	18
Tennessee Valley Authority	Bellefonte 1	PWR	4801	0	0	0	0
	Bellefonte 2	PWR	4802	0	0	0	0
	Browns Ferry 1 & 2	BWR	4803	1	1	0	0
	Browns Ferry 3	BWR	4805	0	0	0	0
	Sequoyah 1 & 2	PWR	4808	0	0	0	0
	Watts Bar 1 & 2	PWR	4810	0	0	0	0
TU Electric	Comanche Peak 1 & 2	PWR	4901	0	0	0	37
Toledo Edison Company	Davis-Besse	PWR	5001	3	1	2	3
Union Electric Company	Callaway	PWR	5101	1	1	0	1

See footnotes at end of table.

Table FE1. Container Data as of December 31, 1992 (Continued)

Electric Utility Name	Reactor Names	Reactor Type	Pool Site ID	Total Canisters	Canisters Fuel	Canisters Nonfuel	Baskets[a]
Vermont Yankee Nuclear Power Corporation	Vermont Yankee	BWR	6001	0	0	0	0
Virginia Power	North Anna 1 & 2	PWR	5201	3	1	2	2
	Surry 1 & 2	PWR	5203	3	2	2	8
Washington Public Power Supply System	Washington Nuclear 2	BWR	5302	0	0	0	1
Wisconsin Electric Power Company	Point Beach 1 & 2	PWR	5401	16	13	3	0
Wisconsin Public Service Corporation	Kewaunee	PWR	5701	0	0	0	0
Yankee Atomic Electric Company	Yankee Rowe	PWR	5601	0	0	0	0
TOTAL				[b]**286**	**151**	**149**	**264**

[a]Baskets column represents the number of open baskets, including rodlet or garbage and debris (GAD) baskets.
[b]Of the 286 total canisters, 14 contain both fuel and nonfuel.
PWR = Pressurized-water reactor; BWR = Boiling-water reactor; HTGR = High-temperature, gas-cooled reactor.
Notes: Data for the following pool sites are as of December 31, 1991 - Pilgrim 1, Indian Point 1 & 2, Big Rock Point, Beaver Valley 1, Three Mile Island 1, Wolf Creek 1, Cooper Station, Diablo Canyon 2, Salem 2, Summer, Davis-Besse, and Yankee Rowe. Shoreham did not report for either 1991 or 1992.
Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Table FE2. Canisters Containing Spent Fuel as of December 31, 1992

Electric Utility Name	Reactor Names	Reactor Type	Pool Site ID	Total Canisters Fuel	Canisters with Intact Assemblies	Canisters with Rods and Pieces[a]	Canisters with Consolidated Assemblies	Number of Assemblies Consolidated	Canisters with Contents Unknown[b]
Alabama Power Company	Farley 1	PWR	0101	1	0	1	0	0	0
	Farley 2	PWR	0102	0	0	0	0	0	0
Arizona Public Service Company	Palo Verde 1	PWR	0301	2	0	2	0	0	0
	Palo Verde 2	PWR	0302	1	0	1	0	0	0
	Palo Verde 3	PWR	0303	1	0	1	0	0	0
Arkansas Power and Light Company	Arkansas Nuclear 1	PWR	0401	1	0	0	0	0	1
	Arkansas Nuclear 2	PWR	0402	1	0	1	0	0	0
Baltimore Gas and Electric Company	Calvert Cliffs 1 & 2	PWR	0501	0	0	0	0	0	0
Boston Edison Company	Pilgrim 1	BWR	0601	1	1	0	0	0	0
Carolina Power and Light Company	Brunswick 1	BWR	0701	0	0	0	0	0	0
	Brunswick 2	BWR	0702	1	0	1	0	0	0
	Harris 1	PWR	0703	1	0	1	0	0	0
	Robinson 2	PWR	0705	1	0	1	0	0	0
Cleveland Electric Illuminating Company	Perry 1	BWR	0901	4	0	0	0	0	4
Commonwealth Edison Company	Braidwood 1 & 2	PWR	1001	1	0	1	0	0	0
	Byron 1 & 2	PWR	1003	2	2	0	0	0	0
	Dresden 1	BWR	1005	1	0	1	0	0	0
	Dresden 2	BWR	1006	2	0	2	0	0	0
	Dresden 3	BWR	1007	2	0	2	0	0	0
	LaSalle County 1 & 2	BWR	1008	1	0	1	0	0	0
	Quad Cities 1 & 2	BWR	1010	4	0	4	0	0	0
	Zion 1 & 2	PWR	1012	1	0	1	0	0	0

See footnotes at end of table.

Table FE2. Canisters Containing Spent Fuel as of December 31, 1992 (Continued)

Electric Utility Name	Reactor Names	Reactor Type	Pool Site ID	Total Canisters Fuel	Canisters with Intact Assemblies	Canisters with Rods and Pieces[a]	Canisters with Consolidated Assemblies	Number of Assemblies Consolidated	Canisters with Contents, Unknown[b]
Consolidated Edison Company of New York	Indian Point 1	PWR	1101	0	0	0	0	0	0
	Indian Point 2	PWR	1102	0	0	0	0	0	0
Consumers Power Company	Big Rock Point	BWR	1201	0	0	0	0	0	0
	Palisades	PWR	1204	6	0	1	5	17	0
Dairyland Power Cooperative	LaCrosse	BWR	1301	0	0	0	0	0	0
Detroit Edison Company	Enrico Fermi 2	BWR	1402	0	0	0	0	0	0
Duke Power Company	Catawba 1	PWR	1501	0	0	0	0	0	0
	Catawba 2	PWR	1502	0	0	0	0	0	0
	McGuire 1	PWR	1504	2	0	2	0	0	0
	McGuire 2	PWR	1505	1	0	1	0	0	0
	Oconee 1 & 2	PWR	1506	4	0	2	2	4	0
	Oconee 3	PWR	1508	1	0	1	0	0	0
Duquesne Light Company	Beaver Valley 1	PWR	1601	3	2	1	0	0	0
	Beaver Valley 2	PWR	1602	1	0	1	0	0	0
Florida Power Corporation	Crystal River 3	PWR	1701	1	0	1	0	0	0
Florida Power and Light Company	St. Lucie 1	PWR	1801	1	0	0	0	0	1
	St. Lucie 2	PWR	1802	1	0	0	0	0	1
	Turkey Point 3	PWR	1803	1	0	1	0	0	0
	Turkey Point 4	PWR	1804	0	0	0	0	0	0
GPU Nuclear Corporation	Three Mile Island 1	PWR	1901	0	0	0	0	0	0
	Oyster Creek	BWR	1903	18	18	0	0	0	0
Georgia Power Company	Hatch 1 & 2	BWR	2001	0	0	0	0	0	0
	Vogtle 1 & 2	PWR	2003	0	0	0	0	0	0

See footnotes at end of table.

Table FE2. Canisters Containing Spent Fuel as of December 31, 1992 (Continued)

Electric Utility Name	Reactor Names	Reactor Type	Pool Site ID	Total Canisters Fuel	Canisters with Intact Assemblies	Canisters with Rods and Pieces[a]	Canisters with Consolidated Assemblies	Number of Assemblies Consolidated	Canisters with Contents Unknown[b]
Gulf States Utilities Company	River Bend 1	BWR	2101	0	0	0	0	0	0
Houston Lighting and Power Company	South Texas 1	PWR	2201	0	0	0	0	0	0
	South Texas 2	PWR	2202	0	0	0	0	0	0
Illinois Power Company	Clinton 1	BWR	2301	0	0	0	0	0	0
Indiana Michigan Power Company	Cook 1	PWR	5801	1	0	0	0	0	1
	Cook 2	PWR	5801	0	0	0	0	0	0
Iowa Electric Light and Power Company	Duane Arnold	BWR	2401	0	0	0	0	0	0
Kansas Gas and Electric Company	Wolf Creek 1	PWR	2501	0	0	0	0	0	0
Long Island Lighting Company	Shoreham	BWR	2601	0	0	0	0	0	0
Louisiana Power and Light Company	Waterford 3	PWR	2701	2	0	2	0	0	0
Maine Yankee Atomic Power Company	Maine Yankee	PWR	2801	0	0	0	0	0	0
Nebraska Public Power District	Cooper Station	BWR	3001	0	0	0	0	0	0
New York Power Authority	Fitzpatrick	BWR	3901	0	0	0	0	0	0
	Indian Point 3	PWR	3902	0	0	0	0	0	0
Niagara Mohawk Power Corporation	Nine Mile Point 1	BWR	3101	0	0	0	0	0	0
	Nine Mile Point 2	BWR	3102	0	0	0	0	0	0

See footnotes at end of table.

Table FE2. Canisters Containing Spent Fuel as of December 31, 1992 (Continued)

Electric Utility Name	Reactor Names	Reactor Type	Pool Site ID	Total Canisters Fuel	Canisters with Intact Assemblies	Canisters with Rods and Pieces[a]	Canisters with Consolidated Assemblies	Number of Assemblies Consolidated	Canisters with Contents Unknown[b]
North Atlantic Energy Service Corporation	Seabrook	PWR	5901	0	0	0	0	0	0
Northeast Utilities Service Company	Millstone 1	BWR	3201	1	0	1	0	0	0
	Millstone 2	PWR	3202	6	0	3	3	6	0
	Millstone 3	PWR	3203	0	0	0	0	0	0
	Haddam Neck	PWR	5701	5	0	5	0	0	0
Northern States Power Company	Monticello	BWR	3301	0	0	0	0	0	0
	Prairie Island 1 & 2	PWR	3302	20	0	2	18	36	0
Omaha Public Power District	Fort Calhoun	PWR	3401	0	0	0	0	0	0
Pacific Gas and Electric Company	Diablo Canyon 1	PWR	3501	0	0	0	0	0	0
	Diablo Canyon 2	PWR	3502	1	0	1	0	0	0
	Humboldt Bay	BWR	3503	1	1	0	0	0	0
Pennsylvania Power and Light Company	Susquehanna 1 & 2	BWR	3601	1	0	1	0	0	0
Philadelphia Electric Company	Limerick 1 & 2	BWR	3701	0	0	0	0	0	0
	Peach Bottom 2	BWR	3704	2	0	2	0	0	0
	Peach Bottom 3	BWR	3705	1	0	1	0	0	0
Portland General Electric Company	Trojan	PWR	3801	12	0	12	0	0	0
Public Service Company of Colorado	Fort St. Vrain	HTGR	4101	0	0	0	0	0	0
Public Service Electric and Gas Company	Hope Creek	BWR	4201	0	0	0	0	0	0
	Salem 1	PWR	4202	0	0	0	0	0	0
	Salem 2	PWR	4203	0	0	0	0	0	0

See footnotes at end of table.

Table FE2. Canisters Containing Spent Fuel as of December 31, 1992 (Continued)

Electric Utility Name	Reactor Names	Reactor Type	Pool Site ID	Total Canisters Fuel	Canisters with Intact Assemblies	Canisters with Rods and Pieces[a]	Canisters with Consolidated Assemblies	Number of Assemblies Consolidated	Canisters with Contents, Unknown[b]
Rochester Gas and Electric Corporation	Ginna	PWR	4401	8	0	0	8	11	0
Sacramento Municipal Utility District	Rancho Seco	PWR	4501	0	0	0	0	0	0
South Carolina Electric and Gas Company	Summer	PWR	4601	1	0	1	0	0	0
Southern California Edison Company	San Onofre 1	PWR	4701	0	0	0	0	0	0
	San Onofre 2	PWR	4702	0	0	0	0	0	0
	San Onofre 3	PWR	4703	0	0	0	0	0	0
System Energy Resources, Inc.	Grand Gulf 1	BWR	2901	1	0	1	0	0	0
Tennessee Valley Authority	Bellefonte 1	PWR	4801	0	0	0	0	0	0
	Bellefonte 2	PWR	4802	0	0	0	0	0	0
	Browns Ferry 1 & 2	BWR	4803	1	1	0	0	0	0
	Browns Ferry 3	BWR	4805	0	0	0	0	0	0
	Sequoyah 1 & 2	PWR	4808	0	0	0	0	0	0
	Watts Bar 1 & 2	PWR	4810	0	0	0	0	0	0
TU Electric	Comanche Peak 1 & 2	PWR	4901	0	0	0	0	0	0
Toledo Edison Company	Davis-Besse	PWR	5001	1	0	1	0	0	0
Union Electric Company	Callaway	PWR	5101	1	0	0	0	0	1
Vermont Yankee Nuclear Power Corporation	Vermont Yankee	BWR	6001	0	0	0	0	0	0
Virginia Power	North Anna 1 & 2	PWR	5201	1	0	1	0	0	0
	Surry 1 & 2	PWR	5203	2	0	2	0	0	0
Washington Public Power Supply System	Washington Nuclear 2	BWR	5302	0	0	0	0	0	0

See footnotes at end of table.

Table FE2. Canisters Containing Spent Fuel as of December 31, 1992 (Continued)

Electric Utility Name	Reactor Names	Reactor Type	Pool Site ID	Total Canisters Fuel	Canisters with Intact Assemblies	Canisters with Rods and Pieces[a]	Canisters with Consolidated Assemblies	Number of Assemblies Consolidated	Canisters with Contents Unknown[b]
Wisconsin Electric Power Company	Point Beach 1 & 2	PWR	5401	13	12	1	0	0	0
Wisconsin Public Service Corporation	Kewaunee	PWR	5701	0	0	0	0	0	0
Yankee Atomic Electric Company	Yankee Rowe	PWR	5601	0	0	0	0	0	0
Total BWR				42	21	17	0	0	4
Total PWR				109	16	52	36	74	5
TOTAL				151	37	69	36	74	9

[a]Canisters with Rods and Pieces column represents the number of canisters containing intact fuel rods from consolidation, reconstitution, or reconstruction.

[b]Canisters with Contents Unknown column represents the number of canisters containing fuel for which specific data on the contents of the canister were not reported on the Form RW-859 survey.

PWR = Pressurized-water reactor; BWR = Boiling-water reactor; HTGR = High-temperature, gas-cooled reactor.

Notes: Data for the following pool sites are as of December 31, 1991 - Pilgrim 1, Indian Point 1 & 2, Big Rock Point, Beaver Valley 1, Three Mile Island 1, Wolf Creek 1, Cooper Station, Diablo Canyon 2, Salem 2, Summer, Davis-Besse, and Yankee Rowe. Shoreham did not report for either 1991 or 1992.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Table FE3. Canisters Containing Nonfuel Components as of December 31, 1992

Electric Utility Name	Reactor Names	Reactor Type	Pool Site ID	Total Canisters Nonfuel[a]	Debris[b]	Nonfuel Disassembly Hardware	Nonfuel Components[c]	Other[d]	Canisters with Contents Unknown[e]
Alabama Power Company	Farley 1	PWR	0101	0	0	0	0	0	0
	Farley 2	PWR	0102	0	0	0	0	0	0
Arizona Public Service Company	Palo Verde 1	PWR	0301	6	0	5	5	0	0
	Palo Verde 2	PWR	0302	4	0	4	4	0	0
	Palo Verde 3	PWR	0303	4	0	4	4	0	0
Arkansas Power and Light Company	Arkansas Nuclear 1	PWR	0401	16	0	0	0	0	16
	Arkansas Nuclear 2	PWR	0402	13	0	0	0	0	13
Baltimore Gas and Electric Company	Calvert Cliffs 1 & 2	PWR	0501	21	0	4	7	10	0
Boston Edison Company	Pilgrim 1	BWR	0601	0	0	0	0	0	0
Carolina Power and Light Company	Brunswick 1	BWR	0701	0	0	0	0	0	0
	Brunswick 2	BWR	0702	0	0	0	0	0	0
	Harris 1	PWR	0703	0	0	0	0	0	0
	Robinson 2	PWR	0705	2	0	0	0	2	0
Cleveland Electric Illuminating Company	Perry 1	BWR	0901	0	0	0	0	0	0
Commonwealth Edison Company	Braidwood 1 & 2	PWR	1001	2	0	0	1	2	0
	Byron 1 & 2	PWR	1003	0	0	0	0	0	0
	Dresden 1	BWR	1005	3	0	0	3	0	0
	Dresden 2	BWR	1006	0	0	0	0	0	0
	Dresden 3	BWR	1007	0	0	0	0	0	0
	LaSalle County 1 & 2	BWR	1008	0	0	0	0	0	0
	Quad Cities 1 & 2	BWR	1010	0	0	0	0	0	0
	Zion 1 & 2	PWR	1012	2	0	0	0	2	0
Consolidated Edison Company of New York	Indian Point 1	PWR	1101	0	0	0	0	0	0
	Indian Point 2	PWR	1102	0	0	0	0	0	0
Consumers Power Company	Big Rock Point	BWR	1201	2	0	0	0	0	2
	Palisades	PWR	1204	0	0	0	0	0	0
Dairyland Power Cooperative	LaCrosse	BWR	1301	0	0	0	0	0	0

See footnotes at end of table.

Table FE3. Canisters Containing Nonfuel Components as of December 31, 1992 (Continued)

Electric Utility Name	Reactor Names	Reactor Type	Pool Site ID	Total Canisters Nonfuel[a]	Debris[b]	Nonfuel Disassembly Hardware	Nonfuel Components[c]	Other[d]	Canisters with Contents Unknown[e]
Detroit Edison Company	Enrico Fermi 2	BWR	1402	0	0	0	0	0	0
Duke Power Company	Catawba 1	PWR	1501	0	0	0	0	0	0
	Catawba 2	PWR	1502	0	0	0	0	0	0
	McGuire 1	PWR	1504	0	0	0	0	0	0
	McGuire 2	PWR	1505	0	0	0	0	0	0
	Oconee 1 & 2	PWR	1506	0	0	0	0	0	0
	Oconee 3	PWR	1508	0	0	0	0	0	0
Duquesne Light Company	Beaver Valley 1	PWR	1601	8	0	2	8	8	0
	Beaver Valley 2	PWR	1602	0	0	0	0	0	0
Florida Power Corporation	Crystal River 3	PWR	1701	1	0	1	1	1	0
Florida Power and Light Company	St. Lucie 1	PWR	1801	4	0	0	0	0	4
	St. Lucie 2	PWR	1802	1	0	0	0	0	1
	Turkey Point 3	PWR	1803	0	0	0	0	0	0
	Turkey Point 4	PWR	1804	0	0	0	0	0	0
GPU Nuclear Corporation	Three Mile Island 1	PWR	1901	0	0	0	0	0	0
	Oyster Creek	BWR	1903	0	0	0	0	0	0
Georgia Power Company	Hatch 1 & 2	BWR	2001	0	0	0	0	0	0
	Vogtle 1 & 2	PWR	2003	0	0	0	0	0	0
Gulf States Utilities Company	River Bend 1	BWR	2101	0	0	0	0	0	0
Houston Lighting and Power Company	South Texas 1	PWR	2201	2	0	0	1	0	0
	South Texas 2	PWR	2202	2	0	0	0	0	0
Illinois Power Company	Clinton 1	BWR	2301	0	0	0	0	0	0
Indiana Michigan Power Company	Cook 1	PWR	5801	2	0	0	0	2	0
	Cook 2	PWR	5801	3	0	0	0	3	0

See footnotes at end of table.

Table FE3. Canisters Containing Nonfuel Components as of December 31, 1992 (Continued)

Electric Utility Name	Reactor Names	Reactor Type	Pool Site ID	Total Canisters Nonfuel[a]	Debris[b]	Nonfuel Disassembly Hardware	Nonfuel Components[c]	Other[d]	Canisters with Contents Unknown[e]
Iowa Electric Light and Power Company	Duane Arnold	BWR	2401	0	0	0	0	0	0
Kansas Gas and Electric Company	Wolf Creek 1	PWR	2501	0	0	0	0	0	0
Long Island Lighting Company	Shoreham	BWR	2601	0	0	0	0	0	0
Louisiana Power and Light Company	Waterford 3	PWR	2701	4	0	4	4	0	0
Maine Yankee Atomic Power Company	Maine Yankee	PWR	2801	0	0	0	0	0	0
Nebraska Public Power District	Cooper Station	BWR	3001	0	0	0	0	0	0
New York Power Authority	Fitzpatrick	BWR	3901	0	0	0	0	0	0
	Indian Point 3	PWR	3902	0	0	0	0	0	0
Niagara Mohawk Power Corporation	Nine Mile Point 1	BWR	3101	0	0	0	0	0	0
	Nine Mile Point 2	BWR	3102	0	0	0	0	0	0
North Atlantic Energy Service Corporation	Seabrook	PWR	5901	0	0	0	0	0	0
Northeast Utilities Service Company	Millstone 1	BWR	3201	0	0	0	0	0	0
	Millstone 2	PWR	3202	4	1	3	0	0	0
	Millstone 3	PWR	3203	0	0	0	0	0	0
	Haddam Neck	PWR	5701	4	0	0	1	3	0
Northern States Power Company	Monticello	BWR	3301	0	0	0	0	0	0
	Prairie Island 1 & 2	PWR	3302	2	0	0	2	0	0
Omaha Public Power District	Fort Calhoun	PWR	3401	0	0	0	0	0	0
Pacific Gas and Electric Company	Diablo Canyon 1	PWR	3501	0	0	0	0	0	0
	Diablo Canyon 2	PWR	3502	0	0	0	0	0	0
	Humboldt Bay	BWR	3503	0	0	0	0	0	0

See footnotes at end of table.

Table FE3. Canisters Containing Nonfuel Components as of December 31, 1992 (Continued)

Electric Utility Name	Reactor Names	Reactor Type	Pool Site ID	Total Canisters Nonfuel[a]	Debris[b]	Nonfuel Disassembly Hardware	Nonfuel Components[c]	Other[d]	Canisters with Contents Unknown[e]
Pennsylvania Power and Light Company	Susquehanna 1 & 2	BWR	3601	0	0	0	0	0	0
Philadelphia Electric Company	Limerick 1 & 2	BWR	3701	5	0	0	0	0	5
	Peach Bottom 2	BWR	3704	0	0	0	0	0	0
	Peach Bottom 3	BWR	3705	0	0	0	0	0	0
Portland General Electric Company	Trojan	PWR	3801	21	5	6	20	0	0
Public Service Company of Colorado	Fort St. Vrain	HTGR	4101	0	0	0	0	0	0
Public Service Electric and Gas Company	Hope Creek	BWR	4201	0	0	0	0	0	0
	Salem 1	PWR	4402	0	0	0	0	0	0
	Salem 2	PWR	4203	0	0	0	0	0	0
Rochester Gas and Electric Corporation	Ginna	PWR	4401	2	0	0	2	0	0
Sacramento Municipal Utility District	Rancho Seco	PWR	4501	0	0	0	0	0	0
South Carolina Electric and Gas Company	Summer	PWR	4601	0	0	0	0	0	0
Southern California Edison Company	San Onofre 1	PWR	4701	0	0	0	0	0	0
	San Onofre 2	PWR	4702	0	0	0	0	0	0
	San Onofre 3	PWR	4703	0	0	0	0	0	0
System Energy Resources, Inc.	Grand Gulf 1	BWR	2901	0	0	0	0	0	0
Tennessee Valley Authority	Bellefonte 1	PWR	4801	0	0	0	0	0	0
	Bellefonte 2	PWR	4802	0	0	0	0	0	0
	Browns Ferry 1 & 2	BWR	4803	0	0	0	0	0	0
	Browns Ferry 3	BWR	4805	0	0	0	0	0	0
	Sequoyah 1 & 2	PWR	4808	0	0	0	0	0	0
	Watts Bar 1 & 2	PWR	4810	0	0	0	0	0	0
TU Electric	Comanche Peak 1 & 2	PWR	4901	0	0	0	0	0	0
Toledo Edison Company	Davis-Besse	PWR	5001	2	0	2	0	0	0

See footnotes at end of table.

Table FE3. Canisters Containing Nonfuel Components as of December 31, 1992 (Continued)

Electric Utility Name	Reactor Names	Reactor Type	Pool Site ID	Total Canisters Nonfuel[a]	Debris[b]	Nonfuel Disassembly Hardware	Nonfuel Components[c]	Other[d]	Canisters with Contents Unknown[e]
Union Electric Company	Callaway	PWR	5101	0	0	0	0	0	0
Vermont Yankee Nuclear Power Corporation	Vermont Yankee	BWR	6001	0	0	0	0	0	0
Virginia Power	North Anna 1 & 2	PWR	5201	2	0	0	1	0	1
	Surry 1 & 2	PWR	5203	2	0	0	1	0	0
Washington Public Power Supply System	Washington Nuclear 2	BWR	5302	0	0	0	0	0	0
Wisconsin Electric Power Company	Point Beach 1 & 2	PWR	5401	3	1	0	2	0	0
Wisconsin Public Service Corporation	Kewaunee	PWR	5701	0	0	0	0	0	0
Yankee Atomic Electric Company	Yankee Rowe	PWR	5601	0	0	0	0	0	0
TOTAL				149	7	35	67	33	42

[a]Total Canisters Nonfuel column may not equal sum of individual canister contents columns since canisters may contain more than one category or be empty.
[b]Debris column represents canisters containing fuel rod pieces, fuel pellets, etc.
[c]Nonfuel Components column represents canisters containing nonfuel assembly hardware.
[d]Other column represents canisters containing other nonfuel material.
[e]Canisters with Contents Unknown column represents the number of canisters containing nonfuel components for which specific data on the contents of the canister were not reported on the Form RW-859 survey.

PWR = Pressurized-water reactor; BWR = Boiling-water reactor; HTGR = High-temperature, gas-cooled reactor.

Notes: Data for the following pool sites are as of December 31, 1991 - Pilgrim 1, Indian Point 1 & 2, Big Rock Point, Beaver Valley 1, Three Mile Island 1, Wolf Creek 1, Cooper Station, Diablo Canyon 2, Salem 2, Summer, Davis-Besse, and Yankee Rowe. Shoreham did not report for either 1991 or 1992.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Table FE4. Canister Dimensions

Length (inches)	Width x Depth (inches) 3x3	5x5	6x6	7x7	8x8	9x9	10x10	12x12	14x14	16x16	19x19	Missing Dimensions[a]	Data Not Reported[b]	Total
84	–	–	–	–	–	–	–	1	–	–	–	–	–	1
100	–	–	1	–	–	–	–	–	–	–	–	–	–	1
138	–	–	–	–	9	–	–	–	–	–	–	–	–	9
144	–	–	1	–	–	6	–	–	–	–	–	–	–	7
152	–	–	1	–	–	–	–	–	–	–	–	–	–	1
153	–	–	–	–	1	–	–	–	–	–	–	–	–	1
155	–	–	–	–	4	–	–	–	–	–	–	–	–	4
156	–	–	–	–	1	8	–	–	–	–	–	–	–	9
157	–	–	–	–	24	–	–	–	–	–	–	–	–	24
158	–	–	–	–	–	4	–	–	–	–	–	–	–	4
159	–	2	–	–	6	1	–	–	–	–	–	–	–	9
160	–	–	–	5	5	3	–	–	–	–	–	–	–	13
161	–	–	–	–	19	22	–	–	–	–	–	–	–	41
163	–	–	1	–	–	2	–	–	–	–	–	–	–	3
166	–	–	–	–	1	–	–	–	–	–	–	–	–	1
168	–	–	–	–	10	–	–	–	–	–	–	–	–	10
170	–	–	–	–	–	–	5	–	2	–	2	–	–	9
171	2	–	–	–	2	–	–	–	–	–	–	–	–	4
174	–	1	–	–	–	–	–	–	–	–	–	–	–	1
176	–	–	4	–	–	–	–	–	–	1	–	–	–	5
180	–	–	–	–	16	18	1	–	–	–	–	–	–	35
186	–	–	–	–	1	–	–	–	–	–	–	–	–	1
189	–	–	–	–	3	–	–	–	–	–	–	–	–	3
192	–	–	–	–	–	2	–	–	–	–	–	–	–	2
Missing Dimensions[a]	–	–	–	–	–	–	–	–	–	–	–	37	–	37
Data Not Reported[b]	–	–	–	–	–	–	–	–	–	–	–	–	51	51
TOTAL	2	3	8	5	102	66	6	1	2	1	2	37	51	286

[a]"Missing Dimensions" represents the canisters for which contents were reported, but dimensions were not.
[b]"Data Not Reported" represents the canisters for which no data were reported.
Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1991)(1992).

Table FE5. Nonfuel Assembly (NFA) Hardware from Babcock & Wilcox Reactors

Reactor Names[a]	Permanently Discharged Fuel Assemblies	NFA Hardware					Total Reported NFA Hardware Items	NFA Hardware Items Reported In/Attached to Fuel Assemblies	Percentage of NFA Hardware Items In/Attached to Fuel Assemblies
		Burnable Poison Rod Assemblies	Axial Power Shaping Assemblies	Control Rod Assemblies	Neutron Sources	Orifice Rod Assemblies			
Arkansas Nuclear 1	624	0	0	0	2	[b]66	68	66	97%
Crystal River 3	531	232	8	61	2	2	305	305	100%
Davis-Besse	386	180	8	0	4	2	194	194	100%
Oconee 1 & 2	[c]1,562	[d]891	[d]35	[d]178	[d]6	[d]15	1,125	1,119	99%
Oconee 3	748	347	13	4	2	7	373	372	100%
Rancho Seco	493	272	[e]16	61	4	62	415	0	0%
Three Mile Island 1	513	268	8	13	4	[b]77	370	366	99%
Total From Reporting Reactors	**4,857**	**2,190**	**88**	**317**	**24**	**231**	**2,850**	**2,422**	**85%**
Percentage of Permanently Discharged Fuel Assemblies		**45.09%**	**1.81%**	**6.53%**	**0.49%**	**4.76%**			

[a] Includes all Babcock & Wilcox reactors.
[b] Quantity is the number reported in the pool plus the number reported in assemblies.
[c] Number of fuel assemblies in pool represents fuel discharged from two reactors into one pool.
[d] Number of nonfuel components in pool represents components discharged from two reactors into one pool.
[e] Includes 8 axial power shaping assemblies and 8 gray axial power shaping assemblies.
Note: Data for the following pool sites are as of December 31, 1991 - Three Mile Island 1 and Davis-Besse.
Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Table FE6. Nonfuel Assembly (NFA) Hardware from Combustion Engineering Reactors

Reactor Names[a]	Permanently Discharged Fuel Assemblies	NFA Hardware			Total Reported NFA Hardware Items	NFA Hardware Items Reported In/Attached to Fuel Assemblies	Percentage of NFA Hardware Items In/Attached to Fuel Assemblies
		Control Element Assemblies	Neutron Sources	Control Element Assembly Flow Plugs			
Arkansas Nuclear 2	564	0	2	0	2	2	100%
Calvert Cliffs 1 & 2	[b]1,412	[c,d]177	[c,d]2	0	179	177	99%
Maine Yankee	1,054	[c]93	[c]1	0	94	94	100%
Millstone 2	784	82	4	8	94	91	97%
St. Lucie 1	796	139	2	0	141	73	52%
San Onofre 2	484	[c]1	0	0	1	1	100%
San Onofre 3	484	[c]1	0	0	1	1	100%
Waterford 3	428	1	0	0	1	1	100%
Total From Reporting Reactors	**6,006**	**494**	**11**	**8**	**513**	**440**	**86%**
Percentage of Permanently Discharged Fuel Assemblies		**8.23%**	**0.18%**	**0.13%**			

[a] Includes all Combustion Engineering reactors except Palo Verde 1, Palo Verde 2, and Palo Verde 3 which did not report these data.
[b] Number of fuel assemblies in pool represents fuel discharged from two reactors into separate pools joined by a transfer canal.
[c] Quantity is the number reported in the pool plus the number reported in assemblies.
[d] Number of nonfuel components in pool represents components stored in fuel discharged from two reactors into separate pools joined by a transfer canal.
Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Table FE7. Nonfuel Assembly (NFA) Hardware from General Electric Reactors

Reactor Names[a]	Permanently Discharged Fuel Assemblies	NFA Hardware: Fuel Channels	NFA Hardware: Control Blades	NFA Hardware: Neutron Sources	NFA Hardware: Local Power Range Monitors	NFA Hardware: Other Instrumentation	Total Reported NFA Hardware Items	NFA Hardware Items Reported In/Attached to Fuel Assemblies	Percentage of NFA Hardware Items In/Attached to Fuel Assemblies
Browns Ferry 1	1,488	1,467	1	0	0	0	1,468	1,464	100%
Browns Ferry 2	1,440	1,409	3	0	0	1	1,413	1,409	100%
Browns Ferry 3	1,029	1,018	35	0	0	0	1,053	1,004	95%
Brunswick 1	1,215	11	0	0	0	0	11	0	0%
Brunswick 2	1,400	6	0	0	0	0	6	0	0%
Clinton 1	568	0	0	5	17	11	33	0	0%
Cooper Station	1,676	93	19	0	34	0	146	0	0%
Dresden 2	2,605	23	15	0	0	0	38	0	0%
Dresden 3	1,864	70	56	0	5	0	131	0	0%
Enrico Fermi 2	672	2	165	0	6	0	173	0	0%
Fitzpatrick	1,684	0	51	0	15	0	66	0	0%
Grand Gulf 1	1,384	0	0	7	31	13	51	0	0%
Hatch 1 & 2	[b]3,376	[c]3,381	0	0	0	0	3,381	3,381	[d]100%
Hope Creek	1,008	1,008	27	1	8	0	1,044	1,008	97%
LaSalle County 1 & 2	[b]1,920	[e]1,512	9	14	88	33	1,656	1,472	89%
Millstone 1	2,116	[e]1,800	0	0	0	0	1,800	1,800	100%
Monticello	1,640	559	21	0	13	0	593	492	83%
Nine Mile Point 1	1,620	1,620	1	0	2	0	1,623	0	0%
Nine Mile Point 2	444	444	0	4	0	0	448	0	0%
Oyster Creek	1,876	1,389	13	2	0	0	1,404	1,389	99%
Peach Bottom 2	2,164	5	0	0	0	0	5	0	0%
Peach Bottom 3	1,944	0	41	1	0	0	42	0	0%

See footnotes at end of table.

Table FE7. Nonfuel Assembly (NFA) Hardware from General Electric Reactors (Continued)

Reactor Names[a]	Permanently Discharged Fuel Assemblies	NFA Hardware: Fuel Channels	NFA Hardware: Control Blades	NFA Hardware: Neutron Sources	NFA Hardware: Local Power Range Monitors	NFA Hardware: Other Instrumentation	Total Reported NFA Hardware Items	NFA Hardware Items Reported In/Attached to Fuel Assemblies	Percentage of NFA Hardware Items In/Attached to Fuel Assemblies
Perry 1	744	0	24	11	43	0	78	0	0%
Pilgrim 1	1,488	[e]1,489	55	1	102	42	1,689	1,514	90%
Quad Cities 1 & 2	[b]2,053	[c,e]370	[c]6	0	[c]5	[c]8	389	369	95%
River Bend 1	764	0	24	5	18	6	53	0	0%
Vermont Yankee	1,850	1,366	0	0	0	0	1,366	1,366	100%
Total From Reporting Reactors	**42,032**	**19,042**	**566**	**51**	**387**	**114**	**20,160**	**16,668**	**83%**
Percentage of Permanently Discharged Fuel Assemblies		**45.30%**	**1.36%**	**0.11%**	**0.92%**	**0.25%**			

[a] Includes all General Electric reactors except Duane Arnold, Limerick 1 & 2, Shoreham, Susquehanna 1 & 2, and Washington Nuclear 2 which did not report these data.

[b] Number of fuel assemblies in pool represents fuel discharged from two reactors into separate pools joined by a transfer canal.

[c] Number of nonfuel components in pool represents components discharged from two reactors into separate pools joined by a transfer canal.

[d] Although all nonfuel components are reported as being in fuel assemblies, more nonfuel components were reported than discharged fuel assemblies.

[e] Quantity is the number reported in the pool plus the number reported in assemblies.

Note: Data for the following pool sites are as of December 31, 1991 - Pilgrim 1 and Cooper Station.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Table FE8. Nonfuel Assembly (NFA) Hardware from Westinghouse Reactors

Reactor Names[a]	Permanently Discharged Fuel Assemblies	NFA Hardware					Total Reported NFA Hardware Items	NFA Hardware Items Reported In/Attached to Fuel Assemblies	Percentage of NFA Hardware Items In/Attached to Fuel Assemblies
		Burnable Poison Rod Assemblies	Thimble Plug Assemblies	Rod Cluster Control Assemblies	Neutron Sources	Incore Instrumentation			
Beaver Valley 1	498	239	106	6	4	0	355	353	99%
Beaver Valley 2	187	68	[b]140	0	2	0	210	183	87%
Braidwood 1 & 2	[c]404	336	23	59	4	3	425	276	65%
Byron 1 & 2	[c]596	452	17	107	4	0	580	384	66%
Callaway	452	230	145	55	2	17	449	383	85%
Catawba 1	408	322	27	8	2	0	359	334	93%
Catawba 2	280	221	30	5	2	0	258	224	87%
Comanche Peak 1 & 2	117	152	21	0	4	3	180	117	65%
Cook 1	866	415	143	20	4	0	582	582	100%
Cook 2	657	461	6	2	4	0	473	463	98%
Diablo Canyon 1	376	188	94	0	3	5	290	261	90%
Diablo Canyon 2	308	136	0	0	3	6	145	122	84%
Farley 1	655	431	177	5	4	83	700	617	88%
Farley 2	498	398	106	0	2	0	506	498	98%
Ginna	701	47	121	36	10	0	214	213	99%
Harris 1	224	110	7	57	3	14	191	177	93%
Indian Point 2	660	414	175	1	10	0	600	600	100%
Indian Point 3	582	0	1	0	0	0	1	0	0%
Kewaunee	604	270	102	68	7	72	519	447	86%
McGuire 1	484	423	61	8	3	0	495	448	91%
McGuire 2	476	668	61	10	2	0	741	735	99%
Millstone 3	248	[d]140	[d]91	[d]40	[d]2	2	275	236	86%
North Anna 1 & 2	[c]959	[e]841	[e]146	[e]6	[e]12	[e]0	1,005	1,005	[f]100%
Point Beach 1 & 2	[c]1,202	[d]361	[d]320	[d]66	[d]14	0	761	755	99%
Robinson 2	768	4	2	6	5	33	50	11	22%
Salem 1	631	[d]505	[d]135	22	[d]5	0	667	594	89%

See footnotes at end of table.

Table FE8. Nonfuel Assembly (NFA) Hardware from Westinghouse Reactors (Continued)

Reactor Names[a]	Permanently Discharged Fuel Assemblies	NFA Hardware: Burnable Poison Rod Assemblies	NFA Hardware: Thimble Plug Assemblies	NFA Hardware: Rod Cluster Control Assemblies	NFA Hardware: Neutron Sources	NFA Hardware: Incore Instrumentation	Total Reported NFA Hardware Items	NFA Hardware Items Reported In/Attached to Fuel Assemblies	Percentage of NFA Hardware Items In/Attached to Fuel Assemblies
Salem 2	432	[d]236	[d]61	0	[d]3	0	300	300	100%
Seabrook	136	90	2	7	2	0	101	60	59%
Sequoyah 1	350	260	2	8	4	0	274	274	100%
Sequoyah 2	387	236	1	2	2	0	241	241	100%
South Texas 1	229	189	3	57	2	0	251	251	[f]100%
South Texas 2	116	98	0	57	2	0	157	157	[f]100%
Summer	372	222	76	0	4	0	302	275	91%
Surry 1 & 2	[c]1,266	[e]506	[e]77	[e]109	[e]7	[e]0	699	699	100%
Trojan	780	92	140	8	4	0	244	244	100%
Turkey Point 3	605	246	191	10	2	0	449	448	100%
Turkey Point 4	547	296	115	9	2	0	422	422	100%
Vogtle 1 & 2	[g]400	[e]430	[e]1	[e]106	[e]2	[e]19	558	400	72%
Wolf Creek 1	340	274	69	55	2	11	411	319	78%
Zion 1 & 2	[c]1,608	[d]826	[d]340	[d]55	[d]8	2	1,231	1,229	100%
Total From Reporting Reactors	**21,409**	**11,833**	**3,335**	**1,070**	**163**	**270**	**16,671**	**15,337**	**92%**
Percentage of Permanently Discharged Fuel Assemblies		**55.27%**	**15.58%**	**5.00%**	**0.76%**	**1.26%**			

[a] Includes all Westinghouse reactors except Prairie Island 1 & 2 and Watts Bar 1 & 2 which did not report these data.
[b] Quantity includes 32 water displacement assemblies.
[c] Number of nonfuel components in pool represents components discharged from two reactors into one pool.
[d] Quantity is the number reported in the pool plus the number reported in assemblies.
[e] Quantities reported for nonfuel components were identical and were assumed to be duplicate records.
[f] Although all nonfuel components are reported as being in fuel assemblies, more nonfuel components were reported than discharged fuel assemblies.
[g] Number of fuel assemblies in pool represents fuel discharged from two reactors into separate pools joined by a transfer canal.
Note: Data for the following pool sites are as of December 31, 1991 - Indian Point 2, Beaver Valley 1, Wolf Creek 1, Diablo Canyon 2, Salem 2, and Summer.
Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Executive Summary

The Energy Information Administration (EIA) of the U.S. Department of Energy (DOE) administers the Nuclear Fuel Data survey, Form RW-859. This form is used to collect data on every fuel assembly irradiated in commercial nuclear reactors operating in the United States, and on the current inventories and storage capacities of those reactors. These data are important to the design and operation of the equipment and facilities that DOE will use for the future acceptance, transport, and disposal of all spent fuel. The information presented in this report summarizes the detailed data collected on Form RW-859 and identifies evident trends in burnup and enrichment in these data. This report focuses on commercial light-water reactor (LWR) spent nuclear fuel reported as discharged as of December 31, 1992.

Spent Nuclear Fuel Discharges

A total of 91,039 assemblies, with an initial loading weight of uranium of 25,958 metric tons (MTU) (Table ES1), have been discharged from 117 commercial LWRs from 1968 through 1992. Electric utilities also reported their plans to reinsert 163 temporarily discharged assemblies into pressurized-water reactors (PWRs) and 5 temporarily discharged assemblies into boiling-water reactors (BWRs). Approximately 37 percent (9,547.6 MTU) of the total discharges is from BWRs; 63 percent (16,410.1 MTU) is from PWRs. Reprocessed spent fuel and discharges from the damaged Three Mile Island Unit 2 reactor and from Fort St. Vrain, the only commercial high-temperature, gas-cooled reactor (HTGR), are not in the scope of this report.

The characteristics of the permanently discharged spent fuel have changed over time. Most spent commercial nuclear fuel disharged before 1972 was reprocessed. Starting in 1970, the annual average burnup for discharged BWR assemblies has shown a fairly steady increase to almost 29 gigawattdays thermal per metric ton of uranium (GWDt/MTU) in 1992. The average burnup has also continued to increase for PWRs, reaching a new high of 36 GWDt/MTU in 1992, the highest annual average yet attained.

Through 1992, a total of 3,448 of the assemblies covered by this report were shipped from electric utilities to 6 away-from-reactor storage facilities. The 3,448 assemblies do not include shipments of fuel between reactors. Typically, these assemblies were moved either to free up space in the discharging reactor's storage site or for use in a research program.

Site Capacities and Inventories, 1992

The total inventory of discharged LWR spent nuclear fuel in storage in the United States as of December 31, 1992, was 91,039 assemblies. The majority of spent nuclear fuel is stored in water filled pools, but 903 assemblies are in dry storage at Independent Spent Fuel Storage Installations (ISFSIs) at Virginia Power's Surry plant, Carolina Power and Light Company's Robinson 2 plant, and Duke Power Company's Oconee plant. This section includes as a fold-out a map showing the location of the commercial nuclear reactors and planned and existing ISFSIs. The current licensed storage capacity is 205,731 assemblies. The total maximum storage capacity of all storage sites, as reported by electric utilities, and off-site storage is 215,989 assemblies. However, the excess of total maximum capacity over current total inventory does not reflect the shortage of pool storage in many individual cases. Of the 111 reactors expected to be in operation in the year 2000, 16 reactors appear to require expansion above current pool maximums before 2000.

The quantities of spent nuclear fuel in storage at nuclear power plants and away-from-reactor facilities aggregated to the State level account for all permanently and temporarily discharged assemblies (Figures ES1 and ES2).

Table ES1. Total U.S. Commercial Spent Nuclear Fuel Discharges, 1968-1992

Reactor Type	Stored at Reactor Sites	Stored at Away-from-reactor Facilities	Total
	Number of Assemblies		
Boiling-Water Reactor	49,645	2,957	52,602
Pressurized-Water Reactor...	37,946	491	38,437
TOTAL	87,591	3,448	91,039
	Metric Tons of Uranium		
Boiling-Water Reactor	8,993.7	553.9	9,547.6
Pressurized-Water Reactor...	16,217.6	192.5	16,410.1
TOTAL	25,211.3	746.4	25,957.7

Notes: A number of assemblies discharged prior to 1972 were reprocessed and are not included in this table. See Table 12 and Technical Note 7 in Appendix E for information on reprocessed assemblies. A total of 2,208 high-temperature, gas-cooled reactor (HTGR) fuel elements, with initial uranium content equal to 25.0 metric tons of uranium (MTU), were discharged. These HTGR fuel elements are *not* included in the above table. See Technical Note 6 in Appendix E.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Figure ES1. Number of Assemblies of Spent Nuclear Fuel in Storage at U.S. Nuclear Power Plants and Away-from-reactor Facilities, by State

Notes: A total of 2,208 high-temperature, gas-cooled reactor (HTGR) fuel elements are in storage (744 stored in Idaho and 1,464 in Colorado). These HTGR fuel elements are reflected on this map but are not included in Table ES1. Numbers in the above map represent assemblies stored at nuclear power plant sites and away-from-reactor facilities, and include both permanently and temporarily discharged assemblies.
Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992)

Figure ES2. Initial Uranium Content of Spent Nuclear Fuel in Storage at U.S. Nuclear Power Plants and Away-from-reactor Facilities, by State
(Metric tons of uranium)

Notes: A total of 2,208 high-temperature, gas-cooled reactor (HTGR) fuel elements are in storage (744 with initial uranium content equal to 8.9 metric tons of uranium (MTU) stored in Idaho and 1,464 with initial uranium content equal to 16.1 MTU stored in Colorado). These HTGR fuel elements are reflected on this map but are not included in Table ES1. Numbers in the above map represent the initial uranium content of assemblies stored at nuclear power plant sites and away-from-reactor facilities, and include both permanently and temporarily discharged assemblies.
Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Assembly Type Characteristics

One hundred twenty-four reactor fuel assembly types have been identified for use in domestic commercial LWRs. These can be broadly grouped by the two LWR types, BWR and PWR. Each assembly type has a unique combination of distinguishing characteristics such as envelope dimensions, rods per assembly, cladding type, and structural materials. Some types may fit in several different reactors. In some cases, a single reactor may use more than one type. Initial enrichment and discharge burnup can vary significantly within a single assembly type.

Forty-five BWR fuel assembly types have been discharged from 41 BWRs through 1992. However, five types make up 58 percent of the BWR assemblies discharged. General Electric fabricated about 91 percent of the discharged BWR assemblies. As fabricated, most are 5.44 inches wide, 176.2 inches long, and contain 183 to 195 kilograms (kg) of uranium. Seventy-six PWRs have discharged 47 PWR fuel assembly types. Five types make up 56 percent of the PWR assemblies discharged. Westinghouse fabricated about 58 percent of the discharged PWR assemblies. As built, most are 8.44 inches wide, 159.8 inches long, and contain 425 to 460 kg of uranium.

1. Spent Fuel Discharges

Reactor Spent Fuel Discharge and Storage Activity for 1992

A total of 117 U.S. commercial light-water reactors (LWRs) have discharged spent nuclear fuel as of December 31, 1992. No reactors discharged spent fuel for the first time in 1992. Two reactors, Portland General Electric Company's Trojan and Southern California Edison Company's San Onofre 1 were permanently shut down in 1992, leaving 108 reactors in operation.

A total of 69 reactors discharged 7,782 spent nuclear fuel assemblies in 1992 (Table 1). Of these, 7,737 were permanently discharged assemblies and 45 were classified as temporarily discharged assemblies. A total of 4,024 boiling-water reactor (BWR) assemblies, containing 728.7 metric tons of uranium (MTU) were permanently discharged from 20 BWRs. A total of 3,713 pressurized-water reactor (PWR) assemblies, containing 1,601.0 MTU were permanently discharged from 49 PWRs. There are 4 BWR and 41 PWR temporarily discharged assemblies.

The total inventory of LWR spent nuclear fuel in storage in the United States as of December 31, 1992, is 91,039 assemblies, containing 25,957.7 MTU. These totals represent an increase from 1991 of 7,439 assemblies containing 2,226.3 MTU. Table 2 summarizes the changes in inventories at nuclear power plants for 1992. As shown in the table, the number of assemblies discharged in 1992 does not match the increase in the number of assemblies stored, because of reinsertion of previously discharged assemblies, transfer of assemblies among storage pools, and revisions to historical survey data from Form RW-859.

Temporarily discharged assemblies are assemblies that utilities have identified for future reinsertion. The cumulative number of discharged assemblies classified as temporarily discharged decreased from 213 assemblies at the end of 1991 to 168 assemblies at the end of 1992 (Table 3).

Nuclear Power Plant Data

All U.S. commercial LWRs which have discharged and/or are storing nuclear fuel assemblies as of December 31, 1992, are reported on Form RW-859. A total of 117 nuclear plants fall into this category: 41 BWRs and 76 PWRs. Three additional PWRs are expected to discharge spent fuel in the future. Table 4 lists data for U.S. commercial nuclear power reactors as of December 31, 1992. The list includes:

- Electric utility name
- Reactor name
- State in which the reactor is located
- Reactor type
- Reactor vendor
- Summer capability rating (net) in megawatts electric (MWe)
- Number of assemblies in the reactor core during its operation (core size)
- Startup date (that is, the year in which electricity was first generated from the reactor)
- License expiration date
- Year projected by the utility for loss of the ability to operate absent pickup of spent fuel by the DOE
- Actual or projected retirement date.

The license expiration date and the electric utility's projected retirement date are generally the same for each reactor. However, some utilities are expected to apply for reactor license renewal to prolong the productive lives of their reactors. All reactors that have shut down to date have done so before their license expiration dates. Some have shut down permanently and relinquished the operating licenses granted by the Nuclear Regulatory Commission. These are referred to as "retired" reactors. Others have shut down but have not surrendered their licenses. These reactors are in a "shutdown mode."

Additional storage capacity is projected to be needed when a current storage facility is filled to capacity, based on an understanding of current storage conditions. Form RW-859 defines being filled to capacity as the loss of ability to discharge spent fuel. The EIA collects data based on the current plans for each commercial reactor for spent fuel storage. It also collects the estimated date on which the utility would discontinue reactor operation because storage space is lacking for discharged fuel, unless DOE picks up spent fuel. This date may change in time as utilities implement plans to rerack existing spent fuel storage pools, expand their storage capacities through licensed dry storage facilities, ship spent fuel, and modify fuel cycle management programs.

Table 1. Spent Fuel Discharges in 1992

Electric Utility Name	Reactor Name	Reactor Type	Reactor ID	Number of Discharged Assemblies	Initial Uranium Content of Discharged Assemblies (MTU)	Number of Temporarily Discharged Assemblies[a]	1992 Reactor Cycle Shutdown Date
Alabama Power Company ...	Farley 1	PWR	0101	54	25.0	0	Sep. 25
	Farley 2	PWR	0102	61	28.3	0	Mar. 06
Arizona Public Service Company	Palo Verde 1	PWR	0301	97	40.4	0	Feb. 15
	Palo Verde 3	PWR	0303	117	47.5	0	Sep. 19
Arkansas Power and Light Company	Arkansas Nuclear 1	PWR	0401	61	28.3	0	Feb. 28
	Arkansas Nuclear 2	PWR	0402	76	30.9	0	Sep. 04
Baltimore Gas and Electric Company	Calvert Cliffs 1	PWR	0501	85	33.0	0	Mar. 19
Carolina Power and Light Company	Harris 1	PWR	0703	64	29.0	0	Sep. 12
	Robinson 2	PWR	0705	49	20.8	0	Mar. 27
Cleveland Electric Illuminating Company......	Perry 1	BWR	0901	204	36.9	4	Mar. 21
Commonwealth Edison Company	Braidwood 1	PWR	1001	84	35.7	0	Sep. 05
	Byron 2	PWR	1004	89	37.7	0	Feb. 28
	LaSalle County 1	BWR	1008	200	37.0	0	Oct. 03
	LaSalle County 2	BWR	1009	224	41.3	0	Jan. 04
	Quad Cities 1	BWR	1010	152	26.8	0	Sep. 20
	Quad Cities 2	BWR	1011	152	26.8	0	Jan. 01
	Zion 1	PWR	1012	76	35.0	0	Nov. 12
	Zion 2	PWR	1013	84	38.6	0	Nov. 12
Consumers Power Company	Palisades	PWR	1204	76	29.7	0	Feb. 06
Detroit Edison Company	Enrico Fermi 2	BWR	1402	316	56.9	0	Sep. 11
Duke Power Company	Catawba 1	PWR	1501	80	34.0	0	Jul. 10
	McGuire 2	PWR	1505	76	32.3	0	Jan. 09
	Oconee 1	PWR	1506	56	25.9	0	Dec. 03
	Oconee 2	PWR	1507	73	33.8	0	Jan. 09
	Oconee 3	PWR	1508	56	25.9	0	Jul. 21
Duquesne Light Company ...	Beaver Valley 2	PWR	1602	69	29.9	4	Mar. 13
Florida Power Corporation...	Crystal River 3	PWR	1701	76	35.2	0	May 30
Florida Power and Light Company	St. Lucie 2	PWR	1802	68	25.8	0	Apr. 20
	Turkey Point 3	PWR	1803	57	26.2	0	Aug. 24
GPU Nuclear Corporation ...	Oyster Creek	BWR	1903	168	29.6	0	Nov. 28
Georgia Power Company....	Hatch 2	BWR	2002	176	32.6	0	Sep. 15
	Vogtle 2	PWR	2004	93	43.1	0	Mar. 11

See footnotes at end of table.

Table 1. Spent Fuel Discharges in 1992 (Continued)

Electric Utility Name	Reactor Name	Reactor Type	Reactor ID	Number of Discharged Assemblies	Initial Uranium Content of Discharged Assemblies (MTU)	Number of Temporarily Discharged Assemblies[a]	1992 Reactor Cycle Shutdown Date
Gulf States Utilities Company	River Bend 1	BWR	2101	200	37.0	0	Mar. 05
Houston Lighting and Power Company	South Texas 1	PWR	2201	89	44.3	7	Sep. 19
Illinois Power Company	Clinton 1	BWR	2301	184	33.8	0	Mar. 01
Indiana Michigan Power Company	Cook 1	PWR	5801	80	36.9	0	Jun. 15
	Cook 2	PWR	5802	76	30.6	0	Feb. 22
Iowa Electric Light and Power Company	Duane Arnold	BWR	2401	104	18.6	0	Feb. 27
Louisiana Power and Light Company	Waterford 3	PWR	2701	85	34.8	0	Sep. 18
Maine Yankee Atomic Power Company	Maine Yankee	PWR	2801	69	21.7	12	Feb. 15
New York Power Authority	Indian Point 3	PWR	3902	80	36.9	0	Apr. 18
Niagara Mohawk Power Corporation	Nine Mile Point 2	BWR	3102	248	45.8	0	Mar. 04
North Atlantic Energy Service Corporation	Seabrook	PWR	5901	76	35.2	0	Sep. 07
Northeast Utilities Service Company	Millstone 2	PWR	3202	73	29.8	0	May 30
Northern States Power Company	Prairie Island 1	PWR	3302	53	19.0	0	Oct. 22
	Prairie Island 2	PWR	3303	53	19.0	0	Feb. 18
Omaha Public Power District	Fort Calhoun	PWR	3401	53	18.9	0	Feb. 01
Pacific Gas and Electric Company	Diablo Canyon 1	PWR	3501	88	39.2	0	Sep. 12
Pennsylvania Power and Light Company	Susquehanna 1	BWR	3601	228	39.4	0	Mar. 06
	Susquehanna 2	BWR	3602	240	41.5	0	Sep. 11
Philadelphia Electric Company	Limerick 1	BWR	3701	240	44.6	0	Mar. 20
	Peach Bottom 2	BWR	3704	268	49.0	0	Sep. 11
Portland General Electric Company	Trojan	PWR	3801	193	88.8	0	Nov. 09

See footnotes at end of table.

Table 1. Spent Fuel Discharges in 1992 (Continued)

Electric Utility Name	Reactor Name	Reactor Type	Reactor ID	Number of Discharged Assemblies	Initial Uranium Content of Discharged Assemblies (MTU)	Number of Temporarily Discharged Assemblies[a]	1992 Reactor Cycle Shutdown Date
Public Service Electric and Gas Company	Hope Creek	BWR	4201	248	46.0	0	Sep. 12
	Salem 1	PWR	4202	93	40.6	5	Apr. 04
Rochester Gas and Electric Corporation	Ginna	PWR	4401	37	13.0	0	Mar. 27
Southern California Edison Company	San Onofre 1	PWR	4701	157	58.1	0	Nov.30
	San Onofre 3	PWR	4703	109	44.2	0	Jan. 24
System Energy Resources, Inc.	Grand Gulf 1	BWR	2901	272	47.9	0	Apr. 17
Tennessee Valley Authority	Sequoyah 2	PWR	4809	93	43.1	0	Mar. 13
TU Electric	Comanche Peak 1	PWR	4901	64	29.4	0	Oct. 22
Union Electric Company	Callaway	PWR	5101	101	42.9	0	Mar. 20
Vermont Yankee Nuclear Power Corporation	Vermont Yankee	BWR	6001	128	23.5	0	Feb. 29
Viriginia Power	North Anna 2	PWR	5202	75	34.2	1	Feb. 26
	Surry 1	PWR	5203	65	29.9	0	Feb. 29
Washington Public Power Supply System	Washington Nuclear 2	BWR	5302	76	13.8	0	Apr. 18
Wisconsin Electric Power Company	Point Beach 1	PWR	5401	29	10.5	0	Apr. 10
	Point Beach 2	PWR	5402	29	10.5	0	Sep. 25
Wisconsin Public Service Corporation	Kewaunee	PWR	5501	57	17.0	12	Mar. 06
Total BWR				4,028	728.7	4	
Total PWR				3,754	1,601.0	41	
TOTAL				7,782	2,329.8	45	

[a]These numbers are included in the number of discharged assemblies column.
MTU = Metric tons of uranium; PWR = Pressurized-water reactor; BWR = Boiling-water reactor.
Note: Totals may not equal sum of components because of independent rounding. See Technical Note 11 in Appendix E.
Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Table 2. Reactor Spent Fuel Discharge and Storage Activity for 1992

Electric Utility Name	Reactor Name	Reactor Type	Pool Site ID	1991 Assembly Total	1992 Assembly Discharges	1992 Assembly Reinsertions	Other (see footnotes)	1992 Assembly Total
Alabama Power Company	Farley 1	PWR	0101	603	54	-2		655
	Farley 2	PWR	0102	441	61	-4		498
Arizona Public Service Company	Palo Verde 1	PWR	'0301	188	97	-9		276
	Palo Verde 2	PWR	0302	288				288
	Palo Verde 3	PWR	0303	192	117	-25		284
Arkansas Power and Light Company.............	Arkansas Nuclear 1	PWR	0401	564	61	-1		624
	Arkansas Nuclear 2	PWR	0402	488	76			564
Baltimore Gas and Electric Company	Calvert Cliffs 1	PWR	0501	714	85	-1		798
	Calvert Cliffs 2	PWR		612				612
Boston Edison Company	Pilgrim 1	BWR	0601	1,489			[a]-1	1,488
Carolina Power and Light Company	Brunswick 1	BWR	0701	1,090				1,090
	Brunswick 1	PWR	0701	160				160
	Brunswick 2	BWR	0702	1,113				1,113
	Brunswick 2	PWR	0702	144				144
	Harris 1	PWR	0703	276	64	- 4	[b]84	420
	Harris 1	BWR	0703	413				413
	Robinson 2	PWR	0705	247	49		- 84	212
	Dry Storage	PWR	0705D	56				56
Cleveland Electric Illuminating Company	Perry 1	BWR	0901	544	204			748
		BWR	0902					
Commonwealth Edison Company	Braidwood 1	PWR	1001	320	84			404
	Braidwood 2	PWR						
	Byron 1	PWR	1003	512				596
	Byron 2	PWR			89	- 5		
	Dresden 1	BWR	1005	683				683
	Dresden 2	BWR	1006	1,954				1,954
	Dresden 3	BWR	1007	1,968				1,968
	LaSalle County 1	BWR	1008	1,496	200			1,920
	LaSalle County 2	BWR		0	224			
	Quad Cities 1	BWR	1010	3,692	152			3,996
	Quad Cities 2	BWR		0	152			
	Zion 1	PWR	1012	1,448	76			1,608
	Zion 2	PWR			84			

See footnotes at end of table.

Table 2. Reactor Spent Fuel Discharge and Storage Activity for 1992 (Continued)

Electric Utility Name	Reactor Name	Reactor Type	Pool Site ID	1991 Assembly Total	1992 Assembly Discharges	1992 Assembly Reinsertions	Other (see footnotes)	1992 Assembly Total
Consolidated Edison Company of New York	Indian Point 1	PWR	1101	160				160
	Indian Point 2	PWR	1102	668				668
Consumers Power Company	Big Rock Point	BWR	1201	294				294
	Palisades	PWR	1204	657	76			733
Dairyland Power Cooperative	LaCrosse	BWR	1301	333				333
Detroit Edison Company	Enrico Fermi 2	BWR	1402	448	316	- 92		672
Duke Power Company	Catawba 1	PWR	1501	336	80	- 8		408
	Catawba 2	PWR	1502	280				280
	McGuire 1	PWR	1504	519				519
	McGuire 2	PWR	1505	665	76			741
	Oconee 1	PWR	1506	954	56		[c]- 48	1,014
	Oconee 2	PWR			73	- 21		
	Oconee 3	PWR	1508	580	56		[c]-120	516
	Dry Storage	PWR	1506D	312			168	480
Duquesne Light Company	Beaver Valley 1	PWR	1601	512				512
	Beaver Valley 2	PWR	1602	124	69	-1		192
Florida Power Corporation	Crystal River 3	PWR	1701	472	76	-12		536
Florida Power and Light Company	St. Lucie 1	PWR	1801	796				796
	St. Lucie 2	PWR	1802	396	68			464
	Turkey Point 3	PWR	1803	532	57	-1		588
	Turkey Point 4	PWR	1804	546				546
GPU Nuclear Corporation	Three Mile Island 1	PWR	1901	521				521
	Oyster Creek	BWR	1903	1,708	168			1,876
Georgia Power Company	Hatch 1	BWR	2001	1,800				1,800
	Hatch 2	BWR		1,400	176			1,576
	Vogtle 1	PWR	2003	240			[d]-17	223
	Vogtle 2	PWR		84	93			177
Gulf States Utilities Company	River Bend 1	BWR	2101	564	200			764
Houston Lighting and Power Company	South Texas 1	PWR	2201	160	89	-13		236
	South Texas 2	PWR	2202	116				116

See footnotes at end of table.

Table 2. Reactor Spent Fuel Discharge and Storage Activity for 1992 (Continued)

Electric Utility Name	Reactor Name	Reactor Type	Pool Site ID	1991 Assembly Total	1992 Assembly Discharges	1992 Assembly Reinsertions	Other (see footnotes)	1992 Assembly Total
Illinois Power Company	Clinton 1	BWR	2301	384	184			568
Indiana Michigan Power Company	Cook 1	PWR	5801	1,367	80			1,523
	Cook 2	PWR			76			
Iowa Electric Light and Power Company	Duane Arnold	BWR	2401	1,048	104			1,152
Kansas Gas and Electric Company	Wolf Creek 1	PWR	2501	340				340
Long Island Lighting Company	Shoreham	BWR	2601	560				560
Louisiana Power and Light Company	Waterford 3	PWR	2701	344	85	-1		428
Maine Yankee Atomic Power Company	Maine Yankee	PWR	2801	1,009	69	-1		1,077
Nebraska Public Power District	Cooper Station	BWR	3001	620				620
New York Power Authority	Fitzpatrick	BWR	3901	1,684				1,684
	Indian Point 3	PWR	3902	504	80			584
Niagara Mohawk Power Corporation	Nine Mile Point 1	BWR	3101	1,620				1,620
	Nine Mile Point 2	BWR	3102	196	248			444
North Atlantic Energy Service Corporation	Seabrook	PWR	5901	60	76			136
Northeast Utilities Service Company	Millstone 1	BWR	3201	2,116				2,116
	Millstone 2	PWR	3202	712	73	-1		784
	Millstone 3	PWR	3203	248				248
	Haddam Neck	PWR	5701	757				757
Northern States Power Company	Monticello	BWR	3301	582				582
	Prairie Island 1	PWR	3302	1,133	53	- 5		1,233
	Prairie Island 2	PWR			53	-1		
Omaha Public Power District	Fort Calhoun	PWR	3401	477	53	-1		529

See footnotes at end of table.

Table 2. Reactor Spent Fuel Discharge and Storage Activity for 1992 (Continued)

Electric Utility Name	Reactor Name	Reactor Type	Pool Site ID	1991 Assembly Total	1992 Assembly Discharges	1992 Assembly Reinsertions	Other (see footnotes)	1992 Assembly Total
Pacific Gas and Electric Company	Diablo Canyon 1	PWR	3501	288	88			376
	Diablo Canyon 2	PWR	3502	308				308
	Humboldt Bay	BWR	3503	390				390
Pennsylvania Power and Light Company	Susquehanna 1	BWR	3601	1,176	228			1,404
	Susquehanna 2	BWR		1,000	240	- 4		1,236
Philadelphia Electric Company	Limerick 1	BWR	3701	900	240			1,140
	Limerick 2	BWR		224				224
	Peach Bottom 2	BWR	3704	1,894	268			2,162
	Peach Bottom 3	BWR	3705	1,944				1,944
Portland General Electric Company	Trojan	PWR	3801	587	193			780
Public Service Electric and Gas Company	Hope Creek	BWR	4201	760	248			1,008
	Salem 1	PWR	4202	588	93	- 25		656
	Salem 2	PWR	4203	436				436
Rochester Gas and Electric Corporation	Ginna	PWR	4401	633	37	- 9		661
Sacramento Municipal Utility District	Rancho Seco	PWR	4501	493				493
South Carolina Electric and Gas Company	Summer	PWR	4601	372				372
Southern California Edison Company	San Onofre 1	PWR	4701	99	157		[e]- 49	207
	San Onofre 2	PWR	4702	554				554
	San Onofre 3	PWR	4703	445	109	-1	49	602
System Energy Resources, Inc.	Grand Gulf 1	BWR	2901	1,112	272			1,384
Tennessee Valley Authority	Browns Ferry 1	BWR	4803	1,488				1,488
	Browns Ferry 2	BWR		1,440				1,440
	Browns Ferry 3	BWR	4805	1,029				1,029
	Sequoyah 1	PWR	4808	661			[f]-16	737
	Sequoyah 2	PWR			93	-1		
	Watts Bar 1	PWR	4810	0				0
	Watts Bar 2	PWR						

See footnotes at end of table.

Table 2. Reactor Spent Fuel Discharge and Storage Activity for 1992 (Continued)

Electric Utility Name	Reactor Name	Reactor Type	Pool Site ID	1991 Assembly Total	1992 Assembly Discharges	1992 Assembly Reinsertions	Other (see footnotes)	1992 Assembly Total
TU Electric	Comanche Peak 1	PWR	4901	56	64	- 3		117
	Comanche Peak 2	PWR		0				0
Toledo Edison Company	Davis-Besse	PWR	5001	392				392
Union Electric Company	Callaway	PWR	5101	364	101	-13		452
Vermont Yankee Nuclear Power Corporation	Vermont Yankee	BWR	6001	1,722	128			1,850
Virginia Power	North Anna 1	PWR	5201	933			[g]- 6	993
	North Anna 2	PWR			75	- 9		
	Surry 1	PWR	5203	837	65	- 2	[h]- 63	837
	Surry 2	PWR						
	Dry Storage	PWR	5203D	304			63	367
Washington Public Power Supply System	Washington Nuclear 2	BWR	5302	836	76			912
Wisconsin Electric Power Company	Point Beach 1	PWR	5401	1,137	29	-1		1,193
	Point Beach 2	PWR			29	-1		
Wisconsin Public Service Corporation	Kewaunee	PWR	5501	584	57	- 25		616
Yankee Atomic Electric Company	Yankee Rowe	PWR	5601	533				533
Total BWR				45,714	4,028	- 96	-1	49,645
Total PWR				34,438	3,754	- 224	- 22	37,946
TOTAL (Nuclear Power Plant Sites Only)				80,152	7,782	- 320	- 23	87,591
Storage Facilities (From Table 14)				3,448	--	--	--	3,448
TOTAL (Including Storage Facilities)				83,600	7,782	- 320	- 23	91,039

[a]Adjustment made in discharge status for one assembly which had one failed rod removed and placed in the pool with associated hardware.
[b]Transfer of 84 assemblies from Robinson 2 to Harris 1 storage pools.
[c]Transfer of 168 assemblies from Oconee storage pools to Oconee dry storage.
[d]Total of 17 assemblies from Vogtle 1 reinserted incore at Vogtle 2.
[e]Transfer of 49 assemblies from San Onofre 1 to San Onofre 3 storage pool.
[f]Total of 16 assemblies from Sequoyah 1 reinserted incore at Sequoyah 2.
[g]Total of 6 assemblies from North Anna 1 reinserted incore at North Anna 2.
[h]Transfer of 63 assemblies from Surry 1 to Surry dry storage.
PWR = Pressurized-water reactor; BWR = Boiling-water reactor.
-- = Not applicable.
Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Table 3. Temporarily Discharged Assemblies

Electric Utility Name	Reactor Name	Reactor Type	Pool Site ID	Temporarily Discharged Assemblies Through 1992	Temporarily Discharged Assemblies Through 1991	Increase or Reduction in Temporarily Discharged Assemblies
Arizona Public Service Company	Palo Verde 1	PWR	0301	0	9	-9
	Palo Verde 3	PWR	0303	1	25	-24
Carolina Power and Light Company	Brunswick 1	BWR	0701	1	1	0
Cleveland Electric Illuminating Company	Perry 1	BWR	0901	4	0	4
Consolidated Edison Company of New York	Indian Point 2	PWR	1102	8	8	0
Consumers Power Company	Palisades	PWR	1204	1	1	0
Duquesne Light Company	Beaver Valley 1	PWR	1601	14	14	0
	Beaver Valley 2	PWR	1602	5	2	3
Florida Power Corporation.......	Crystal River 3	PWR	1701	5	17	-12
GPU Nuclear Corporation	Three Mile Island 1	PWR	1901	8	8	0
Houston Lighting and Power Company	South Texas 1	PWR	2201	7	0	7
Maine Yankee Atomic Power Company	Maine Yankee	PWR	2801	23	12	11
New York Power Authority.....................	Indian Point 3	PWR	3902	2	2	0
Northeast Utilities Service Company	Millstone 2	PWR	3202	0	1	-1
	Haddam Neck	PWR	5701	1	1	0
Northern States Power Company	Prairie Island 1	PWR	3302	0	6	-6
Public Service Electric and Gas Company	Salem 1	PWR	4202	25	25	0
	Salem 2	PWR	4203	4	0	4
TU Electric....................	Comanche Peak 1	PWR	4901	0	3	-3
Toledo Edison Company	Davis-Besse	PWR	5001	6	6	0

See footnotes at end of table.

Table 3. Temporarily Discharged Assemblies (Continued)

Electric Utility Name	Reactor Name	Reactor Type	Pool Site ID	Temporarily Discharged Assemblies Through 1992	Temporarily Discharged Assemblies Through 1991	Increase or Reduction in Temporarily Discharged Assemblies
Virginia Power	North Anna 1	PWR	5201	34	35	- 1
	Surry 1	PWR	5203	7	21	- 14
Wisconsin Public Service Corporation	Kewaunee	PWR	5501	12	16	- 4
TOTAL				**168**	**213**	**- 45**

PWR = Pressurized-water reactor; BWR = Boiling-water reactor.

Note: Changes in number of temporarily discharged assemblies are due to discharge of additional temporarily discharged assemblies, reinsertion of previously discharged assemblies, and/or change in status of previously discharged assemblies.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Table 4. Nuclear Power Plant Data as of December 31, 1992

Electric Utility Name	Reactor Name	State	Reactor Type	Vendor[a]	Net Summer Capability (net MWe)[b]	Core Size (number of assemblies)	Startup (year)[c]	License Expiration (year)[d]	Loss of Ability to Operate (year)[e]	Actual or Projected Retirement (year)
Alabama Power Company . .	Farley 1	AL	PWR	WE	815	157	1977	2017	2012	2017
	Farley 2	AL	PWR	WE	826	157	1981	2021	2014	2021
Arizona Public Service Company	Palo Verde 1	AZ	PWR	CE	1,270	241	1985	2024	2005	2024
	Palo Verde 2	AZ	PWR	CE	1,270	241	1986	2025	2005	2025
	Palo Verde 3	AZ	PWR	CE	1,270	241	1987	2027	2006	2027
Arkansas Power and Light Company.	Arkansas Nuclear 1	AR	PWR	B&W	836	177	1974	2014	1996	2014
	Arkansas Nuclear 2	AR	PWR	CE	858	177	1978	2018	1997	2018
Baltimore Gas and Electric Company.	Calvert Cliffs 1	MD	PWR	CE	825	217	1975	2014	1994	2016
	Calvert Cliffs 2	MD	PWR	CE	825	217	1976	2016	1993	2016
Boston Edison Company . . .	Pilgrim 1	MA	BWR	GE	665	580	1972	2012	2003	2012
Carolina Power and Light Company	Brunswick 1	NC	BWR	GE	767	560	1976	2016	2002	2016
	Brunswick 2	NC	BWR	GE	754	560	1975	2014	2001	2014
	Harris 1	NC	PWR	WE	860	157	1987	2026	2018	2026
	Robinson 2	SC	PWR	WE	683	157	1970	2010	2002	2010
Cleveland Electric Illuminating Company	Perry 1	OH	BWR	GE	1,169	748	1986	2026	2009	2026
Commonwealth Edison Company	Braidwood 1	IL	PWR	WE	1,090	193	1987	2026	2012	2028
	Braidwood 2	IL	PWR	WE	1,090	193	1988	2027	2013	2028
	Byron 1	IL	PWR	WE	1,120	193	1985	2024	2011	2025
	Byron 2	IL	PWR	WE	1,120	193	1987	2026	2011	2027
	Dresden 1	IL	BWR	GE	200	464	1960	1996	SD	1984
	Dresden 2	IL	BWR	GE	772	724	1970	2006	2000	2010
	Dresden 3	IL	BWR	GE	773	724	1971	2011	2001	2013
	LaSalle County 1	IL	BWR	GE	1,048	764	1982	2022	2013	2024
	LaSalle County 2	IL	BWR	GE	1,048	764	1984	2023	2015	2024
	Quad Cities 1	IL	BWR	GE	769	724	1972	2012	2007	2013
	Quad Cities 2	IL	BWR	GE	769	724	1972	2012	2006	2013
	Zion 1	IL	PWR	WE	1,040	193	1973	2013	2006	2013
	Zion 2	IL	PWR	WE	1,040	193	1973	2013	2006	2014

See footnotes at end of table.

Table 4. Nuclear Power Plant Data as of December 31, 1992 (Continued)

Electric Utility Name	Reactor Name	State	Reactor Type	Vendor[a]	Net Summer Capability (net MWe)[b]	Core Size (number of assemblies)	Startup (year)[c]	License Expiration (year)[d]	Loss of Ability to Operate (year)[e]	Actual or Projected Retirement (year)
Consolidated Edison Company of New York	Indian Point 1	NY	PWR	B&W	265	120	1962	1980	RD	1980
	Indian Point 2	NY	PWR	WE	931	193	1973	2013	2003	2013
Consumers Power Company	Big Rock Point	MI	BWR	GE	67	84	1962	2000	1999	2000
	Palisades	MI	PWR	CE	755	204	1971	2007	2007	2011
Dairyland Power Cooperative	LaCrosse	WI	BWR	AC	50	72	1968	2031	RD	1987
Detroit Edison Company....	Enrico Fermi 2	MI	BWR	GE	1,060	764	1985	2025	2006	2025
Duke Power Company	Catawba 1	SC	PWR	WE	1,129	193	1985	2024	2011	2025
	Catawba 2	SC	PWR	WE	1,129	193	1986	2026	2011	2026
	McGuire 1	NC	PWR	WE	1,129	193	1981	2021	2007	2021
	McGuire 2	NC	PWR	WE	1,129	193	1983	2023	2006	2023
	Oconee 1	SC	PWR	B&W	846	177	1973	2013	2010	2013
	Oconee 2	SC	PWR	B&W	846	177	1973	2013	2010	2013
	Oconee 3	SC	PWR	B&W	846	177	1974	2014	2011	2014
Duquesne Light Company ..	Beaver Valley 1	PA	PWR	WE	810	157	1976	2016	2013	2016
	Beaver Valley 2	PA	PWR	WE	833	157	1987	2027	2008	2026
Florida Power Corporation..	Crystal River 3	FL	PWR	B&W	820	177	1977	2016	2010	2016
Florida Power and Light Company	St. Lucie 1	FL	PWR	CE	839	217	1976	2016	2016	2016
	St. Lucie 2	FL	PWR	CE	839	217	1983	2023	2023	2023
	Turkey Point 3	FL	PWR	WE	666	157	1972	2007	2007	2007
	Turkey Point 4	FL	PWR	WE	666	157	1973	2007	2007	2007
GPU Nuclear Corporation ..	Three Mile Island 1	PA	PWR	B&W	808	177	1974	2014	2014	2014
	Oyster Creek	NJ	BWR	GE	610	560	1969	2009	2000	2009
Georgia Power Company...	Hatch 1	GA	BWR	GE	748	560	1974	2014	2003	2014
	Hatch 2	GA	BWR	GE	770	560	1978	2018	2004	2018
	Vogtle 1	GA	PWR	WE	1,110	193	1987	2027	2011	2027
	Vogtle 2	GA	PWR	WE	1,114	193	1989	2029	2010	2029
Gulf States Utilities Company	River Bend 1	LA	BWR	GE	931	624	1985	2025	2003	2025

See footnotes at end of table.

Table 4. Nuclear Power Plant Data as of December 31, 1992 (Continued)

Electric Utility Name	Reactor Name	State	Reactor Type	Vendor[a]	Net Summer Capability (net MWe)[b]	Core Size (number of assemblies)	Startup (year)[c]	License Expiration (year)[d]	Loss of Ability to Operate (year)[e]	Actual or Projected Retirement (year)
Houston Lighting and Power Company	South Texas 1	TX	PWR	WE	1,241	193	1988	2027	2027	2027
	South Texas 2	TX	PWR	WE	1,241	193	1989	2028	2028	2028
Illinois Power Company	Clinton 1	IL	BWR	GE	930	624	1987	2026	2008	2026
Indiana Michigan Power Company	Cook 1	MI	PWR	WE	1,000	193	1975	2014	2011	2014
	Cook 2	MI	PWR	WE	1,060	193	1978	2017	2011	2017
Iowa Electric Light and Power Company	Duane Arnold	IA	BWR	GE	515	368	1974	2014	1999	2014
Kansas Gas and Electric Company	Wolf Creek 1	KS	PWR	WE	1,159	193	1985	2025	2011	2025
Long Island Lighting Company	Shoreham	NY	BWR	GE	849	560	1986	2013	SD	1987
Louisiana Power and Light Company	Waterford 3	LA	PWR	CE	1,075	217	1985	2024	2000	2024
Maine Yankee Atomic Power Company	Maine Yankee	ME	PWR	CE	870	217	1972	2008	1999	2008
Nebraska Public Power District	Cooper Station	NE	BWR	GE	778	548	1974	2014	2006	2014
New York Power Authority	Fitzpatrick	NY	BWR	GE	800	560	1975	2014	2003	2014
	Indian Point 3	NY	PWR	WE	980	193	1976	2015	2006	2015
Niagara Mohawk Power Corporation	Nine Mile Point 1	NY	BWR	GE	605	532	1969	2009	2005	2008
	Nine Mile Point 2	NY	BWR	GE	1,045	764	1987	2026	2017	2026
North Atlantic Energy Service Corporation	Seabrook	NH	PWR	WE	1,150	193	1990	2026	2012	2030
Northeast Utilities Service Company	Millstone 1	CT	BWR	GE	652	580	1970	2010	2004	2010
	Millstone 2	CT	PWR	CE	863	217	1975	2015	2000	2015
	Millstone 3	CT	PWR	WE	1,137	193	1986	2025	2002	2025
	Haddam Neck	CT	PWR	WE	560	157	1967	2007	2002	2007

See footnotes at end of table.

Table 4. Nuclear Power Plant Data as of December 31, 1992 (Continued)

Electric Utility Name	Reactor Name	State	Reactor Type	Vendor[a]	Net Summer Capability (net MWe)[b]	Core Size (number of assemblies)	Startup (year)[c]	License Expiration (year)[d]	Loss of Ability to Operate (year)[e]	Actual or Projected Retirement (year)
Northern States Power Company	Monticello	MN	BWR	GE	532	484	1971	2010	2004	2010
	Prairie Island 1	MN	PWR	WE	510	121	1973	2013	1995	2013
	Prairie Island 2	MN	PWR	WE	505	121	1974	2014	1995	2014
Omaha Public Power District	Fort Calhoun	NE	PWR	CE	476	133	1973	2008	2002	2008
Pacific Gas and Electric Company	Diablo Canyon 1	CA	PWR	WE	1,073	193	1984	2008	2004	2021
	Diablo Canyon 2	CA	PWR	WE	1,087	193	1985	2010	2011	2026
	Humboldt Bay	CA	BWR	GE	65	184	1963	2015	SD	1976
Pennsylvania Power and Light Company	Susquehanna 1	PA	BWR	GE	1,040	764	1982	2022	2001	2022
	Susquehanna 2	PA	BWR	GE	1,044	764	1984	2024	2001	2024
Philadelphia Electric Company	Limerick 1	PA	BWR	GE	1,055	764	1985	2024	2000	2024
	Limerick 2	PA	BWR	GE	1,055	764	1989	2029	1996	2029
	Peach Bottom 2	PA	BWR	GE	1,051	764	1974	2008	1998	2008
	Peach Bottom 3	PA	BWR	GE	1,035	764	1974	2008	1999	2008
Portland General Electric Company	Trojan	OR	PWR	WE	1,104	193	1975	2011	SD	1992
Public Service Electric and Gas Company	Hope Creek	NJ	BWR	GE	1,031	764	1986	2026	2010	2026
	Salem 1	NJ	PWR	WE	1,106	193	1976	2016	2002	2016
	Salem 2	NJ	PWR	WE	1,106	193	1981	2020	2006	2020
Rochester Gas and Electric Corporation	Ginna	NY	PWR	WE	470	121	1969	2009	1999	2009
Sacramento Municipal Utility District	Rancho Seco	CA	PWR	B&W	918	177	1974	2008	SD	1989
South Carolina Electric and Gas Company	Summer	SC	PWR	WE	885	157	1982	2022	2008	2035
Southern California Edison Company	San Onofre 1	CA	PWR	WE	436	157	1967	2004	SD	1992
	San Onofre 2	CA	PWR	CE	1,070	217	1982	2013	2005	2013
	San Onofre 3	CA	PWR	CE	1,080	217	1983	2013	2005	2013

See footnotes at end of table.

Table 4. Nuclear Power Plant Data as of December 31, 1992 (Continued)

Electric Utility Name	Reactor Name	State	Reactor Type	Vendor[a]	Net Summer Capability (net MWe)[b]	Core Size (number of assemblies)	Startup (year)[c]	License Expiration (year)[d]	Loss of Ability to Operate (year)[e]	Actual or Projected Retirement (year)
System Energy Resources, Inc.	Grand Gulf 1	MS	BWR	GE	1,143	800	1984	2022	2005	2022
Tennessee Valley Authority	Browns Ferry 1	AL	BWR	GE	1,065	764	1973	2013	2006	2013
	Browns Ferry 2	AL	BWR	GE	1,065	764	1974	2014	2006	2014
	Browns Ferry 3	AL	BWR	GE	1,065	764	1976	2016	2006	2016
	Sequoyah 1	TN	PWR	WE	1,148	193	1980	2020	2002	2020
	Sequoyah 2	TN	PWR	WE	1,148	193	1981	2021	2002	2021
	Watts Bar 1	TN	PWR	WE	1,170	193	1994	C	2007	2030
	Watts Bar 2	TN	PWR	WE	1,170	193	1996	C	2007	2032
TU Electric	Comanche Peak 1	TX	PWR	WE	1,150	193	1990	2030	2020	2030
	Comanche Peak 2	TX	PWR	WE	1,150	193	1993	C	2021	2030
Toledo Edison Company	Davis-Besse	OH	PWR	B&W	877	177	1977	2017	NA	2037
Union Electric Company	Callaway	MO	PWR	WE	1,125	193	1984	2024	2007	2024
Vermont Yankee Nuclear Power Corporation	Vermont Yankee	VT	BWR	GE	496	368	1972	2012	2004	2012
Virginia Power	North Anna 1	VA	PWR	WE	848	157	1978	2018	2000	2018
	North Anna 2	VA	PWR	WE	909	157	1980	2020	2000	2020
	Surry 1	VA	PWR	WE	781	157	1972	2012	2012	2012
	Surry 2	VA	PWR	WE	781	157	1973	2013	2013	2013
Washington Public Power Supply System	Washington Nuclear 2	WA	BWR	GE	1,100	764	1984	2023	1999	2023
Wisconsin Electric Power Company	Point Beach 1	WI	PWR	WE	492	121	1970	2010	1996	2010
	Point Beach 2	WI	PWR	WE	492	121	1972	2013	1996	2013

See footnotes at end of table.

Table 4. Nuclear Power Plant Data as of December 31, 1992 (Continued)

Electric Utility Name	Reactor Name	State	Reactor Type	Vendor[a]	Net Summer Capability (net MWe)[b]	Core Size (number of assemblies)	Startup (year)[c]	License Expiration (year)[d]	Loss of Ability to Operate (year)[e]	Actual or Projected Retirement (year)
Wisconsin Public Service Corporation	Kewaunee	WI	PWR	WE	522	121	1974	2013	2002	2014
Yankee Atomic Electric Company	Yankee Rowe	MA	PWR	WE	175	76	1960	2000	SD	1992

[a]Vendor codes are as follows: AC = Allis Chalmers; B&W = Babcock & Wilcox Company; CE = ABB Combustion Engineering; GE = GE Nuclear Energy; WE = Westinghouse Electric.

[b]Net Summer Capability (net MWe) data are not available on Form RW-859 data base. Data are from Energy Information Administration (EIA) publication *World Nuclear Capacity and Fuel Cycle Requirements 1993*, Table D1.

[c]Startup Year not available for all reactors on Form RW-859 data base. Startup Years for Watts Bar 1 & 2 and Comanche Peak 2 are from EIA, *World Nuclear Capacity and Fuel Cycle Requirements 1993*, Table E1, Estimated Operable Date column.

[d]License Expiration Year not available for all reactors on Form RW-859 data base. License Expiration Years for Watts Bar 1 & 2 and Comanche Peak 2 are from EIA, *World Nuclear Capacity and Fuel Cycle Requirements 1993*, Table E1, Status column. License status codes: C = construction permit.

[e]These data are compiled directly from question 2.3 on Form RW-859. It reads as follows: "What is the estimated date on which you would not continue reactor operation, because of a lack of storage space for discharged fuel absent spent fuel pickup by DOE?"

PWR = Pressurized-water reactor; BWR = Boiling-water reactor; MWe = Megawatts electric.

NA = Not available (no Loss of Ability to Operate Year date has been estimated by the utility). SD = Shutdown reactor. RD = Retired reactor.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Annual Discharges and Burnup

A total of 91,039 spent nuclear fuel assemblies discharged through 1992 contained 25,958 MTU. By weight, approximately 37 percent of the spent nuclear fuel came from BWRs and 63 percent came from PWRs. In 1992, the number of PWR assemblies permanently discharged (3,713) represents an increase from the previous high of 3,550 in 1990. The number of BWR assemblies permanently discharged (4,024) represents an increase from the previous high of 3,924 reported in 1989.

Annual spent fuel discharges and burnup values are summarized in Table 5. Permanently discharged spent fuel for BWRs and PWRs is shown by number of assemblies and metric tons of uranium in Figure 1. Both show the number of assemblies and metric tons of uranium discharged in each year for BWRs and PWRs. The table also shows the annual average burnup in gigawattdays thermal per initial loading weight of uranium, in metric tons (GWDt/MTU), including assemblies discharged from nonequilibrium cycles.

Some electric utilities report plans to continue increasing burnup in the future. Increasing the concentration of U-235 in the enriched uranium product and changing the design specifications of the fuel rods to allow for longer in-core exposures achieves increases in burnup.

Electric utilities use higher fuel burnup to increase cycle lengths and/or to reduce spent fuel generation. Increasing cycle length allows the potential for reducing the relative outage time: for example, an annual cycle requires three refuelings in a 3-year period, while an 18-month cycle requires only two refuelings in the same time period. Thus, increased capacity factors can result from increased cycle length; however, increased lengths of fuel outages can offset this increase in capacity factors.

Starting in 1970, the annual average burnup for all discharged BWR assemblies have shown an increase to a high of 28.8 GWDt/MTU in 1992. Average burnups have fluctuated between 1984 and 1992 because of the number of reactors discharging first and second cycle assemblies. The average burnup for all PWR assemblies increased to 36.4 GWDt/MTU in 1992, the highest annual average yet attained. It had been fairly constant from 1980 through 1987 at roughly 30 GWDt/MTU.

The last two columns in Table 5 show the burnup of equilibrium cycle discharges for BWRs and PWRs. Equilibrium cycle is an analytical term that refers to fuel cycles occurring after the initial two cycles of a reactor's operation and prior to its final cycle. It is an assumed condition in which the spent nuclear fuel from a facility has a relatively constant composition from cycle to cycle. In a reactor, this condition typically begins with the third or fourth fuel loading, depending on the portion of the core being replaced. (For the purpose of this report, it is assumed to begin with the third fuel loading.) For example, the first fuel loading may have three sectors; one has an enrichment of 1.7 percent, the second an enrichment of 2.7 percent, and the third an enrichment of 3.7 percent. The first sector would be discharged at the end of the first cycle, with an average burnup of 10 GWDt/MTU; the second sector would be discharged at the end of the second cycle, with a burnup of 20 GWDt/MTU; the third sector would be the first equilibrium cycle discharge and would be discharged at the end of the third cycle.

For BWRs, the average equilibrium spent fuel discharge burnup in 1992 was 29.4 GWDt/MTU. For PWRs, the average equilibrium spent fuel discharge burnup in 1992 was 38.7 GWDt/MTU. The trends in achieved burnup levels for BWR and PWR spent fuel discharged to date are shown in Figure 2. The graph shows that PWR spent fuel has achieved increasingly higher burnup levels than BWR spent fuel.

Table 5. Annual Spent Fuel Discharges and Burnup, 1968-1992

Year	Number of Assemblies			Metric Tons of Uranium			Average Burnup (GWDt/MTU) All Discharged Assemblies		Average Burnup (GWDt/MTU) Equilibrium Cycle Discharges	
	BWR	PWR	Total	BWR	PWR	Total	BWR	PWR	BWR	PWR
1968	5	0	5	0.6	0.0	0.6	1.6	0.0	1.6	0.0
1969	96	0	96	9.8	0.0	9.8	15.2	0.0	15.2	0.0
1970	29	99	128	5.6	39.0	44.6	0.3	18.4	0.0	0.0
1971	408	113	521	64.0	44.5	108.5	5.8	23.9	16.6	0.0
1972	771	282	1,053	141.5	99.9	241.4	6.4	21.9	16.3	28.0
1973	576	165	741	95.1	67.1	162.2	12.4	23.7	15.9	28.1
1974	1,313	575	1,888	244.6	207.7	452.3	12.7	18.9	14.5	25.7
1975	1,223	797	2,020	225.6	321.8	547.4	16.9	18.1	17.3	27.3
1976	1,666	931	2,597	297.4	401.0	698.3	13.4	22.2	16.7	25.8
1977	2,047	1,107	3,154	382.9	466.9	849.8	16.6	25.1	19.0	27.8
1978	2,239	1,666	3,905	383.2	699.0	1,082.3	19.8	26.4	22.1	28.7
1979	2,131	1,662	3,793	399.8	721.2	1,121.1	22.4	27.0	23.7	30.2
1980	3,330	1,456	4,786	619.9	618.1	1,237.9	22.4	29.7	23.3	30.7
1981	2,467	1,585	4,052	458.7	675.9	1,134.6	23.9	30.2	23.9	30.9
1982	1,951	1,491	3,442	357.2	640.4	997.6	24.7	29.7	24.9	32.3
1983	2,698	1,778	4,476	491.3	772.2	1,263.5	26.7	30.0	26.7	31.6
1984	2,736	1,938	4,674	498.0	841.7	1,339.8	25.4	29.5	25.4	32.1
1985	2,835	2,037	4,872	514.6	861.3	1,375.9	23.4	31.8	25.9	33.2
1986	2,551	2,301	4,852	458.2	1,000.9	1,459.0	21.0	30.4	27.3	33.9
1987	3,876	2,604	6,480	699.4	1,113.8	1,813.2	19.2	31.3	27.0	34.4
1988	2,956	2,644	5,600	535.6	1,125.2	1,660.8	24.1	33.3	27.0	35.4
1989	3,924	2,810	6,734	714.9	1,226.7	1,941.7	22.0	32.5	27.3	36.8
1990	3,485	3,550	7,035	632.8	1,531.9	2,164.7	25.0	34.0	27.8	36.0
1991	3,260	2,970	6,230	588.0	1,297.7	1,885.6	28.2	35.2	30.4	37.3
1992[a]	4,024	3,713	7,737	728.7	1,601.0	2,329.8	28.8	36.4	29.4	38.7
Temps[b]	5	163	168	0.2	35.1	35.3	23.0	24.2	23.0	26.2
TOTAL	52,602	38,437	91,039	9,547.6	16,410.1	25,957.7	22.3	30.9	24.8	33.3

[a]Some data for previous years have been revised. Current-year data may be revised in future publications. When utilities reinsert assemblies discharged in previous years, historical totals change. See Technical Note 12 in Appendix E.

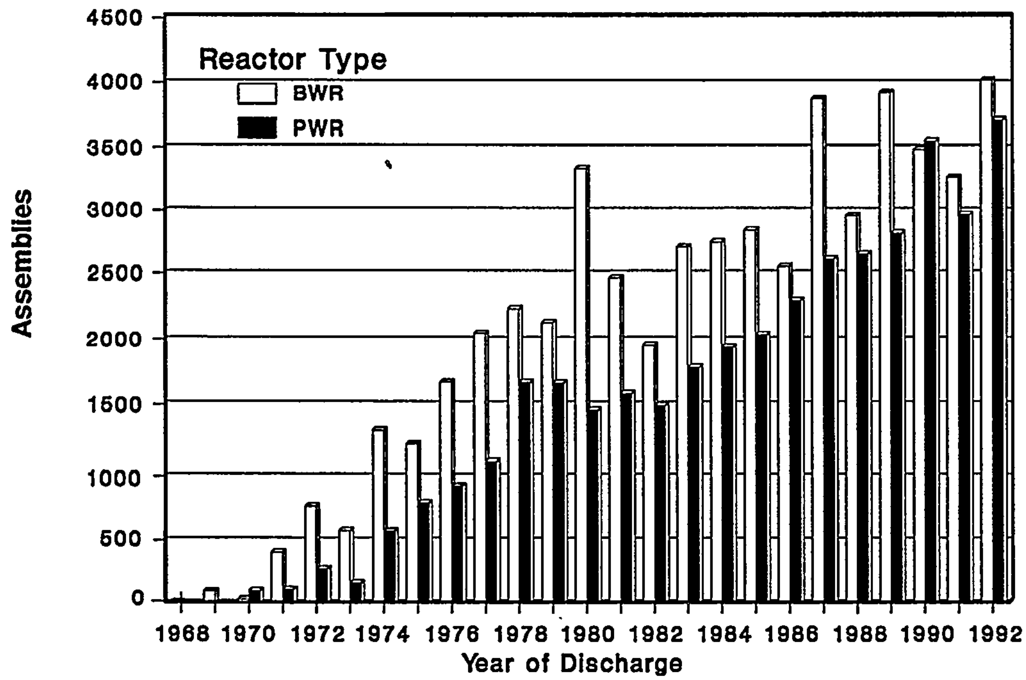
[b]Temps are temporarily discharged assemblies, as of December 31, 1992, as reported on Form RW-859.

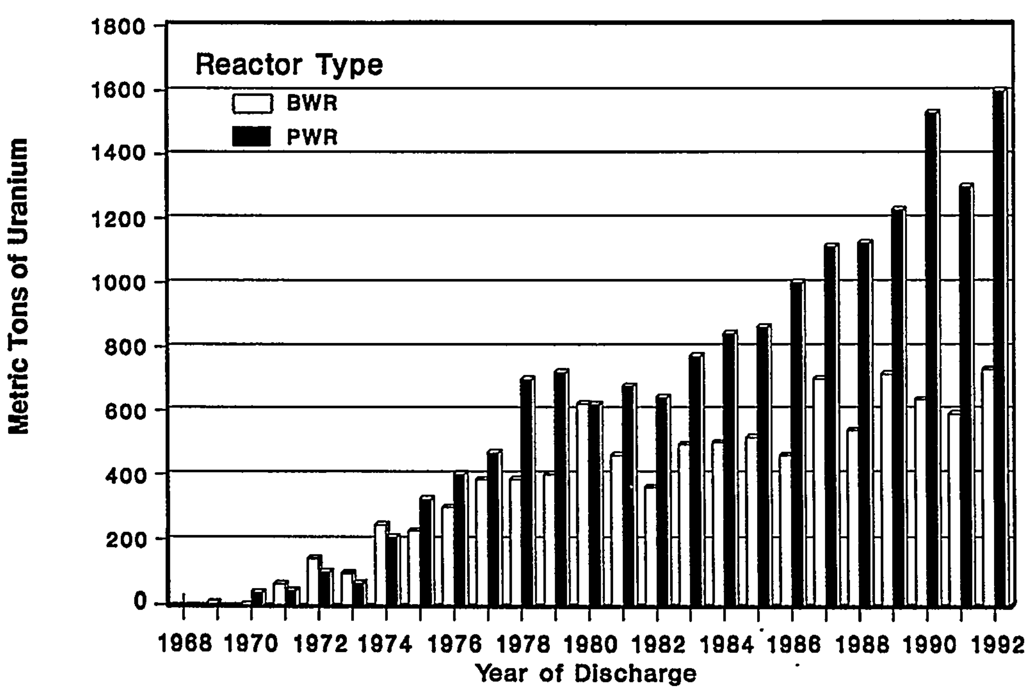
PWR = Pressurized-water reactor; BWR = Boiling-water reactor; GWDt/MTU = Gigawattdays thermal per metric ton of uranium.

Notes: A total of 2,208 high-temperature, gas-cooled reactor (HTGR) fuel elements, with initial uranium content equal to 25.0 MTU, were discharged. These HTGR fuel elements are *not* included in the above table. See Technical Note 6 in Appendix E. Totals may not equal sum of components because of independent rounding. See Technical Note 11 in Appendix E.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Figure 1. Summary of Spent Fuel Discharges, 1968-1992



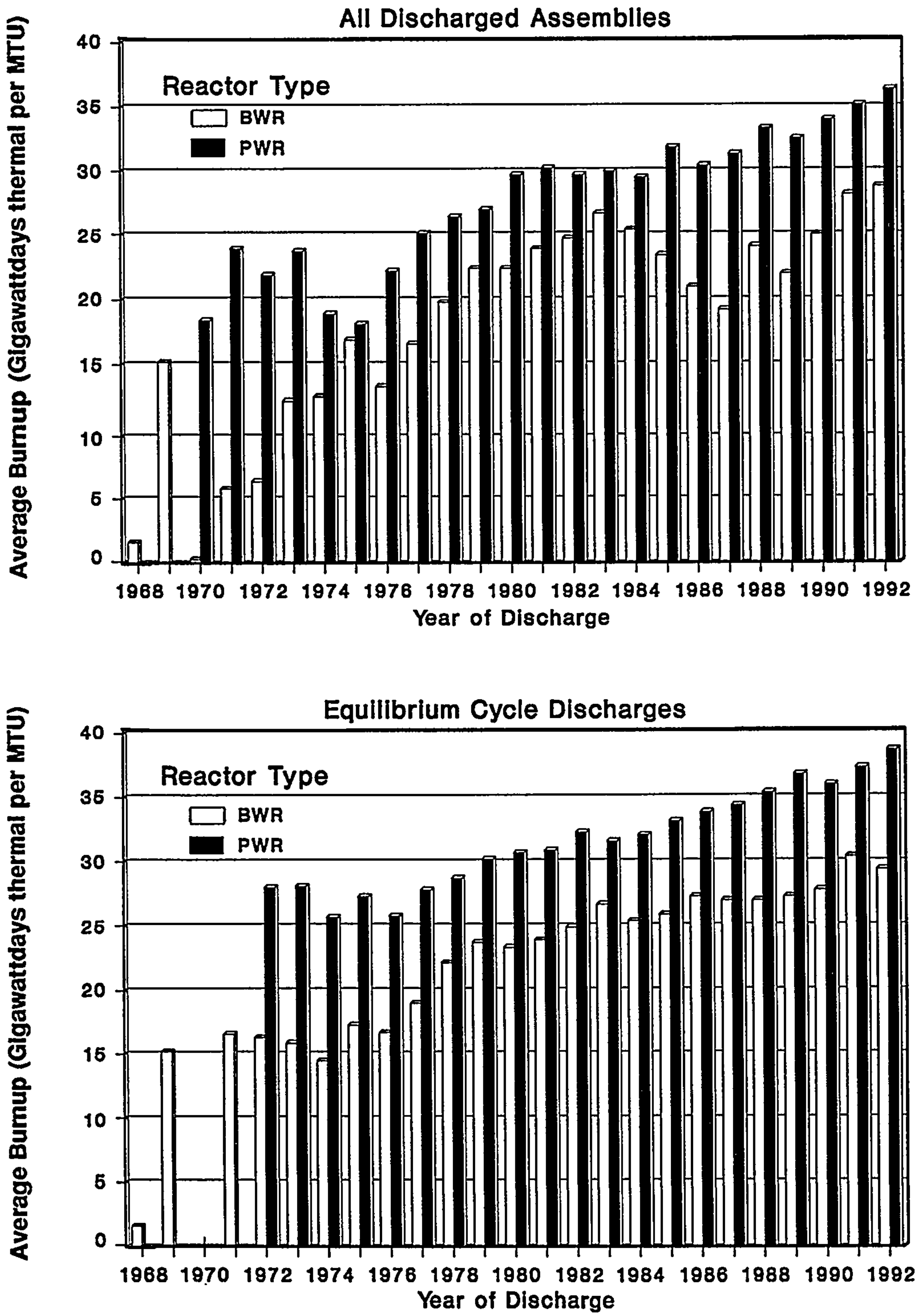


BWR = Boiling-water reactor; PWR = Pressurized-water reactor.

Notes: A number of assemblies discharged prior to 1972 were reprocessed and are not included in this figure. See Table 12 and Technical Note 7 in Appendix E for information on reprocessed assemblies. Graphs do not include 2,208 high-temperature, gas-cooled reactor (HTGR) fuel elements and 168 temporarily discharged assemblies.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Figure 2. Summary of Average Burnups, 1968-1992



BWR = Boiling-water reactor; PWR = Pressurized-water reactor; MTU = Metric tons of uranium.

Notes: A number of assemblies discharged prior to 1972 were reprocessed and are not included in this figure. See Table 12 and Technical Note 7 in Appendix E for information on reprocessed assemblies. Graphs do not included 2,208 high-temperature, gas-cooled reactor (HTGR) fuel elements and 168 temporarily discharged assemblies. Equilibrium Cycle Discharges exclude discharge data for cycles 1 and 2 of each reactor.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

The annual spent fuel burnup distributions in number of BWR and PWR assemblies are presented in Table 6. Data are presented by year of discharge and burnup range, in intervals of 5 GWDt/MTU. The spent fuel burnup of assemblies has increased over time, as indicated by the progression of larger concentrations of assemblies in higher burnup categories in most recent years. For example, 1,996 BWR assemblies discharged in 1992 (49.6 percent) fall in the range of 30 to 35 GWDt/MTU, the highest percentage for that range for any year. A total of 1,499 PWR assemblies (40.4 percent) had burnups greater than 40 GWDt/MTU in 1992. This total increased dramatically from the 756 PWR assemblies (25.5 percent) in 1991, thus continuing the pattern for larger concentrations of assemblies in higher burnup categories.

On the high end of the discharge burnups, only 7 BWR assemblies have exceded 40 GWDt/MTU, while 58 PWR assemblies have exceded 50 GWDt/MTU. The annual spent fuel burnup distribution by weight for BWR and PWR assemblies, in categories identical to those in Table 6, are shown in Table 7. As expected, the results parallel those shown in Table 6. These increases show the effect of the improved fuel management practices being used to provide higher burnups.

Assembly weights, burnups, and enrichment data by burnup range for BWRs and PWRs are compared in Table 8. Examination of the data shows that BWRs have discharged over 57 percent of the assemblies, yet PWRs account for 63 percent of the uranium (by weight) that has been discharged; PWR assemblies contain substantially more uranium than BWR assemblies (450 kg and 200 kg, respectively). Of the discharged BWR assemblies, 69 percent (by initial loading weight of uranium) is concentrated in the 15 to 30 GWDt/MTU range, and of the discharged PWR assemblies, 71 percent is concentrated in the 25 to 40 GWDt/MTU range (Table 8).

Data for reprocessed fuel assemblies have not been collected and, therefore, are not addressed in this report. Data for Fort St. Vrain have been omitted, since it is not an LWR. Three Mile Island Unit 2 ceased operation in 1979. The reactor core is now part of a DOE test and evaluation program; thus, because of this unique situation, the fuel from that reactor is not included in this report.

Cladding

Early reactors used stainless steel cladding for their fuel assemblies. This was less than perfect because stainless steel is a neutron absorber or poison to the nuclear reaction. As a result, Zircaloy-2 (for BWRs) and Zircaloy-4 (for PWRs) have been used as the cladding material of choice since the early 1970s. For simplicity of data presentation, the designation zircaloy is used for both cladding types. Current LWRs use zircaloy cladding almost exclusively. Zircaloy cladding provides better neutron utilization, and is also more resistant to corrosion under the harsh physical and chemical conditions present in the reactor core. Only one reactor still has some stainless steel clad fuel rods in core.

Advances in the fabrication and treatment of zircaloy clad fuel have reduced fuel failures significantly. This has resulted in higher burnups and, to some extent, improved fuel economy. This trend is expected to continue as assemblies with the improved cladding are loaded with higher enrichments (over 4 percent enrichment), irradiated, and discharged. Zircaloy cladding is also usually much less radioactive after being discharged from the core than is stainless steel.

The number of spent fuel assemblies and MTU of spent fuel discharged by year and by fuel rod cladding type are presented in Table 9. The table shows that most discharged spent fuel is zircaloy clad. Based on MTU, 99 percent of BWR fuel is zircaloy clad, and 96 percent of PWR fuel is zircaloy clad. Overall, only 3 percent of discharged fuel is stainless steel clad.

Only five reactors have discharged fuel rods with stainless steel cladding (Table 10). Of these, four reactors (Indian Point 1, LaCrosse, San Onofre 1, and Yankee Rowe) are permanently shutdown. Yankee Rowe switched to zircaloy clad fuel in the mid-1970's. Haddam Neck is in the process of switching to zircaloy clad fuel. After Haddam Neck has completed its switch to zircaloy clad fuel, no U.S. commercial reactor will be using stainless steel clad fuel.

Table 6. Annual Spent Fuel Burnup (in Assemblies), 1968-1992

Year	Burnup Ranges[a] (GWDt/MTU)											
	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	TOTAL
	Boiling-Water Reactors (BWR)												
1968....	5	0	0	0	0	0	0	0	0	0	0	0	5
1969....	0	11	10	72	2	1	0	0	0	0	0	0	96
1970....	29	0	0	0	0	0	0	0	0	0	0	0	29
1971....	215	43	28	106	16	0	0	0	0	0	0	0	408
1972....	509	64	146	52	0	0	0	0	0	0	0	0	771
1973....	51	86	192	230	16	1	0	0	0	0	0	0	576
1974....	0	406	622	248	37	0	0	0	0	0	0	0	1,313
1975....	2	15	327	735	144	0	0	0	0	0	0	0	1,223
1976....	5	392	599	656	14	0	0	0	0	0	0	0	1,666
1977....	0	251	208	1,250	334	4	0	0	0	0	0	0	2,047
1978....	66	198	106	502	1,283	84	0	0	0	0	0	0	2,239
1979....	0	0	108	582	794	645	2	0	0	0	0	0	2,131
1980....	76	2	3	505	2,210	476	58	0	0	0	0	0	3,330
1981....	0	1	1	314	1,426	717	4	4	0	0	0	0	2,467
1982....	0	1	26	151	748	945	75	3	2	0	0	0	1,951
1983....	0	0	5	25	620	1,852	194	2	0	0	0	0	2,698
1984....	0	43	237	2	743	1,318	391	0	2	0	0	0	2,736
1985....	92	232	100	206	508	1,640	56	0	1	0	0	0	2,835
1986....	276	176	232	376	243	1,014	232	2	0	0	0	0	2,551
1987....	728	204	385	232	137	1,950	238	0	2	0	0	0	3,876
1988....	92	132	10	234	929	1,072	487	0	0	0	0	0	2,956
1989....	168	92	464	388	1,051	1,263	478	20	0	0	0	0	3,924
1990....	92	0	184	368	582	1,357	893	9	0	0	0	0	3,485
1991....	96	132	0	40	137	1,183	1,604	68	0	0	0	0	3,260
1992[b]...	0	0	41	467	462	466	1,996	592	0	0	0	0	4,024
Temps[c].	0	0	0	0	1	0	0	0	0	0	0	0	[d]5
TOTAL..	2,502	2,481	4,034	7,741	12,437	15,988	6,708	700	7	0	0	0	52,602
	Pressurized-Water Reactors (PWR)												
1968....	0	0	0	0	0	0	0	0	0	0	0	0	0
1969....	0	0	0	0	0	0	0	0	0	0	0	0	0
1970....	0	0	4	95	0	0	0	0	0	0	0	0	99
1971....	0	12	0	0	16	85	0	0	0	0	0	0	113
1972....	0	0	31	74	80	44	53	0	0	0	0	0	282
1973....	0	0	0	59	0	85	21	0	0	0	0	0	165
1974....	41	4	225	34	119	148	4	0	0	0	0	0	575
1975....	7	107	231	131	181	82	58	0	0	0	0	0	797
1976....	0	0	12	437	193	147	142	0	0	0	0	0	931
1977....	0	0	6	257	248	351	205	40	0	0	0	0	1,107
1978....	0	3	120	219	86	797	297	143	1	0	0	0	1,666
1979....	0	0	66	238	152	562	530	113	1	0	0	0	1,662
1980....	0	0	1	0	145	568	672	65	5	0	0	0	1,456
1981....	0	0	40	4	57	528	837	116	3	0	0	0	1,585
1982....	0	0	4	177	181	162	677	278	6	1	3	2	1,491
1983....	0	12	10	175	97	383	766	322	12	0	1	0	1,778
1984....	0	0	142	100	122	450	860	255	9	0	0	0	1,938
1985....	0	0	0	112	32	513	736	580	63	1	0	0	2,037
1986....	0	2	65	295	43	428	743	634	85	3	3	0	2,301
1987....	0	0	64	181	118	404	957	748	132	0	0	0	2,604
1988....	0	0	0	186	35	318	819	1,003	266	11	1	5	2,644
1989....	0	0	98	210	155	262	655	941	451	37	0	1	2,810
1990....	0	0	48	182	54	281	929	1,447	591	17	1	0	3,550
1991....	0	40	115	3	148	160	369	1,379	599	149	8	0	2,970
1992[b]...	0	44	40	105	35	236	696	1,058	1,178	288	33	0	3,713
Temps[c].	0	0	1	15	9	8	23	0	12	0	0	0	[e]163
TOTAL..	48	224	1,323	3,289	2,306	7,002	11,049	9,122	3,414	507	50	8	38,437

[a]Ranges do not overlap. The source data are in batch averages in gigawattdays thermal per metric ton of uranium (GWDt/MTU). Therefore, 0-5 GWDt/MTU means 0 through 4.999 GWDt/MTU; 5-10 GWDt/MTU means 5.000-9.999 GWDt/MTU; etc. See Technical Note 9 in Appendix E.

[b]Some data for previous years have been revised. Current-year data may be revised in future publications. When utilities reinsert assemblies discharged in previous years, historical totals change. See Technical Note 12 in Appendix E.

[c]Temps are temporarily discharged assemblies, as of December 31, 1992, as reported on Form RW-859.

[d]Includes 4 temporarily discharged BWR assemblies with missing burnup data. See Technical Note 10 in Appendix E.

[e]Includes 95 temporarily discharged PWR assemblies with missing burnup data. See Technical Note 10 in Appendix E.

Note: A total of 2,208 high-temperature, gas-cooled reactor (HTGR) fuel elements, with inital uranium content equal to 25.0 MTU, were discharged. These HTGR fuel elements are *not* included in the above table. See Technical Note 6 in Appendix E.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Table 7. Metric Tons of Uranium in Annual Spent Fuel Burnup, 1968-1992

Boiling-Water Reactors (BWR)

Year	Burnup Ranges[a] (GWDt/MTU) 0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	TOTAL
1968	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6
1969	0.0	1.2	1.0	7.3	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	9.8
1970	5.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6
1971	41.5	8.1	2.8	10.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	64.0
1972	97.9	12.1	27.6	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	141.5
1973	9.7	16.5	30.9	36.4	1.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	95.1
1974	0.0	78.4	117.7	44.7	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	244.6
1975	0.3	1.7	62.0	136.4	25.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	225.6
1976	0.9	67.1	108.7	118.4	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	297.4
1977	0.0	48.0	40.3	235.0	58.9	0.7	0.0	0.0	0.0	0.0	0.0	0.0	382.9
1978	6.3	32.4	13.1	84.2	232.0	15.2	0.0	0.0	0.0	0.0	0.0	0.0	383.2
1979	0.0	0.0	18.6	108.7	149.2	123.1	0.3	0.0	0.0	0.0	0.0	0.0	399.8
1980	14.0	0.4	0.6	93.3	413.3	87.6	10.7	0.0	0.0	0.0	0.0	0.0	619.9
1981	0.0	0.2	0.2	58.1	265.4	133.3	0.7	0.7	0.0	0.0	0.0	0.0	458.7
1982	0.0	0.2	4.6	25.6	138.5	173.6	13.8	0.6	0.4	0.0	0.0	0.0	357.2
1983	0.0	0.0	0.9	2.9	113.5	337.8	35.7	0.4	0.0	0.0	0.0	0.0	491.3
1984	0.0	7.9	43.0	0.3	136.2	239.5	70.8	0.0	0.4	0.0	0.0	0.0	498.0
1985	16.9	42.5	18.3	35.8	93.2	297.4	10.2	0.0	0.2	0.0	0.0	0.0	514.6
1986	50.8	32.4	42.5	66.6	43.1	180.7	41.7	0.4	0.0	0.0	0.0	0.0	458.2
1987	133.5	36.1	68.8	40.8	24.7	352.4	42.9	0.0	0.4	0.0	0.0	0.0	699.4
1988	17.0	24.5	1.8	42.9	168.3	192.4	88.7	0.0	0.0	0.0	0.0	0.0	535.6
1989	30.9	16.9	85.3	71.8	193.2	227.7	85.5	3.6	0.0	0.0	0.0	0.0	714.9
1990	17.0	0.0	34.0	67.6	106.2	247.5	158.9	1.6	0.0	0.0	0.0	0.0	632.8
1991	17.8	24.6	0.0	7.2	24.0	215.0	287.2	12.1	0.0	0.0	0.0	0.0	588.0
1992[b]	0.0	0.0	7.6	86.1	85.1	83.9	362.7	103.4	0.0	0.0	0.0	0.0	728.7
Temps[c]	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
TOTAL	460.7	451.0	730.4	1,384.0	2,279.7	2,908.1	1,209.8	122.6	1.3	0.0	0.0	0.0	9,547.6

Pressurized-Water Reactors (PWR)

Year	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	TOTAL
1968	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1969	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1970	0.0	0.0	1.7	37.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	39.0
1971	0.0	4.6	0.0	0.0	6.2	33.7	0.0	0.0	0.0	0.0	0.0	0.0	44.5
1972	0.0	0.0	11.9	29.3	27.8	8.9	22.1	0.0	0.0	0.0	0.0	0.0	99.9
1973	0.0	0.0	0.0	26.2	0.0	33.3	7.6	0.0	0.0	0.0	0.0	0.0	67.1
1974	7.4	1.5	86.4	13.6	40.5	57.2	1.1	0.0	0.0	0.0	0.0	0.0	207.7
1975	2.7	42.6	95.0	53.6	79.4	25.3	23.1	0.0	0.0	0.0	0.0	0.0	321.8
1976	0.0	0.0	5.6	194.2	82.4	63.3	55.4	0.0	0.0	0.0	0.0	0.0	401.0
1977	0.0	0.0	2.8	108.3	113.1	140.3	87.1	15.4	0.0	0.0	0.0	0.0	466.9
1978	0.0	1.4	47.9	89.8	39.1	336.9	123.1	60.4	0.4	0.0	0.0	0.0	699.0
1979	0.0	0.0	30.6	109.4	64.0	232.3	234.3	50.1	0.5	0.0	0.0	0.0	721.2
1980	0.0	0.0	0.4	0.0	66.8	241.8	280.6	26.3	2.0	0.0	0.0	0.0	618.1
1981	0.0	0.0	17.2	1.9	25.8	228.5	351.1	50.1	1.3	0.0	0.0	0.0	675.9
1982	0.0	0.0	1.8	81.1	80.4	61.4	292.0	118.3	2.7	0.4	1.3	0.9	640.4
1983	0.0	5.5	4.0	80.6	44.2	168.9	331.8	131.4	5.4	0.0	0.5	0.0	772.2
1984	0.0	0.0	58.0	45.2	56.3	198.4	374.8	104.8	4.1	0.0	0.0	0.0	841.7
1985	0.0	0.0	0.0	49.0	13.6	217.0	317.8	239.4	24.1	0.4	0.0	0.0	861.3
1986	0.0	0.8	27.6	132.0	19.3	180.2	335.4	268.0	35.0	1.3	1.3	0.0	1,000.9
1987	0.0	0.0	27.2	78.1	53.4	175.7	411.9	315.8	51.8	0.0	0.0	0.0	1,113.8
1988	0.0	0.0	0.0	83.9	15.0	139.2	349.6	427.4	103.1	4.6	0.4	2.0	1,125.2
1989	0.0	0.0	48.0	91.4	68.6	112.1	286.7	415.0	189.3	15.2	0.0	0.4	1,226.7
1990	0.0	0.0	24.0	85.2	24.0	127.5	398.0	616.4	249.4	7.0	0.3	0.0	1,531.9
1991	0.0	9.2	53.2	1.4	79.5	60.5	159.4	609.9	257.1	64.2	3.4	0.0	1,297.7
1992[b]	0.0	19.8	14.8	43.7	15.0	111.8	304.1	453.0	505.0	119.0	14.8	0.0	1,601.0
Temps[c]	0.0	0.0	0.5	6.5	4.0	3.7	9.9	0.0	5.6	0.0	0.0	0.0	[d]35.1
TOTAL	10.2	85.4	558.6	1,441.7	1,018.5	2,958.1	4,756.9	3,901.7	1,436.7	212.1	21.9	3.3	16,410.1

[a]Ranges do not overlap. The source data are in batch averages in gigawattdays thermal per metric ton of uranium (GWDt/MTU). Therefore, 0-5 GWDt/MTU means 0 through 4.999 GWDt/MTU; 5-10 GWDt/MTU means 5.000-9.999 GWDt/MTU; etc. See Technical Note 9 in Appendix E.

[b]Some data for previous years have been revised. Current-year data may be revised in future publications. When utilities reinsert assemblies discharged in previous years, historical totals change. See Technical Note 12 in Appendix E.

[c]Temps are temporarily discharged assemblies, as of December 31, 1992, as reported on Form RW-859.

[d]Includes 4.9 MTU for temporarily discharged PWR assemblies with missing burnup data. See Technical Note 10 in Appendix E.

Notes: A total of 2,208 high-temperature, gas-cooled reactor (HTGR) fuel elements, with initial uranium content equal to 25.0 MTU, were discharged. These HTGR fuel elements are *not* included in the above table. See Technical Note 6 in Appendix E. Totals may not equal sum of components because of independent rounding. See Technical Note 11 in Appendix E.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Table 8. U.S. Burnup Distribution for All Discharged Assemblies

Burnup Ranges[a] (GWDt/MTU)	Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWDt/MTU)	Enrichment (weight percent)
Boiling-Water Reactors (BWR)				
0-5	2,502	460.7	2.7	1.46
5-10	2,481	451.0	8.4	1.52
10-15	4,034	730.4	12.5	2.06
15-20	7,741	1,384.0	17.8	2.13
20-25	12,437	2,279.7	22.8	2.39
25-30	15,988	2,908.1	27.3	2.66
30-35	6,708	1,209.8	31.6	2.88
35-40	700	122.6	36.0	3.10
40-45	7	1.3	42.3	2.62
TOTAL	**[b]52,602**	**9,547.6**	**22.3**	**2.39**
Pressurized-Water Reactors (PWR)				
0-5	48	10.2	4.6	3.61
5-10	224	85.4	8.7	3.08
10-15	1,323	558.6	12.8	2.13
15-20	3,289	1,441.7	17.5	2.18
20-25	2,306	1,018.5	22.5	2.61
25-30	7,002	2,958.1	27.6	2.86
30-35	11,049	4,756.9	32.4	3.17
35-40	9,122	3,901.7	37.0	3.39
40-45	3,414	1,436.7	41.4	3.57
45-50	507	212.1	46.4	3.68
50-55	50	21.9	51.0	3.74
55-60	8	3.3	56.2	3.54
TOTAL	**[c]38,437**	**[d]16,410.1**	**30.9**	**3.05**
Total Reactors				
0-5	2,550	470.8	2.7	1.50
5-10	2,705	536.4	8.5	1.76
10-15	5,357	1,289.0	12.6	2.09
15-20	11,030	2,825.7	17.6	2.15
20-25	14,743	3,298.2	22.7	2.45
25-30	22,990	5,866.2	27.5	2.76
30-35	17,757	5,966.8	32.2	3.11
35-40	9,822	4,024.3	37.0	3.39
40-45	3,421	1,438.0	41.4	3.57
45-50	507	212.1	46.4	3.68
50-55	50	21.9	51.0	3.74
55-60	8	3.3	56.2	3.54
TOTAL	**91,039**	**25,957.7**	**27.7**	**2.81**

[a]Ranges do not overlap. The source data are in batch averages in gigawattdays thermal per metric ton of uranium (GWDt/MTU). Therefore, 0-5 GWDt/MTU means 0 through 4.999 GWDt/MTU; 5-10 GWDt/MTU means 5.000-9.999 GWDt/MTU; etc. See Technical Note 9 in Appendix E.

[b]No assigned burnup range for 4 temporarily discharged BWR assemblies. These BWR assemblies are included in the Total columns. See Technical Note 10 in Appendix E.

[c]No assigned burnup range for 95 temporarily discharged PWR assemblies. These PWR assemblies are included in the Total columns. See Technical Note 10 in Appendix E.

[d]Includes 4.9 MTU for temporarily discharged PWR assemblies with no assigned burnup range. These weights are included in the Total columns. See Technical Note 10 in Appendix E.

Notes: A total of 2,208 high-temperature, gas-cooled reactor (HTGR) fuel elements, with initial uranium content equal to 25.0 MTU, were discharged. These HTGR fuel elements are *not* included in the Total Reactors section of the table. See Technical Note 6 in Appendix E. Totals may not equal sum of components because of independent rounding. See Technical Note 11 in Appendix E.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Table 9. Spent Fuel by Cladding and Reactor Type, 1968-1992

Year	Number of Assemblies				Metric Tons of Uranium			
	BWR		PWR		BWR		PWR	
	Stainless Steel	Zircaloy Clad	Stainless Steel	Zircaloy Clad	Stainless Steel	Zircaloy Clad	Stainless Steel	Zircaloy Clad
1968......	--	5	--	--	--	0.6	--	--
1969......	--	96	--	--	--	9.8	--	--
1970......	--	29	99	--	--	5.6	39.0	--
1971......	--	408	101	12	--	64.0	39.9	4.6
1972......	6	765	129	153	0.7	140.8	39.7	60.2
1973......	50	526	108	57	6.0	89.1	41.5	25.6
1974......	--	1,313	156	419	--	244.6	32.6	175.0
1975......	25	1,198	106	691	3.0	222.6	40.5	281.2
1976......	--	1,666	106	825	--	297.4	41.0	360.0
1977......	32	2,015	53	1,054	3.9	379.0	21.8	445.1
1978......	--	2,239	52	1,614	--	383.2	19.2	679.9
1979......	28	2,103	49	1,613	3.4	396.5	20.2	701.0
1980......	12	3,318	105	1,351	1.4	618.4	41.0	577.0
1981......	--	2,467	53	1,532	--	458.7	21.8	654.1
1982......	30	1,921	--	1,491	3.3	354.0	--	640.4
1983......	22	2,676	49	1,729	2.4	488.9	20.2	752.0
1984......	--	2,736	53	1,885	--	498.0	21.8	819.9
1985......	28	2,807	52	1,985	3.0	511.6	19.3	842.0
1986......	28	2,523	56	2,245	3.0	455.1	23.0	977.8
1987......	72	3,804	53	2,551	7.8	691.6	21.8	1,092.0
1988......	--	2,956	52	2,592	--	535.6	19.2	1,105.9
1989......	--	3,924	54	2,756	--	714.9	22.1	1,204.7
1990......	--	3,485	40	3,510	--	632.8	14.8	1,517.1
1991......	--	3,260	53	2,917	--	588.0	21.8	1,275.9
1992[a].....	--	4,024	157	3,556	--	728.7	58.1	1,542.9
Temps[b] ...	--	5	1	162	--	0.2	0.4	34.7
TOTAL....	333	52,269	1,737	36,700	38.0	9,509.6	641.0	15,769.1

[a]Some data for previous years have been revised. Current-year data may be revised in future publications. When utilities reinsert assemblies discharged in previous years, historical totals change. See Technical Note 12 in Appendix E.

[b]Temps are temporarily discharged assemblies, as of December 31, 1992, as reported on Form RW-859.

BWR = Boiling-water reactor; PWR = Pressurized-water reactor.

-- = Not applicable.

Notes: A total of 2,208 high-temperature, gas-cooled reactor (HTGR) zircaloy clad fuel elements, with initial uranium content equal to 25.0 metric tons of uranium (MTU), were discharged. These HTGR fuel elements are *not* included in the above table. See Technical Note 6 in Appendix E. Totals may not equal sum of components because of independent rounding. See Technical Note 11 in Appendix E.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Table 10. Reactors Discharging Stainless Steel Clad Assemblies

Reactor Name	Number of Assemblies				Metric Tons of Uranium			
	BWR		PWR		BWR		PWR	
	Stainless Steel	Zircaloy Clad	Stainless Steel	Zircaloy Clad	Stainless Steel	Zircaloy Clad	Stainless Steel	Zircaloy Clad
Haddam Neck	--	--	836	4	--	--	345.2	1.5
Indian Point 1	--	--	160	--	--	--	30.6	--
LaCrosse	333	--	--	--	38.0	--	--	--
San Onofre 1	--	--	665	--	--	--	244.3	--
Yankee Rowe	--	--	76	457	--	--	20.8	106.5
TOTAL	333	--	1,737	461	38.0	--	641.0	107.9

BWR = Boiling-water reactor; PWR = Pressurized-water reactor.
-- = Not applicable.
Note: Totals may not equal sum of components because of independent rounding. See Technical Note 11 in Appendix E.
Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Enrichment and Burnup

The distribution of spent fuel assemblies discharged through 1992 by enrichment (weight percent) and burnup ranges is shown in Table 11. Separate data are displayed for each combination of reactor type (BWR and PWR) and cladding (zircaloy and stainless steel). Enrichments (weight percents) for stainless steel clad assemblies are higher than those for zircaloy clad assemblies, because stainless steel is a neutron poison. (Four PWR mixed-oxide assemblies were discharged from San Onofre 1. These assemblies are shown in the PWR stainless steel category in the 0.6 to 1.0 range, as the plutonium content of these assemblies is not reflected in the table.)

Utility Shipments to Away-from-reactor Storage Facilities

Spent fuel shipments may be of two types, both of which are regulated by the U.S. Nuclear Regulatory Commission and are monitored by State and local governments. The first is the transfer of spent fuel assemblies within an electric utility. These transfers allow for the unused spent fuel storage capacity at one site to be used as additional storage for a reactor that may be running low on spent fuel storage capability. They also help utilities to use the available capacity efficiently and delay the need to build additional storage capabilities. These intrautility transfers are not covered in this report because they have no effect on a particular utility's storage capability. A second type of shipment is from a utility to an away-from-reactor storage facility (Table 12). There were no shipments of spent fuel from a utility to a storage facility in 1992.

Table 11. Burnup Versus Enrichment by Cladding and Reactor Type (in Assemblies)

Enrichment (weight percent)[a]	Burnup Ranges (GWDt/MTU)[a]												
	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	Total
Boiling-Water Reactor: Stainless Steel													
0.0-0.6	--	--	--	--	--	--	--	--	--	--	--	--	--
0.6-1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
1.0-1.4	--	--	--	--	--	--	--	--	--	--	--	--	--
1.4-1.8	--	--	--	--	--	--	--	--	--	--	--	--	--
1.8-2.2	--	--	--	--	--	--	--	--	--	--	--	--	--
2.2-2.6	--	--	--	--	--	--	--	--	--	--	--	--	--
2.6-3.0	--	--	--	--	--	--	--	--	--	--	--	--	--
3.0-3.4	--	--	--	--	--	--	--	--	--	--	--	--	--
3.4-3.8	--	25	88	143	4	--	--	--	--	--	--	--	260
3.8-4.2	--	2	32	39	--	--	--	--	--	--	--	--	73
4.2-4.6	--	--	--	--	--	--	--	--	--	--	--	--	--
4.6-5.0	--	--	--	--	--	--	--	--	--	--	--	--	--
TOTAL	--	27	120	182	4	--	--	--	--	--	--	--	333
Boiling-Water Reactor: Zircaloy Clad													
0.0-0.6	--	--	--	--	--	--	--	--	--	--	--	--	[b]4
0.6-1.0	1,060	536	140	--	--	--	--	--	--	--	--	--	1,736
1.0-1.4	--	932	277	108	--	--	--	--	--	--	--	--	1,317
1.4-1.8	4	172	188	388	37	--	--	--	--	--	--	--	789
1.8-2.2	1,314	231	2,246	4,245	2,498	180	--	1	--	--	--	--	10,715
2.2-2.6	118	526	525	2,508	7,301	3,773	75	56	--	--	--	--	14,882
2.6-3.0	--	49	260	261	2,381	11,097	4,092	131	7	--	--	--	18,278
3.0-3.4	--	--	198	8	124	884	2,535	512	--	--	--	--	4,261
3.4-3.8	6	8	80	41	92	40	6	--	--	--	--	--	273
3.8-4.2	--	--	--	--	--	14	--	--	--	--	--	--	14
4.2-4.6	--	--	--	--	--	--	--	--	--	--	--	--	--
4.6-5.0	--	--	--	--	--	--	--	--	--	--	--	--	--
TOTAL	2,502	2,454	3,914	7,559	12,433	15,988	6,708	700	7	--	--	--	52,269

See footnotes at end of table.

Table 11. Burnup Versus Enrichment by Cladding and Reactor Type (in Assemblies) (Continued)

Enrichment (weight percent)[a]	Burnup Ranges (GWDt/MTU)[a] 0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	Total
Pressurized-Water Reactor: Stainless Steel													
0.0-0.6	--	--	--	--	--	--	--	--	--	--	--	--	--
0.6-1.0	--	--	--	4	--	--	--	--	--	--	--	--	4
1.0-1.4	--	--	--	--	--	--	--	--	--	--	--	--	--
1.4-1.8	--	--	--	--	--	--	--	--	--	--	--	--	--
1.8-2.2	--	--	--	--	--	--	--	--	--	--	--	--	--
2.2-2.6	--	--	--	--	--	--	--	--	--	--	--	--	--
2.6-3.0	--	--	--	--	--	--	--	--	--	--	--	--	--
3.0-3.4	--	--	--	95	8	46	--	--	--	--	--	--	149
3.4-3.8	--	--	4	--	10	90	53	4	--	--	--	--	161
3.8-4.2	--	2	85	52	41	197	798	132	--	--	--	--	1,307
4.2-4.6	40	--	--	--	--	--	--	--	--	--	--	--	40
4.6-5.0	--	--	--	--	32	36	8	--	--	--	--	--	76
TOTAL	40	2	89	151	91	369	859	136	--	--	--	--	1,737
Pressurized-Water Reactor: Zircaloy Clad													
0.0-0.6	--	--	--	--	--	--	--	--	--	--	--	--	[c]95
0.6-1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
1.0-1.4	--	--	--	--	--	--	--	--	--	--	--	--	--
1.4-1.8	--	25	418	78	7	--	--	--	--	--	--	--	528
1.8-2.2	7	3	570	2,116	227	97	--	--	--	--	--	--	3,020
2.2-2.6	--	--	69	796	948	993	5	--	1	--	--	--	2,812
2.6-3.0	--	--	4	57	631	3,456	2,516	176	82	5	--	--	6,927
3.0-3.4	--	98	126	64	319	1,630	6,363	4,037	505	24	5	1	13,172
3.4-3.8	1	56	36	18	66	346	1,218	4,105	1,921	236	11	6	8,020
3.8-4.2	--	40	11	9	11	111	88	668	905	223	29	1	2,096
4.2-4.6	--	--	--	--	6	--	--	--	--	19	5	--	30
4.6-5.0	--	--	--	--	--	--	--	--	--	--	--	--	--
TOTAL	8	222	1,234	3,138	2,215	6,633	10,190	8,986	3,414	507	50	8	36,700

[a]Ranges do not overlap. See Technical Note 9 in Appendix E.
[b]No enrichment (weight percent) is reported for 4 temporarily discharged BWR assemblies. These BWR assemblies are included in the Total Column. See Technical Note 10 in Appendix E.
[c]No enrichment (weight percent) is reported for 95 temporarily discharged PWR assemblies. These PWR assemblies are included in the Total Column. See Technical Note 10 in Appendix E.
GWDt/MTU = Gigawattdays thermal per metric ton of uranium.
-- = Not applicable.
Note: A total of 2,208 high-temperature, gas-cooled reactor (HTGR) fuel elements, with initial uranium content equal to 25.0 MTU, were discharged. These HTGR fuel elements are *not* included in the above table. See Technical Note 6 in Appendix E.
Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Table 12. Fuel Stored in Away-from-reactor Facilities

Shipped From	Stored At		
Reactor Name	Storage Facility Name	Number of Assemblies	Initial Uranium Content (MTU)
Calvert Cliffs 1	Washington (Hanford)	2	0.8
Dresden 1	General Electric Company (Vallecitos Nuclear)	1	0.1
Dresden 1	Idaho National Engineering Laboratory	2	0.2
Dresden 1	South Carolina (Savannah River Plant)	[a] 8	0.6
Dresden 1	West Valley Demonstration Project	[b] 683	72.4
Dresden 2	General Electric Company (Morris Operation)	753	145.3
Big Rock Point	West Valley Demonstration Project	85	11.5
LaCrosse	South Carolina (Savannah River Plant)	[a] 1	0.1
Turkey Point 3	Idaho National Engineering Laboratory	18	8.2
Cooper Station	General Electric Company (Morris Operation)	1,054	198.2
Cooper Station	Washington (Hanford)	2	0.4
Monticello	General Electric Company (Morris Operation)	1,058	197.8
Humboldt Bay	West Valley Demonstration Project	[c] 270	21.3
Peach Bottom 2	Idaho National Engineering Laboratory	2	0.4
Ginna	West Valley Demonstration Project	40	15.3
San Onofre 1	General Electric Company (Morris Operation)	270	98.3
Surry 1	Idaho National Engineering Laboratory	1	0.5
Surry 2	Idaho National Engineering Laboratory	68	31.0
Point Beach 1	Idaho National Engineering Laboratory	6	2.4
Point Beach 1	Washington (Hanford)	3	1.2
Haddam Neck	General Electric Company (Morris Operation)	82	34.4
Haddam Neck	Ohio (Battelle)	1	0.4
Total Assemblies Shipped from Utilities to Storage Facilities		**4,410**	**840.8**
Assemblies Reported on Form RW-859 as Reprocessed [d]		**962**	**94.4**
Total Fuel Stored in Away-from-reactor Facilities		**3,448**	**746.4**

[a]All assemblies shipped to South Carolina (Savannah River Plant) have been reprocessed.
[b]Assemblies shipped from Dresden 1 to West Valley Demonstration Project have since been reprocessed.
[c]Assemblies shipped from Humboldt Bay to West Valley Demonstration Project have since been reprocessed.
[d]Complete historical data are not available for reprocessed assemblies. See Technical Note 7 in Appendix E.

Notes: A total of 744 high-temperature, gas-cooled reactor (HTGR) fuel elements, with initial uranium content equal to 8.9 metric tons of uranium (MTU), were shipped from Fort St. Vrain to Idaho National Engineering Laboratory. These HTGR fuel elements are *not* included in the above table. See Technical Note 6 in Appendix E. Round-trip shipments are not included in this table. Totals may not equal sum of components because of independent rounding. See Technical Note 11 in Appendix E.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

2. Site Capacities, Inventories, and Dry Storage at Utilities and Storage Facilities

Site Capacities and Inventories at Utilities

The total licensed capacity for storage of spent nuclear fuel in the United States as of December 31, 1992, was 205,731 slots or cells; each slot is capable of holding one assembly (Table 13). The reported maximum capacity was 215,989 including 3,932 dry storage slots, 3,061 off-site slots, and 208,996 on-site slots in storage pools. These totals change slightly as the calculation assumptions change. Footnotes h and i of Table 13 explain the assumptions used in calculating this total.

The respondents were asked to report their maximum established spent fuel storage capacity for each site (in number of assemblies). The definition used by EIA was "the maximum number of intact assemblies that will be able to be stored at some point in the future (between the reporting date and the reactor's end of life) considering any established or current studies or engineering evaluations, at the time of submittal for licensing approval from the U.S. Nuclear Regulatory Commission (NRC)" (see Technical Note 13). The maximum storage capacity can change from year to year as reflected in Table 13 and the pictograms in Appendix C.

Many electric utilities are in the process of reracking their storage pools to achieve a higher maximum capacity; some have inaccessible slots that lower their maximum capacity. For example, the Duke Power Company's Oconee 3 power plant storage pool has four slots which are currently unusable because of equipment interference in addition to three slots which will never be used for spent nuclear fuel. The Northern States Power Company's Monticello power plant storage pool has a maximum established spent fuel storage capacity listed as 2,210 assemblies. This figure does not include seven slots which will never be used for spent nuclear fuel. An additional 20 slots are used for storing nonfuel bearing components (control blades) and are also unusable at this time. Reworking of these 20 cells may produce a maximum established spent fuel storage capacity of 2,230 in the future.

The total initial uranium content of assemblies in storage is 25,958 metric tons of uranium (MTU). The total inventory of light-water reactor (LWR) spent nuclear fuel in storage in the United States as of December 31, 1992, is 91,039 assemblies (Table 13). Of these, 87,591 assemblies are in storage at 117 reactors that have been or are discharging and/or storing nuclear fuel assemblies, including 903 assemblies in the Independent Spent Fuel Storage Installations (ISFSIs) at Virginia Power's Surry plant, Carolina Power and Light Company's Robinson 2 plant, and Duke Power Company's Oconee plant. An additional 3,448 assemblies have been shipped to away-from-reactor storage facilities.

Site Capacities and Inventories at Storage Facilities

More than 99 percent of the assemblies at U.S. away-from-reactor storage facilities are located at General Electric Morris (Morris, Illinois), DOE's Idaho National Engineering Laboratory (Idaho Falls, Idaho), and the West Valley Demonstration Project (West Valley, New York) (Table 14). There are seven assemblies stored at Hanford, Washington, and one each at Columbus, Ohio, and Vallecitos, California. Table 15 corresponds to the maps which list all spent fuel in storage by State (Figures ES2 and ES3). LWR spent nuclear fuel is stored in 34 States (Figure ES2). Additionally, high-temperature, gas-cooled reactor (HTGR) spent fuel elements are currently being stored in Colorado and Idaho. The data in Table 15 and both Figures ES2 and ES3 include all permanently discharged assemblies and all temporarily discharged assemblies with uranium content that are scheduled to be reinserted at a later date. The away-from-reactor storage facilities are also included in the State totals.

Table 13. Site Capacities and Inventories at Nuclear Power Plants as of December 31, 1992

Electric Utility Name	Reactor/Storage Site Name	Reactor Type	Pool Site ID	Licensed Storage Capacity[a]	Maximum Established Storage Capacity[b]	Current Inventory[c]	Initial Uranium Content of Pool Inventory (MTU)	Number of Temporarily Discharged Assemblies[d]
Alabama Power Company	Farley 1	PWR	0101	1,407	1,407	655	302.0	0
	Farley 2	PWR	0102	1,407	1,407	498	229.6	0
Arizona Public Service Company	Palo Verde 1	PWR	0301	665	1,323	276	113.7	0
	Palo Verde 2	PWR	0302	665	1,323	288	118.1	0
	Palo Verde 3	PWR	0303	665	1,322	284	115.9	1
Arkansas Power and Light Company	Arkansas Nuclear 1	PWR	0401	968	948	624	288.9	0
	Arkansas Nuclear 2	PWR	0402	988	933	564	234.6	0
Baltimore Gas and Electric Company	Calvert Cliffs 1	PWR	0501	830	800	798	306.4	0
	Calvert Cliffs 2	PWR		1,000	988	612	235.0	0
Boston Edison Company	Pilgrim 1	BWR	0601	2,320	2,304	1,488	276.8	0
Carolina Power and Light Company	[e]Brunswick 1	BWR	0701	1,803	1,803	1,090	200.8	1
	Brunswick 1	[f]PWR	0701	160	160	160	71.4	0
	[e]Brunswick 2	BWR	0702	1,839	1,839	1,113	205.9	0
	Brunswick 2	[f]PWR	0702	144	144	144	65.5	0
	[g]Harris 1	PWR	0703	4,184	1,832	420	187.1	0
	[g]Harris 1	BWR	0703	5,808	2,541	413	76.8	0
	Robinson 2	PWR	0705	544	537	212	91.4	0
	Dry Storage	PWR	0705D	56	56	56	24.1	0
Cleveland Electric Illuminating Company	Perry 1	BWR	0901	2,400	2,400	748	137.6	4
		BWR	0902	1,620	1,620	0	0.0	0

See footnotes at end of table.

Table 13. Site Capacities and Inventories at Nuclear Power Plants as of December 31, 1992 (Continued)

Electric Utility Name	Reactor/Storage Site Name	Reactor Type	Pool Site ID	Licensed Storage Capacity[a]	Maximum Established Storage Capacity[b]	Current Inventory[c]	Initial Uranium Content of Pool Inventory (MTU)	Number of Temporarily Discharged Assemblies[d]
Commonwealth Edison Company	Braidwood 1	PWR	1001	2,870	2,834	404	171.6	0
	Braidwood 2	PWR						
	Byron 1	PWR	1003	2,870	2,824	596	253.2	0
	Byron 2	PWR						
	Dresden 1	BWR	1005	720	720	683	69.7	0
	Dresden 2	BWR	1006	3,537	3,537	1,954	353.0	0
	Dresden 3	BWR	1007	3,537	3,537	1,968	355.6	0
	LaSalle County 1	BWR	1008	5,153	8,083	1,920	351.4	0
	LaSalle County 2	BWR		0	0	0	0.0	0
	Quad Cities 1	BWR	1010	7,554	7,551	3,996	737.2	0
	Quad Cities 2	BWR		0	0	0	0.0	0
	Zion 1	PWR	1012	2,112	3,012	1,608	734.0	0
	Zion 2	PWR						
Consolidated Edison Company of New York	Indian Point 1	PWR	1101	756	756	160	30.6	0
	Indian Point 2	PWR	1102	1,374	1,374	668	303.3	8
Consumers Power Company	Big Rock Point	BWR	1201	441	441	294	38.5	0
	Palisades	PWR	1204	892	1,075	733	292.5	1
Dairyland Power Cooperative	LaCrosse	BWR	1301	440	440	333	38.0	0
Detroit Edison Company	Enrico Fermi 2	BWR	1402	2,383	2,383	672	121.6	0
Duke Power Company	Catawba 1	PWR	1501	1,419	2,615	408	173.0	0
	Catawba 2	PWR	1502	1,418	2,615	280	119.0	0
	McGuire 1	PWR	1504	1,463	1,387	519	228.4	0
	McGuire 2	PWR	1505	1,463	1,381	741	331.9	0
	Oconee 1	PWR	1506	1,312	1,311	1,014	470.0	0
	Oconee 2	PWR						
	Oconee 3	PWR	1508	825	818	516	239.2	0
	Dry Storage	PWR	1506D	2,112	2,112	480	222.7	0

See footnotes at end of table.

Table 13. Site Capacities and Inventories at Nuclear Power Plants as of December 31, 1992 (Continued)

Electric Utility Name	Reactor/Storage Site Name	Reactor Type	Pool Site ID	Licensed Storage Capacity[a]	Maximum Established Storage Capacity[b]	Current Inventory[c]	Initial Uranium Content of Pool Inventory (MTU)	Number of Temporarily Discharged Assemblies[d]
Duquesne Light Company	Beaver Valley 1	PWR	1601	833	1,621	512	236.0	14
	Beaver Valley 2	PWR	1602	1,088	1,088	192	88.5	5
Florida Power Corporation	Crystal River 3	PWR	1701	1,357	1,357	536	248.7	5
Florida Power and Light Company	St. Lucie 1	PWR	1801	1,706	1,705	796	300.1	0
	St. Lucie 2	PWR	1802	1,584	1,076	464	175.9	0
	Turkey Point 3	PWR	1803	1,404	1,367	588	267.5	0
	Turkey Point 4	PWR	1804	1,404	1,376	546	248.4	0
GPU Nuclear Corporation	Three Mile Island 1	PWR	1901	752	1,284	521	238.1	8
	Oyster Creek	BWR	1903	2,600	2,600	1,876	343.3	0
Georgia Power Company	Hatch 1	BWR	2001	3,181	3,101	1,800	333.0	0
	Hatch 2	BWR		2,845	2,845	1,576	290.0	0
	Vogtle 1	PWR	2003	288	284	223	103.7	0
	Vogtle 2	PWR		2,098	1,999	177	81.9	0
Gulf States Utilities Company	River Bend 1	BWR	2101	2,680	3,172	764	141.3	0
Houston Lighting and Power Company	South Texas 1	PWR	2201	1,969	1,959	236	127.9	7
	South Texas 2	PWR	2202	1,969	1,958	116	62.6	0
Illinois Power Company	Clinton 1	BWR	2301	2,512	2,512	568	104.5	0
Indiana Michigan Power Company	Cook 1	PWR	5801	2,050	3,613	1,523	669.6	0
	Cook 2	PWR						
Iowa Electric Light and Power Company	Duane Arnold	BWR	2401	2,050	1,898	1,152	212.0	0
Kansas Gas and Electric Company	Wolf Creek 1	PWR	2501	1,340	1,327	340	157.4	0

See footnotes at end of table.

Table 13. Site Capacities and Inventories at Nuclear Power Plants as of December 31, 1992 (Continued)

Electric Utility Name	Reactor/Storage Site Name	Reactor Type	Pool Site ID	Licensed Storage Capacity[a]	Maximum Established Storage Capacity[b]	Current Inventory[c]	Initial Uranium Content of Pool Inventory (MTU)	Number of Temporarily Discharged Assemblies[d]
Long Island Lighting Company	Shoreham	BWR	2601	2,436	2,685	560	102.5	0
Louisana Power and Light Company	Waterford 3	PWR	2701	1,088	1,070	428	176.3	0
Maine Yankee Atomic Power Company	Maine Yankee	PWR	2801	1,476	1,464	1,077	405.0	23
Nebraska Public Power District	Cooper Station	BWR	3001	2,366	2,366	620	113.5	0
New York Power Authority................	Fitzpatrick	BWR	3901	2,797	2,797	1,684	311.5	0
	Indian Point 3	PWR	3902	1,345	1,340	584	266.9	2
Niagara Mohawk Power Corporation	Nine Mile Point 1	BWR	3101	2,776	2,324	1,620	301.3	0
	Nine Mile Point 2	BWR	3102	4,049	2,528	444	82.1	0
North Atlantic Energy Service Corporation	Seabrook	PWR	5901	1,236	1,236	136	63.0	0
Northeast Utilities Service Company	Millstone 1	BWR	3201	3,229	3,229	2,116	391.5	0
	Millstone 2	PWR	3202	1,072	1,065	784	311.2	0
	Millstone 3	PWR	3203	756	756	248	114.6	0
	Haddam Neck	PWR	5701	1,172	1,167	757	311.9	1
Northern States Power Company	Monticello	BWR	3301	2,237	2,210	582	104.8	0
	Prairie Island 1	PWR	3302	1,386	1,354	1,233	466.7	0
	Prairie Island 2	PWR						
Omaha Public Power District	Fort Calhoun	PWR	3401	729	729	529	190.4	0

See footnotes at end of table.

Table 13. Site Capacities and Inventories at Nuclear Power Plants as of December 31, 1992 (Continued)

Electric Utility Name	Reactor/Storage Site Name	Reactor Type	Pool Site ID	Licensed Storage Capacity[a]	Maximum Established Storage Capacity[b]	Current Inventory[c]	Initial Uranium Content of Pool Inventory (MTU)	Number of Temporarily Discharged Assemblies[d]
Pacific Gas and Electric Company	Diablo Canyon 1	PWR	3501	1,324	1,324	376	171.8	0
	Diablo Canyon 2	PWR	3502	1,324	1,317	308	142.0	0
	Humboldt Bay	BWR	3503	486	485	390	28.9	0
Pennsylvania Power and Light Company	Susquehanna 1	BWR	3601	2,840	2,840	1,404	252.7	0
	Susquehanna 2	BWR		2,840	2,840	1,236	221.3	0
Philadelphia Electric Company	Limerick 1	BWR	3701	2,040	2,766	1,140	210.9	0
	Limerick 2	BWR		2,040	2,030	224	41.7	0
	Peach Bottom 2	BWR	3704	3,819	3,819	2,162	400.0	0
	Peach Bottom 3	BWR	3705	3,819	3,814	1,944	361.6	0
Portland General Electric Company	Trojan	PWR	3801	1,408	1,395	780	358.8	0
Public Service Electric and Gas Company	Hope Creek	BWR	4201	4,006	3,998	1,008	186.5	0
	Salem 1	PWR	4202	1,170	1,117	656	300.4	25
	Salem 2	PWR	4203	1,170	1,139	436	201.0	4
Rochester Gas and Electric Corporation	Ginna	PWR	4401	1,016	987	661	249.9	0
Sacramento Municipal Utility District	Rancho Seco	PWR	4501	1,080	1,080	493	228.3	0
South Carolina Electric and Gas Company	Summer	PWR	4601	1,276	1,276	372	169.6	0
Southern California Edison Company	San Onofre 1	PWR	4701	216	216	207	76.2	0
	San Onofre 2	PWR	4702	1,542	1,542	554	226.2	0
	San Onofre 3	PWR	4703	1,542	1,542	602	243.9	0

See footnotes at end of table.

Table 13. Site Capacities and Inventories at Nuclear Power Plants as of December 31, 1992 (Continued)

Electric Utility Name	Reactor/Storage Site Name	Reactor Type	Pool Site ID	Licensed Storage Capacity[a]	Maximum Established Storage Capacity[b]	Current Inventory[c]	Initial Uranium Content of Pool Inventory (MTU)	Number of Temporarily Discharged Assemblies[d]
System Energy Resources, Inc.	Grand Gulf 1	BWR	2901	2,324	3,822	1,384	250.5	0
Tennessee Valley Authority	Browns Ferry 1	BWR	4803	3,471	3,471	1,488	276.8	0
	Browns Ferry 2	BWR		3,471	3,471	1,440	267.8	0
	Browns Ferry 3	BWR	4805	3,471	3,471	1,029	191.4	0
	Sequoyah 1	PWR	4808	1,386	2,091	737	339.0	0
	Sequoyah 2	PWR						
	Watts Bar 1	PWR	4810	1,312	1,294	0	0.0	0
	Watts Bar 2	PWR						
TU Electric	Comanche Peak 1	PWR	4901	556	1,693	117	53.7	0
	Comanche Peak 2	PWR		560	1,687	0	0.0	0
Toledo Edison Company	Davis-Besse	PWR	5001	735	720	392	181.5	6
Union Electric Company	Callaway	PWR	5101	1,340	1,340	452	199.3	0
Vermont Yankee Nuclear Power Corporation	Vermont Yankee	BWR	6001	2,870	2,860	1,850	344.1	0
Virginia Power	North Anna 1	PWR	5201	1,737	1,708	993	457.3	34
	North Anna 2	PWR						
	Surry 1	PWR	5203	1,044	1,033	837	382.5	7
	Surry 2	PWR						
	Dry Storage	PWR	5203D	1,764	1,764	367	165.8	0
Washington Public Power Supply System	Washington Nuclear 2	BWR	5302	2,658	2,654	912	166.0	0
Wisconsin Electric Power Company	Point Beach 1	PWR	5401	1,502	1,488	1,193	466.0	0
	Point Beach 2	PWR						

See footnotes at end of table.

Table 13. Site Capacities and Inventories at Nuclear Power Plants as of December 31, 1992 (Continued)

Electric Utility Name	Reactor/Storage Site Name	Reactor Type	Pool Site ID	Licensed Storage Capacity[a]	Maximum Established Storage Capacity[b]	Current Inventory[c]	Initial Uranium Content of Pool Inventory (MTU)	Number of Temporarily Discharged Assemblies[d]
Wisconsin Public Service Corporation	Kewaunee	PWR	5501	990	990	616	237.8	12
Yankee Atomic Electric Company	Yankee Rowe	PWR	5601	721	721	533	127.4	0
TOTAL (Nuclear Power Plant Sites Only)				**[h]202,670**	**[h]212,928**	**87,591**	**25,211.3**	**168**
Away-from-reactor Storage Facilities (From Table 14)				3,061	3,061	3,448	746.4	0
TOTAL (Including Away-from-reactor Storage Facilities)				**[i]205,731**	**[i]215,989**	**91,039**	**25,957.7**	**168**

[a]Licensed Storage Capacity is the maximum number of spent nuclear fuel assemblies and canisters to be stored at a given site or spent nuclear fuel pool, as licensed by the Nuclear Regulatory Commission.

[b]Maximum Established Storage Capacity is the maximum established spent fuel capacity for the site defined by the DOE as the maximum number of intact assemblies that will be able to be stored at some point in the future (between the reporting date and the reactor's end of life) taking into account any established or current studies or engineering evaluations, at the time of submittal for licensing approval from the NRC.

[c]Current Inventory is the number of spent nuclear fuel assemblies stored at a given site or spent nuclear fuel pool, at a given point in time.

[d]These numbers are included in the current inventory column.

[e]Brunswick 1 and 2 are BWR reactors with the capability of storing both BWR and PWR fuel assemblies in their storage pools.

[f]The current inventory of assemblies stored in the PWR portion of Brunswick pools came from the Robinson 2 reactor.

[g]Harris 1 is a PWR reactor with the capability of storing both PWR and BWR fuel assemblies in its storage pools, based on future needs. The pools are licensed to hold up to 4,184 PWR or 5,808 BWR assemblies.

[h]Licensed storage capacity total and maximum established storage capacity total assume that Carolina Power and Light Company's Harris 1 site (capable of storing PWR and BWR fuel assemblies), will store BWR assemblies only. Totals assuming PWR assemblies only are 201,046 licensed storage capacity and 212,219 maximum established storage capacity.

[i]Licensed storage capacity total and maximum established storage capacity total assume that Carolina Power and Light Company's Harris 1 site and General Electric Company's Morris Operation site (both capable of storing PWR and BWR fuel assemblies) will store BWR assemblies only. Totals assuming PWR assemblies only are 201,559 licensed storage capacity and 212,732 maximum established storage capacity.

MTU = Metric tons of uranium; PWR = Pressurized-water reactor; BWR = Boiling-water reactor.

Note: Totals may not equal sum of components because of independent rounding. See Technical Note 11 in Appendix E.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Table 14. Site Capacities and Inventories at Away-from-reactor Storage Facilities as of December 31, 1992

Storage Facility	Contributing Reactor	Reactor ID	Reactor Type	Pool Site ID	Licensed Storage Capacity [a]	Maximum Established Storage Capacity [a]	Current Inventory [a]	Initial Uranium Content of Pool Inventory (MTU)
Babcock & Wilcox Company (Lynchburg)		--	PWR	7101	4	4	0	0.0
		--	BWR		4	4	0	0.0
General Electric Company (Morris Operation)	San Onofre 1	4701	PWR	6601	[b] 380	380	270	98.3
	Haddam Neck	5701	PWR				82	34.4
	Dresden 2	1006	BWR		[b] 2,928	2,928	753	145.3
	Cooper Station	3001	BWR				1,054	198.2
	Monticello	3301	BWR				1,058	197.8
Subtotal							3,217	674.0
General Electric Company (Vallecitos Nuclear)	Dresden 1	1005	BWR	6201			1	0.1
Idaho National Engineering Laboratory[c]	Turkey Point 3	1803	PWR	7002	--	--	18	8.2
	[d] Surry 1	5203	PWR		--	--	1	0.5
	[d] Surry 2	5204	PWR		--	--	68	31.0
	Point Beach 1	5401	PWR		--	--	6	2.4
	Dresden 1	1005	BWR		--	--	2	0.2
	Peach Bottom 2	3704	BWR		--	--	2	0.4
Subtotal							97	42.7
Ohio (Battelle) [c]	Haddam Neck	5701	PWR	7006	--	--	1	0.4
Washington (Hanford) [c]	Calvert Cliffs 1	0501	PWR	7007	--	--	2	0.8
	Point Beach 1	5401	PWR		--	--	3	1.2
	Cooper Station	3001	BWR		--	--	2	0.4
Subtotal							7	2.4
West Valley Demonstration Project	Ginna	4401	PWR	7005	[e] 40	40	40	15.3
	Big Rock Point	1201	BWR		[e] 85	85	85	11.5
Subtotal							125	26.8
TOTAL					[f] 3,061	[f] 3,061	3,448	746.4

[a]In number of assemblies (see Glossary for definition).
[b]General Electric Company (Morris Operation) is not licensed to receive any more assemblies.
[c]These storage facilities are not surveyed by Form RW-859. The current inventory data for these facilities are shipments to these facilities which were reported by the individual utilities on Form RW-859. See Technical Note 2 in Appendix E. Licensed and maximum established storage capacity data are not applicable to these DOE facilities.
[d]Surry 1 and 2 spent fuel stored at Idaho National Engineering Laboratory is in dry storage.
[e]West Valley Demonstration Project is not licensed to receive any more assemblies.
[f]Licensed storage capacity total and maximum established storage capacity total assume General Electric Company's Morris Operation site (capable of storing PWR and BWR fuel assemblies), will store BWR assemblies only. Totals assuming PWR assemblies only are 513 licensed storage capacity and 513 maximum established storage capacity.
MTU = Metric tons of uranium; PWR = Pressurized-water reactor; BWR = Boiling-water reactor.
-- = Not applicable.
Note: Totals may not equal sum of components because of independent rounding. See Technical Note 11 in Appendix E.
Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Table 15. Spent Fuel in Storage by State and Storage Site

State	Storage Site	BWR Assemblies	BWR Initial Uranium Content (MTU)	PWR Assemblies	PWR Initial Uranium Content (MTU)	Total Stored Assemblies	Total Initial Uranium Content (MTU)
Alabama..........	Browns Ferry 1	2,928	544.6	0	0.0	2,928	544.6
	Browns Ferry 3	1,029	191.4	0	0.0	1,029	191.4
	Farley 1	0	0.0	655	302.0	655	302.0
	Farley 2	0	0.0	498	229.6	498	229.6
Alabama	**Total**	**3,957**	**736.0**	**1,153**	**531.6**	**5,110**	**1,267.6**
Arizona...........	Palo Verde 1	0	0.0	276	113.7	276	113.7
	Palo Verde 2	0	0.0	288	118.1	288	118.1
	Palo Verde 3	0	0.0	284	115.9	284	115.9
Arizona	**Total**	**0**	**0.0**	**848**	**347.7**	**848**	**347.7**
Arkansas	Arkansas Nuclear 1	0	0.0	624	288.9	624	288.9
	Arkansas Nuclear 2	0	0.0	564	234.6	564	234.6
Arkansas........	**Total**	**0**	**0.0**	**1,188**	**523.5**	**1,188**	**523.5**
California.........	Diablo Canyon 1	0	0.0	376	171.8	376	171.8
	Diablo Canyon 2	0	0.0	308	142.0	308	142.0
	Humboldt Bay	390	28.9	0	0.0	390	28.9
	Rancho Seco	0	0.0	493	228.3	493	228.3
	San Onofre 1	0	0.0	207	76.2	207	76.2
	San Onofre 2	0	0.0	554	226.2	554	226.2
	San Onofre 3	0	0.0	602	243.9	602	243.9
	Vallecitos	1	0.1	0	0.0	1	0.1
California	**Total**	**391**	**29.0**	**2,540**	**1,088.4**	**2,931**	**1,117.4**
Colorado	Fort St.Vrain	0	0.0	0	0.0	[a]1,464	[a]16.1
Colorado........	**Total**	**0**	**0.0**	**0**	**0.0**	**[a]1,464**	**[a]16.1**
Connecticut.......	Haddam Neck	0	0.0	757	311.9	757	311.9
	Millstone 1	2,116	391.5	0	0.0	2,116	391.5
	Millstone 2	0	0.0	784	311.2	784	311.2
	Millstone 3	0	0.0	248	114.6	248	114.6
Connecticut	**Total**	**2,116**	**391.5**	**1,789**	**737.7**	**3,905**	**1,129.2**
Florida	Crystal River 3	0	0.0	536	248.7	536	248.7
	St. Lucie 1	0	0.0	796	300.1	796	300.1
	St. Lucie 2	0	0.0	464	175.9	464	175.9
	Turkey Point 3	0	0.0	588	267.5	588	267.5
	Turkey Point 4	0	0.0	546	248.4	546	248.4
Florida..........	**Total**	**0**	**0.0**	**2,930**	**1,240.6**	**2,930**	**1,240.6**
Georgia	Hatch 1	3,376	623.0	0	0.0	3,376	623.0
	Vogtle 1	0	0.0	400	185.6	400	185.6
Georgia	**Total**	**3,376**	**623.0**	**400**	**185.6**	**3,776**	**808.6**
Idaho	Idaho National Engineering Laboratory	4	0.6	93	42.1	[b]841	[b]51.6
Idaho	**Total**	**4**	**0.6**	**93**	**42.1**	**[b]841**	**[b]51.6**

See footnotes at end of table.

Table 15. Spent Fuel in Storage by State and Storage Site (Continued)

State	Storage Site	BWR Assemblies	BWR Initial Uranium Content (MTU)	PWR Assemblies	PWR Initial Uranium Content (MTU)	Total Stored Assemblies	Total Initial Uranium Content (MTU)
Illinois............	Braidwood 1	0	0.0	404	171.6	404	171.6
	Byron 1	0	0.0	596	253.2	596	253.2
	Clinton 1	568	104.5	0	0.0	568	104.5
	Dresden 1	683	69.7	0	0.0	683	69.7
	Dresden 2	1,954	353.0	0	0.0	1,954	353.0
	Dresden 3	1,968	355.6	0	0.0	1,968	355.6
	LaSalle County 1	1,920	351.4	0	0.0	1,920	351.4
	Morris	2,865	541.3	352	132.7	3,217	674.0
	Quad Cities 1	3,996	737.2	0	0.0	3,996	737.2
	Zion 1	0	0.0	1,608	734.0	1,608	734.0
Illinois	**Total**	**13,954**	**2,512.7**	**2,960**	**1,291.5**	**16,914**	**3,804.2**
Iowa.............	Duane Arnold	1,152	212.0	0	0.0	1,152	212.0
Iowa............	**Total**	**1,152**	**212.0**	**0**	**0.0**	**1,152**	**212.0**
Kansas...........	Wolf Creek 1	0	0.0	340	157.4	340	157.4
Kansas	**Total**	**0**	**0.0**	**340**	**157.4**	**340**	**157.4**
Louisiana.........	River Bend 1	764	141.3	0	0.0	764	141.3
	Waterford 3	0	0.0	428	176.3	428	176.3
Louisiana	**Total**	**764**	**141.3**	**428**	**176.3**	**1,192**	**317.6**
Maine............	Maine Yankee	0	0.0	1,077	405.0	1,077	405.0
Maine...........	**Total**	**0**	**0.0**	**1,077**	**405.0**	**1,077**	**405.0**
Maryland	Calvert Cliffs 1	0	0.0	1,410	541.4	1,410	541.4
Maryland........	**Total**	**0**	**0.0**	**1,410**	**541.4**	**1,410**	**541.4**
Massachusetts	Pilgrim 1	1,488	276.8	0	0.0	1,488	276.8
	Yankee Rowe	0	0.0	533	127.4	533	127.4
Massachusetts...	**Total**	**1,488**	**276.8**	**533**	**127.4**	**2,021**	**404.2**
Michigan	Big Rock Point	294	38.5	0	0.0	294	38.5
	Cook 1	0	0.0	1,523	669.6	1,523	669.6
	Enrico Fermi 2	672	121.6	0	0.0	672	121.6
	Palisades	0	0.0	733	292.5	733	292.5
Michigan........	**Total**	**966**	**160.1**	**2,256**	**962.1**	**3,222**	**1,122.2**
Minnesota	Monticello	582	104.8	0	0.0	582	104.8
	Prairie Island 1	0	0.0	1,233	466.7	1,233	466.7
Minnesota.......	**Total**	**582**	**104.8**	**1,233**	**466.7**	**1,815**	**571.5**
Mississippi........	Grand Gulf 1	1,384	250.5	0	0.0	1,384	250.5
Mississippi......	**Total**	**1,384**	**250.5**	**0**	**0.0**	**1,384**	**250.5**
Missouri..........	Callaway	0	0.0	452	199.3	452	199.3
Missouri	**Total**	**0**	**0.0**	**452**	**199.3**	**452**	**199.3**
Nebraska.........	Cooper Station	620	113.5	0	0.0	620	113.5
	Fort Calhoun	0	0.0	529	190.4	529	190.4
Nebraska........	**Total**	**620**	**113.5**	**529**	**190.4**	**1,149**	**303.9**
New Hampshire....	Seabrook	0	0.0	136	63.0	136	63.0
New Hampshire..	**Total**	**0**	**0.0**	**136**	**63.0**	**136**	**63.0**

See footnotes at end of table.

Table 15. Spent Fuel in Storage by State and Storage Site (Continued)

State	Storage Site	BWR Assemblies	BWR Initial Uranium Content (MTU)	PWR Assemblies	PWR Initial Uranium Content (MTU)	Total Stored Assemblies	Total Initial Uranium Content (MTU)
New Jersey	Hope Creek	1,008	186.5	0	0.0	1,008	186.5
	Oyster Creek	1,876	343.3	0	0.0	1,876	343.3
	Salem 1	0	0.0	656	300.4	656	300.4
	Salem 2	0	0.0	436	201.0	436	201.0
New Jersey......	**Total**	**2,884**	**529.8**	**1,092**	**501.4**	**3,976**	**1,031.2**
New York.........	Fitzpatrick	1,684	311.5	0	0.0	1,684	311.5
	Ginna	0	0.0	661	249.9	661	249.9
	Indian Point 1	0	0.0	160	30.6	160	30.6
	Indian Point 2	0	0.0	668	303.3	668	303.3
	Indian Point 3	0	0.0	584	266.9	584	266.9
	Nine Mile Point 1	1,620	301.3	0	0.0	1,620	301.3
	Nine Mile Point 2	444	82.1	0	0.0	444	82.1
	Shoreham	560	102.5	0	0.0	560	102.5
	West Valley	85	11.5	40	15.3	125	26.8
New York........	**Total**	**4,393**	**808.9**	**2,113**	**866.0**	**6,506**	**1,674.9**
North Carolina.....	Brunswick 1	1,090	200.8	160	71.4	1,250	272.2
	Brunswick 2	1,113	205.9	144	65.5	1,257	271.4
	Harris 1	413	76.8	420	187.1	833	263.9
	McGuire 1	0	0.0	519	228.4	519	228.4
	McGuire 2	0	0.0	741	331.9	741	331.9
North Carolina...	**Total**	**2,616**	**483.5**	**1,984**	**884.3**	**4,600**	**1,367.8**
Ohio.............	Battelle	0	0.0	1	0.4	1	0.4
	Davis-Besse	0	0.0	392	181.5	392	181.5
	Perry 1	748	137.6	0	0.0	748	137.6
Ohio............	**Total**	**748**	**137.6**	**393**	**181.9**	**1,141**	**319.5**
Oregon...........	Trojan	0	0.0	780	358.8	780	358.8
Oregon	**Total**	**0**	**0.0**	**780**	**358.8**	**780**	**358.8**
Pennsylvania......	Beaver Valley 1	0	0.0	512	236.0	512	236.0
	Beaver Valley 2	0	0.0	192	88.5	192	88.5
	Limerick 1	1,364	252.6	0	0.0	1,364	252.6
	Peach Bottom 2	2,162	400.0	0	0.0	2,162	400.0
	Peach Bottom 3	1,944	361.6	0	0.0	1,944	361.6
	Susquehanna 1	2,640	474.0	0	0.0	2,640	474.0
	Three Mile Island 1	0	0.0	521	238.1	521	238.1
Pennsylvania	**Total**	**8,110**	**1,488.2**	**1,225**	**562.6**	**9,335**	**2,050.8**
South Carolina	Catawba 1	0	0.0	408	173.0	408	173.0
	Catawba 2	0	0.0	280	119.0	280	119.0
	Oconee 1	0	0.0	1,014	470.0	1,014	470.0
	Oconee 3	0	0.0	516	239.2	516	239.2
	Oconee 1 Dry	0	0.0	480	222.7	480	222.7
	Robinson 2	0	0.0	212	91.4	212	91.4
	Robinson 2 Dry	0	0.0	56	24.1	56	24.1
	Summer	0	0.0	372	169.6	372	169.6
South Carolina...	**Total**	**0**	**0.0**	**3,338**	**1,509.0**	**3,338**	**1,509.0**
Tennessee........	Sequoyah 1	0	0.0	737	339.0	737	339.0
	Watts Bar 1	0	0.0	0	0.0	0	0.0
Tennessee	**Total**	**0**	**0.0**	**737**	**339.0**	**737**	**339.0**

See footnotes at end of table.

Table 15. Spent Fuel in Storage by State and Storage Site (Continued)

State	Storage Site	BWR Assemblies	BWR Initial Uranium Content (MTU)	PWR Assemblies	PWR Initial Uranium Content (MTU)	Total Stored Assemblies	Total Initial Uranium Content (MTU)
Texas............	Comanche Peak 1	0	0.0	117	53.7	117	53.7
	South Texas 1	0	0.0	236	127.9	236	127.9
	South Texas 2	0	0.0	116	62.6	116	62.6
Texas...........	**Total**	**0**	**0.0**	**469**	**244.2**	**469**	**244.2**
Vermont..........	Vermont Yankee	1,850	344.1	0	0.0	1,850	344.1
Vermont.........	**Total**	**1,850**	**344.1**	**0**	**0.0**	**1,850**	**344.1**
Virginia...........	North Anna 1	0	0.0	993	457.3	993	457.3
	Surry 1	0	0.0	837	382.5	837	382.5
	Surry 1 Dry	0	0.0	367	165.8	367	165.8
Virginia	**Total**	**0**	**0.0**	**2,197**	**1,005.6**	**2,197**	**1,005.6**
Washington	Hanford	2	0.4	5	2.0	7	2.4
	Washington Nuclear 2	912	166.0	0	0.0	912	166.0
Washington	**Total**	**914**	**166.4**	**5**	**2.0**	**919**	**168.4**
Wisconsin........	Kewaunee	0	0.0	616	237.8	616	237.8
	LaCrosse	333	38.0	0	0.0	333	38.0
	Point Beach 1	0	0.0	1,193	466.0	1,193	466.0
Wisconsin.......	**Total**	**333**	**38.0**	**1,809**	**703.8**	**2,142**	**741.8**
TOTAL..........		**52,602**	**9,547.6**	**38,437**	**16,410.1**	**91,039**	**25,957.7**

[a]These 1,464 high-temperature, gas-cooled reactor (HTGR) fuel elements are *not* included in the table totals. See Technical Note 6 in Appendix E.

[b]A total of 744 HTGR fuel elements, with initial uranium content equal to 8.9 metric tons of uranium (MTU), were discharged. These HTGR fuel elements are *not* included in the above table totals. See Technical Note 6 in Appendix E.

BWR = Boiling-water reactor; PWR = Pressurized-water reactor; MTU = Metric tons of uranium.

Note: Totals may not equal sum of components because of independent rounding. See Technical Note 11 in Appendix E.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Dry Storage at Utilities

In order to meet the demand for storage space, several utility companies have opted to increase their spent fuel storage capacity through the use of dry storage techniques. Many different dry storage techniques have been designed and are being, or will be, licensed and used. These include metal storage casks, concrete storage casks, metal canisters housed in concrete modules, and concrete storage vaults.

All U.S. commercial LWR's which are storing, or are planning to store nuclear fuel assemblies in an ISFSI as of December 31, 1992, are reported on Form RW-859. Several utilities have contributed supplementary dry storage information. Table 16 lists data for each of these utilities and affected reactors. Utilities are listed by the date the dry storage license was issued.

The three utilities that currently use the Nutec Horizontal Modular Storage (NUHOMS) Spent Fuel Storage System are Baltimore Gas and Electric Company, Carolina Power and Light Company, and Duke Power Company. Both GPU Nuclear Corporation and Sacramento Municipal Utility District plan to employ the NUHOMS system. The system consists of three major safety-related components: a dry shielded canister (DSC), which provides a high integrity containment boundary and a controlled storage environment for the fuel; a reinforced concrete horizontal storage module (HSM), which houses the stored DSC and provides radiation shielding, protection against natural phenomena, and an efficient means for decay heat removal; and a transfer cask, which provides for the safe shielded transfer of the DSC from the plant spent fuel pool to the storage module. The NUHOMS system is designed and licensed to the requirements of 10 CFR 72 and ANS/ANSI 57.9 for ISFSIs.

Baltimore Gas and Electric Company

The ISFSI at Baltimore Gas and Electric Company's Calvert Cliffs station is the NUHOMS-24P design. The Calvert Cliffs ISFSI has been designed as a life-of-plant storage facility. The ISFSI will have the capacity to store all spent fuel discharged from Calvert Cliffs Units 1 and 2, beyond the spent fuel pool capacity, up to the 40-year plant life, if necessary. The exact capacity needed is uncertain, and to limit capital investment until necessary, the ISFSI will be constructed in up to five phases. The ISFSI required the preparation of a 10 CFR 72 License Application, Safety Analysis Report, Environmental Report, and a Security Plan for NRC review and approval. The license material was prepared and submitted to the NRC in December 1989. Construction of the ISFSI west of the plant began in April 1991 after NRC approved the Environmental Report. The facility and its pre-operational testing were completed in October 1992. The ISFSI was licensed by the NRC on November 25, 1992. The license allows Baltimore Gas and Electric Company to place as many as 2,880 pool-cooled assemblies in casks that would then be placed in ISFSIs. Each cask can hold 24 assemblies, and there are currently 48 cask spaces in the storage module. The license has a 20-year term, but the licensee may seek to extend the term before it expires.

Carolina Power and Light Company

The ISFSI for Carolina Power and Light Company's Robinson 2 plant is composed of eight HSMs, and is the NUHOMS-7P design. The HSM is a steel-reinforced concrete structure which holds seven intact assemblies in each module. The ISFSI was licensed by the NRC in August 1986 to hold 56 assemblies. They are located inside the fenced area at the Robinson 2 plant site. The Carolina Power and Light Company also applied to the NRC for a license for an ISFSI to be built at its Brunswick plant. The ISFSI will be used only as a backup if shipping of spent nuclear fuel to the Harris plant is prohibited.

Consumers Power Company

In April 1993, the NRC approved the dry-cask storage of fuel that has already undergone pool cooling, and the use of the new VSC-24 cask by Sierra Nuclear Corporation at the Consumers Power Company's Palisades plant. The approval was challenged by the Michigan Attorney General and a citizen organization, the Lake Michigan Federation, on the grounds that the process should have entailed a full environmental impact statement, rather than the less elaborate environmental assessment. On May 10, 1993, the U.S. District Court for Western Michigan ruled that they did not have jurisdiction, and denied the request to prevent cask loading. The plaintiffs then took their request to the U.S. Court of Appeals for the Sixth Circuit, in Cincinnati. On May 17, 1993, a three-judge panel of that court declined to issue an emergency motion to stop cask loading; no decision had been rendered, at this writing, on the basic argument on the legality of the cask approval. The Palisades plant was the first to load spent fuel cask in its ISFSI under the NRC general licensing provisions. This ruling, under 10 CFR 72 subpart K, allows the use of certain cask/storage systems at licensed nuclear power plants without the need for further site-specific licensing. Plant personnel started loading casks on May 7, 1993, and by May 19, 1993, the job for the upcoming refueling was finished: two casks had each received 24 spent fuel assemblies, and had then been welded shut and placed on the storage pad. There are 6 more casks already on-site, and the license amendment allows for as many as 25 to be used at the plant—which would last Palisades through the end of its current licensed life, in 2007.

Duke Power Company

The Duke Power Company received its Oconee site license from the NRC in January 1990 to operate 88 modules of the NUHOMS-24P design. They are designed to store 24 pressurized-water reactor (PWR) assemblies per module; therefore, the maximum capacity is 2,112 assemblies. The first 20 modules were completed in 1990 and the second set of 20 were finished in 1992. Duke Power Company estimates that it will need 20 more modules by 1996 because of a lack of storage in their spent fuel pool. The schedule for loading the modules with fuel is as follows: in 1990, 4 modules were loaded; in 1991, 9 more modules were loaded; in 1992, 7 modules were loaded; in 1993, 4 modules will be loaded; in 1994, 5 modules will be loaded; in 1995, 5 modules will be loaded; in 1996, 5 modules will be loaded; in 1997, 5 modules will be loaded; and in 1998, 5 modules will be loaded.

GPU Nuclear Corporation

The GPU Nuclear Corporation has contracted Pacific Nuclear to engineer, license, and construct a spent fuel storage system for the Oyster Creek nuclear plant. The agreement includes the design and contruction of concrete modules and stainless steel containers for use in storing the plant's spent fuel on-site. The facility will employ Pacific Nuclear's NUHOMS technology. Pacific Nuclear will complete engineering and licensing work in 1994 and will begin delivering the fuel-storage equipment in 1995.

Northern States Power Company

The decision by the Minnesota Public Utilities Commission to allow 17 containers for aboveground spent fuel storage at Northern States Power Company's Prairie Island site was granted June 26, 1991. Although the storage capacity granted is less than the 48 casks the company asked for in its certificate of need submitted in April 1991, the 17 casks will enable it to continue operation of Prairie Island at least through the end of the century. The possibility of more cost effective measures, other than dry cask storage, being available at the end of the century prompted the Commission to limit the company to 17 casks. These measures include, but are not limited to, research and development in renewable energy resources, conservation, and load management. Without the additional storage, the two-unit plant might have been forced to cease operating in 1995. Northern States will be transferring the oldest spent fuel from its storage pool into the casks. The NRC requires that the fuel to be stored in aboveground casks be at least 10 years old; but the Commission is calling for it to be at least 15 years old. Site construction began in September 1992. The initial TN-40 cask order had been placed for seven casks. The first cask was scheduled for completion November 1993.

In August 1993, a Minnesota Supreme Court decision put a hold for at least 7 months on Northern States Power Company's plans for dry cask storage at Prairie Island. The State's highest court recently decided not to review an appeals court decision which overturned State regulators' approval of the on-site storage plan. The appeals court had found that plant licensee Northern States Power Company needs the Minnesota legislature's approval before using dry cask storage to supplement dwindling space in the plant's spent fuel pool.

A State law, enacted in the 1970s, requires the State legislature's approval for "permanent" spent fuel storage within Minnesota. The appeals court concluded, and the supreme court agreed, that Northern States' dry cask storage option constituted "permanent" storage, thus requiring State legislative approval.

The spent fuel pool will be full in 1994. The utility estimates that with no additional fuel storage space, the Prairie Island 2 reactor will shut down in May 1995 while the Prairie Island 1 reactor will shut down in January 1996.

Before the supreme court ruling came down, Northern States had finished all the necessary preparatory site work for the spent fuel casks, including construction of the concrete pads on which the casks would sit. The utility also had contracted with Transnuclear, Inc., to purchase casks, and the first two were being fabricated. Cask fabrication has since been suspended pending approval from the State legislature.

Meanwhile, in October 1993 the NRC granted the utility a license for the Prairie Island site to store fuel in up to 48 TN-40 casks.

Public Service Company of Colorado

The NRC licensed the ISFSI at Public Service Company of Colorado's closed Fort St. Vrain plant on November 4, 1991. The ISFSI is a Modular Vault Dry Storage System, made up of six air-cooled concrete vaults. The ISFSI will hold the fuel in dry storage until such time as DOE, under its contract with the utility, takes possession of the material. The license authorizes storage in the ISFSI of up to 1,482 spent fuel elements, 37 reflector control rod elements, and 6 neutron source elements. In December 1991, the Public Service Company of Colorado transferred 18 elements to its ISFSI. In June 1992, 1,446 elements were transferred to the ISFSI, for a total of 1,464 which now reside in the ISFSI. The reflector elements and neutron source elements were disposed of off-site. The design lifetime of the facility is 40 years, although the current license is limited to 20 years. This facility is designed as a stand alone operation although it currently relies on a portion of the plant's security system.

Sacramento Municipal Utility District

The Sacramento Municipal Utility District (SMUD) first applied for a license with the NRC for an ISFSI at the Rancho Seco plant in October 1991. A revised application was submitted to the NRC in October 1993. The environmental assessment will be completed in early 1994, after which time construction of the ISFSI might commence. The design will be similar to the Oconee and Calvert Cliffs plants, the NUHOMS-24P storage model. The utility predicts that licensing of the ISFSI to store spent nuclear fuel will be issued by mid-1995. SMUD is also the first utility to apply for a license to the NRC for a transportable storage system under 10 CFR 71, which will license a cask and canisters so that they can be transported off-site to a repository.

Toledo Edison Company

Instead of reracking its wet pool, Toledo Edison Company chose to build an ISFSI at its Davis-Besse plant with an existing NRC-approved cask design. The utility plans to load the first fuel into the casks in 1995.

Virginia Power

Virginia Power was the first U.S. utility to use dry storage for spent nuclear fuel. The Virginia Power ISFSI located at the Surry Power Station, Surry, Virginia, is a design using metal storage casks. It was licensed by the NRC in July 1986 for use of the CASTOR V/21. Use of the MC-10 and NAC-I28/ST has also been approved by the NRC. Each cask is 16 feet high, 8 feet in diameter, and weighs 110 to 120 tons when loaded with fuel. These three cask designs hold between 21 and 28 fuel assemblies. The casks sit on a pad 230 feet long, 32 feet wide, and 3 feet thick (reinforced concrete). Each pad will hold 28 casks, and the facility license provides for three pads. The facility and casks have been evaluated for extreme temperatures (-20°F to 115°F), extreme wind (105 m.p.h.), snow and ice, loss of electrical power, loss of cask radiation shielding, tornados (300 m.p.h.), gas pipeline explosions, and cask seal leakage and drops. By the end of 1990, a total of 252 assemblies had been stored in 12 casks. By the end of 1991, 52 more assemblies were stored in 2 additional casks, one holding 28 assemblies, the other 24. In 1992, 3 more casks each holding 21 assemblies for a total of 63 were stored. This increased the total number of assemblies in dry storage at Surry to 367 by the end of 1992. The following are projections for upcoming years: in 1993, 2 casks holding 49 assemblies; in 1994, 5 casks holding 117 assemblies; and in 1995, 4 casks holding 84 assemblies. The ISFSI has been licensed to hold up to 1,764 assemblies.

Other Utilities

The Wisconsin Electric Power Company's Point Beach plant, the Arkansas Power and Light Company's Arkansas Nuclear plant, and the New York Power Authority's Fitzpatrick plant do not have applications with the NRC but have contracts with vendors to provide on-site dry storage.

Table 16. Dry Spent Fuel Storage Data as of December 31, 1992

Utility	Reactor	Date License Issued/ Submitted[a]/ Expected[b]	Vendor	Storage Type	Model	Capacity (assemblies)	Assemblies Stored Through				
							1989	1990	1991	1992	Total
Baltimore Gas and Electric Company........	Calvert Cliffs 1 & 2	11/92	Pacific Nuclear Fuel Services, Inc.	Concrete Module	NUHOMS-24P	24 PWR	--	--	--	--	--
Carolina Power and Light Company..........	Robinson 2	08/86	Pacific Nuclear Fuel Services, Inc.	Concrete Module	NUHOMS-7P	7 PWR	56	--	--	--	56
Carolina Power and Light Company..........	Brunswick 1 & 2	[a]05/89	Pacific Nuclear Fuel Services, Inc.	Concrete Module	NUHOMS-7P	7 PWR	--	--	--	--	--
Consumers Power Company	Palisades	[a]03/90	Sierra Nuclear Corporation	Concrete Cask	VSC-24	24 PWR	--	--	--	--	--
Duke Power Company	Oconee 1, 2, 3	01/90	Pacific Nuclear Fuel Services, Inc.	Concrete Module	NUHOMS-24P	24 PWR	--	96	216	168	480
GPU Nuclear Corporation..	Oyster Creek	[b]06/94	Pacific Nuclear Fuel Services, Inc.	Concrete Module	NUHOMS-52B	52 BWR	--	--	--	--	--
Northern States Power Company	Prairie Island 1 & 2	10/93	Transnuclear, Inc.	Metal Cask	TN-40	40 PWR	--	--	--	--	--
Public Service Company of Colorado.............	Fort St. Vrain	11/91	Foster Wheeler Energy Applications, Inc.	Concrete Vault	Modular Vault Dry Storage	83 PWR 150 BWR	--	--	18	1,446	1,464
Sacramento Municipal Utility District	Rancho Seco	[a]10/91	Pacific Nuclear Fuel Services, Inc.	Concrete Module	NUHOMS-24P	24 PWR	--	--	--	--	--

See footnotes at end of table.

Table 16. Dry Spent Fuel Storage Data as of December 31, 1992 (Continued)

Utility	Reactor	Date License Issued/ Submitted[a]/ Expected[b]	Vendor	Storage Type	Model	Capacity (assemblies)	Assemblies Stored Through				
							1989	1990	1991	1992	Total
Virginia Power	Surry 1 & 2	07/86	General Nuclear Systems, Inc.	Metal Cask	Castor V/21	21 PWR	168	84	--	63	315
			Westinghouse	Metal Cask	MC-10	24 PWR	--	--	24	--	24
			Nuclear Assurance Corporation	Metal Cask	NAC-I28S/T	28 PWR	--	--	28	--	28
Subtotal							168	84	52	63	367
TOTAL							224	180	[c]268	[c]231	[c]903

[a]Date license application was submitted to the Nuclear Regulatory Commission.
[b]Date utility estimates license application to be approved by the Nuclear Regulatory Commission.
[c]A total of 1,464 high-temperature, gas-cooled reactor (HTGR) fuel elements are in dry storage at the Fort St. Vrain reactor. These HTGR fuel elements are *not* included in the above table totals. See Technical Note 6 in Appendix E.
PWR = Pressurized-water reactor; BWR = Boiling-water reactor.
Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

3. Assembly Characteristics

Background

A fuel rod, used in a nuclear power reactor, consists essentially of a stack of uranium dioxide (UO_2) pellets encapsulated within a metal tube that is sealed at both ends. Current light-water reactors (LWRs) use zircaloy cladding almost exclusively because of its lower neutron absorption relative to stainless steel. An LWR fuel assembly (or bundle) is a configuration of fuel rods assembled together for insertion into a reactor core.

Fuel assemblies are constructed from a number of individual fuel rods arranged together, generally in square arrays. Historically, these arrays have been of many different sizes. For example, one boiling-water reactor (BWR) design uses an array of 6 rods by 6 rods. BWR designs have had 6x6, 7x7, 8x8, 9x9, 10x10, and 11x11 fuel rod arrays. Pressurized-water reactor (PWR) designs have 13x14, 14x14, 15x15, 15x16, 16x16, 17x17, and 17x18 fuel rod arrays. Virtually all assemblies are stamped with a unique identifier.

In conjunction with Oak Ridge National Laboratory (ORNL), EIA has developed a categorization of assembly classes and assembly types within each class for spent fuel. This categorization, described in Appendix B, is based on the rod array configuration, fuel vendor, and other distinguishing characteristics, such as assembly length and width and type of fuel cladding. The eight-character assembly type codes listed in Appendix B are the codes used on Form RW-859. Neither enrichment nor discharge burnup affects the assembly type classification.

Some assembly types have had very limited use. For example, the Big Rock Point reactor has had 84-inch-long assemblies loaded with fuel rods in 7x7, 8x8, 9x9, and 11x11 array configurations. These assemblies had a range of initial loading weights of uranium and were fabricated by either General Electric, Nuclear Fuel Services, or Siemens Nuclear Fuel Company (formerly Advanced Nuclear Fuel Corporation, Exxon Nuclear Corporation, and Jersey Nuclear). These assemblies were manufactured exclusively for the Big Rock Point reactor.

Appendix B provides an excerpt from Form RW-859 instructions, titled "Assembly Types." This table defines the assembly type codes used in this report, and was the basis for developing Tables 17 and 18. Assembly types are listed by reactor type (BWR, PWR) and are then further identified by fabricator, cladding material, initial uranium content, size, and number discharged (Appendix B, Table B5). There are 124 different reactor fuel assembly types which are, have been, or will be in use by nuclear power reactors. Table B5 also shows that BWR fuel assemblies range from 4.28 to 6.52 inches in width, from 84.0 to 176.2 inches in length, and have a uranium component of 70 to 195 kilograms (kg). PWR fuel assemblies range from 6.27 to 8.54 inches in width, from 111.8 to 199.0 inches in length, and have a uranium component of 191 to 542 kg. Tables B6 and B7 present assembly type summaries by reactor unit and by assembly type, respectively.

The Characteristics Data Base (CDB) developed by ORNL contains a more complete physical description of each type of assembly. That data base includes the characteristics of the fuel pellets in each assembly, the material composition of each component of the hardware, and related information. It also contains detailed mechanical drawings for each assembly type.

Fabricator Summary

Spent fuel assemblies summarized by fabricator and reactor type show the percentage of BWR and PWR assemblies produced by each fabricator in Table 17. General Electric fabricated 91 percent of the BWR discharged fuel assemblies, most of which are 176.2 inches long. Approximately 58 percent of the discharged PWR fuel assemblies were manufactured by Westinghouse. The majority of Westinghouse PWR fuel assemblies have a length of 159.8 inches.

Assembly Distribution

The distribution of assembly transverse dimensions is presented in Table 18. Assemblies utilized in BWRs vary from 84.0 to 176.2 inches long. However,

Table 17. Assemblies by Fuel Fabricating Company and Reactor Type

Fabricating Company	Reactor Type	Total Assemblies	Fabricating Company Percent
Allis Chalmers	BWR	155	0.29
GE Nuclear Energy	BWR	48,050	91.35
Nuclear Fuel Services	BWR	8	0.02
Siemens Nuclear Fuel Company	BWR	3,923	7.46
United Nuclear Corporation	BWR	458	0.87
Westinghouse Electric	BWR	4	0.01
Subtotal		[a]52,602	[a]100.00
ABB Combustion Engineering	PWR	7,162	18.63
Babcock & Wilcox Company	PWR	5,443	14.16
General Atomics	PWR	3	0.01
Nuclear Materials and Equipment Corporation	PWR	4	0.01
Siemens Nuclear Fuel Company	PWR	3,542	9.22
United Nuclear Corporation	PWR	73	0.19
Westinghouse Electric	PWR	22,141	57.60
Subtotal		[b]38,437	[b]100.00
TOTAL		91,039	100.00

[a]A total of 4 temporarily discharged BWR assemblies that have not been assigned an assembly type code are included in the Subtotal columns. Without an assembly type code, the fuel fabricating company cannot be identified. See Technical Note 10 in Appendix E.

[b]A total of 69 temporarily discharged PWR assemblies that have not been assigned an assembly type code are included in the Subtotal columns. Without an assembly type code, the fuel fabricating company cannot be identified. See Technical Note 10 in Appendix E.

BWR = Boiling-water reactor; PWR = Pressurized-water reactor.

Note: A total of 2,208 high-temperature, gas-cooled reactor (HTGR) fuel elements, with initial uranium content equal to 25.0 metric tons of uranium (MTU), were discharged. These HTGR fuel elements are not included in the above table. See Technical Note 6 in Appendix E.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Table 18. Distribution of Assembly Transverse Dimensions

Assembly Length (inches)	Assembly Width (inches)	Number of Assemblies	Assembly Percent
Boiling-Water Reactors (BWR)			
84.0	6.52	379	0.72
95.0	4.67	390	0.74
102.5	5.62	333	0.63
134.4	4.28	892	1.70
171.2	5.44	17,205	32.71
176.2	5.44	33,399	63.49
TOTAL		[a]52,602	[a]100.00
Pressurized-Water Reactors (PWR)			
111.8	7.62	533	1.39
137.1	7.76	665	1.73
137.1	8.42	840	2.19
138.8	6.27	160	0.42
146.0	8.10	529	1.38
147.5	8.20	733	1.91
157.0	8.10	4,069	10.59
158.2	8.10	464	1.21
159.8	7.76	3,740	9.73
159.8	8.44	18,608	48.41
165.7	8.54	4,870	12.67
176.8	8.10	1,960	5.10
178.3	8.10	848	2.21
199.0	8.43	349	0.91
TOTAL		[b]38,437	[b]100.00

[a]A total of 4 temporarily discharged BWR assemblies that have not been assigned an assembly type code are included in the Total columns. See Technical Note 10 in Appendix E.

[b]A total of 69 temporarily discharged PWR assemblies that have not been assigned an assembly type code are included in the Total columns. See Technical Note 10 in Appendix E.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

96 percent of all these assemblies are greater than or equal to 171.2 inches in length. Assembly lengths used in PWRs are from 111.8 to 199.0 inches; 79 percent of all PWR assemblies are greater than or equal to 159.8 inches in length. Assemblies used in BWRs vary in maximum as built assembly width from 4.28 to 6.52 inches. Maximum as built assembly widths used in PWRs are from 6.27 to 8.54 inches. More than 97 percent of the BWR assemblies are greater than or equal to 5.44 inches in width, and approximately 61 percent of PWR assemblies are greater than or equal to 8.44 inches in width.

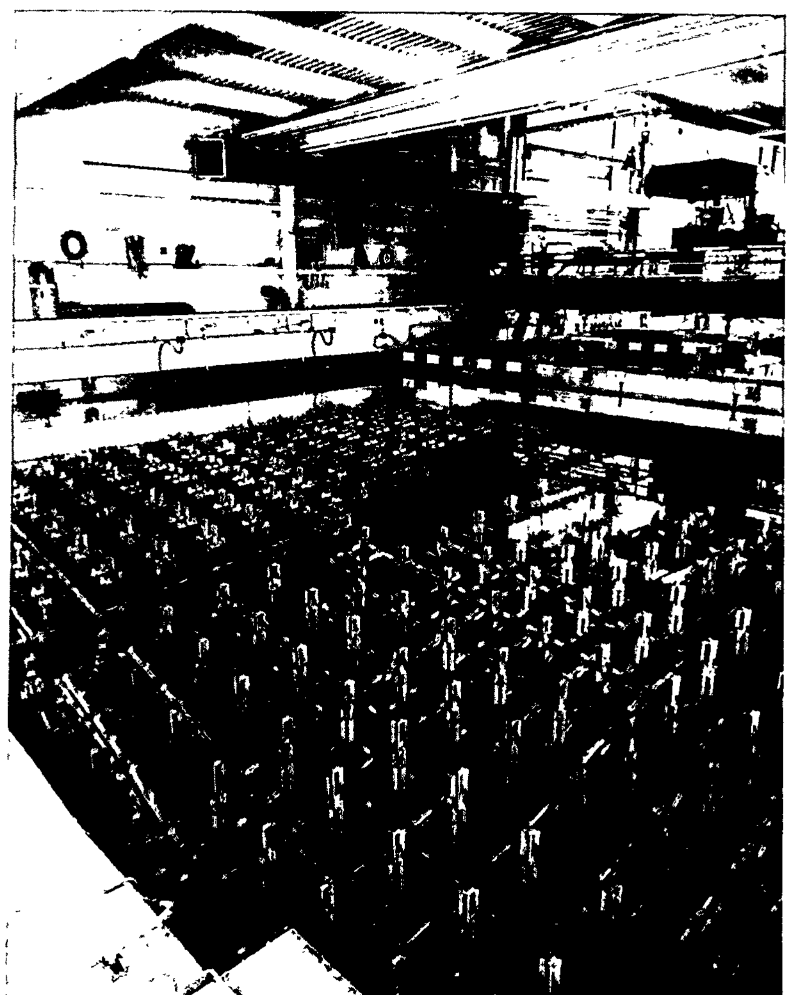
Assembly Identifiers

Domestic LWR fuel assemblies are identified by a serial number that is stamped on each assembly. These serial numbers are used as identifiers throughout the life of the fuel. The uniqueness of assembly serial numbers is important in determining their effectiveness as unambiguous identifiers. The ORNL report *Analysis of Assembly Serial Number Usage in Domestic Light-Water Reactors* (ORNL/TM11841, May 1991), studied serial numbering schemes, the effectiveness of these schemes, and how many duplicate serial numbers occur on domestic LWR fuel assemblies. The serial numbering scheme adopted by the American National Standards Institute (ANSI) ensures uniqueness of assembly serial numbers. Westinghouse, Babcock & Wilcox, and Siemens use the ANSI Standard for serial numbers. Combustion Engineering and General Electric both use serial numbers which are unique but do not follow the ANSI Standard. Some assemblies fabricated prior to the establishment of the ANSI Standard in 1974 may have their own serial number schemes which are unique only at the reactor where they were originally irradiated.

Most of the numbering schemes used by electric utilities are not inherently unique, and errors within such schemes account for all of the identified serial number duplication except for three isolated instances. Three duplicate serial numbers were found when analysis focused on duplication within the individual fuel inventory at each reactor site, but these were traced back to data response errors. There were also three instances where the serial numbers used to identify assemblies used for hot cell studies differed from the serial numbers reported to EIA. As a result of the study, EIA is requesting that utilities provide the stamped serial number on the assembly when reporting these data on the Form RW-859 survey.

Appendix A

Survey Methodology



Spent fuel storage pool at General Electric Company's Morris Operation.

Appendix A

Survey Methodology

Survey Design

The Energy Information Administration (EIA) administers the Nuclear Fuel Data survey, Form RW-859, under a Memorandum of Understanding with the Office of Civilian Radioactive Waste Management (OCRWM). Form RW-859 is used to collect data from all commercial utilities that operate nuclear power plants and from all other owners of commercial spent nuclear fuel. Form RW-859 is a mandatory data collection form authorized under the Federal Energy Administration Act of 1974 (15 USC 761 et seq.) and the Nuclear Waste Policy Act of 1982, as amended (42 USC 10101 et seq.)

EIA normally revises the Nuclear Fuel Data survey form every 3 years. The current version of the survey form, which has been used since the 1991 survey year, is used to collect more detailed data on dry storage, consolidated assemblies, assembly identifier codes, failed fuel, and nonfuel components. A number of reporting inconsistencies have appeared on these revised sections of the survey form. EIA is currently undertaking an extensive form redesign effort to correct the current deficiencies, to collect additional data elements, and to delete no longer needed data elements. This next version of the form will be used beginning with the 1994 survey year.

Respondents to the Nuclear Fuel Data survey are required to report data on every fuel assembly discharged from domestic commercial nuclear reactors, spent fuel projected to be discharged, and spent fuel storage pool inventories and capacities. Form RW-859 respondents list all assemblies permanently discharged at the end of the reporting cycle, assemblies declared to be temporarily discharged at the end of the last cycle, assemblies to be inserted during the next cycle, previously irradiated assemblies to be inserted in the next cycle, and assemblies shipped to another storage site or to dry storage.

For all assemblies permanently discharged during the most recent refueling interval, the utilities submit the following data on Form RW-859:

- Discharge cycle
- End-of-cycle date
- Average initial loading weight for each group of assemblies, in kilograms of uranium (kg)
- Average nominal initial enrichment assay for each group of assemblies, in percent weight
- Average discharge burnup for each group of assemblies, in gigawattdays thermal per initial metric ton of uranium (GWDt/MTU)
- Assembly model type (Table B4) and rod array configuration for each group of assemblies
- Current storage location of each assembly
- Standard disposal contract number applicable to each assembly
- Number of assemblies in each group
- Specific unique assembly identifiers for all assemblies in each group, including Form RW-859, American National Standards Institute (ANSI), and fuel fabricator identifiers.

The above spent fuel discharge data are reported at the batch level, where a batch is characterized by the number of assemblies in it, the nominal initial enrichment, and the batch average discharge burnup. The utilities also provide spent fuel discharge projections for their next five fueling cycles, along with the projected cycle shutdown dates and the cycle burnup in terms of effective full-power days. Spent fuel storage data include the amount of fuel stored at each pool site, or in dry storage, current, licensed and maximum storage site capacities, data on planned increases in pool storage capacity, maximum cask weights that can be handled at each site, and scheduled shipments of assemblies to other locations.

This appendix includes microfiche containing the Nuclear Fuel Data survey, Form RW-859, and the instructions for completing the survey.

Survey Universe and Frame

Form RW-859 is a total universe survey of all owners of commercial spent nuclear fuel. The Form RW- 859 survey frame, therefore, consists of all commercial electric utility nuclear power plants and all storage facilities possessing irradiated nuclear fuel from commercial power plants. The respondent population for Form RW-859 is stable. The frame contains operating reactors, storage facilities, reactors that have been permanently shut down, and reactors that have been constructed but are not yet operating. Shut down reactors are maintained on the survey frame for their historical data. Currently, 54 utilities report for 120 reactors. Four storage facilities are also required to report.

Data Collection Procedures

EIA sends survey packages in December to an official of each company, via certified mail to ensure their receipt and to ascertain the correct mailing address. Survey packages include a diskette containing current data, a software diskette, a paper copy of the survey form, a set of instructions, a pictogram showing current inventory and storage data, a cover letter, and a return envelope. Most Form RW-859 respondents submit their data on diskette.

The microcomputer software system used is referred to as the Automated Nuclear Fuel Data Collection System (ANFDCS). This is a CLIPPER-compiled program with a dBASE file structure. The microcomputer software is designed to run on any IBM-compatible microcomputer.

In order to reduce the respondent burden, EIA provides the organizations with their current data and requests them to update these data using the ANFDCS and the instructions provided. EIA provides assistance in completing the survey by telephone when requested. Most respondents successfully and accurately update their data diskettes with little or no assistance and file their completed surveys by the requested deadlines.

Data Editing, Analysis, and Processing

As EIA receives survey packages from Form RW-859 respondents, they are logged in and reviewed. The preliminary review is to check for obvious errors or omissions and to verify respondent name, address, and contact information. Data from the completed Form RW-859 surveys are then uploaded to the EIA mainframe computer and maintained in two files. The first is an assembly-level SAS file, which contains data on all individual assemblies at all reactors. These detailed assembly data are aggregated to the batch level. Batch level data are maintained in the second file, a partitioned data set of flat transaction files, with one member for each reactor.

Computer programs review individual assembly data and report the data in well-organized formats that are useful to both analysts and management. A number of the tables and graphs presented in this Report were produced from these programs. These tables are also available through the Nuclear Data Information System (NUCDIS), a microcomputer-based, menu-driven information retrieval system. Additional tables, which may be of interest to analysts requiring greater detail, are available upon request from OCRWM or EIA.

In addition to updating the historical Form RW-859 data files, EIA also produces spent fuel projections, using a set of assumptions concerning the future operation of the Nation's nuclear power plants. While the projected data submitted by the utilities generally forecast a more optimistic operating environment, in aggregate, than has actually been achieved, both EIA and utility forecasts track each other reasonably well in the short term. EIA developed the Disaggregate Forecasting System to bring the aggregated EIA forecasts in line with comparable utility projections. This process preserves, as much as possible, the information that the reactor operators provide in their spent fuel projections. The disaggregated forecasts are published annually in EIA's *World Nuclear Capacity and Fuel Cycle Requirements* report.

The historical data submitted on Form RW-859 aggregated to the batch-level, along with the projections of spent fuel discharges from EIA's disaggregated forecasts, constitute the official DOE spent fuel data base. EIA distributes this data base in computer files on magnetic tape to the OCRWM and its contractors, and to the DOE national laboratories for their review and analysis.

Response Rates

Respondents to Form RW-859 are required to submit forms under one of two options, chosen by the utility.

Option A requires a utility to submit its data within 90 days of cycle startup after refueling. Data reflect the utility's status at cycle startup. Option B requires a utility to submit data once each year by February 15. Data reflect the utility's status as of December 31 of the previous year. Storage-only facilities are required to report annually by February 15 for the previous year.

A total of 27 Option A reactors submitted data reflecting a cycle startup after refueling in 1992. Data for the remaining 19 Option A reactors were simply "rolled over" from the previous year. All 74 Option B reactors and 4 storage facilities also reported. The data presented in this report, therefore, represent an accurate account as of December 31, 1992.

Missing Data and Imputation

EIA encourages utility companies to complete all elements on Form RW-859. There is no imputing of missing values. If there are omissions, or if incorrect data are reported, the EIA Survey Manager telephones the utility to obtain missing or corrected data.

A limited number of data items were identified as missing or omitted from Form RW-859 data files. Most missing items represented data that were not available to the companies in their data files. Respondents were telephoned regarding the missing items to verify that these items could not be reported. Only confirmed company-reported data are contained in the data base and included in this report.

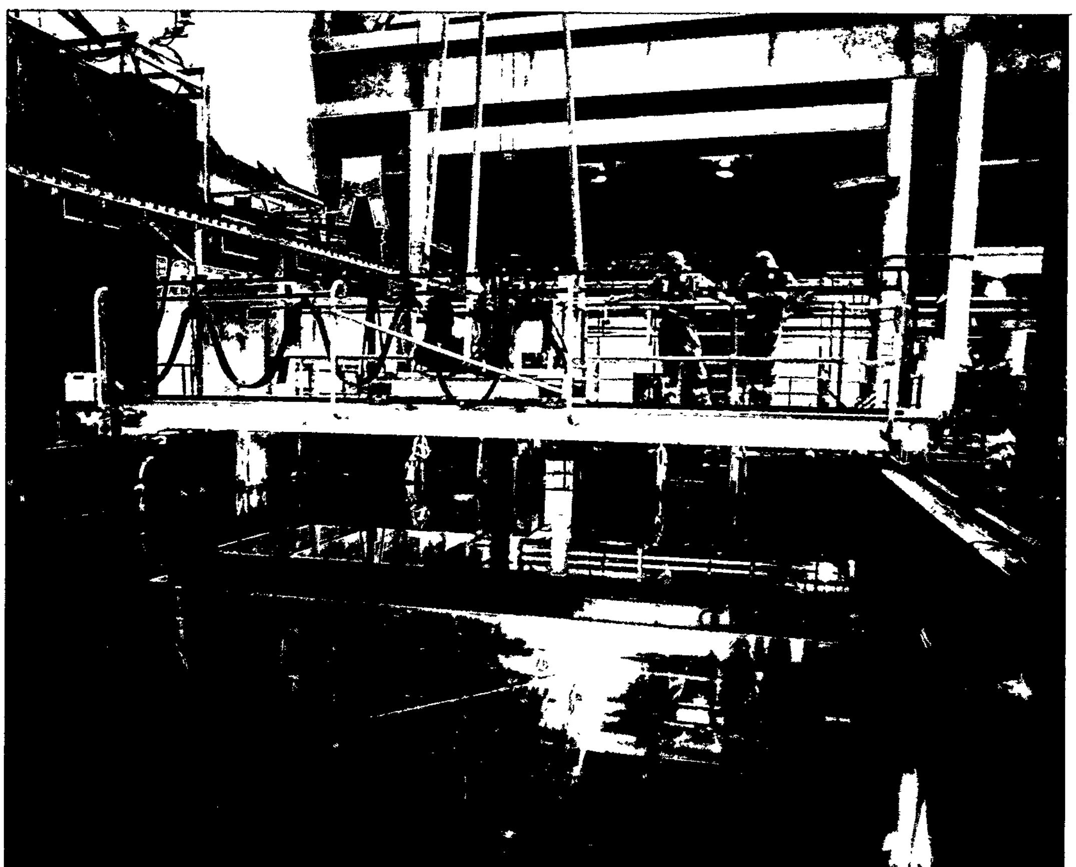
EIA Quality Assurance Procedures

To ensure the quality and accuracy of data collected on Form RW-859, EIA has developed extensive quality assurance (QA) procedures as part of the Form RW-859 survey processing system. At the core of the process is a mainframe Pascal QA program that produces a matrix for each reactor. The EIA QA report is run to identify possible errors throughout the processing cycle and to ensure that data submitted on diskettes have been correctly uploaded from the PC to the mainframe. After the Survey Manager and other data users have reviewed the EIA QA matrix for a particular reactor, data are corrected and an iterative process of running additional reports is performed until all data for that reactor are clean. A description of the EIA QA reports and a more detailed discussion of EIA QA procedures is included in Appendix D of this Service Report.

The data certainty of all spent fuel assembly weights and discharge dates has been verified through reconciliation with two separate but related efforts: the spent fuel fee paid by utilities for assemblies discharged prior to April 7, 1983, and the Acceptance Priority Ranking (APR) process which designates the order in which spent fuel will be picked up by DOE on an oldest-fuel-first basis.

Appendix B

Detailed Assembly Type Statistics



Baltimore Gas and Electric's Calvert Cliffs spent fuel storage pool.

Appendix B

Detailed Assembly Type Statistics

The spent fuel Characteristics Data Base (CDB) developed by Oak Ridge National Laboratory (ORNL) includes detailed information on physical, radiological, and quantitative characteristics of spent nuclear fuel. The physical characteristics are organized by assembly class and, within assembly class, by assembly type codes (developed jointly by ORNL and EIA) to provide detailed information about each type, including the length and width of the overall assembly and of the individual fuel rods, the number of fuel rods, the type of material used in the cladding and other parts of the assembly, and detailed assembly drawings. An eight-character assembly type code links Form RW-859 data with the CDB.

The characteristics of fuel assemblies are important in many areas of radioactive waste management. Assembly dimensions are clearly a major concern for shipping cask and waste package designers. If the fuel is to be consolidated, knowledge of the individual assembly types is essential, from the rod array configuration to the location of the bolts and welds for disassembly. The composition of the assembly hardware and cladding is also important. For example, cobalt-60, one of the major activation products, is more concentrated in stainless steel than in zircaloy. Assembly type characteristics are summarized by assembly type and reactor and are further amplified by a CDB module referred to as "LWR Fuel Assemblies Data Base," as described in the four-volume publication, *Characteristics of Potential Repository Wastes* (DOE/RW-0184-R1).

Whereas the physical characteristics of assemblies are identified through the assembly type codes, the radiological data in the CDB are calculated based on the reactor type, discharge burnup, initial enrichment, and age from time of discharge. All these data are obtainable from Form RW-859. The radiological characteristics of the discharged assemblies are time-dependent and generally subject to the laws of exponential decay. The radiological characteristics in the CDB include grams, curies, and watts for more than 350 isotopes; photons for 18 gamma energy ranges; and neutrons.

This appendix provides detailed information on assembly type characteristics that is not included in the body of the report. These data are presented in table format and include the following:

- Table B1, Fabricator Identifiers
- Table B2, Assembly Class and Design Type
- Table B3, Reactors by Assembly Class and Design Type
- Table B4, Descriptions of Assembly Types
- Table B5, Assembly Characteristics by Assembly Type
- Table B6, Assembly Type Summary by Reactor
- Table B7, Assembly Type Summary by Assembly Type
- Table B8, Spent Fuel Assemblies, by Type, Discharged by Year
- Table B9, Initial Uranium Content of Spent Fuel Assemblies, by Type, Discharged by Year
- Table B10, Burnup of Spent Fuel Assemblies, by Type, Discharged by Year.

Each assembly is characterized by fabricator, array size, and model type. Table B1 assigns an identification code for each fabricator. Table B2 lists reactors by assembly class and design type. Table B3 lists each reactor by array size and assembly class. Descriptions of assembly types are presented in Table B4.

The information provided for each assembly type in Table B5 includes fabricator, cladding material, assembly dimensions and initial uranium content, and number discharged. Additionally, number of rods, length, and rod position data are also presented. Table B6 is sorted by reactor. The data elements are assembly type, number of assemblies, initial uranium content, average burnup, and enrichment (weight percent). Table B7 presents the same information, sorted by assembly type. The numbers of assemblies discharged in 2-year periods are shown in Table B8. An eight-character alphanumeric code is used to identify the assembly type. The same information, in metric tons of uranium, appears in Table B9. The average discharge burnups of spent fuel assemblies by 2-year group and assembly type are presented in Table B10.

The fuel assembly types throughout Appendix B have been listed in the following manner:

- The primary ordering criterion is assembly class —only assembly types within a reactor's particular assembly class are used at that reactor.
- Within an assembly class, the secondary ordering criterion is fabricator. All fuel assembly types fabricated by the primary fuel fabricator (typically the reactor vendor) are listed first, followed by other fabricators in a generally alphabetical manner.
- Within a fabricator in an assembly class, the primary ordering criterion is chronology. Earlier versions of fuels are listed first, more recent versions are listed later. This ordering is not absolute, but is based on the progression of designs over time.

The detailed assembly type table statistics presented in Appendix B use the eight-character assembly type code. The eight-character code is used exclusively for Form RW-859 submissions and in the CDB.

The code will be presented as follows:
8-Character Code W1414ATR

The first three characters of the code identify the assembly class and are fully compatible with the CDB scheme. The W14 in the example indicates WE 14x14 assembly class. All reactor-specific assembly type codes have an "X" as the first characteristic of the eight-character code (e.g., XHN indicates Haddam Neck). The next two characters identify the array size (14 = 14x14). The sixth character represents the fuel vendor (e.g., A for Advanced Nuclear Fuel (formerly Exxon Nuclear)). The last two characters are a discriminator code that is designed to distinguish two fuel assembly types that are otherwise the same. The TR in the example indicates a top rod version.

Some examples of discriminator codes that are used as the last two characters are:

Discriminator	Meaning	Assembly Type Code
• L	Low parasitic fuel (LOPAR) zircaloy guide tubes	W1414WL W1515WL
• O	Optimized Fuel Assembly (OFA) zircaloy spacers, smaller fuel rods	W1414WO W1515WO W1717WO
• 5	GE-5 fuel design (original retrofit fuel)	G2308G5 G4608G5
• P	Prepressurized BWR fuel rods	G2308GP G4608GP

Table B1. Fabricator Identifiers

A fuel rod, used in a nuclear power reactor, consists of uranium dioxide pellets encapsulated in a metal tube that is sealed at both ends. A fuel assembly is fabricated from a number of individual fuel rods arranged in arrays. The arrays are generally square, and they have been made in many different dimensions. There are 124 reactor fuel assembly types which have been, or will be used. Each assembly type has certain distinguishing characteristics, such as the number of rods per assembly, fuel rod diameter, cladding type, materials used in fabrication, and other design features. The fuel assembly fabricator, the specific reactor and fuel models are characteristics often used to describe or name assembly types.

Assembly classes generally refer to generic groupings of assembly types designed for a particular class of reactor (for example, WE 14x14 class reactors). Assembly classes can also be reactor-specific, because in some cases fuel assembly arrays are configured so that they fit only one reactor (for example, the Big Rock Point reactor).

The fabricator of an assembly for a given reactor is not necessarily related to the reactor vendor or to the original fuel fabricator. The following fuel fabricator codes are used:

Current Fabricator Name	Other Names Used	Short Name	Code
ABB Combustion Engineering	Combustion Engineering ABB Atom (ABB) (BWR Only)	CE	C
Allis Chalmers		AC	L
Babcock & Wilcox Company		B & W	B
GE Nuclear Energy	General Electric	GE	G
General Atomics	Gulf General Atomics (GGA) Gulf/United Nuclear Fuels (GULF)	GA	H
Nuclear Fuel Services		NFS	N
Nuclear Materials and Equipment Corporation	NUMEC	NU	M
Siemens Nuclear Fuel Company	Advanced Nuclear Fuel Corporation (ANF) Exxon Nuclear Corporation (EXA) Jersey Nuclear	SIEM	A
United Nuclear Corporation		UNC	U
Westinghouse Electric		WE	W

BWR = Boiling-water reactor.
Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Table B2. Assembly Class and Design Type

Electric Utility Name	Reactor Name	Reactor ID	Assembly Class	Nuclear Steam System Supplier[a]	Design Type[b]
Alabama Power Company	Farley 1	0101	WE 17 X 17	WEST	3LP
	Farley 2	0102	WE 17 X 17	WEST	3LP
Arizona Public Service Company	Palo Verde 1	0301	CE System 80	COMB	CE80
	Palo Verde 2	0302	CE System 80	COMB	CE80
	Palo Verde 3	0303	CE System 80	COMB	CE80
Arkansas Power and Light Company.............	Arkansas Nuclear 1	0401	BW 15 X 15	B&W	LLP
	Arkansas Nuclear 2	0402	CE 16 X 16	COMB	CE
Baltimore Gas and Electric Company	Calvert Cliffs 1	0501	CE 14 X 14	COMB	CE
	Calvert Cliffs 2	0502	CE 14 X 14	COMB	CE
Boston Edison Company	Pilgrim 1	0601	GE BWR/2,3	GE	3
Carolina Power and Light Company	Brunswick 1	0701	GE BWR/4-6	GE	4
	Brunswick 2	0702	GE BWR/4-6	GE	4
	Harris 1	0703	WE 17 X 17	WEST	3LP
	Robinson 2	0705	WE 15 X 15	WEST	3LP
Cleveland Electric Illuminating Company	Perry 1	0901	GE BWR/4-6	GE	6
Commonwealth Edison Company	Braidwood 1	1001	WE 17 X 17	WEST	4LP
	Braidwood 2	1002	WE 17 X 17	WEST	4LP
	Byron 1	1003	WE 17 X 17	WEST	4LP
	Byron 2	1004	WE 17 X 17	WEST	4LP
	Dresden 1	1005	Dresden 1	GE	1
	Dresden 2	1006	GE BWR/2,3	GE	3
	Dresden 3	1007	GE BWR/2,3	GE	3
	LaSalle County 1	1008	GE BWR/4-6	GE	5
	LaSalle County 2	1009	GE BWR/4-6	GE	5
	Quad Cities 1	1010	GE BWR/2,3	GE	3
	Quad Cities 2	1011	GE BWR/2,3	GE	3
	Zion 1	1012	WE 15 X 15	WEST	4LP
	Zion 2	1013	WE 15 X 15	WEST	4LP
Consolidated Edison Company of New York	Indian Point 1	1101	Indian Point 1	B&W	--
	Indian Point 2	1102	WE 15 X 15	WEST	4LP
Consumers Power Company	Big Rock Point	1201	Big Rock Point	GE	1
	Palisades	1204	Palisades	COMB	CE
Dairyland Power Cooperative	LaCrosse	1301	LaCrosse	AC	--
Detroit Edison Comapny	Enrico Fermi 2	1402	GE BWR/4-6	GE	4

See footnotes at end of table.

Table B2. Assembly Class and Design Type (Continued)

Electric Utility Name	Reactor Name	Reactor ID	Assembly Class	Nuclear Steam System Supplier[a]	Design Type[b]
Duke Power Company	Catawba 1	1501	WE 17 X 17	WEST	4LP
	Catawba 2	1502	WE 17 X 17	WEST	4LP
	McGuire 1	1504	WE 17 X 17	WEST	4LP
	McGuire 2	1505	WE 17 X 17	WEST	4LP
	Oconee 1	1506	BW 15 X 15	B&W	LLP
	Oconee 2	1507	BW 15 X 15	B&W	LLP
	Oconee 3	1508	BW 15 X 15	B&W	LLP
Duquesne Light Company	Beaver Valley 1	1601	WE 17 X 17	WEST	3LP
	Beaver Valley 2	1602	WE 17 X 17	WEST	3LP
Florida Power Corporation.....	Crystal River 3	1701	BW 15 X 15	B&W	LLP
Florida Power and Light Company	St. Lucie 1	1801	CE 14 X 14	COMB	CE
	St. Lucie 2	1802	St. Lucie 2	COMB	CE
	Turkey Point 3	1803	WE 15 X 15	WEST	3LP
	Turkey Point 4	1804	WE 15 X 15	WEST	3LP
GPU Nuclear Corporation	Three Mile Island 1	1901	BW 15 X 15	B&W	LLP
	Oyster Creek	1903	GE BWR/2,3	GE	2
Georgia Power Company......	Hatch 1	2001	GE BWR/4-6	GE	4
	Hatch 2	2002	GE BWR/4-6	GE	4
	Vogtle 1	2003	WE 17 X 17	WEST	4LP
	Vogtle 2	2004	WE 17 X 17	WEST	4LP
Gulf States Utilities Company	River Bend 1	2101	GE BWR/4-6	GE	6
Houston Lighting and Power Company	South Texas 1	2201	South Texas	WEST	4LP
	South Texas 2	2202	South Texas	WEST	4LP
Illinois Power Company	Clinton 1	2301	GE BWR/4-6	GE	6
Indiana Michigan Power Company	Cook 1	5801	WE 15 X 15	WEST	4LP
	Cook 2	5802	WE 17 X 17	WEST	4LP
Iowa Electric Light and Power Company	Duane Arnold	2401	GE BWR/4-6	GE	4
Kansas Gas and Electric Company	Wolf Creek 1	2501	WE 17 X 17	WEST	4LP
Long Island Lighting Company	Shoreham	2601	GE BWR/4-6	GE	4
Louisana Power and Light Company.............	Waterford 3	2701	CE 16 X 16	COMB	CE
Maine Yankee Atomic Power Company	Maine Yankee	2801	CE 14 X 14	COMB	CE

See footnotes at end of table.

Table B2. Assembly Class and Design Type (Continued)

Electric Utility Name	Reactor Name	Reactor ID	Assembly Class	Nuclear Steam System Supplier[a]	Design Type[b]
Nebraska Public Power District	Cooper Station	3001	GE BWR/4-6	GE	4
New York Power Authority	Fitzpatrick	3901	GE BWR/4-6	GE	4
	Indian Point 3	3902	WE 15 X 15	WEST	4LP
Niagara Mohawk Power Corporation	Nine Mile Point 1	3101	GE BWR/2,3	GE	2
	Nine Mile Point 2	3102	GE BWR/4-6	GE	5
North Atlantic Energy Service Corporation	Seabrook	5901	WE 17 X 17	WEST	4LP
Northeast Utilities Service Company	Millstone 1	3201	GE BWR/2,3	GE	3
	Millstone 2	3202	CE 14 X 14	COMB	CE
	Millstone 3	3203	WE 17 X 17	WEST	4LP
	Haddam Neck	5701	Haddam Neck	WEST	4LP
Northern States Power Company	Monticello	3301	GE BWR/2,3	GE	3
	Prairie Island 1	3302	WE 14 X 14	WEST	2LP
	Prairie Island 2	3303	WE 14 X 14	WEST	2LP
Omaha Public Power District	Fort Calhoun	3401	Fort Calhoun	COMB	CE
Pacific Gas and Electric Company	Diablo Canyon 1	3501	WE 17 X 17	WEST	4LP
	Diablo Canyon 2	3502	WE 17 X 17	WEST	4LP
	Humboldt Bay	3503	Humboldt Bay	GE	1
Pennsylvania Power and Light Company	Susquehanna 1	3601	GE BWR/4-6	GE	4
	Susquehanna 2	3602	GE BWR/4-6	GE	4
Philadelphia Electric Company	Limerick 1	3701	GE BWR/4-6	GE	4
	Limerick 2	3702	GE BWR/4-6	GE	4
	Peach Bottom 2	3704	GE BWR/4-6	GE	4
	Peach Bottom 3	3705	GE BWR/4-6	GE	4
Portland General Electric Company	Trojan	3801	WE 17 X 17	WEST	4LP
Public Service Electric and Gas Company	Hope Creek	4201	GE BWR/4-6	GE	4
	Salem 1	4202	WE 17 X 17	WEST	4LP
	Salem 2	4203	WE 17 X 17	WEST	4LP
Rochester Gas and Electric Corporation	Ginna	4401	WE 14 X 14	WEST	2LP
Sacramento Municipal Utility District	Rancho Seco	4501	BW 15 X 15	B&W	LLP

See footnotes at end of table.

Table B2. Assembly Class and Design Type (Continued)

Electric Utility Name	Reactor Name	Reactor ID	Assembly Class	Nuclear Steam System Supplier[a]	Design Type[b]
South Carolina Electric and Gas Company	Summer	4601	WE 17 X 17	WEST	3LP
Southern California Edison Company	San Onofre 1	4701	San Onofre 1	WEST	3LP
	San Onofre 2	4702	CE 16 X 16	COMB	CE
	San Onofre 3	4703	CE 16 X 16	COMB	CE
System Energy Resources, Inc.	Grand Gulf 1	2901	GE BWR/4-6	GE	6
Tennessee Valley Authority	Browns Ferry 1	4803	GE BWR/4-6	GE	4
	Browns Ferry 2	4804	GE BWR/4-6	GE	4
	Browns Ferry 3	4805	GE BWR/4-6	GE	4
	Sequoyah 1	4808	WE 17 X 17	WEST	4LP
	Sequoyah 2	4809	WE 17 X 17	WEST	4LP
	Watts Bar 1	4810	WE 17 X 17	WEST	4LP
	Watts Bar 2	4811	WE 17 X 17	WEST	4LP
TU Electric	Comanche Peak 1	4901	WE 17 X 17	WEST	4LP
	Comanche Peak 2	4902	WE 17 X 17	WEST	4LP
Toledo Edison Company	Davis-Besse	5001	BW 15 X 15	B&W	LLP
Union Electric Company	Callaway	5101	WE 17 X 17	WEST	4LP
Vermont Yankee Nuclear Power Corporation	Vermont Yankee	6001	GE BWR/4-6	GE	4
Virginia Power	North Anna 1	5201	WE 17 X 17	WEST	3LP
	North Anna 2	5202	WE 17 X 17	WEST	3LP
	Surry 1	5203	WE 15 X 15	WEST	3LP
	Surry 2	5204	WE 15 X 15	WEST	3LP
Washington Public Power Supply System	Washington Nuclear 2	5302	GE BWR/4-6	GE	5
Wisconsin Electric Power Company	Point Beach 1	5401	WE 14 X 14	WEST	2LP
	Point Beach 2	5402	WE 14 X 14	WEST	2LP
Wisconsin Public Service Corporation	Kewaunee	5501	WE 14 X 14	WEST	2LP
Yankee Atomic Electric Company	Yankee Rowe	5601	Yankee Rowe	WEST	4LP

[a]Nuclear Steam System Supplier (NSSS) codes are as follows: AC = Allis Chalmers; B&W = Babcock & Wilcox Company; COMB = Combustion Engineering; GE = GE Nuclear Energy; WEST = Westinghouse Electric. Data obtained from Nuclear Regulatory Commission publication *Information Digest 1993*, Appendix A, NSSS column.

[b]Design types are as follows: 1 = GE Type 1; 2 = GE Type 2; 3 = GE Type 3; 4 = GE Type 4; 5 = GE Type 5; 6 = GE Type 6; 2LP = Westinghouse Two-Loop; 3LP = Westinghouse Three-Loop; 4LP = Westinghouse Four-Loop; CE = Combustion Engineering; CE80 = CE Standard Design; LLP = B&W Lowered Loop. Data obtained from Nuclear Regulatory Commission publication *Information Digest 1993*, Appendix A, NSSS column.

-- = Not applicable.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Table B3. Reactors by Assembly Class and Design Type

B&W 15 X 15 Assembly Class

Arkansas Nuclear 1 (LLP)	Crystal River 3 (LLP)	Davis-Besse (LLP)
Oconee 1 (LLP)	Oconee 2 (LLP)	Oconee 3 (LLP)
Rancho Seco (LLP)*	Three Mile Island 1 (LLP)	

B&W 17 X 17 Assembly Class

(Four test assemblies irradiated at Oconee 1, 2, & 3)

CE 14 X 14 Assembly Class

Calvert Cliffs 1 (CE)	Calvert Cliffs 2 (CE)	Maine Yankee (CE)
Millstone 2 (CE)	St. Lucie 1 (CE)	

CE 16 X 16 Assembly Class

Arkansas Nuclear 2 (CE)	San Onofre 2 (CE)	San Onofre 3 (CE)
Waterford 3 (CE)		

CE 16 X 16 System 80 Assembly Class

Palo Verde 1 (CE80)	Palo Verde 2 (CE80)	Palo Verde 3 (CE80)

GE BWR/2,3 Assembly Class

Dresden 2 (3)	Dresden 3 (3)	Millstone 1 (3)
Monticello (3)	Nine Mile Point 1 (2)	Oyster Creek (2)
Pilgrim 1 (3)	Quad Cities 1 (3)	Quad Cities 2 (3)

GE BWR/4-6 Assembly Class

Browns Ferry 1 (4)	Browns Ferry 2 (4)	Browns Ferry 3 (4)
Brunswick 1 (4)	Brunswick 2 (4)	Clinton 1 (6)
Cooper Station (4)	Duane Arnold (4)	Enrico Fermi 2 (4)
Fitzpatrick (4)	Grand Gulf 1 (6)	Hatch 1 (4)
Hatch 2 (4)	Hope Creek (4)	LaSalle County 1 (5)
LaSalle County 2 (5)	Limerick 1 (4)	Limerick 2 (4)
Nine Mile Point 2 (5)	Peach Bottom 2 (4)	Peach Bottom 3 (4)
Perry 1 (6)	River Bend 1 (6)	Shoreham (4)*
Susquehanna 1 (4)	Susquehanna 2 (4)	Vermont Yankee (4)
Washington Nuclear 2 (5)		

WE 14 X 14 Assembly Class

Ginna (2LP)	Kewaunee (2LP)	Point Beach 1 (2LP)
Point Beach 2 (2LP)	Prairie Island 1 (2LP)	Prairie Island 2 (2LP)

See footnotes at end of table.

Table B3. Reactors by Assembly Class and Design Type (Continued)

WE 15 X 15 Assembly Class

Cook 1 (4LP)	Indian Point 2 (4LP)	Indian Point 3 (4LP)
Robinson 2 (3LP)	Surry 1 (3LP)	Surry 2 (3LP)
Turkey Point 3 (3LP)	Turkey Point 4 (3LP)	Zion 1 (4LP)
Zion 2 (4LP)		

WE 17 X 17 Assembly Class

Beaver Valley 1 (3LP)	Beaver Valley 2 (3LP)	Braidwood 1 (4LP)
Braidwood 2 (4LP)	Byron 1 (4LP)	Byron 2 (4LP)
Callaway (4LP)	Catawba 1 (4LP)	Catawba 2 (4LP)
Comanche Peak 1 (4LP)	Comanche Peak 2 (4LP)	Cook 2 (4LP)
Diablo Canyon 1 (4LP)	Diablo Canyon 2 (4LP)	Farley 1 (3LP)
Farley 2 (3LP)	Harris 1 (3LP)	McGuire 1 (4LP)
McGuire 2 (4LP)	Millstone 3 (4LP)	North Anna 1 (3LP)
North Anna 2 (3LP)	Salem 1 (4LP)	Salem 2 (4LP)
Seabrook (4LP)	Sequoyah 1 (4LP)	Sequoyah 2 (4LP)
Summer (3LP)	Trojan (4LP)*	Vogtle 1 (4LP)
Vogtle 2 (4LP)	Watts Bar 1 (4LP)	Watts Bar 2 (4LP)
Wolf Creek 1 (4LP)		

South Texas Assembly Class

South Texas 1 (4LP)	South Texas 2 (4LP)	

Single Reactor Assembly Classes

Big Rock Point (1)	Dresden 1 (1)*	Fort Calhoun (CE)
Humboldt Bay (1)*	Haddam Neck (4LP)	Indian Point 1 (--)*
LaCrosse (--)*	Palisades (CE)	St. Lucie 2 (CE)
San Onofre 1 (3LP)*	Yankee Rowe (4LP)*	

-- = Not applicable.

Notes: Design types are as follows: 1 = GE Type 1; 2 = GE Type 2; 3 = GE Type 3; 4 = GE Type 4; 5 = GE Type 5; 6 = GE Type 6; 2LP = Westinghouse Two-Loop; 3LP = Westinghouse Three-Loop; 4LP = Westinghouse Four-Loop; CE = Combustion Engineering; CE80 = CE Standard Design; LLP = B&W Lowered Loop. Data obtained from Nuclear Regulatory Commission publication *Information Digest 1993*, Appendix A, NSSS column. * = Reactors are permanently shut down.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Table B4. Descriptions of Assembly Types

Assembly Type	Description	Assembly Type Code
	B&W 15 X 15 Assembly Class (Reactor Type: PWR/Length: 165.7 in./Width: 8.54 in.)	
B&W 15 X 15 B&W Mark B2	B&W-manufactured fuel for B&W 15 X 15 reactors; Mark B2 fuel uses a corrugated flexible grid spacer and a zirconium dioxide solid spacer between the fuel column and the fuel rod end plug; ~464 kg U.	B1515B2
B&W 15 X 15 B&W Mark B3	B&W-manufactured fuel for B&W 15 X 15 reactors; Mark B3 characteristics are not well defined because it is an early fuel design; ~464 kg U.	B1515B3
B&W 15 X 15 B&W Mark B4	B&W-manufactured fuel for B&W 15 X 15 reactors; standard fuel from B&W for many years; inconel spacer grids; ~464 kg U.	B1515B4
B&W 15 X 15 B&W Mark B4Z	B&W-manufactured fuel for B&W 15 X 15 reactors; features 6 Zircaloy grid spacers in the core zone; ~464 kg U.	B1515B4Z
B&W 15 X 15 B&W Mark B5	B&W-manufactured fuel for B&W 15 X 15 reactors; redesigned upper end fitting eliminates retainers for Burnable Poison Rod Assembly holddown; redesigned holddown spring made of Inconel 718 rather than Inconel X-750; ~464 kg U.	B1515B5
B&W 15 X 15 B&W Mark B5Z	B&W-manufactured fuel for B&W 15 X 15 reactors; assemblies feature 6 Zircaloy acid spacers in the core zone, a redesigned upper end fitting which eliminates the retainers for Burnable Poison Rod Assembly holddown, and a redesigned holddown spring made of Inconel 718 rather than Inconel X-750; ~464 kg U.	B1515B5Z
B&W 15 X 15 B&W Mark B6	B&W-manufactured fuel for B&W 15 X 15 reactors; assemblies feature 6 Zircaloy grid spacers in the core zone and a skirtless and removable upper end fitting; ~464 kg U.	B1515B6
B&W 15 X 15 B&W Mark B7	B&W-manufactured fuel for B&W 15 X 15 reactors; in addition to the Mark B6 fuel, the Mark B7 features slightly longer fuel rods and a shorter lower end fitting; these features increase the plenum volume and fuel rod-to-nozzle gap, allowing for increased discharge burnups; ~464 kg U.	B1515B7
B&W 15 X 15 B&W Mark B8	B&W-manufactured fuel for B&W 15 X 15 reactors; in addition to the features of Mark B7 fuel, the Mark B8 fuel has a debris fretting resistant fuel rod design; ~464 kg U.	B1515B8

Table B4. Descriptions of Assembly Types (Continued)

Assembly Type	Description	Assembly Type Code
	B&W 15 X 15 Assembly Class (Continued) (Reactor Type: PWR/Length: 165.7 in./Width: 8.54 in.)	
B&W 15 X 15 B&W Mark B	B&W-manufactured fuel for B&W 15 X 15 reactors; Mark B is a generic designation and is used when the specific assembly type is unknown; ~464 kg U.	B1515B
B&W 15 X 15 B&W Zirc Grids	B&W-manufactured fuel for B&W 15 X 15 reactors; generic designation for fuels with Zircaloy grid spaces which encompasses Mark B4Z, B5Z, B6, B7 and B8 fuels when specific assembly type has not been determined; ~464 kg U.	B1515BZ
B&W 15 X 15 B&W Mark BEB	B&W-manufactured fuel for B&W 15 X 15 reactors; designed to test extended burnup features, this fuel had a shorter active fuel length and was used only as lead test assemblies at Arkansas Nuclear 1; ~464 kg U.	B1515BEB
B&W 15 X 15 B&W Mark BGd	B&W-manufactured fuel for B&W 15 X 15 reactors; used as lead test assemblies at Oconee 1; this fuel utilized gadolinia in the fuel rods as a neutron absorber; apparently had removable upper end fittings, the forerunner of the skirtless (Mark B6) upper end fitting; ~430 kg U.	B1515BGD
B&W 15 X 15 WE	WE-manufactured fuel for B&W 15 X 15 reactors; scheduled for lead test assembly use at Three Mile Island 1; ~462 kg U.	B1515W
	B&W 17 X 17 Assembly Class (Reactor Type: PWR/Length: 165.7 in./Width: 8.54 in.)	
B&W 17 X 17 B&W Mark C	B&W-manufactured fuel for B&W 17 X 17 reactors; test assemblies used at Oconee 1, 2, & 3; ~456 kg U.	B1717B
	CE 14 X14 Assembly Class (Reactor Type: PWR/Length: 157 in./Width: 8.1 in.)	
CE 14 X 14 CE	CE-manufactured fuel for CE 14 X 14 reactors; ~382 kg U.	C1414C
CE 14 X 14 ANF	ANF-manufactured fuel for CE 14 X 14 reactors; ~370 kg U.	C1414A
CE 14 X 14 WE	WE-manufactured fuel for CE 14 X 14 reactors; ~407 kg U.	C1414W

Table B4. Descriptions of Assembly Types (Continued)

Assembly Type	Description	Assembly Type Code
	CE 16 X 16 Assembly Class (Reactor Type: PWR/Length: 176.8 in./Width: 8.1 in.)	
CE 16 X 16 CE	CE-manufactured fuel for CE 16 X 16 reactors; ~416 kg U.	C1616CSD
	CE 16 X 16 System 80 Assembly Class (Reactor Type: PWR/Length: 178.3 in./Width: 8.1 in.)	
CE 16 X 16 CE System 80	CE-manufactured fuel for CE System 80 reactors; ~413 kg U.	C8016C
	GE BWR/2,3 Assembly Class (Reactor Type: BWR/Length: 171.2 in./Width: 5.44 in.)	
GE BWR/2,3 7 X 7 GE-2a	GE-manufactured fuel for GE BWR/2,3 reactors; original core fuel at Oyster Creek, Nine Mile Point 1, and Millstone 1; fuel rod diameter of 0.570"; ~195 kg U.	G2307G2A
GE BWR/2,3 7 X 7 GE-2b	GE-manufactured fuel for GE BWR/2,3 reactors; original core fuel at other reactors; fuel rod diameter of 0.563"; cladding thickness of 0.032"; ~193 kg U.	G2307G2B
GE BWR/2,3 7 X 7 GE-3	GE-manufactured fuel for GE BWR/2,3 reactors; "Improved" fuel; cladding thickness of 0.037; hydrogen getter introduced; ~188 kg U.	G2307G3
GE BWR/2,3 8 X 8 GE-4	GE-manufactured fuel for GE BWR/2,3 reactors; first 8 X 8 fuel; 1 water rod; ~184 kg U.	G2308G4
GE BWR/2,3 8 X 8 GE-5	GE-manufactured fuel for GE BWR/2,3 reactors; "retrofit" fuel; 2 water rods; natural uranium axial blankets; ~177 kg U.	G2308G5
GE BWR/2,3 8 X 8 Prepres.	GE-manufactured fuel for GE BWR/2,3 reactors; fuel rods prepressurized to 3 Atm He; 2 water rods; ~177 kg U.	G2308GP
GE BWR/2,3 8 X 8 Barrier	GE-manufactured fuel for GE BWR/2,3 reactors; pure zirconium "barrier" on inside of cladding to reduce pellet-clad interaction; ~177 kg U.	G2308GB
GE BWR/2,3 8 X 8 GE-8a	GE-manufactured fuel for GE BWR/2,3 reactors; features of GE BWR/2,3 8 X 8 fuel with only 2 water rods; ~177 kg U.	G2308G8A

Table B4. Descriptions of Assembly Types (Continued)

Assembly Type	Description	Assembly Type Code
	GE BWR/2,3 Assembly Class (Continued) (Reactor Type: BWR/Length: 171.2 in./Width: 5.44 in.)	
GE BWR/2,3 8 X 8 GE-8b	GE-manufactured fuel for GE BWR/2,3 reactors; 4 water rods; introduces axially zoned enrichments and burnable absorbers; fuel rod prepressurization increased to 5 Atms; ~172 kg U.	G2308G8B
GE BWR/2,3 8 X 8 GE-9	GE-manufactured fuel for GE BWR/2,3 reactors; ferule-type spacer grids; large diameter water rod which displaced 4 fuel rod positions; axially zoned enrichment and burnable absorbers; fuel rod pre-pressurization of 5 Atm; "barrier" cladding; ~172 kg U.	G2308G9
GE BWR/2,3 8 X 8 GE-10	GE-manufactured fuel for GE BWR/2,3 reactors; fuel channel is 100-mils thick at corners and 65-mils thick on sides reducing the parasitic material in core; uses flow directors on the inside of the channel thus redirecting the flow of water away from the channel wall towards the center of the fuel bundle; no weight available.	G2308G10
GE BWR/2,3 9 X 9 GE-11	GE-manufactured fuel for GE BWR/2,3 reactors; uses 2 medium diameter water rods which replace 7 fuel rods; 8 of the remaining fuel rods extend only to the top of the fifth spacer grid; no weight available.	G2309G11
GE BWR/2,3 7 X 7 ANF	ANF-manufactured fuel for GE BWR/2,3 reactors; 7 X 7 fuel rod array; used only at Oyster Creek; ~182 kg U.	G2307A
GE BWR/2,3 8 X 8 ANF	ANF-manufactured fuel for GE BWR/2,3 reactors; 8 X 8 fuel rod array; 1 water rod; estimated 175 kg U.	G2308A
GE BWR/2,3 8 X 8 ANF Prepres.	ANF-manufactured fuel for GE BWR/2,3 reactors; rods prepressurized with He to several Atms; ~175 kg U.	G2308AP
GE BWR/2,3 9 X 9 ANF	ANF-manufactured fuel for GE BWR/2,3 reactors; 9 X 9 fuel rod array; 2 water rods; ~168 kg U.	G2309A
GE BWR/2,3 9 X 9 ANF 9-5	ANF-manufactured fuel for GE BWR/2,3 reactors; 5 water rods per assembly; estimated 161 kg U.	G2309A5
GE BWR/2,3 9 X 9 ANF 9X	ANF-manufactured fuel for GE BWR/2,3 reactors; uses a central water channel that replaces 9 water rods; estimated 153 kg U.	G2309A9X

Table B4. Descriptions of Assembly Types (Continued)

Assembly Type	Description	Assembly Type Code
GE BWR/2,3 Assembly Class (Continued) (Reactor Type: BWR/Length: 171.2 in./Width: 5.44 in.)		
GE BWR/2,3 9 X 9 ANF IX	ANF-manufactured fuel for GE BWR/2,3 reactors; uses a central water channel that replaces 9 rods; the regular fuel rods in the IX version utilize an internal cladding liner of pure zirconium; estimated 153 kg U.	G2309AIX
GE BWR/4-6 Assembly Class (Reactor Type: BWR/Length: 176.2 in./Width: 5.44 in.)		
GE BWR/4-6 7 X 7 GE-2	GE-manufactured fuel for GE BWR/4-6 reactors; original core fuel for several BWR/4 plants; high failure rate instigated introduction of GE-3 and GE-4 fuels; ~195 kg U.	G4607G2
GE BWR/4-6 7 X 7 GE-3a	GE-manufactured fuel for GE BWR/4-6 reactors; "Improved" fuel; cladding thickness of 0.037"; hydrogen getter introduced; 144 inch active fuel length; ~187 kg U.	G4607G3A
GE BWR/4-6 7 X 7 GE-3b	GE-manufactured fuel for GE BWR/4-6 reactors; "Improved" fuel; cladding thickness of 0.037"; hydrogen getter introduced; 146 active length; ~190 kg U.	G4607G3B
GE BWR/4-6 8 X 8 GE-4a	GE-manufactured fuel for GE BWR/4-6 reactors; first 8 X 8 fuel; 1 water rod; 144 inch active fuel length; ~184 kg U.	G4608G4A
GE BWR/4-6 8 X 8 GE-4b	GE-manufactured fuel for GE BWR/4-6 reactors; first 8 X 8 fuel; 1 water rod; 146 inch active fuel length; ~187 kg U.	G4608G4B
GE BWR/4-6 8 X 8 GE-5	GE-manufactured fuel for GE BWR/4-6 reactors; "retrofit" fuel; 2 water rods; natural uranium axial blankets; ~183 kg U.	G4608G5
GE BWR/4-6 8 X 8 GE Prepres.	GE-manufactured fuel for GE BWR/4-6 reactors; fuel rods prepressureized to 3 Atm He; 2 water rods; ~183 kg U.	G4608GP
GE BWR/4-6 8 X 8 Barrier	GE-manufactured fuel for GE BWR/4-6 reactors; pure zirconium "barrier" on inside of cladding to reduce pellet-clad interaction; ~185 kg U.	G4608GB

Table B4. Descriptions of Assembly Types (Continued)

Assembly Type	Description	Assembly Type Code
	GE BWR/4-6 Assembly Class (Continued) (Reactor Type: BWR/Length: 176.2 in./Width: 5.44 in.)	
GE BWR/4-6 8 X 8 GE-8	GE-manufactured fuel for GE BWR/4-6 reactors; 4 water rods; axially zoned enrichment and burnable absorbers; fuel rod prepressurization increased to 5 Atm; other "barrier" fuel features; ~179 kg U.	G4608G8
GE BWR/4-6 8 X 8 GE-9	GE-manufactured fuel for GE BWR/4-6 reactors; ferule-type spacer grids; large diameter water rod which displaced 4 fuel rod positions; axially zoned enrichment and burnable absorbers; fuel rod prepressurization of 5 Atm; "barrier" cladding; ~172 kg U.	G4608G9
GE BWR/4-6 8 X 8 GE-10	GE-manufactured fuel for GE BWR/4-6 reactors; fuel channel is 100 mils thick at the corners and 65 mils thick on the sides, reducing the parasitic material in core; uses flow directors on the inside of the channel thus redirecting the flow of water away from the channel wall towards the center of the fuel bundle; estimated 177 kg U.	G4608G10
GE BWR/4-6 9 X 9 GE-11	GE-manufactured fuel for GE BWR/4-6 reactors; uses 2 medium diameter water rods which replace 7 fuel rods; 8 of the rods remaining extend to only the fifth spacer grid; estimated 170 kg U.	G4609G11
GE BWR/4-6 8 X 8 ANF	ANF-manufactured fuel for GE BWR/4-6 reactors; 8 X 8 fuel rod array; 1 water rod; ~176 kg U.	G4608A
GE BWR/4-6 8 X 8 ANF Prepres.	ANF-manufactured fuel for GE BWR/4-6 reactors; prepressurized fuel rods; ~176 kg U.	G4608AP
GE BWR/4-6 8 X 8 WE	WE-manufactured fuel for GE BWR/4-6 reactors; reactors; "QUAD + fuel"; design of fuel is lead test assembly use only; a licensed version of ABB Atom water cross fuel; ~174 kg U.	G4608W
GE BWR/4-6 9 X 9 ANF	ANF-manufactured fuel for GE BWR/4-6 reactors; 9 X 9 fuel rod array; 2 water rods; ~173 kg U.	G4609A
GE BWR/4-6 9 X 9 ANF 9-5	ANF-manufactured fuel for GE BWR/4-6 reactors; 5 water rods per assembly; estimated 168 kg U.	G4609A5
GE BWR/4-6 9 X 9 ANF 9X	ANF-manufactured fuel for GE BWR/4-6 reactors; central water channel replaces 9 fuel rods; estimated 168 kg U.	G4609A9X

Table B4. Descriptions of Assembly Types (Continued)

Assembly Type	Description	Assembly Type Code
	GE BWR/4 - 6 Assembly Class (Continued) (Reactor Type: BWR/Length: 176.2 in./Width: 5.44 in.)	
GE BWR/4-6 9 X 9 ANF IX	ANF-manufactured fuel for GE BWR/4-6 reactors; central water channel replaces 9 fuel rods; regular fuel rods utilize an internal cladding liner of pure zirconium; estimated 168 kg U.	G4609AIX
GE BWR/4-6 9 X 9 ANF IX+	ANF-manufactured fuel for GE BWR/4-6 reactors; central water channel replaces 9 fuel rods; high-performance thermal spacers; estimated 168 kg U.	G4609AX+
GE BWR/4-6 10 X 10 ABB	ABB Atom-manufactured fuel for GE BWR/4-6 reactors; fuel has 4, 5 X 5 minibundles, each with 24 fuel rods; fuel bundles are separated by a water cross and a centralized water channel; estimated 176 kg U.	G4610C
	WE 14 X 14 Assembly Class (Reactor Type: PWR/Length: 159.8 in./Width: 7.76 in.)	
WE 14 X 14 WE Standard	WE-manufactured fuel for WE 14 X 14 reactors; Zircaloy cladding; stainless steel guide tubes; ~394 kg U.	W1414W
WE 14 X 14 WE LOPAR	WE-manufactured fuel for WE 14 X 14 reactors; "'Low Parasitic (LOPAR) fuel"; Zircaloy guide tubes; often referred to as "Standard" fuel; ~399 kg U.	W1414WL
WE 14 X 14 WE OFA	WE-manufactured fuel for WE 14 X 14 reactors; "Optimized Fuel Assemblies"; Zircaloy spacer grids; smaller fuel rod diameter; ~358 kg U.	W1414WO
WE 14 X 14 ANF	ANF-manufactured fuel for WE 14 X 14 reactors; shorter, larger diameter fuel rod than WE 14 X 14 ANF Top Rod fuel; ~377 kg U.	W1414A
WE 14 X 14 ANF Top Rod	ANF-manufactured fuel for WE 14 X 14 reactors; longer, smaller diameter fuel rod than WE 14 X 14 ANF fuel; ~361 kg U.	W1414ATR
WE 14 X 14 B&W	B&W-manufactured fuel for WE 14 X 14 reactors; only 2 lead test assemblies used at Ginna; ~383 kg U.	W1414B

Table B4. Descriptions of Assembly Types (Continued)

Assembly Type	Description	Assembly Type Code
	WE 15 X 15 Assembly Class (Reactor Type: PWR/Length: 159.8 in./Width: 8.44 in.)	
WE 15 X 15 WE Standard	WE-manufactured fuel for WE 15 X 15 reactors; Zircaloy cladding; stainless steel guide tubes; ~454 kg U.	W1515W
WE 15 X 15 WE LOPAR	WE-manufactured fuel for WE 15 X 15 reactors; '"Low Parasitic (LOPAR) fuel"; Zircaloy guide tubes; often referred to as "Standard" fuel; ~455 kg U.	W1515WL
WE 15 X 15 WE OFA	WE-manufactured fuel for WE 15 X 15 reactors; "Optimized Fuel Assemblies"; Zircaloy spacer grids; ~460 kg U.	W1515WO
WE 15 X 15 ANF	ANF-manufactured fuel for WE 15 X 15 reactors; ~429 kg U.	W1515A
WE 15 X 15 ANF Part Length	ANF-manufactured fuel for WE 15 X 15 reactors; bottom 42 inches of fuel rods replaced by inserts made from stainless steel 304; assemblies placed in positions on the core periphery to provide shielding for core support structure; estimated 305 kg U.	W1515APL
WE 15 X 15 B&W Mark BW	B&W-manufactured fuel for WE 15 X 15 reactors; no weight available.	W1515B
	WE 17 X 17 Assembly Class (Reactor Type: PWR/Length: 159.8 in./Width: 8.44 in.)	
WE 17 X 17 WE LOPAR	WE-manufactured fuel for WE 17 X 17 reactors; "Low Parasitic (LOPAR) fuel"; Zircaloy guide tubes; Inconel Spacer grids; often referred to as "Standard" fuel; ~460 kg U.	W1717WL
WE 17 X 17 WE OFA	WE-manufactured fuel for WE 17 X 17 reactors; "Optimized Fuel Assemblies"; Zircaloy spacer grids; ~425 kg U.	W1717WO
WE 17 X 17 WE Vantage 5	WE-manufactured fuel for WE 17 X 17 reactors; integral zirconium dioboride neutron absorbers in fuel; natural uranium axial blankets, intermediated flow mixers, removable top nozzle, increased discharged burnup; other OFA features; ~426 kg U.	W1717WV5

Table B4. Descriptions of Assembly Types (Continued)

Assembly Type	Description	Assembly Type Code
	WE 17 X 17 Assembly Class (Continued) (Reactor Type: PWR/Length: 159.8 in./Width: 8.44 in.)	
WE 17 X 17 WE Vantage +	WE-manufactured fuel for WE 17 X 17 reactors; combines a new cladding material - ZIRLO (a zirconium-niobium alloy) with the advanced neutronic characteristics of Vantage 5 fuel; estimated 426 kg U.	W1717WV+
WE 17 X 17 WE Vantage 5H	WE-manufactured fuel for WE 17 X 17 reactors; hybrid fuel combining the advanced neutronic characteristics of Vantage 5 fuel with the larger fuel rod diameter associated with LOPAR fuel; ~464 kg U.	W1717WVH
WE 17 X 17 ANF	ANF-manufactured fuel for WE 17 X 17 reactors; ~402 kg U.	W1717A
WE 17 X 17 B&W Mark BW	B&W-manufactured fuel for WE 17 X 17 reactors; ~425 kg U.	W1717B
	South Texas Assembly Class (Reactor Type: PWR/Length: 199 in./Width: 8.43 in.)	
South Texas 17 X 17 WE	WE-manufactured fuel for use at South Texas reactors; initial core fuel; ~542 kg U.	WST17W
	Big Rock Point Assembly Class (Reactor Type: BWR/Length: 84 in./Width: 6.52 in.)	
Big Rock Point 12 X 12 GE	GE-manufactured fuel for use at Big Rock Point; stainless steel clad fuel; all assemblies reprocessed at West Valley.	XBR12G
Big Rock Point 11 X 11 GE	GE-manufactured fuel for use at Big Rock Point; Zircaloy cladding; generic designation which encompasses "B," "C," "D1," and "D2" assembly types; most assemblies reprocessed at West Valley; ~124 kg U.	XBR11G
Big Rock Point 7 X 7 GE	GE-manufactured fuel for use at Big Rock Point developmental center-melt fuel; test assembly use only; ~131 kg U.	XBR07G
Big Rock Point 8 X 8 GE	GE-manufactured fuel for use at Big Rock Point developmental center-melt fuel; test assembly use only; ~112 kg U.	XBR08G

Table B4. Descriptions of Assembly Types (Continued)

Assembly Type	Description	Assembly Type Code
	Big Rock Point Assembly Class (Continued) (Reactor Type: BWR/Length: 84 in./Width: 6.52 in.)	
Big Rock Point 9 X 9 GE	GE-manufactured fuel for use at Big Rock Point; Zircaloy cladding; generic designation which encompasses "E," "EG," "F," "MEG," and "PEG" assembly types; ~137 kg U.	XBR09G
Big Rock Point 9 X 9 ANF	ANF-manufactured fuel for use at Big Rock Point; lead test assembly use only; ~127 kg U.	XBR09A
Big Rock Point 11 X 11 ANF	ANF-manufactured fuel for use at Big Rock Point; ~128 kg U.	XBR11A
Big Rock Point 11 X 11 NFS	NFS-manufactured fuel for use at Big Rock Point; lead test assembly use only; ~129 kg U.	XBR11N
	Dresden 1 Assembly Class (Reactor Type: BWR/Length: 134.4 in./Width: 4.28 in.)	
Dresden 1 6 X 6 GE Type 1	GE-manufactured fuel for use at Dresden 1; all but one assembly reprocessed at West Valley; ~111 kg U.	XDR06G
Dresden 1 7 X 7 GE	GE-manufactured fuel for use at Dresden 1; stainless steel clad fuel; 9 thorium oxide corner rods; all reprocessed at West Valley except for the corner rods, which were shipped to the Savannah River Plant.	XDR07G
Dresden 1 6 X 6 GE Type III-B	GE-manufactured fuel for use at Dresden 1; erbium oxide as burnable absorber in all 36 fuel rods; some assemblies reprocessed at West Valley; ~102 kg U.	XDR06G3B
Dresden 1 6 X 6 GE Type III-F	GE-manufactured fuel for use at Dresden 1; gadolinium oxide as a burnable absorber in a single, nonfueled rod; some assemblies reprocessed at West Valley; ~102 kg U.	XDR06G3F
Dresden.1 6 X 6 GE Type V	GE-manufactured fuel for use at Dresden 1; gadolinium oxide as a burnable absorber in selected fuel rods; ~106 kg U.	XDR06G5
Dresden 1 7 X 7 GE SA-1	GE-manufactured fuel for use at Dresden 1; a single prototype fuel assembly manufactured and owned by GE.	XDR07GS

Table B4. Descriptions of Assembly Types (Continued)

Assembly Type	Description	Assembly Type Code
	Dresden 1 Assembly Class (Continued) (Reactor Type: BWR/Length: 134.4 in./Width: 4.28 in.)	
Dresden 1 8 X 8 GE PF Fuels	GE-manufactured fuel for use at Dresden 1; prototype fuel assemblies with 6 X 6, 7 X 7, and 8 X 8 fuel rod arrays; all have been reprocessed except for one 8 X 8 assembly; ~100 kg U.	XDR08G
Dresden 1 6 X 6 UNC	UNC-manufactured fuel for use at Dresden 1; ~102 kg U.	XDR06U
Dresden 1 6 X 6 ANF	ANF-manufactured fuel for use at Dresden 1; ~95 kg U.	XDR06A
	Fort Calhoun Assembly Class (Reactor Type: PWR/Length: 146 in./Width: 8.1 in.)	
Fort Calhoun 14 X 14 CE	CE-manufactured fuel for use at Fort Calhoun; similar to CE 14 X 14 class fuels except for shorter length; ~366 kg U.	XFC14C
Fort Calhoun 14 X 14 ANF	ANF-manufactured fuel for use at Fort Calhoun; similar to CE 14 X 14 class fuels except for shorter length; ~353 kg U.	XFC14A
Fort Calhoun 14 X 14 WE	WE-manufactured fuel for use at Fort Calhoun; similar to CE 14 X 14 class fuels except for shorter length; ~374 kg U.	XFC14W
	Humboldt Bay Assembly Class (Reactor Type: BWR/Length: 95 in./Width: 4.67 in.)	
Humboldt Bay 7 X 7 GE Type I	GE-manufactured fuel for use at Humboldt Bay; stainless steel clad fuel; all assemblies reprocessed at West Valley; ~80 kg U.	XHB07G
Humboldt Bay 7 X 7 GE Type II	GE-manufactured fuel for use at Humboldt Bay; Zircaloy cladding; some assemblies reprocessed at West Valley; ~76 kg U.	XHB07G2
Humboldt Bay 6 X 6 GE	GE-manufactured fuel for use at Humboldt Bay; Zircaloy cladding; ~76 kg U.	XHB06G
Humboldt Bay 6 X 6 ANF	ANF-manufactured fuel for use at Humboldt Bay; Zircaloy cladding; ~70 kg U.	XHB06A

Table B4. Descriptions of Assembly Types (Continued)

Assembly Type	Description	Assembly Type Code
	Haddam Neck Assembly Class (Reactor Type: PWR/Length: 137.1 in./Width: 8.42 in.)	
Haddam Neck 15 X 15 WE	WE-manufactured fuel for use at Haddam Neck; stainless steel clad; ~416 kg U.	XHN15W
Haddam Neck 15 X 15 NUMEC SS	NU-manufactured fuel for use at Haddam Neck; stainless steel clad; lead test assembly use only; ~406 kg U.	XHN15MS
Haddam Neck 15 X 15 NUMEC Zr	NU-manufactured fuel for use at Haddam Neck; Zircaloy clad; lead test assembly use only; ~371 kg U.	XHN15MZ
Haddam Neck 15 X 15 GULF SS	GULF-manufactured fuel for use at Haddam Neck; stainless steel clad; lead test assembly use only; ~406 kg U.	XHN15HS
Haddam Neck 15 X 15 GULF Zr	GULF-manufactured fuel for use at Haddam Neck; Zircaloy clad; lead test assembly use only; ~363 kg U.	XHN15HZ
Haddam Neck 15 X 15 B&W SS	B&W-manufactured fuel for use at Haddam Neck; stainless steel clad; ~412 kg U.	XHN15B
Haddam Neck 15 X 15 B&W Zr	B&W-manufactured fuel for use at Haddam Neck; Zircaloy clad; ~412 kg U.	XHN15BZ
	Indian Point 1 Assembly Class (Reactor Type: PWR/Length: 138.8 in./Width: 6.27 in.)	
Indian Point 1 14 X 15 B&W	B&W-manufactured fuel for use at Indian Point 1; a thorium/uranium oxide fuel pellet; stainless steel clad; assemblies were used with the initial core configuration and were not the same assembly dimensions as later fuels; all assemblies reprocessed at West Valley; ~152 kg U, thorium/uranium.	XIP14B
Indian Point 1 13 X 14 WE	WE-manufactured fuel for use at Indian Point 1; stainless steel clad; dimensions are as specified above for Indian Point 1 assembly class; some assemblies reprocessed at West Valley; ~191 kg U.	XIP14W

Table B4. Descriptions of Assembly Types (Continued)

Assembly Type	Description	Assembly Type Code
	LaCrosse Assembly Class (Reactor Type: BWR/Length: 102.5 in./Width: 5.62 in.)	
LaCrosse 10 X 10 AC	AC-manufactured fuel for use at LaCrosse; stainless steel cladding; ~120 kg U.	XLC10L
LaCrosse 10 X 10 ANF	ANF-manufactured fuel for use at LaCrosse; stainless steel cladding; ~109 kg U.	XLC10A
	Palisades Assembly Class (Reactor Type: PWR/Length: 147.5 in./Width: 8.2 in.)	
Palisades 15 X 15 CE	CE-manufactured fuel for use at Palisades; ~412 kg U.	XPA15C
Palisades 15 X 15 ANF	ANF-manufactured fuel for use at Palisades; ~391 kg U.	XPA15A
	St. Lucie 2 Assembly Class (Reactor Type: PWR/Length: 158.2 in./Width: 8.1 in.)	
St. Lucie 2 16 X 16 CE	CE-manufactured fuel for use at St. Lucie 2; ~377 kg U.	XSL16C
	San Onofre 1 Assembly Class (Reactor Type: PWR/Length: 137.1 in./Width: 7.76 in.)	
San Onofre 1 14 X 14 WE	WE-manufactured fuel for use at San Onofre 1; stainless steel clad; ~366 kg U.	XSO14W
San Onofre 1 14 X 14 WE Zr	WE-manufactured fuel for use at San Onofre 1; Zircaloy clad demonstration fuel; no weight available.	XSO14WZ
	Yankee Rowe Assembly Class (Reactor Type: PWR/Length: 111.8 in./Width: 7.62 in.)	
Yankee Rowe 17 X 18 WE	WE-manufactured fuel for use at Yankee Rowe; stainless steel clad; nonsquare array designed to allow space for cruciform control blades; most assemblies reprocessed at West Valley; ~273 kg U.	XYR18W
Yankee Rowe 15 X 16 UNC	UNC-manufactured fuel for use at Yankee Rowe; nonsquare array designed to allow for space for cruciform control blades; ~239 kg U.	XYR16U

Table B4. Descriptions of Assembly Types (Continued)

Assembly Type	Description	Assembly Type Code
	Yankee Rowe Assembly Class (Continued) (Reactor Type: PWR/Length: 111.8 in./Width: 7.62 in.)	
Yankee Rowe 15 X 16 ANF	ANF-manufactured fuel for use at Yankee Rowe; nonsquare array designed to allow space for cruciform control blades; ~234 kg U.	XYR16A
Yankee Rowe 15 X 16 CE	CE-manufactured fuel for use at Yankee Rowe; nonsquare array designed to allow space for cruciform control blades; ~229 kg U.	XYR16C

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Table B5. Assembly Characteristics by Assembly Type

Assemblies							Rods		
Assembly Type Code	Current Fabricator	Cladding	Avg. Initial Loading Weight of Uranium (kg)	Width as Built (inches)	Length as Built (inches)	Number Discharged	Length (inches)	Number of Positions	Number of Fuel Rods
Boiling-Water Reactors (BWR)									
G2307G2A	GE	ZR	195	5.44	171.2	1,672	158.9	49	49
G2307G2B	GE	ZR	193	5.44	171.2	5,047	158.9	49	49
G2307G3	GE	ZR	188	5.44	171.2	394	158.9	49	49
G2308G4	GE	ZR	184	5.44	171.2	3,876	158.9	64	63
G2308G5	GE	ZR	177	5.44	171.2	879	158.9	64	62
G2308GP	GE	ZR	177	5.44	171.2	2,532	158.9	64	62
G2308GB	GE	ZR	177	5.44	171.2	1,104	158.9	64	62
G2308G8A	GE	ZR	177	5.44	171.2	212	158.9	64	62
G2308G8B	GE	ZR	172	5.44	171.2	--	158.9	64	60
G2308G9	GE	ZR	172	5.44	171.2	--	158.9	64	60
G2308G10	GE	ZR	--	5.44	171.2	--	158.9	64	60
G2309G11	GE	ZR	--	5.44	171.2	--	[a]158.9	81	74
G2307A	SIEM	ZR	182	5.44	171.2	260	158.9	49	48
G2308A	SIEM	ZR	[b]175	5.44	171.2	1,225	158.9	64	63
G2308AP	SIEM	ZR	175	5.44	171.2	--	158.9	64	63
G2309A	SIEM	ZR	168	5.44	171.2	4	158.9	81	79
G2309A5	SIEM	ZR	[b]161	5.44	171.2	--	158.9	81	76
G2309A9X	SIEM	ZR	[b]153	5.44	171.2	--	158.9	81	72
G2309AIX	SIEM	ZR	[b]153	5.44	171.2	--	158.9	81	72
G4607G2	GE	ZR	195	5.44	176.2	1,142	163.8	49	49
G4607G3A	GE	ZR	187	5.44	176.2	3,752	163.8	49	49
G4607G3B	GE	ZR	190	5.44	176.2	1,184	163.8	49	49
G4608G4A	GE	ZR	184	5.44	176.2	1,785	163.8	64	63
G4608G4B	GE	ZR	187	5.44	176.2	1,787	163.8	64	63
G4608G5	GE	ZR	183	5.44	176.2	4,310	163.8	64	62
G4608GP	GE	ZR	183	5.44	176.2	11,107	163.8	64	62
G4608GB	GE	ZR	185	5.44	176.2	6,262	163.8	64	62
G4608G8	GE	ZR	179	5.44	176.2	216	163.8	64	60
G4608G9	GE	ZR	172	5.44	176.2	2	163.8	64	60
G4608G10	GE	ZR	[b]177	5.44	176.2	--	163.8	64	60
G4609G11	GE	ZR	[b]170	5.44	176.2	--	[a]163.8	81	74
G4608A	SIEM	ZR	176	5.44	176.2	1,200	163.8	64	62
G4608AP	SIEM	ZR	176	5.44	176.2	8	163.8	64	62
G4608W	WE	ZR	174	5.44	176.2	4	163.8	64	64
G4609A	SIEM	ZR	173	5.44	176.2	640	163.8	81	79
G4609A5	SIEM	ZR	[b]168	5.44	176.2	--	163.8	81	76
G4609A9X	SIEM	ZR	[b]168	5.44	176.2	--	163.8	81	72
G4609AIX	SIEM	ZR	[b]168	5.44	176.2	--	163.8	81	72
G4609AX+	SIEM	ZR	[b]168	5.44	176.2	--	163.8	81	72
G4610C	CE	ZR	[b]176	6.52	176.2	--	163.8	81	72
XBR12G	GE	SS	--	6.52	84.0	--	NA	96	96
XBR11G	GE	ZR	124	6.52	84.0	6	75.0	121	121
XBR07G	GE	ZR	131	6.52	84.0	4	75.0	49	49
XBR08G	GE	ZR	112	6.52	84.0	2	75.0	64	64
XBR09G	GE	ZR	137	6.52	84.0	143	75.0	81	81
XBR09A	SIEM	ZR	127	6.52	84.0	4	75.0	81	81
XBR11A	SIEM	ZR	128	6.52	84.0	212	75.0	121	117
XBR11N	NFS	ZR	129	6.52	84.0	8	75.0	121	121
XDR06G	GE	ZR	111	4.28	134.4	1	117.0	36	36
XDR07G	GE	SS	--	4.28	134.4	--	117.0	49	49
XDR06G3B	GE	ZR	102	4.28	134.4	163	117.0	36	36
XDR06G3F	GE	ZR	102	4.28	134.4	96	117.0	36	35
XDR06G5	GE	ZR	106	4.28	134.4	106	117.0	36	36
XDR07GS	GE	ZR	--	4.28	134.4	1	117.0	49	44
XDR08G	GE	ZR	100	4.28	134.4	1	117.0	64	63
XDR06U	UNC	ZR	102	4.28	134.4	458	117.0	36	36
XDR06A	SIEM	ZR	95	4.28	134.4	66	117.0	36	35
XHB07G	GE	SS	80	4.67	95.0	--	NA	49	49
XHB07G2	GE	ZR	76	4.67	95.0	88	83.2	49	49
XHB06G	GE	ZR	76	4.67	95.0	176	79.0	36	36
XHB06A	SIEM	ZR	70	4.67	95.0	126	79.0	36	36
XLC10L	AC	SS	120	5.62	102.5	155	90.0	100	100
XLC10A	SIEM	SS	109	5.62	102.5	178	90.0	100	96

See footnotes at end of table.

Table B5. Assembly Characteristics by Assembly Type (Continued)

Assemblies							Rods		
Assembly Type Code	Current Fabricator	Cladding	Avg. Initial Loading Weight of Uranium (kg)	Width as Built (inches)	Length as Built (inches)	Number Discharged	Length (inches)	Number of Positions	Number of Fuel Rods
Pressurized-Water Reactors (PWR)									
B1515B2	B&W	ZR	464	8.54	165.7	--	153.7	225	208
B1515B3	B&W	ZR	464	8.54	165.7	--	153.7	225	208
B1515B4	B&W	ZR	464	8.54	165.7	4,106	153.7	225	208
B1515B4Z	B&W	ZR	464	8.54	165.7	4	153.7	225	208
B1515B5	B&W	ZR	464	8.54	165.7	--	153.7	225	208
B1515B5Z	B&W	ZR	464	8.54	165.7	20	153.7	225	208
B1515B6	B&W	ZR	464	8.54	165.7	109	153.7	225	208
B1515B7	B&W	ZR	464	8.54	165.7	43	153.7	225	208
B1515B8	B&W	ZR	464	8.54	165.7	--	153.7	225	208
B1515B	B&W	ZR	464	8.54	165.7	--	153.7	225	208
B1515BZ	B&W	ZR	464	8.54	165.7	580	153.7	225	208
B1515BEB	B&W	ZR	464	8.54	165.7	--	153.7	225	208
B1515BGD	B&W	ZR	430	8.54	165.7	4	153.7	225	208
B1515W	WE	ZR	462	8.54	165.7	--	NA	225	208
B1717B	B&W	ZR	456	8.54	165.7	4	152.7	289	264
C1414C	CE	ZR	382	8.10	157.0	3,124	147.0	176	164
C1414A	SIEM	ZR	370	8.10	157.0	522	147.0	196	176
C1414W	WE	ZR	407	8.10	157.0	423	147.0	176	176
C1616CSD	CE	ZR	416	8.10	176.8	1,960	161.0	236	224
C8016C	CE	ZR	413	8.10	178.3	848	161.0	231	220
W1414W	WE	ZR	394	7.76	159.8	619	152.4	196	179
W1414WL	WE	ZR	399	7.76	159.8	1,411	152.4	196	179
W1414WO	WE	ZR	358	7.76	159.8	698	152.4	196	179
W1414A	SIEM	ZR	377	7.76	159.8	722	152.4	196	179
W1414ATR	SIEM	ZR	361	7.76	159.8	288	152.4	196	179
W1414B	B&W	ZR	383	7.76	159.8	2	152.4	196	179
W1515W	WE	ZR	454	8.44	159.8	1,577	152.0	225	204
W1515WL	WE	ZR	455	8.44	159.8	3,349	152.0	225	204
W1515WO	WE	ZR	460	8.44	159.8	1,139	152.0	225	204
W1515A	SIEM	ZR	429	8.44	159.8	840	152.0	225	204
W1515APL	SIEM	ZR	[b]305	8.44	159.8	--	NA	225	204
W1515B	B&W	ZR	--	8.44	159.8	--	NA	225	204
W1717WL	WE	ZR	460	8.44	159.8	8,627	152.0	289	264
W1717WO	WE	ZR	425	8.44	159.8	2,349	155.0	289	264
W1717WV5	WE	ZR	426	8.44	159.8	278	152.0	289	264
W1717WV+	WE	ZIRLO	[b]426	8.44	159.8	--	NA	289	260
W1717WVH	WE	ZR	464	8.44	159.8	112	NA	289	264
W1717A	SIEM	ZR	402	8.44	159.8	290	152.0	289	264
W1717B	B&W	ZR	425	8.44	159.8	47	152.0	289	264
WST17W	WE	ZR	542	8.43	199.0	349	176.6	289	264
XFC14C	CE	ZR	366	8.10	146.0	337	137.0	196	168
XFC14A	SIEM	ZR	353	8.10	146.0	192	137.0	196	176
XFC14W	WE	ZR	374	8.10	146.0	--	NA	196	176
XHN15W	WE	SS	416	8.42	137.1	309	126.7	225	204
XHN15MS	NU	SS	406	8.42	137.1	2	126.7	225	204
XHN15MZ	NU	ZR	371	8.42	137.1	2	126.7	225	204
XHN15HS	GA	SS	406	8.42	137.1	1	126.7	225	204
XHN15HZ	GA	ZR	363	8.42	137.1	2	126.7	225	204
XHN15B	B&W	SS	412	8.42	137.1	524	126.7	225	204
XHN15BZ	B&W	ZR	412	8.42	137.1	--	126.7	225	208
XIP14B	B&W	SS	[c]152	6.14	135.7	--	99.0	206	206
XIP14W	WE	SS	191	6.27	138.8	160	126.7	196	180
XPA15C	CE	ZR	412	8.20	147.5	273	139.4	216	204
XPA15A	SIEM	ZR	391	8.20	147.5	460	139.4	225	216
XSL16C	CE	ZR	377	8.10	158.2	464	146.5	236	224
XSO14W	WE	SS	366	7.76	137.1	665	126.7	196	180
XSO14WZ	WE	ZR	--	7.76	137.1	--	126.7	196	179
XYR18W	WE	SS	273	7.62	111.8	76	95.0	305	305
XYR16U	UNC	ZR	239	7.62	111.8	73	95.0	240	231
XYR16A	SIEM	ZR	234	7.62	111.8	228	95.0	240	231
XYR16C	CE	ZR	229	7.62	111.8	156	95.0	240	231

[a]Eight part-length fuel rods.
[b]Estimated weight based on most current data.
[c]Average initial loading weight of thorium/uranium (kg).
-- = Not applicable.
NA = Not available.

Note: There are 4 temporarily discharged BWR assemblies and 69 temporarily discharged PWR assemblies that have not been assigned an assembly type code. These assemblies are *not* included in the above table. See Technical Note 10 in Appendix E.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Table B6. Assembly Type Summary by Reactor

Reactor Name	Assembly Type Code	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWDt/MTU)	Enrichment (weight percent)
Arkansas Nuclear 1	B1515B4	624	289.1	30.8	2.97
Arkansas Nuclear 2	C1616CSD	564	234.5	34.7	3.25
Beaver Valley 1	W1717WL	454	209.0	29.9	2.99
	W1717WO	2	0.8	35.8	3.20
	W1717WVH	56	26.0	34.9	3.48
Subtotal Beaver Valley 1		**512**	**235.9**		
Beaver Valley 2	W1717WL	156	71.8	26.4	2.60
	W1717WVH	32	14.9	35.0	3.32
	[a]Temps	4	1.9		
Subtotal Beaver Valley 2		**192**	**88.5**		
Big Rock Point	XBR11G	6	0.7	19.8	3.63
	XBR07G	4	0.5	1.5	3.63
	XBR08G	2	0.2	4.1	3.63
	XBR09G	143	19.6	14.5	3.59
	XBR09A	4	0.5	20.9	3.48
	XBR11A	212	27.3	24.9	3.41
	XBR11N	8	1.0	18.9	2.86
Subtotal Big Rock Point		**379**	**50.0**		
Braidwood 1	W1717WO	236	100.4	29.0	2.79
Braidwood 2	W1717WO	168	71.1	25.9	2.52
Browns Ferry 1	G4607G2	168	32.9	10.4	1.11
	G4607G3A	596	111.8	24.0	2.50
	G4608G4A	168	30.9	26.5	2.73
	G4608G5	156	28.6	28.1	2.66
	G4608GP	400	73.0	24.5	2.85
Subtotal Browns Ferry 1		**1,488**	**277.2**		
Browns Ferry 2	G4607G2	168	32.9	9.8	1.10
	G4607G3A	596	111.5	23.0	2.51
	G4608G4A	168	30.9	28.2	2.73
	G4608G5	162	29.5	27.7	2.88
	G4608GP	346	63.3	15.2	2.81
Subtotal Browns Ferry 2		**1,440**	**268.1**		
Browns Ferry 3	G4608G4B	764	142.8	20.7	2.20
	G4608G5	208	38.1	28.0	2.65
	G4608GP	57	10.4	25.8	2.66
Subtotal Browns Ferry 3		**1,029**	**191.3**		
Brunswick 1	G4608G4B	560	104.5	18.3	2.11
	G4608G5	360	65.9	28.9	2.78
	G4608GP	153	28.0	29.4	2.84
	G4608GB	143	26.4	33.8	2.99
Subtotal Brunswick 1		**1,216**	**224.7**		
Brunswick 2	G4607G3A	564	105.7	16.6	1.90
	G4608G4B	140	26.1	24.8	2.74
	G4608G5	300	55.0	26.4	2.83
	G4608GP	247	45.2	26.6	2.68
	G4608GB	148	27.3	33.0	2.99
	G4608G9	1	0.2	18.0	3.29
Subtotal Brunswick 2		**1,400**	**259.5**		
Byron 1	W1717WO	340	144.1	31.7	2.98

See footnotes at end of table.

Table B6. Assembly Type Summary by Reactor (Continued)

Reactor Name	Assembly Type Code	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWDt/MTU)	Enrichment (weight percent)
Byron 2	W1717WO	256	109.0	31.5	2.82
Callaway	W1717WL	193	89.0	24.4	2.60
	W1717WO	84	35.9	39.7	3.61
	W1717WV5	175	74.4	39.2	3.81
Subtotal Callaway		**452**	**199.2**		
Calvert Cliffs 1	C1414C	800	307.6	32.1	3.10
Calvert Cliffs 2	C1414C	612	235.0	32.8	3.08
Catawba 1	W1717WO	408	173.1	30.1	2.87
Catawba 2	W1717WO	280	118.9	28.3	2.67
Clinton 1	G4608GP	568	104.3	15.7	1.68
Comanche Peak 1	W1717WL	117	53.7	18.6	2.01
Cook 1	W1515WL	193	87.5	27.5	2.78
	W1515WO	287	132.1	37.5	3.42
	W1515A	386	165.0	31.5	2.91
Subtotal Cook 1		**866**	**384.7**		
Cook 2	W1717WL	365	167.6	28.8	2.98
	W1717WV5	2	0.9	21.0	4.20
	W1717A	290	116.6	39.3	3.76
Subtotal Cook 2		**657**	**285.1**		
Cooper Station	G4607G2	128	25.1	10.1	1.09
	G4607G3B	420	79.8	25.2	2.51
	G4608G4A	72	13.2	25.0	2.51
	G4608G4B	136	25.4	30.5	2.73
	G4608G5	192	35.1	30.8	2.82
	G4608GP	636	116.5	29.6	2.75
	G4608GB	92	17.0	31.2	2.79
Subtotal Cooper Station		**1,676**	**312.1**		
Crystal River 3	B1515B4	496	230.3	26.7	2.77
	B1515BZ	40	18.5	38.0	3.85
Subtotal Crystal River 3		**536**	**248.9**		
Davis-Besse	B1515B4	386	181.5	30.0	2.82
	[a]Temps	6	[b]0.0		
Subtotal Davis-Besse		**392**	**181.5**		
Diablo Canyon 1	W1717WL	337	155.4	33.5	3.06
	W1717WV5	39	16.6	39.7	4.01
Subtotal Diablo Canyon 1		**376**	**171.9**		
Diablo Canyon 2	W1717WL	308	141.9	31.8	3.05
Dresden 1	XDR06G	1	0.1	21.3	1.47
	XDR06G3B	163	16.6	16.9	1.83
	XDR06G3F	96	9.8	20.0	2.25
	XDR06G5	106	11.2	19.0	2.26
	XDR07GS	1	0.1	29.0	3.10
	XDR08G	1	0.1	23.3	1.95
	XDR06U	458	46.7	16.1	2.24
	XDR06A	66	6.3	4.5	2.23
Subtotal Dresden 1		**892**	**90.9**		

See footnotes at end of table.

Table B6. Assembly Type Summary by Reactor (Continued)

Reactor Name	Assembly Type Code	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWDt/MTU)	Enrichment (weight percent)
Dresden 2	G2307G2B	1,477	284.1	10.4	2.08
	G2307G3	32	6.0	23.7	2.29
	G2308G4	476	87.8	25.1	2.52
	G2308G5	160	28.3	28.7	2.67
	G2308GP	228	40.4	28.4	2.64
	G2308A	228	39.5	30.8	2.82
	G2309A	4	0.7	36.0	2.77
Subtotal Dresden 2		**2,605**	**486.7**		
Dresden 3	G2307G2B	724	140.2	17.3	2.13
	G2307G3	52	9.8	24.0	2.30
	G2308G4	508	93.4	25.7	2.56
	G2308GP	200	35.4	28.0	2.65
	G2308A	380	66.0	31.9	2.74
Subtotal Dresden 3		**1,864**	**344.8**		
Duane Arnold	G4607G3A	372	69.8	15.9	1.90
	G4608G4A	185	34.1	26.3	2.74
	G4608GP	388	71.0	28.6	2.86
	G4608GB	119	21.9	28.0	3.01
	G4608G8	88	15.7	33.7	3.01
Subtotal Duane Arnold		**1,152**	**212.5**		
Enrico Fermi 2	G4608GP	672	121.8	19.0	1.86
Farley 1	W1717WL	653	301.0	31.5	3.18
	W1717WO	2	0.8	46.3	3.11
Subtotal Farley 1		**655**	**301.8**		
Farley 2	W1717WL	498	229.7	32.2	3.22
Fitzpatrick	G4607G2	132	25.8	9.1	1.11
	G4607G3A	428	80.2	22.8	2.50
	G4608G4A	132	24.3	26.0	2.74
	G4608G5	136	24.8	26.8	2.78
	G4608GP	552	100.8	27.9	2.90
	G4608GB	196	36.1	29.8	2.99
	G4608G8	104	18.5	32.0	3.19
	G4608W	4	0.6	23.0	3.01
Subtotal Fitzpatrick		**1,684**	**311.3**		
Fort Calhoun	XFC14C	337	122.7	29.1	2.78
	XFC14A	192	67.8	37.3	3.57
Subtotal Fort Calhoun		**529**	**190.5**		
Ginna	W1414W	362	141.8	24.4	3.03
	W1414WO	143	50.4	39.6	3.49
	W1414A	194	72.3	37.1	3.22
	W1414B	2	0.8	24.4	3.22
Subtotal Ginna		**701**	**265.3**		
Grand Gulf 1	G4608GP	800	146.9	15.5	1.72
	G4608A	584	103.0	30.3	2.94
Subtotal Grand Gulf 1		**1,384**	**249.9**		

See footnotes at end of table.

Table B6. Assembly Type Summary by Reactor (Continued)

Reactor Name	Assembly Type Code	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWDt/MTU)	Enrichment (weight percent)
Haddam Neck	XHN15W	309	128.4	27.9	3.58
	XHN15MS	2	0.8	28.3	3.66
	XHN15MZ	2	0.7	25.6	2.95
	XHN15HS	1	0.4	32.2	3.99
	XHN15HZ	2	0.7	18.5	3.26
	XHN15B	524	215.6	33.7	3.99
Subtotal Haddam Neck.........		**840**	**346.7**		
Harris 1	W1717WL	205	95.0	29.5	2.83
	W1717WV5	19	8.1	40.4	3.87
Subtotal Harris 1		**224**	**103.1**		
Hatch 1	G4607G3A	560	104.9	20.9	2.33
	G4608G4A	92	16.9	23.1	2.51
	G4608G5	384	70.3	22.9	2.43
	G4608GP	328	60.1	25.2	2.82
	G4608GB	506	93.3	25.5	2.69
Subtotal Hatch 1		**1,870**	**345.5**		
Hatch 2	G4608G5	509	93.4	19.2	1.97
	G4608GP	407	74.5	25.0	2.74
	G4608GB	585	108.2	27.0	2.74
	G4608G9	1	0.2	14.0	3.14
	G4609A	4	0.7	36.0	2.79
Subtotal Hatch 2		**1,506**	**276.9**		
Hope Creek.....................	G4608GP	92	17.0	3.0	0.73
	G4608GB	916	169.5	22.7	2.27
Subtotal Hope Creek...........		**1,008**	**186.6**		
Humboldt Bay	XHB07G2	88	6.7	18.2	2.11
	XHB06G	176	13.4	17.2	2.43
	XHB06A	126	8.8	9.0	2.40
Subtotal Humboldt Bay		**390**	**28.9**		
Indian Point 1	XIP14W	160	30.6	16.7	4.11
Indian Point 2	W1515W	393	177.3	29.3	3.00
	W1515WL	267	122.3	36.0	3.32
	[a]Temps	8	[b]0.0		
Subtotal Indian Point 2.........		**668**	**299.6**		
Indian Point 3	W1515WL	409	186.8	31.5	3.03
	W1515WO	173	79.9	36.6	3.35
	[a]Temps	2	[b]0.0		
Subtotal Indian Point 3.........		**584**	**266.7**		
Kewaunee	W1414W	241	95.7	31.7	3.06
	W1414A	363	137.4	35.2	3.27
	[a]Temps	12	[b]0.0		
Subtotal Kewaunee		**616**	**233.1**		
LaCrosse.......................	XLC10L	155	18.6	14.5	3.77
	XLC10A	178	19.3	14.9	3.69
Subtotal LaCrosse.............		**333**	**38.0**		
LaSalle County 1	G4608G5	627	114.9	17.9	1.81
	G4608GP	192	35.0	28.9	2.42
	G4608GB	201	37.2	33.5	3.04
Subtotal LaSalle County 1......		**1,020**	**187.1**		

See footnotes at end of table.

Table B6. Assembly Type Summary by Reactor (Continued)

Reactor Name	Assembly Type Code	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWDt/MTU)	Enrichment (weight percent)
LaSalle County 2	G4608G5	764	139.6	19.7	1.89
	G4608GB	136	25.3	33.0	3.00
Subtotal LaSalle County 2......		**900**	**164.9**		
Limerick 1	G4608GP	128	23.8	10.5	0.98
	G4608GB	1,012	187.2	18.0	2.22
Subtotal Limerick 1............		**1,140**	**210.9**		
Limerick 2	G4608GB	224	41.7	5.9	0.85
Maine Yankee....................	C1414C	854	318.3	25.6	2.66
	C1414A	223	82.5	36.8	3.20
Subtotal Maine Yankee.........		**1,077**	**400.8**		
McGuire 1	W1717WL	193	88.7	27.5	2.60
	W1717WO	288	122.2	34.4	3.34
	W1717B	3	1.3	42.0	2.90
Subtotal McGuire 1		**484**	**212.2**		
McGuire 2	W1717WL	193	88.8	26.1	2.58
	W1717WO	283	120.2	35.2	3.28
Subtotal McGuire 2		**476**	**209.1**		
Millstone 1......................	G2307G2A	580	113.4	16.8	2.08
	G2307G2B	82	15.9	21.0	2.30
	G2307G3	154	28.9	24.1	2.45
	G2308G4	392	72.2	26.9	2.69
	G2308G5	148	26.2	26.4	2.66
	G2308GP	360	63.8	27.9	2.79
	G2308GB	212	37.7	27.8	3.00
	G2308G8A	188	33.5	32.0	2.98
Subtotal Millstone 1		**2,116**	**391.6**		
Millstone 2......................	C1414C	361	138.9	28.6	2.61
	C1414W	423	172.3	32.9	3.05
Subtotal Millstone 2		**784**	**311.2**		
Millstone 3......................	W1717WL	248	114.6	30.3	3.05
Monticello	G2307G2B	484	93.7	15.5	2.25
	G2307G3	20	3.7	23.8	2.30
	G2308G4	596	109.8	24.6	2.41
	G2308G5	112	19.8	30.8	2.74
	G2308GP	404	71.6	32.2	2.72
	G2308G8A	24	4.3	34.5	2.98
Subtotal Monticello............		**1,640**	**302.9**		
Nine Mile Point 1.................	G2307G2A	532	103.2	16.2	2.11
	G2307G2B	96	18.6	20.1	2.42
	G2307G3	108	20.2	26.0	2.50
	G2308G4	456	83.9	25.7	2.60
	G2308G5	184	32.5	27.9	2.77
	G2308GP	244	43.0	24.0	2.77
Subtotal Nine Mile Point 1......		**1,620**	**301.4**		
Nine Mile Point 2.................	G4608GP	332	61.4	12.5	1.47
	G4608GB	112	20.7	22.0	2.19
Subtotal Nine Mile Point 2......		**444**	**82.0**		

See footnotes at end of table.

Table B6. Assembly Type Summary by Reactor (Continued)

Reactor Name	Assembly Type Code	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWDt/MTU)	Enrichment (weight percent)
North Anna 1	W1717WL	492	226.5	32.2	3.26
	[a]Temps	8	[b]0.0		
Subtotal North Anna 1		**500**	**226.5**		
North Anna 2	W1717WL	487	224.7	34.8	3.33
	W1717WVH	4	1.9	23.0	4.21
	[a]Temps	2	[b]0.0		
Subtotal North Anna 2		**493**	**226.6**		
Oconee 1	B1515B4	569	264.5	26.7	2.75
	B1515B4Z	4	1.9	42.0	3.30
	B1515B6	43	19.9	42.6	3.56
	B1515BZ	206	95.5	37.9	3.33
	B1515BGD	4	1.7	43.0	3.92
Subtotal Oconee 1		**826**	**383.5**		
Oconee 2	B1515B4	568	263.5	29.1	2.89
	B1515B5Z	20	9.3	36.0	3.20
	B1515B6	53	24.5	42.0	3.40
	B1515BZ	91	42.2	36.2	3.22
	B1717B	4	1.8	29.5	2.84
Subtotal Oconee 2		**736**	**341.3**		
Oconee 3	B1515B4	505	233.9	28.3	2.83
	B1515B6	13	6.0	37.0	3.20
	B1515B7	43	19.9	41.0	3.50
	B1515BZ	187	86.7	34.1	3.24
Subtotal Oconee 3		**748**	**346.4**		
Oyster Creek	G2307G2A	560	109.3	17.3	2.11
	G2307G2B	156	30.2	22.7	2.62
	G2308G5	87	15.4	26.0	2.39
	G2308GP	156	27.5	29.2	2.84
	G2308GB	40	7.1	25.6	2.68
	G2307A	260	47.4	23.5	2.64
	G2308A	617	108.0	25.0	2.50
Subtotal Oyster Creek		**1,876**	**344.8**		
Palisades	XPA15C	273	112.6	16.0	2.47
	XPA15A	460	179.9	30.4	2.92
Subtotal Palisades		**733**	**292.5**		
Palo Verde 1	C8016C	276	113.6	28.1	2.73
Palo Verde 2	C8016C	288	118.1	29.2	2.85
Palo Verde 3	C8016C	284	115.9	27.2	2.79
Peach Bottom 2	G4607G2	168	32.9	9.5	1.10
	G4607G3A	596	111.7	22.7	2.51
	G4608G4A	360	66.3	25.5	2.74
	G4608G5	260	47.5	29.2	2.86
	G4608GP	552	100.8	28.0	2.89
	G4608GB	228	41.7	31.4	2.99
Subtotal Peach Bottom 2		**2,164**	**400.8**		

See footnotes at end of table.

Table B6. Assembly Type Summary by Reactor (Continued)

Reactor Name	Assembly Type Code	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWDt/MTU)	Enrichment (weight percent)
Peach Bottom 3	G4607G3B	764	145.0	20.1	2.19
	G4608G4B	187	34.9	24.1	2.74
	G4608G5	252	46.1	29.7	2.83
	G4608GP	741	135.1	29.7	2.94
Subtotal Peach Bottom 3		**1,944**	**361.2**		
Perry 1	G4608GB	744	137.1	17.4	1.88
	[a]Temps	4	[b]0.0		
Subtotal Perry 1		**748**	**137.1**		
Pilgrim 1	G2307G2B	580	111.9	14.9	2.19
	G2308G4	580	106.7	20.7	2.30
	G2308GP	328	58.1	26.9	2.73
Subtotal Pilgrim 1		**1,488**	**276.7**		
Point Beach 1	W1414W	10	4.0	38.0	3.21
	W1414WL	517	206.0	31.3	3.06
	W1414WO	109	39.2	41.4	3.45
Subtotal Point Beach 1		**636**	**249.2**		
Point Beach 2	W1414W	6	2.4	41.8	3.20
	W1414WL	412	164.5	33.3	3.09
	W1414WO	148	53.1	40.5	3.42
Subtotal Point Beach 2		**566**	**220.0**		
Prairie Island 1	W1414WL	241	95.9	30.6	3.01
	W1414WO	149	53.5	40.3	3.60
	W1414A	89	33.6	37.5	3.44
	W1414ATR	145	52.9	37.7	3.33
Subtotal Prairie Island 1		**624**	**235.8**		
Prairie Island 2	W1414WL	241	96.8	31.7	3.11
	W1414WO	149	53.6	39.4	3.57
	W1414A	76	28.8	37.3	3.45
	W1414ATR	143	51.6	38.6	3.43
Subtotal Prairie Island 2		**609**	**230.7**		
Quad Cities 1	G2307G2B	693	133.5	20.1	2.13
	G2307G3	28	5.2	29.0	2.24
	G2308G4	376	69.2	28.0	2.52
	G2308G5	188	33.3	30.1	2.63
	G2308GP	336	59.5	29.1	2.76
	G2308GB	432	76.6	31.5	2.75
Subtotal Quad Cities 1		**2,053**	**377.3**		
Quad Cities 2	G2307G2B	755	144.8	19.8	2.14
	G2308G4	492	90.6	28.2	2.55
	G2308GP	276	48.8	29.1	2.66
	G2308GB	420	74.3	31.5	2.73
Subtotal Quad Cities 2		**1,943**	**358.6**		
Rancho Seco	B1515B4	437	202.5	28.2	2.92
	B1515BZ	56	25.9	10.0	3.06
Subtotal Rancho Seco		**493**	**228.4**		
River Bend 1	G4608GB	764	141.6	20.8	2.07
Robinson 2	W1515WL	314	141.5	23.7	2.63
	W1515A	454	195.1	33.5	3.03
Subtotal Robinson 2		**768**	**336.6**		

See footnotes at end of table.

Table B6. Assembly Type Summary by Reactor (Continued)

Reactor Name	Assembly Type Code	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWDt/MTU)	Enrichment (weight percent)
St. Lucie 1	C1414C	497	189.6	28.9	2.81
	C1414A	299	110.7	37.1	3.47
Subtotal St. Lucie 1		796	**300.3**		
St. Lucie 2	XSL16C	464	175.7	32.1	2.93
Salem 1	W1717WL	611	281.5	32.5	3.23
	W1717WO	2	0.8	34.7	2.79
	W1717WVH	19	8.8	33.2	3.66
	[a]Temps	24	[b]0.0		
Subtotal Salem 1		656	291.2		
Salem 2	W1717WL	436	200.9	31.3	3.21
San Onofre 1	XSO14W	665	244.3	27.3	3.86
San Onofre 2	C1616CSD	484	200.4	30.4	3.10
San Onofre 3	C1616CSD	484	200.3	30.6	3.11
Seabrook	W1717WL	136	63.0	20.2	2.06
Sequoyah 1	W1717WL	349	160.6	31.6	3.06
	W1717WVH	1	0.5	20.0	3.55
Subtotal Sequoyah 1		350	**161.1**		
Sequoyah 2	W1717WL	387	178.2	31.6	3.06
Shoreham	G4608GP	560	102.5	0.5	1.88
South Texas 1	WST17W	233	126.2	21.3	2.37
	[a]Temps	3	[b]0.0		
Subtotal South Texas 1		236	**126.2**		
South Texas 2	WST17W	116	62.6	19.8	2.32
Summer	W1717WL	329	151.5	31.6	3.16
	W1717WV5	43	18.2	37.7	3.52
Subtotal Summer		372	**169.7**		
Surry 1	W1515W	614	279.5	29.6	2.99
	W1515WL	57	26.2	43.6	3.64
	W1515WO	8	3.7	37.0	3.80
	W1717WL	2	0.9	16.1	1.86
Subtotal Surry 1		681	**310.3**		
Surry 2	W1515W	570	259.6	31.3	3.12
	W1515WL	20	9.2	36.0	3.80
	W1717WL	2	0.9	35.3	3.10
Subtotal Surry 2		592	**269.8**		
Susquehanna 1	G4608GP	764	140.2	18.3	1.88
	G4608A	488	85.8	30.4	2.83
	G4609A	152	26.3	36.0	3.31
Subtotal Susquehanna 1		**1,404**	**252.3**		
Susquehanna 2	G4608GP	764	140.1	18.9	1.89
	G4609A	472	81.7	34.7	3.29
Subtotal Susquehanna 2		**1,236**	**221.8**		

See footnotes at end of table.

Table B6. Assembly Type Summary by Reactor (Continued)

Reactor Name	Assembly Type Code	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWDt/MTU)	Enrichment (weight percent)
Three Mile Island 1	B1515B4	521	238.0	28.0	2.81
Trojan	W1717WL	736	339.0	32.6	3.08
	W1717B	44	19.8	8.2	3.56
Subtotal Trojan		**780**	**358.8**		
Turkey Point 3	W1515WL	492	223.5	28.9	2.83
	W1515WO	113	52.0	37.7	3.34
Subtotal Turkey Point 3		**605**	**275.4**		
Turkey Point 4	W1515WL	483	219.5	29.5	2.85
	W1515WO	64	29.4	32.3	3.18
Subtotal Turkey Point 4		**547**	**248.9**		
Vermont Yankee	G4607G2	378	72.8	8.5	2.50
	G4607G3A	40	7.5	18.6	2.30
	G4608G4A	608	111.7	22.3	2.46
	G4608GP	664	121.7	26.5	2.89
	G4608GB	136	25.1	29.4	3.00
	G4608G8	24	4.3	29.0	3.20
Subtotal Vermont Yankee		**1,850**	**343.1**		
Vogtle 1	W1717WL	223	103.6	28.6	2.77
Vogtle 2	W1717WL	177	82.0	25.9	2.56
Washington Nuclear 2	G4608GP	764	140.0	18.6	1.88
	G4608A	128	22.6	30.3	2.71
	G4608AP	8	1.4	28.0	2.72
	G4609A	12	2.1	31.0	2.72
Subtotal Washington Nuclear 2		**912**	**166.1**		
Waterford 3	C1616CSD	428	176.4	31.6	3.04
Wolf Creek 1	W1717WL	340	157.4	30.6	3.01
Yankee Rowe	XYR18W	76	20.8	25.5	4.94
	XYR16U	73	17.4	27.5	3.83
	XYR16A	228	53.2	29.0	3.70
	XYR16C	156	35.8	24.3	3.83
Subtotal Yankee Rowe		**533**	**127.2**		
Zion 1	W1515WL	567	258.4	31.5	2.93
	W1515WO	235	108.1	34.8	3.13
Subtotal Zion 1		**802**	**366.5**		
Zion 2	W1515WL	547	248.7	31.9	2.95
	W1515WO	259	118.9	35.1	3.25
Subtotal Zion 2		**806**	**367.7**		
TOTAL		**91,039**	**25,957.7**		

[a]Temps represent temporarily discharged assemblies with no assigned assembly type.
[b]No weight reported for temporarily discharged assemblies with no assigned assembly type.
MTU = Metric tons of uranium; GWDt/MTU = Gigawattdays thermal per metric ton of uranium.
Note: Totals may not equal sum of components because of independent rounding. See Technical Note 11 in Appendix E.
Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Table B7. Assembly Type Summary by Assembly Type

Assembly Type Code	Reactor Name	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWDt/MTU)	Enrichment (weight percent)
B1515B4	Arkansas Nuclear 1	624	289.1	30.8	2.97
	Crystal River 3	496	230.3	26.7	2.77
	Davis-Besse	386	181.5	30.0	2.82
	Oconee 1	569	264.5	26.7	2.75
	Oconee 2	568	263.5	29.1	2.89
	Oconee 3	505	233.9	28.3	2.83
	Rancho Seco	437	202.5	28.2	2.92
	Three Mile Island 1	521	238.0	28.0	2.81
Subtotal B1515B4		**4,106**	**1,903.3**		
B1515B4Z	Oconee 1	4	1.9	42.0	3.30
B1515B5Z	Oconee 2	20	9.3	36.0	3.20
B1515B6	Oconee 1	43	19.9	42.6	3.56
	Oconee 2	53	24.5	42.0	3.40
	Oconee 3	13	6.0	37.0	3.20
Subtotal B1515B6		**109**	**50.4**		
B1515B7	Oconee 3	43	19.9	41.0	3.50
B1515BZ	Crystal River 3	40	18.5	38.0	3.85
	Oconee 1	206	95.5	37.9	3.33
	Oconee 2	91	42.2	36.2	3.22
	Oconee 3	187	86.7	34.1	3.24
	Rancho Seco	56	25.9	10.0	3.06
Subtotal B1515BZ		**580**	**268.8**		
B1515BGD	Oconee 1	4	1.7	43.0	3.92
B1717B	Oconee 2	4	1.8	29.5	2.84
C1414C	Calvert Cliffs 1	800	307.6	32.1	3.10
	Calvert Cliffs 2	612	235.0	32.8	3.08
	Maine Yankee	854	318.3	25.6	2.66
	Millstone 2	361	138.9	28.6	2.61
	St. Lucie 1	497	189.6	28.9	2.81
Subtotal C1414C		**3,124**	**1,189.4**		
C1414A	Maine Yankee	223	82.5	36.8	3.20
	St. Lucie 1	299	110.7	37.1	3.47
Subtotal C1414A		**522**	**193.2**		
C1414W....................	Millstone 2	423	172.3	32.9	3.05
C1616CSD	Arkansas Nuclear 2	564	234.5	34.7	3.25
	San Onofre 2	484	200.4	30.4	3.10
	San Onofre 3	484	200.3	30.6	3.11
	Waterford 3	428	176.4	31.6	3.04
Subtotal C1616CSD........		**1,960**	**811.6**		
C8016C	Palo Verde 1	276	113.6	28.1	2.73
	Palo Verde 2	288	118.1	29.2	2.85
	Palo Verde 3	284	115.9	27.2	2.79
Subtotal C8016C		**848**	**347.7**		
G2307G2A..................	Millstone 1	580	113.4	16.8	2.08
	Nine Mile Point 1	532	103.2	16.2	2.11
	Oyster Creek	560	109.3	17.3	2.11
Subtotal G2307G2A........		**1,672**	**325.9**		

See footnotes at end of table.

Table B7. Assembly Type Summary by Assembly Type (Continued)

Assembly Type Code	Reactor Name	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWDt/MTU)	Enrichment (weight percent)
G2307G2B	Dresden 2	1,477	284.1	10.4	2.08
	Dresden 3	724	140.2	17.3	2.13
	Millstone 1	82	15.9	21.0	2.30
	Monticello	484	93.7	15.5	2.25
	Nine Mile Point 1	96	18.6	20.1	2.42
	Oyster Creek	156	30.2	22.7	2.62
	Pilgrim 1	580	111.9	14.9	2.19
	Quad Cities 1	693	133.5	20.1	2.13
	Quad Cities 2	755	144.8	19.8	2.14
Subtotal G2307G2B		**5,047**	**972.9**		
G2307G3	Dresden 2	32	6.0	23.7	2.29
	Dresden 3	52	9.8	24.0	2.30
	Millstone 1	154	28.9	24.1	2.45
	Monticello	20	3.7	23.8	2.30
	Nine Mile Point 1	108	20.2	26.0	2.50
	Quad Cities 1	28	5.2	29.0	2.24
Subtotal G2307G3		**394**	**73.9**		
G2308G4	Dresden 2	476	87.8	25.1	2.52
	Dresden 3	508	93.4	25.7	2.56
	Millstone 1	392	72.2	26.9	2.69
	Monticello	596	109.8	24.6	2.41
	Nine Mile Point 1	456	83.9	25.7	2.60
	Pilgrim 1	580	106.7	20.7	2.30
	Quad Cities 1	376	69.2	28.0	2.52
	Quad Cities 2	492	90.6	28.2	2.55
Subtotal G2308G4		**3,876**	**713.7**		
G2308G5	Dresden 2	160	28.3	28.7	2.67
	Millstone 1	148	26.2	26.4	2.66
	Monticello	112	19.8	30.8	2.74
	Nine Mile Point 1	184	32.5	27.9	2.77
	Oyster Creek	87	15.4	26.0	2.39
	Quad Cities 1	188	33.3	30.1	2.63
Subtotal G2308G5		**879**	**155.5**		
G2308GP	Dresden 2	228	40.4	28.4	2.64
	Dresden 3	200	35.4	28.0	2.65
	Millstone 1	360	63.8	27.9	2.79
	Monticello	404	71.6	32.2	2.72
	Nine Mile Point 1	244	43.0	24.0	2.77
	Oyster Creek	156	27.5	29.2	2.84
	Pilgrim 1	328	58.1	26.9	2.73
	Quad Cities 1	336	59.5	29.1	2.76
	Quad Cities 2	276	48.8	29.1	2.66
Subtotal G2308GP		**2,532**	**448.1**		
G2308GB	Millstone 1	212	37.7	27.8	3.00
	Oyster Creek	40	7.1	25.6	2.68
	Quad Cities 1	432	76.6	31.5	2.75
	Quad Cities 2	420	74.3	31.5	2.73
Subtotal G2308GB		**1,104**	**195.7**		
G2308G8A	Millstone 1	188	33.5	32.0	2.98
	Monticello	24	4.3	34.5	2.98
Subtotal G2308G8A		**212**	**37.8**		
G2307A	Oyster Creek	260	47.4	23.5	2.64

See footnotes at end of table.

Table B7. Assembly Type Summary by Assembly Type (Continued)

Assembly Type Code	Reactor Name	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWDt/MTU)	Enrichment (weight percent)
G2308A	Dresden 2	228	39.5	30.8	2.82
	Dresden 3	380	66.0	31.9	2.74
	Oyster Creek	617	108.0	25.0	2.50
Subtotal G2308A		**1,225**	**213.5**		
G2309A	Dresden 2	4	0.7	36.0	2.77
G4607G2	Browns Ferry 1	168	32.9	10.4	1.11
	Browns Ferry 2	168	32.9	9.8	1.10
	Cooper Station	128	25.1	10.1	1.09
	Fitzpatrick	132	25.8	9.1	1.11
	Peach Bottom 2	168	32.9	9.5	1.10
	Vermont Yankee	378	72.8	8.5	2.50
Subtotal G4607G2		**1,142**	**222.4**		
G4607G3A	Browns Ferry 1	596	111.8	24.0	2.50
	Browns Ferry 2	596	111.5	23.0	2.51
	Brunswick 2	564	105.7	16.6	1.90
	Duane Arnold	372	69.8	15.9	1.90
	Fitzpatrick	428	80.2	22.8	2.50
	Hatch 1	560	104.9	20.9	2.33
	Peach Bottom 2	596	111.7	22.7	2.51
	Vermont Yankee	40	7.5	18.6	2.30
Subtotal G4607G3A		**3,752**	**703.3**		
G4607G3B	Cooper Station	420	79.8	25.2	2.51
	Peach Bottom 3	764	145.0	20.1	2.19
Subtotal G4607G3B		**1,184**	**224.9**		
G4608G4A	Browns Ferry 1	168	30.9	26.5	2.73
	Browns Ferry 2	168	30.9	28.2	2.73
	Cooper Station	72	13.2	25.0	2.51
	Duane Arnold	185	34.1	26.3	2.74
	Fitzpatrick	132	24.3	26.0	2.74
	Hatch 1	92	16.9	23.1	2.51
	Peach Bottom 2	360	66.3	25.5	2.74
	Vermont Yankee	608	111.7	22.3	2.46
Subtotal G4608G4A		**1,785**	**328.3**		
G4608G4B	Browns Ferry 3	764	142.8	20.7	2.20
	Brunswick 1	560	104.5	18.3	2.11
	Brunswick 2	140	26.1	24.8	2.74
	Cooper Station	136	25.4	30.5	2.73
	Peach Bottom 3	187	34.9	24.1	2.74
Subtotal G4608G4B		**1,787**	**333.7**		
G4608G5	Browns Ferry 1	156	28.6	28.1	2.66
	Browns Ferry 2	162	29.5	27.7	2.88
	Browns Ferry 3	208	38.1	28.0	2.65
	Brunswick 1	360	65.9	28.9	2.78
	Brunswick 2	300	55.0	26.4	2.83
	Cooper Station	192	35.1	30.8	2.82
	Fitzpatrick	136	24.8	26.8	2.78
	Hatch 1	384	70.3	22.9	2.43
	Hatch 2	509	93.4	19.2	1.97
	LaSalle County 1	627	114.9	17.9	1.81
	LaSalle County 2	764	139.6	19.7	1.89
	Peach Bottom 2	260	47.5	29.2	2.86
	Peach Bottom 3	252	46.1	29.7	2.83
Subtotal G4608G5		**4,310**	**788.7**		

See footnotes at end of table.

Table B7. Assembly Type Summary by Assembly Type (Continued)

Assembly Type Code	Reactor Name	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWDt/MTU)	Enrichment (weight percent)
G4608GP	Browns Ferry 1	400	73.0	24.5	2.85
	Browns Ferry 2	346	63.3	15.2	2.81
	Browns Ferry 3	57	10.4	25.8	2.66
	Brunswick 1	153	28.0	29.4	2.84
	Brunswick 2	247	45.2	26.6	2.68
	Clinton 1	568	104.3	15.7	1.68
	Cooper Station	636	116.5	29.6	2.75
	Duane Arnold	388	71.0	28.6	2.86
	Enrico Fermi 2	672	121.8	19.0	1.86
	Fitzpatrick	552	100.8	27.9	2.90
	Grand Gulf 1	800	146.9	15.5	1.72
	Hatch 1	328	60.1	25.2	2.82
	Hatch 2	407	74.5	25.0	2.74
	Hope Creek	92	17.0	3.0	0.73
	LaSalle County 1	192	35.0	28.9	2.42
	Limerick 1	128	23.8	10.5	0.98
	Nine Mile Point 2	332	61.4	12.5	1.47
	Peach Bottom 2	552	100.8	28.0	2.89
	Peach Bottom 3	741	135.1	29.7	2.94
	Shoreham	560	102.5	0.5	1.88
	Susquehanna 1	764	140.2	18.3	1.88
	Susquehanna 2	764	140.1	18.9	1.89
	Vermont Yankee	664	121.7	26.5	2.89
	Washington Nuclear 2	764	140.0	18.6	1.88
Subtotal G4608GP		**11,107**	**2,033.7**		
G4608GB	Brunswick 1	143	26.4	33.8	2.99
	Brunswick 2	148	27.3	33.0	2.99
	Cooper Station	92	17.0	31.2	2.79
	Duane Arnold	119	21.9	28.0	3.01
	Fitzpatrick	196	36.1	29.8	2.99
	Hatch 1	506	93.3	25.5	2.69
	Hatch 2	585	108.2	27.0	2.74
	Hope Creek	916	169.5	22.7	2.27
	LaSalle County 1	201	37.2	33.5	3.04
	LaSalle County 2	136	25.3	33.0	3.00
	Limerick 1	1,012	187.2	18.0	2.22
	Limerick 2	224	41.7	5.9	0.85
	Nine Mile Point 2	112	20.7	22.0	2.19
	Peach Bottom 2	228	41.7	31.4	2.99
	Perry 1	744	137.1	17.4	1.88
	River Bend 1	764	141.6	20.8	2.07
	Vermont Yankee	136	25.1	29.4	3.00
Subtotal G4608GB		**6,262**	**1,157.1**		
G4608G8	Duane Arnold	88	15.7	33.7	3.01
	Fitzpatrick	104	18.5	32.0	3.19
	Vermont Yankee	24	4.3	29.0	3.20
Subtotal G4608G8		**216**	**38.5**		
G4608G9	Brunswick 2	1	0.2	18.0	3.29
	Hatch 2	1	0.2	14.0	3.14
Subtotal G4608G9		**2**	**0.4**		
G4608A	Grand Gulf 1	584	103.0	30.3	2.94
	Susquehanna 1	488	85.8	30.4	2.83
	Washington Nuclear 2	128	22.6	30.3	2.71
Subtotal G4608A		**1,200**	**211.3**		
G4608AP	Washington Nuclear 2	8	1.4	28.0	2.72

See footnotes at end of table.

Table B7. Assembly Type Summary by Assembly Type (Continued)

Assembly Type Code	Reactor Name	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWDt/MTU)	Enrichment (weight percent)
G4608W	Fitzpatrick	4	0.6	23.0	3.01
G4609A	Hatch 2	4	0.7	36.0	2.79
	Susquehanna 1	152	26.3	36.0	3.31
	Susquehanna 2	472	81.7	34.7	3.29
	Washington Nuclear 2	12	2.1	31.0	2.72
Subtotal G4609A		**640**	**110.8**		
W1414W	Ginna	362	141.8	24.4	3.03
	Kewaunee	241	95.7	31.7	3.06
	Point Beach 1	10	4.0	38.0	3.21
	Point Beach 2	6	2.4	41.8	3.20
Subtotal W1414W		**619**	**243.9**		
W1414WL	Point Beach 1	517	206.0	31.3	3.06
	Point Beach 2	412	164.5	33.3	3.09
	Prairie Island 1	241	95.9	30.6	3.01
	Prairie Island 2	241	96.8	31.7	3.11
Subtotal W1414WL		**1,411**	**563.1**		
W1414WO	Ginna	143	50.4	39.6	3.49
	Point Beach 1	109	39.2	41.4	3.45
	Point Beach 2	148	53.1	40.5	3.42
	Prairie Island 1	149	53.5	40.3	3.60
	Prairie Island 2	149	53.6	39.4	3.57
Subtotal W1414WO		**698**	**249.8**		
W1414A	Ginna	194	72.3	37.1	3.22
	Kewaunee	363	137.4	35.2	3.27
	Prairie Island 1	89	33.6	37.5	3.44
	Prairie Island 2	76	28.8	37.3	3.45
Subtotal W1414A		**722**	**272.0**		
W1414ATR	Prairie Island 1	145	52.9	37.7	3.33
	Prairie Island 2	143	51.6	38.6	3.43
Subtotal W1414ATR		**288**	**104.5**		
W1414B	Ginna	2	0.8	24.4	3.22
W1515W	Indian Point 2	393	177.3	29.3	3.00
	Surry 1	614	279.5	29.6	2.99
	Surry 2	570	259.6	31.3	3.12
Subtotal W1515W		**1,577**	**716.4**		
W1515WL	Cook 1	193	87.5	27.5	2.78
	Indian Point 2	267	122.3	36.0	3.32
	Indian Point 3	409	186.8	31.5	3.03
	Robinson 2	314	141.5	23.7	2.63
	Surry 1	57	26.2	43.6	3.64
	Surry 2	20	9.2	36.0	3.80
	Turkey Point 3	492	223.5	28.9	2.83
	Turkey Point 4	483	219.5	29.5	2.85
	Zion 1	567	258.4	31.5	2.93
	Zion 2	547	248.7	31.9	2.95
Subtotal W1515WL		**3,349**	**1,523.7**		

See footnotes at end of table.

Table B7. Assembly Type Summary by Assembly Type (Continued)

Assembly Type Code	Reactor Name	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWDt/MTU)	Enrichment (weight percent)
W1515WO	Cook 1	287	132.1	37.5	3.42
	Indian Point 3	173	79.9	36.6	3.35
	Surry 1	8	3.7	37.0	3.80
	Turkey Point 3	113	52.0	37.7	3.34
	Turkey Point 4	64	29.4	32.3	3.18
	Zion 1	235	108.1	34.8	3.13
	Zion 2	259	118.9	35.1	3.25
Subtotal W1515WO		**1,139**	**524.2**		
W1515A	Cook 1	386	165.0	31.5	2.91
	Robinson 2	454	195.1	33.5	3.03
Subtotal W1515A		**840**	**360.1**		
W1717WL	Beaver Valley 1	454	209.0	29.9	2.99
	Beaver Valley 2	156	71.8	26.4	2.60
	Callaway	193	89.0	24.4	2.60
	Comanche Peak 1	117	53.7	18.6	2.01
	Cook 2	365	167.6	28.8	2.98
	Diablo Canyon 1	337	155.4	33.5	3.06
	Diablo Canyon 2	308	141.9	31.8	3.05
	Farley 1	653	301.0	31.5	3.18
	Farley 2	498	229.7	32.2	3.22
	Harris 1	205	95.0	29.5	2.83
	McGuire 1	193	88.7	27.5	2.60
	McGuire 2	193	88.8	26.1	2.58
	Millstone 3	248	114.6	30.3	3.05
	North Anna 1	492	226.5	32.2	3.26
	North Anna 2	487	224.7	34.8	3.33
	Salem 1	611	281.5	32.5	3.23
	Salem 2	436	200.9	31.3	3.21
	Seabrook	136	63.0	20.2	2.06
	Sequoyah 1	349	160.6	31.6	3.06
	Sequoyah 2	387	178.2	31.6	3.06
	Summer	329	151.5	31.6	3.16
	Surry 1	2	0.9	16.1	1.86
	Surry 2	2	0.9	35.3	3.10
	Trojan	736	339.0	32.6	3.08
	Vogtle 1	223	103.6	28.6	2.77
	Vogtle 2	177	82.0	25.9	2.56
	Wolf Creek 1	340	157.4	30.6	3.01
Subtotal W1717WL		**8,627**	**3,976.8**		
W1717WO	Beaver Valley 1	2	0.8	35.8	3.20
	Braidwood 1	236	100.4	29.0	2.79
	Braidwood 2	168	71.1	25.9	2.52
	Byron 1	340	144.1	31.7	2.98
	Byron 2	256	109.0	31.5	2.82
	Callaway	84	35.9	39.7	3.61
	Catawba 1	408	173.1	30.1	2.87
	Catawba 2	280	118.9	28.3	2.67
	Farley 1	2	0.8	46.3	3.11
	McGuire 1	288	122.2	34.4	3.34
	McGuire 2	283	120.2	35.2	3.28
	Salem 1	2	0.8	34.7	2.79
Subtotal W1717WO		**2,349**	**997.4**		

See footnotes at end of table.

Table B7. Assembly Type Summary by Assembly Type (Continued)

Assembly Type Code	Reactor Name	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWDt/MTU)	Enrichment (weight percent)
W1717WV5	Callaway	175	74.4	39.2	3,81
	Cook 2	2	0.9	21.0	4.20
	Diablo Canyon 1	39	16.6	39.7	4.01
	Harris 1	19	8.1	40.4	3.87
	Summer	43	18.2	37.7	3.52
Subtotal W1717WV5		**278**	**118.1**		
W1717WVH	Beaver Valley 1	56	26.0	34.9	3.48
	Beaver Valley 2	32	14.9	35.0	3.32
	North Anna 2	4	1.9	23.0	4.21
	Salem 1	19	8.8	33.2	3.66
	Sequoyah 1	1	0.5	20.0	3.55
Subtotal W1717WVH		**112**	**52.0**		
W1717A	Cook 2	290	116.6	39.3	3.76
W1717B	McGuire 1	3	1.3	42.0	2.90
	Trojan	44	19.8	8.2	3.56
Subtotal W1717B		**47**	**21.1**		
WST17W	South Texas 1	233	126.2	21.3	2.37
	South Texas 2	116	62.6	19.8	2.32
Subtotal WST17W		**349**	**188.8**		
XBR11G	Big Rock Point	6	0.7	19.8	3.63
XBR07G	Big Rock Point	4	0.5	1.5	3.63
XBR08G	Big Rock Point	2	0.2	4.1	3.63
XBR09G	Big Rock Point	143	19.6	14.5	3.59
XBR09A	Big Rock Point	4	0.5	20.9	3.48
XBR11A	Big Rock Point	212	27.3	24.9	3.41
XBR11N	Big Rock Point	8	1.0	18.9	2.86
XDR06G	Dresden 1	1	0.1	21.3	1.47
XDR06G3B	Dresden 1	163	16.6	16.9	1.83
XDR06G3F	Dresden 1	96	9.8	20.0	2.25
XDR06G5	Dresden 1	106	11.2	19.0	2.26
XDR07GS	Dresden 1	1	0.1	29.0	3.10
XDR08G	Dresden 1	1	0.1	23.3	1.95
XDR06U	Dresden 1	458	46.7	16.1	2.24
XDR06A	Dresden 1	66	6.3	4.5	2.23
XFC14C	Fort Calhoun	337	122.7	29.1	2.78
XFC14A	Fort Calhoun	192	67.8	37.3	3.57
XHB07G2	Humboldt Bay	88	6.7	18.2	2.11

See footnotes at end of table.

Table B7. Assembly Type Summary by Assembly Type (Continued)

Assembly Type Code	Reactor Name	Number of Assemblies	Initial Uranium Content (MTU)	Average Burnup (GWDt/MTU)	Enrichment (weight percent)
XHB06G	Humboldt Bay	176	13.4	17.2	2.43
XHB06A	Humboldt Bay	126	8.8	9.0	2.40
XHN15W	Haddam Neck	309	128.4	27.9	3.58
XHN15MS	Haddam Neck	2	0.8	28.3	3.66
XHN15MZ	Haddam Neck	2	0.7	25.6	2.95
XHN15HS	Haddam Neck	1	0.4	32.2	3.99
XHN15HZ	Haddam Neck	2	0.7	18.5	3.26
XHN15B	Haddam Neck	524	215.6	33.7	3.99
XIP14W	Indian Point 1	160	30.6	16.7	4.11
XLC10L	LaCrosse	155	18.6	14.5	3.77
XLC10A	LaCrosse	178	19.3	14.9	3.69
XPA15C	Palisades	273	112.6	16.0	2.47
XPA15A	Palisades	460	179.9	30.4	2.92
XSL16C	St. Lucie 2	464	175.7	32.1	2.93
XSO14W	San Onofre 1	665	244.3	27.3	3.86
XYR18W	Yankee Rowe	76	20.8	25.5	4.94
XYR16U	Yankee Rowe	73	17.4	27.5	3.83
XYR16A	Yankee Rowe	228	53.2	29.0	3.70
XYR16C	Yankee Rowe	156	35.8	24.3	3.83
TOTAL		[a]91,039	[b]25,957.7		

[a]Includes 4 temporarily discharged boiling-water reactor (BWR) assemblies and 69 temporarily discharged pressurized-water reactor (PWR) assemblies with no assigned assembly type. See Technical Note 10 in Appendix E.

[b]Includes 1.9 metric tons of uranium (MTU) for temporarily discharged PWR assemblies with no assigned assembly type. See Technical Note 10 in Appendix E.

GWDt/MTU = Gigawattdays thermal per metric ton of uranium.

Note: Totals may not equal sum of components because of independent rounding. See Technical Note 11 in Appendix E.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Table B8. Spent Fuel Assemblies, by Type, Discharged by Year

Assembly Type Code[a]	1968-1969	1970-1971	1972-1973	1974-1975	1976-1977	1978-1979	1980-1981	1982-1983	1984-1985	1986-1987	1988-1989	1990-1991	1992[b]	Temps[c]	Total
Boiling-Water Reactors (BWR)															
G2307G2A	--	41	447	917	174	93	--	--	--	--	--	--	--	--	1,672
G2307G2B	--	244	593	1,045	1,765	993	407	--	--	--	--	--	--	--	5,047
G2307G3	--	--	--	2	52	191	119	30	--	--	--	--	--	--	394
G2308G4	--	--	--	--	--	102	1,268	1,636	730	140	--	--	--	--	3,876
G2308G5	--	--	--	--	--	--	--	2	518	272	--	87	--	--	879
G2308GP	--	--	--	--	--	--	--	--	300	1,184	544	348	156	--	2,532
G2308GB	--	--	--	--	--	--	--	--	--	164	348	288	304	--	1,104
G2308G8A	--	--	--	--	--	--	--	--	--	--	--	212	--	--	212
G2307A	--	--	--	--	4	124	108	24	--	--	--	--	--	--	260
G2308A	--	--	--	--	--	--	45	183	--	184	408	393	12	--	1,225
G2309A	--	--	--	--	--	--	--	--	--	--	--	4	--	--	4
G4607G2	--	--	50	328	589	175	--	--	--	--	--	--	--	--	1,142
G4607G3A	--	--	--	2	501	1,037	1,723	349	140	--	--	--	--	--	3,752
G4607G3B	--	--	--	--	192	747	209	36	--	--	--	--	--	--	1,184
G4608G4A	--	--	--	--	112	250	647	571	204	--	--	--	1	--	1,785
G4608G4B	--	--	--	--	--	140	1,100	353	194	--	--	--	--	--	1,787
G4608G5	--	--	--	--	--	--	111	1,170	1,426	312	987	216	88	--	4,310
G4608GP	--	--	--	--	--	--	26	199	1,994	3,814	2,592	1,749	733	--	11,107
G4608GB	--	--	--	--	--	--	--	--	1	233	1,738	2,436	1,853	1	6,262
G4608G8	--	--	--	--	--	--	--	--	--	--	--	104	112	--	216
G4608G9	--	--	--	--	--	--	--	--	--	--	--	1	1	--	2
G4608A	--	--	--	--	--	--	--	--	--	--	220	632	348	--	1,200
G4608AP	--	--	--	--	--	--	--	--	--	--	--	--	8	--	8
G4608W	--	--	--	--	--	--	--	--	--	--	--	4	--	--	4
G4609A	--	--	--	--	--	--	--	--	--	--	1	231	408	--	640
XBR11G	--	--	6	--	--	--	--	--	--	--	--	--	--	--	6
XBR07G	4	--	--	--	--	--	--	--	--	--	--	--	--	--	4
XBR08G	2	--	--	--	--	--	--	--	--	--	--	--	--	--	2
XBR09G	--	--	37	52	32	18	4	--	--	--	--	--	--	--	143
XBR09A	--	--	--	--	4	--	--	--	--	--	--	--	--	--	4
XBR11A	--	--	--	--	--	8	18	44	36	24	42	40	--	--	212
XBR11N	--	--	--	2	6	--	--	--	--	--	--	--	--	--	8
XDR06G	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1
XDR06G3B	58	69	5	22	9	--	--	--	--	--	--	--	--	--	163
XDR06G3F	24	20	3	36	13	--	--	--	--	--	--	--	--	--	96
XDR06G5	9	15	11	2	15	54	--	--	--	--	--	--	--	--	106
XDR07GS	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1
XDR08G	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1
XDR06U	1	8	33	43	29	344	--	--	--	--	--	--	--	--	458
XDR06A	--	--	--	--	--	66	--	--	--	--	--	--	--	--	66
XHB07G2	--	33	55	--	--	--	--	--	--	--	--	--	--	--	88
XHB06G	--	7	51	56	62	--	--	--	--	--	--	--	--	--	176
XHB06A	--	--	--	4	122	--	--	--	--	--	--	--	--	--	126
XLC10L	--	--	56	25	32	28	12	2	--	--	--	--	--	--	155
XLC10A	--	--	--	--	--	--	--	50	28	100	--	--	--	--	178
Total BWR	101	437	1,347	2,536	3,713	4,370	5,797	4,649	5,571	6,427	6,880	6,745	4,024	5	[d]52,602

See footnotes at end of table.

Table B8. Spent Fuel Assemblies, by Type, Discharged by Year (Continued)

Assembly Type Code[a]	1968-1969	1970-1971	1972-1973	1974-1975	1976-1977	1978-1979	1980-1981	1982-1983	1984-1985	1986-1987	1988-1989	1990-1991	1992[b]	Temps[c]	Total
Pressurized-Water Reactors (PWR)															
B1515B4	--	--	--	53	450	684	555	546	499	380	382	438	106	13	4,106
B1515B4Z	--	--	--	--	--	--	--	--	--	--	--	--	4	--	4
B1515B5Z	--	--	--	--	--	--	--	--	--	--	--	--	20	--	20
B1515B6	--	--	--	--	--	--	--	--	--	--	--	--	109	--	109
B1515B7	--	--	--	--	--	--	--	--	--	--	--	--	43	--	43
B1515BZ	--	--	--	--	--	--	--	--	--	72	269	199	40	--	580
B1515BGD	--	--	--	--	--	--	--	--	--	3	1	--	--	--	4
B1717B	--	--	--	--	--	--	4	--	--	--	--	--	--	--	4
C1414C	--	--	--	224	147	645	588	467	426	221	189	64	141	12	3,124
C1414A	--	--	--	--	--	--	--	--	72	97	147	194	1	11	522
C1414W	--	--	--	--	--	--	--	3	59	130	73	85	73	--	423
C1616CSD	--	--	--	--	--	--	35	125	196	443	520	371	270	--	1,960
C8016C	--	--	--	--	--	--	--	--	--	74	260	299	214	1	848
W1414W	--	12	109	37	130	135	123	42	14	1	--	14	2	--	619
W1414WL	--	--	44	129	301	252	261	158	74	130	51	11	--	--	1,411
W1414WO	--	--	--	--	--	--	--	1	3	12	184	300	198	--	698
W1414A	--	--	--	--	2	--	2	178	177	130	91	97	45	--	722
W1414ATR	--	--	--	--	--	--	--	--	64	137	83	3	1	--	288
W1414B	--	--	--	--	2	--	--	--	--	--	--	--	--	--	2
W1515W	--	--	--	117	314	217	178	198	189	104	137	116	--	7	1,577
W1515WL	--	--	53	283	407	781	331	348	407	439	167	76	57	--	3,349
W1515WO	--	--	--	--	--	--	--	--	1	80	324	349	385	--	1,139
W1515A	--	--	--	--	--	50	180	176	154	133	49	49	49	--	840
W1717WL	--	--	--	--	2	243	442	850	1,232	1,568	1,424	1,966	856	44	8,627
W1717WO	--	--	--	--	--	--	--	--	5	344	666	1,005	329	--	2,349
W1717WV5	--	--	--	--	--	--	--	--	--	--	4	113	161	--	278
W1717WVH	--	--	--	--	--	--	--	--	--	--	--	57	55	--	112
W1717A	--	--	--	--	--	--	--	--	--	60	71	85	74	--	290
W1717B	--	--	--	--	--	--	--	--	--	--	--	3	44	--	47
WST17W	--	--	--	--	--	--	--	--	--	--	36	227	82	4	349
XFC14C	--	--	--	25	88	44	80	20	21	12	--	2	45	--	337
XFC14A	--	--	--	--	--	--	--	--	69	34	44	37	8	--	192
XHN15W	--	103	102	48	56	--	--	--	--	--	--	--	--	--	309
XHN15MS	--	--	2	--	--	--	--	--	--	--	--	--	--	--	2
XHN15MZ	--	--	2	--	--	--	--	--	--	--	--	--	--	--	2
XHN15HS	--	--	--	1	--	--	--	--	--	--	--	--	--	--	1
XHN15HZ	--	--	2	--	--	--	--	--	--	--	--	--	--	--	2
XHN15B	--	--	--	--	50	49	106	49	53	109	54	53	--	1	524
XIP14W	--	--	40	120	--	--	--	--	--	--	--	--	--	--	160
XPA15C	--	--	--	205	--	8	60	--	--	--	--	--	--	--	273
XPA15A	--	--	--	--	--	128	8	68	52	--	52	75	76	1	460
XSL16C	--	--	--	--	--	--	--	--	80	156	84	76	68	--	464
XSO14W	--	97	57	53	53	52	52	--	52	--	52	40	157	--	665
XYR18W	--	--	36	40	--	--	--	--	--	--	--	--	--	--	76
XYR16U	--	--	--	37	36	--	--	--	--	--	--	--	--	--	73
XYR16A	--	--	--	--	--	40	36	40	76	36	--	--	--	--	228
XYR16C	--	--	--	--	--	--	--	--	--	--	40	116	--	--	156
Total PWR	--	212	447	1,372	2,038	3,328	3,041	3,269	3,975	4,905	5,454	6,520	3,713	163	[e]38,437

[a]Assembly types are defined in Table B4.
[b]Some data for previous years have been revised. Current-year data may be revised in future publications. When utilities reinsert assemblies discharged in previous years, historical totals change. See Technical Note 12 in Appendix E.
[c]Temps are temporarily discharged assemblies, as of December 31, 1992, as reported on Form RW-859.
[d]No assigned assembly type for 4 temporarily discharged BWR assemblies. These BWR assemblies are included in the Total column. See Technical Note 10 in Appendix E.
[e]No assigned assembly type for 69 temporarily discharged PWR assemblies. These PWR assemblies are included in the Total column. See Technical Note 10 in Appendix E.
-- = Not applicable.
Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Table B9. Initial Uranium Content of Spent Fuel Assemblies, by Type, Discharged by Year
(Metric tons of uranium)

Assembly Type Code[a]	1968-1969	1970-1971	1972-1973	1974-1975	1976-1977	1978-1979	1980-1981	1982-1983	1984-1985	1986-1987	1988-1989	1990-1991	1992[b]	Temps[c]	Total
Boiling-Water Reactors (BWR)															
G2307G2A	--	7.9	87.0	178.9	33.9	18.1	--	--	--	--	--	--	--	--	325.9
G2307G2B	--	7.1	114.1	201.8	339.8	191.6	78.5	--	--	--	--	--	--	--	972.9
G2307G3	--	--	--	0.4	9.7	35.8	22.3	5.6	--	--	--	--	--	--	73.9
G2308G4	--	--	--	--	--	18.7	233.4	301.3	134.4	25.8	--	--	--	--	713.7
G2308G5	--	--	--	--	--	--	--	0.4	91.6	48.1	--	15.4	--	--	155.5
G2308GP	--	--	--	--	--	--	--	--	53.1	209.4	96.4	61.7	27.5	--	448.1
G2308GB	--	--	--	--	--	--	--	--	--	29.1	61.9	51.2	53.6	--	195.7
G2308G8A	--	--	--	--	--	--	--	--	--	--	--	37.8	--	--	37.8
G2307A	--	--	--	--	0.7	22.6	19.7	4.4	--	--	--	--	--	--	47.4
G2308A	--	--	--	--	--	--	7.9	32.0	--	32.2	71.0	68.3	2.1	--	213.5
G2309A	--	--	--	--	--	--	--	--	--	--	--	0.7	--	--	0.7
G4607G2	--	--	9.5	63.3	115.3	34.2	--	--	--	--	--	--	--	--	222.4
G4607G3A	--	--	--	0.4	93.9	194.4	323.1	65.3	26.2	--	--	--	--	--	703.3
G4607G3B	--	--	--	--	36.6	141.7	39.7	6.8	--	--	--	--	--	--	224.9
G4608G4A	--	--	--	--	20.6	45.9	119.1	105.1	37.4	--	--	--	0.2	--	328.3
G4608G4B	--	--	--	--	--	26.1	205.4	65.9	36.2	--	--	--	--	--	333.7
G4608G5	--	--	--	--	--	--	20.3	213.9	261.1	57.1	180.7	39.5	16.0	--	788.7
G4608GP	--	--	--	--	--	--	4.8	36.4	364.6	698.9	475.2	320.3	133.5	--	2,033.7
G4608GB	--	--	--	--	--	--	--	--	0.2	43.2	320.9	450.0	342.7	0.2	1,157.1
G4608G8	--	--	--	--	--	--	--	--	--	--	--	18.5	20.0	--	38.5
G4608G9	--	--	--	--	--	--	--	--	--	--	--	0.2	0.2	--	0.4
G4608A	--	--	--	--	--	--	--	--	--	--	38.8	111.5	61.0	--	211.3
G4608AP	--	--	--	--	--	--	--	--	--	--	--	--	1.4	--	1.4
G4608W	--	--	--	--	--	--	--	--	--	--	--	0.6	--	--	0.6
G4609A	--	--	--	--	--	--	--	--	--	--	0.2	40.0	70.6	--	110.8
XBR11G	--	--	0.7	--	--	--	--	--	--	--	--	--	--	--	0.7
XBR07G	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--	0.5
XBR08G	0.2	--	--	--	--	--	--	--	--	--	--	--	--	--	0.2
XBR09G	--	--	5.1	7.1	4.4	2.5	0.6	--	--	--	--	--	--	--	19.6
XBR09A	--	--	--	--	0.5	--	--	--	--	--	--	--	--	--	0.5
XBR11A	--	--	--	--	--	1.0	2.3	5.6	4.6	3.1	5.5	5.3	--	--	27.3
XBR11N	--	--	--	0.3	0.8	--	--	--	--	--	--	--	--	--	1.0
XDR06G	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	0.1
XDR06G3B	5.9	7.0	0.5	2.2	0.9	--	--	--	--	--	--	--	--	--	16.6
XDR06G3F	2.4	2.0	0.3	3.7	1.3	--	--	--	--	--	--	--	--	--	9.8
XDR06G5	1.0	1.6	1.2	0.2	1.6	5.7	--	--	--	--	--	--	--	--	11.2
XDR07GS	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	0.1
XDR08G	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	0.1
XDR06U	0.1	0.8	3.4	4.4	3.0	35.0	--	--	--	--	--	--	--	--	46.7
XDR06A	--	--	--	--	--	6.3	--	--	--	--	--	--	--	--	6.3
XHB07G2	--	2.5	4.2	--	--	--	--	--	--	--	--	--	--	--	6.7
XHB06G	--	0.5	3.9	4.3	4.8	--	--	--	--	--	--	--	--	--	13.4
XHB06A	--	--	--	0.3	8.5	--	--	--	--	--	--	--	--	--	8.8
XLC10L	--	--	6.7	3.0	3.9	3.4	1.4	0.2	--	--	--	--	--	--	18.6
XLC10A	--	--	--	--	--	--	--	5.4	3.0	10.8	--	--	--	--	19.3
Total BWR	10.4	69.6	236.6	470.2	680.3	783.0	1,078.6	848.5	1,012.6	1,157.6	1,250.5	1,220.8	728.7	0.2	9,547.6

See footnotes at end of table.

Table B9. Initial Uranium Content of Spent Fuel Assemblies, by Type, Discharged by Year (Continued)
(Metric tons of uranium)

Assembly Type Code[a]	1968-1969	1970-1971	1972-1973	1974-1975	1976-1977	1978-1979	1980-1981	1982-1983	1984-1985	1986-1987	1988-1989	1990-1991	1992[b]	Temps[c]	Total
Pressurized-Water Reactors (PWR)															
B1515B4	--	--	--	24.8	209.2	317.0	257.2	254.8	231.7	176.0	177.4	203.7	49.1	2.3	1,903.3
B1515B4Z	--	--	--	--	--	--	--	--	--	--	--	--	1.9	--	1.9
B1515B5Z	--	--	--	--	--	--	--	--	--	--	--	--	9.3	--	9.3
B1515B6	--	--	--	--	--	--	--	--	--	--	--	--	50.4	--	50.4
B1515B7	--	--	--	--	--	--	--	--	--	--	--	--	19.9	--	19.9
B1515BZ	--	--	--	--	--	--	--	--	--	33.4	124.6	92.3	18.5	--	268.8
B1515BGD	--	--	--	--	--	--	--	--	--	1.3	0.4	--	--	--	1.7
B1717B	--	--	--	--	--	--	1.8	--	--	--	--	--	--	--	1.8
C1414C	--	--	--	84.2	57.6	245.1	224.3	179.6	162.1	84.8	73.5	24.0	54.3	--	1,189.4
C1414A	--	--	--	--	--	--	--	--	27.0	35.0	54.3	72.5	0.4	4.0	193.2
C1414W	--	--	--	--	--	--	--	1.2	24.0	52.8	29.8	34.7	29.8	--	172.3
C1616CSD	--	--	--	--	--	--	14.9	51.3	83.7	182.8	216.1	152.8	110.0	--	811.6
C8016C	--	--	--	--	--	--	--	--	--	31.5	107.4	120.5	87.9	0.4	347.7
W1414W	--	4.6	42.7	14.4	51.1	53.0	48.9	16.8	5.6	0.4	--	5.6	0.8	--	243.9
W1414WL	--	--	17.5	50.5	119.4	100.6	104.8	63.5	29.7	52.2	20.5	4.4	--	--	563.1
W1414WO	--	--	--	--	--	--	--	0.4	1.1	4.3	65.8	107.5	70.8	--	249.8
W1414A	--	--	--	--	0.7	--	0.7	67.3	66.7	48.8	34.3	36.4	17.0	--	272.0
W1414ATR	--	--	--	--	--	--	--	--	23.3	50.0	29.7	1.1	0.4	--	104.5
W1414B	--	--	--	--	0.8	--	--	--	--	--	--	--	--	--	0.8
W1515W	--	--	--	53.0	141.2	98.3	81.1	90.1	86.0	47.6	62.8	53.3	--	3.2	716.4
W1515WL	--	--	24.2	126.8	183.9	354.2	151.3	159.0	186.0	200.6	76.5	35.0	26.2	--	1,523.7
W1515WO	--	--	--	--	--	--	--	--	0.5	36.8	149.0	160.6	177.2	--	524.2
W1515A	--	--	--	--	--	21.4	77.1	75.3	66.0	57.2	21.1	21.2	20.8	--	360.1
W1717WL	--	--	--	--	0.9	111.7	203.2	390.3	565.4	721.9	657.7	909.2	396.2	20.3	3,976.8
W1717WO	--	--	--	--	--	--	--	--	2.1	145.9	283.3	426.4	139.7	--	997.4
W1717WV5	--	--	--	--	--	--	--	--	--	--	1.7	48.0	68.4	--	118.1
W1717WVH	--	--	--	--	--	--	--	--	--	--	--	26.5	25.5	--	52.0
W1717A	--	--	--	--	--	--	--	--	--	24.1	28.5	34.2	29.8	--	116.6
W1717B	--	--	--	--	--	--	--	--	--	--	--	1.3	19.8	--	21.1
WST17W	--	--	--	--	--	--	--	--	--	--	19.6	122.7	44.4	2.2	188.8
XFC14C	--	--	--	9.3	31.7	16.4	29.3	7.3	7.6	4.4	--	0.7	16.0	--	122.7
XFC14A	--	--	--	--	--	--	--	--	24.7	12.1	15.2	13.0	2.9	--	67.8
XHN15W	--	43.3	42.3	19.8	23.0	--	--	--	--	--	--	--	--	--	128.4
XHN15MS	--	--	0.8	--	--	--	--	--	--	--	--	--	--	--	0.8
XHN15MZ	--	--	0.7	--	--	--	--	--	--	--	--	--	--	--	0.7
XHN15HS	--	--	--	0.4	--	--	--	--	--	--	--	--	--	--	0.4
XHN15HZ	--	--	0.7	--	--	--	--	--	--	--	--	--	--	--	0.7
XHN15B	--	--	--	--	20.6	20.2	43.6	20.2	21.8	44.9	22.1	21.8	--	0.4	215.6
XIP14W	--	--	7.8	22.8	--	--	--	--	--	--	--	--	--	--	30.6
XPA15C	--	--	--	84.3	--	3.3	24.9	--	--	--	--	--	--	--	112.6
XPA15A	--	--	--	--	--	50.5	3.1	26.3	20.2	--	20.4	29.3	29.7	0.4	179.9
XSL16C	--	--	--	--	--	--	--	--	31.0	57.9	31.8	29.3	25.8	--	175.7
XSO14W	--	35.6	20.5	19.3	19.2	19.2	19.2	--	19.3	--	19.2	14.8	58.1	--	244.3
XYR18W	--	--	9.8	10.9	--	--	--	--	--	--	--	--	--	--	20.8
XYR16U	--	--	--	8.8	8.6	--	--	--	--	--	--	--	--	--	17.4
XYR16A	--	--	--	--	--	9.4	8.5	9.4	17.7	8.3	--	--	--	--	53.2
XYR16C	--	--	--	--	--	--	--	--	--	--	9.2	26.6	--	--	35.8
Total PWR	--	83.5	167.0	529.5	867.9	1,420.2	1,294.0	1,412.6	1,703.0	2,114.7	2,351.9	2,829.6	1,601.0	[d]35.1	16,410.1

[a]Assembly types are identified in Table B4.
[b]Some data for previous years have been revised. Current-year data may be revised in future publications. When utilities reinsert assemblies discharged in previous years, historical totals change. See Technical Note 12 in Appendix E.
[c]Temps are temporarily discharged assemblies, as of December 31, 1992, as reported on Form RW-859.
[d]Includes 1.9 metric tons of uranium (MTU) for temporarily discharged PWR assemblies with no assigned assembly type. See Technical Note 10 in Appendix E.
-- = Not applicable.
Note: Totals may not equal sum of components because of independent rounding. See Technical Note 11 in Appendix E.
Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Table B10. Burnup of Spent Fuel Assemblies, by Type, Discharged by Year
(Gigawattdays thermal per metric ton of uranium)

Assembly Type Code[a]	1968-1969	1970-1971	1972-1973	1974-1975	1976-1977	1978-1979	1980-1981	1982-1983	1984-1985	1986-1987	1988-1989	1990-1991	1992[b]	Temps[c]
Boiling-Water Reactors (BWR)														
G2307G2A	--	7.7	13.2	17.8	20.0	21.7	--	--	--	--	--	--	--	--
G2307G2B	--	1.4	4.4	13.4	17.3	23.4	23.0	--	--	--	--	--	--	--
G2307G3	--	--	--	9.0	22.2	25.6	25.1	25.4	--	--	--	--	--	--
G2308G4	--	--	--	--	--	23.9	24.0	25.8	27.0	24.7	--	--	--	--
G2308G5	--	--	--	--	--	--	--	22.5	28.2	29.8	--	26.0	--	--
G2308GP	--	--	--	--	--	--	--	--	27.8	27.6	29.5	30.5	29.2	--
G2308GB	--	--	--	--	--	--	--	--	--	27.6	29.0	30.2	34.3	--
G2308G8A	--	--	--	--	--	--	--	--	--	--	--	32.3	--	--
G2307A	--	--	--	--	25.2	24.7	22.6	21.8	--	--	--	--	--	--
G2308A	--	--	--	--	--	--	25.1	27.3	--	23.9	27.3	32.2	22.7	--
G2309A	--	--	--	--	--	--	--	--	--	--	--	36.0	--	--
G4607G2	--	--	3.7	9.2	9.8	9.9	--	--	--	--	--	--	--	--
G4607G3A	--	--	--	4.7	12.8	19.9	23.6	23.1	22.8	--	--	--	--	--
G4607G3B	--	--	--	--	10.6	23.5	25.9	26.7	--	--	--	--	--	--
G4608G4A	--	--	--	--	18.9	19.6	24.6	26.9	28.5	--	--	--	33.0	--
G4608G4B	--	--	--	--	--	17.1	20.7	24.2	23.0	--	--	--	--	--
G4608G5	--	--	--	--	--	--	7.9	26.6	23.6	14.9	25.0	23.4	29.0	--
G4608GP	--	--	--	--	--	--	23.2	26.7	22.4	17.4	22.6	24.1	22.4	--
G4608GB	--	--	--	--	--	--	--	--	5.5	9.2	17.6	24.7	27.9	23.0
G4608G8	--	--	--	--	--	--	--	--	--	--	--	32.0	32.7	--
G4608G9	--	--	--	--	--	--	--	--	--	--	--	18.0	14.0	--
G4608A	--	--	--	--	--	--	--	--	--	--	26.7	29.8	33.6	--
G4608AP	--	--	--	--	--	--	--	--	--	--	--	--	28.0	--
G4608W	--	--	--	--	--	--	--	--	--	--	--	23.0	--	--
G4609A	--	--	--	--	--	--	--	--	--	--	24.0	33.5	35.9	--
XBR11G	--	--	19.8	--	--	--	--	--	--	--	--	--	--	--
XBR07G	1.5	--	--	--	--	--	--	--	--	--	--	--	--	--
XBR08G	4.1	--	--	--	--	--	--	--	--	--	--	--	--	--
XBR09G	--	--	10.9	12.3	17.7	20.5	21.3	--	--	--	--	--	--	--
XBR09A	--	--	--	--	20.9	--	--	--	--	--	--	--	--	--
XBR11A	--	--	--	--	--	25.7	25.5	25.3	23.4	27.3	24.4	24.4	--	--
XBR11N	--	--	--	16.3	19.8	--	--	--	--	--	--	--	--	--
XDR06G	21.3	--	--	--	--	--	--	--	--	--	--	--	--	--
XDR06G3B	16.3	16.6	22.7	18.3	16.7	--	--	--	--	--	--	--	--	--
XDR06G3F	14.7	21.3	21.5	22.3	21.3	--	--	--	--	--	--	--	--	--
XDR06G5	9.3	13.5	17.8	19.5	22.2	21.5	--	--	--	--	--	--	--	--
XDR07GS	29.0	--	--	--	--	--	--	--	--	--	--	--	--	--
XDR08G	23.3	--	--	--	--	--	--	--	--	--	--	--	--	--
XDR06U	5.2	12.5	16.4	17.3	22.4	15.5	--	--	--	--	--	--	--	--
XDR06A	--	--	--	--	--	4.5	--	--	--	--	--	--	--	--
XHB07G2	--	17.7	18.5	--	--	--	--	--	--	--	--	--	--	--
XHB06G	--	10.0	17.1	18.1	17.3	--	--	--	--	--	--	--	--	--
XHB06A	--	--	--	17.5	8.8	--	--	--	--	--	--	--	--	--
XLC10L	--	--	13.0	15.5	16.5	14.0	15.9	11.0	--	--	--	--	--	--
XLC10A	--	--	--	--	--	--	--	16.9	18.0	13.0	--	--	--	--

See footnotes at end of table.

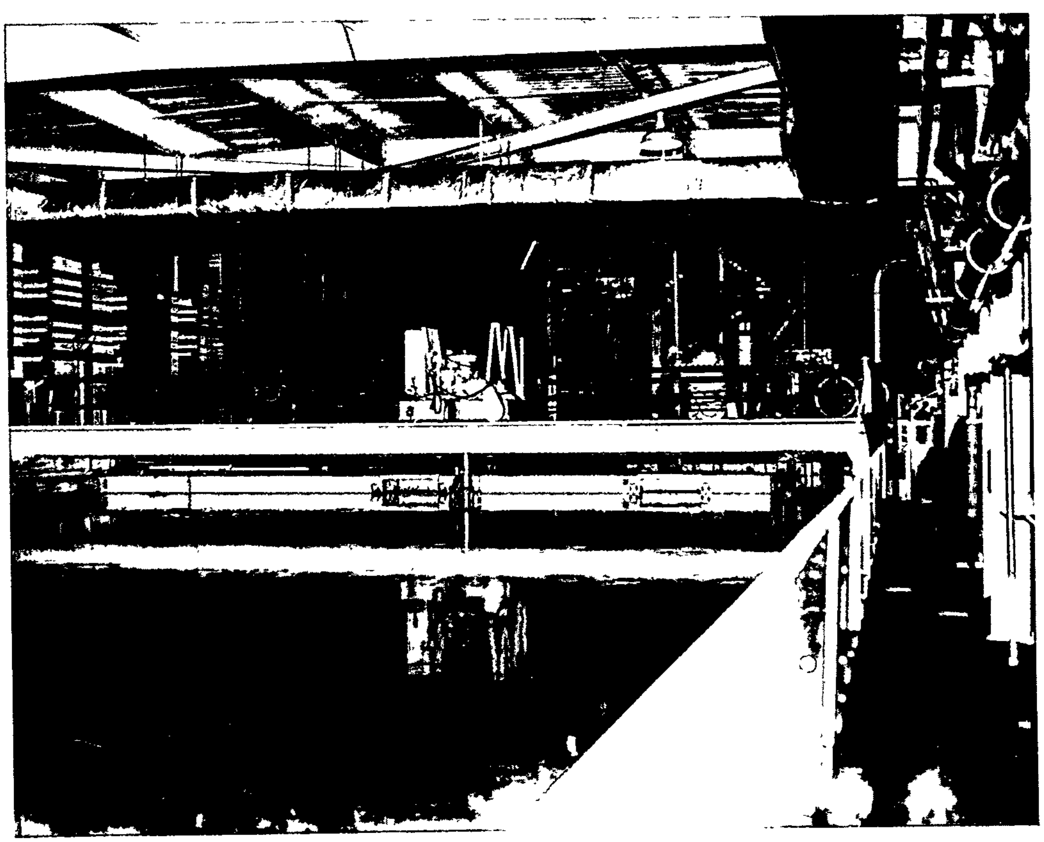
Table B10. Burnup of Spent Fuel Assemblies, by Type, Discharged by Year (Continued)
(Gigawattdays thermal per metric ton of uranium)

Assembly Type Code[a]	1968-1969	1970-1971	1972-1973	1974-1975	1976-1977	1978-1979	1980-1981	1982-1983	1984-1985	1986-1987	1988-1989	1990-1991	1992[b]	Temps[c]
Pressurized-Water Reactors (PWR)														
B1515B4	--	--	--	11.6	21.1	25.7	27.7	28.3	31.0	32.2	31.7	32.9	36.9	20.8
B1515B4Z	--	--	--	--	--	--	--	--	--	--	--	--	42.0	--
B1515B5Z	--	--	--	--	--	--	--	--	--	--	--	--	36.0	--
B1515B6	--	--	--	--	--	--	--	--	--	--	--	--	41.6	--
B1515B7	--	--	--	--	--	--	--	--	--	--	--	--	41.0	--
B1515BZ	--	--	--	--	--	--	--	--	--	34.9	28.9	38.9	38.0	--
B1515BGD	--	--	--	--	--	--	--	--	--	38.0	58.0	--	--	--
B1717B	--	--	--	--	--	--	29.5	--	--	--	--	--	--	--
C1414C	--	--	--	12.9	17.4	22.8	30.8	32.2	34.3	37.6	39.1	40.8	41.5	--
C1414A	--	--	--	--	--	--	--	--	35.7	37.0	38.6	36.6	47.0	26.9
C1414W	--	--	--	--	--	--	--	22.1	33.8	33.7	32.3	31.3	33.6	--
C1616CSD	--	--	--	--	--	--	13.6	26.9	21.0	25.8	33.4	39.4	42.2	--
C8016C	--	--	--	--	--	--	--	--	--	17.1	21.1	32.6	34.6	18.0
W1414W	--	7.7	17.6	24.4	26.6	31.0	32.1	34.3	35.2	30.5	--	39.5	39.0	--
W1414WL	--	--	18.4	24.3	27.2	32.9	34.3	35.5	36.2	36.4	40.0	43.0	--	--
W1414WO	--	--	--	--	--	--	--	19.4	40.7	36.0	39.5	39.7	41.8	--
W1414A	--	--	--	--	25.3	--	28.6	36.2	35.2	37.2	35.9	36.9	36.8	--
W1414ATR	--	--	--	--	--	--	--	--	37.4	38.0	38.5	45.0	44.0	--
W1414B	--	--	--	--	24.4	--	--	--	--	--	--	--	--	--
W1515W	--	--	--	19.3	21.2	30.7	29.0	33.1	35.2	35.5	37.2	39.2	--	25.1
W1515WL	--	--	15.9	21.1	24.3	30.2	31.5	33.3	32.9	35.0	35.4	36.4	43.6	--
W1515WO	--	--	--	--	--	--	--	--	18.3	32.1	35.9	35.6	37.2	--
W1515A	--	--	--	--	--	30.3	31.6	31.4	30.6	32.6	35.7	38.0	39.9	--
W1717WL	--	--	--	--	16.1	17.0	28.0	25.2	28.4	29.6	32.7	34.5	34.8	28.9
W1717WO	--	--	--	--	--	--	--	--	36.1	20.4	30.2	34.0	37.3	--
W1717WV5	--	--	--	--	--	--	--	--	--	--	46.0	38.3	39.3	--
W1717WVH	--	--	--	--	--	--	--	--	--	--	--	34.7	33.5	--
W1717A	--	--	--	--	--	--	--	--	--	37.0	38.6	38.9	42.1	--
W1717B	--	--	--	--	--	--	--	--	--	--	--	42.0	8.2	--
WST17W	--	--	--	--	--	--	--	--	--	--	12.0	19.4	29.7	--
XFC14C	--	--	--	8.6	25.5	24.0	30.9	36.1	39.2	39.0	--	31.0	39.1	--
XFC14A	--	--	--	--	--	--	--	--	34.8	36.3	38.9	41.0	38.0	--
XHN15W	--	22.5	29.3	32.8	31.2	--	--	--	--	--	--	--	--	--
XHN15MS	--	--	28.3	--	--	--	--	--	--	--	--	--	--	--
XHN15MZ	--	--	25.6	--	--	--	--	--	--	--	--	--	--	--
XHN15HS	--	--	--	32.2	--	--	--	--	--	--	--	--	--	--
XHN15HZ	--	--	18.5	--	--	--	--	--	--	--	--	--	--	--
XHN15B	--	--	--	--	33.5	32.7	33.8	33.8	35.2	33.9	32.0	34.3	--	22.4
XIP14W	--	--	25.2	13.8	--	--	--	--	--	--	--	--	--	--
XPA15C	--	--	--	11.3	--	26.7	30.3	--	--	--	--	--	--	--
XPA15A	--	--	--	--	--	20.2	35.3	33.3	34.8	--	35.0	36.7	32.4	23.5
XSL16C	--	--	--	--	--	--	--	--	12.6	29.5	39.1	39.8	43.6	--
XSO14W	--	21.7	29.0	28.9	31.9	31.9	30.5	--	29.7	--	34.9	30.0	21.7	--
XYR18W	--	--	23.9	27.0	--	--	--	--	--	--	--	--	--	--
XYR16U	--	--	--	26.9	28.2	--	--	--	--	--	--	--	--	--
XYR16A	--	--	--	--	--	27.3	29.9	29.0	28.5	31.0	--	--	--	--
XYR16C	--	--	--	--	--	--	--	--	--	--	32.0	21.6	--	--

[a]Assembly types are identified in Table B4.
[b]Some data for previous years have been revised. Current-year data may be revised in future publications. When utilities reinsert assemblies discharged in previous years, historical totals change. See Technical Note 12 in Appendix E.
[c]Temps are temporarily discharged assemblies, as of December 31, 1992, as reported on Form RW-859.
-- = Not applicable.
Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Appendix C

Pictograms Showing Reactor Storage Pool Configurations, Pool Capacities, and Inventories at Nuclear Power Plant Sites and Storage Facilities



West Valley Demonstration Project spent fuel storage pool.

Appendix C

Pictograms Showing Reactor Storage Pool Configurations, Pool Capacities, and Inventories at Nuclear Power Plant Sites and Storage Facilities

The pool site pictograms contained in this appendix graphically compare the maximum storage capacity of each spent fuel storage pool site with its inventory as of December 31, 1992. (A pool site is a configuration of pools having a single cask loading area.) EIA defines maximum established spent fuel capacity for the site as the number of intact assemblies that will be able to be stored at some point in the future (between the reporting date and the reactor's end of life) considering any established or current studies or engineering evaluations, at the time of submittal for licensing approval from the U.S. Nuclear Regulatory Commission. (See Technical Note 13).

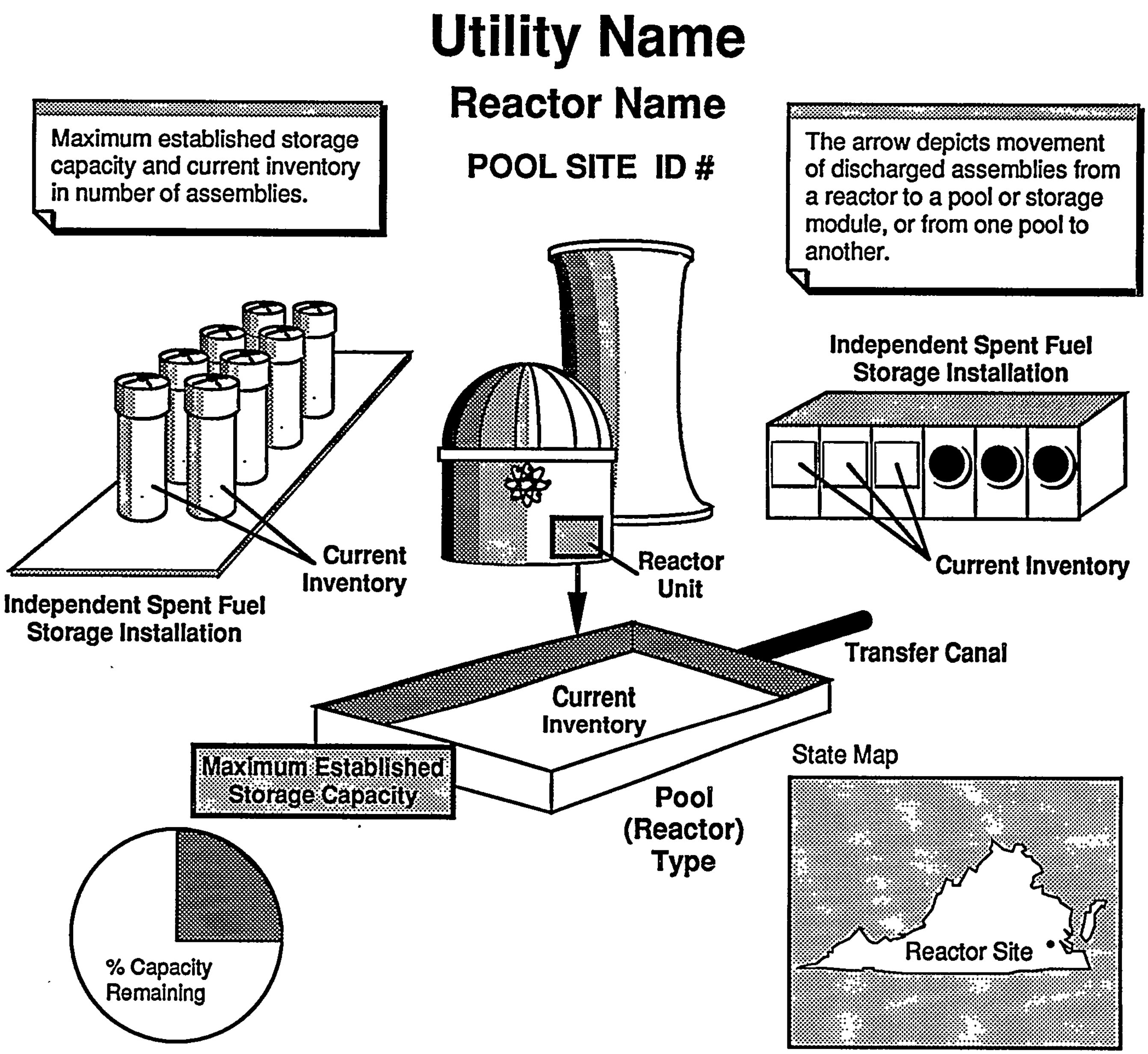
The pictograms are grouped by utility and highlight the various reactor/pool site configurations, such as the absence or presence of transfer canals, multiple pools servicing single reactors, and reactors sharing one pool site. Multiple storage pools linked by transfer canals have one pool site ID number because they share a common cask loading dock. In the pictograms, temporarily discharged assemblies are included in the present inventory totals. The movement of fuel between the storage pools at an individual site is represented by arrows. Two different designs of Independent Spent Fuel Storage Installations (ISFSIs) are also shown. Additional information on the ISFSIs is reported in Chapter 2.

The definition of an assembly has been extended to include assembly skeletons occupying the same space (slot) as a single assembly. A slot holds the equivalent of one nuclear fuel assembly in a matrix within a spent fuel storage rack.

Legend

In Appendix C the pictograms show selected data from Tables 13 and 14. Data in the pictograms include Utility and Reactor Names, Pool Site ID Number, Maximum Established Storage Capacity, and Current Inventory.

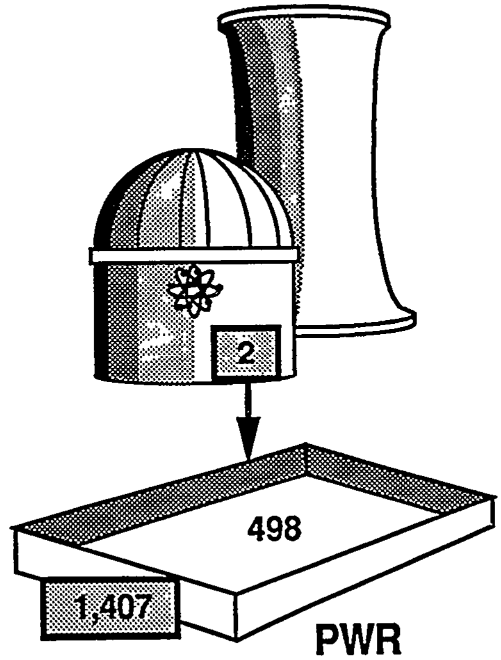
Each pictogram illustrates reactor/pool site configurations, such as the absence or presence of transfer canals, multiple pools servicing single reactors, and reactors sharing one pool site. Multiple storage pools linked by transfer canals have one pool site ID number. Two different designs of Independent Spent Fuel Storage Installations (ISFSIs) are depicted. A pie chart indicating the reactor's percentage of storage capacity remaining is shown in each pictogram. A State map has been included indicating the location of reactor(s) within that State.



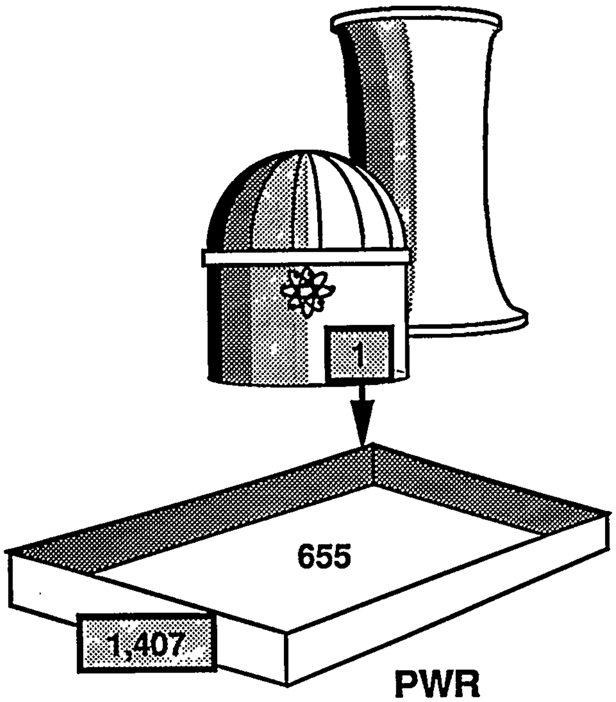
Alabama Power Company

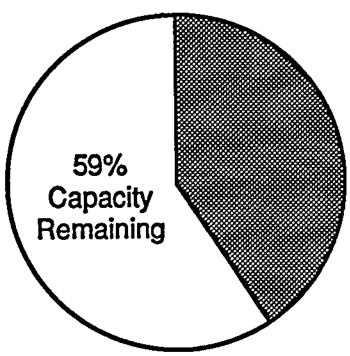
Farley

POOL SITE #0102

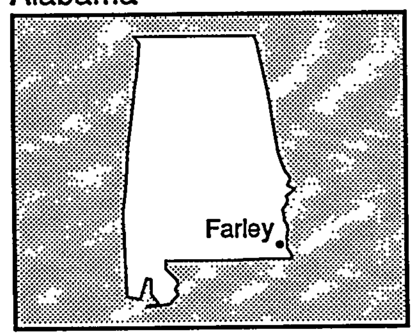


POOL SITE #0101



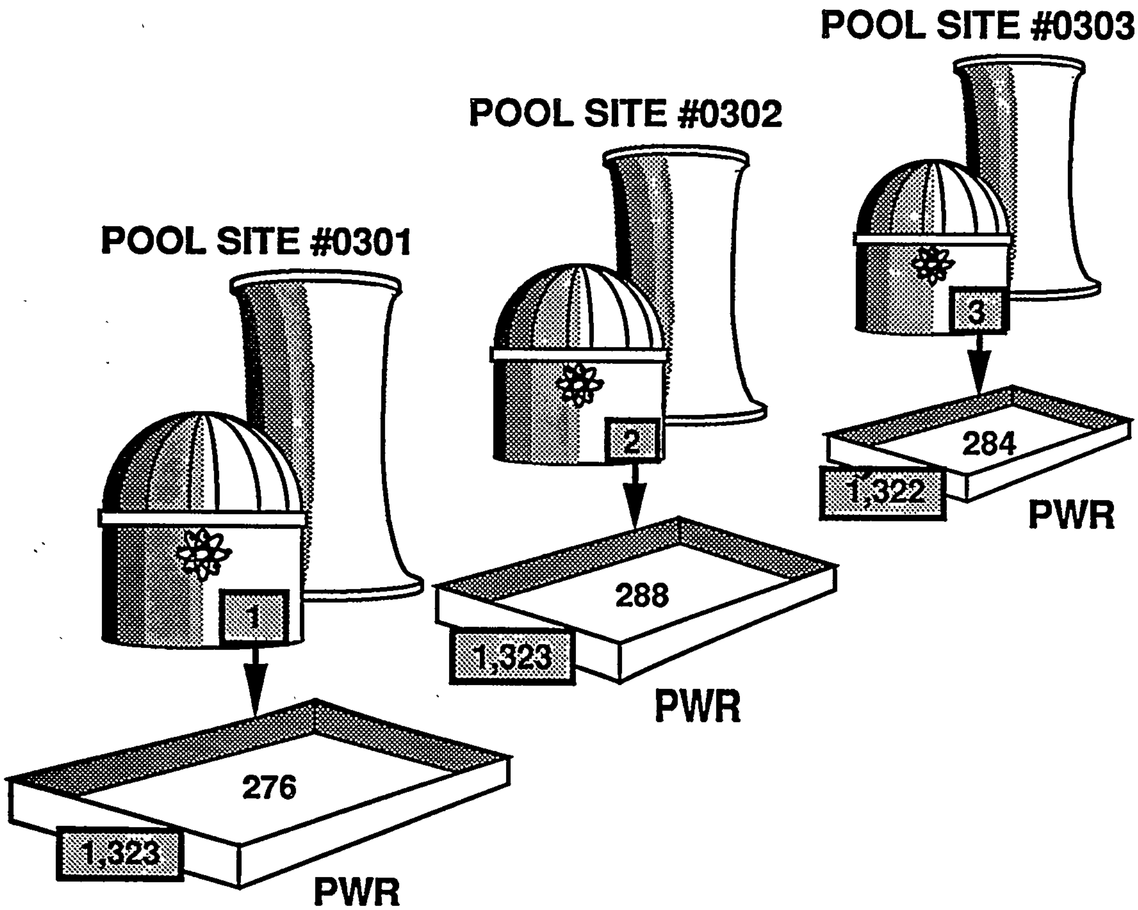


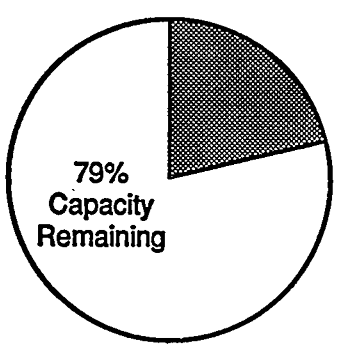
Alabama

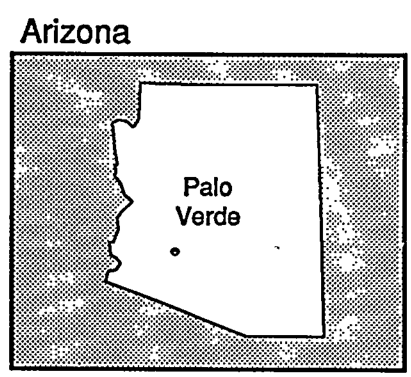


Arizona Public Service Company

Palo Verde

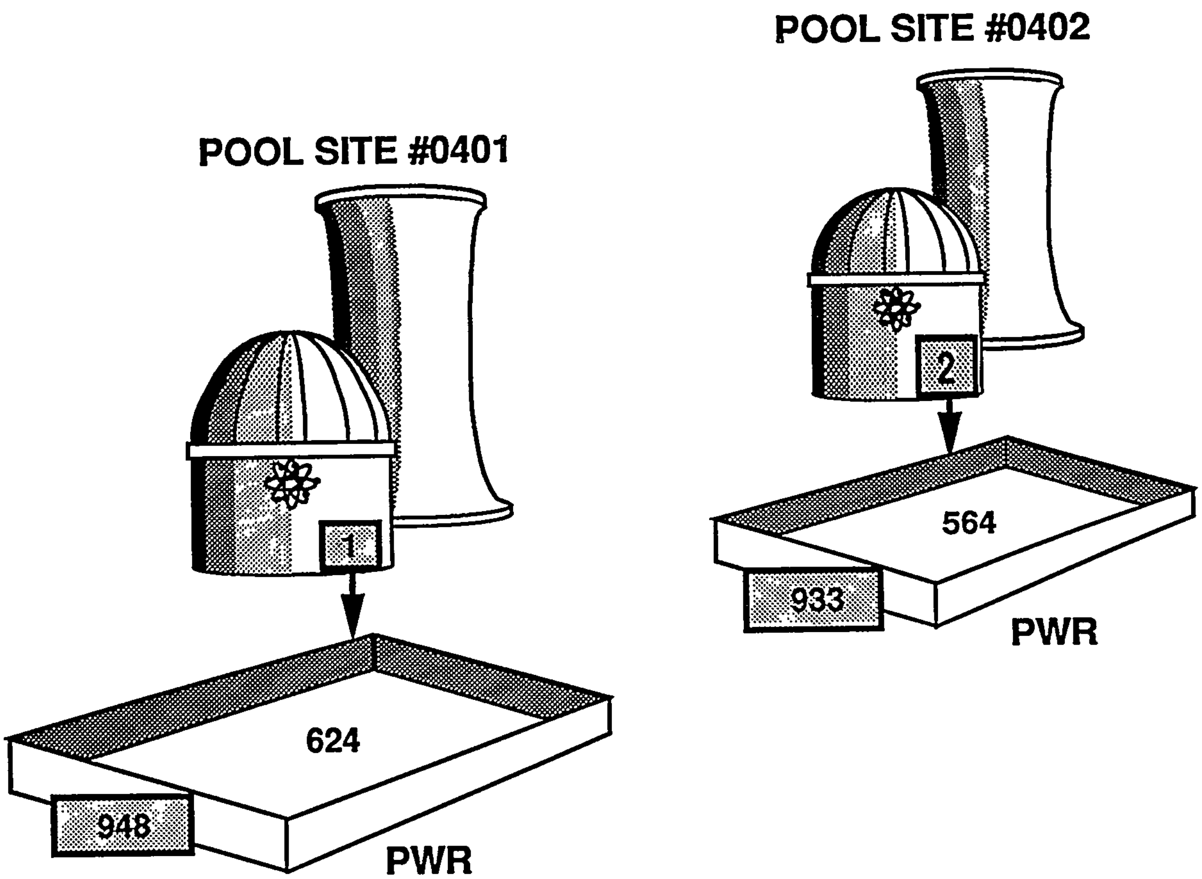


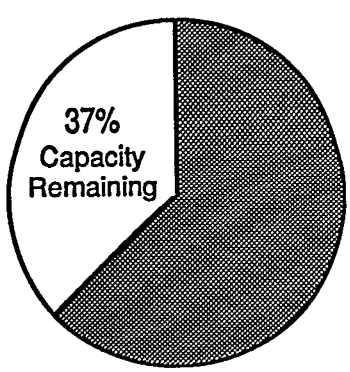


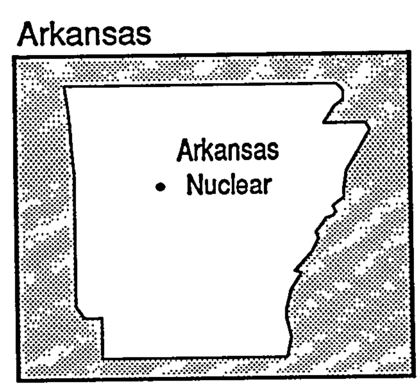


Arkansas Power and Light Company

Arkansas Nuclear



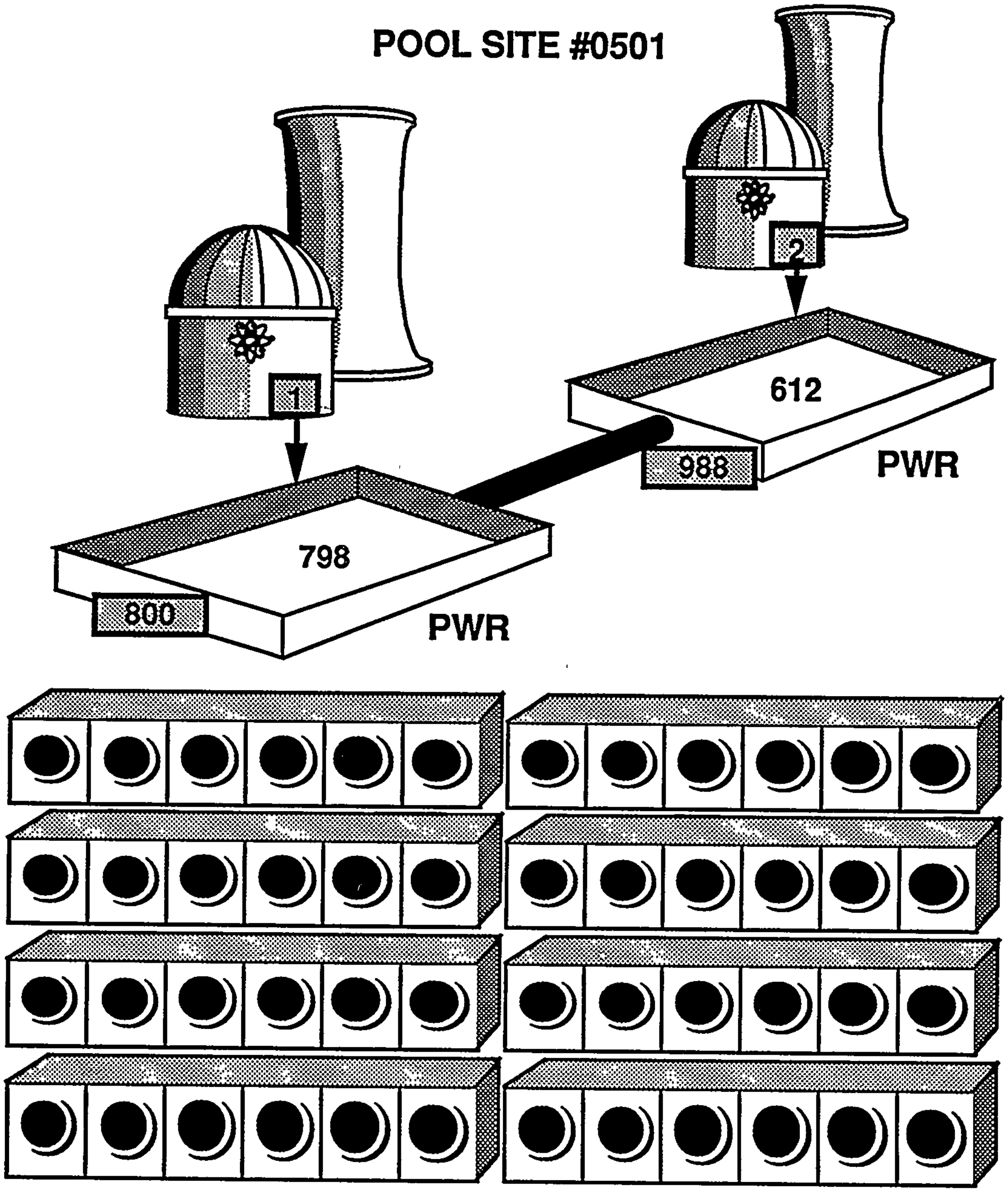




Baltimore Gas and Electric Company

Calvert Cliffs

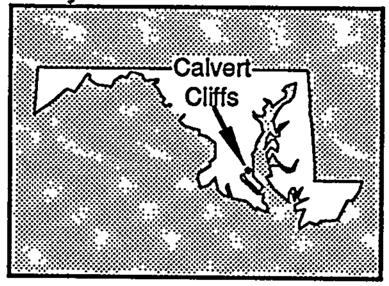
POOL SITE #0501



Independent Spent Fuel Storage Installation

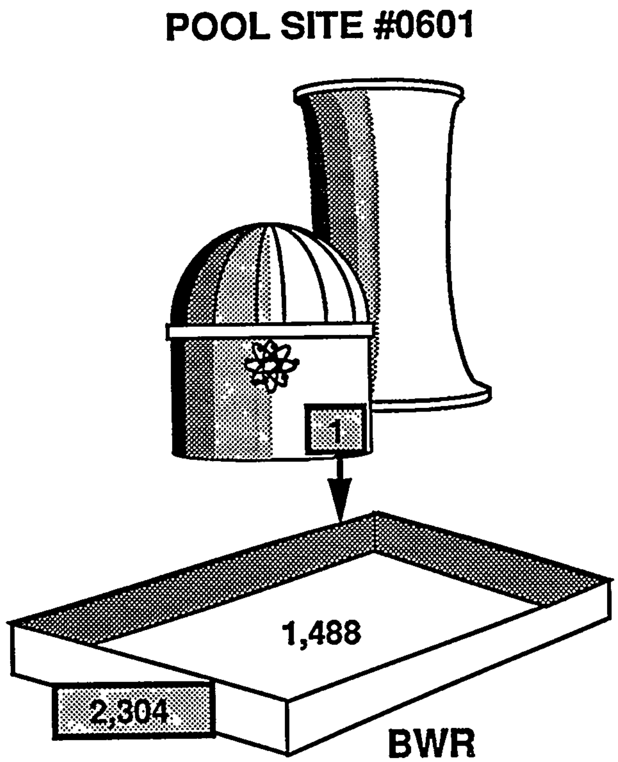
21%
Capacity
Remaining

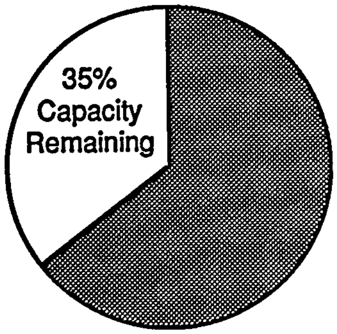
Maryland

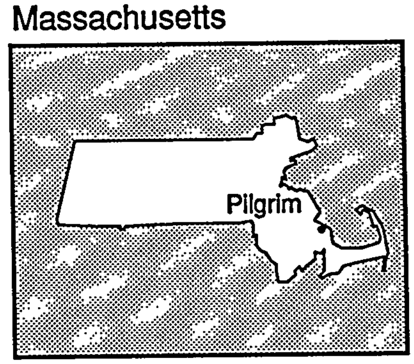


Boston Edison Company

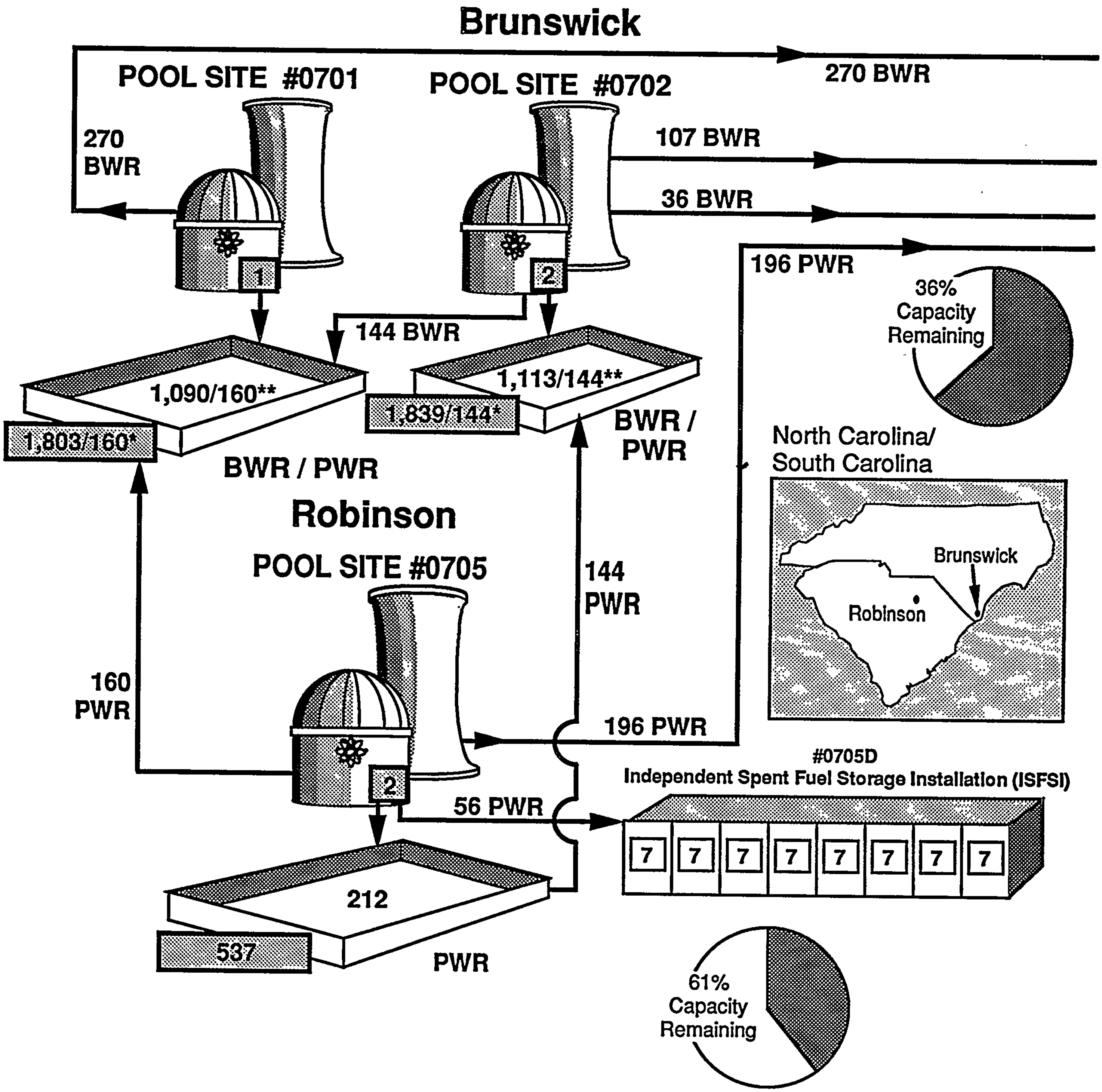
Pilgrim







Carolina Power and Light Company



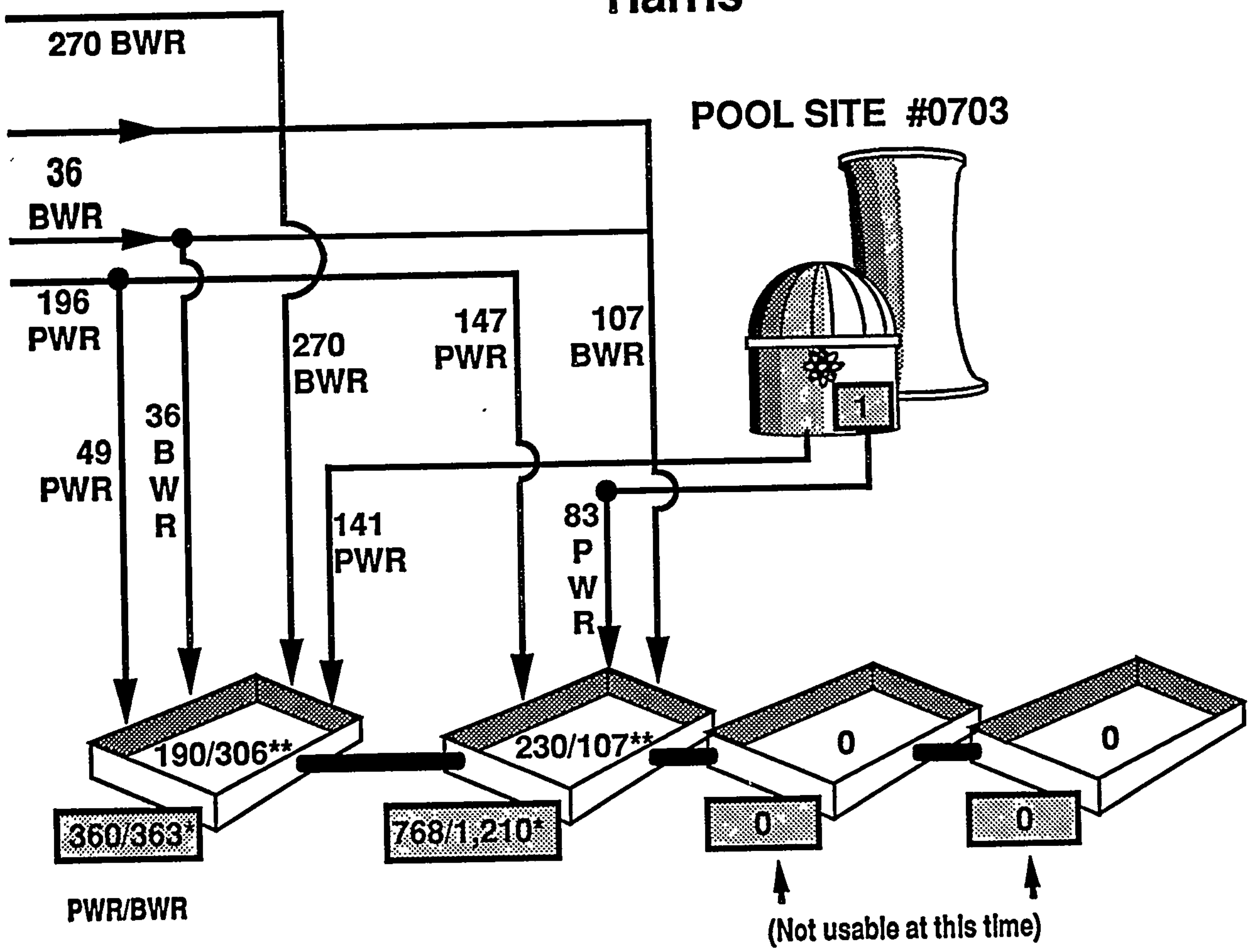
*The first number in the ratio denotes the maximum established storage capacity for assemblies in the BWR portion of the Brunswick pools. The second number is the maximum established storage capacity for assemblies in the PWR portion of the Brunswick pools.

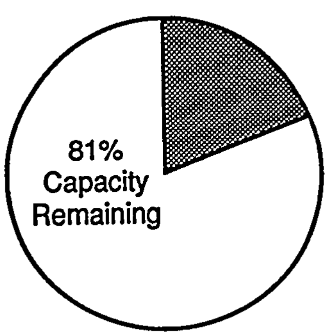
**The first number in the ratio denotes the current inventory of assemblies stored in the BWR portion of the Brunswick pools. The second number is the current inventory of assemblies stored in the PWR portion of the Brunswick pools.

Notes: The arrows depict movement of assemblies from a storage pool site to another storage pool site or ISFSI. The numbers beside the arrows indicate the number of assemblies moved.

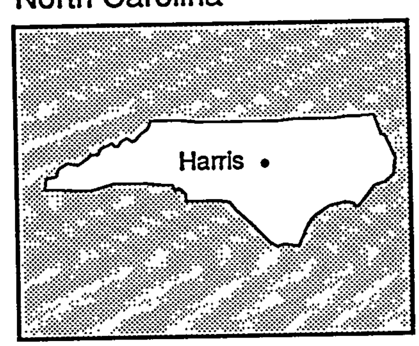
Carolina Power and Light Company
(Continued)

Harris





North Carolina



*The first number in the ratio denotes the maximum established storage capacity for assemblies in the PWR portion of the Harris pool. The second number is the maximum established storage capacity for assemblies in the BWR portion of the Harris pool.

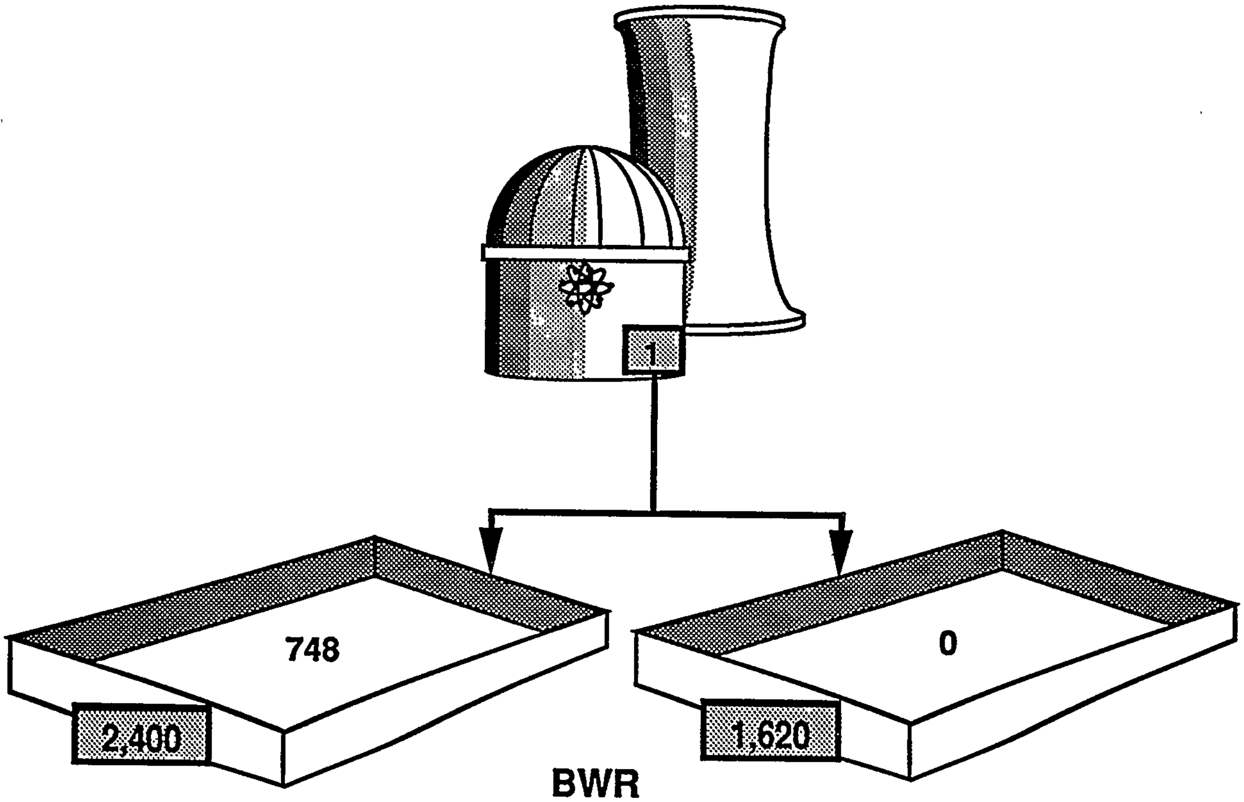
**The first number in the ratio denotes the current inventory of assemblies stored in the PWR portion of the Harris pool. The second number is the current inventory of assemblies stored in the BWR portion of the Harris pool.

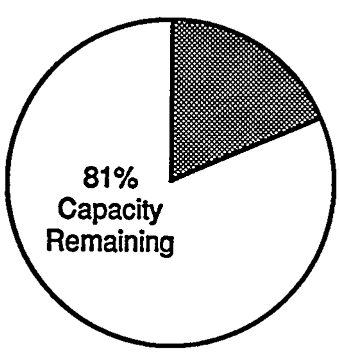
Notes: The Harris pools are licensed to hold up to 4,184 PWR or 5,808 BWR assemblies or a combination of each. In addition to the capacities shown, 704 PWR and 968 BWR racks are available as needed from site storage. These capacities reflect the maximum storage until additional storage racks are purchased.

Cleveland Electric Illuminating Company

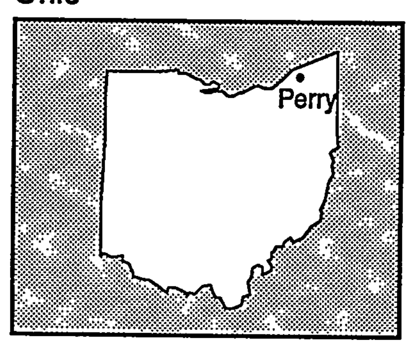
Perry

POOL SITES #0901 and #0902





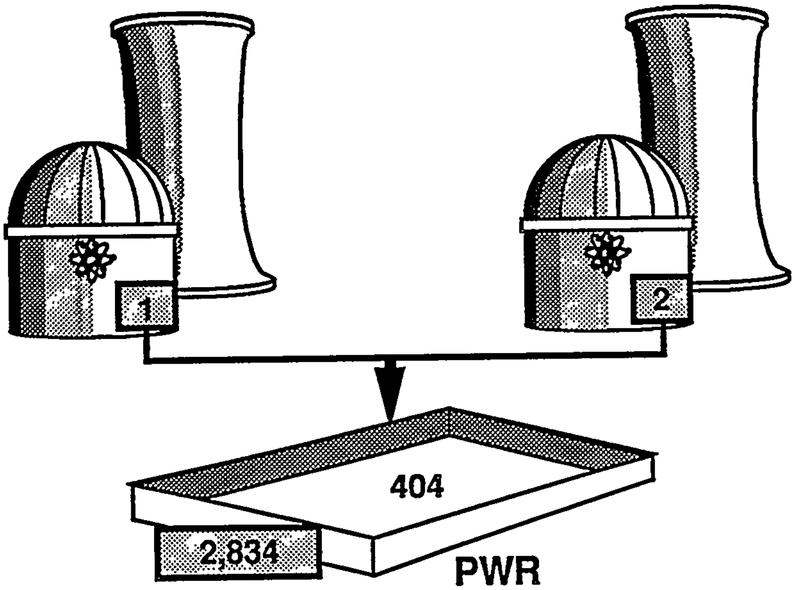
Ohio

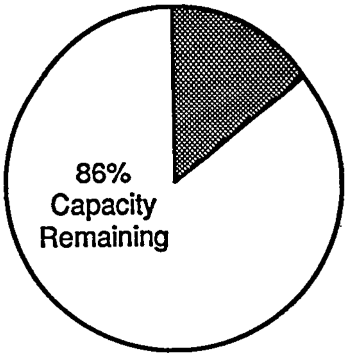


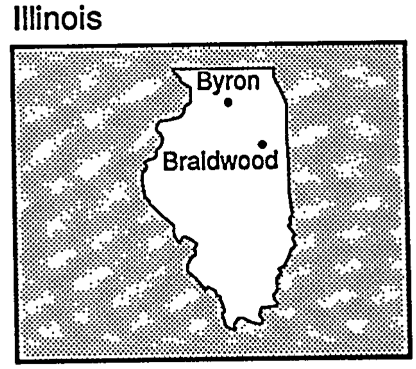
Commonwealth Edison Company

Braidwood

POOL SITE #1001

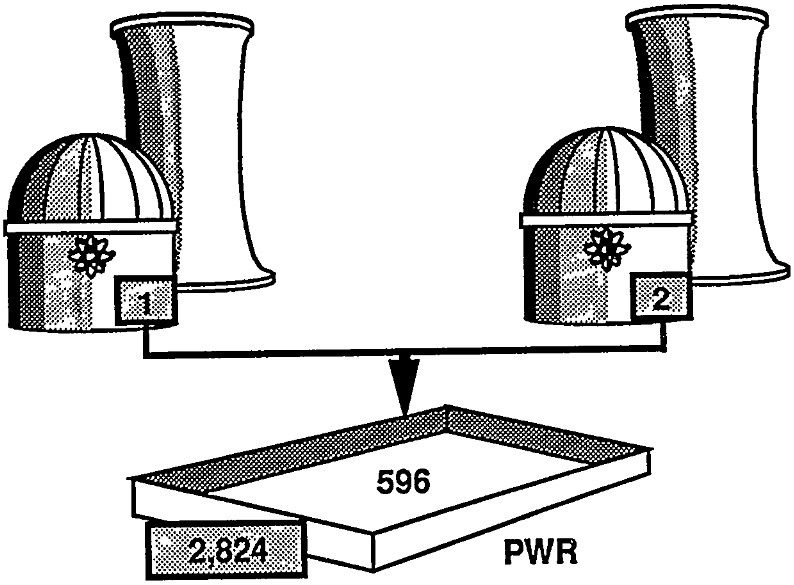


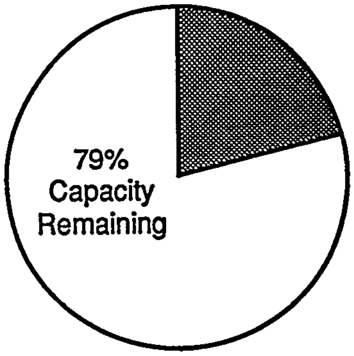




Byron

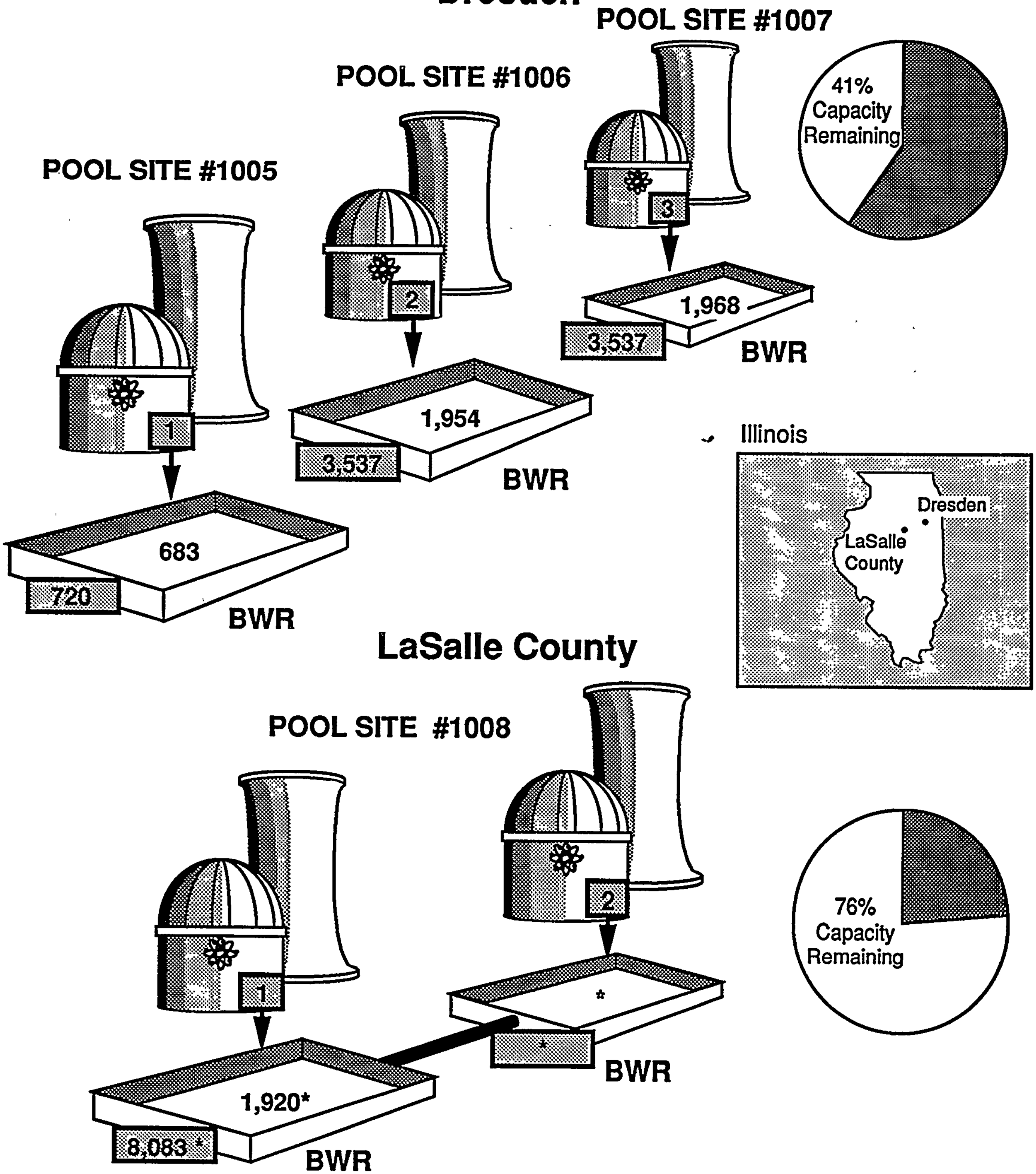
POOL SITE #1003





Commonwealth Edison Company
(Continued)

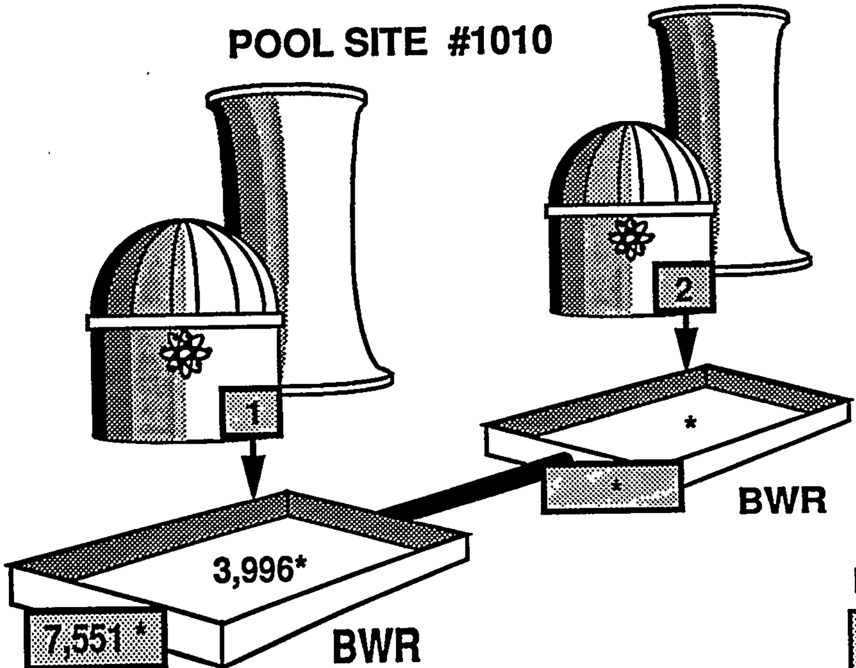
Dresden

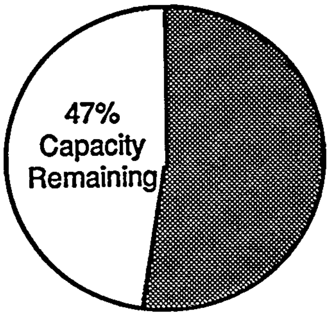


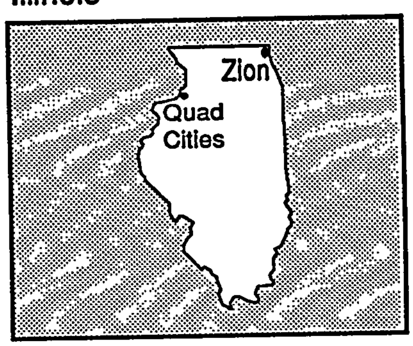
* Reported by utility as a single pool.

Commonwealth Edison Company
(Continued)

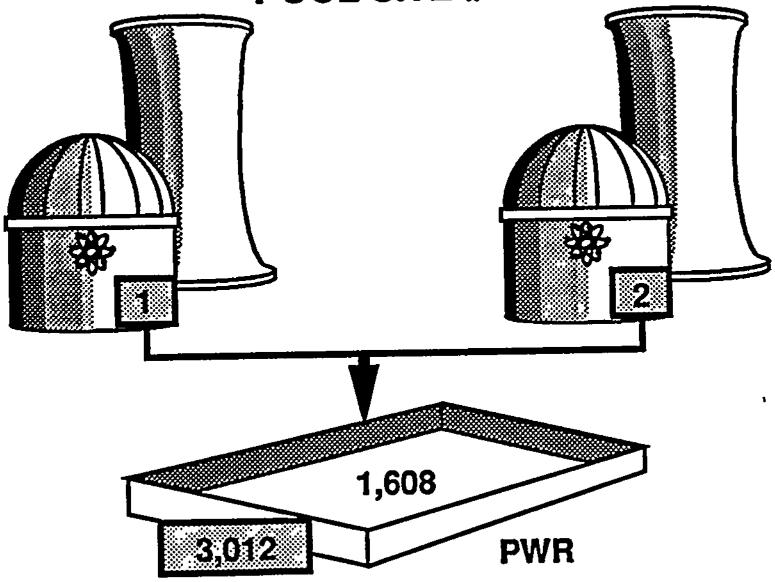
Quad Cities

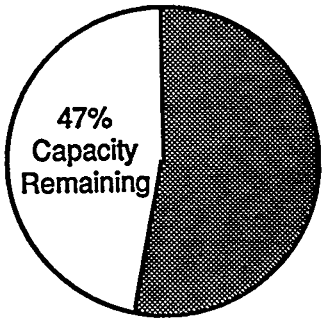






Zion



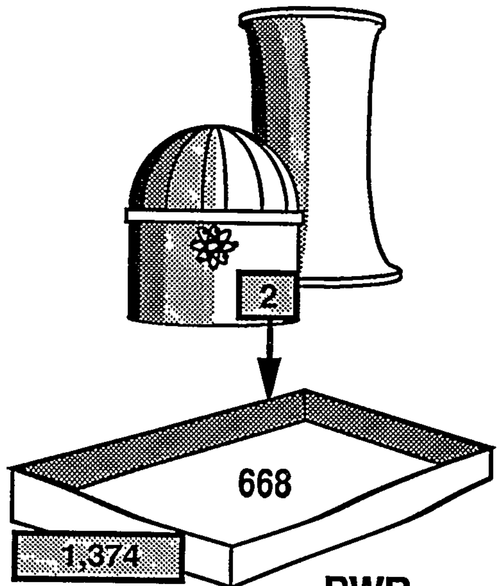


* Reported by utility as a single pool.

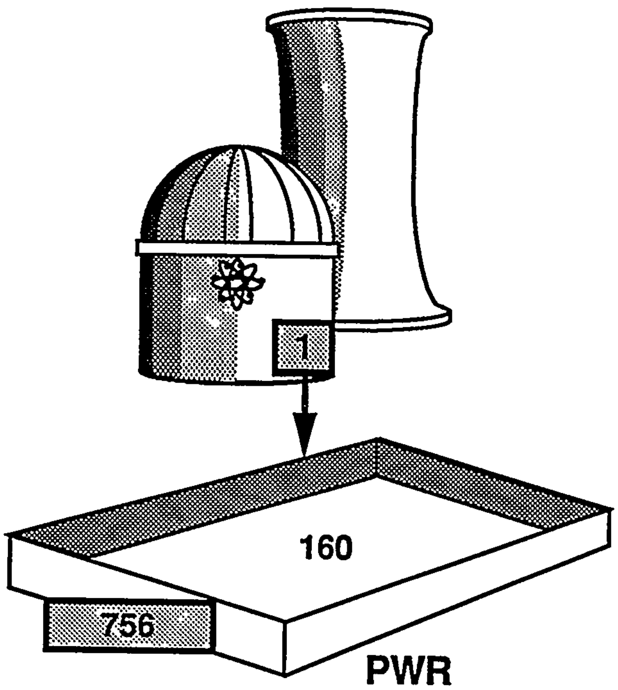
Consolidated Edison Company of New York

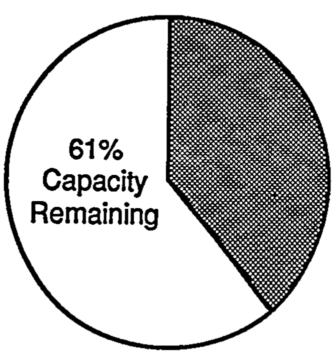
Indian Point*

POOL SITE #1102

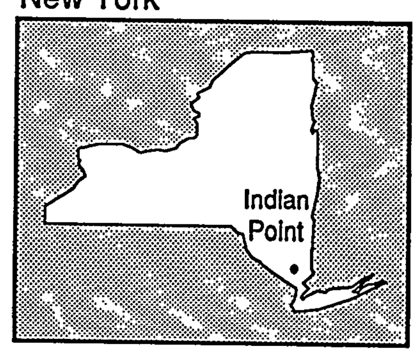


POOL SITE #1101





New York

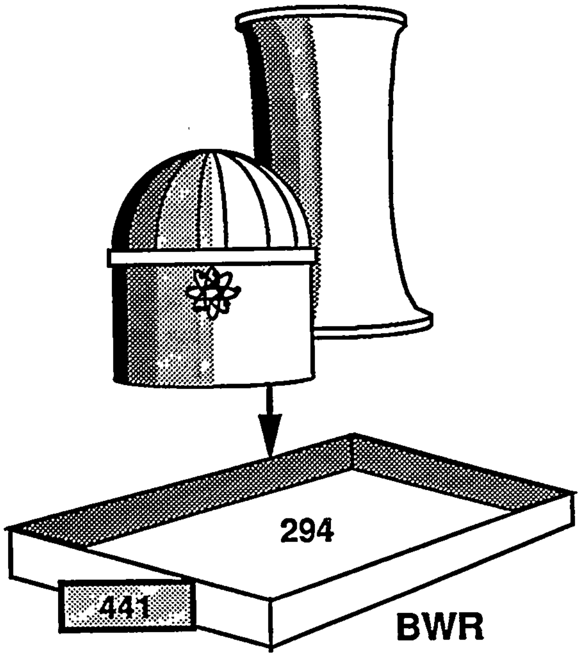


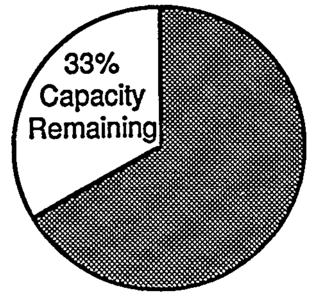
* Reactors at this site are Indian Point 1 & 2.

Consumers Power Company

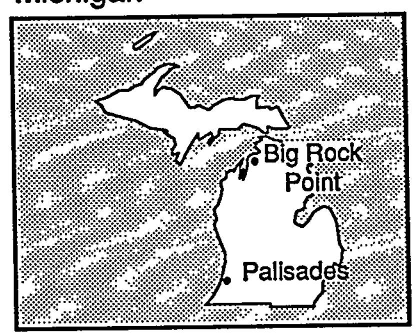
Big Rock Point

POOL SITE #1201



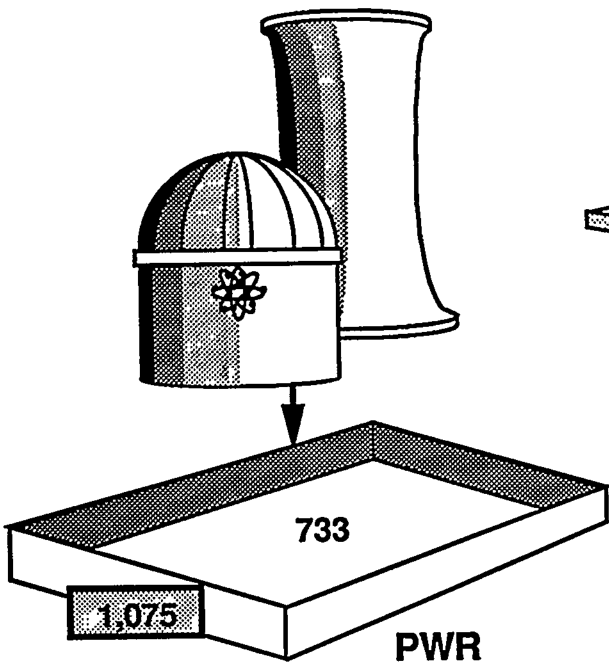


Michigan

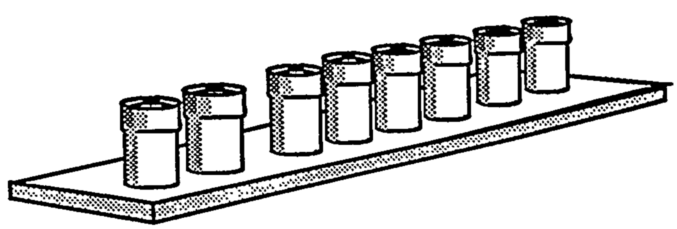


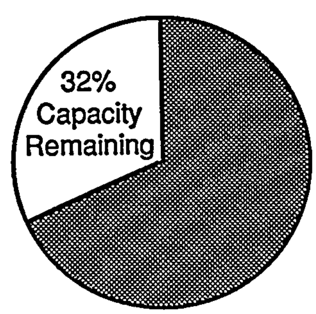
Palisades

POOL SITE #1204



#1204D
Independent Spent Fuel Storage Installation

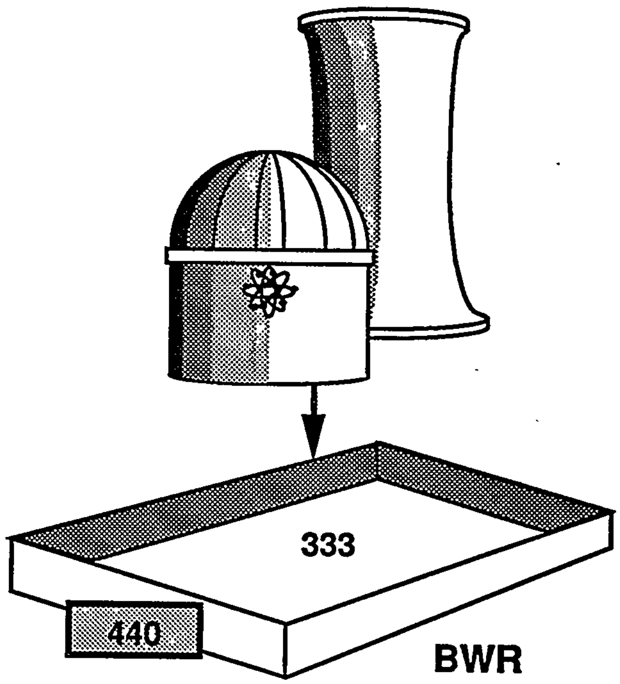


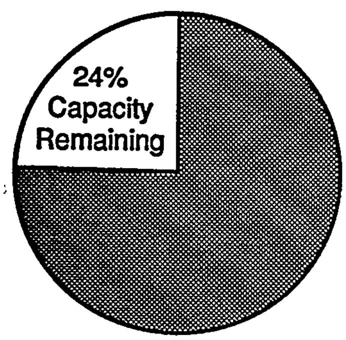


Dairyland Power Cooperative

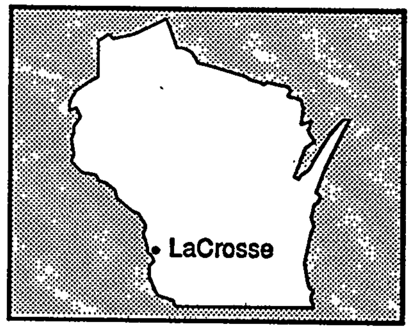
LaCrosse

POOL SITE #1301





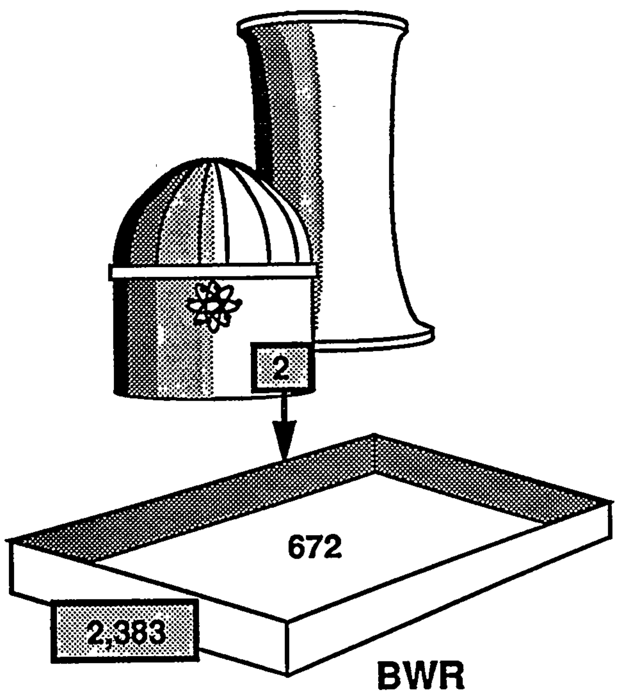
Wisconsin

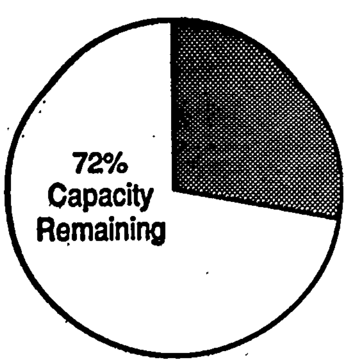


Detroit Edison Company

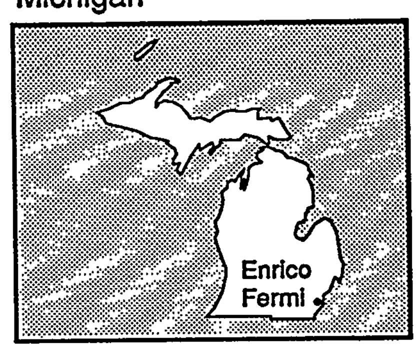
Enrico Fermi

POOL SITE #1402





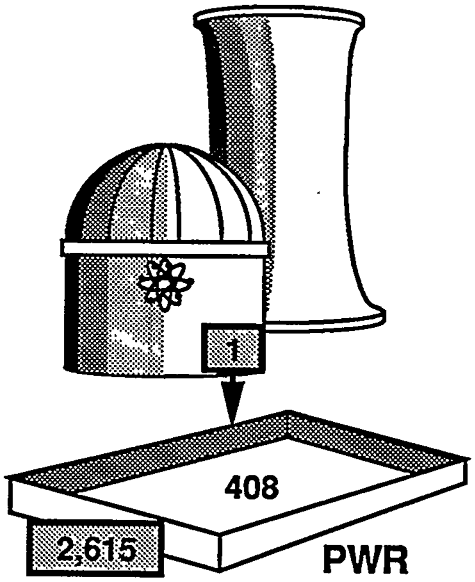
Michigan



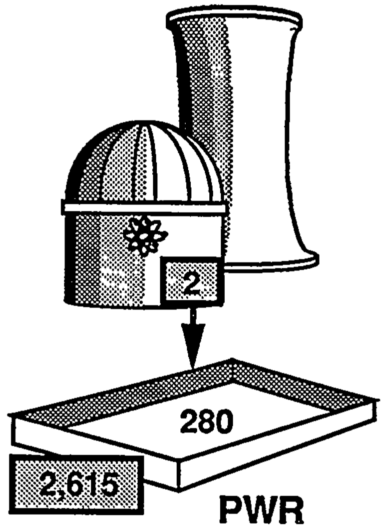
Duke Power Company

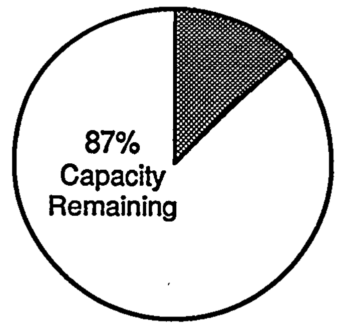
Catawba

POOL SITE #1501

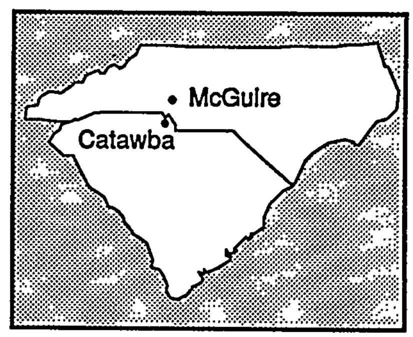


POOL SITE #1502



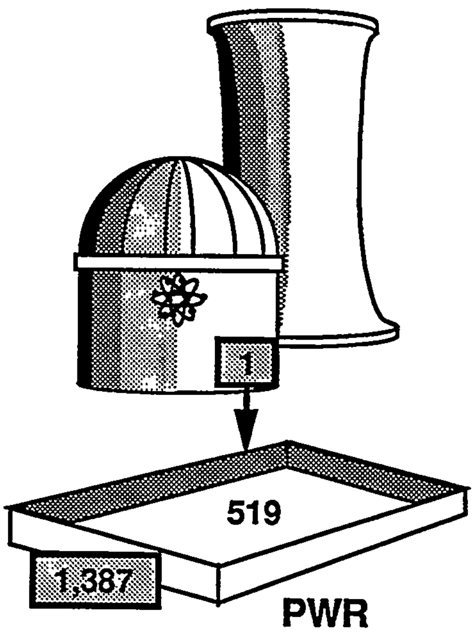


North Carolina/
South Carolina

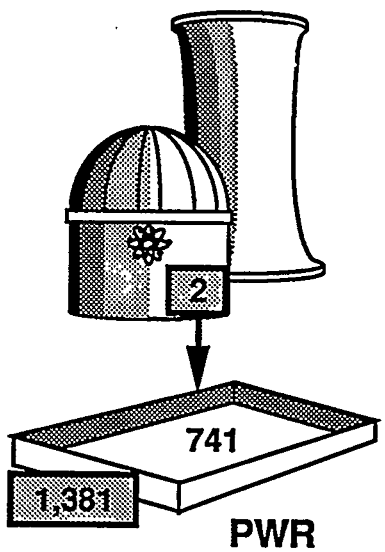


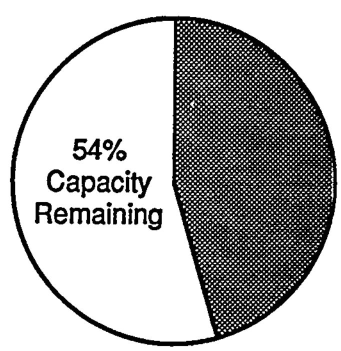
McGuire

POOL SITE #1504



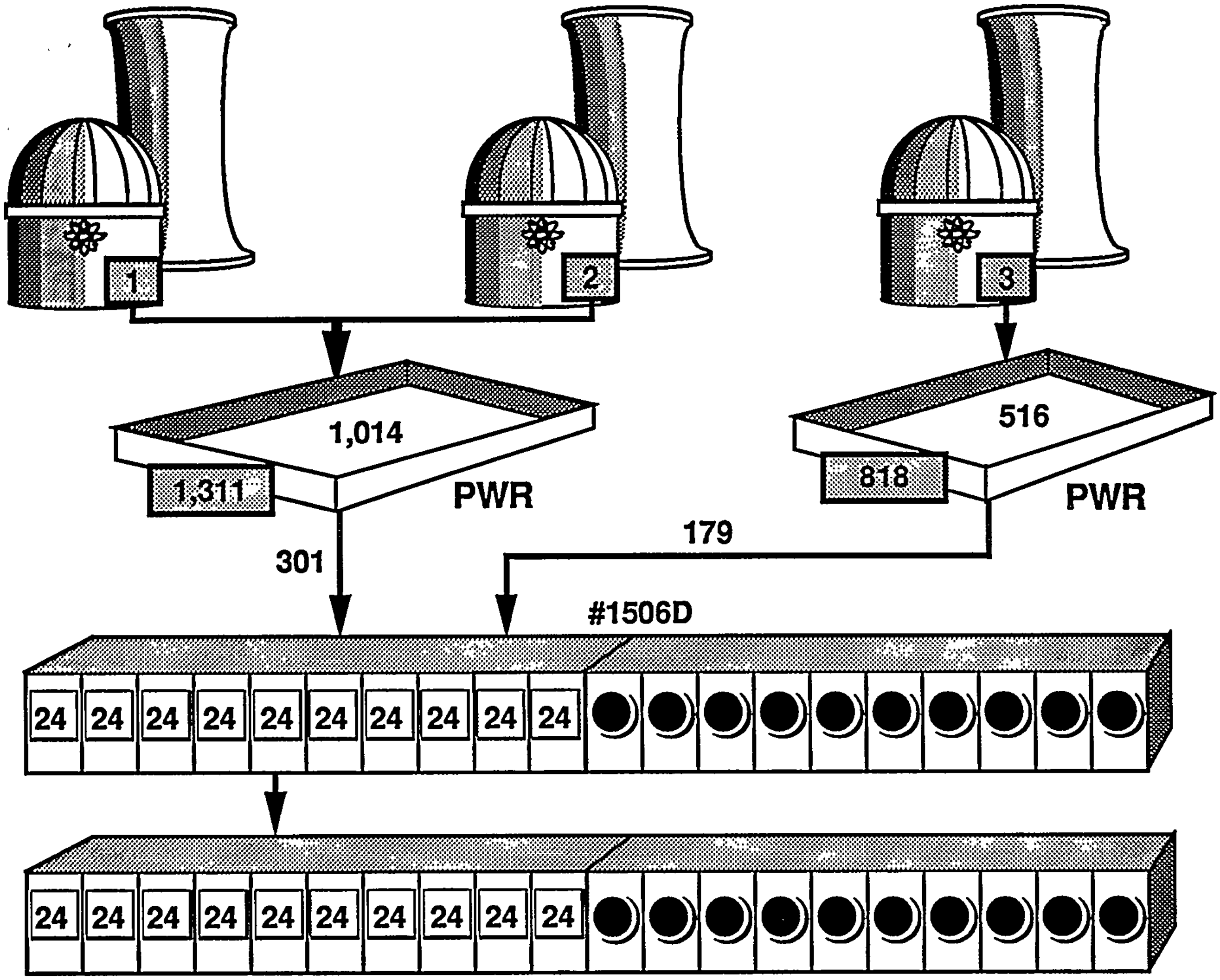
POOL SITE #1505



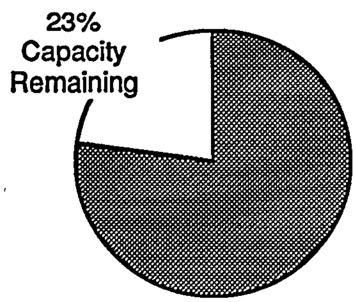


Duke Power Company
(Continued)

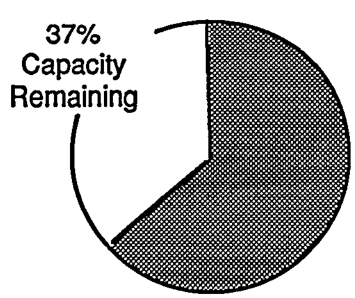
Oconee



Independent Spent Fuel Storage Installation

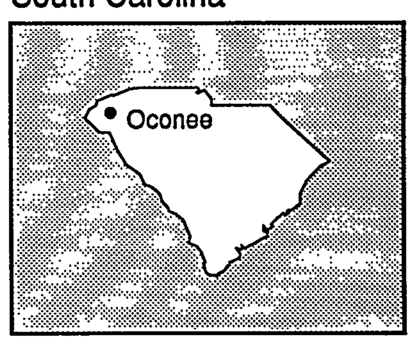


Oconee 1 & 2



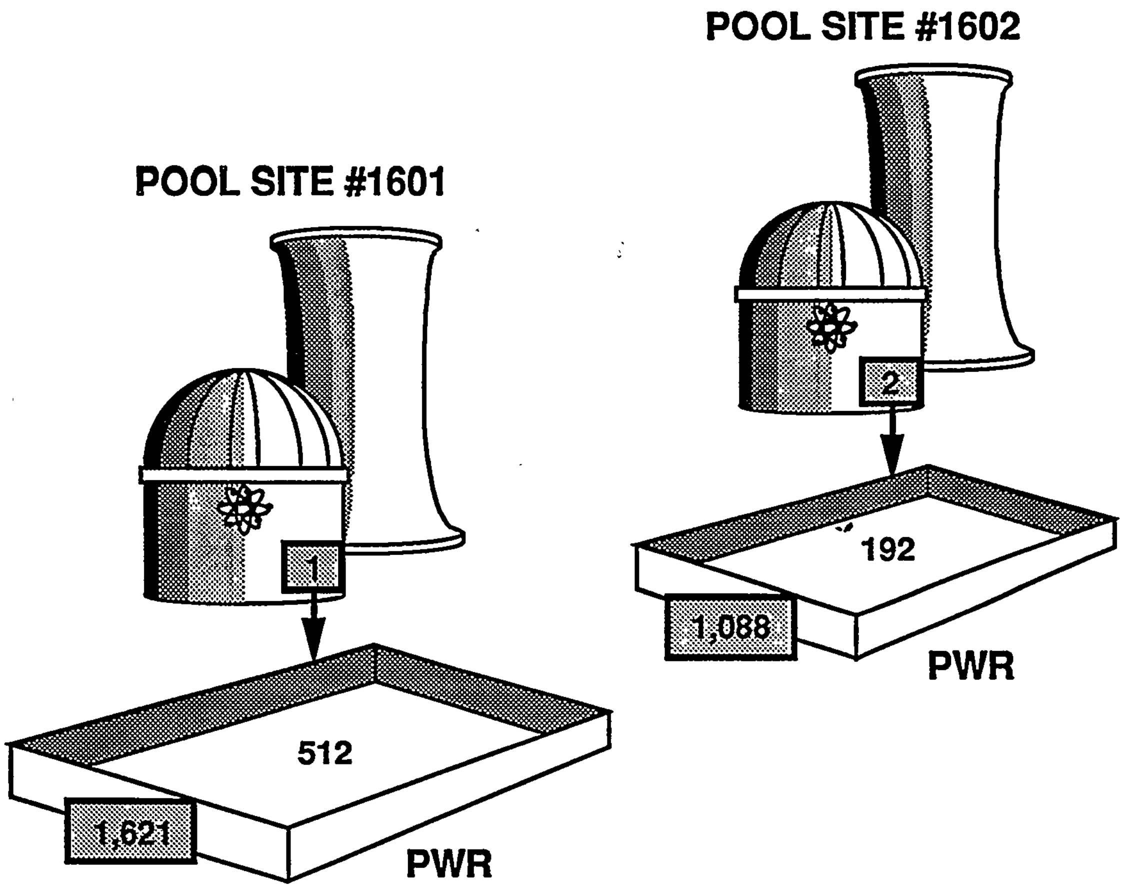
Oconee 3

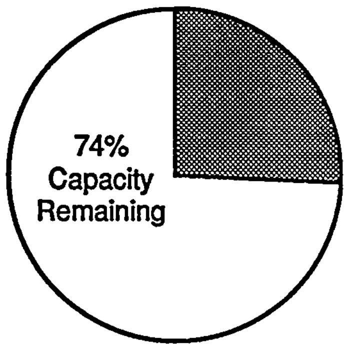
South Carolina

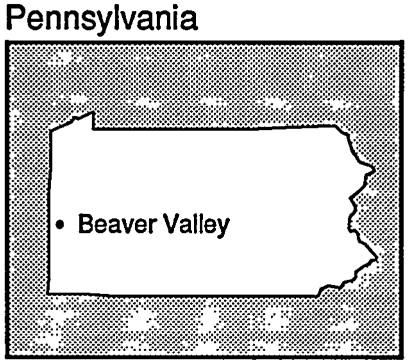


Duquesne Light Company

Beaver Valley



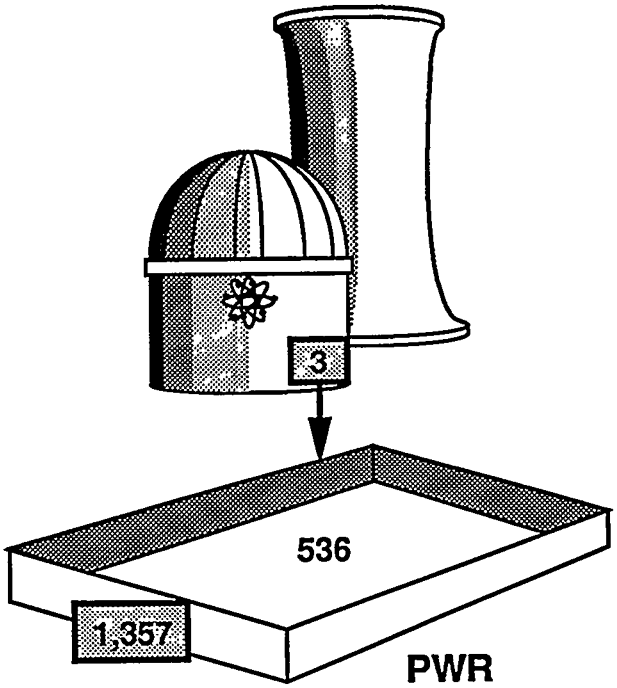


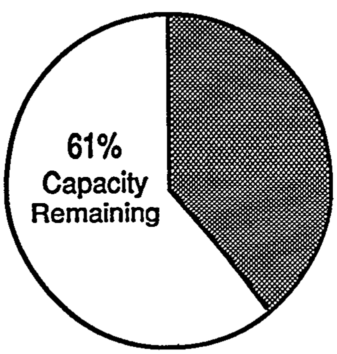


Florida Power Corporation

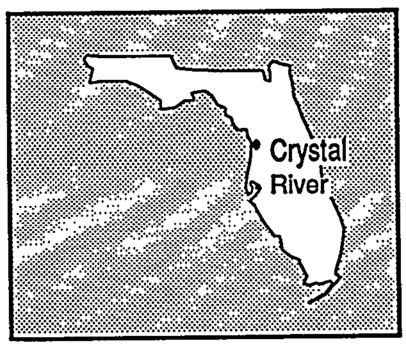
Crystal River

POOL SITE #1701



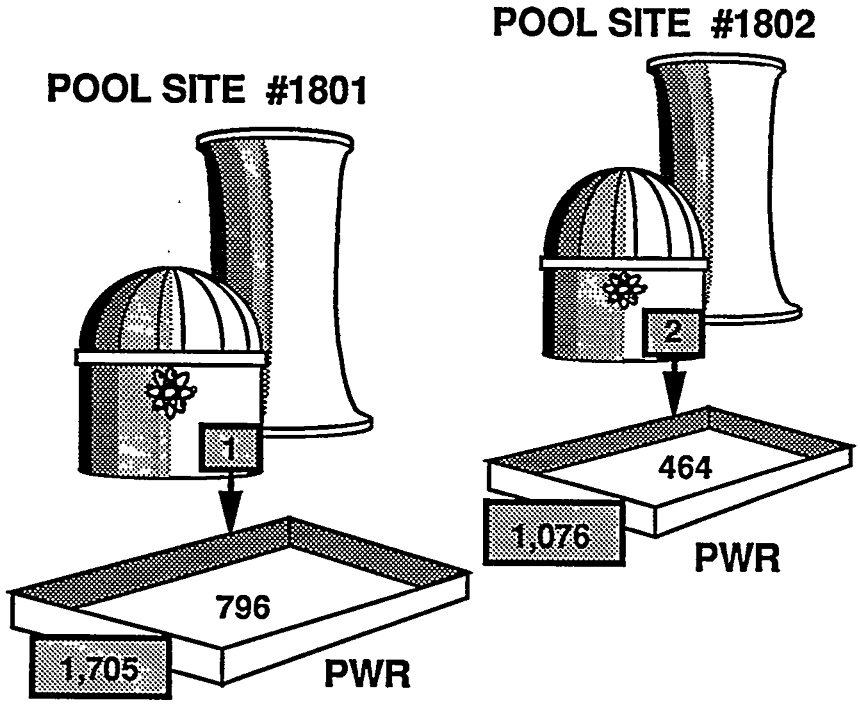


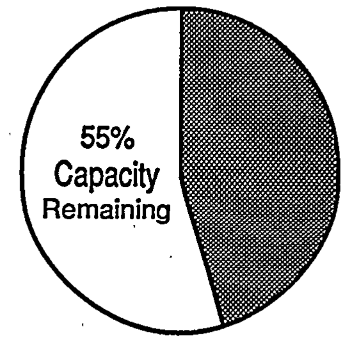
Florida

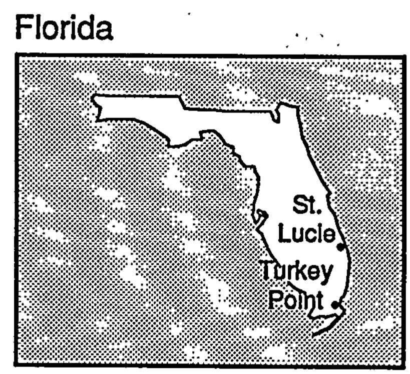


Florida Power and Light Company

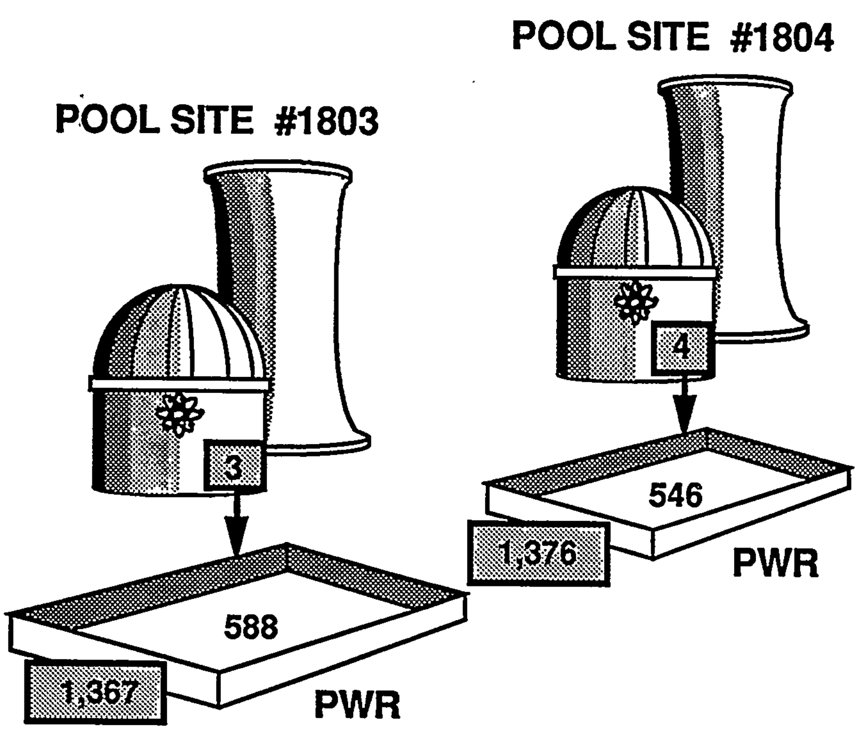
St. Lucie

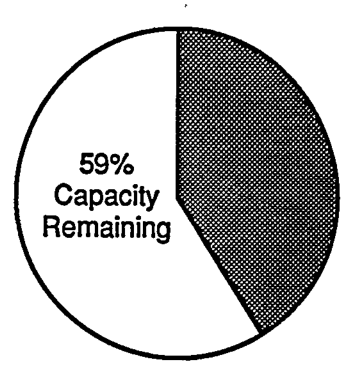






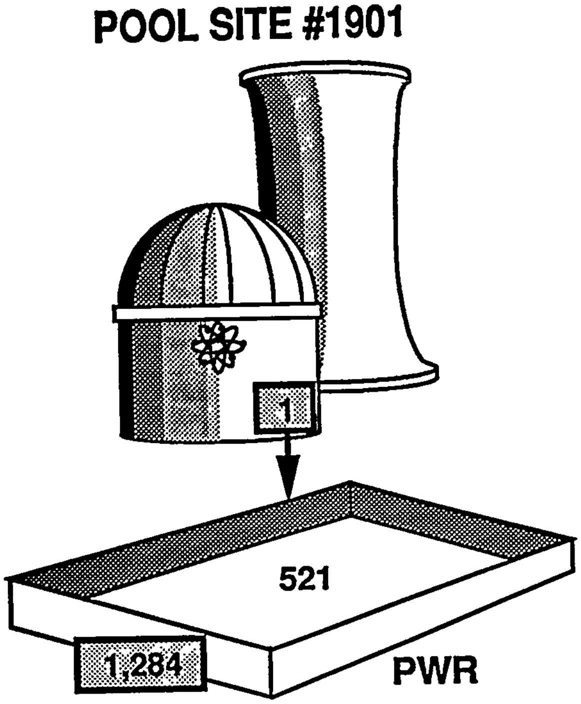
Turkey Point

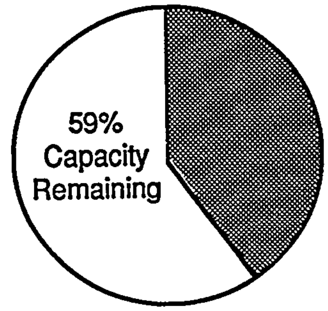


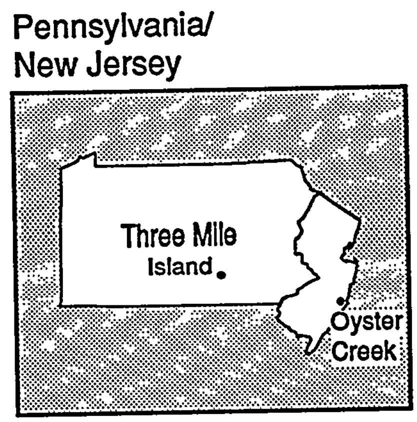


GPU Nuclear Corporation

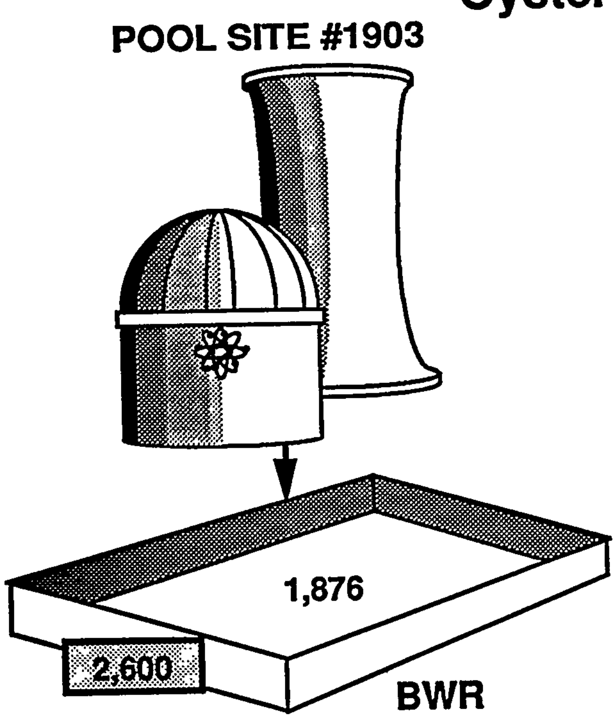
Three Mile Island

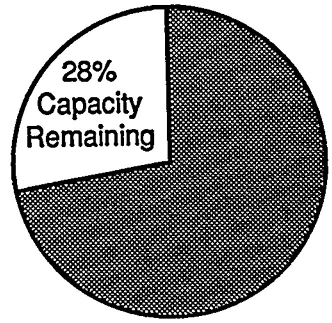






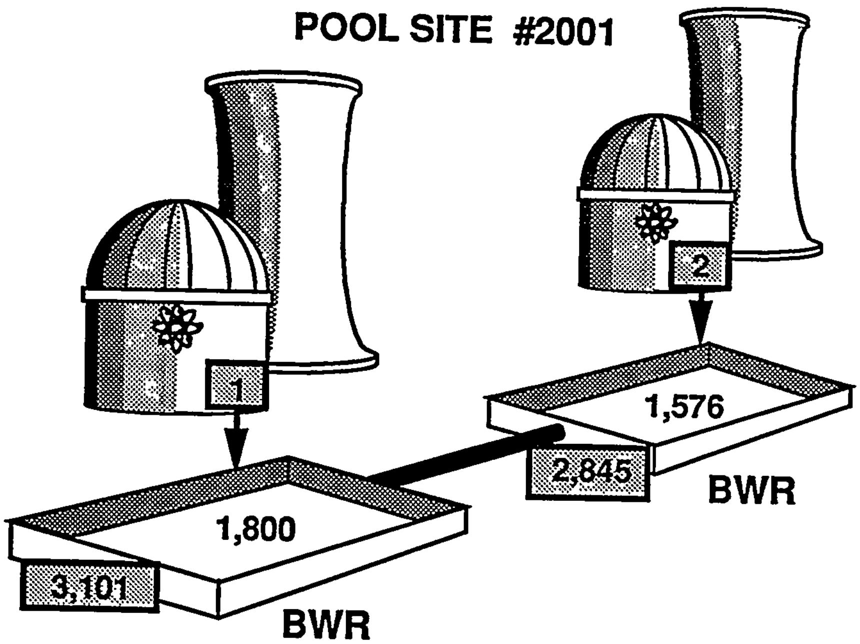
Oyster Creek

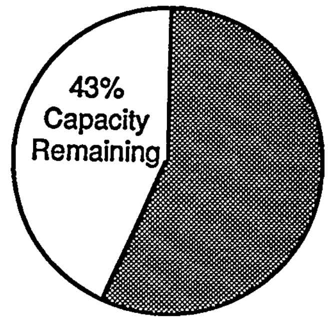


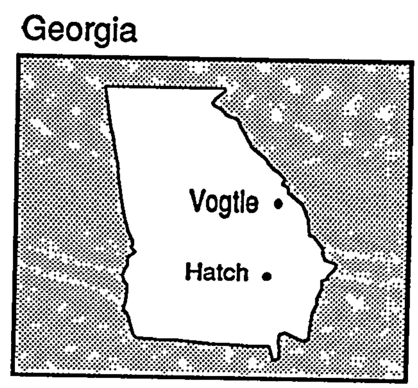


Georgia Power Company

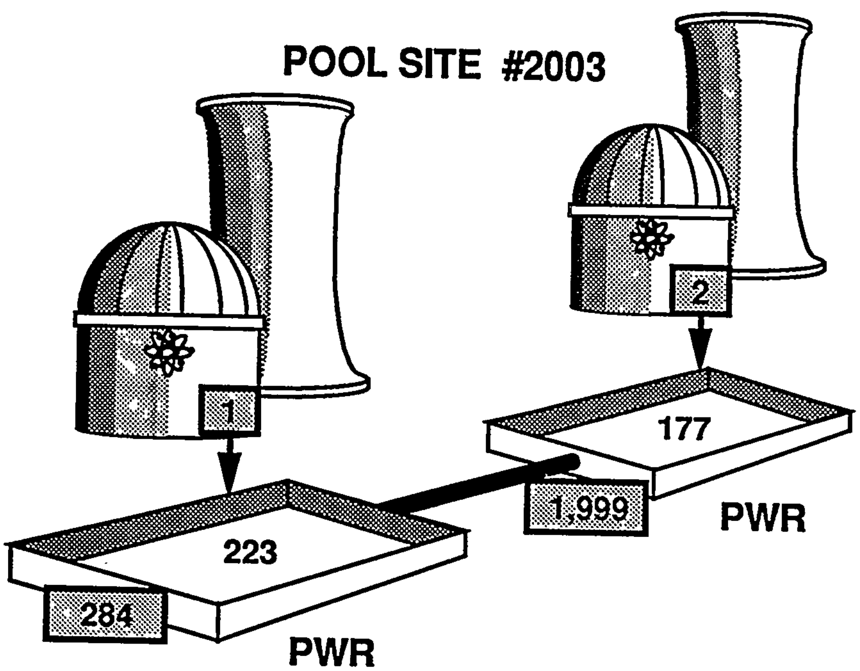
Hatch

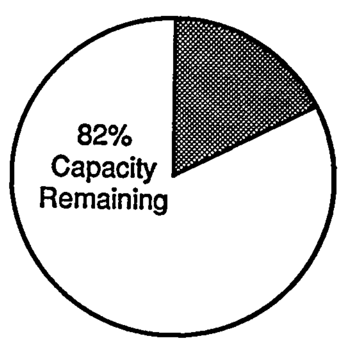






Vogtle

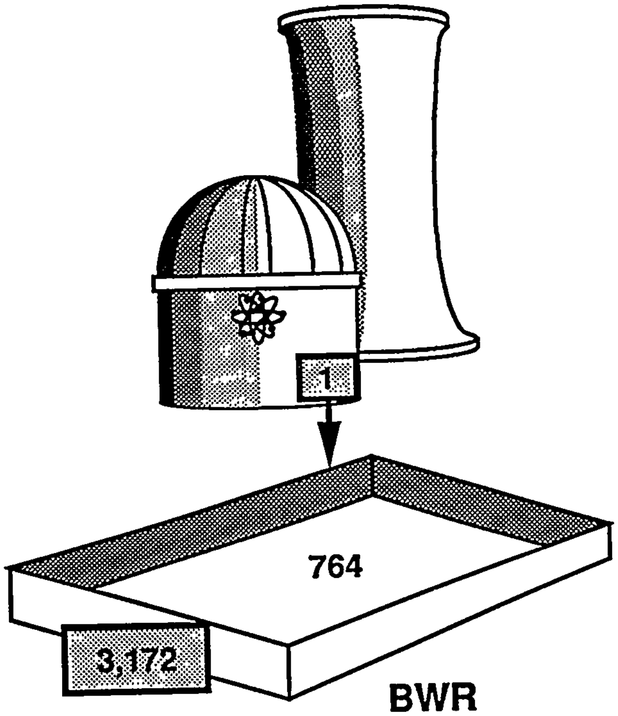


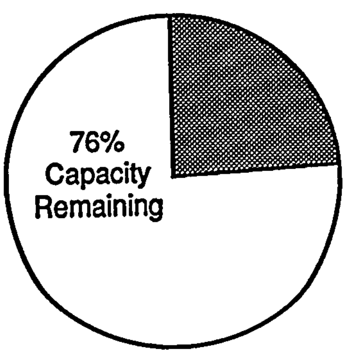


Gulf States Utilities Company

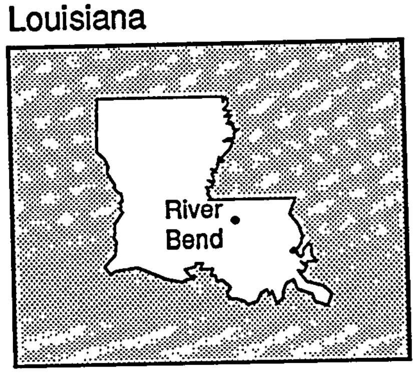
River Bend

POOL SITE #2101



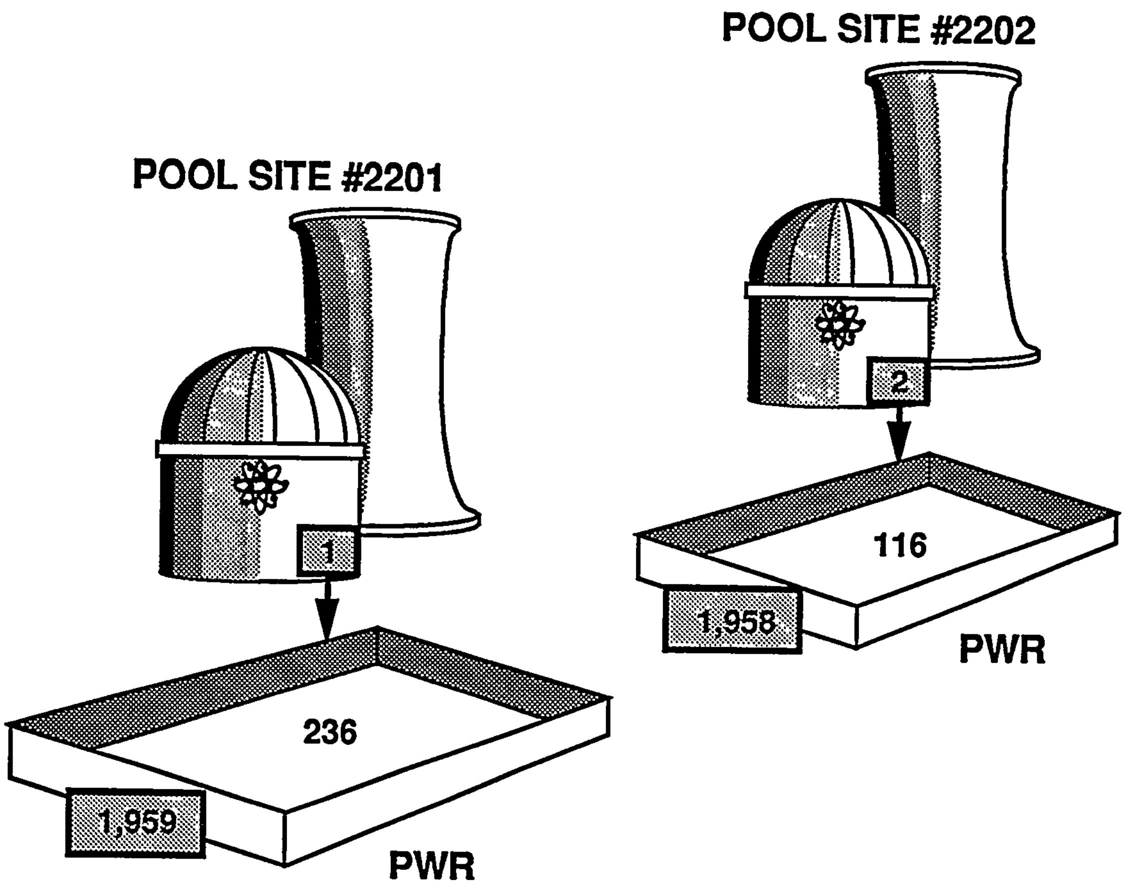


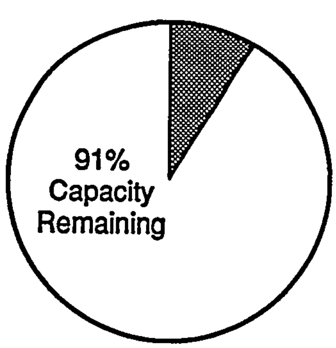
Louisiana

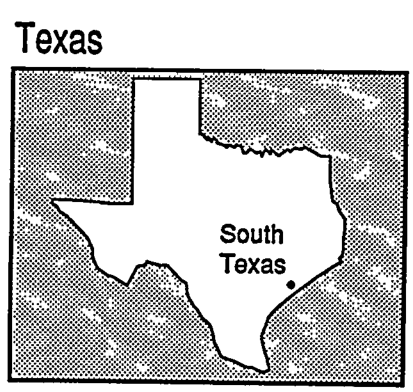


Houston Lighting and Power Company

South Texas



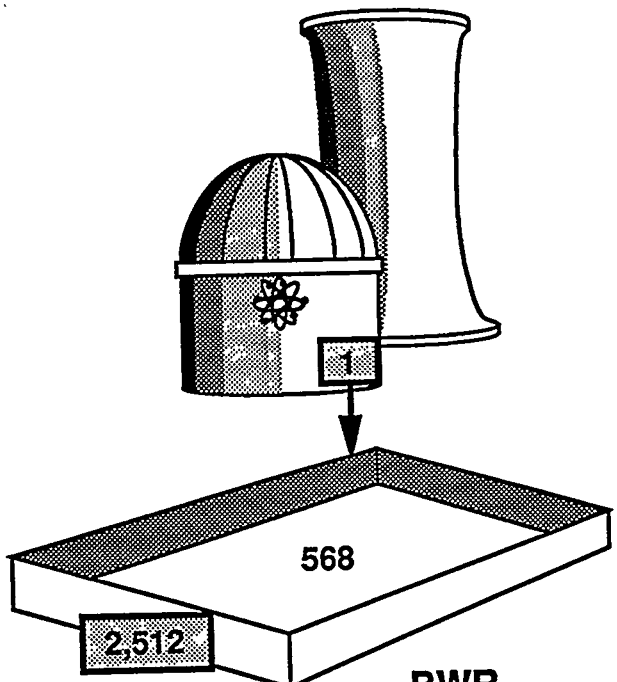




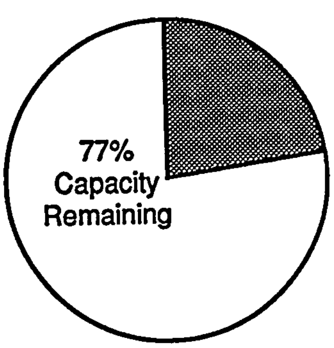
Illinois Power Company

Clinton

POOL SITE #2301



BWR



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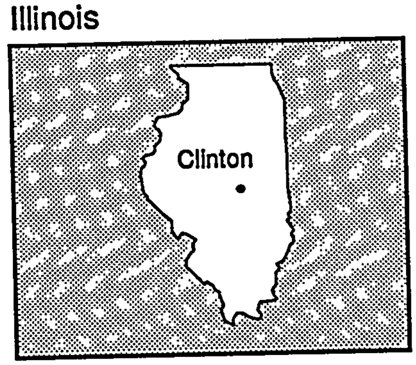
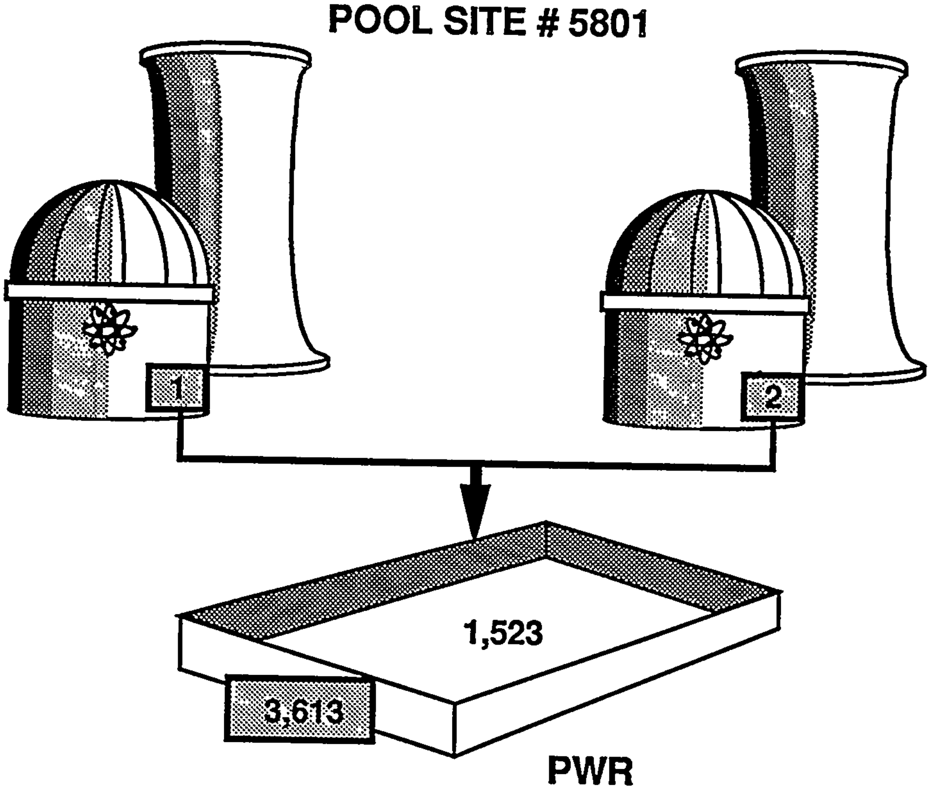
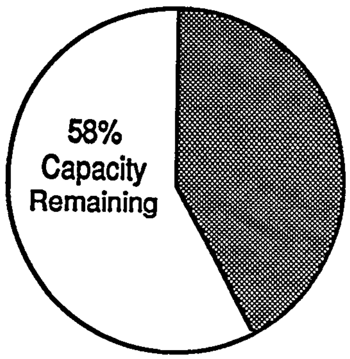
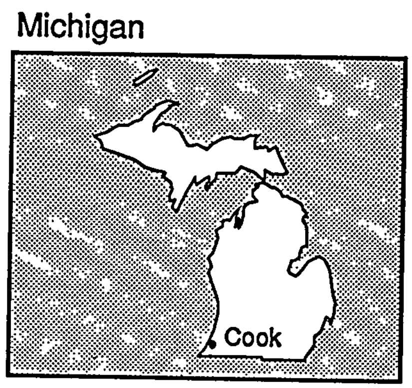


Indiana Michigan Power Company

Cook



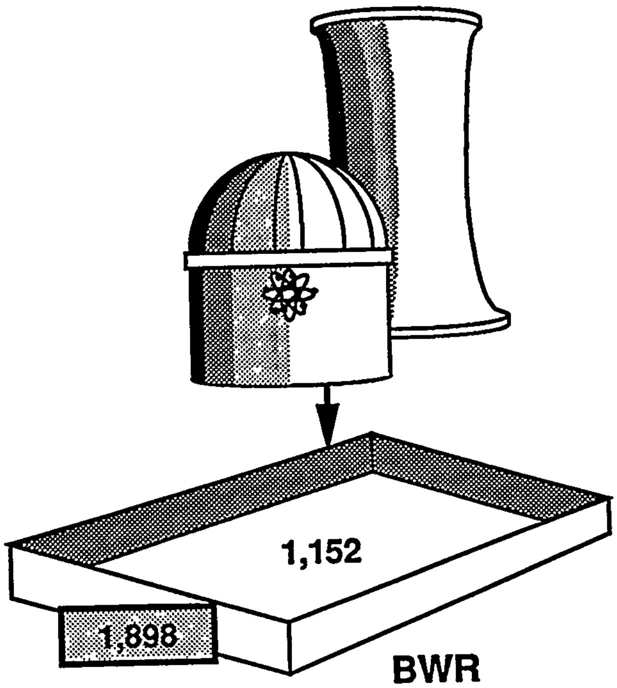


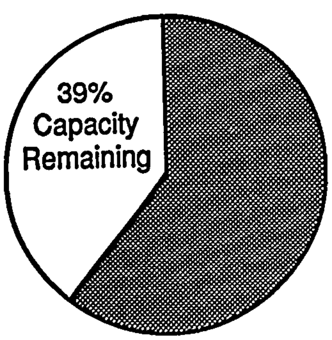


Iowa Electric Light and Power Company

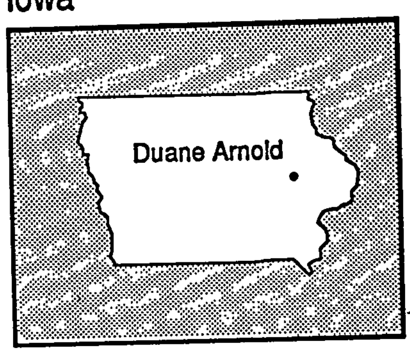
Duane Arnold

POOL SITE #2401



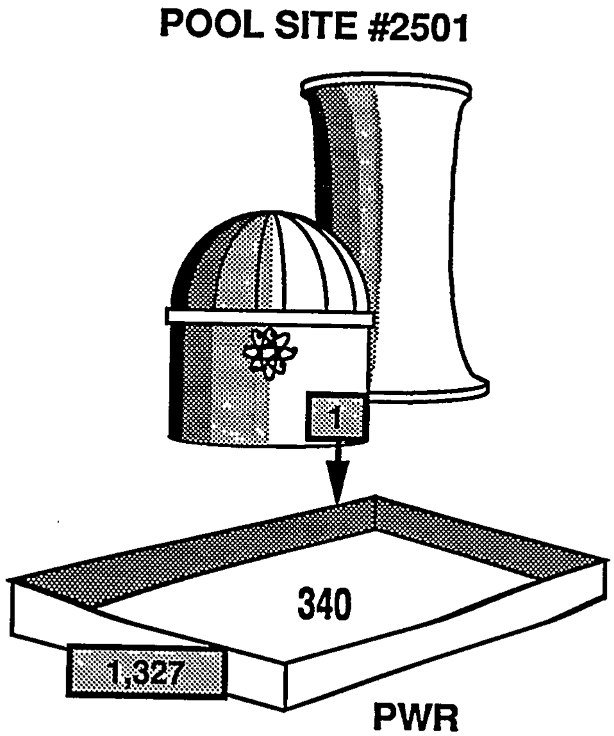


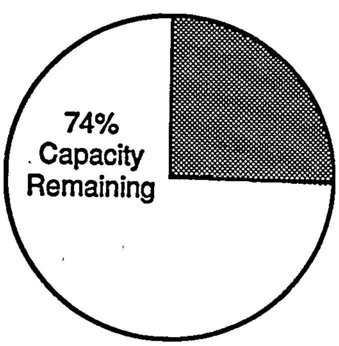
Iowa

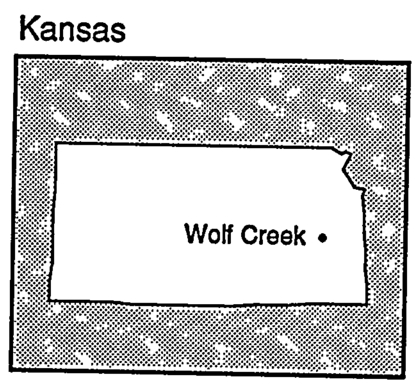


Kansas Gas and Electric Company

Wolf Creek



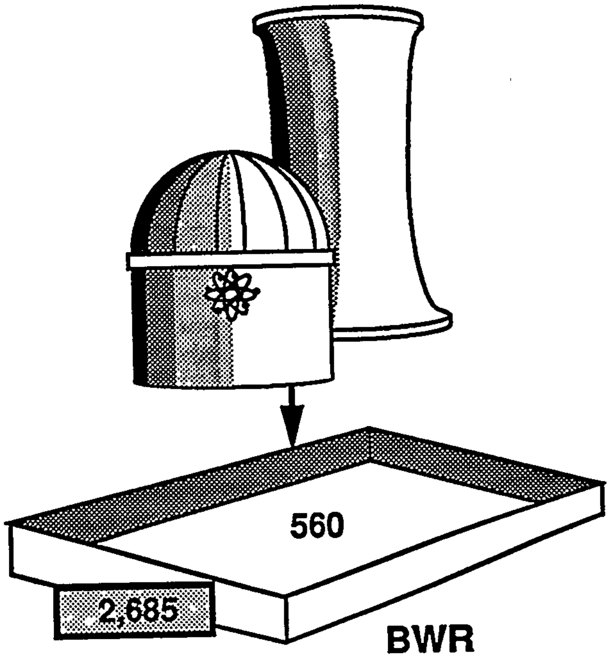


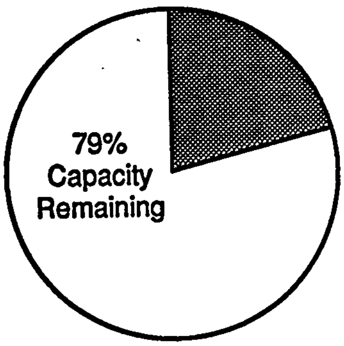


Long Island Lighting Company

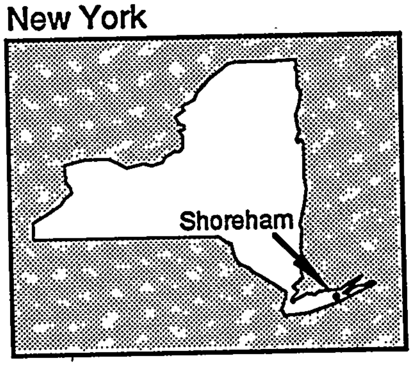
Shoreham

POOL SITE #2601





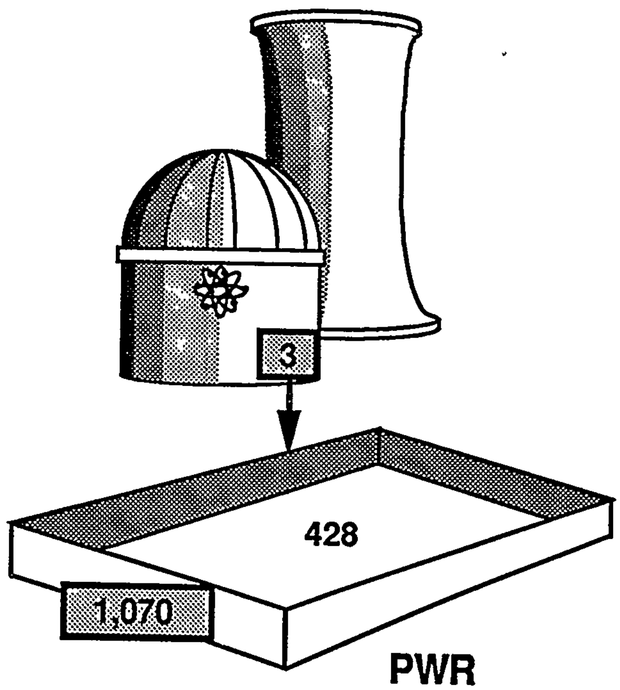
New York

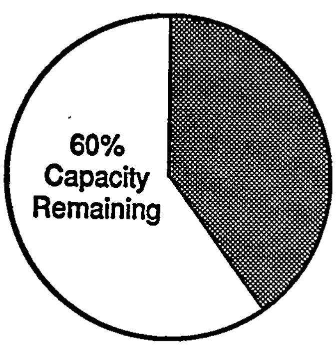


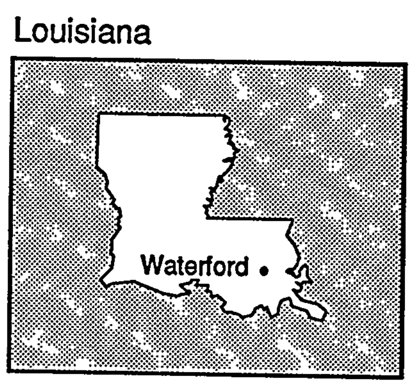
Louisiana Power and Light Company

Waterford

POOL SITE #2701



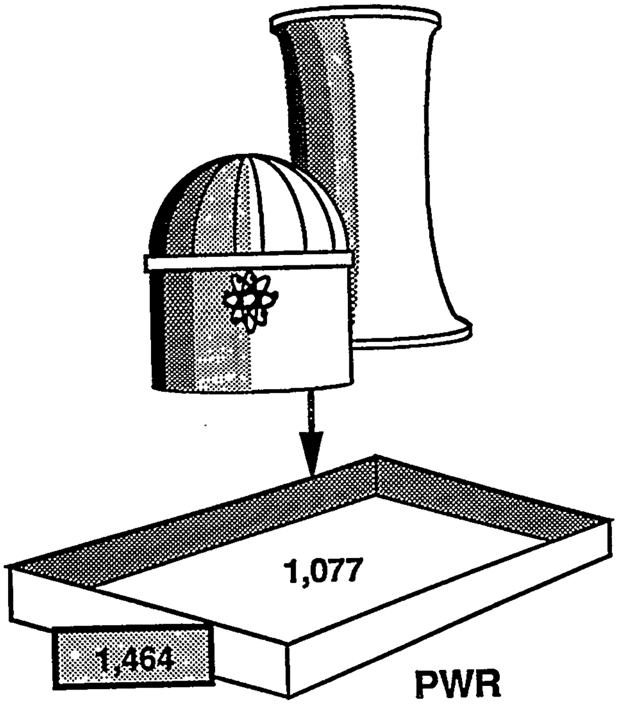


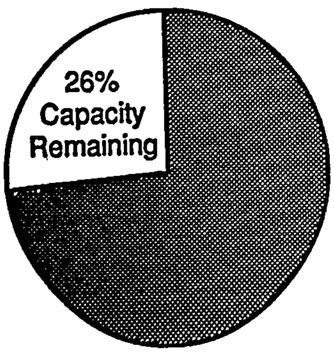


Maine Yankee Atomic Power Company

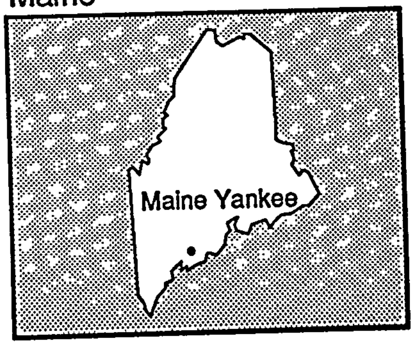
Maine Yankee

POOL SITE #2801



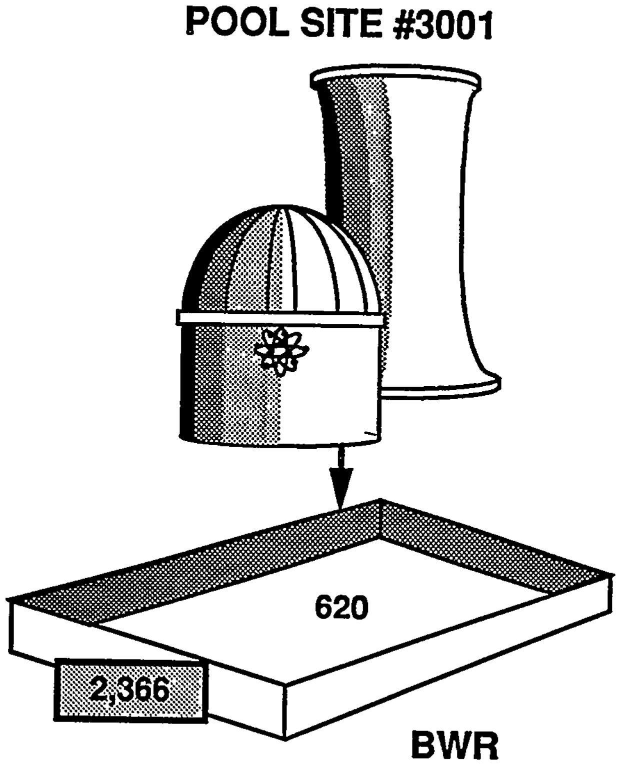


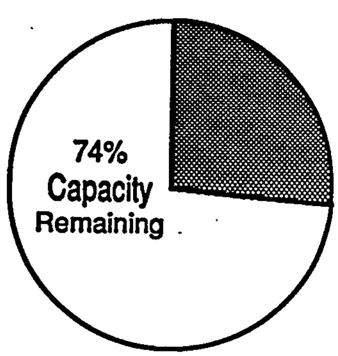
Maine

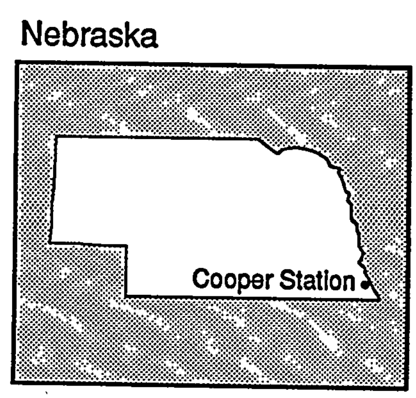


Nebraska Public Power District

Cooper Station



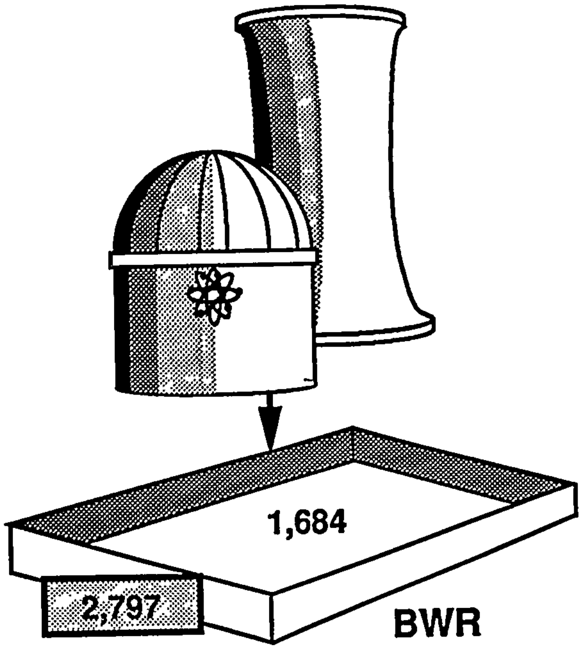


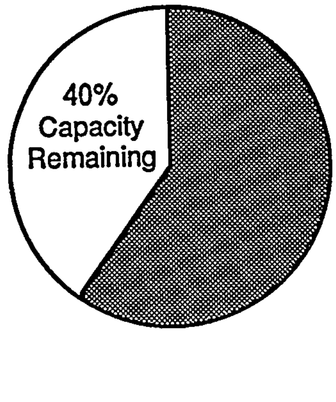


New York Power Authority

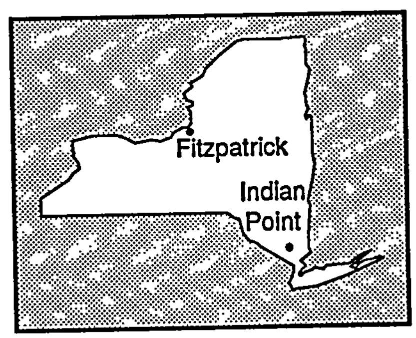
Fitzpatrick

POOL SITE #3901



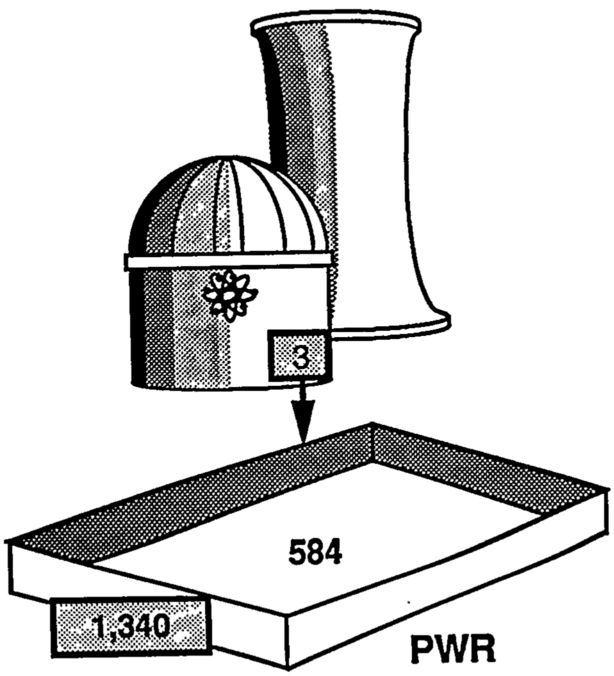


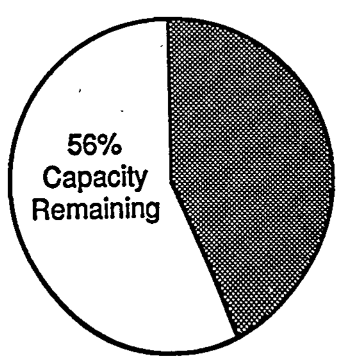
New York



Indian Point*

POOL SITE #3902

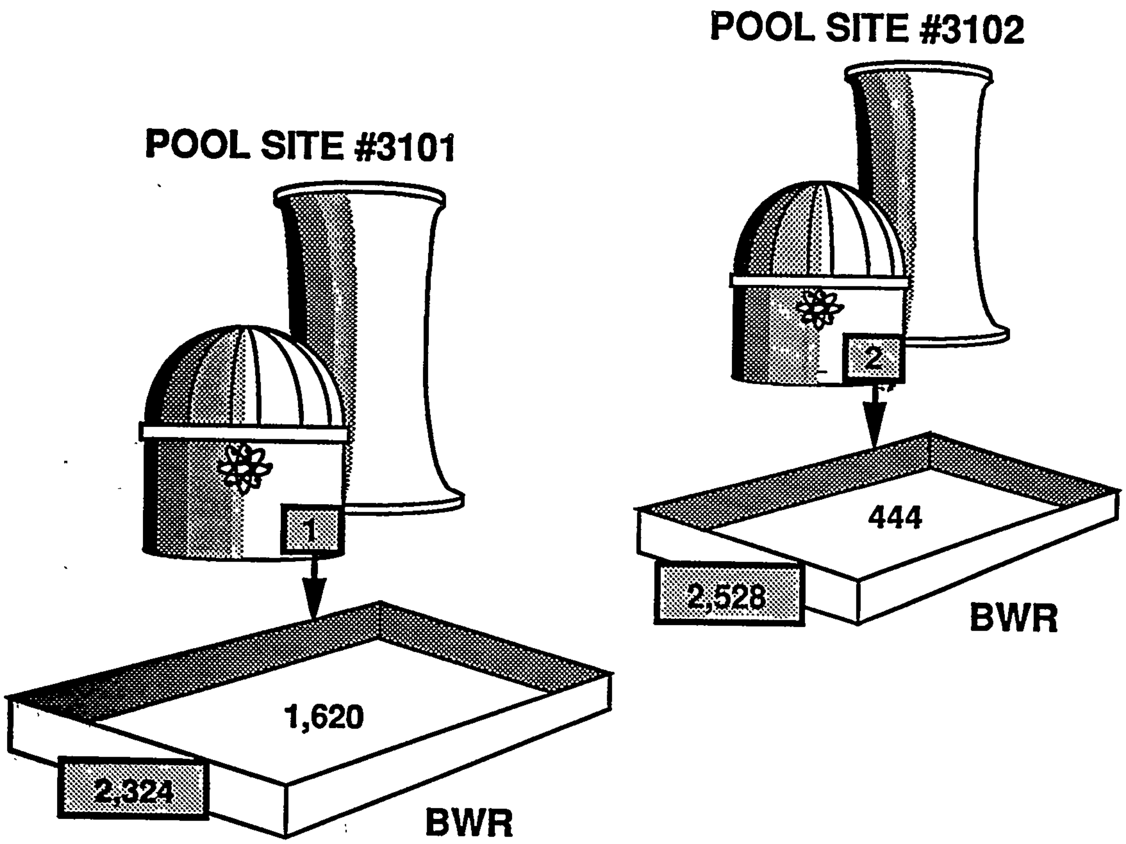


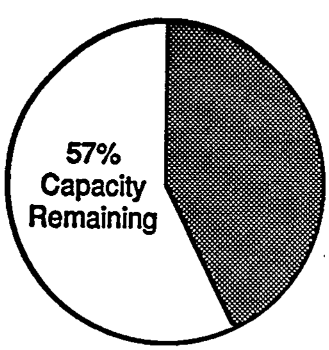


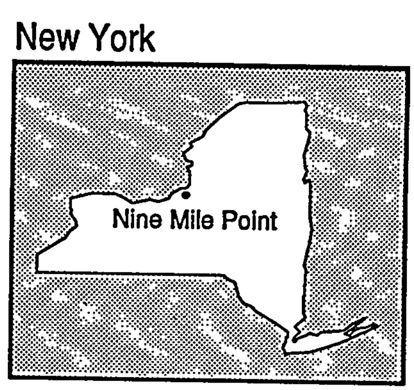
* Reactor at this site is Indian Point 3.

Niagara Mohawk Power Corporation

Nine Mile Point



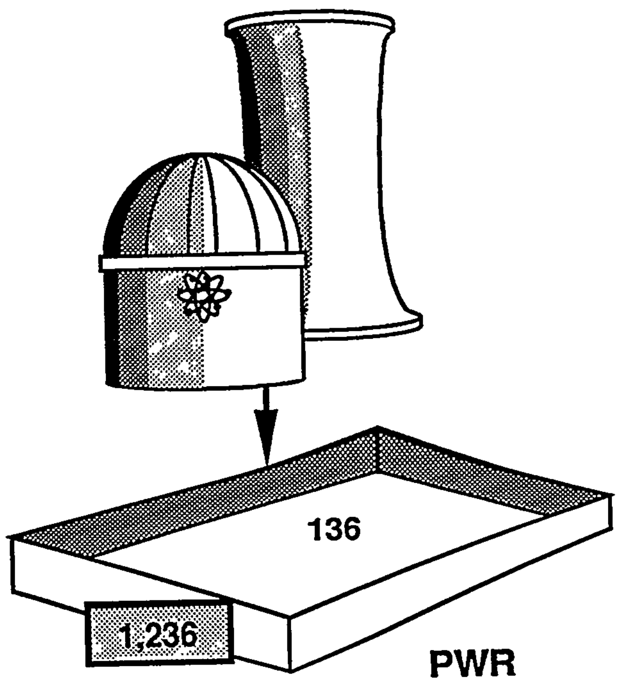


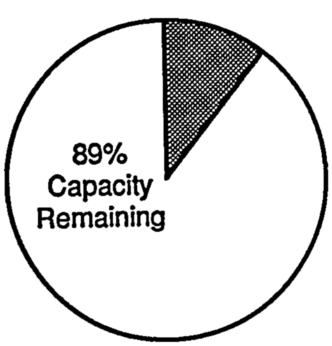


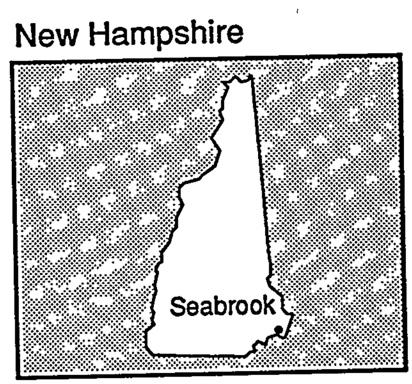
North Atlantic Energy Service Corporation

Seabrook

POOL SITE #5901

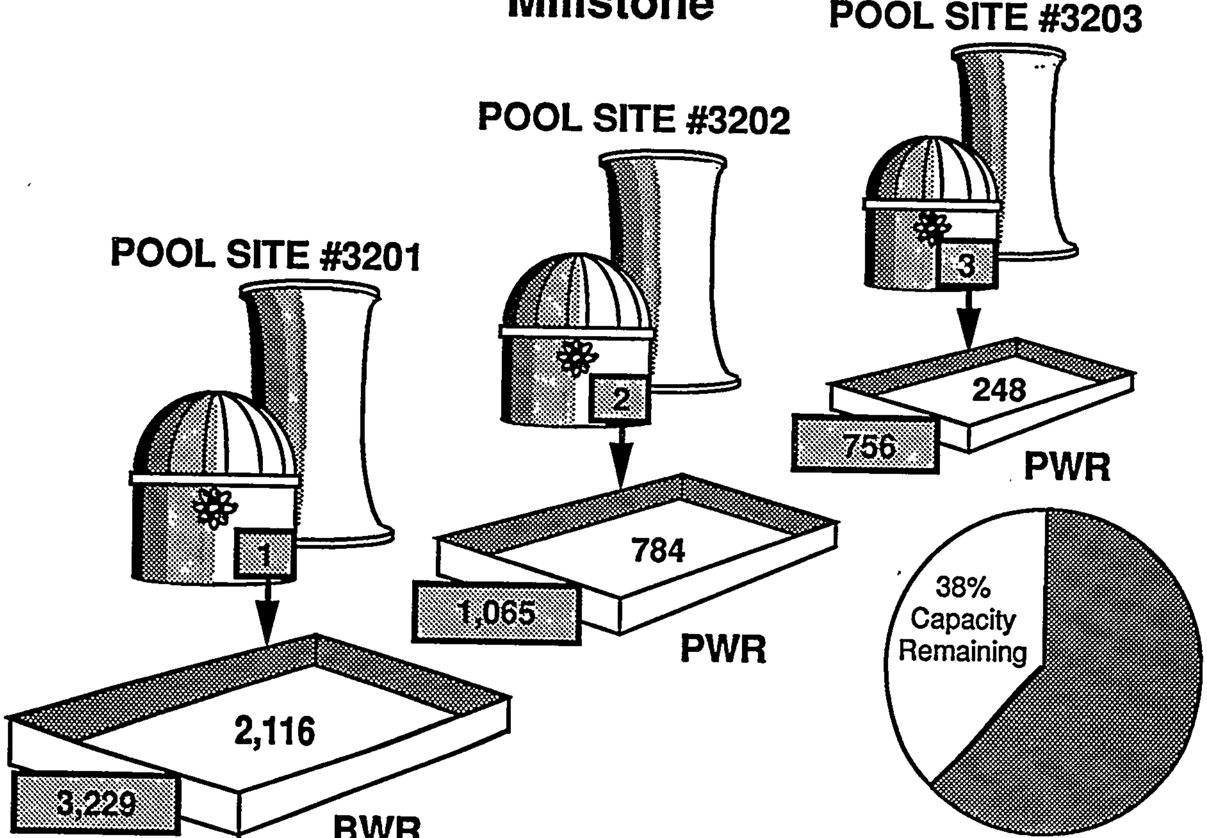




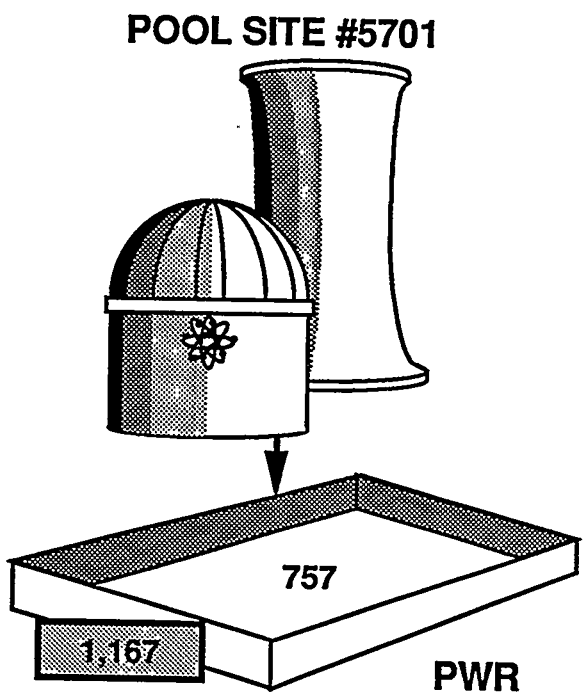


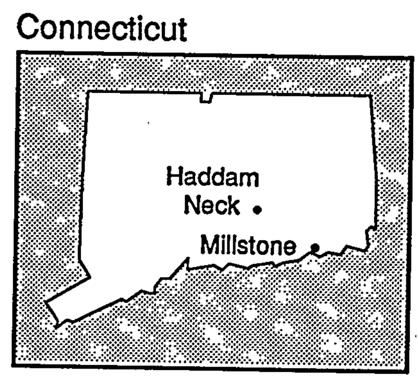
Northeast Utilities Service Company

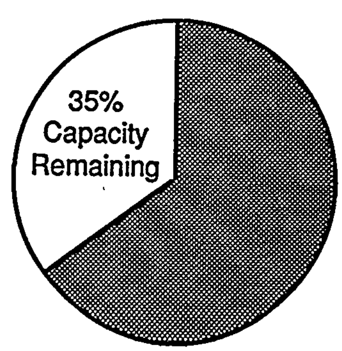
Millstone



Haddam Neck



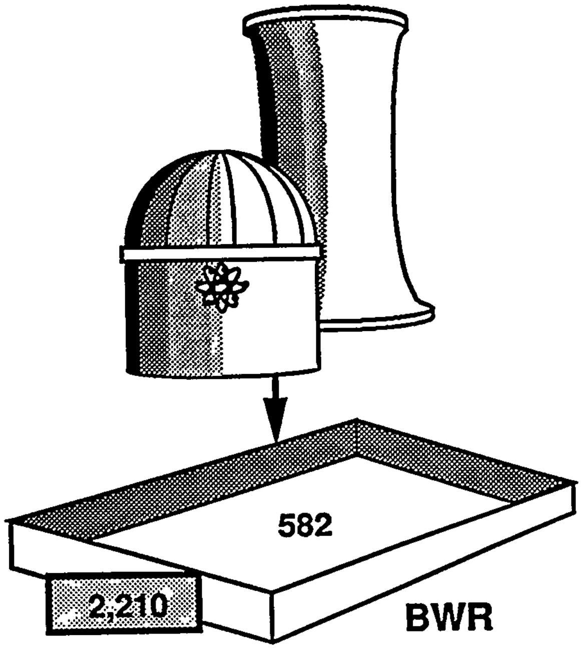


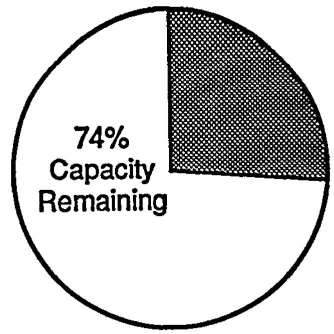


Northern States Power Company

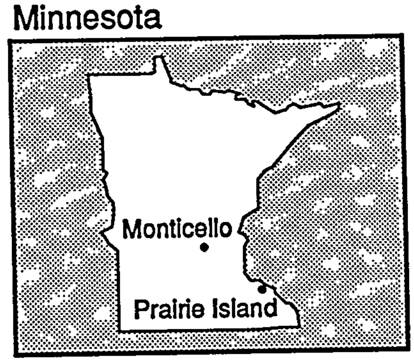
Monticello

POOL SITE #3301



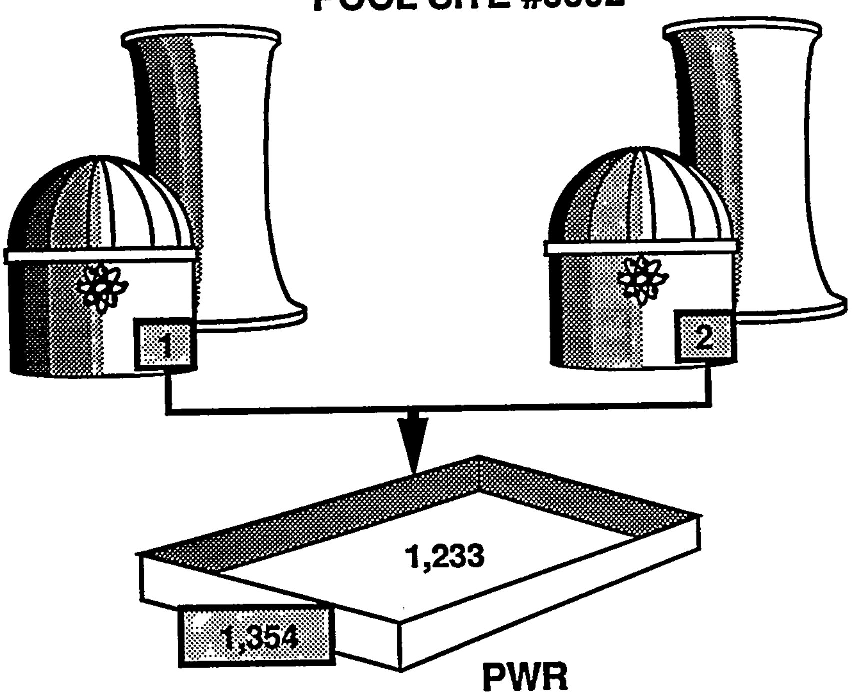


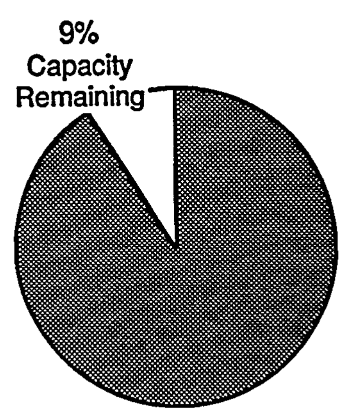
Minnesota



Prairie Island

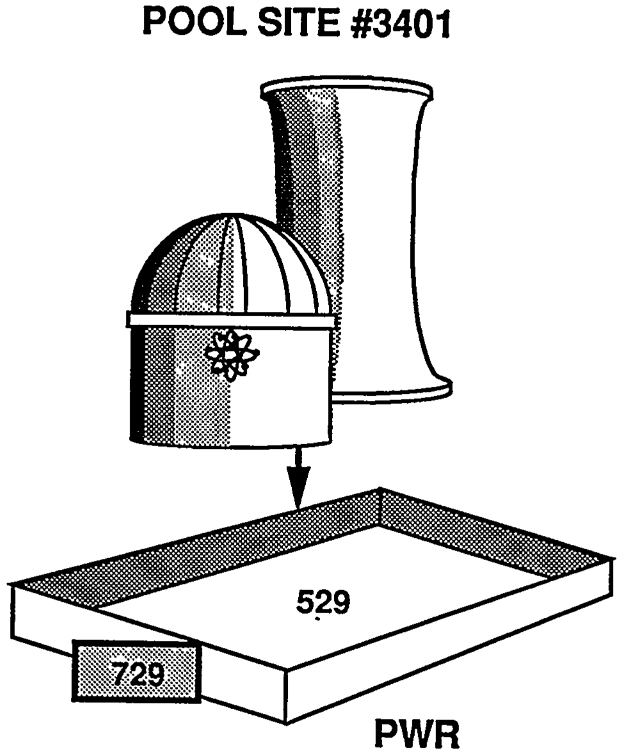
POOL SITE #3302

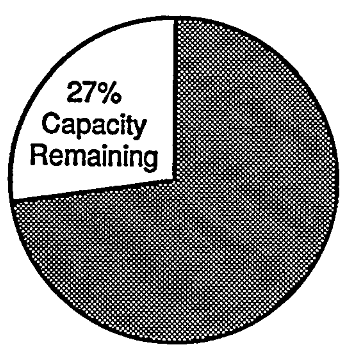


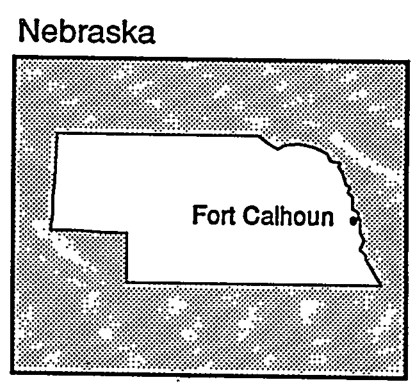


Omaha Public Power District

Fort Calhoun

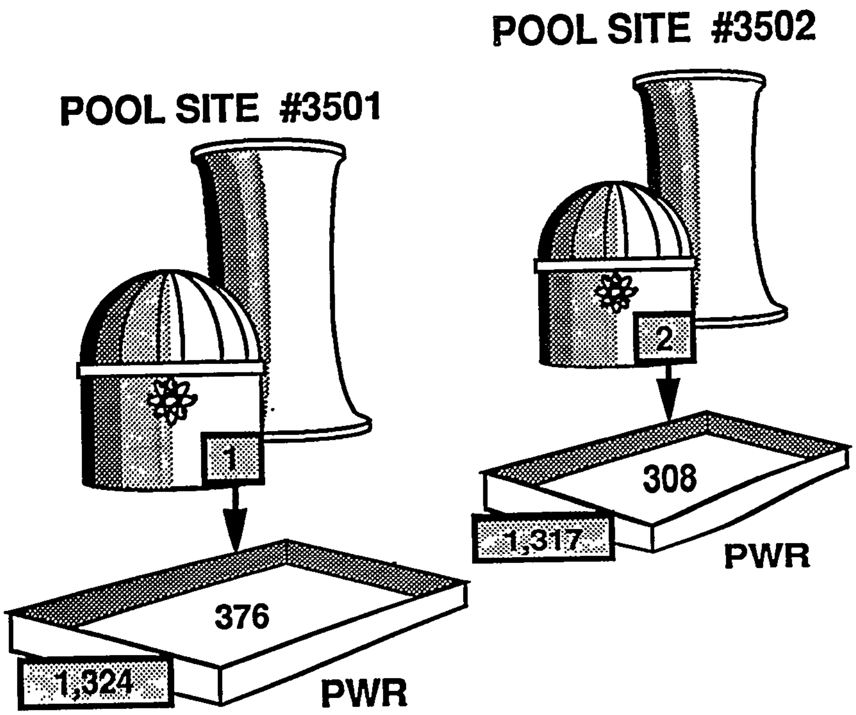


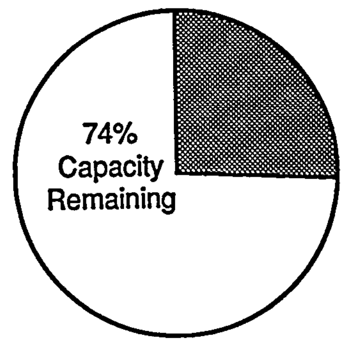


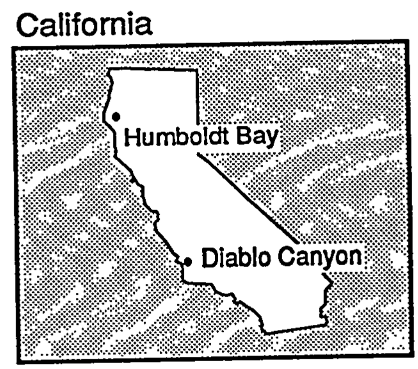


Pacific Gas and Electric Company

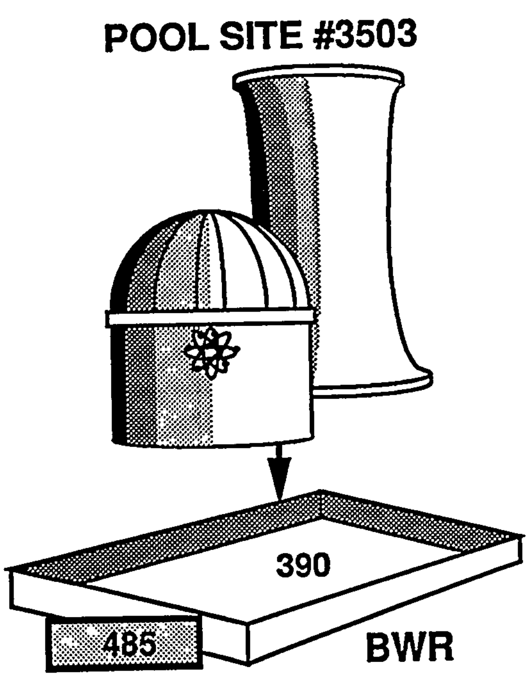
Diablo Canyon

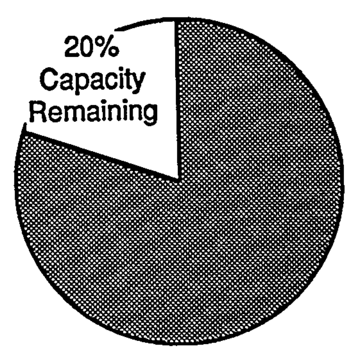






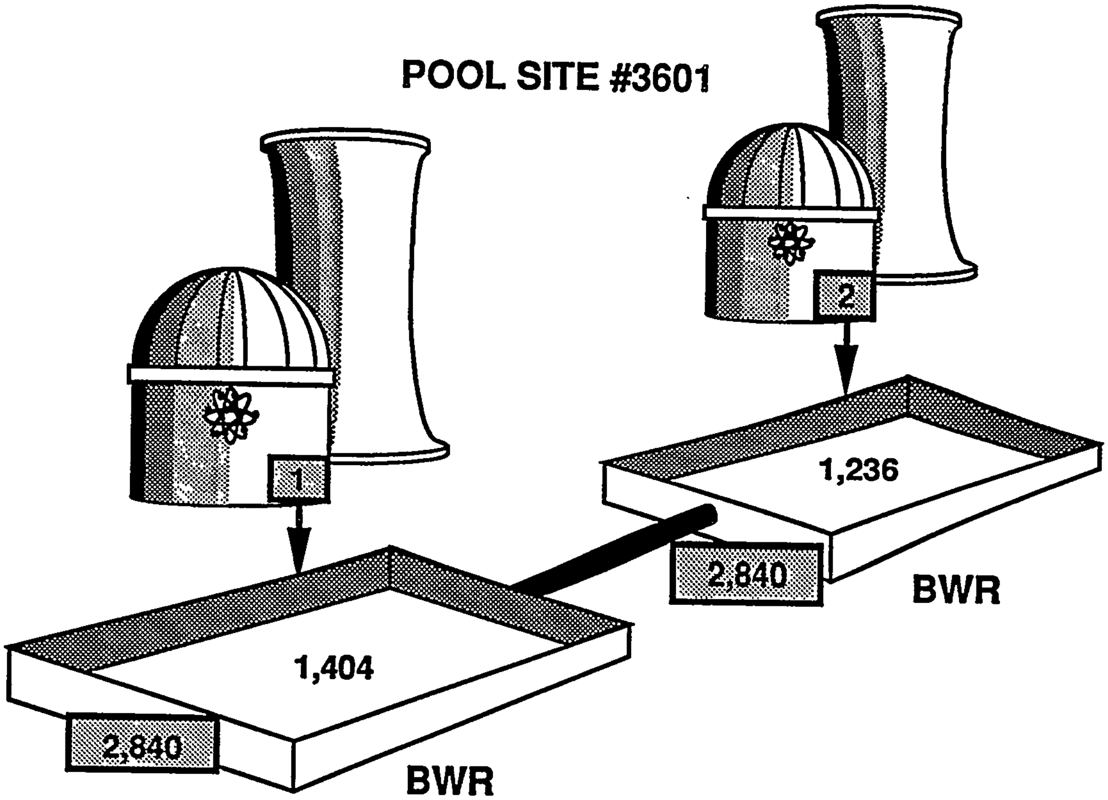
Humboldt Bay

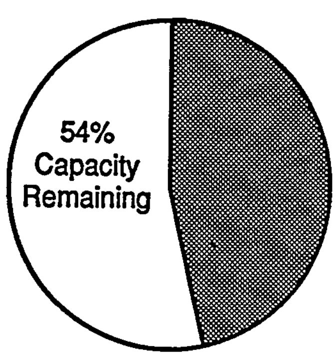


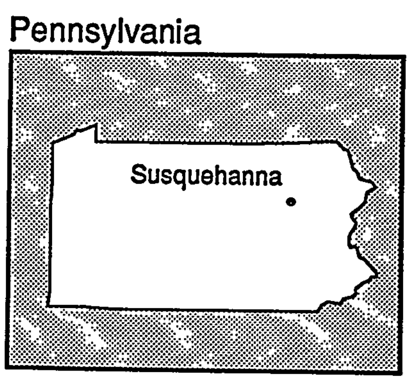


Pennsylvania Power and Light Company

Susquehanna

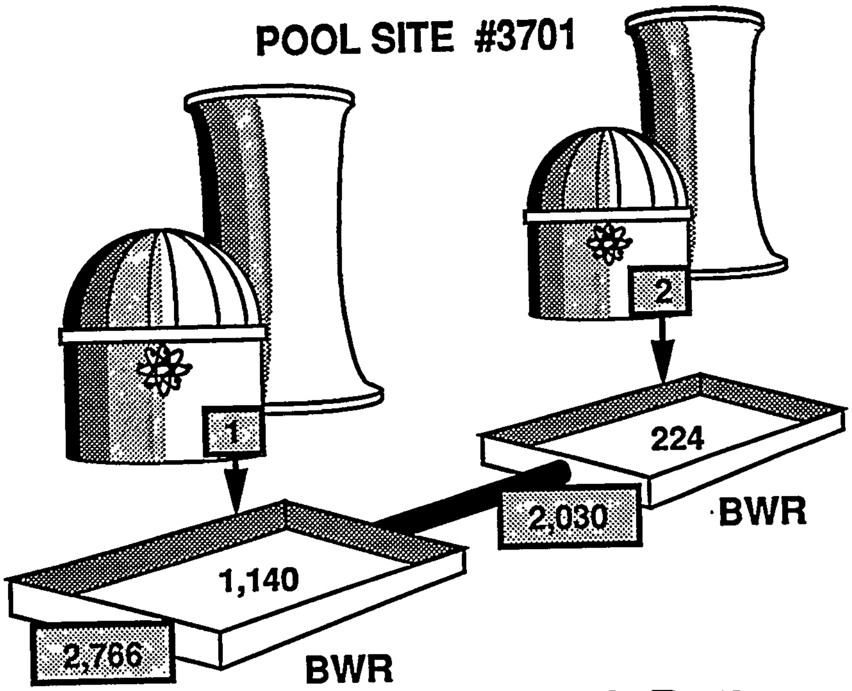


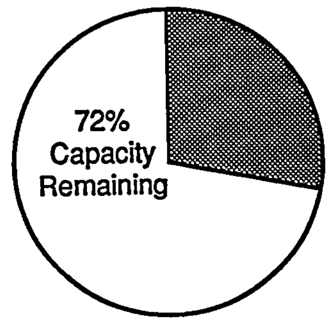


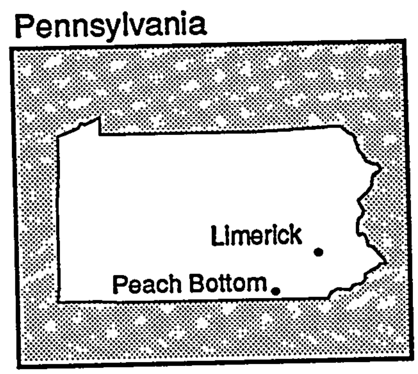


Philadelphia Electric Company

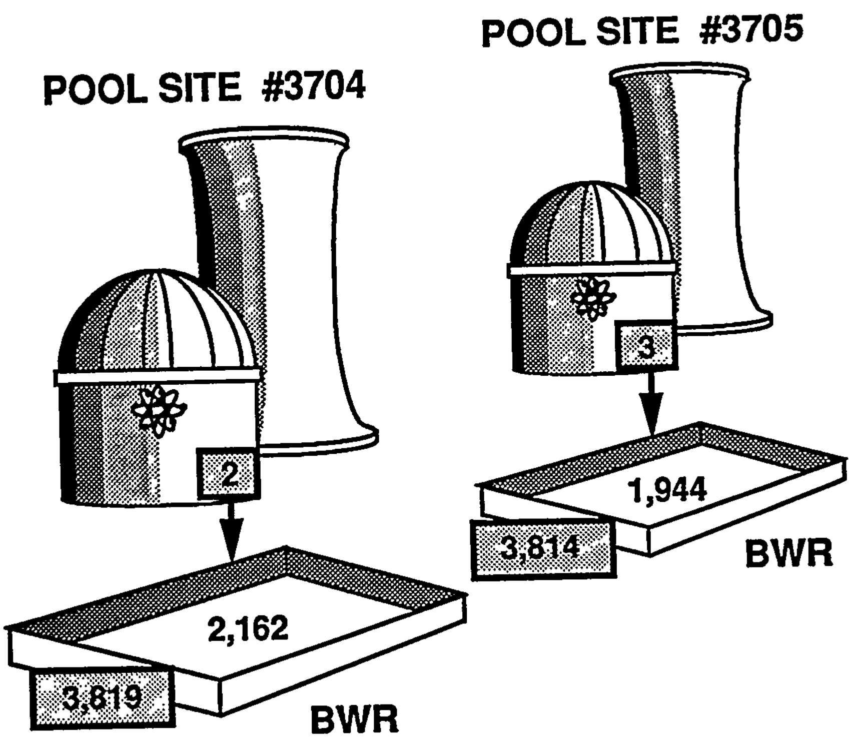
Limerick

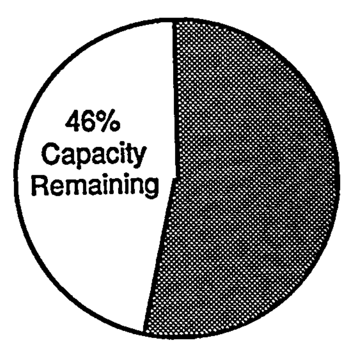






Peach Bottom

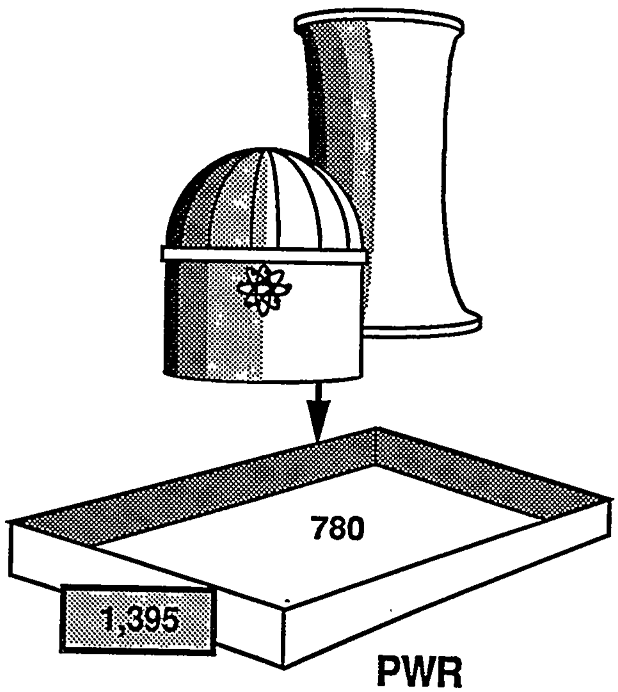


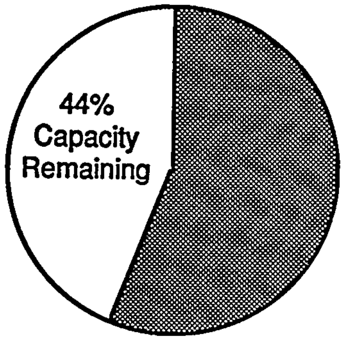


Portland General Electric Company

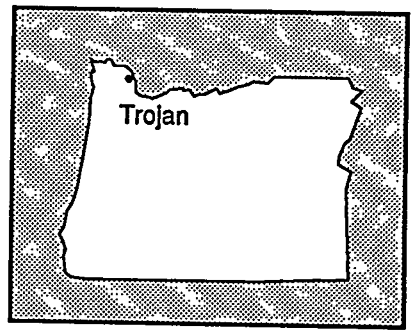
Trojan

POOL SITE #3801





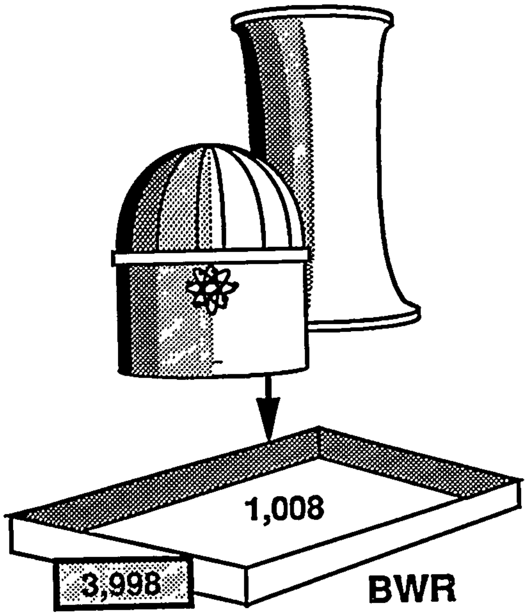
Oregon

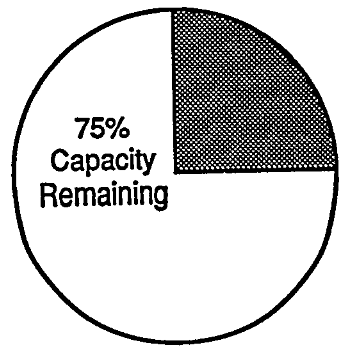


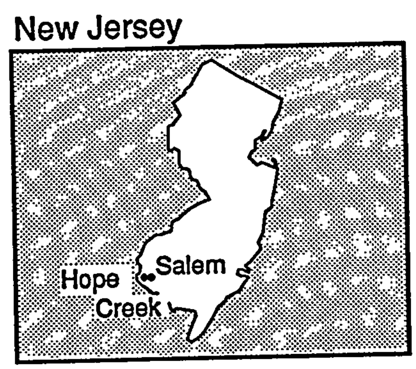
Public Service Electric and Gas Company

Hope Creek

POOL SITE #4201

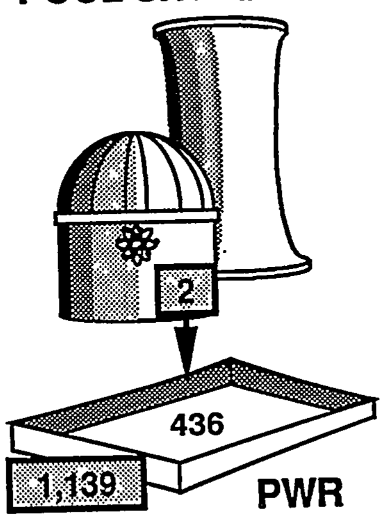




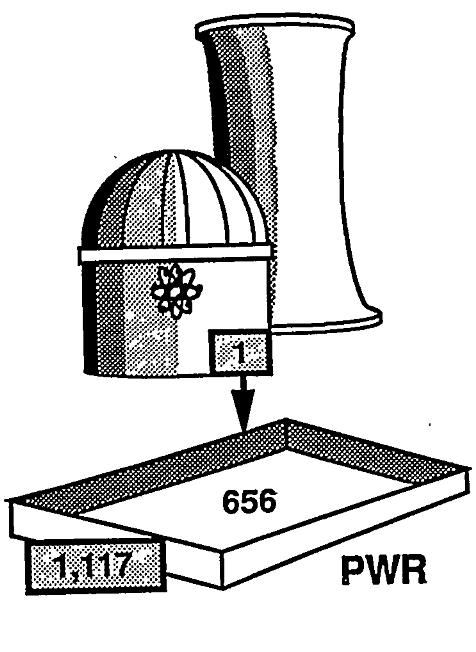


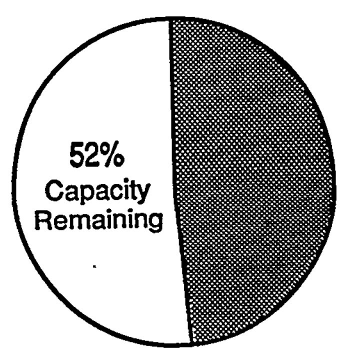
Salem

POOL SITE #4203



POOL SITE #4202

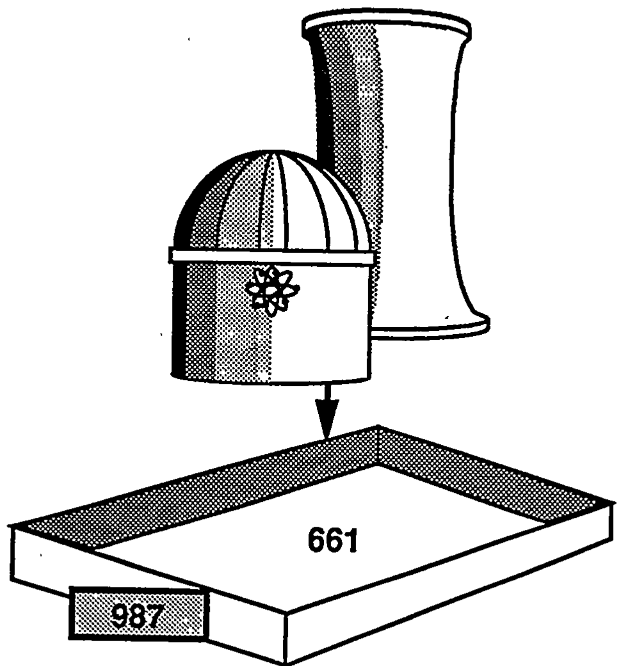




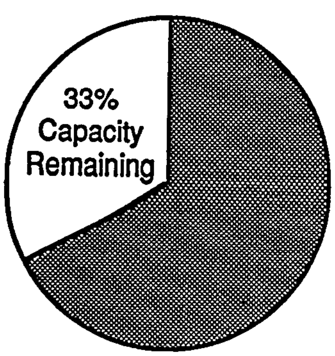
Rochester Gas and Electric Corporation

Ginna

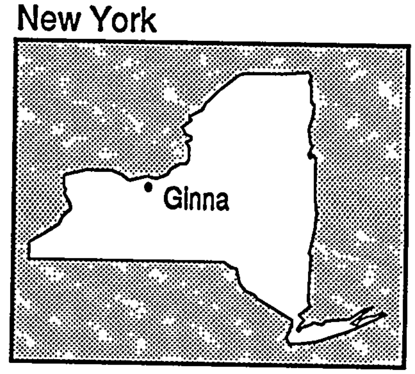
POOL SITE #4401



PWR



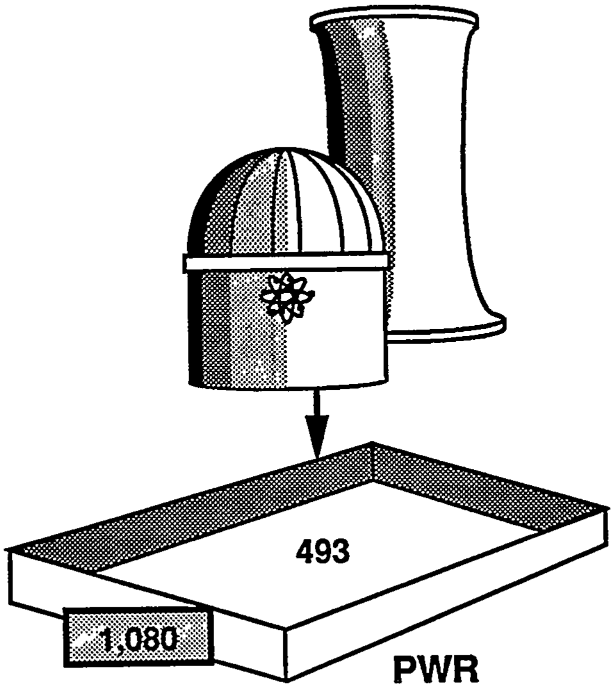
New York

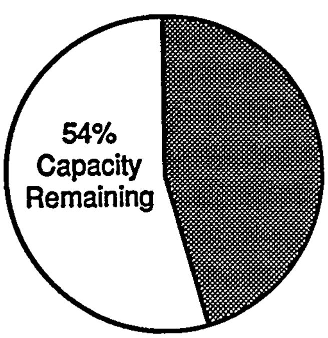


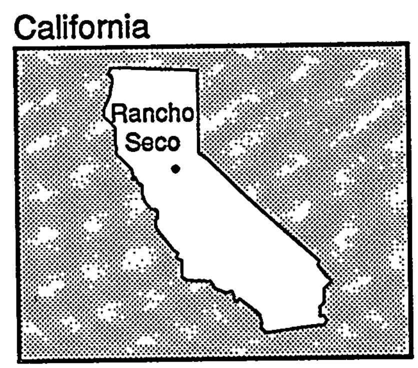
Sacramento Municipal Utility District

Rancho Seco

POOL SITE #4501



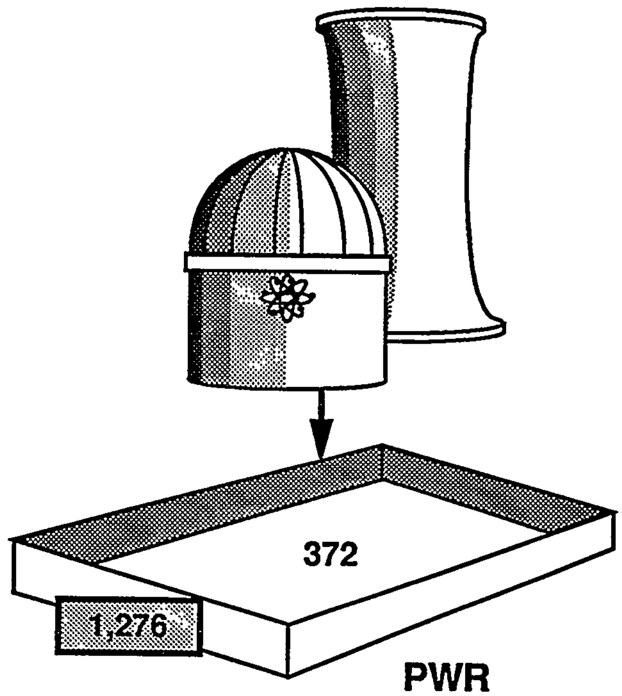


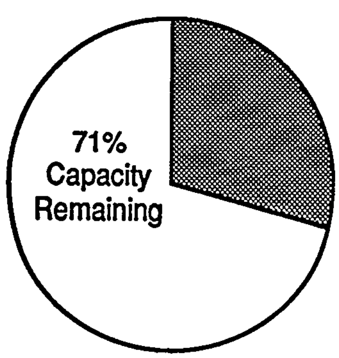


South Carolina Electric and Gas Company

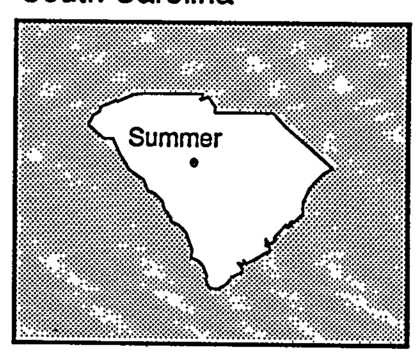
Summer

POOL SITE #4601



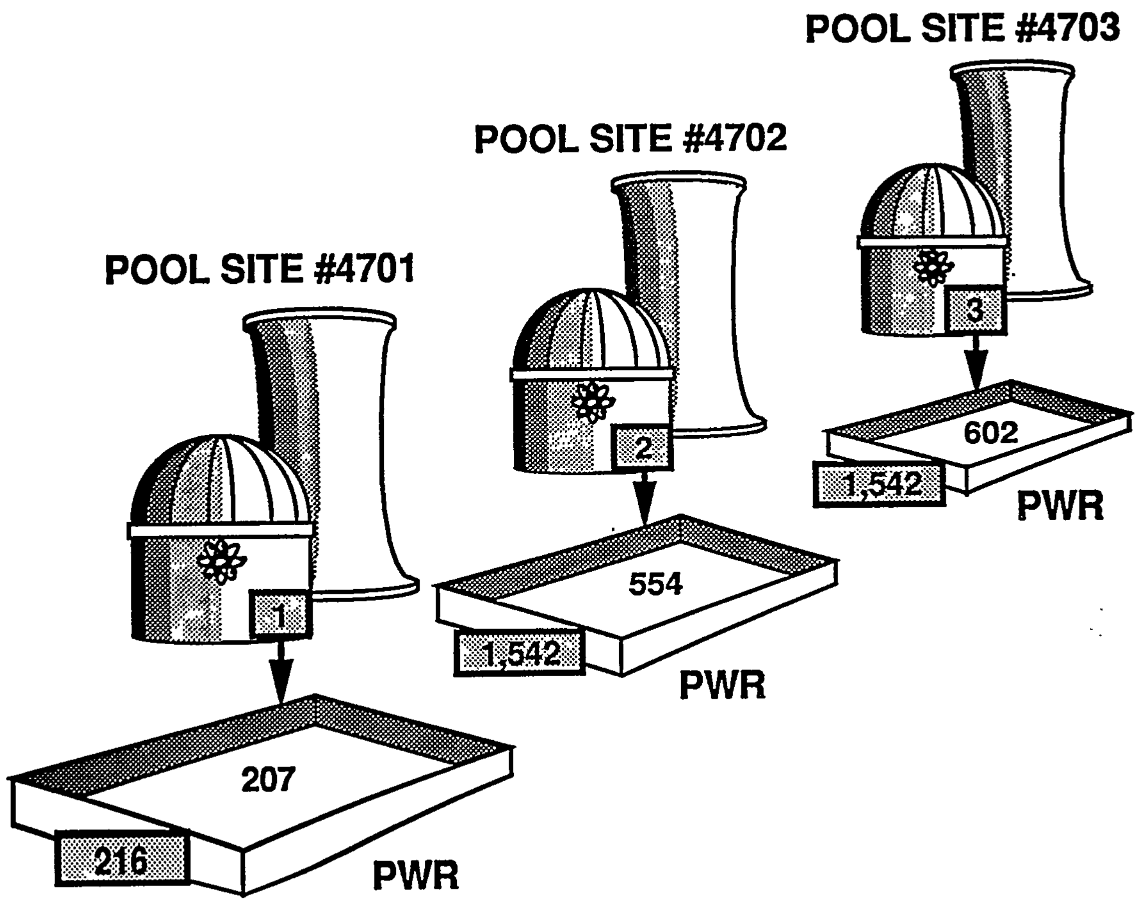


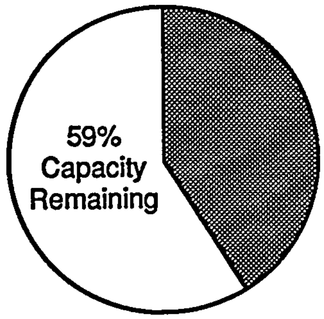
South Carolina

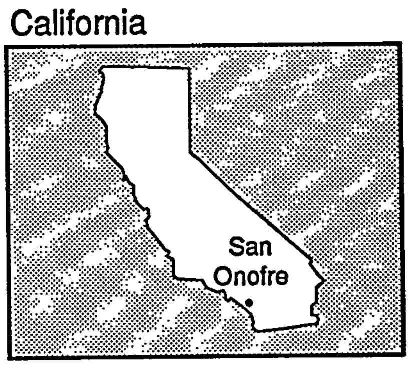


Southern California Edison Company

San Onofre

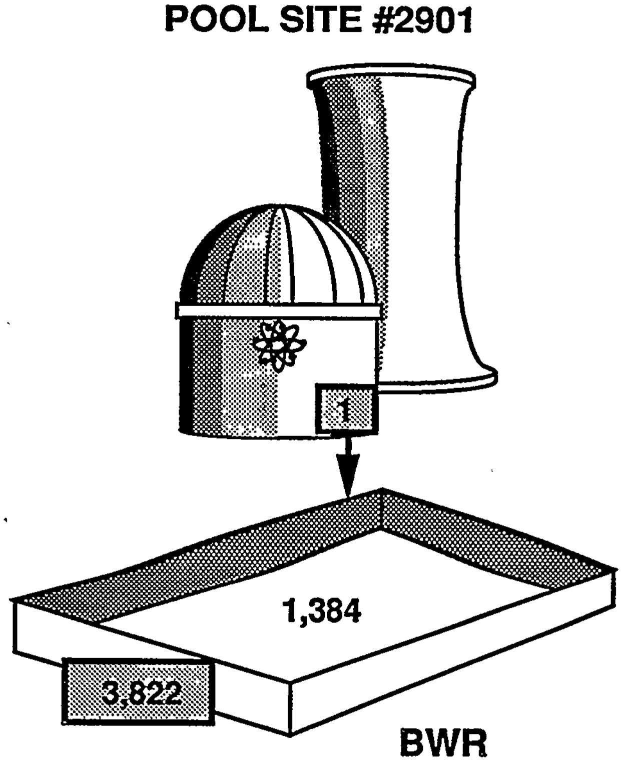


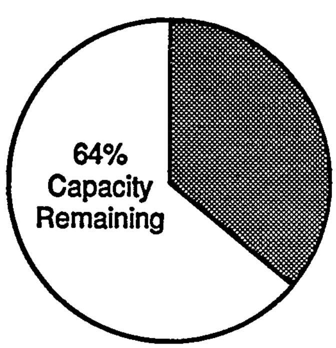


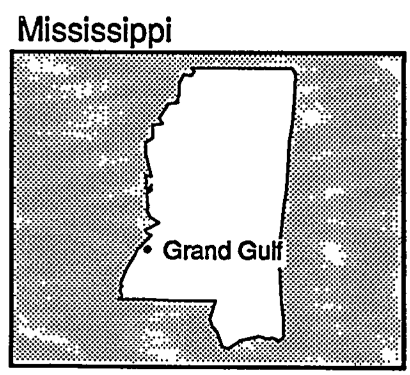


System Energy Resources, Inc.

Grand Gulf



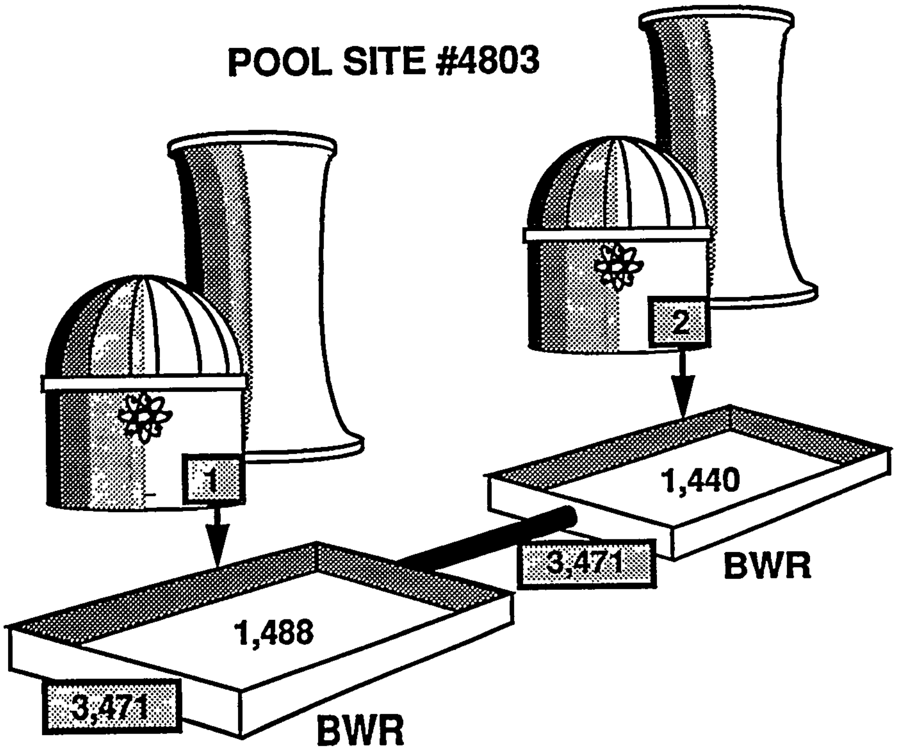


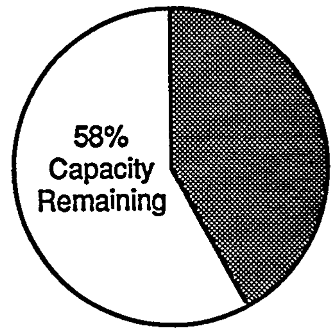


Tennessee Valley Authority

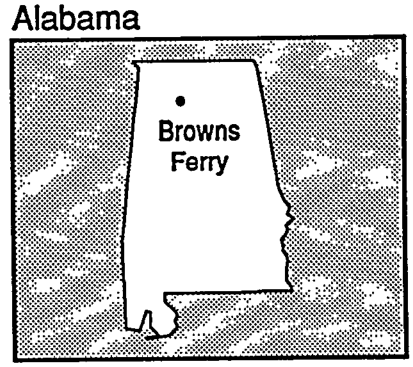
Browns Ferry

POOL SITE #4803

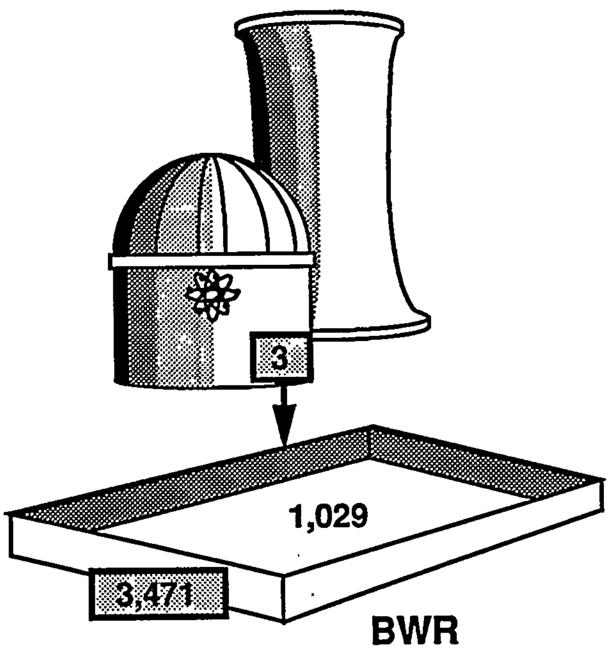


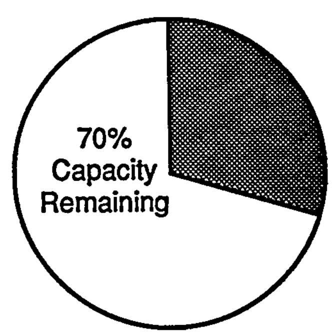


Alabama



POOL SITE #4805

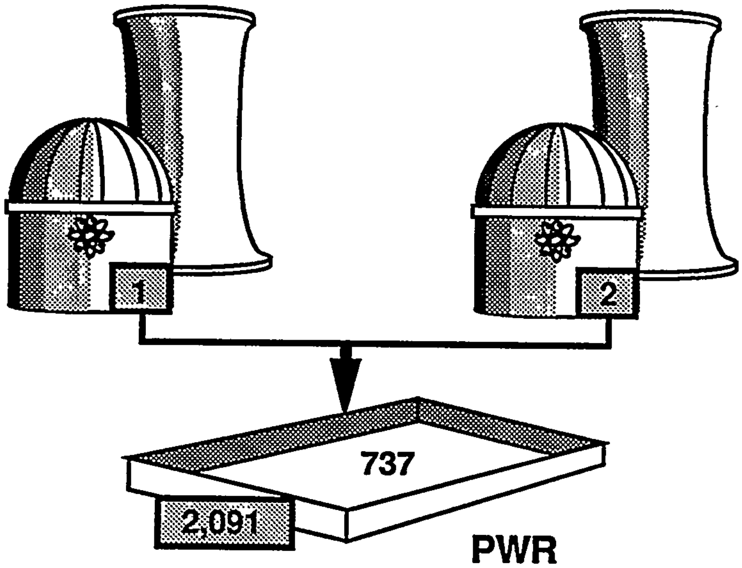


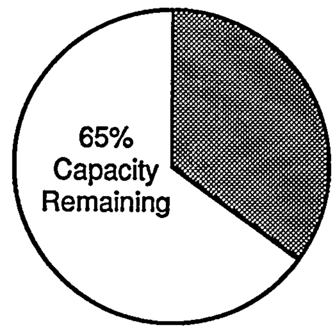


Tennessee Valley Authority
(Continued)

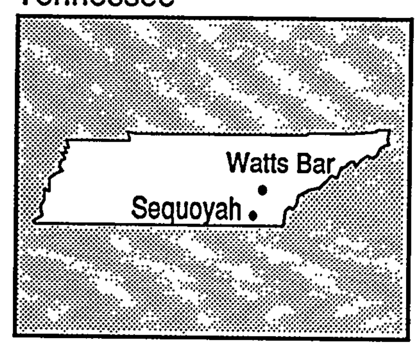
Sequoyah

POOL SITE #4808



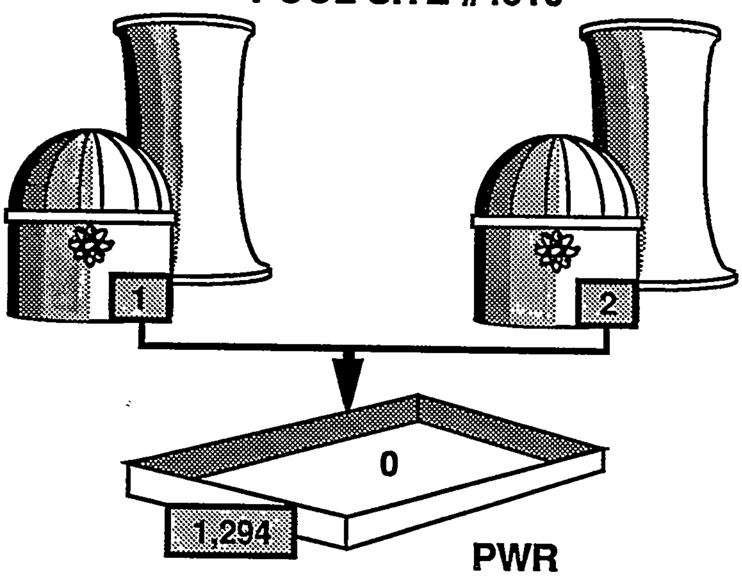


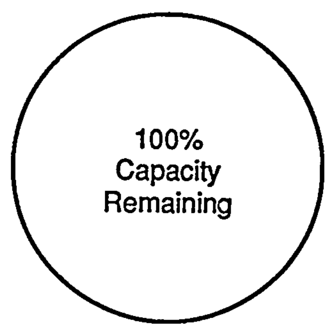
Tennessee



Watts Bar

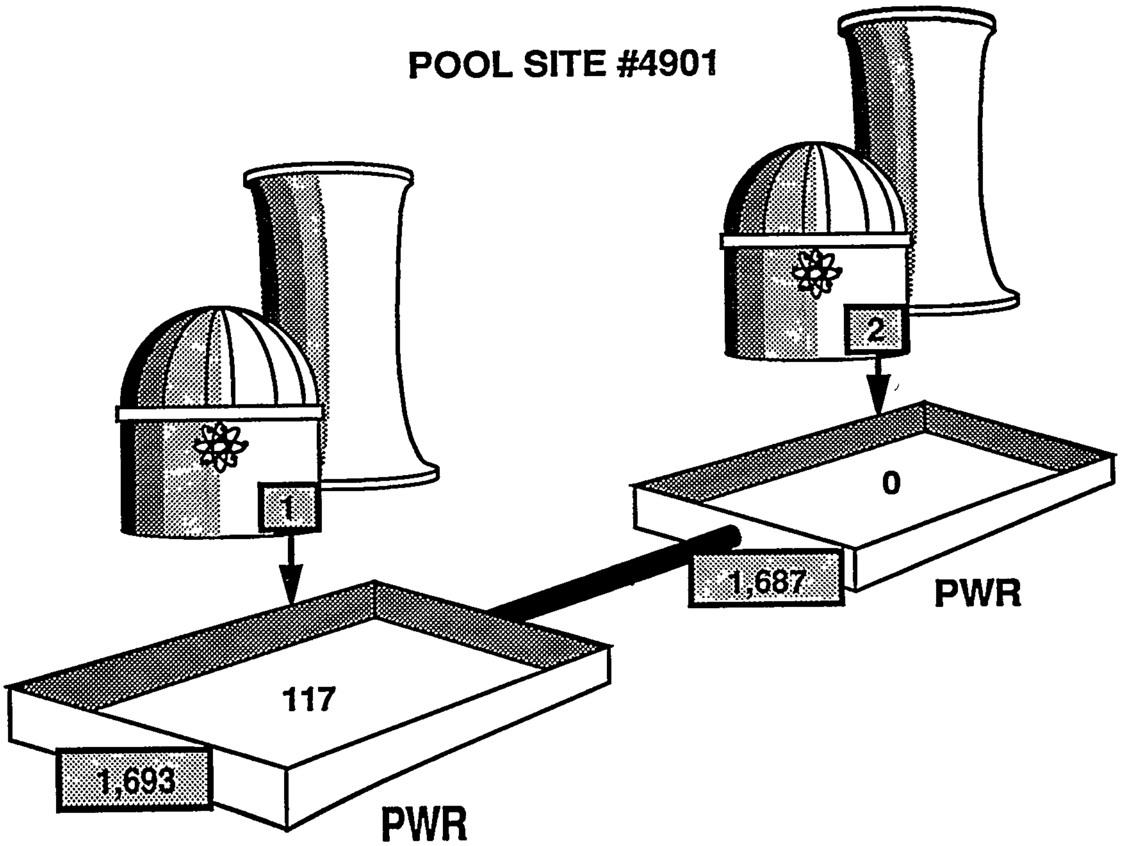
POOL SITE #4810

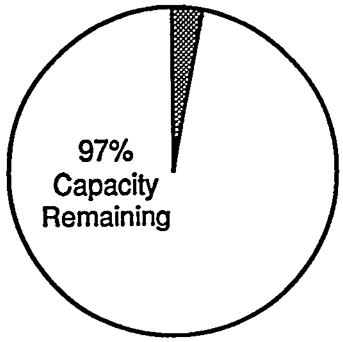




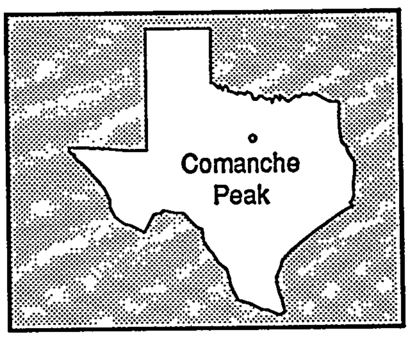
TU Electric

Comanche Peak





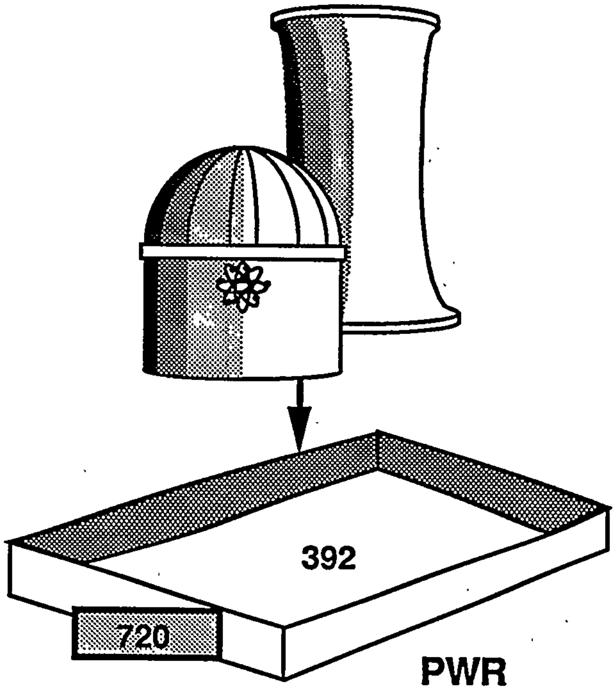
Texas

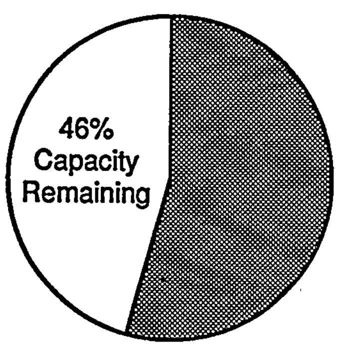


Toledo Edison Company

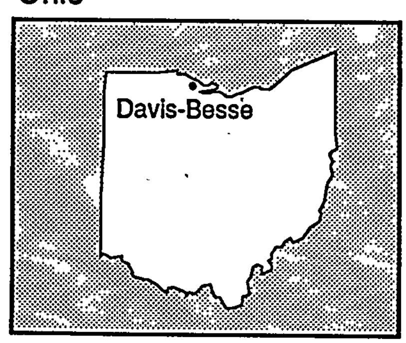
Davis-Besse

POOL SITE #5001



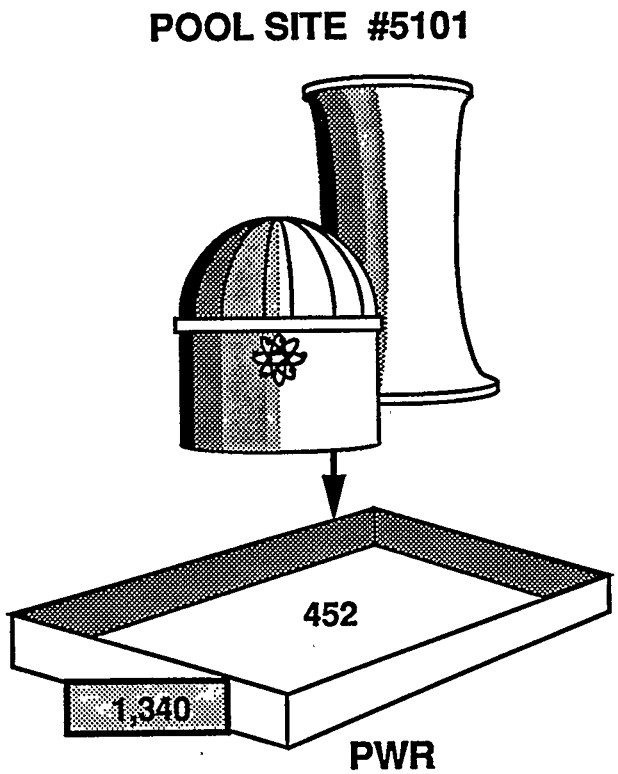


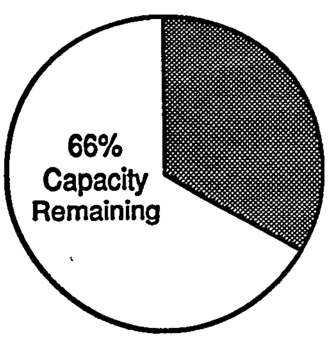
Ohio

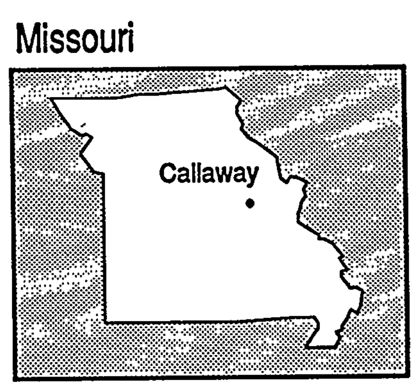


Union Electric Company

Callaway

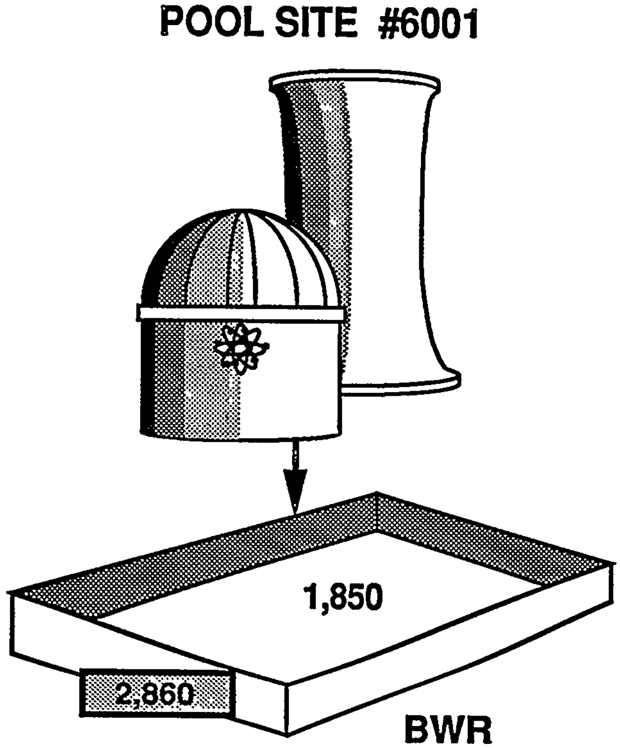


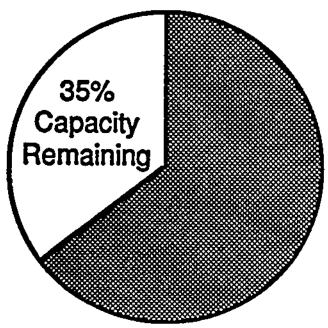


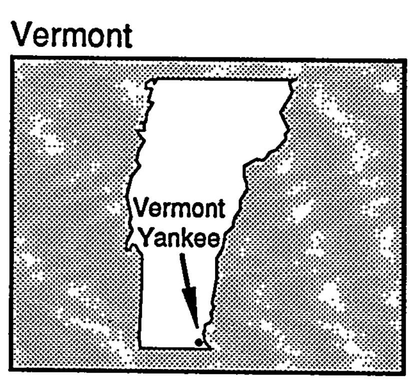


Vermont Yankee Nuclear Power Corporation

Vermont Yankee







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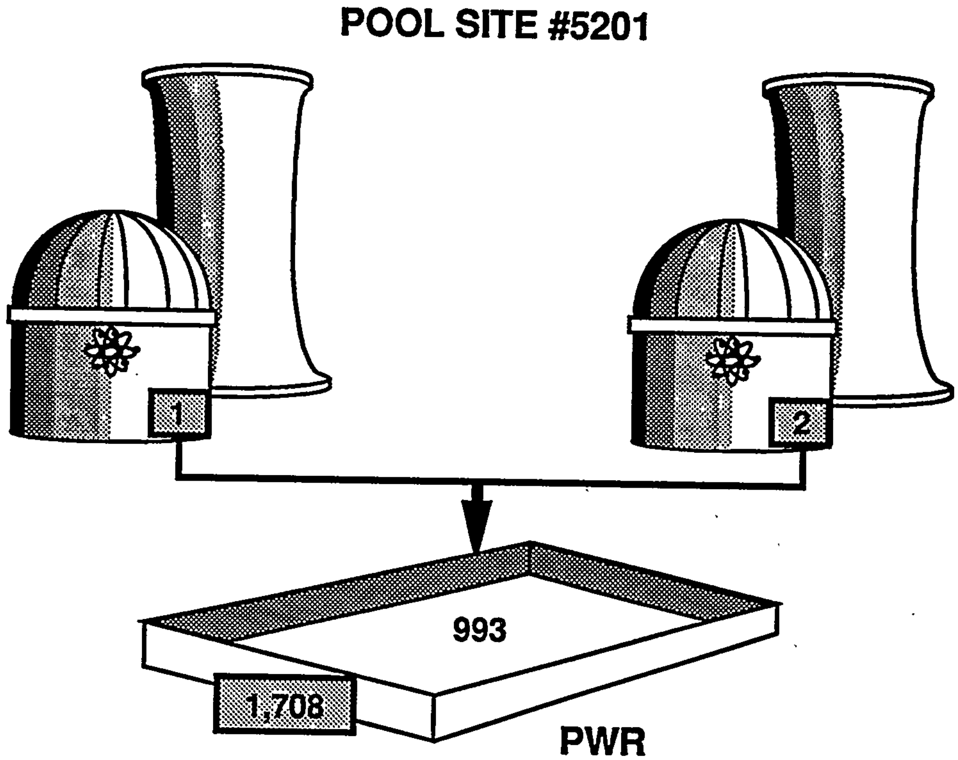
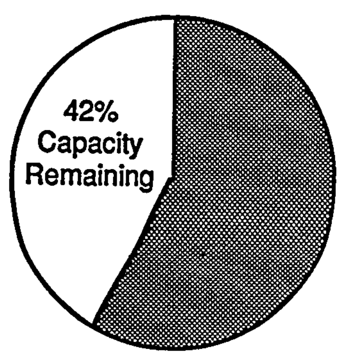
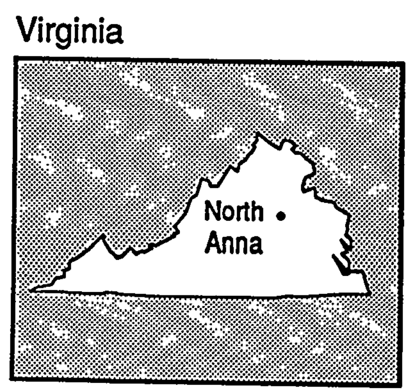
Virginia Power

North Anna







Virginia Power
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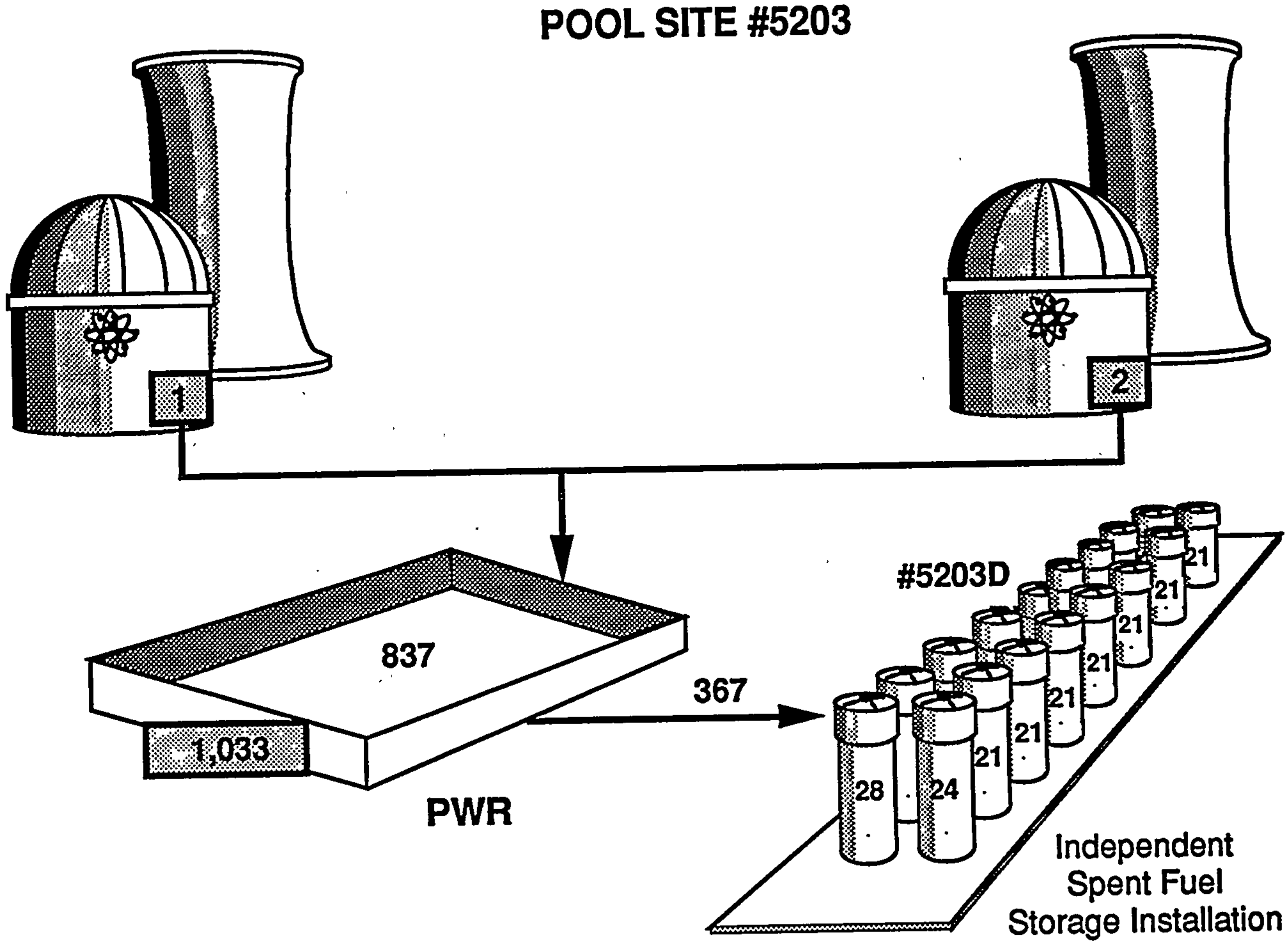
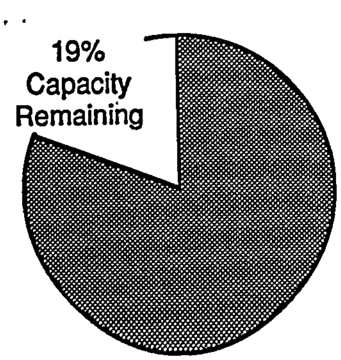
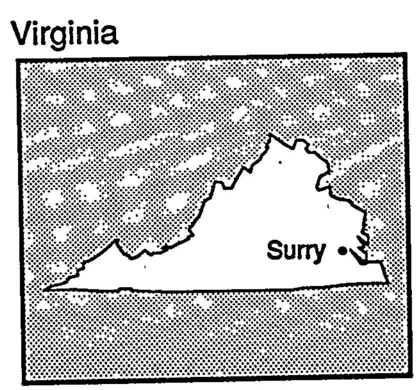
Surry

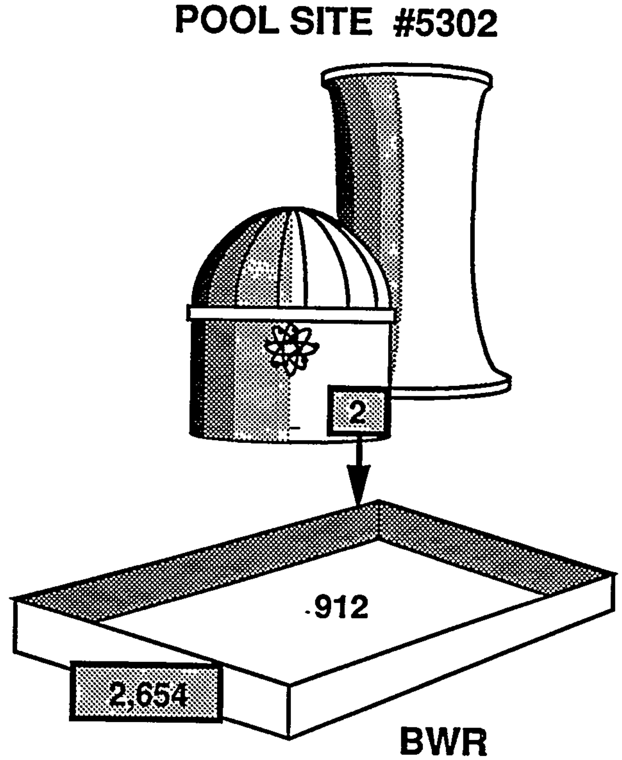


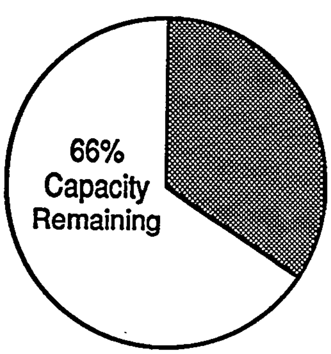


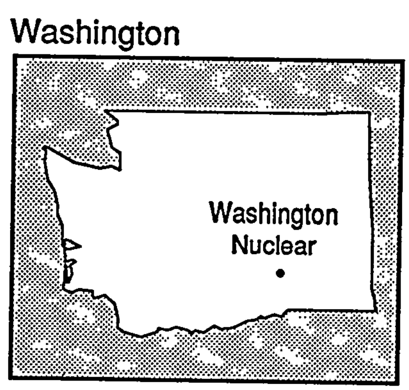


Washington Public Power Supply System

Washington Nuclear

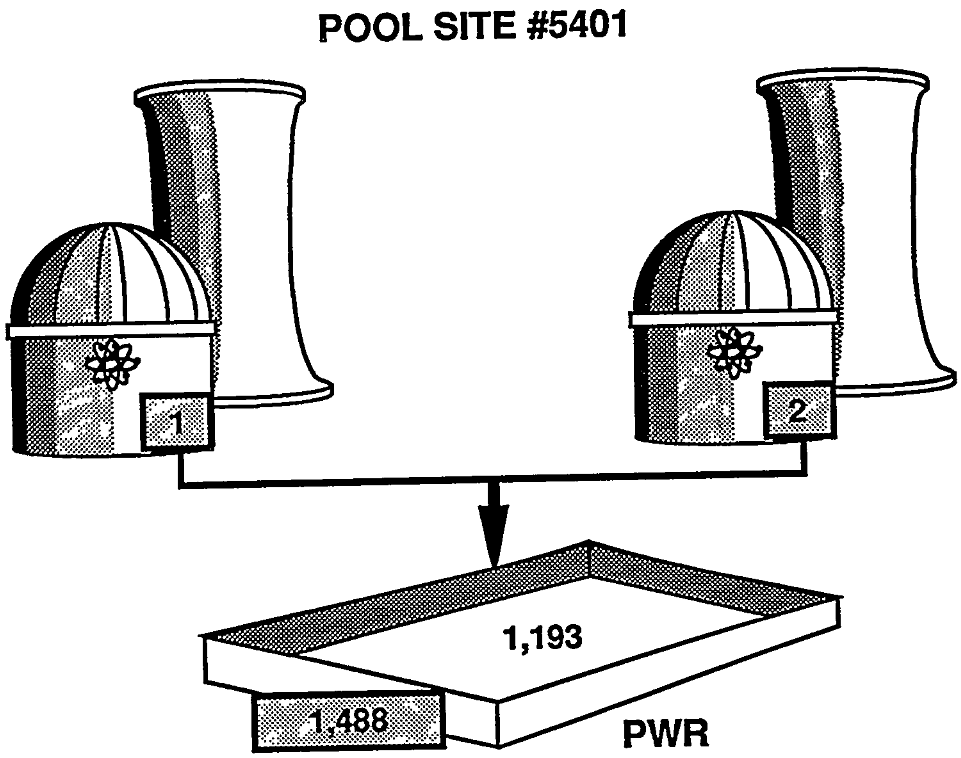


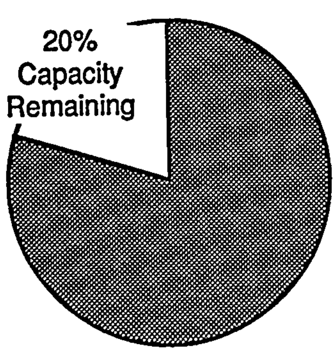


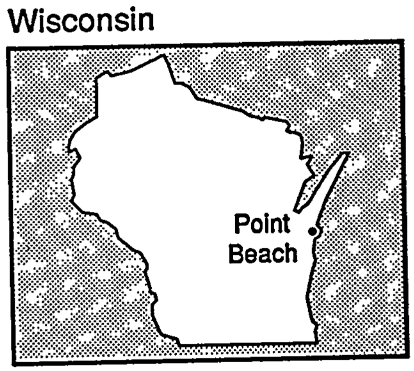


Wisconsin Electric Power Company

Point Beach



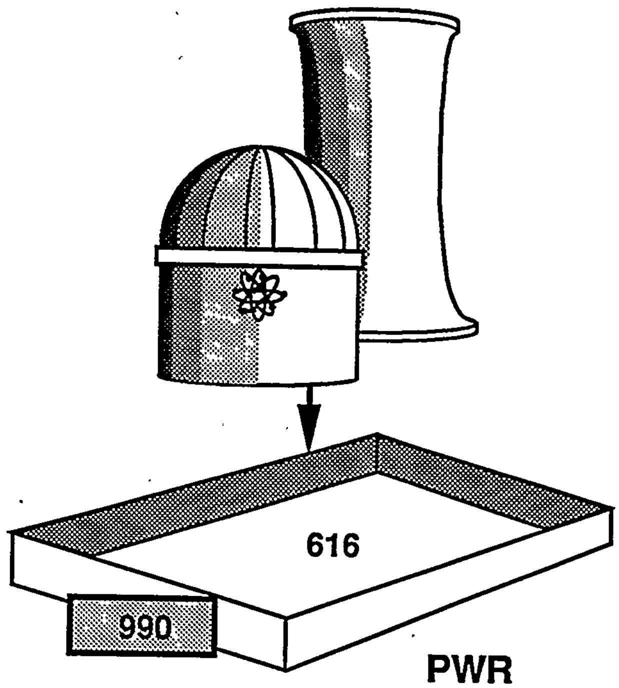


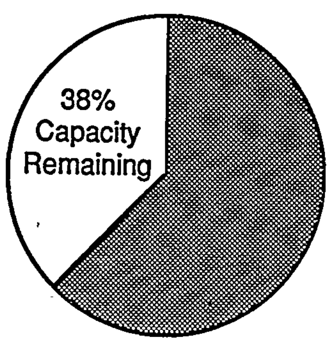


Wisconsin Public Service Corporation

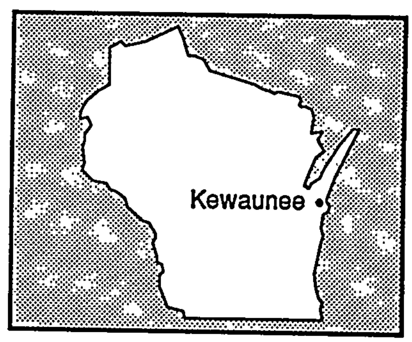
Kewaunee

POOL SITE #5501



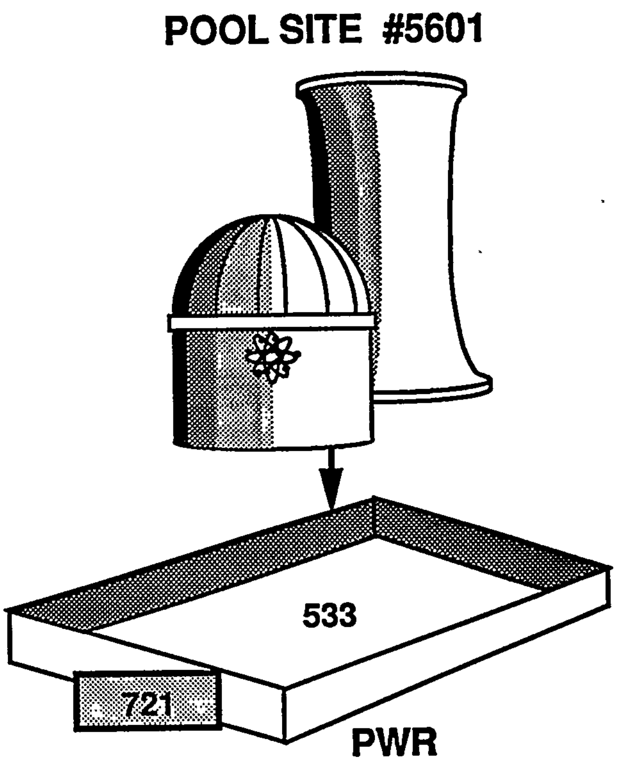


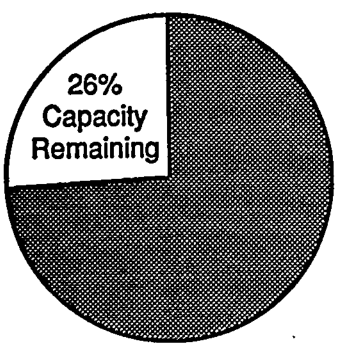
Wisconsin

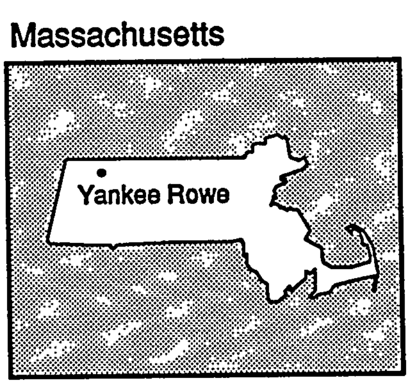


Yankee Atomic Electric Company

Yankee Rowe





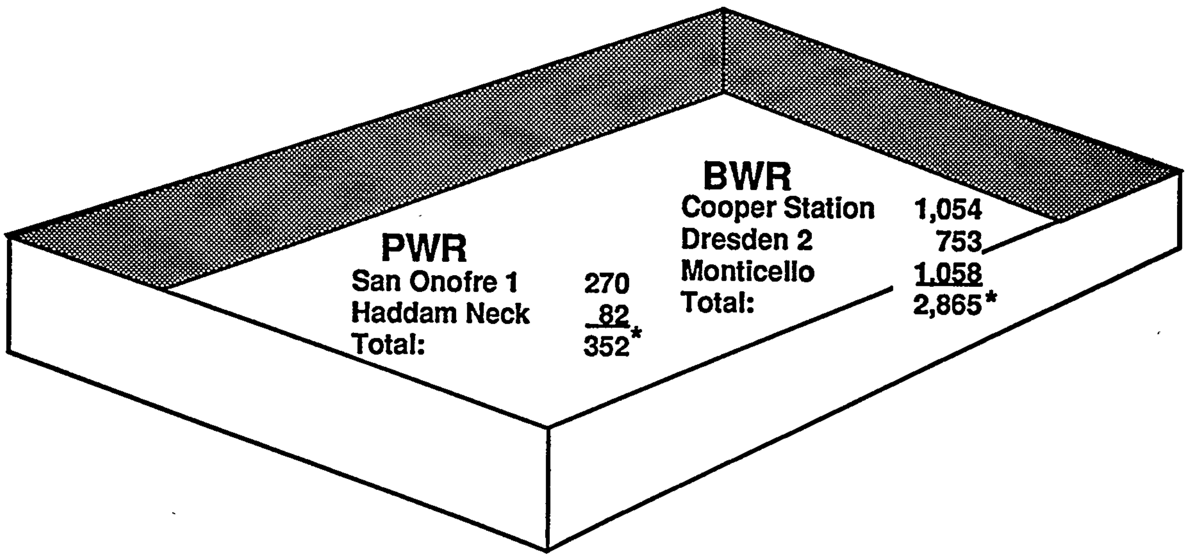


General Electric Company

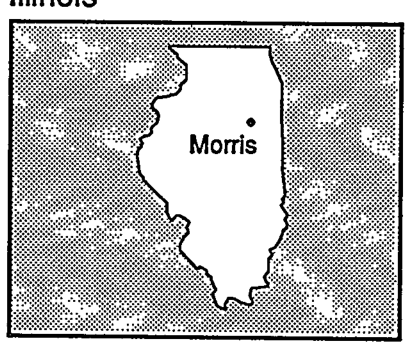
Morris Operation

Away-from-reactor Spent Fuel Storage Facility

POOL SITE #6601



Illinois

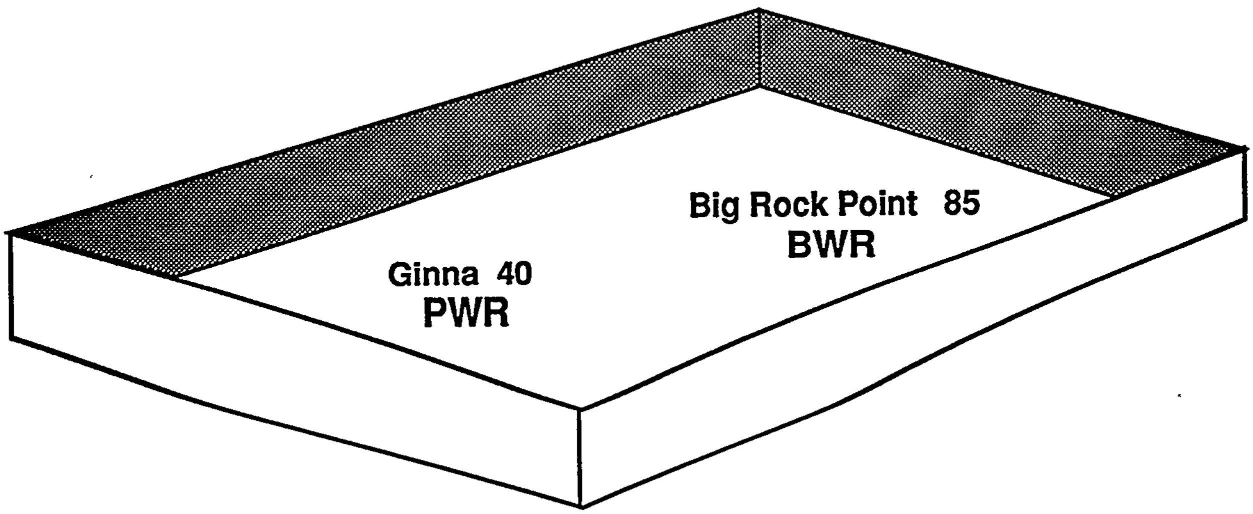


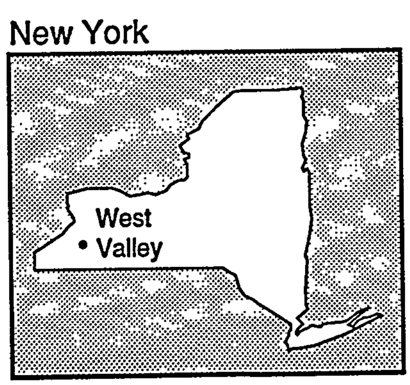
*There are 7 slots still available for use. If PWR assemblies are stored, 4 assemblies will fit in each of the 7 slots totaling 28 assemblies. If BWR assemblies are stored, 9 assemblies will fit in each of the 7 slots totaling 63 assemblies.

West Valley Demonstration Project

Away-from-reactor Spent Fuel Storage Facility

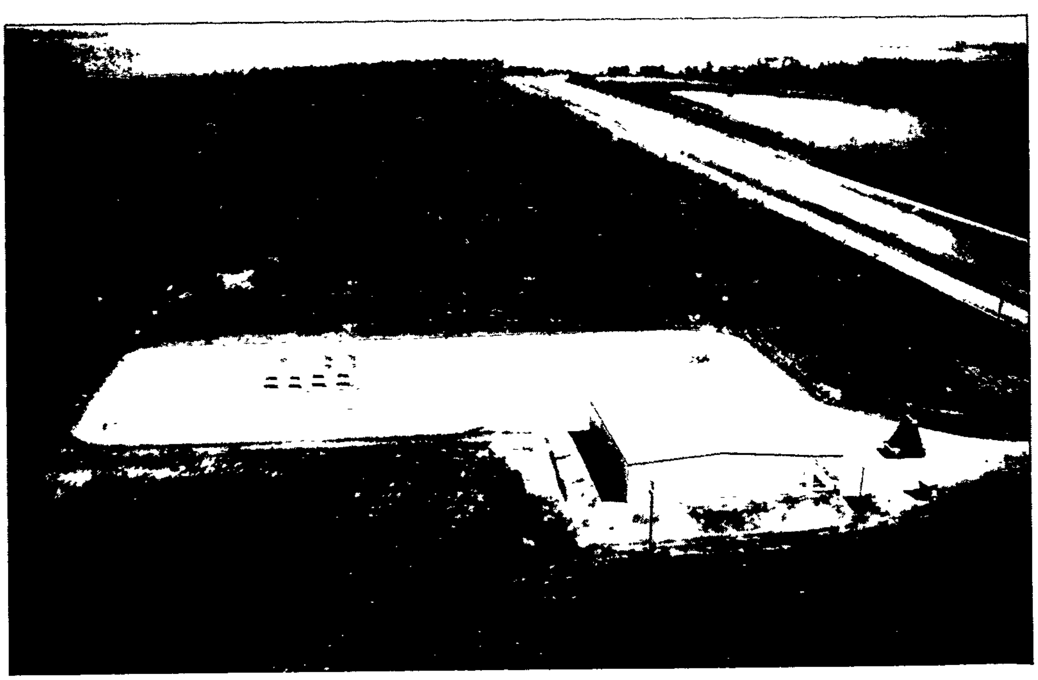
POOL SITE #7005





Appendix D

Quality Assurance



Virginia Power's Surry Independent Spent Fuel Storage Installation site.

Appendix D

Quality Assurance

Data submitted by respondents to Form RW-859 Nuclear Fuel Data survey are subject to extensive Energy Information Administration (EIA) quality assurance (QA) procedures to ensure their accuracy and completeness. A mainframe EIA QA program, written in Pascal, generates a nuclear fuel cycle matrix and summary reports for each reactor. These reports identify and highlight errors in assembly and fuel batch data submitted by nuclear fuel utilities on Form RW-859. Analysts review the EIA QA matrix report produced by the program to check that the data submitted are consistent with data obtained from previous surveys.

Figure D1 presents a sample EIA QA report for one reactor on the Form RW-859 data base. The first part of the report is composed of a nuclear fuel cycle matrix generated from assembly data aggregated to the batch level, which presents the fuel batches through their cycle history. The format helps to identify and highlight corrections needed for data on assemblies and batches of irradiated and unirradiated fuel. The sum of the number of assemblies in the fuel batches in the reactor core during each fuel cycle are compared with the reactor's full core capacity. In addition, assemblies permanently or temporarily discharged (as indicated by their status codes) are aggregated and compared with totals of assemblies discharged and currently not in cycle. The matrix extends over all reactor cycles from reactor startup to the fifth cycle past the current reporting period. Other key data displayed in the matrix include utility ID, cycle discharge dates, batch status, initial uraniumcontent, burnup, assay (enrichment percent), assembly type codes, and an indicator for defective fuel.

The second part of the report contains a discharge/storage summary page, which is composed of three groups of data. Group 1 represents a count of the assemblies discharged at the end of each cycle. Group 2 represents the net cumulative total number of assemblies in storage during each cycle. Group 3 represents net cumulative totals of initial uranium content for assemblies stored during each cycle. The cycle number and end date for the reactor's next (n+1) cycle also appears on the page.

The final part of the report, the storage pool inventory report, lists storage pool inventories (and reactors contributing to the pool) as submitted at the end of the survey report period. Inventories are subdivided into permanent and temporary discharges. Storage pool inventories by pool ID, based on assembly status codes, are compared with those based on the reactor's reported total inventory. The number of canisters in storage and the number of assemblies contained in these canisters are also reported. Assembly type and pool type (wet or dry) are also indicated.

Figure D1. Energy Information Administration Quality Assurance Report

Nuclear Fuel Matrix

Utility ID = 23 Utility Name: Illinois Power Company
Reactor ID = 01 Reactor Name: Clinton 1

Entries in cycle matrix are number of assemblies.

Batch	Stat	Assmb Type Codes	Assmbs	Initial Uranium Content (MTU)	Burnup (MWD/MTU)	Assay (%)	DEF	Cycle → 01 Discharge Date → 8901	02 9010	03 9203	04 9309	05 9503	06 9610	07 9803	08 9910
01A01	D	G4608GP	76	13.992	3000	0.711		76							
01B01	D	G4608GP	92	16.918	10000	1.540		92							
01B02	D	G4608GP	96	17.654	15000	1.538		96	96						
01C01	D	G4608GP	120	22.011	19000	2.004		120	120						
01C02	D	G4608GP	184	33.751	22000	2.004		184	184	184					
A	I		56	0.0	0	0.0		56	56	56	56				
B	I		168	0.0	0	0.0			168	168	168				
C	I		216	0.0	0	0.0				216	216				
04AYY	I	G4608G4A	184	33.790	0	3.005					184				
02A02			20	3.725	29000	2.839						20			
02B02			28	5.207	30000	2.839						28			
03A01			144	26.720	31000	2.989						144			
03A02			20	3.711	33000	2.989							20		
04A01			144	26.444	35000	3.005							144		
03A03			52	9.649	35000	2.989								52	
04A02			40	7.346	35000	3.005								40	
05A01			36	6.430	35000	3.181								36	
05B01			64	11.396	36000	3.251								64	
05A02			32	5.715	37000	3.181									32
05B02			36	6.411	38000	3.251									36
06A01			44	7.813	37000	3.241									44
06B01			68	12.109	37000	3.251									68
Number of Assemblies in Core								624	624	624	624	192	164	192	180
Difference from Core Size								0	0	0	0	-432	-460	-432	-444

Status Codes "D," "T": record type 13 historical data.
Status Code "I": record type 15 in core data.
Status Code " ": record type 14 projected data.

Figure D1. Energy Information Administration Quality Assurance Report (Continued)

Discharge/Storage Summary

Utility ID = 23 Utility Name: Illinois Power Company
Reactor ID = 01 Reactor Name: Clinton 1

Cycle →	01	02	03	04	05	06	07	08
Discharge Date →	8901	9010	9203	9309	9503	9610	9803	9910
Assemblies Discharged from Cycle (Gross)[a]	168	216	184	624	192	164	192	180
Permanently Discharged	168	216	184	624	192	164	192	180
Temporarily Discharged (per logic)	0	0	0	0	0	0	0	0
Total Assemblies Stored (Net of Discharges)[b]	0	168	384	568	1192	1384	1548	1740
Permanently Discharged	0	168	384	568	1192	1384	1548	1740
Temporarily Discharged (per flag)			0					
Temporarily Discharged (per logic)	0	0	0	0	0	0	0	0
Difference			0					
Total Assemblies MTIHM (Net of Discharges)[c]	0.0	30.9	70.6	104.3	138.1	173.8	203.9	238.7
Permanently Discharged	0.0	30.9	70.6	104.3	138.1	173.8	203.9	238.7
Temporarily Discharged (per flag)				0.0				
Temporarily Discharged (per logic)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Difference				0.0				

[a] Counts of assemblies that were discharged after the end of each cycle. The numbers can be understood by inserting them into the sentence, "After cycle ___ there were ___ assemblies permanently/temporarily discharged."

[b] Net cumulative totals of assemblies that were in storage during each cycle. The numbers can be understood by inserting them into the sentence, "During cycle ___ there were a cumulative total of ___ permanently/temporarily stored irradiated assemblies."

[c] Net cumulative totals of weights of assemblies that were stored during each cycle. The numbers can be understood by inserting them into the sentence, "During cycle ___ the cumulative weight of the permanently/temporarily stored assemblies was ___."

Cycle N + 1 = 04
End of cycle date = SEP-26-1993

Figure D1. Energy Information Administration Quality Assurance Report (Continued)

Storage Pool Inventory

Utility ID = 23 | Utility Name: Illinois Power Company
Reactor ID = 01 | Reactor Name: Clinton 1

Storage Pool Inventory as of 12/31/92

Assemblies Discharged [a]	Total Number	Initial Uranium Content	Perm. Number	Temp. Number
Into Pool: 2301	568	104.326	568	0
Into Pool:	0	0.000	0	0
Into Pool:	0	0.000	0	0
Into Pool:	0	0.000	0	0
Into Pool:	0	0.000	0	0
Into Pool:	0	0.000	0	0
Into Pool:	0	0.000	0	0
Total	568	104.326	568	0
Missing	0	0.000		

Assemblies Stored [b]		Pool Type	Cani-sters	Assmb. In Cans.	Number
In Pool: 2301	(BWR)	Wet	(0/	0)	568
In Pool:	( )		(0/	0)	0
In Pool:	( )		(0/	0)	0
In Pool:	( )		(0/	0)	0
In Pool:	( )		(0/	0)	0
In Pool:	( )		(0/	0)	0
In Pool:	( )		(0/	0)	0

Pool Contributions -2301 [c]		
From Reac: 2301	568	104.512
From Reac:	0	0.000
From Reac:	0	0.000
From Reac:	0	0.000
From Reac:	0	0.000
From Reac:	0	0.000
From Reac:	0	0.000
Total	568	104.512

[a] The number of assemblies discharged and their total weight for the life of the reactor ordered by the storage pools at which these assemblies are stored. The total number of assemblies equals the number of permanently discharged assemblies (status code = D) plus the number of temporarily discharged assemblies (status code = T).

[b] The number of assemblies currently stored in each storage pool. Reactor type (BWR = Boiling-water reactor, PWR = Pressurized-water reactor) is indicated in parentheses. Pool type indicates Wet (storage pool) or Dry (dry cask) storage. The number of assemblies contained in canisters are shown in parentheses (canisters/assemblies).

[c] The number of assemblies stored in the pool indicated along with their total weight ordered by discharging reactor.

Source: Energy Information Administration, Form RW-859, "Nuclear Fuel Data" (1992).

Appendix E

Technical Notes

Carolina Power and Light's Robinson Independent Spent Fuel Storage Installation.

Technical Notes

Note 1: Reactor Status

Data for a total of 120 commercial light-water reactors have been reported on the Form RW-859 survey. The total includes 117 reactors which have been or are discharging and/or storing nuclear fuel assemblies. Reports are also required for three reactors that have not discharged spent nuclear fuel (Watts Bar 1 and 2, and Comanche Peak 2). For three reactors that were reported on previous surveys (Bellefonte 1 and 2, which have been indefinitely deferred, and Fort St. Vrain, which has been shut down and is not a light-water reactor), reports are no longer required. Nine reactors that have either shut down or been retired (Dresden 1, Humboldt Bay, Indian Point 1, LaCrosse, Shoreham, Rancho Seco, San Onofre 1, Trojan, and Yankee Rowe) are maintained on the data base for their historical information.

	1991	1992
Operating Reactors	110	108
Shut Down Reactors	7	9
Under Construction	3	3
Total	120	120

Note: Totals do not include Bellefonte 1 and 2, which are indefinitely deferred, and Fort St. Vrain, which is an HTGR and was shut down in 1989. Totals also do not include the four storage-only facilities.

Two reactors that have discharged spent nuclear fuel are *not* reported on Form RW-859, and their data are *not* included in this report. Hanford-N was placed in cold standby status by the DOE in 1988. Hanford-N spent fuel is used in DOE's Defense Programs. Three Mile Island 2 was shut down in 1979 because of an accident. Three Mile Island 2 spent fuel now belongs to a DOE experimental research program. Five other reactors have begun construction but have been indefinitely deferred. These reactors are Perry 2, Bellefonte 1 and 2, and Washington Nuclear Power 1 and 3.

Note 2: Storage Facilities

In addition to the spent nuclear fuel assemblies stored at reactor sites, a number of assemblies are stored at away-from-reactor storage facilities throughout the United States. Four of these facilities (General Electric Company (Morris Operation), West Valley Demonstration Project, Babcock and Wilcox Company (Lynchburg), and General Electric Vallecitos Nuclear) report on the Form RW-859 survey. Data for these facilities are obtained directly from their survey submissions and verified by checking shipment data from the contributing reactors (Table 14). Data for an additional four storage facilities (Idaho National Engineering Laboratory, Ohio (Battelle), South Carolina, and Washington (Hanford)) are compiled from shipment data submitted by the contributing reactors.

Table 14 contains complete data on assemblies stored at away-from-reactor storage facilities. These totals are also included in Table ES1, Figures ES1 and ES2, and the State totals in Table 15. Table 12 presents a compilation of data on shipments from utilities to away-from-reactor storage facilities. See Technical Note 7 on reprocessed assemblies and Technical Note 12 on data adjustments for more information.

Note 3: Pool Site Configurations

The format for presenting data in Table 13 is dependent upon the individual reactor/pool site configurations. The configurations are shown graphically in the pictograms in Appendix C and include the presence of transfer canals, multiple pools servicing a single reactor, and multiple reactors sharing a single pool site. Each case is presented below.

- When two pools are joined by a transfer canal, only one pool site ID is assigned since there is only one loading area. Such is the case at Baltimore Gas and Electric Company's Calvert Cliffs 1 and 2. In Table 13 only one pool site ID (0501) is listed, but separate capacity and inventory data are listed for each reactor.

- Only two reactors have multiple pools. Cleveland Electric Illuminating Company's Perry 1 is assigned two pool site ID's (0901 and 0902) and separate capacity and inventory data for each. Carolina Power and Light Company's Harris 1 has four pools which share the same pool site ID (0703). Of these four pools, two are currently licensed and two are not usable at this time. Harris 1 is a PWR reactor with the capability of storing both PWR and BWR fuel assemblies in its storage pools. In Table 13, separate capacity and inventory data are listed for each reactor type.
- In the case where two or more reactors share a single pool, as with Commonwealth Edison Company's Byron 1 and 2, only one pool site ID (1003) is listed, and the multiple reactors' data are combined and listed with that pool site.

Note 4: Intact Assemblies in Canisters

Prior to the collection of 1991 survey data, Form RW-859 respondents were required to report the number of canisters stored at a pool site separate from the number of assemblies stored at the site. A few of the canisters reported contained either intact spent fuel assemblies or rods from consolidated assemblies. This resulted in a difference between the number of spent fuel assemblies discharged and the number of spent fuel assemblies stored.

More detailed data on the contents of canisters were collected on the revised Form RW-859 survey. This alleviated some of the reporting inconsistencies. However, since the collection of these data are relatively new, they should be considered as preliminary and subject to change.

Note 5: Alternative Data Sources

The majority of data in this report come directly from a compilation of data on the Form RW-859 survey. Alternative data were obtained from the EIA publication, *World Nuclear Capacity and Fuel Cycle Requirements 1993* (Table 4), and the Nuclear Regulatory Commission publication, *Information Digest 1993* (Tables B2 and B3). The following data were obtained from these publications:

- *World Nuclear Capacity and Fuel Cycle Requirements 1993*

  —Summer capability rating (net MWe) for all reactors

  —Startup year for Watts Bar 1 and 2, and Comanche Peak 2

  —License expiration year for Watts Bar 1 and 2, and Comanche Peak 2.

- *Information Digest 1993*

  —Nuclear steam system supplier and design type for all reactors.

Note 6: HTGR Fuel Elements

One Form RW-859 reactor, Fort St. Vrain, is a high-temperature, gas-cooled reactor (HTGR). An HTGR uses an inert gas (helium) as the primary coolant and a graphite moderator. Highly enriched uranium is used as initial fuel and thorium as a source of new fuel.

This HTGR has spent fuel wells instead of a pool. Data for Fort St. Vrain are listed only in Tables 15 and 16, and are not included in totals on those tables.

Fort St. Vrain shut down in 1988 for repairs and will not restart. A total of 726 spent fuel elements (including 6 test elements) were discharged prior to this shutdown and shipped to Idaho National Engineering Laboratory (INEL). An additional 18 spent fuel elements were shipped to INEL in October 1991. Ultimately, all the irradiated fuel elements will be shipped to INEL for storage and reprocessing. Until all legal issues with the State of Idaho regarding transportation of irradiated spent fuel are resolved, contingency plans have been developed to hold the spent fuel in an Independent Spent Fuel Storage Installation (ISFSI). The ISFSI was licensed on November 4, 1991, by the U.S. Nuclear Regulatory Commission. The license authorizes storage in the ISFSI of up to 1,482 spent fuel elements, 37 reflector control rod elements, and 6 neutron source elements. In December 1991, the Public Service Company of Colorado transferred 18 elements to its ISFSI. By June of 1992, 1,446 elements were transferred to the ISFSI, for a total of 1,464 which now reside in the ISFSI.

Note 7: Reprocessed Assemblies

Spent fuel discharged from light-water reactors contains appreciable quantities of fissile (U-235, Pu-239), fertile (U-238), and other radioactive materials. These fissile and fertile materials can be chemically separated and recovered from the spent nuclear fuel. The recovered uranium and plutonium can, if economic and institutional conditions permit, be recycled for use as nuclear fuel.

A number of assemblies were discharged and reprocessed prior to 1972. Data on these reprocessed assemblies are *not* included in this report, except for 962 reprocessed assemblies reflected in Table 12 as shipments. Other reprocessed assemblies have not been included on Form RW-859 submissions.

Note 8: Reactor Dates

Key dates in the life of a reactor are presented in Table 4. While the majority of the information presented in this table was obtained from Form RW-859 data, other data sources were used in cases where Form RW-859 data were not available (See Technical Note 5: Alternative Data Sources). Definitions for each of the key dates are as follows:

- Startup date—year in which electricity was first generated from the reactor.
- License expiration date—year listed on the reactor's Nuclear Regulatory Commission operating license.
- Loss of ability to operate—year estimated by the utility on Form RW-859 in which the utility would not continue reactor operation because of a lack of storage space for discharged fuel, absent spent fuel pickup by DOE. This also takes into consideration the current licensed capacity (slots) and the total maximum established site capacity.
- Projected retirement year—utility estimate, either the license expiration date or a date based on a license extension.

Note 9: Burnup Ranges

Burnup is defined as the amount of thermal energy produced per unit weight of fuel irradiated or "burned." Burnup levels are generally expressed in units of gigawattdays thermal per metric ton of uranium (GWDt/MTU). Average burnups are presented in Tables 5, 6, 7, 8, and 11, Figure 2, and Appendix B. Burnup ranges reflect associated batch average discharge burnups. A burnup range may have a given assembly in one of the following: 0-4.999 GWDt/MTU; 5.000-9.999 GWDt/MTU; 10.000-14.999 GWDt/MTU; etc.

Note 10: Missing Data

Most Form RW-859 respondents submit complete and accurate data. All Form RW-859 data are subject to extensive EIA quality assurance procedures. As of the final frozen file date of September 1, 1993, a limited number of data items were missing. In these instances, the missing data items involved temporarily discharged assemblies. Utilities are not required to report complete data until these assemblies are permanently discharged. These items, listed below, are omitted from the tables in this report.

- The following 73 assemblies, all temporarily discharged, are missing assembly type codes, burnups, and enrichment (weight percents).

Beaver Valley 2	PWR	4
Davis-Besse	PWR	6
Indian Point 2	PWR	8
Indian Point 3	PWR	2
Kewaunee	PWR	12
North Anna 1	PWR	8
North Anna 2	PWR	2
Perry 1	BWR	4
Salem 1	PWR	24
South Texas 1	PWR	3

- The following 26 assemblies, all temporarily discharged, are missing burnups.

Maine Yankee	PWR	12
North Anna 2	PWR	1
Salem 1	PWR	1
South Texas 1	PWR	4
Three Mile Island	PWR	8

Note 11: Rounding

All initial uranium contents presented in the tables of this Service Report are presented in metric tons of uranium (MTU) and are rounded to the nearest one-tenth. Totals may not exactly equal sum of components because of independent rounding. All average burnups in the tables of the Service Report are presented in gigawattdays thermal per initial metric ton of uranium (GWDt/MTU) and are rounded to the nearest one-tenth. Average burnup totals are weighted averages and, as such, are not averages of individual table entries.

Note 12: Data Adjustments

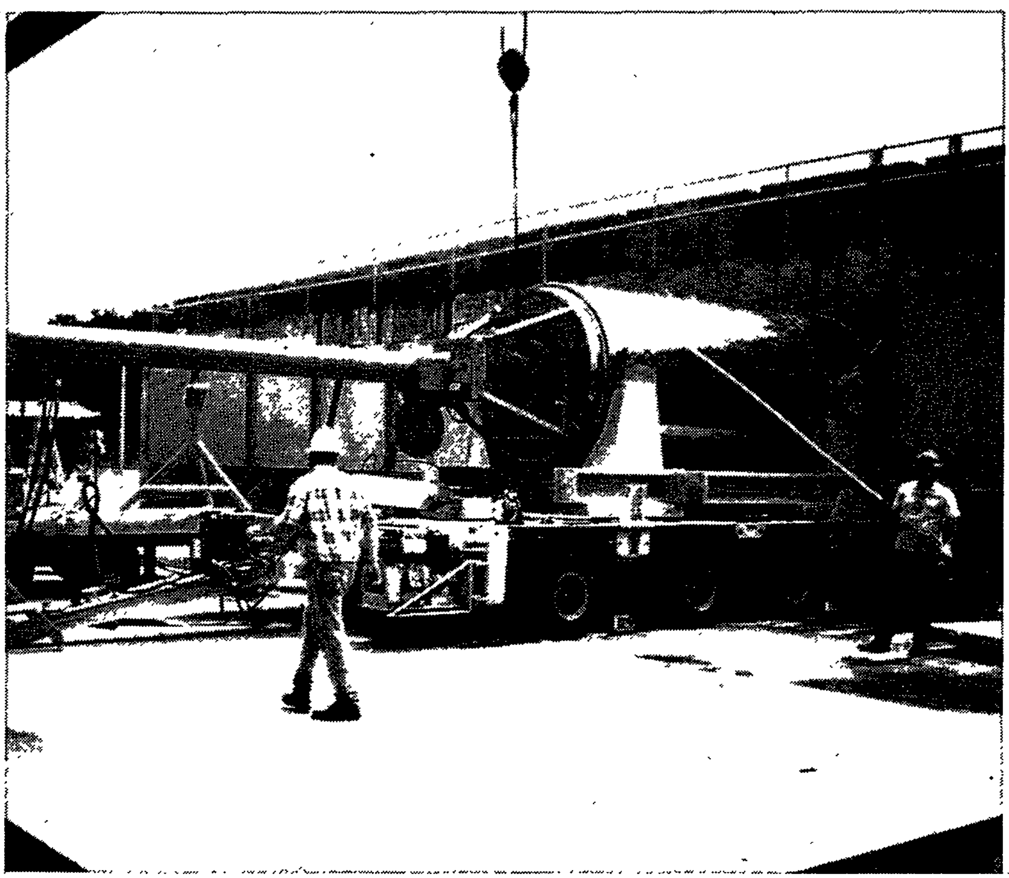
The Form RW-859 survey is a total universe survey of all commercial nuclear reactors. Respondents usually submit complete data. As such, data adjustments are not usually necessary. In cases where errors or omissions are identified during the quality assurance process, EIA adjusts the data only after the respondent has been contacted to verify the change. A footnote has been added to tables where data for previous years have been revised. The note also states that current-year data may be revised in future publications. When utilities reinsert assemblies discharged in previous years, historical totals change.

Note 13: Storage Capacities

Form RW-859 respondents are required to report their licensed storage capacity and their maximum established spent fuel storage capacity.

- Licensed storage capacity represents the number of spent nuclear fuel assemblies and canisters to be stored at a given site or spent nuclear fuel pool, as licensed by the Nuclear Regulatory Commission.
- Maximum established spent fuel storage capacity represents the maximum number of intact assemblies that will be able to be stored at some point in the future (between the reporting date and the reactor's end of life) considering any established or current studies or engineering evaluations at the time of submittal for licensing approval from the U.S. Nuclear Regulatory Commission. Utilities adjust their maximum established spent fuel storage capacity by adding capacity based on reracking or other engineering improvements or decreasing capacity by subtracting unusable pool locations.

Glossary



Transfer Cask loading spent fuel into Oconee's Independent Spent Fuel Storage Installation.

Glossary

Activity or Radioactivity: The rate at which radioactive material emits radiation, stated in terms of the number of nuclear disintegrations occurring in a unit of time; the common unit of radioactivity is the curie.

Assembly: A group of fuel rods fastened together with top and bottom tie plates, guide tubes, and grids. For boiling water reactors, they are sometimes called a bundle without the channels.

Assembly Class: A generic grouping for individual reactors based on the core configuration. The assembly class for a particular reactor is primarily a function of overall assembly size (length and transverse width). For pressurized water reactors, assembly class is also a function of fuel rod array configuration. A key attribute of the assembly class scheme is that fuel assemblies in an assembly class are only used in reactors belonging to the same assembly class. Codes representing the assembly class are used as the first three characters of the eight-character assembly type codes. Codes for multiple-reactor assembly classes consist of a single-character code representing the reactor vendor and a two-character code identifying the particular assembly class. Codes for single-reactor assembly classes consist of the letter "X" and a two-character code representing the specific reactor. The assembly class also serves as the basis for the characterization of nonfuel components.

Assembly Identifier: A unique string of alphanumeric characters which identifies an assembly, bundle, or canister from a specific reactor in which it has been irradiated. Must be consistent with other submissions to the Department of Energy (DOE)/ Nuclear Regulatory Commission (NRC); that is, Annex B, previous Form RW-859, and DOE/NRC Form 741.

Assembly Type: Describes a group of fuel assemblies with similar physical and design characteristics. In general, a breakdown of the assembly class into various fuel designs. Assemblies of the same assembly type are always of the same assembly class, fuel design, and manufacturer. Typically, they have identical lengths, widths, cladding materials, active fuel lengths, hardware (both parts and materials), and weight of heavy metal.

Average Discharge Burnup: The average amount of energy produced by each assembly in a batch of spent fuel assemblies that have been discharged from a nuclear reactor, reported in gigawattdays thermal per metric ton of uranium (GWDt/MTU).

Average Initial Enrichment Assay: Average enrichment for a fresh fuel assembly as specified and ordered in fuel cycle planning. This average includes axial blankets, and axially and radially zoned enrichments.

Average Initial Uranium Content: Average weight in kilograms (kg) of uranium of fresh fuel assemblies in a batch before they are initially inserted into the reactor core. To be included in a batch the initial uranium content of each assembly must be within 3 kg of the average for boiling water reactor assemblies and within 5 kg of the average for pressurized water reactor assemblies.

Axial Power Shaping Assemblies: Assemblies used at Babcock and Wilcox-designed pressurized-water reactors to provide control over the power level of the reactor core during operation. They are very similar to control rod assemblies (CRAs), but have less neutron absorbing material. Gray axial power shaping assemblies use a weaker neutron absorber, but serve an identical function.

Batch: A logical grouping of assemblies with similar characteristics. All assemblies in a batch have the same vendor model number, the same approximate initial loading weight, the same initial average loading enrichment, and approximately the same burnup after final discharge.

Boiling-Water Reactor (BWR): A light-water reactor in which water, used as both coolant and moderator, is allowed to boil in the core. The resulting steam can be used directly to drive a turbine.

Burnable Poison Rod Assemblies (BPRAs): Assemblies are inserted and locked into the guide tubes of pressurized-water reactor fuel assemblies in Babcock and Wilcox- and Westinghouse Electric-designed reactors to provide additional reactivity control. Both borosilicate glass and a boron carbide/aluminum oxide mixture have been used as the absorber for these assemblies. Because these absorbing materials are rapidly depleted, BPRAs are useful in limiting power output in the higher enriched assemblies that are now being placed into service. The use of burnable poison rod assemblies varies greatly from utility to utility.

Burnup: A measure of the amount of energy obtained from fuel in a reactor. Typically, burnup is expressed as the amount of energy produced per unit weight of fuel irradiated or "burned." Burnup levels are generally measured in units of gigawattdays thermal per initial loading weight of uranium, in metric tons (GWDt/MTU).

Burnup Range: A data structure that represents assemblies, once and only once, by their associated batch average discharge burnup. As a batch is defined as all assemblies having identical reactor and cycle histories, identical nominal initial enrichments, and a burnup within 10 percent of the final mean average burnup, some assemblies placed within a range may not actually fall within that range. A burnup range may have a given assembly in one of the following: 0-4.999 gigawattdays thermal per inital loading weight of uranium, in metric tons (GWDt/MTU); 5.000-9.999 GWDt/MTU; 10.000-14.999 GWDt/MTU; etc.

Canister: The outermost container into which vitrified high-level waste, intact spent fuel assemblies, consolidated spent fuel, or spent fuel rods are to be placed. Made of stainless steel or an inert alloy.

Caretaker: Spent fuel storage facility that stores assemblies, subassemblies, or batches but does not irradiate them in a reactor.

Characteristic Waste: A set of qualitative and quantitative criteria used to describe the features of a particular category of radioactive waste. Typical quantitative criteria used for most radioactive wastes include volume (m^3), activity (Ci), and thermal power (W).

Cladding: Protective alloy tube shielding in which fissionable fuel is inserted. Cladding is relatively resistant to radiation and the physical and chemical conditions in a reactor core. The cladding may be of stainless steel or some alloy, such as zircaloy.

Commercial Operation: The phase of reactor operation that begins when power ascension ends and the operating utility formally declares to the Nuclear Regulatory Commission that the nuclear power plant is available for the regular production of electricity. This declaration is usually related to the satisfactory completion of qualification tests on critical components of the unit.

Consolidation: The process whereby fuel rods are removed from an assembly and placed into a container in which a minimum of space is left unoccupied by the rods.

Control Blades: Blades (often called cruciforms) that control the nuclear chain reactor in boiling-water reactors by limiting the number of neutrons in the core. Made of strongly neutron-absorbing materials, control blades are inserted into the reactor core at planned shutdowns and during scrams. Particular groups of control blades are also used to control the power level of the reactor. Several pressurized-water reactors (Indian Point 1, Palisades, and Yankee Rowe) use(d) control blades.

Control Element Assemblies (CEAs): Assemblies used at Combustion Engineering (CE)-designed pressurized-water reactors to provide control over the nuclear chain reaction by limiting the number of neutrons in the core. Made of strongly neutron-absorbing materials, CEAs are inserted into the reactor core at planned shutdowns and during scrams. At most CE-designed reactors, they consist of 4 or 5 control elements connected together by a control rod spider and fit into the guide tubes of a single assembly. At CE-designed System 80 reactors, they consist of either 4 or 12 control elements connected together by a control rod spider. The 4-element CEAs fit into the guide tubes of a single assembly, but the 12-element CEAs fit across 5 fuel assemblies in the core of the reactor.

Control Element Assembly Flow Plugs: Plugs used at some Combustion Engineering-designed reactors in the same manner that thimble plug assemblies and orifice rod assemblies are used at Westinghouse Electric- and Babcock and Wilcox-designed reactors, respectively.

Control Rod Assemblies (CRAs): Assemblies used at Babcock and Wilcox-designed pressurized-water reactors to provide control over the nuclear chain reaction by limiting the number of neutrons in the core. Made of strongly neutron-absorbing materials, CRAs are inserted into the reactor core at planned shutdowns and during scrams. They consist of 16 control rods connected together by a control rod spider and fit into each guide tube of a single assembly.

Coolant: Material used to conduct heat away from the reactor core to the steam cycle of a nuclear power plant. Liquids, gases, and liquid metals can be used as coolants.

Core: The place in the reactor in which the nuclear fuel is irradiated and thermal energy is generated.

Core Size: The fixed number of fuel assemblies that can be irradiated at any one time in the reactor core.

Current Inventory: Number of spent nuclear fuel assemblies stored at a given site or spent nuclear fuel pool, at a given point in time.

Cycle: The period of time from reactor fuel loading to subsequent refueling.

Cycle End Date: The date of reactor shutdown for fuel discharge and refueling.

Decay or Radioactive Decay: The transition of a nucleus from one energy state to a lower one, usually involving the emission of a photon, electron, or neutron.

Design Electrical Rating (Capacity), Net: The nominal net electrical output of a nuclear unit, as specified by the utility for the purpose of plant design.

Discharge Cycle: The sequential numbering of a reactor's refueling, from the start of reactor fuel loading to subsequent refueling. Initial loading, first operation, and first refueling is cycle 01.

Discharged Fuel: Irradiated fuel removed from a reactor during refueling. (See Spent Nuclear Fuel.)

Disposal Contract: See Standard Contract.

Dry Shielded Canister (DSC): The dry shielded canister is a cylindrical stainless steel pressure-retaining component which contains an internal basket assembly to maintain the spent fuel assemblies in a safe geometry during loading, transfer, storage, and postulated cask drop events.

Dry Storage Facilities: Shielded mobile or stationary containers, silos, modules, vaults, or dry wells filled with an inert gas or with air, as appropriate, in which spent fuel assemblies or canisters of highly radioactive material may be stored.

End of Cycle Date: See Cycle End Date.

Enrichment: A nuclear fuel cycle process in which the concentration of fissionable uranium is increased above its natural level of 0.71 percent. Enrichment is the process that changes the isotopic ratio in a material. The process currently utilized in the United States to increase uranium-235 to uranium-238 is gaseous diffusion of uranium hexafluoride (UF_6).

Enrichment Weight Percent: A value determined on the basis of burnup calculations for the original fresh fuel assembly.

Equilibrium Cycle: An analytical term that refers to fuel cycles that occur after the initial one or two cycles of a reactor's operation. For a given reactor, equilibrium cycles have similar fuel characteristics.

Fabricator: The manufacturer or supplier of a particular nuclear fuel assembly. The fabricator of an assembly for a given reactor is not *necessarily* related to the reactor vendor or to the original fuel fabricator.

Fuel Assembly: Nuclear fuel is fabricated into small pellets. These pellets are encased into long cylindrical rods. An assembly is a group of these rods fastened together. Referred to as a "bundle" for some boiling water reactors.

Fuel Assembly Identifier: A unique string of alpha-numeric characters that identifies an assembly, bundle, or canister for a specific reactor in which it has been irradiated.

Fuel Channels: Metal (usually zircaloy) box-like items which are used in boiling-water reactors (BWR) to control the flow of water through the core. BWR fuel bundles are inserted into the fuel channels to form the fuel assembly.

Fuel Cycle: The length of time a reactor is operated between refuelings (typically 14 to 24 months), including the refueling time, usually measured from the startup of one cycle to the startup of the following cycle.

Fuel Rods: Tubes of high-grade zircaloy or stainless steel that contain pellets of ceramic-grade uranium dioxide nuclear fuel.

Gigawattday: A unit of measure equal to 1 billion wattdays.

Graphite: A crystalline form of carbon used to moderate nuclear reactions.

High-Level Waste (HLW): Either of the following are considered to be high-level waste: (1) the highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations; and (2) other highly radioactive material that the Nuclear Regulatory Commission, consistent with existing law, determines by rule to require permanent isolation.

High-Temperature, Gas-Cooled Reactor (HTGR): A reactor that is cooled by helium and moderated by graphite. The reactor is fueled with enriched uranium and with thorium, which can be transformed into useful fuel when irradiated.

Horizontal Storage Module (HSM): The horizontal storage module is a steel reinforced concrete structure. The HSM may be constructed in-place at the Independent Spent Fuel Storage Installation (ISFSI) location or it may be prefabricated off-site and positioned on a reinforced concrete pad at the ISFSI. The principal design functions of the HSM are to provide radiation shielding for the fuel/dry shielded canister during storage and to provide a passive mechanism for the removal of decay heat by natural circulation of ambient air.

Incore Instrumentation: Instrumentation used to monitor the neutron flux within the core. In pressurized-water reactors, this instrumentation is inserted into an instrument tube in the fuel assembly.

Independent Spent Fuel Storage Installation (ISFSI): Dry storage facility located at reactor site in which spent fuel assemblies may be stored.

Integral Fuel Burnable Absorbers (IFBAs): Westinghouse Electric-design neutron absorbers that are integral to the fuel assembly (i.e., not a nonfuel component). IFBAs consist of a zirconium diboride coating on the exterior of selected fuel pellets.

Interim Storage: The temporary holding of wastes on or away from the generator's site when disposal space is not available. Monitoring and human control are provided, and subsequent action involving treatment, transportation, or final disposition is expected.

Irradiated Nuclear Fuel: Nuclear fuel which has undergone a self-sustaining chain reaction. (See Burnup and Spent Nuclear Fuel.)

Joule: The International System unit of energy, equal to the work done when a current of 1 ampere is passed through a resistance of 1 ohm for 1 second.

Licensed Storage Capacity: Maximum number of spent nuclear fuel assemblies and canisters to be stored at a given site or spent nuclear fuel pool, as licensed by the Nuclear Regulatory Commission.

Licensed Thermal Power: The maximum thermal power of the reactor as authorized by the Nuclear Regulatory Commission, expressed in gigawatts thermal (GWt).

Licensing: The guidelines and procedures required to obtain a permit to build or operate a facility.

Light-Water Reactor (LWR): A nuclear reactor that uses ordinary water as the primary coolant and moderator, with slightly enriched uranium as fuel. There are two types of commercial light-water reactors--the boiling-water reactor (BWR) and the pressurized-water reactor (PWR).

Local Power Range Monitors: Incore instrumentation used to monitor the power level of General Electric-designed reactors during regular operation (at or near full power).

Low-Level Waste (LLW): Radioactive waste not classified as high-level waste, spent nuclear fuel, or by-product material specified as uranium or thorium tailing and waste.

Maximum Established Storage Capacity: The maximum established spent fuel capacity for a storage site, defined by the Department of Energy as the maximum number of intact assemblies that will be able to be stored at some point in the future (between the reporting date and the reactor's end of life) taking into account any established or current studies or engineering evaluations, at the time of submittal for licensing approval from the Nuclear Regulatory Commission.

Maximum Initial Pellet Enrichment Assay: The maximum enrichment in uranium-235 weight percent of all pellets contained in the fuel rods in a nuclear fuel assembly.

MTIHM (Metric Tons of Initial Heavy Metal): The weight of the initial fuel loading (in metric tons) used in an assembly and other fissile and fertile materials that are loaded into an assembly during fabrication of the assembly, also expressed in MTU (metric tons of uranium) and MTHM (metric tons of heavy metal).

MTU (Metric Tons of Uranium): A measure of weight equivalent to 2,204.6 pounds of uranium.

Net Summer Capability: The steady hourly output which generating equipment is expected to supply to a system load exclusive of auxiliary power as demonstrated by testing at the time of summer peak demand.

Neutron Poison: A material (e.g., boron or cadmium) that absorbs neutrons readily. Insertion of one of these poisons results in a decrease in the reactivity (or neutron multiplying property) of the core, and consequently in a decrease of the neutron density.

Neutron Sources: A base source of neutrons that initiate the nuclear chain reaction within the reactor core. Primary neutron sources are typically polonium- or plutonium-beryllium alloys; secondary neutron sources are typically antimony-beryllium alloys.

Nonfuel Components: Nuclear reactor core parts and hardware, excluding the nuclear fuel itself. Such components include shrouds, control rods, fuel channels, in-core chambers, support tubes, and dummy fuel rods.

Nuclear Fuel: Fissionable materials that have been enriched to such a composition that when placed in a nuclear reactor they will support a self-sustained chain reaction, producing heat in a controlled manner for process use.

Nuclear Fuel Cycle: The complete series of steps involved in supplying fuel for nuclear reactors, including mining, refining, enrichment, the original fabrication of fuel elements, their use in a reactor, and management of spent fuel and radioactive wastes. A closed fuel cycle includes chemical reprocessing to recover the fissionable material remaining in the spent fuel; an open fuel cycle does not.

Nuclear Fuel Cycle "Front End": Locating and mining ore bodies containing uranium; milling the uranium-bearing ore to extract the uranium oxide (U_3O_8), called uranium concentrate or'yellowcake'; chemically converting the U_3O_8 to uranium hexafluoride (UF_6), which is a solid at room temperature but changes to a gas at slightly higher temperatures; enriching, that is, increasing the concentration of the uranium-235 isotope in the UF_6, so that a nuclear chain reaction can be sustained; converting the enriched UF_6 into fuel pellets of uranium dioxide (UO_2); and fabricating rods containing the pellets into assemblies for loading into a reactor. (See Fuel Cycle.)

Nuclear Power: Electricity generated by an electric power plant whose turbines are driven by steam generated in a reactor by heat from the fissioning of nuclear fuel.

Nuclear Power Plant: A single- or multi-unit facility in which heat produced in a reactor(s) by the fissioning of nuclear fuel is used to drive a steam turbine(s).

Nuclear Reactor: An apparatus in which the nuclear fission chain reaction can be initiated, maintained, and controlled so that energy is released at a specific rate. The reactor apparatus includes fissionable material (fuel) such as uranium or plutonium; fertile material; moderating material (unless it is a fast reactor); a heavy-walled pressure vessel; shielding to protect personnel; provision for heat removal; and control elements and instrumentation.

Nuclear Regulatory Commission (NRC): The U.S. Government organization that regulates the nuclear industry, under the Atomic Energy Act of 1954, et seq., to insure public safety.

Nuclear Waste Policy Act of 1982, as Amended: The Act mandates the establishment of repositories for the long-term storage and disposal of high-level radioactive waste and the collection of fees from utilities to finance these repositories. Under this Act the Department of Energy (DOE) was given the responsibility for providing permanent disposal of spent fuel from domestic nuclear power reactors.

Operable: A nuclear unit in the United States is "operable" after it completes low power testing and is issued a full power license by the Nuclear Regulatory Commission.

Orifice Rod Assemblies: Short (typically 8-10") metal plugs that are inserted into the guide tubes of fuel assemblies in Babcock and Wilcox-designed reactors to block the flow of coolant through guide tubes. They consist of 20 orifice rods connected together by a spider or similar holddown device. Each orifice rod assembly fits into the guide tubes of a single assembly.

Other Instrumentation: Incore instrumentation, such as source range monitors (SRMs), intermediate range monitors (IRMs), and transverse incore probes (TIPs), that are used to monitor the power level of General Electric-designed reactors.

Pool Crane: A machine for raising assemblies and depositing them into or out of a spent fuel storage pool.

Pool Site: A configuration of pools having a single cask loading area.

Pressurized-Water Reactor (PWR): A nuclear reactor in which heat is transferred from the core to a heat exchanger via water kept under high pressure, so that high temperatures can be maintained in the primary system without boiling the water. Steam is generated in a secondary circuit.

Radiation: Particles or waves from atomic or nuclear processes and the process in which energy is emitted as particles or waves.

Radioactivity: See Activity.

Reactor, Commercial Power: Any unit of a commercial nuclear facility, licensed by the Nuclear Regulatory Commission, which generates electrical power.

Refueling: The process of shutting down a reactor and replacing the spent nuclear fuel assemblies. The refueling process usually takes several months to accomplish.

Reinserted Fuel: Irradiated fuel that is discharged in one cycle and inserted in the same reactor after sitting in the storage pool for at least one subsequent cycle. In a few cases, fuel discharged from one reactor has been used to fuel a different reactor.

Repository: A permanent disposal facility for high-level or transuranic wastes and spent fuel.

Reprocessing: The process by which spent fuel is separated into waste material for disposal and material such as uranium and plutonium for reuse.

Reracking: The installation of high-density racks to increase the storage capacity of a spent fuel pool.

Rod Array Configuration: Fuel assemblies are constructed from a number of individual fuel rods arranged together. These arrays have been of many different sizes, generally in square arrays. The number of fuel rods on each side of these arrays is referred to as the rod array configuration. Thus, an assembly with a rod array configuration of 14 X 14 has a total of 196 positions in a 14 X 14 array (most positions contain fuel rods, although some are guide tube locations, etc.). Pressurized-water reactor (PWR) rod array configurations are typically 14 X 14, 15 X 15, 16 X 16, and 17 X 17. A very few nonsquare arrays (13 X 14, 15 X 16, 17 X 18) have been used in PWRs which use cruciform control blades (Indian Point 1 and Yankee Rowe). Boiling-water reactor (BWR) rod array configurations have typically been either 7 X 7 or 8 X 8, but newer fuel assembly types are in use in reactors with 9 X 9 and 10 X 10 rod array configurations.

Rod Cluster Control Assemblies (RCCAs): Assemblies used at Westinghouse Electric-designed pressurized-water reactors to provide control over the nuclear chain reaction by limiting the number of neutrons in the core. Made of strongly neutron-absorbing materials, RCCAs are inserted into the reactor core at planned shutdowns and during scrams. They consist of 16, 20, or 24 control rods connected together by a control rod spider. Each RCCA fits into the guide tubes of a single assembly.

Shipment: A generic term meant to cover all the diverse forms of shipments away from the discharging reactor's spent fuel pool. As in: shipped down the transfer canal to an adjoining spent fuel pool; shipped in a transport cask to an on-site storage facility; shipped to an off-site storage facility; or shipped in a storage cask to a dry storage facility. Excludes round-trip and intermediate shipments that do not affect inventories of spent nuclear fuel.

Shutdown Date: Month and year of reactor shutdown for fuel discharge and refueling. The date is the point at which the reactor becomes subcritical.

Site: Any location under institutional control within which radioactive wastes are handled, stored, or disposed.

Slot: A physical position in a rack in a spent fuel pool which is intended to be occupied by an intact assembly or equivalent (that is, a canister or an assembly skeleton).

Spent Fuel Storage Pool: A borated water-filled pool in which assemblies may be stored.

Spent Nuclear Fuel (SNF): Fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated by reprocessing. Spent or irradiated fuel is usually discharged from reactors because of chemical, physical, and nuclear changes that make the fuel no longer efficient for the production of heat, rather than because of the complete depletion of fissionable material. (Uranium metal is susceptible to radiation damage, which limits its operating life in a reactor.)

Standard Contract: A contract between the Department of Energy (DOE) and each commercial owner and/or generator of irradiated nuclear fuel. The contract stipulates the terms and method of payment, how fees are to be calculated, and how spent nuclear fuel is to be transferred to DOE custody.

Startup: The first date electrical energy is generated by a reactor.

Storage: Operations designed to provide isolation and easy recovery of spent fuel (and other radioactive materials), which rely on continuous human monitoring, maintenance, and protection from human intrusion for a specified period of time.

Thimble Plug Assemblies: Short (typically 8-10") metal plugs that are inserted into the guide tubes of fuel assemblies in Westinghouse Electric-designed reactors to block the flow of coolant through guide tubes. Thimble plug assemblies consist of 16, 20, or 24 thimble plugs connected together by a spider or similar holddown device. Each thimble plug assembly fits into the guide tubes of a single assembly.

Transport Cask: Container that provides shielding during transportation of canisters of radioactive materials, available in several sizes for truck and rail use.

Transshipment: The shipment of spent nuclear fuel assemblies and canisters from one storage site to another using railroads or trucks as the primary mode of transportation.

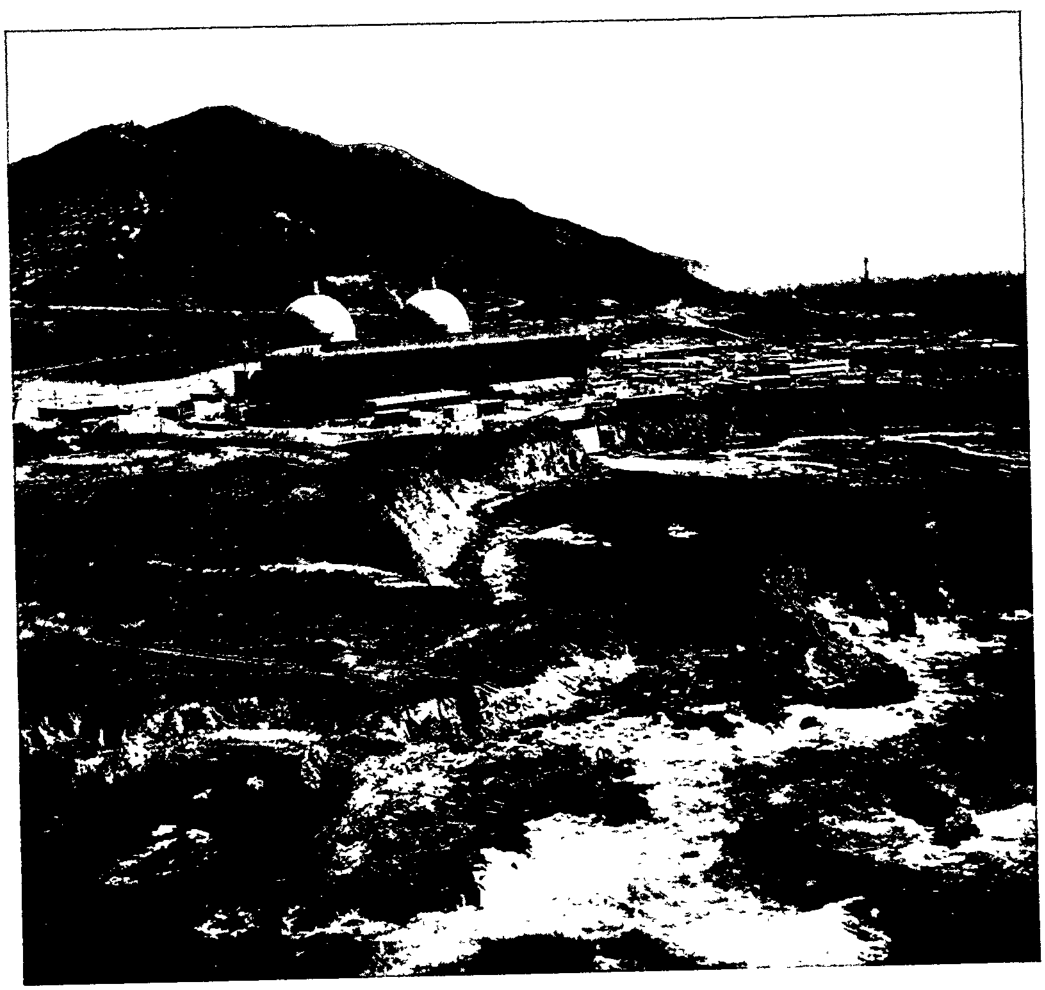
Uranium (U): A heavy, naturally radioactive, metallic element (atomic number 92). Its two principally occurring isotopes are uranium-235 and uranium-238. Uranium-235 is indispensable to the nuclear industry because it is the only isotope existing in nature to any appreciable extent that is fissionable by thermal neutrons. Uranium-238 is also important because it absorbs neutrons to produce a radioactive isotope that subsequently decays to plutonium-239, an isotope that also is fissionable by thermal neutrons.

Waste Disposal: A current concern in the nuclear power field is the safe disposal and isolation of spent fuel. These materials must be isolated from the biosphere until the radioactivity contained in them has diminished to a safe level. Under the Nuclear Waste Policy Act of 1982, as amended, the Department of Energy has been given responsibility for the long-term management of spent fuel and high-level radioactive waste. Current plans call for the ultimate disposal of the wastes in solid form in licensed deep, stable geologic structures.

Waste Stream: The processing sequence for waste materials that isolates particular types of waste and prevents the mixing of undesirable materials during handling and disposition.

Watt: A unit of power. The rate of energy transfer equivalent to 1 joule per second.

Bibliography and Notes



Diablo Canyon nuclear power plant, operated by Pacific Gas and Electric, located in Avila Beach, Claifornia.

Bibliography and Notes

This section presents a listing of other publications containing information about nuclear waste along with a brief abstract of each. The most recent version of each report is listed.

Integrated Data Base for 1993, U.S. Spent Fuel and Radioactive Waste Inventories, Projections, and Characteristics, Office of Civilian Radioactive Waste Management (DOE/RW-0009).

The Integrated Data Base (IDB) Program contains current data on inventories and characteristics of commercial spent fuel and both commercial and U.S. Government-owned radioactive waste through December 31, 1992. The radioactive materials considered are spent fuel, high-level waste, transuranic waste, low-level waste, commercial uranium mill tailings, remedial action program wastes, commercial reactor and fuel cycle facility decommissioning wastes, highly radioactive materials that may require geologic disposal, and mixed (hazardous and radioactive) low-level waste. For these categories, current and projected inventories are given through the year 2020, and the radioactivity and thermal power are calculated based on reported or estimated isotopic compositions.

Characteristics of Potential Repository Wastes, Office of Civilian Radioactive Waste Management (DOE/RW-0184-R1, Volumes 1-4).

The Characteristics Data Base (CDB) provides the detailed technical characteristics of those wastes that will, or may, eventually be disposed of in a deep geologic repository. This includes spent fuel from commercial light-water reactors (LWRs) and immobilized high-level waste (HLW) from reprocessing. Other sources include spent fuel from non-LWRs such as test and experimental reactors, and various miscellaneous sources such as greater-than-class-C low-level wastes and radioisotope capsules. The technical characteristics of relevant interest are physical descriptions and measurements, chemical compositions, radiological properties, inventories, and projected quantities. These data are collected, tabulated, organized, placed into computer data files, and made available to users in a range of formats, including hard-copy reports and menu-driven PC data bases.

Spent Fuel Storage Requirements: 1992 to 2036, Office of Civilian Radioactive Waste Management (DOE/RW-0431).

The source data contained in this report are based on individual reactor information supplied by the reactor owners on the Nuclear Fuel Data survey, Form RW-859. Historical inventories of spent fuel from existing, planned, and projected pressurized-water reactors (PWRs) and boiling-water reactors (BWRs) and one existing high-temperature, gas-cooled reactor (HTGR), and utility estimates of future discharges, are presented through the year 2036. The ultimate needs for additional storage capacity are estimated. These estimates are based on the maximum capacities within current and planned at-reactor facilities and on any planned transshipments of fuel to other reactors or facilities.

World Nuclear Capacity and Fuel Cycle Requirements 1993, Energy Information Administration (DOE/EIA-0436-93).

The nuclear fuel cycle consists of mining and milling uranium ore, processing the uranium into a form suitable for generating electricity, "burning" the fuel in nuclear reactors, and managing the resulting spent nuclear fuel. This report presents the current status and projections of nuclear capacity, generation, and fuel cycle requirements for all countries in the world with commercial nuclear power programs. Also included are projections of domestic and foreign requirements for natural uranium and enrichment services as well as projections of discharges of spent nuclear fuel.

1993 Acceptance Priority Ranking, Office of Civilian Radioactive Waste Management (DOE/RW-0328P).

This document is based on spent nuclear fuel (SNF) discharges as of December 31, 1992. The 1993 Acceptance Priority Ranking (APR) report is the basis for allocating projected spent nuclear fuel acceptance capacity to each owner in the *1993 Annual Capacity Report.*

1993 Annual Capacity Report, **Office of Civilian Radioactive Waste Management (DOE/ RW-0331P).**

The *Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste* (10 CFR Part 961) requires the U.S. Department of Energy to issue an Annual Capacity Report (ACR) for planning purposes. As required by the Standard Contract, the acceptance priority ranking is based on the date the spent nuclear fuel was permanently discharged, with the owners of the oldest spent nuclear fuel, on an industry-wide basis, given the highest priority. The 1993 ACR applies the projected waste acceptance rates in Table 2.1 to the 1993 Acceptance Priority Ranking (APR), resulting in individual allocations for the owners and generators of the spent nuclear fuel. These allocations are listed in detail in the Appendix, and summarized in Table 3.1.

Uranium Industry Annual 1992, **Energy Information Administration (DOE/EIA-0478-92).**

This report presents data on U.S. uranium raw materials and marketing activities of the domestic uranium industry and electric utilities. It contains aggregated data reported by U.S. companies on the "Uranium Industry Annual" survey, Form EIA-858, and historical data from prior data collections and other pertinent sources.

Analysis of Assembly Serial Number Usage in Domestic Light-Water Reactors, ***Oak Ridge* National Laboratory (ORNL/TM-11841, May 1991, authors W.J. Reich and R.S. Moore).**

This report is an analysis of the domestic light-water reactor (LWR) fuel assembly serial number identification that is placed on each assembly. The study was made to determine what serial numbering schemes are used, the effectiveness of these schemes, and how many duplicate serial numbers occur on domestic LWR fuel assemblies.

Information Digest 1993 Edition, **Nuclear Regulatory Commission (NUREG-1350, Volume 5).**

This digest is a compilation of nuclear and NRC related data and is designed to provide a quick reference to major facts about the agency and the industry it regulates. In general, the data cover 1975 through 1992, with exceptions noted. Information on generating capacity and average capacity factor for operating U.S. commercial nuclear power reactors is obtained from monthly operating reports that are submitted directly to the NRC by the licensee. This information is reviewed by the NRC for consistency only. No independent validation and/or verification is performed.

Form RW-859 Canisters, **Energy Information Administration Contractor Report (Z, EIA-9306601), Z, Inc., Silver Spring, Maryland.**

The Nuclear Fuel Data survey, Form RW-859 is now collecting detailed data on canisters and their contents. A canister is a container made of stainless steel or an inert alloy into which radioactive or high-level waste may be placed. The report presents detailed data on the size and contents of canisters stored in pools at commercial utilities that operate nuclear reactors. Each canister may contain an intact spent fuel assembly, consolidated spent fuel assemblies, spent fuel rods or pieces, nonfuel components, nonfuel hardware, or debris.

Form RW-859 Nonfuel Components, **Energy Information Administration Contractor Report (ASG/EIA-9302), Automated Science Group, Inc., Oak Ridge, Tennessee.**

The Nuclear Fuel Data survey, Form RW-859, is now collecting detailed data on nonfuel components. According to the Standard Contract between the Department of Energy and the nuclear utilities (10 CFR 961), nonfuel components that are contained within the fuel assembly, or which are an integral part of the assembly, may be included as part of the spent nuclear fuel delivered for disposal. Other nonfuel components, generally used within or between assemblies and usually retired from service on a schedule that is different from that of the fuel assemblies are called nonfuel assembly (NFA) hardware. This report focuses on the specific NFA components which are listed in the contract, including control spiders, burnable absorber assemblies, control rod elements, thimble plugs, fission chambers, primary and secondary neutron sources, and fuel channels.

COMMENTS CARD AND ORDER FORM FOR SERVICE REPORT

The EIA solicits your comments on the Service Report, *Spent Nuclear Fuel Discharges from U.S. Reactors 1992.* Corrections of errors and suggestions for improvement are desirable. Forward a copy of this form or an equivalent memorandum to:

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