Commercial Nuclear Reactors and Waste: The Current Status

**A. M. Platt
J. V. Robinson**

April 1980

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Richland, Washington 99352

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COMMERCIAL NUCLEAR REACTORS AND WASTE: THE CURRENT STATUS

EXECUTIVE SUMMARY

During the last five years, the declared^(a) size of the commercial light water reactor (LWR) nuclear power industry in the U.S. has steadily decreased. As of January 1980, the total number of power plants had dropped to 191 from the 226 in December 31, 1974. At least another nine were cancelled in the last few months.

This report was developed as the first of a series to track implications to waste management due to such changes in the declared size of the industry.

For the presently declared size, key conclusions are:

- The declared reactors will peak at a capacity of 162 GWe and consume about 10^6 MTU as enrichment feed.
- As few as two repositories of about 100,000 MTHM capacity each would hold the waste.
- Predisposal storage (reactor basins and AFRs) would peak at less than 100,000 MTHM (in the year 2020) with one repository opening in the year 1997 and the other in the year 2020. Most of the 100,000 MTHM would have to be in AFR storage unless current practice regarding reactor basin size was radically changed.

INTRODUCTION

This report provides an executive overview of the LWR industry in the U.S. and its implications to the Department of Energy's (DOE) commercial waste management program. It summarizes the status of the United States' LWR commercial reactors and spent fuel as of early CY-1980.

(a) Power plants that are either inoperative, operating, being built, or announced.

Two projections (scenarios) are made to the year 2060. One, treated in the body of the report, relates to the presently declared size of the industry and assumes that no new plants will be announced. The second relates to the situation if a resurgence in the industry were to occur in the future, resulting in some additional plants being built. This enhanced scenario is discussed in Appendix A and typifies the analytical capability used in producing this report.

This report is based on the status of the commercial nuclear power industry as of December 31, 1979⁽¹⁾ except that the power reactors cancelled between then and March 1, 1980, as reported in Nucleonics Week and other trade publications, have been deleted from the two scenarios analyzed. Appendix B provides detailed information on the PWRs and BWRs excluded from, as well as those included in, the analyses.

It should also be noted that only commercial LWR reactors are included. Reactors specifically excluded are: Hallam, EBR 2, Hanford N, Enrico Fermi (1), Fort St. Vrain, Peach Bottom (1), Carolina-Virginia Tube Reactor, and Piqua.

METHODOLOGY

The information contained in this report is a very simple extrapolation of the past performance of existing U.S. light water reactors. The computer program used assumes that the announced future reactors will be operated similarly. More sophisticated computer codes^(2,3) attempt to anticipate changes in fuel management for existing reactors as well as the operation of announced reactors on almost a batch-by-batch basis.

The program used in producing the results in this report is based on the logic that reactor fuel management in boiling water reactors (BWR) and pressurized water reactors (PWR) has progressed to the point where it is very closely tied to the electrical energy produced. Thus a reactor startup and shutdown time establishes the quantity and timing of fuel discharge. Hypothetical reactors can be added to the stream by defining their capacities and startup and shutdown times.

With fuel discharge cycles established, the timing and size of terminal storage needs are clearly projected for any given power capacity scenario. Utilizing the program, combinations of various power scenarios, fuel exposures, and repository construction schedules can be analyzed very rapidly.

POWER CAPACITY

Figure 1^(a) shows cumulative power capacity of reactors in the U.S. whose status ranges from public announcement to those in commercial operation. This is the declared power scenario. Note that these reactors attain a peak generating capacity of 162 GWe at the turn of the century.

Reactor lifetimes are arbitrarily assumed to be 40 years unless contrary specific data are available.

ELECTRICAL ENERGY GENERATED

Figure 2 shows the cumulative electrical energy generated when 50, 60, or 70% of the installed capacity is used. The actual energy generated in the past (see squares in Figure 2) is also displayed. The actual energy curve closely matches the 60% capacity parameter.

FUEL DISCHARGED

The quantities of fuel that will be discharged by the nuclear power industry will be influenced primarily by the fraction of installed capacity used and by the exposure of the fuel. These two factors are combined in the

(a) Appendix C provides the data (tabular and by year) from which the figures in this report were produced.

exposure/on-line parameters^(a) shown in Figure 3. This figure projects the cumulative fuel to be discharged by the nuclear capacity previously described. Actual fuel discharged through 1979 is only slightly (<7%) over-estimated by the 15,000 MWED/T-OL parameter.⁽⁴⁾

It is anticipated that future reactor operations will be at higher exposures and capacity. If waste packages were comprised of one element from the predominant PWRs or three elements from the BWRs, some 2000 packages would be generated from 1000 MTU.

DISPOSAL SCENARIO

No firm schedule has been established for the operation (loading rate, capacity) and startup of repositories for storage of waste from the commercial nuclear power industry. For this analysis, we assumed that the repositories would be built and operated according to the following schedule, shown in Table 1.

You will note that the repositories begin operation in different years and each uses a lower loading rate in the first two years of operation than that used for the remaining 38 years of its operation.

The cumulative amount of spent fuel disposed in these repositories is shown in Figure 4.

(a) The burnup parameter, MWED/T-OL, will be unfamiliar to most readers. A simple explanation is that it is the electrical energy that would be generated by a metric ton of nuclear fuel if 100% of the available power capacity were used. For example,

$$31,500 \frac{\text{MWD(thermal)}}{\text{ton}} \times \frac{1 \text{ electrical}}{3 \text{ thermal}} \times \frac{100\% \text{ available}}{70\% \text{ on line}} = 15,000 \text{ MWED/T-OL}$$

Dividing this parameter into the maximum possible energy production by installed nuclear capacity yields amount of fuel discharged.

TABLE 1. Disposal Scenario--Declared Power Capacity

<u>Repository Identification</u>	<u>Capacity, MTU</u>	<u>Year(a) of Startup</u>	<u>Year of Shutdown or Changed Operation</u>	<u>Maximum Loading Rate, MTU/yr</u>	<u>Spent Fuel Loaded in Time Period, MTU</u>
Rep 1	98,000	1997.0	1998.0	1,000	1,000
		1998.0	1999.0	2,000	2,000
		1999.0	2037.0	2,500	95,000
Rep 2	95,500	2020.0	2021.0	1,000	1,000
		2021.0	2022.0	2,000	2,000
		2023.0	2060.0	2,500	92,500

(a) Throughout tables herein, years are expressed in decimal fashion; thus 1980 or 1980.0 is January 1 of 1980.

FUEL AGE TO DISPOSAL

Significant quantities of spent fuel first became available in the U.S. in the mid-1970s. This 20-year-old material could be used to start operation of the repositories. After that, and based on the principle, oldest fuel to disposal first, the age of the youngest fuel going to disposal was determined and is shown in Figure 5 for the repository disposal scenario assumed.

REPOSITORY CAPACITY

With the disposal scenario assumed, the repositories are loaded at their maximum loading rate through the year 2059. At that time all fuel discharged by the commercial nuclear power industry will have been disposed of.

Both the loading rate and capacity of the two repositories as functions of time are shown in Figure 6.

PREDISPOSAL FUEL STORAGE

Predisposal storage will peak at 90,000 MTU (for the 15,000 MWED/T-OL parameter) in 2020. Quantities of fuel in predisposal storage at other times are shown in Figure 7. A one-time correction to fuel stored has been made (in 1973) for the 255 tons of commercial LWR fuel reprocessed by Nuclear Fuel Services, Inc., at West Valley, NY, in the period 1967 to 1971. No corrections have been made for the minute amounts of fuel consumed in R&D operations, e.g., the Nuclear Waste Vittrification Project.

ENRICHMENT FEED

As a sidelight to these calculations, it was determined that some 990,000 MT of uranium feed to enrichment would be required for this scenario, with 0.2% tails and 3% product.

REPROCESSING AND OTHER WASTES

Table 2 shows the volume of TRU waste that would go to geologic disposal if the option to reprocess and recycle were elected rather than the once-through fuel cycle. Also LLW volumes for the recycle option are shown in Table 3.

TABLE 2. Projected Volumes of Transuranic Waste Disposed in Geologic Repository from the LWR-Recycle Fuel Cycle

	Volume, m ³ /1000 MTHM
Fuel reprocessing wastes	1600
Vitrified HLW	73
Hulls and hardware	330
Other TRU wastes	1200
Mixed-oxide fuel refabrication wastes	<u>320</u>
	1900

Notes:

Includes decommissioning wastes.
 Fuel cycle characteristics are those described in Ref. 5.
 Data for waste volumes were taken from Ref. 6.
 Waste treatment assumptions include:
 HLW: vitrification
 General trash: incineration/cementation
 Wet wastes: cementation
 Scrap: direct packaging

TABLE 3. Projected Low-Level Waste Volumes from the LWR-Recycle Fuel Cycle

	Volume, m ³ /1000 MTHM
Mill tailings	950,000
Refinery, conversion and enrichment wastes	680
Uranium fuel fabrication wastes	900
Reactor wastes	32,000
Fuel reprocessing plant LLW	<u>630</u>
Total	984,000

Notes:

Includes decommissioning wastes.
 Waste volume data were taken from Refs. 6 through 10.
 Uranium mill tailings volume assumes an ore containing 0.2 wt% U with a 95% extraction efficiency.
 Waste treatment assumptions include:
 General trash: compaction
 Wet wastes: cementation
 Scrap: direct packaging

PLOT 1 15.35.51 FRI 11 APR, 1980 JOB-SURFPGO , RL DISSPLA VER 7.3

FIGURE 1
DECLARED US NUCLEAR POWER
REACTOR STATUS 03/1/80

PLOT 2 15.35.57 FRI 11 APR, 1980 JOB-SURFPGO, RL DISSPLA VER 7.3

FIGURE 2
US NUCLEAR ENERGY
REACTOR STATUS 03/1/80

FIGURE 3
US DISCHARGED FUEL
REACTOR STATUS 03/1/80

FIGURE 4
US FUEL DISPOSED
 REACTOR STATUS 03/1/80
 DISPOSAL START 1997

FIGURE 5
MINIMUM AGE OF FUEL DISPOSED

REACTOR STATUS 03/1/80
DISPOSAL START 1997

FIGURE 6
MAXIMUM RATE FOR DISPOSAL

REACTOR STATUS 03/1/80
DISPOSAL START 1997

FIGURE 7
FUEL IN PRE-DISPOSAL STORAGE
 REACTOR STATUS 03/1/80

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APPENDIX A

EXPANDED POWER-CAPACITY SCENARIO

APPENDIX A
EXPANDED POWER-CAPACITY SCENARIO

For comparison, it was assumed that an additional 118 GWe will be added to the declared power scenario. The additional power would be added between 1997 and 2010 at a rate approximately equal to the rate expected between the years 1980 and 1990. This power scenario is shown in Figure A-1.

For this expanded nuclear capacity, the following loading schedule, shown in Table A-1, for four repositories was assumed:

TABLE A-1. Disposal Scenario--Expanded Power Capacity

<u>Repository Identification</u>	<u>Year of Startup</u>	<u>Year of Shutdown</u>	<u>Maximum Loading Rate, MTU/yr</u>	<u>Repository Capacity, MTU</u>
Rep 1	1997.0	2032.0	2,400	84,000
Rep 2	2004.0	2039.0	2,400	84,000
Rep 3	2023.0	2055.0	3,000	96,000
Rep 4	2033.0	2060.0	3,000	81,000

The energy produced, fuel discharged, fuel disposed, etc., for this power scenario are shown in Figures A-2 to A-7 and are on the same bases as for the declared power scenario previously described.

The two scenarios can be compared as shown in Table A-2 to the year 2060 using the 15,000 MWED/T-OL and 60% capacity parameters.

Table A-2. Comparison of the Two Power Scenarios

	<u>Declared Reactors</u>	<u>Declared Plus Projected Reactors</u>
Peak capacity, GWe	162	280
Energy, MWED	1.42E09	2.50E09
Fuel discharged, MTU	168,000	296,000
Maximum fuel to predisposal, MTU	99,000 (in 2020)	105,000 (in 2023)
Maximum total repository load rate, MTU/yr	5,000	8,400
Enrichment feed, MTU	930,000	1,671,000

PLOT 1 15.34.18 FRI 11 APR, 1980 JOB-SURFPGP, RL DISSPLA VER 7.3

FIGURE A-1
US NUCLEAR POWER
REACTOR STATUS 03/1/80

FIGURE A-2
US NUCLEAR ENERGY
 REACTOR STATUS 03/1/80

FIGURE A-3
US DISCHARGED FUEL
REACTOR STATUS 03/1/80

FIGURE A-4
US FUEL DISPOSED
REACTOR STATUS 03/1/80
DISPOSAL START 1997

FIGURE A-5
MINIMUM AGE OF FUEL DISPOSED
REACTOR STATUS 03/1/80
DISPOSAL START 1997

FIGURE A-6
MAXIMUM RATE FOR DISPOSAL

REACTOR STATUS 03/1/80
DISPOSAL START 1997

FIGURE A-7 FUEL IN PRE-DISPOSAL STORAGE

REACTOR STATUS 03/1/80

APPENDIX B

DETAILED INFORMATION ON LWRs
INCLUDED IN AND EXCLUDED FROM THE ANALYSES

TABLE B-1. U.S. LWR Commercial Reactors - PWR
On-Line/Down

Area of U.S.	Plant Name	Location State	Capacity, MWe	Manufacturer	Date On-Line	Date Shut Down
SO	ARKANSAS NUCLEAR I 1	AR	850	BW	12/74	
SO	ARKANSAS NUCLEAR ONE 2	AR	912	CE	4/80	
NE	BEAVER VALLEY 1	PA	852	W	10/76	
NE	CALVERT CLIFFS 1	MD	845	CE	5/75	
NE	CALVERT CLIFFS 2	MD	845	CE	4/77	
MW	DONALD C COOK 1	MI	1054	W	8/75	
MW	DONALD C COOK 2	MI	1100	W	7/78	
NE	CONN YANKEE	CT	575	W	1/68	
SO	CRYSTAL RIVER 3	FL	825	BW	3/77	
MW	DAVIS BESSE 1	OH	906	BW	11/77	
SO	JOSEPH M FARLEY 1	AL	829	W	12/77	
MW	FORT CALHOUN 1	NB	457	CE	9/73	
NE	ROBERT E GINNA	NY	470	W	7/70	
NE	INDIAN POINT 1	NY	265	BW	10/62	10/74
NE	INDIAN POINT 2	NY	873	W	8/73	
NE	INDIAN POINT 3	NY	965	W	8/76	
MW	KEWAUNEE	WI	535	W	6/74	
NE	MAINE YANKEE	ME	825	CE	12/72	
NE	MILLSTONE 2	CT	870	CE	12/75	
SO	NORTH ANNA 1	VA	907	W	6/78	
SO	OCONNE 1	SC	887	BW	7/73	
SO	OCONNE 2	SC	887	BW	9/74	
SO	OCONNE 3	SC	887	BW	12/74	
MW	PALISADES	MI	805	CE	12/71	
MW	POINT BEACH 1	WI	497	W	12/70	
MW	POINT BEACH 2	WI	497	W	4/73	
MW	PRAIRIE ISLAND 1	MN	530	W	12/73	
MW	PRAIRIE ISLAND 2	MN	530	W	12/74	
NW	RANCHO SECO	CA	918	BW	4/75	
SO	ROBINSON 2	SC	700	W	3/71	
SO	ST LUCIE 1	FL	802	CE	12/76	
NE	SALEM 1	NJ	1090	W	6/77	
NW	SAN ONOFRE 1	CA	436	W	1/68	
NE	SHIPPINGPORT	PA	60	W	01/58	12/74
SO	SURRY 1	VA	822	W	12/72	
SO	SURRY 2	VA	822	W	5/73	
NE	THREE MILE ISLAND 1	PA	819	BW	9/74	
NE	THREE MILE ISLE 2	PA	906	BW	12/78	4/79
NW	TROJAN	OR	1130	W	5/76	
SO	TURKEY POINT 3	FL	693	W	12/72	
SO	TURKEY POINT 4	FL	693	W	9/73	
NE	YANKEE ROWE	MA	175	W	7/61	
MW	ZION 1	IL	1040	W	12/73	
MW	ZION 2	IL	1040	W	9/74	

TABLE B-2. U.S. LWR Commercial Reactors - PWR
Projected

Area of U.S.	Plant Name	Location State	Capacity, MWe	Manufacturer	Planned Date On-Line
SW	ALLENS CREEK 1	TX	1150	GE	11/87
NE	BEAVER VALLEY 2	PA	833	W	5/86
SO	BELLEFRONTE 1	AL	1213	BW	9/83
SO	BELLEFRONTE 2	AL	1213	BW	6/84
MW	BRAIDWOOD 1	IL	1120	W	10/83
MW	BRADWOOD 2	IL	1120	W	10/84
MW	BYRON 1	IL	1120	W	10/82
MW	BYRON 2	IL	1120	W	10/83
MW	CALLAWAY 1	MO	1120	W	10/82
MW	CALLAWAY 2	MO	1120	W	4/87
MW	CARROLL 1	IL	1120		10/92
MW	CARROLL 2	IL	1120		10/93
SO	CATAWBA 1	SC	1145	W	7/83
SO	CATAWBA 2	SC	1145	W	1/85
SO	CHEROKEE 1	SC	1280	CE	1/87
SO	CHEROKEE 2	SC	1280	CE	1/89
SO	CHEROKEE 3	SC	1280	CE	1/91
SW	COMANCHE PEAK 1	TX	1111	W	12/81
SW	COMANCHE PEAK 2	TX	1111	W	12/83
NW	DIABLO CANYON 1	CA	1084	W	7/80
NW	DIABLO CANYON 2	CA	1106	W	/81
SO	JOSEPH M FARLEY 2	AL	829	W	9/80
MW	MARBLE HILL 1	IN	1130	W	10/82
MW	MARBLE HILL 2	IN	1130	W	1/84
SO	MCGUIRE 1	NC	1180	W	8/80
SO	MCGUIRE 2	NC	1180	W	4/82
MW	MIDLAND 1	MI	460	BW	/84
MW	MIDLAND 2	MI	811	BW	/84
NE	MILLSTONE 3	CT	1156	W	5/86
NE	NEW HAVEN 1	NY	1250	CE	12/92
SO	NORTH ANNA 2	VA	907	W	7/80
SW	PALO VERDE 1	AZ	1270	CE	5/83
SW	PALO VERDE 2	AZ	1270	CE	5/84
SW	PALO VERDE 3	AZ	1270	CE	6/86
NW	PEBBLE SPRING 1	OR	1260	BW	11/88
NW	PEBBLE SPRINGS 2	OR	1260	BW	11/90
SO	PERKINS 1	NC	1280	CE	1/93
SO	PERKINS 2	NC	1280	CE	1/95
SO	PERKINS 3	NC	1280	CE	1/97
NE	PILGRIM 2	MA	1150	CE	12/85

TABLE B-2 (contd)

Area of U.S.	Plant Name	Location State	Capacity, MWe	Manufacturer	Planned Date On-Line
NE	SALEM 2	NJ	1115	W	10/80
NE	SEABROOK 1	NH	1200	W	4/83
NE	SEABROOK 2	NH	1200	W	2/85
SW	SO TEXAS PROJECT 1	TX	1250	W	2/84
SW	SO TEXAS PROJECT 2	TX	1250	W	2/86
SO	ST LUCIE 2	FL	810	CE	5/83
NW	SAN ONOFRE 2	CA	1100	CE	10/81
NW	SAN ONOFRE 3	CA	1100	CE	1/83
SO	SEQUOYAH 2	TN	1148	W	6/81
SO	SEQUOYAH 1	TN	1148	W	6/80
SO	SHEARON HARRIS 1	NC	900	W	3/84
SO	SHEARON HARRIS 2	NC	900	W	3/86
SO	SHEARON HARRIS 3	NC	900	W	3/90
SO	SHEARON HARRIS 4	NC	900	W	3/88
5	VANDALIA NUCLEAR	IA	1270	BW	12/90
SO	VIRGIL C SUMMER 1	SC	900	W	12/80
SO	VOGTLE 1	GA	1110	W	11/84
SO	VOGTLE 2	GA	1110	W	11/87
NW	WNP 1	WA	1218	BW	12/83
NW	WNP 3	WA	1242	CE	12/84
NW	WNP 4	WA	1218	BW	6/85
NW	WNP 5	WA	1240	CE	6/86
MW	WOLF CREEK	KS	1150	W	4/83
SO	WATERFORD 3	LA	1113	CE	2/82
SO	WATTS BAR 1	TN	1177	W	9/81
SO	WATTS BAR 2	TN	1177	W	6/82
SO	YELLOW CREEK 1	MS	1285	CE	11/85
SO	YELLOW CREEK 2	MS	1285	CE	4/88

TABLE B-3. U.S. LWR Commercial Reactors - PWR
Cancelled

Area of U.S.	Plant Name	Location State	Capacity, MWe	Manufacturer	Planned Date On-Line
NE	ATLANTIC 1	NJ	1150	WE	5/85
NE	ATLANTIC 2	NJ	1150	WE	5/87
NE	1990 UNIT	NY	1150	WE	5/90
NE	1992 UNIT	NY	1150	WE	5/92
SW	BLUE HILLS 1	TX	918	CB	/89
SW	BLUE HILLS 2	TX	918	CB	/91
SO	CAROLINA P-L 8	SC	1150	BW	3/87
SO	CAROLINA P-L 9	NC	1150	BW	3/89
SO	CAROLINA P-L 10	NC	1150	BW	3/91
MW	DAVIS BESSE 2	OH	906	BW	12/88
MW	DAVIS BESSE 3	OH	906	BW	12/90
MW	ERIE 1	OH	1260	BW	4/86
MW	ERIE 2	OH	1260	BW	4/88
MW	FT CALHOUN 2	NB	1136	WE	1/83
NE	GREENE CO	NY	1191	BW	9/84
MW	GREENWOOD 2	MI	1264	BW	9/90
MW	GREENWOOD 3	MI	1200	BW	9/92
MW	HAVEN NO. 2	WI	900	W	6/89
NE	JAMESPORT 1	NY	1150	W	7/88
NE	JAMESPORT 2	NY	1150	W	7/90
MW	KOSHKONONG 1	WI	900	WE	2/85
MW	KOSHKONONG 2	WI	900	WE	7/86
NE	NEP 1	RI	1150	WE	10/84
NE	NEP 2	RI	1150	WE	10/86
NE	NEW HAVEN 2	NY	1250	CE	12/94
NE	SEARS ISLE	ME	1150	WE	/91
SO	SO DADE 1	FL	1100	WE	/91
SO	SO DADE 2	FL	1100	WE	/91
NE	STERLING	NY	1150	W	4/91
SW	SUNDESERT 1	CA	974	WE	4/84
SW	SUNDESERT 2	CA	974	WE	1/86
SO	SURRY 3	VA	859	BW	4/86
SO	SURRY 4	VA	859	BW	4/87
MW	TYRONE 1	WI	1150	WE	4/84

TABLE B-4. U.S. LWR Commercial Reactors - PWR
Indefinite

Area of U.S.	Plant Name	Location State	Capacity, MWe	Manufacturer	Date On-Line
SO	NORTH ANNA 4	VA	907	BW	4/87
SO	NORTH ANNA 3	VA	907	BW	4/86
NE	FORKED RIVER 1	NJ	1070	CE	12/83

TABLE B-5. U.S. LWR Commercial Reactors - BWR
On-Line/Down

Area of U.S.	Plant Name	Location State	Capacity, MWe	Manufacturer	Date On-Line	Date Shut Down
NE	DUANE ARNOLD	IA	538	GE	2/75	
MW	BIG ROCK POINT	MI	72	GE	3/63	
3	BONUS	PR	16	OJ	06/65	06/68
SO	BROWNS FERRY 1	AL	1065	GE	8/74	
SO	BROWNS FERRY 2	AL	1065	GE	3/75	
SO	BROWNS FERRY 3	AL	1065	GE	3/77	
SO	BRUNSWICK 1	NC	821	GE	3/77	
SO	BRUNSWICK 2	NC	821	GE	11/75	
MW	COOPER	NB	778	GE	7/74	
MW	DRESDEN 1	IL	200	GE	7/60	
MW	DRESDEN 2	IL	794	GE	8/70	
MW	DRESDEN 3	IL	794	GE	11/71	
NE	FITZPATRICK	NY	821	GE	7/75	
SO	EDWIN I HATCH 1	GA	786	GE	12/75	
SO	EDWIN I HATCH 2	GA	784	GE	9/79	
NW	HUMBOLDT BAY 3	CA	65	GE	8/63	7/76
MW	LACROSSE	WI	50	AL	9/69	
NE	MILLSTONE 1	CT	660	GE	3/71	
MW	MONTICELLO	MN	545	GE	6/71	
NE	NINE MILF PT 1	NY	620	GE	12/69	
NE	OYSTER CREEK 1	NJ	650	GE	12/69	
5	PATHFINDER	SD	58	AC	06/64	10/67
NE	PEACH BOTTOM 2	PA	1065	GE	7/74	
NE	PEACH BOTTOM 3	PA	1065	GE	12/74	
NE	PILGRIM 1	MA	655	GE	12/72	
MW	QUAD CITIES 1	IL	789	GE	8/72	
MW	QUAD CITIES 2	IL	789	GE	10/72	
NE	VERMONT YANKEE	VT	514	GE	11/72	

TABLE B-6. U.S. LWR Commercial Reactors - BWR
Projected

Area of U.S.	Plant Name	Location State	Capacity, MWe	Manufacturer	Date On-Line
MW	BAILLY N 1	IN	644	GE	6/87
SW	BLACK FOX 1	OK	1150	GE	7/85
SW	BLACK FOX 2	OK	1150	GE	7/88
MW	CLINTON 1	IL	933	GE	12/82
MW	CLINTON 2	IL	933	GE	6/88
MW	FERMI 2	MI	1093	GE	03/82
SO	GRAND GULF 1	MS	1250	GE	4/82
SO	GRAND GULF 2	MS	1250	GE	4/85
SO	HARTSVILLE A1	TN	1233	GE	7/86
SO	HARTSVILLE A2	TN	1233	GE	7/87
SO	HARTSVILLE B1	TN	1233	GE	6/89
SO	HARTSVILLE B2	TN	1233	GE	6/90
NE	HOPE CREEK 1	NJ	1067	GE	5/85
NE	HOPE CREEK 2	NJ	1067	GE	5/87
MW	LASALLE 1	IL	1078	GE	12/80
MW	LASALLE 2	IL	1078	GE	12/81
NE	LIMERICK 1	PA	1055	GE	4/83
NE	LIMERICK 2	PA	1055	GE	4/85
NE	NINE MILE POINT 2	NY	1099	GE	10/86
MW	PERRY 1	OH	1205	GE	5/84
MW	PERRY 2	OH	1205	GE	5/88
SO	PHIPPS BEND 1	TN	1233	GE	3/87
SO	PHIPPS BEND 2	TN	1233	GE	8/89
SO	RIVER BEND 1	LA	934	GE	4/84
7	RIVER BEND 2	LA	934	GE	/90
NE	SHOREHAM	NY	819	GE	5/81
NW	SKAGIT 1	WA	1277	GE	1/90
NW	SKAGIT 2	WA	1277	GE	1/92
NE	SUSQUEHANNA 1	PA	1050	GE	1/82
NE	SUSQUEHANNA 2	PA	1050	GE	1/83
NW	WPPSS-2	WA	1093	GE	9/81
MW	ZIMMER 1	OH	810	GE	01/81

TABLE B-7. U.S. LWR Commercial Reactors - BWR
Cancelled

Area of U.S.	Plant Name	Location State	Capacity, MWe	Manufacturer	Projected On-Line Date
SO	BARTON 1	AL	1159	GE	/90
SO	BARTON 2	AL	1159	GE	/90
NE	DOUGLAS PT 1	MD	1146	GE	3/87
NE	DOUGLAS PT 2	MD	1146	GE	3/91
NE	MONTAGUE 1	MA	1150	GE	4/88
NE	MONTAGUE 2	MA	1150	GE	1/90
SW	PG-E/GE 1	CA	1200	GE	/91
SW	PG-E/GE 2	CA	1200	GE	/91
MW	ZIMMER 2	OH	1170	GE	/87

TABLE B-8. U.S. LWR Commercial Reactors
Announced as of 1-1-77
Since Cancelled

Project/Location	Owner	Capacity Net (MWe)	Public Annnc'd
Fulton Generating Station Unit 1 (PA)	Philadelphia Electric Co.	1160	8/71
Fulton Generating Station Unit 2 (PA)	Philadelphia Electric Co.	1160	8/71
Summit Power Station Unit 1 (DE)	Delmarva Power & Light Co.	1200	12/76
San Joaquin Nuclear Project 1 (CA)	LA Dept. of Water, PG&E SCE, SDE&G, CDWR	1300	3/74
San Joaquin Nuclear Project 2 (CA)	LA Dept. of Water, PG&E SCE, SDE&G, CDWR	1300	3/74
San Joaquin Nuclear Project 3 (CA)	LA Dept. of Water, PG&E SCE, SDE&G, CDWR	1300	3/74
San Joaquin Nuclear Project 4 (CA)	LA Dept. of Water, PG&E SCE, SDE&G, CDWR	1300	3/74
Rancho Seco Nuclear Gen. Stat. No. 2 (CA)	Sacramento Municipal	1100	9/74
Nebraska Public Power (NB)	Nebraska Public Power	1100	1/75
Mid-Hudson East 1 (NY)	Empire State Power Resources	1300	4/75
Mid-Hudson East 2 (NY)	Empire State Power Resources	1300	4/75
Mid-Hudson West 1 (NY)	Empire State Power Resources	1300	4/75
Shoreham West 1 (NY)	Empire State Power Resources	1300	4/75
Shoreham West 2 (NY)	Empire State Power Resources	1300	4/75
St. Lawrence 1 (NY)	Empire State Power Resources	1300	4/75
St. Lawrence 2 (NY)	Empire State Power Resources	1300	4/75
Eastern Desert 1 (CA)	Southern California Edison Co.	1000	7/76
Eastern Desert 2 (CA)	Southern California Edison Co.	1000	7/76

APPENDIX C

SURF I: DECLARED NUCLEAR POWER INDUSTRY

SURF II: EXPANDED NUCLEAR POWER INDUSTRY

TABLE C-1. SURF I: Declared Nuclear Power Industry

REACTOR STATUS 03/1/80											
U S N U C L E A R P O W E R											
M W D A T											
MTU DISCHARGED AT MWED/T-01											
YEAR	G W E		REACTOR STATUS 03/1/80				MTU DISCHARGED AT MWED/T-01				
	ACTUAL	TOTAL	50 PER CENT	60 PER CENT	70 PER CENT	ACTUAL	12000	15000	18000	ACTUAL	
1961.0	0.	0.	6.100E+04	7.320E+04	8.540E+04	4.046E+04	5.	4.	3.	0.	
1962.0	0.	0.	1.243E+05	1.494E+05	1.742E+05	1.167E+05	15.	12.	10.	11.	
1963.0	1.	1.	2.136E+05	2.563E+05	2.990E+05	2.183E+05	30.	24.	20.	51.	
1964.0	1.	1.	3.567E+05	4.280E+05	4.994E+05	3.702E+05	54.	43.	36.	53.	
1965.0	1.	1.	5.148E+05	6.178E+05	7.208E+05	5.172E+05	80.	64.	54.	68.	
1966.0	1.	1.	6.797E+05	8.157E+05	9.516E+05	6.852E+05	108.	86.	72.	135.	
1967.0	1.	1.	8.461E+05	1.015E+06	1.185E+06	9.036E+05	136.	108.	90.	155.	
1968.0	1.	1.	1.010E+06	1.212E+06	1.415E+06	1.170E+06	167.	134.	112.	191.	
1969.0	2.	2.	1.349E+06	1.619E+06	1.889E+06	1.577E+06	224.	180.	151.	225.	
1970.0	2.	2.	1.690E+06	2.027E+06	2.365E+06	2.084E+06	281.	226.	189.	247.	
1971.0	4.	4.	2.369E+06	2.843E+06	3.317E+06	2.947E+06	394.	316.	265.	327.	
1972.0	8.	8.	3.532E+06	4.239E+06	4.945E+06	4.520E+06	588.	472.	394.	494.	
1973.0	11.	11.	5.168E+06	6.202E+06	7.235E+06	6.583E+06	861.	690.	576.	699.	
1974.0	18.	18.	7.999E+06	9.598E+06	1.120E+07	9.875E+06	1333.	1067.	890.	936.	
1975.0	25.	25.	1.196E+07	1.435E+07	1.675E+07	1.471E+07	2015.	1617.	1352.	1481.	
1976.0	35.	35.	1.779E+07	2.135E+07	2.491E+07	2.200E+07	2986.	2394.	2000.	1873.	
1977.0	39.	39.	2.463E+07	2.955E+07	3.448E+07	2.842E+07	4130.	3310.	2764.	2773.	
1978.0	45.	45.	3.254E+07	3.904E+07	4.555E+07	3.800E+07	5448.	4365.	3643.	4002.	
1979.0	48.	48.	4.118E+07	4.941E+07	5.765E+07	5.000E+07	6888.	5517.	4602.	5050.	
1980.0	49.	49.	5.009E+07	6.011E+07	7.013E+07		8434.	6766.	5653.	6342.	
1981.0	56.	56.	5.963E+07	7.156E+07	8.348E+07		10024.	8038.	6713.		
1982.0	65.	65.	7.098E+07	8.517E+07	9.937E+07		11915.	9550.	7974.		
1983.0	78.	78.	8.441E+07	1.013E+08	1.182E+08		14155.	11342.	9467.		
1984.0	91.	91.	1.001E+08	1.201E+08	1.402E+08		16713.	13436.	11212.		
1985.0	105.	105.	1.185E+08	1.422E+08	1.659E+08		19839.	15889.	13256.		
1986.0	115.	115.	1.389E+08	1.667E+08	1.945E+08		23243.	18613.	15526.		
1987.0	126.	126.	1.612E+08	1.934E+08	2.256E+08		26948.	21576.	17996.		
1988.0	134.	134.	1.850E+08	2.220E+08	2.590E+08		30917.	24752.	20642.		
1989.0	141.	141.	2.102E+08	2.522E+08	2.942E+08		35115.	28110.	23440.		
1990.0	145.	145.	2.364E+08	2.837E+08	3.309E+08		39463.	31605.	26352.		
1991.0	150.	150.	2.635E+08	3.162E+08	3.689E+08		44004.	35222.	29367.		
1992.0	153.	153.	2.915E+08	3.497E+08	4.080E+08		48662.	38948.	32472.		
1993.0	155.	155.	3.197E+08	3.836E+08	4.476E+08		53366.	42711.	35608.		
1994.0	159.	159.	3.486E+08	4.183E+08	4.880E+08		58180.	46564.	38817.		
1995.0	159.	159.	3.776E+08	4.531E+08	5.287E+08		63022.	50436.	42045.		
1996.0	160.	160.	4.069E+08	4.883E+08	5.697E+08		67903.	54341.	45299.		
1997.0	160.	160.	4.362E+08	5.234E+08	6.107E+08		72784.	58245.	48553.		
1998.0	162.	162.	4.657E+08	5.588E+08	6.520E+08		77703.	62181.	51833.		
1999.0	162.	162.	4.952E+08	5.943E+08	6.933E+08		82623.	66117.	55113.		

TABLE C-1 (contd)

REACTOR STATUS 03/1/80							MTU DISCHARGED AT MWED/T-OL			
U S N U C L E A R P O W E R										
M W D AT										
YEAR	ACTUAL	TOTAL	50 PER CENT	60 PER CENT	70 PER CENT	ACTUAL	12000	15000	18000	ACTUAL
2000.0	162.	162.	5.247E+08	6.297E+08	7.346E+08	87543.	70053.	58392.		
2001.0	161.	161.	5.542E+08	6.651E+08	7.759E+08	92473.	73999.	61684.		
2002.0	161.	161.	5.837E+08	7.005E+08	8.172E+08	97396.	77940.	64969.		
2003.0	161.	161.	6.132E+08	7.358E+08	8.584E+08	102304.	81867.	68242.		
2004.0	161.	161.	6.426E+08	7.711E+08	8.996E+08	107215.	85797.	71517.		
2005.0	161.	161.	6.720E+08	8.064E+08	9.409E+08	112122.	89722.	74788.		
2006.0	161.	161.	7.015E+08	8.418E+08	9.821E+08	117028.	93646.	78059.		
2007.0	161.	161.	7.309E+08	8.771E+08	1.023E+09	121934.	97571.	81330.		
2008.0	161.	161.	7.603E+08	9.124E+08	1.064E+09	126908.	101564.	84668.		
2009.0	160.	160.	7.896E+08	9.475E+08	1.105E+09	131783.	105464.	87918.		
2010.0	160.	160.	8.188E+08	9.826E+08	1.146E+09	136746.	109452.	91256.		
2011.0	158.	158.	8.478E+08	1.017E+09	1.187E+09	141682.	113424.	94586.		
2012.0	154.	154.	8.762E+08	1.051E+09	1.227E+09	146653.	117448.	97978.		
2013.0	151.	151.	9.041E+08	1.085E+09	1.266E+09	151651.	121514.	101423.		
2014.0	144.	144.	9.309E+08	1.117E+09	1.303E+09	156498.	125469.	104783.		
2015.0	137.	137.	9.565E+08	1.148E+09	1.339E+09	161402.	129519.	108264.		
2016.0	127.	127.	9.802E+08	1.176E+09	1.372E+09	165867.	133194.	111412.		
2017.0	123.	123.	1.003E+09	1.203E+09	1.404E+09	169898.	136469.	114183.		
2018.0	116.	116.	1.025E+09	1.229E+09	1.434E+09	173925.	139775.	117009.		
2019.0	113.	113.	1.045E+09	1.254E+09	1.464E+09	177539.	142693.	119463.		
2020.0	113.	113.	1.066E+09	1.279E+09	1.492E+09	181033.	145499.	121810.		
2021.0	105.	105.	1.086E+09	1.303E+09	1.520E+09	185101.	148901.	124768.		
2022.0	96.	96.	1.104E+09	1.325E+09	1.546E+09	188701.	151896.	127359.		
2023.0	84.	84.	1.120E+09	1.344E+09	1.568E+09	192199.	154858.	129963.		
2024.0	71.	71.	1.134E+09	1.361E+09	1.588E+09	195489.	157687.	132485.		
2025.0	57.	57.	1.149E+09	1.374E+09	1.603E+09	198101.	159929.	134480.		
2026.0	46.	46.	1.154E+09	1.385E+09	1.616E+09	200242.	161766.	136116.		
2027.0	36.	36.	1.162E+09	1.394E+09	1.626E+09	202141.	163422.	137610.		
2028.0	27.	27.	1.167E+09	1.401E+09	1.634E+09	203595.	164686.	138747.		
2029.0	21.	21.	1.172E+09	1.406E+09	1.640E+09	204852.	165798.	139763.		
2030.0	17.	17.	1.175E+09	1.410E+09	1.645E+09	205715.	166551.	140442.		
2031.0	11.	11.	1.177E+09	1.413E+09	1.648E+09	206510.	167266.	141104.		
2032.0	9.	9.	1.179E+09	1.415E+09	1.650E+09	206857.	167561.	141364.		
2033.0	6.	6.	1.180E+09	1.416E+09	1.652E+09	207316.	167977.	141751.		
2034.0	3.	3.	1.181E+09	1.417E+09	1.653E+09	207496.	168136.	141896.		
2035.0	3.	3.	1.181E+09	1.418E+09	1.654E+09	207659.	168284.	142034.		
2036.0	1.	1.	1.182E+09	1.418E+09	1.654E+09	207698.	168315.	142059.		
2037.0	1.	1.	1.182E+09	1.418E+09	1.654E+09	207823.	168432.	142171.		
2038.0	0.	0.	1.182E+09	1.418E+09	1.654E+09	207823.	168432.	142171.		
2039.0	0.	0.	1.182E+09	1.418E+09	1.654E+09	207823.	168432.	142171.		

TABLE C-1 (contd)

YEAR	G W E		REACTOR STATUS 03/1/80 U S N U C L E A R P O W E R M W D A T				MTU DISCHARGED AT MWED/T-OL			
										
	ACTUAL	TOTAL	50 PER CENT	60 PER CENT	70 PER CENT	ACTUAL	12000	15000	18000	ACTUAL
	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
2040.0	0.	0.	1.182E+09	1.418E+09	1.654E+09		207823.	168432.	142171.	
2041.0	0.	0.	1.182E+09	1.418E+09	1.654E+09		207823.	168432.	142171.	
2042.0	0.	0.	1.182E+09	1.418E+09	1.654E+09		207823.	168432.	142171.	
2043.0	0.	0.	1.182E+09	1.418E+09	1.654E+09		207823.	168432.	142171.	
2044.0	0.	0.	1.182E+09	1.418E+09	1.654E+09		207823.	168432.	142171.	
2045.0	0.	0.	1.182E+09	1.418E+09	1.654E+09		207823.	168432.	142171.	
2046.0	0.	0.	1.182E+09	1.418E+09	1.654E+09		207823.	168432.	142171.	
2047.0	0.	0.	1.182E+09	1.418E+09	1.654E+09		207823.	168432.	142171.	
2048.0	0.	0.	1.182E+09	1.418E+09	1.654E+09		207823.	168432.	142171.	
2049.0	0.	0.	1.182E+09	1.418E+09	1.654E+09		207823.	168432.	142171.	
2050.0	0.	0.	1.182E+09	1.418E+09	1.654E+09		207823.	168432.	142171.	
2051.0	0.	0.	1.182E+09	1.418E+09	1.654E+09		207823.	168432.	142171.	
2052.0	0.	0.	1.182E+09	1.418E+09	1.654E+09		207823.	168432.	142171.	
2053.0	0.	0.	1.182E+09	1.418E+09	1.654E+09		207823.	168432.	142171.	
2054.0	0.	0.	1.182E+09	1.418E+09	1.654E+09		207823.	168432.	142171.	
2055.0	0.	0.	1.182E+09	1.418E+09	1.654E+09		207823.	168432.	142171.	
2056.0	0.	0.	1.182E+09	1.418E+09	1.654E+09		207823.	168432.	142171.	
2057.0	0.	0.	1.182E+09	1.418E+09	1.654E+09		207823.	168432.	142171.	
2058.0	0.	0.	1.182E+09	1.418E+09	1.654E+09		207823.	168432.	142171.	
2059.0	0.	0.	1.182E+09	1.418E+09	1.654E+09		207823.	168432.	142171.	
2060.0	0.	0.	1.182E+09	1.418E+09	1.654E+09		207823.	168432.	142171.	

TABLE C-1 (contd)

REACTOR STATUS 03/1/80

FUEL STATUS, MTU
15,000 MWED/T-OL SCENARIO

YEAR	CUMULATIVE DISCHARGED	PREDISPOSAL STORAGE	TERMINAL STORAGE	FILL RATE MTU/YR	CAPACITY MTU/YR	MINIMUM AGE, YRS
*****	*****	*****	*****	*****	*****	*****
1961.0	4.	4.	0.	0.	0.	.9
1962.0	12.	12.	0.	0.	0.	1.9
1963.0	24.	24.	0.	0.	0.	2.9
1964.0	43.	43.	0.	0.	0.	3.9
1965.0	64.	64.	0.	0.	0.	4.9
1966.0	86.	86.	0.	0.	0.	5.9
1967.0	108.	108.	0.	0.	0.	6.9
1968.0	134.	134.	0.	0.	0.	7.9
1969.0	180.	180.	0.	0.	0.	8.9
1970.0	226.	226.	0.	0.	0.	9.9
1971.0	316.	316.	0.	0.	0.	10.9
1972.0	472.	472.	0.	0.	0.	11.9
1973.0	690.	435.	0.	0.	0.	12.9
1974.0	1067.	813.	0.	0.	0.	13.9
1975.0	1617.	1363.	0.	0.	0.	14.9
1976.0	2394.	2140.	0.	0.	0.	15.9
1977.0	3310.	3056.	0.	0.	0.	16.9
1978.0	4365.	4110.	0.	0.	0.	17.9
1979.0	5517.	5262.	0.	0.	0.	18.9
1980.0	6766.	6511.	0.	0.	0.	19.9
1981.0	8038.	7783.	0.	0.	0.	20.9
1982.0	9550.	9296.	0.	0.	0.	21.9
1983.0	11342.	11088.	0.	0.	0.	22.9
1984.0	13436.	13182.	0.	0.	0.	23.9
1985.0	15889.	15635.	0.	0.	0.	24.9
1986.0	18613.	18359.	0.	0.	0.	25.9
1987.0	21576.	21322.	0.	0.	0.	26.9
1988.0	24752.	24498.	0.	0.	0.	27.9
1989.0	28110.	27856.	0.	0.	0.	28.9
1990.0	31605.	31350.	0.	0.	0.	29.9
1991.0	35222.	34967.	0.	0.	0.	30.9
1992.0	38948.	38694.	0.	0.	0.	31.9
1993.0	42711.	42456.	0.	0.	0.	32.9
1994.0	46562.	46308.	0.	0.	0.	33.9
1995.0	50436.	50182.	0.	0.	0.	34.9
1996.0	54341.	54086.	0.	0.	0.	35.9
1997.0	58245.	57991.	0.	0.	0.	36.9
1998.0	62181.	60927.	1000.	1000.	1000.	24.1
1999.0	66117.	62862.	3000.	2000.	2000.	22.3

TABLE C-1 (contd)

REACTOR STATUS 03/1/80

FUEL STATUS, MTU
15,000 MWED/T-OL- SCENARIO

YEAR	CUMULATIVE DISCHARGED	PREDISPOSAL STORAGE	TERMINAL STORAGE	FILL RATE MTU/YR	CAPACITY MTU/YR	MINIMUM AGE, YRS
*****	*****	*****	*****	*****	*****	*****
2000.0	70053.	64298.	5500.	2500.	2500.	21.0
2001.0	73999.	65745.	8000.	2500.	2500.	20.0
2002.0	77940.	67185.	10500.	2500.	2500.	19.4
2003.0	81867.	68612.	13000.	2500.	2500.	19.1
2004.0	85797.	70042.	15500.	2500.	2500.	19.1
2005.0	89722.	71467.	18000.	2500.	2500.	19.2
2006.0	93646.	72892.	20500.	2500.	2500.	19.3
2007.0	97571.	74317.	23000.	2500.	2500.	19.5
2008.0	101564.	75809.	25500.	2500.	2500.	19.7
2009.0	105464.	77210.	28000.	2500.	2500.	20.0
2010.0	109452.	78698.	30500.	2500.	2500.	20.3
2011.0	113424.	80170.	33000.	2500.	2500.	20.6
2012.0	117448.	81694.	35500.	2500.	2500.	20.9
2013.0	121514.	83260.	38000.	2500.	2500.	21.2
2014.0	125469.	84714.	40500.	2500.	2500.	21.5
2015.0	129519.	86265.	43000.	2500.	2500.	21.9
2016.0	133194.	87439.	45500.	2500.	2500.	22.2
2017.0	136469.	88214.	48000.	2500.	2500.	22.6
2018.0	139775.	89021.	50500.	2500.	2500.	22.9
2019.0	142693.	89439.	53000.	2500.	2500.	23.3
2020.0	145499.	89745.	55500.	2500.	2500.	23.7
2021.0	148901.	89647.	59000.	3500.	3500.	23.8
2022.0	151896.	88141.	63500.	4500.	4500.	23.6
2023.0	154858.	88603.	66000.	2500.	2500.	24.0
2024.0	157687.	86432.	71000.	5000.	5000.	23.7
2025.0	159929.	83674.	76000.	5000.	5000.	23.4
2026.0	161766.	80512.	81000.	5000.	5000.	23.2
2027.0	163422.	77168.	86000.	5000.	5000.	22.9
2028.0	164686.	73432.	91000.	5000.	5000.	22.6
2029.0	165798.	69544.	96000.	5000.	5000.	22.4
2030.0	166551.	65297.	101000.	5000.	5000.	22.1
2031.0	167266.	61012.	106000.	5000.	5000.	21.8
2032.0	167561.	56307.	111000.	5000.	5000.	21.5
2033.0	167977.	51723.	116000.	5000.	5000.	21.3
2034.0	168136.	46882.	121000.	5000.	5000.	21.0
2035.0	168284.	42029.	126000.	5000.	5000.	20.8
2036.0	168315.	37061.	131000.	5000.	5000.	20.6
2037.0	168432.	32177.	136000.	5000.	5000.	20.1
2038.0	168432.	29677.	138500.	2500.	2500.	20.4
2039.0	168432.	27177.	141000.	2500.	2500.	20.5

TABLE C-1 (contd)

REACTOR STATUS 03/1/80

FUEL STATUS, MTU
 15,000 MWED/T-OL SCENARIO

YEAR	CUMULATIVE DISCHARGED	PREDISPOSAL STORAGE	TERMINAL STORAGE	FILL RATE MTU/YR	CAPACITY MTU /YR	MINIMUM AGE, YRS
*****	*****	*****	*****	*****	*****	*****
2040.0	168432.	24677.	143500.	2500.	2500.	20.7
2041.0	168432.	22177.	146000.	2500.	2500.	20.8
2042.0	168432.	19677.	148500.	2500.	2500.	21.0
2043.0	168432.	17177.	151000.	2500.	2500.	21.2
2044.0	168432.	14677.	153500.	2500.	2500.	21.4
2045.0	168432.	12177.	156000.	2500.	2500.	21.6
2046.0	168432.	9677.	158500.	2500.	2500.	21.6
2047.0	168432.	7177.	161000.	2500.	2500.	21.5
2048.0	168432.	4677.	163500.	2500.	2500.	20.9
2049.0	168432.	2177.	166000.	2500.	2500.	19.5
2050.0	168432.	0.	168432.	2432.	2500.	13.0
2051.0	168432.	0.	168432.	0.	2500.	14.0
2052.0	168432.	0.	168432.	0.	2500.	15.0
2053.0	168432.	0.	168432.	0.	2500.	16.0
2054.0	168432.	0.	168432.	0.	2500.	17.0
2055.0	168432.	0.	168432.	0.	2500.	18.0
2056.0	168432.	0.	168432.	0.	2500.	19.0
2057.0	168432.	0.	168432.	0.	2500.	20.0
2058.0	168432.	0.	168432.	0.	2500.	21.0
2059.0	168432.	0.	168432.	0.	2500.	22.0
2060.0	168432.	0.	168432.	0.	2500.	23.0

TABLE C-2. SURF II. Expanded Nuclear Power Industry

YEAR	G W E			REACTOR STATUS 03/1/80 U S N U C L E A R P O W E R			MTU DISCHARGED AT MWED/T-OL			
	*****			*****			*****			
	ACTUAL	TOTAL		50 PER CENT	60 PER CENT	70 PER CENT	ACTUAL	12000	15000	18000
1961.0	0.	0.	6.100E+04	7.320E+04	8.540E+04	4.046E+04	5.	4.	3.	0.
1962.0	0.	0.	1.245E+05	1.494E+05	1.742E+05	1.167E+05	15.	12.	10.	11.
1963.0	1.	1.	2.136E+05	2.563E+05	2.990E+05	2.183E+05	30.	25.	20.	51.
1964.0	1.	1.	3.567E+05	4.280E+05	4.994E+05	3.702E+05	54.	43.	36.	53.
1965.0	1.	1.	5.148E+05	6.178E+05	7.208E+05	5.172E+05	80.	64.	54.	68.
1966.0	1.	1.	6.797E+05	8.157E+05	9.516E+05	6.852E+05	108.	86.	72.	135.
1967.0	1.	1.	8.461E+05	1.015E+06	1.185E+06	9.036E+05	136.	108.	90.	155.
1968.0	1.	1.	1.010E+06	1.212E+06	1.415E+06	1.170E+06	167.	134.	112.	191.
1969.0	2.	2.	1.349E+06	1.619E+06	1.889E+06	1.577E+06	224.	180.	151.	225.
1970.0	2.	2.	1.690E+06	2.027E+06	2.365E+06	2.084E+06	281.	226.	189.	247.
1971.0	4.	4.	2.369E+06	2.843E+06	3.317E+06	2.947E+06	394.	316.	265.	327.
1972.0	8.	8.	3.532E+06	4.239E+06	4.945E+06	4.520E+06	588.	472.	394.	494.
1973.0	11.	11.	5.168E+06	6.202E+06	7.235E+06	6.583E+06	861.	690.	576.	699.
1974.0	18.	18.	7.999E+06	9.598E+06	1.120E+07	9.875E+06	1333.	1067.	890.	936.
1975.0	25.	25.	1.196E+07	1.435E+07	1.675E+07	1.471E+07	2015.	1617.	1352.	1481.
1976.0	35.	35.	1.774E+07	2.135E+07	2.491E+07	2.200E+07	2986.	2394.	2000.	1873.
1977.0	39.	39.	2.463E+07	2.955E+07	3.448E+07	2.842E+07	4130.	3310.	2764.	2773.
1978.0	45.	45.	3.254E+07	3.904E+07	4.555E+07	3.800E+07	5448.	4365.	3643.	4002.
1979.0	48.	48.	4.118E+07	4.941E+07	5.765E+07	5.000E+07	6888.	5517.	4602.	5050.
1980.0	49.	49.	5.009E+07	6.011E+07	7.013E+07		8434.	6766.	5653.	6342.
1981.0	56.	56.	5.963E+07	7.156E+07	8.348E+07		10024.	8038.	6713.	
1982.0	65.	65.	7.098E+07	8.517E+07	9.937E+07		11915.	9550.	7974.	
1983.0	78.	78.	8.441E+07	1.013E+08	1.182E+08		14155.	11342.	9467.	
1984.0	91.	91.	1.001E+08	1.201E+08	1.402E+08		16773.	13436.	11212.	
1985.0	105.	105.	1.185E+08	1.422E+08	1.659E+08		19839.	15889.	13256.	
1986.0	115.	115.	1.389E+08	1.667E+08	1.945E+08		23243.	18613.	15526.	
1987.0	126.	126.	1.612E+08	1.934E+08	2.256E+08		26948.	21576.	17996.	
1988.0	134.	134.	1.850E+08	2.220E+08	2.590E+08		30917.	24752.	20642.	
1989.0	141.	141.	2.102E+08	2.522E+08	2.942E+08		35115.	28110.	23440.	
1990.0	145.	145.	2.364E+08	2.837E+08	3.309E+08		39483.	31605.	26352.	
1991.0	150.	150.	2.635E+08	3.162E+08	3.689E+08		44004.	35222.	29367.	
1992.0	153.	153.	2.915E+08	3.497E+08	4.080E+08		48662.	38948.	32472.	
1993.0	155.	155.	3.197E+08	3.836E+08	4.476E+08		53366.	42711.	35608.	
1994.0	159.	159.	3.486E+08	4.183E+08	4.880E+08		58180.	46562.	38817.	
1995.0	159.	159.	3.776E+08	4.531E+08	5.287E+08		63022.	50436.	42045.	
1996.0	160.	160.	4.069E+08	4.883E+08	5.697E+08		67903.	54341.	45299.	
1997.0	160.	160.	4.362E+08	5.234E+08	6.107E+08		72784.	58245.	48553.	
1998.0	162.	170.	4.673E+08	5.608E+08	6.542E+08		77970.	62394.	52010.	
1999.0	162.	179.	5.000E+08	6.000E+08	7.000E+08		83422.	66759.	55645.	

TABLE C-2 (contd)

		REACTOR STATUS 03/1/80				MTU DISCHARGED AT MWED/T-OL			
		U S N U C L E A R P O W E R							
		M W D A Y							
		G W E							
YEAR	ACTUAL	TOTAL	50 PER CENT	60 PER CENT	70 PER CENT	ACTUAL	12000	15000	18000
2000.0	162.	188.	5.343E+08	6.412E+08	7.481E+08	89141.	71331.	59458.	
2001.0	161.	196.	5.702E+08	6.843E+08	7.983E+08	95136.	76130.	63459.	
2002.0	161.	205.	6.077E+08	7.292E+08	8.508E+08	101391.	81136.	67633.	
2003.0	161.	214.	6.467E+08	7.761E+08	9.054E+08	107897.	86341.	71970.	
2004.0	161.	222.	6.873E+08	8.248E+08	9.623E+08	114673.	91762.	76489.	
2005.0	161.	231.	7.296E+08	8.755E+08	1.021E+09	121709.	97392.	81180.	
2006.0	161.	240.	7.734E+08	9.281E+08	1.083E+09	129013.	103234.	86049.	
2007.0	161.	249.	8.188E+08	9.826E+08	1.146E+09	136582.	109290.	91095.	
2008.0	161.	257.	8.658E+08	1.039E+09	1.212E+09	144485.	115626.	96386.	
2009.0	160.	265.	9.142E+08	1.097E+09	1.280E+09	152557.	122083.	101767.	
2010.0	160.	274.	9.643E+08	1.157E+09	1.350E+09	160982.	128841.	107413.	
2011.0	158.	280.	1.018E+09	1.214E+09	1.422E+09	169646.	135796.	113229.	
2012.0	154.	277.	1.066E+09	1.280E+09	1.493E+09	178346.	142802.	119107.	
2013.0	151.	274.	1.117E+09	1.340E+09	1.563E+09	187073.	149852.	125037.	
2014.0	144.	267.	1.166E+09	1.399E+09	1.632E+09	195648.	156789.	130883.	
2015.0	137.	259.	1.214E+09	1.457E+09	1.699E+09	204281.	163822.	136850.	
2016.0	127.	250.	1.260E+09	1.512E+09	1.764E+09	212474.	170480.	142484.	
2017.0	123.	245.	1.305E+09	1.566E+09	1.827E+09	220234.	176738.	147740.	
2018.0	116.	239.	1.349E+09	1.619E+09	1.888E+09	227989.	183027.	153052.	
2019.0	113.	236.	1.392E+09	1.671E+09	1.949E+09	235332.	188928.	157992.	
2020.0	113.	235.	1.435E+09	1.722E+09	2.009E+09	242555.	194717.	162825.	
2021.0	105.	228.	1.478E+09	1.773E+09	2.069E+09	250351.	201101.	168268.	
2022.0	96.	219.	1.518E+09	1.822E+09	2.125E+09	257680.	207079.	173345.	
2023.0	84.	206.	1.557E+09	1.868E+09	2.179E+09	264907.	213024.	178435.	
2024.0	71.	193.	1.593E+09	1.911E+09	2.230E+09	271925.	218836.	183443.	
2025.0	57.	179.	1.626E+09	1.951E+09	2.277E+09	278266.	224061.	187924.	
2026.0	46.	169.	1.658E+09	1.989E+09	2.321E+09	284135.	228881.	192044.	
2027.0	36.	159.	1.687E+09	2.025E+09	2.362E+09	289763.	233520.	196025.	
2028.0	27.	150.	1.715E+09	2.058E+09	2.402E+09	294946.	237767.	199648.	
2029.0	21.	143.	1.742E+09	2.091E+09	2.439E+09	299931.	241862.	203149.	
2030.0	17.	139.	1.768E+09	2.121E+09	2.475E+09	304523.	245598.	206314.	
2031.0	11.	134.	1.793E+09	2.151E+09	2.510E+09	309046.	249293.	209462.	
2032.0	9.	131.	1.818E+09	2.180E+09	2.543E+09	313122.	252573.	212207.	
2033.0	6.	129.	1.840E+09	2.208E+09	2.576E+09	317310.	255972.	215080.	
2034.0	3.	125.	1.863E+09	2.236E+09	2.608E+09	321218.	259114.	217711.	
2035.0	3.	125.	1.886E+09	2.263E+09	2.640E+09	325110.	262244.	220334.	
2036.0	1.	124.	1.909E+09	2.290E+09	2.672E+09	328878.	265258.	222846.	
2037.0	1.	124.	1.931E+09	2.317E+09	2.704E+09	333314.	268941.	226026.	
2038.0	0.	114.	1.952E+09	2.342E+09	2.733E+09	337360.	272294.	228918.	
2039.0	0.	105.	1.971E+09	2.365E+09	2.760E+09	341139.	275434.	231632.	

TABLE C-2 (contd)

REACTOR STATUS 03/1/80										
U S N U C L E A R P O W E R										
M W D AT										
MTU DISCHARGED AT MWED/T-OL										
YEAR	G W E		PER CENT			ACTUAL	12000	15000	18000	ACTUAL
	ACTUAL	TOTAL	50 PER CENT	60 PER CENT	70 PER CENT					
2040.0	0.	96.	1.989E+09	2.386E+09	2.784E+09	*****	344652.	278361.	234168.	*****
2041.0	0.	88.	2.005E+09	2.406E+09	2.807E+09		347898.	281075.	236527.	
2042.0	0.	79.	2.019E+09	2.423E+09	2.827E+09		350879.	283576.	238708.	
2043.0	0.	70.	2.032E+09	2.438E+09	2.845E+09		353593.	285864.	240712.	
2044.0	0.	61.	2.043E+09	2.452E+09	2.860E+09		356040.	287939.	242538.	
2045.0	0.	53.	2.053E+09	2.463E+09	2.874E+09		358222.	289801.	244187.	
2046.0	0.	44.	2.061E+09	2.473E+09	2.885E+09		360136.	291449.	245658.	
2047.0	0.	35.	2.067E+09	2.480E+09	2.894E+09		361785.	292885.	246951.	
2048.0	0.	26.	2.072E+09	2.486E+09	2.901E+09		363167.	294107.	248067.	
2049.0	0.	18.	2.075E+09	2.490E+09	2.905E+09		364283.	295117.	249006.	
2050.0	0.	9.	2.077E+09	2.492E+09	2.907E+09		365133.	295913.	249767.	
2051.0	0.	0.	2.077E+09	2.492E+09	2.907E+09		365133.	295913.	249767.	
2052.0	0.	0.	2.077E+09	2.492E+09	2.907E+09		365133.	295913.	249767.	
2053.0	0.	0.	2.077E+09	2.492E+09	2.907E+09		365133.	295913.	249767.	
2054.0	0.	0.	2.077E+09	2.492E+09	2.907E+09		365133.	295913.	249767.	
2055.0	0.	0.	2.077E+09	2.492E+09	2.907E+09		365133.	295913.	249767.	
2056.0	0.	0.	2.077E+09	2.492E+09	2.907E+09		365133.	295913.	249767.	
2057.0	0.	0.	2.077E+09	2.492E+09	2.907E+09		365133.	295913.	249767.	
2058.0	0.	0.	2.077E+09	2.492E+09	2.907E+09		365133.	295913.	249767.	
2059.0	0.	0.	2.077E+09	2.492E+09	2.907E+09		365133.	295913.	249767.	
2060.0	0.	0.	2.077E+09	2.492E+09	2.907E+09		365133.	295913.	249767.	

TABLE C-2 (contd)

REACTOR STATUS 03/1/80

FUEL STATUS. MTU
15,000 MWED/T-OL SCENARIO

YEAR	CUMULATIVE DISCHARGED	PREDISPOSAL STORAGE	TERMINAL STORAGE	FILL RATE MTU /YR	CAPACITY MTU /YR	MINIMUM AGE, YRS
*****	*****	*****	*****	*****	*****	*****
1961.0	4.	4.	0.	0.	0.	.9
1962.0	12.	12.	0.	0.	0.	1.9
1963.0	24.	24.	0.	0.	0.	2.9
1964.0	43.	43.	0.	0.	0.	3.9
1965.0	64.	64.	0.	0.	0.	4.9
1966.0	86.	86.	0.	0.	0.	5.9
1967.0	108.	108.	0.	0.	0.	6.9
1968.0	134.	134.	0.	0.	0.	7.9
1969.0	180.	180.	0.	0.	0.	8.9
1970.0	226.	226.	0.	0.	0.	9.9
1971.0	316.	316.	0.	0.	0.	10.9
1972.0	472.	472.	0.	0.	0.	11.9
1973.0	690.	435.	0.	0.	0.	12.9
1974.0	1067.	813.	0.	0.	0.	13.9
1975.0	1617.	1363.	0.	0.	0.	14.9
1976.0	2394.	2140.	0.	0.	0.	15.9
1977.0	3310.	3056.	0.	0.	0.	16.9
1978.0	4365.	4110.	0.	0.	0.	17.9
1979.0	5517.	5262.	0.	0.	0.	18.9
1980.0	6766.	6511.	0.	0.	0.	19.9
1981.0	8038.	7783.	0.	0.	0.	20.9
1982.0	9550.	9296.	0.	0.	0.	21.9
1983.0	11342.	11088.	0.	0.	0.	22.9
1984.0	13436.	13182.	0.	0.	0.	23.9
1985.0	15889.	15635.	0.	0.	0.	24.9
1986.0	18613.	18359.	0.	0.	0.	25.9
1987.0	21576.	21322.	0.	0.	0.	26.9
1988.0	24752.	24498.	0.	0.	0.	27.9
1989.0	28110.	27856.	0.	0.	0.	28.9
1990.0	31605.	31350.	0.	0.	0.	29.9
1991.0	35222.	34967.	0.	0.	0.	30.9
1992.0	38948.	38694.	0.	0.	0.	31.9
1993.0	42711.	42456.	0.	0.	0.	32.9
1994.0	46562.	46308.	0.	0.	0.	33.9
1995.0	50436.	50182.	0.	0.	0.	34.9
1996.0	54341.	54086.	0.	0.	0.	35.9
1997.0	58245.	57991.	0.	0.	0.	36.9
1998.0	62394.	59740.	2400.	2400.	2400.	21.9
1999.0	66756.	61702.	4800.	2400.	2400.	20.6

TABLE C-2 (contd)

REACTOR STATUS 03/1/80

FUEL STATUS, MTU
15,000 MWED/T-OL SCENARIO

YEAR	CUMULATIVE DISCHARGED	PREDISPOSAL STORAGE	TERMINAL STORAGE	FILL RATE MTU/YR	CAPACITY MTU/YR	MINIMUM AGE, YRS
*****	*****	*****	*****	*****	*****	*****
2000.0	71331.	63877.	7200.	2400.	2400.	19.6
2001.0	76130.	66276.	9600.	2400.	2400.	18.9
2002.0	81136.	68881.	12000.	2400.	2400.	18.6
2003.0	86341.	71686.	14400.	2400.	2400.	18.5
2004.0	91762.	74708.	16800.	2400.	2400.	18.6
2005.0	97392.	75537.	21600.	4800.	4800.	17.9
2006.0	103234.	76580.	26400.	4800.	4800.	17.5
2007.0	109290.	77835.	31200.	4800.	4800.	17.1
2008.0	115626.	79371.	36000.	4800.	4800.	16.7
2009.0	122083.	81029.	40800.	4800.	4800.	16.5
2010.0	128841.	82986.	45600.	4800.	4800.	16.2
2011.0	135796.	85141.	50400.	4800.	4800.	16.0
2012.0	142802.	87348.	55200.	4800.	4800.	15.7
2013.0	149852.	89597.	60000.	4800.	4800.	15.5
2014.0	156789.	91735.	64800.	4800.	4800.	15.4
2015.0	163822.	93968.	69600.	4800.	4800.	15.3
2016.0	170480.	95825.	74400.	4800.	4800.	15.3
2017.0	176738.	97283.	79200.	4800.	4800.	15.3
2018.0	183027.	98773.	84000.	4800.	4800.	15.4
2019.0	188928.	99873.	88800.	4800.	4800.	15.5
2020.0	194717.	100862.	93600.	4800.	4800.	15.6
2021.0	201101.	102447.	98400.	4800.	4800.	15.8
2022.0	207079.	103625.	103200.	4800.	4800.	16.0
2023.0	213024.	104769.	108000.	4800.	4800.	16.2
2024.0	218836.	102781.	115800.	7800.	7800.	15.9
2025.0	224061.	100206.	123600.	7800.	7800.	15.7
2026.0	228881.	97226.	131400.	7800.	7800.	15.6
2027.0	233520.	94066.	139200.	7800.	7800.	15.5
2028.0	237767.	90512.	147000.	7800.	7800.	15.3
2029.0	241862.	86807.	154800.	7800.	7800.	15.2
2030.0	245598.	82743.	162600.	7800.	7800.	15.1
2031.0	249295.	78641.	170400.	7800.	7800.	15.0
2032.0	252573.	74119.	178200.	7800.	7800.	14.7
2033.0	255972.	72118.	183600.	5400.	5400.	14.9
2034.0	259114.	66860.	192000.	8400.	8400.	14.4
2035.0	262244.	61590.	200400.	8400.	8400.	14.0
2036.0	265258.	56204.	208800.	8400.	8400.	13.7
2037.0	268941.	51487.	217200.	8400.	8400.	13.2
2038.0	272294.	46440.	225600.	8400.	8400.	12.6
2039.0	275434.	41180.	234000.	8400.	8400.	11.8

TABLE C-2 (contd)

REACTOR STATUS 03/1/80

FUEL STATUS. MTU
 15,000 MWED/T-OL SCENARIO

YEAR	CUMULATIVE DISCHARGED	PREDISPOSAL STORAGE	TERMINAL STORAGE	FILL RATE MTU/YR	CAPACITY MTU/YR	MINIMUM AGE, YRS
*****	*****	*****	*****	*****	*****	*****
2040.0	278361.	38107.	240000.	6000.	6000.	11.4
2041.0	281075.	34821.	246000.	6000.	6000.	10.8
2042.0	283576.	31322.	252000.	6000.	6000.	10.1
2043.0	285864.	29638.	255972.	3972.	6000.	10.0
2044.0	287939.	28571.	259114.	3142.	6000.	10.0
2045.0	289801.	27302.	262244.	3131.	6000.	10.0
2046.0	291449.	25936.	265258.	3014.	6000.	10.0
2047.0	292885.	24059.	268571.	3313.	6000.	10.0
2048.0	294107.	21819.	272034.	3463.	6000.	10.0
2049.0	295117.	19667.	275195.	3161.	6000.	10.0
2050.0	295913.	17515.	278144.	2948.	6000.	10.0
2051.0	295913.	14780.	280879.	2735.	6000.	10.0
2052.0	295913.	12258.	283401.	2522.	6000.	10.0
2053.0	295913.	9948.	285710.	2309.	6000.	10.0
2054.0	295913.	7852.	287806.	2096.	6000.	10.0
2055.0	295913.	5969.	289689.	1883.	6000.	10.0
2056.0	295913.	4599.	291059.	1370.	3000.	10.0
2057.0	295913.	3143.	292516.	1457.	3000.	10.0
2058.0	295913.	1899.	293760.	1244.	3000.	10.0
2059.0	295913.	868.	294791.	1031.	3000.	10.0
2060.0	295913.	50.	295609.	818.	3000.	10.0

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