

Table 1B.1 (continued)

Parent	Half-life	Decay mode ^a	Q (W/CI)	Daughter
Pa-233	2.333E+06 s	Beta	2.270E-03	U-233
Pa-234	2.412E+04 s	Beta	1.436E-02	U-234
Pa-234m	70.2 s	IT (0.130%) Beta (99.9%)	4.942E-03	Pa-234 U-234m
Pa-235	24.1 min	Beta	2.792E-03	U-235
U-230	20.8 d	Alpha	3.552E-02	Th-226
U-231	3.629E+05 s	POS or EC (100.%) Alpha (5.500E-03%)	8.270E-04	Pa-231 Th-227
U-232	2.272E+09 s	Alpha (100.%) SF (1.000E-10%)	3.211E-02	Th-228 fiss. p
U-233	5.002E+12 s	Alpha (100.%) SF (1.300E-10%)	2.907E-02	Th-229 fiss. p
U-234	7.716E+12 s	Alpha (100.%) SF (1.000E-09%)	2.880E-02	Th-230 fiss. p
U-235	2.221E+16 s	Alpha (100.%) SF (2.600E-07%)	2.619E-02	Th-231 fiss. p
U-236	7.389E+14 s	Alpha (100.%) SF (1.200E-07%)	2.709E-02	Th-232 fiss. p
U-237	5.832E+05 s	Beta	1.892E-03	Np-237
U-238	1.410E+17 s	Alpha (100.%) SF (5.100E-05%)	2.537E-02	Th-234 fiss. p
U-239	1.412E+03 s	Beta	2.692E-03	Np-239
U-240	5.076E+04 s	Beta to *	8.204E-04	Np-240m
U-241	1.00 s	Beta	2.395E-03	Np-241
Np-235	3.422E+07 s	POS or EC (100.%) Alpha (1.400E-03%)	5.810E-05	U-235 Pa-231
Np-236	3.629E+12 s	POS or EC (91.0%) Beta (9.00%)	2.017E-03	U-236 Pu-236
Np-236m	8.100E+04 s	POS or EC (52.0%) Beta (48.0%)	7.902E-04	U-236m Pu-236m
Np-237	6.753E+13 s	Alpha	3.057E-02	Pa-233
Np-238	1.829E+05 s	Beta	4.790E-03	Pu-238
Np-239	2.035E+05 s	Beta	2.417E-03	Pu-239
Np-240	3.900E+03 s	Beta	1.060E-02	Pu-240
Np-240m	444. s	Beta	5.795E-03	Pu-240m
Np-241	16.0 min	Beta	2.792E-03	Pu-241
Pu-236	8.997E+07 s	Alpha (100.%) SF (8.000E-08%)	3.480E-02	U-232 fiss. p
Pu-237	45.6 d	POS or EC (100.%) Alpha (3.300E-03%)	3.687E-04	Np-237 U-233
Pu-238	2.769E+09 s	Alpha (100.%) SF (1.840E-07%)	3.314E-02	U-234 fiss. p
Pu-239	7.594E+11 s	Alpha (100.%) SF (4.400E-10%)	3.082E-02	U-235 fiss. p
Pu-240	2.063E+11 s	Alpha (100.%) SF (5.000E-06%)	3.114E-02	U-236 fiss. p

Table 1B.1 (continued)

Parent	Half-life	Decay mode ^a	Q (W/Ci)	Daughter
Pu-241	4.544E+08 s	Alpha (2.450E-03%) Beta (100.%)	3.100E-05	U-237 Am-241
Pu-242	1.221E+13 s	Alpha (100.%) SF (5.550E-04%)	2.953E-02	U-238 fiss. p
Pu-243	1.784E+04 s	Beta	1.154E-03	Am-243
Pu-244	2.607E+15 s	Alpha (99.9%) SF (0.120%)	2.900E-02	U-240 fiss. p
Pu-245	10.6 h	Beta	2.371E-03	Am-245
Pu-246	10.9 d	Beta	8.418E-04	Am-246
Am-239	4.284E+04 s	POS or EC (100.%) Alpha (1.000E-02%)	2.417E-03	Pu-239 Np-235
Am-240	1.829E+05 s	POS or EC (100.%) Alpha (1.900E-04%)	6.545E-03	Pu-240 Np-236
Am-241	1.364E+10 s	Alpha (100.%) SF (4.100E-10%)	3.322E-02	Np-237 fiss. p
Am-242	5.767E+04 s	POS or EC (17.3%) Beta (82.7%)	1.135E-03	Pu-242 Cm-242
Am-242m	4.797E+09 s	Alpha (0.500%) IT (99.5%) SF (1.600E-08%)	3.950E-04	Np-238m Am-242 fiss. p
Am-243	2.329E+11 s	Alpha (100.%) SF (1.800E-08%)	3.215E-02	Np-239 fiss. p
Am-244	10.1 h	Beta	5.240E-03	Cm-244
Am-244m	26.0 min	POS or EC (4.100E-02%) Beta (100.%)	3.025E-03	Pu-244m Cm-244m
Am-245	2.07 h	Beta	1.855E-03	Cm-245
Am-246	25.0 min	Beta	8.074E-03	Cm-246
Cm-241	36.0 d	POS or EC (99.0%) Alpha (1.00%)	4.111E-03	Am-241 Pu-237
Cm-242	1.410E+07 s	Alpha (100.%) SF (6.800E-06%)	3.685E-02	Pu-238 fiss. p
Cm-243	8.994E+08 s	Alpha (99.8%) Beta (0.240%)	3.669E-02	Pu-239 Bk-243
Cm-244	5.715E+08 s	Alpha (100.%) SF (1.346E-04%)	3.498E-02	Pu-240 fiss. p
Cm-245	2.682E+11 s	Alpha	3.319E-02	Pu-241
Cm-246	1.493E+11 s	Alpha (100.%) SF (2.610E-02%)	3.274E-02	Pu-242 fiss. p
Cm-247	4.923E+14 s	Alpha	3.195E-02	Pu-243
Cm-248	1.070E+13 s	Alpha (91.7%) SF (8.33%)	0.124	Pu-244 fiss. p
Cm-249	3.849E+03 s	Beta	1.740E-03	Bk-249
Cm-250	17.4 10 ³ y	Alpha (25.0%) SF (61.0%) Beta (14.0%)	0.731	Pu-246 fiss. p Bk-250
Cm-251	1.00 s	Beta	1.778E-03	Bk-251

Table 1B.1 (continued)

Parent	Half-life	Decay mode ^a	Q (W/C1)	Daughter
Bk-249	2.765E+07 s	Alpha (1.450E-03%) SF (4.600E-08%) Beta (100.%)	7.410E-04	Am-245 fiss. p Cf-249
Bk-250	1.160E+04 s	Beta	6.948E-03	Cf-250
Bk-251	57.0 min	Beta	6.521E-03	Cf-251
Cf-249	1.106E+10 s	Alpha (100.%) SF (5.000E-07%)	4.627E-02	Cm-245 fiss. p
Cf-250	4.128E+08 s	Alpha (99.9%) SF (7.700E-02%)	3.715E-02	Cm-246 fiss. p
Cf-251	2.834E+10 s	Alpha	3.573E-02	Cm-247
Cf-252	8.325E+07 s	Alpha (96.9%) SF (3.10%)	7.137E-02	Cm-248 fiss. p
Cf-253	1.539E+06 s	Alpha (0.310%) Beta (99.7%)	5.799E-04	Cm-249 Es-253
Cf-254	60.5 d	Alpha (0.310%) SF (99.7%)	1.18	Cm-250 fiss. p
Cf-255	1.50 h	Beta	5.928E-04	Es-255
Es-253	20.5 d	Alpha (100.%) SF (8.700E-06%)	5.799E-04	Bk-249 fiss. p
Es-254	276. d	Alpha (100.%) SF (3.000E-06%)	3.926E-02	Bk-250 fiss. p
Es-254m	39.3 h	POS or EC (7.800E-02%) Alpha (98.3%) IT (1.55%) SF (0.103%)	4.845E-02	Cf-254m Bk-250m Es-254 fiss. p
Es-255	39.0 d	Alpha (100.%) SF (4.167E-03%)	4.369E-02	Bk-251 fiss. p

^aPOS - positron; EC - electron capture; IT - internal transition;
* - excited state; n - neutron; and SF - spontaneous fission.

APPENDIX 1C. ORIGEN2 INTERPOLATION FUNCTIONS

APPENDIX 1C. ORIGEN2 INTERPOLATION FUNCTIONS

1.0 PURPOSE

The LWR Radiological Data Base provides calculated radiological characteristics for spent fuel, including activity (curies/MTIHM), thermal output (watts/MTIHM), neutron activity (neutrons/sec/MTIHM), photon spectra (photons/sec/MTIHM, in 18 energy groups), and integral heats (watt-years/MTIHM). The basic radiological data used in the Data Base were calculated by means of the ORIGEN2 code for 36 basic combinations of burnup and initial enrichment (described in Section 2.4), each with 24 decay times. These 36 basic combinations and 24 decay times are listed in Table 1C-1. The Data Base permits the user to retrieve directly the calculated radiological characteristics for these basic combinations of burnup, initial enrichment, and decay time. In addition, interpolation routines are incorporated that permit the user to request radiological characteristics for other desired combinations of burnup, enrichment, and decay time, within the range of the basic combinations. This appendix describes the mathematical procedures used by the interpolation routines. Justification for the interpolation procedures will be published in a separate report (Moore).

2.0 BASIC DATA COMBINATIONS

For each reactor type (BWR and PWR), the basic data combinations were based on three empirical equations relating burnup to initial enrichment. These equations represent "low", "medium" and "high" initial enrichment, and were based on a study of past and projected reactor data. The three curves are shown schematically in Fig. 1C.1. The equations of the "medium" curves are:

$$\text{For BWR's: } E = 0.1962 + 0.121756B - 0.001018B^2$$

$$\text{For PWR's: } E = 0.8694 + 0.085366B - 0.000351B^2$$

where E is initial enrichment (% U-235) and B is burnup (MWD/kgU). For the "low" and "high" curves, the first term is decreased/increased by 0.7000, except that the initial enrichment is not permitted to have a value less than 0.72% (natural uranium). These equations are not to be extrapolated beyond the range of the actual data from which they were derived. These equations are strictly empirical for a wide range of fuels and are not intended for specific application to a fixed fuel design.

3.0 INTERPOLATION AT CONSTANT DECAY TIME

The interpolation routine uses power-law interpolation when decay time is constant and burnup is variable. The object of the interpolation is to estimate a radiological characteristic (for example, thermal power) at some burnup intermediate between two adjacent burnup points on one of the burnup-initial enrichment curves. Because the interpolation is along one of the burnup - enrichment curves, the value of enrichment will not be constant but will vary in accordance with the equation of the curve as the burnup is varied.

In power-law interpolation, the ratio of characteristics is assumed to be equal to the ratio of burnups raised to an appropriate power. The power is chosen so that the relationship is exact at the two end points bounding the range. For a characteristic C relative to a reference characteristic C_0 at burnup B_0 the relationship for interpolation is

$$C/C_0 = (B/B_0)^m \quad (1)$$

where m is chosen for an exact fit at the end-points of the interval:

$$m = \frac{\ln(C_0/C_1)}{\ln(B_0/B_1)} \quad (2)$$

If Equations (1) and (2) are valid, it can be shown that the logarithms of the values of the variables must obey the law of simple linear interpolation. Simple linear interpolation can be defined by the relation

$$\frac{y-y_0}{y_1-y_0} = \frac{x-x_0}{x_1-x_0} \quad (3)$$

where x_0 , x_1 , y_0 , and y_1 , are the bounding values of x and y respectively, and x and y represent corresponding intermediate values.

Suppose we are given an interval in which the independent variable a has bounding values C_{a0} and C_{a1} and the dependent variable z has the corresponding bounding values C_{z0} and C_{z1} . Suppose we are given an intermediate value C_a for variable a and we wish to find the corresponding intermediate value C_z of variable z . If we apply simple linear interpolation to the logarithms of these quantities we have:

$$\frac{\ln C_z - \ln C_{z0}}{\ln C_{z1} - \ln C_{z0}} = \frac{\ln C_a - \ln C_{a0}}{\ln C_{a1} - \ln C_{a0}} \quad (4)$$

$$\frac{\ln(C_z/C_{z0})}{\ln(C_a/C_{a0})} = \frac{\ln(C_{z1}/C_{z0})}{\ln(C_{a1}/C_{a0})} \quad (5)$$

Since the boundary points C_{a0} , C_{a1} , C_{z0} , and C_{z1} are known, we can evaluate the right side of this equation and call this value m :

$$\frac{\ln(C_{z1}/C_{z0})}{\ln(C_{a1}/C_{a0})} = m \quad (6)$$

Then Equation (5) becomes:

$$\frac{\ln(C_z/C_{z0})}{\ln(C_a/C_{a0})} = m \quad (7)$$

and

$$\frac{C_z}{C_{z0}} = \left(\frac{C_a}{C_{a0}} \right)^m \quad (8)$$

Equations (6) and (8) are the defining relationships for power-law interpolation. Thus linear interpolation of the logarithms of the variables is equivalent to power-law interpolation of the variables themselves. Therefore, if we were to tabulate the logarithms of the values of the variables, intermediate values could be obtained by simple linear interpolation of the logarithms.

4.0 INTERPOLATION OF DECAY TIME

Where interpolation is needed to estimate radiological characteristics at non-standard decay times, the method of double exponential interpolation with correction is used. This method is an extension of single exponential decay. Single exponential decay assumes that a radiological characteristic C decays exponentially with a decay constant λ . If a characteristic has known values C_0 and C_1 at times t_0 and t_1 respectively, the equation for determining its value C at an intermediate time t is

$$C = C_0 e^{\lambda(t-t_0)} \quad (9)$$

The value of λ is determined from the two known end-points of the interval, (C_0, t_0) and (C_1, t_1) :

$$\lambda = \frac{-\ln(C_1/C_0)}{t_0 - t_1} \quad (10)$$

The method of double exponential decay assumes that the characteristic can be represented as the sum of two expressions representing a long-lived exponential decay and a short-lived exponential decay. Fig. 1C.2 shows the procedure schematically. Four data points are needed, represented by $t_1, t_2, t_3,$ and $t_4,$ in ascending order of time. The desired time point t lies between t_2 and $t_3.$ The long-lived decay constant is chosen so that it exactly represents the decay between t_3 and $t_4.$ The contributions of the long-lived exponential at t_1 and t_2 are calculated and subtracted from the values of the characteristic at those points, C_1 and $C_2.$ This gives adjusted values C_1' and $C_2'.$ The short-lived decay constant is chosen so that it exactly represents the decay between these two adjusted points. Characteristics between t_3 and t_4 are calculated by adding the values obtained from short-lived and long-lived equations:

$$C = C_2' e^{S(t-t_2)} + C_3 e^{L(t-t_3)} \quad (11)$$

where

$$S = \frac{\ln(C_1' / C_2')}{t_1 - t_2}, \quad (12)$$

$$L = \frac{\ln(C_4 / C_3)}{(t_4 - t_3)}, \quad (13)$$

$$C_1' = C_1 - C_3 e^{L(t_1 - t_3)}, \quad (14)$$

$$C_2' = C_2 - C_3 e^{L(t_2 - t_3)} \quad (15)$$

Because the long-lived exponential decay constant L was chosen to exactly represent the point C_4 , Eq. 11 overestimates the value of C . A correction factor is subtracted to make C have the values C_2 and C_3 at t_2 and t_3 respectively. The correction factor is given by:

$$\text{correction} = C_2' e^{s(t_3-t_2)} \left(\frac{t-t_2}{t_3-t_2} \right) \quad (16)$$

and the final expression for C is:

$$C = C_2' e^{s(t-t_2)} + C_3 e^{L(t-t_3)} - C_2' e^{s(t_3-t_2)} \left(\frac{t-t_2}{t_3-t_2} \right) \quad (17)$$

5.0 SEQUENTIAL INTERPOLATION

Power-law interpolation can be applied sequentially when interpolation in both burnup and enrichment is needed. Figure 1C.3 shows the procedure schematically. In the example shown, thermal power W is desired at intermediate burnup B_2 and intermediate enrichment E_6 . The first interpolation is between the known points (B_0, E_0, W_0) and (B_1, E_1, W_1) on the low enrichment curve to determine the thermal power W_2 at burnup B_2 . The enrichment value E_2 is determined from the equation of the low enrichment curve. Using the same procedure on the standard enrichment curve, the point (B_2, E_5, W_5) is determined from the known end-points (B_0, E_3, W_3) and (B_1, E_4, W_4) . Finally, interpolation along the constant burnup line at burnup B_2 with variable enrichment determines the value of thermal power W_6 at the desired enrichment E_6 .

The sequential procedures described in this section have not yet been added to the Data Base, but are planned for the future.

REFERENCES

R. S. Moore and T. D. Welch, Interpolation Functions for Use with Radiological Data (in preparation).

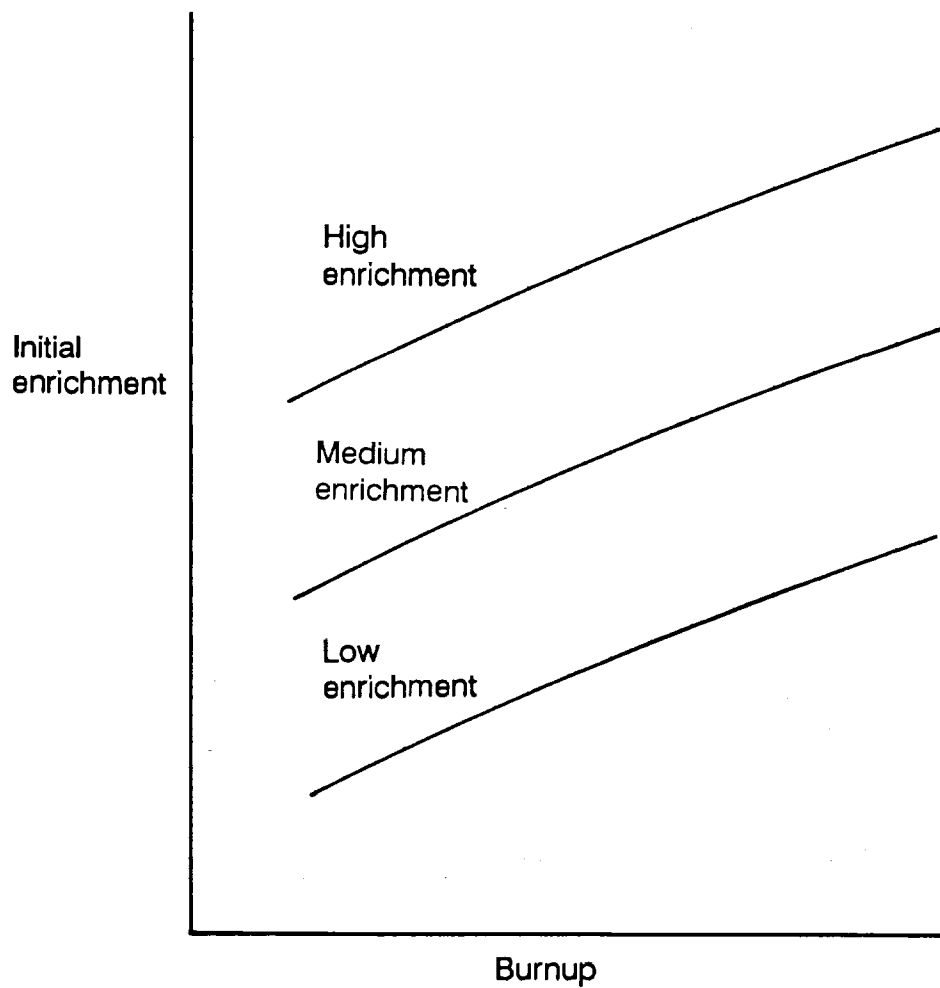


Fig. 1C.1. High, medium, and low burnup-enrichment curves (not to scale).

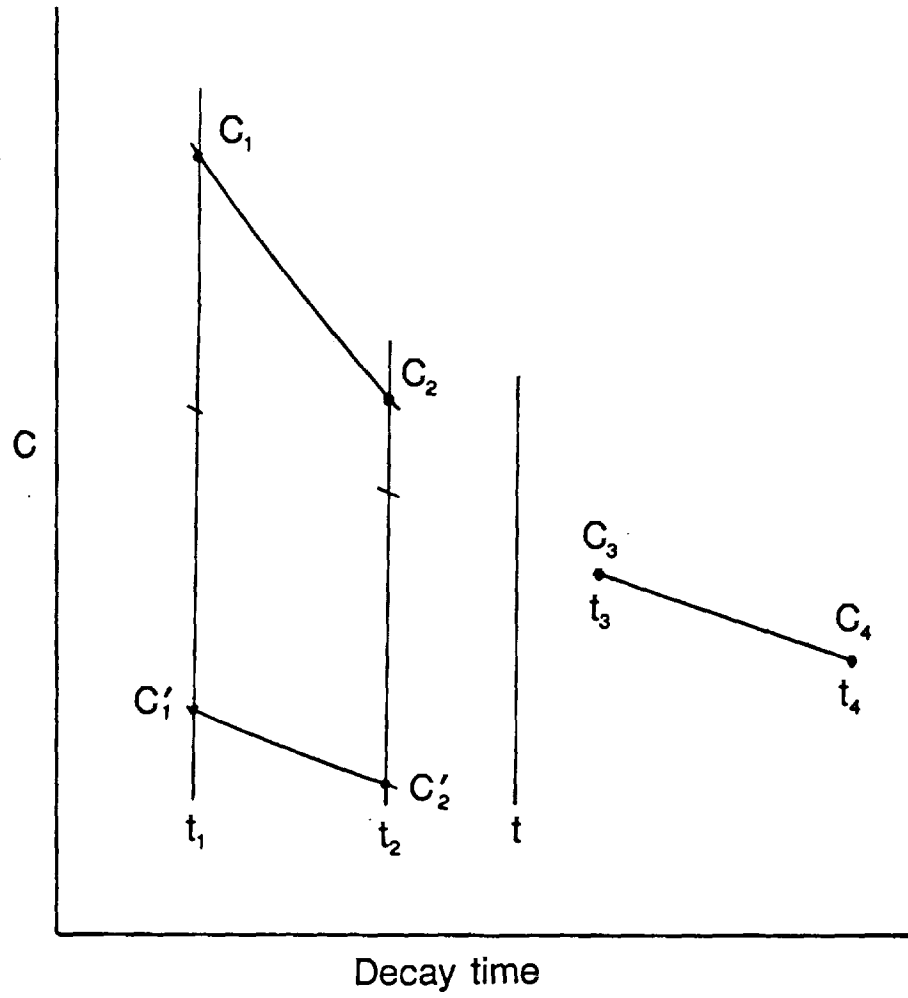


Fig. 1C.2. Double exponential decay with correction.

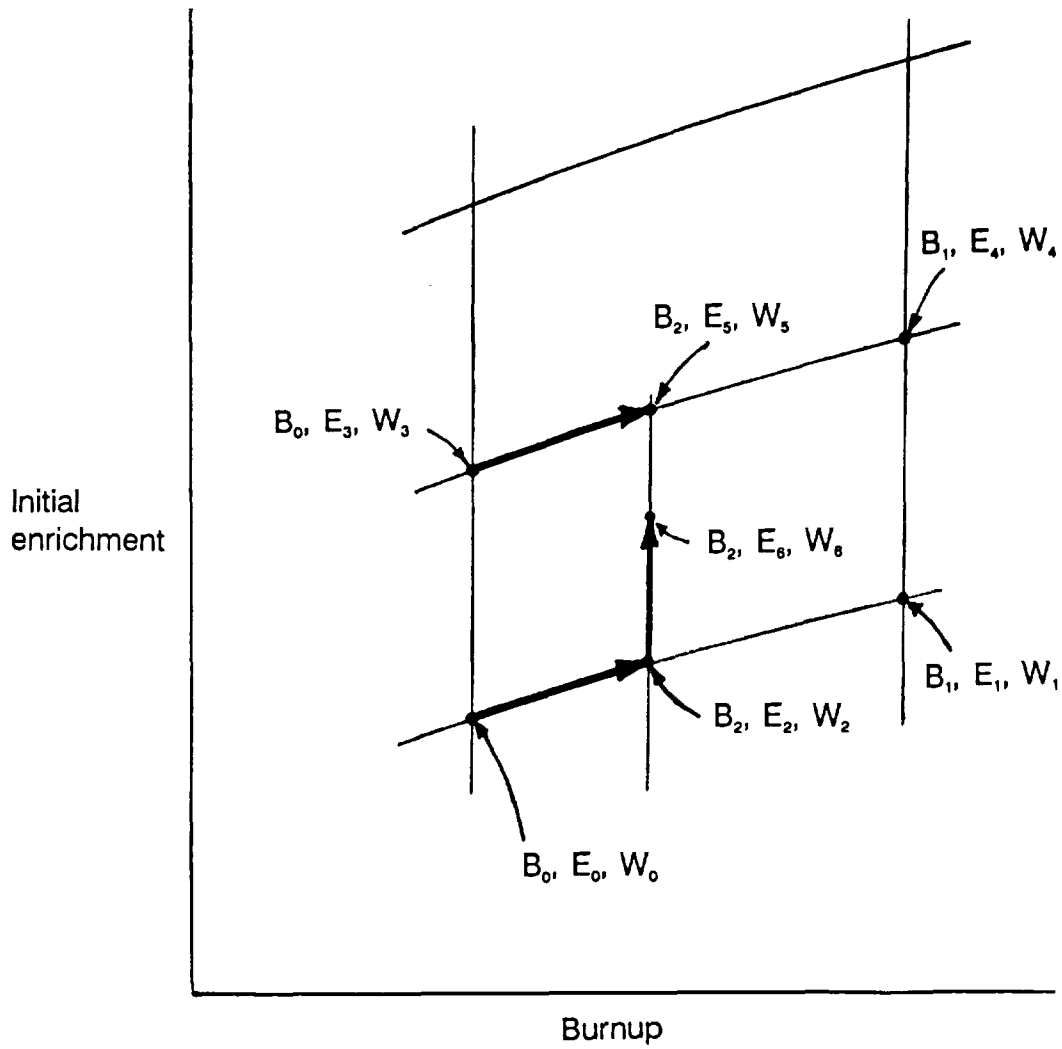


Fig. 1C.3. Sequential power-law interpolation in burnup and enrichment. This illustration shows how thermal power W_6 is estimated at intermediate burnup B_2 and intermediate enrichment E_6 .

Table 1C.1. Basic combinations of burnup, initial enrichment, and cooling time used in LWR Radiological Data Base

Burnup (MWD/MTIHM)	Initial enrichment, %		
	Low	Medium	High
<u>BWRs:</u>			
7,500	0.72	1.05	1.75
15,000	1.09	1.79	2.49
22,500	1.72	2.42	3.12
30,000	2.23	2.93	3.63
40,000	2.74	3.44	4.14
50,000	3.04	3.74	4.44
<u>PWRs:</u>			
10,000	0.99	1.69	2.39
20,000	1.74	2.44	3.14
30,000	2.41	3.11	3.81
40,000	3.02	3.72	4.42
50,000	3.56	4.26	4.96
60,000	4.03	4.73	5.43
<u>Cooling times, years:</u>			
0	30	5,000	
1	50	10,000	
2	100	20,000	
3	200	50,000	
5	300	100,000	
10	500	200,000	
15	1,000	500,000	
20	2,000	1,000,000	

APPENDIX 2A. PHYSICAL DESCRIPTIONS OF LWR FUEL ASSEMBLIES

This appendix contains general descriptions of fuel assembly types, grouped by assembly class and cross-referenced by vendor and fuel design.

Dimensions given for components are prior to irradiation.

Index to Fuel Assembly Types by Assembly Class

BABCOCK & WILCOX 15 X 15	7	GENERAL ELECTRIC BWR/2,3 (continued)	
B&W 15 X 15 B&W Mark B	7	GE BWR/2,3 9 X 9 GE-13	18
B&W 15 X 15 B&W Mark B2	7	GE BWR/2,3 8 X 8 ANF	18
B&W 15 X 15 B&W Mark B3	7	GE BWR/2,3 8 X 8 ANF Prepres.	18
B&W 15 X 15 B&W Mark B4	7	GE BWR/2,3 9 X 9 ANF	19
B&W 15 X 15 B&W Mark B4Z	8	GE BWR/2,3 9 X 9 ANF 9-5	19
B&W 15 X 15 B&W Mark B5	8	GE BWR/2,3 9 X 9 ANF IX	19
B&W 15 X 15 B&W Mark B5Z	8	GE BWR/2,3 9 X 9 ANF 9X	19
B&W 15 X 15 B&W Mark B6	8		
B&W 15 X 15 B&W Mark B7	9	GENERAL ELECTRIC BWR/4-6	20
B&W 15 X 15 B&W Mark B8	9	GE BWR/4-6 7 X 7 GE-2	20
B&W 15 X 15 B&W Mark BEB	9	GE BWR/4-6 7 X 7 GE-3a	20
B&W 15 X 15 B&W Mark BGd	9	GE BWR/4-6 7 X 7 GE-3b	20
B&W 15 X 15 WE	10	GE BWR/4-6 8 X 8 GE-4a	20
		GE BWR/4-6 8 X 8 GE-4b	21
BABCOCK & WILCOX 17 X 17	11	GE BWR/4-6 8 X 8 GE-5	21
B&W 17 X 17 B&W Mark C	11	GE BWR/4-6 8 X 8 GE Prepres.	21
		GE BWR/4-6 8 X 8 GE Barrier	21
COMBUSTION ENGINEERING 14 X 14	12	GE BWR/4-6 8 X 8 GE-8	22
CE 14 X 14 CE	12	GE BWR/4-6 8 X 8 GE-9	22
CE 14 X 14 ANF	12	GE BWR/4-6 8 X 8 GE-10	22
CE 14 X 14 WE	12	GE BWR/4-6 9 X 9 GE-11	22
		GE BWR/4-6 10 X 10 GE-12	23
COMBUSTION ENGINEERING 16 X 16	13	GE BWR/4-6 9 X 9 GE-13	23
CE 16 X 16 CE	13	GE BWR/4-6 8 X 8 ANF	23
		GE BWR/4-6 8 X 8 ANF Prepres.	23
COMB. ENGINEERING SYSTEM 80	14	GE BWR/4-6 9 X 9 ANF	24
CE SYSTEM 80 16 X 16 CE	14	GE BWR/4-6 9 X 9 ANF 9-5	24
		GE BWR/4-6 9 X 9 ANF IX	24
GENERAL ELECTRIC BWR/2,3	15	GE BWR/4-6 9 X 9 ANF 9X	25
GE BWR/2,3 7 X 7 GE-2a	15	GE BWR/4-6 8 X 8 WE	24
GE BWR/2,3 7 X 7 GE-2b	15	GE BWR/4-6 10 x 10 SVEA 96	25
GE BWR/2,3 7 X 7 GE-3	15		
GE BWR/2,3 7 X 7 ANF	15	WESTINGHOUSE 14 X 14	26
GE BWR/2,3 8 X 8 GE-4	16	WE 14 X 14 WE Standard	26
GE BWR/2,3 8 X 8 GE-5	16	WE 14 X 14 WE LOPAR	26
GE BWR/2,3 8 X 8 GE Prepres.	16	WE 14 X 14 WE OFA	26
GE BWR/2,3 8 X 8 GE Barrier	16	WE 14 X 14 WE Vantage 5	27
GE BWR/2,3 8 X 8 GE-8a	17	WE 14 X 14 ANF	26
GE BWR/2,3 8 X 8 GE-9	17	WE 14 X 14 ANF Top Rod	27
GE BWR/2,3 8 X 8 GE-10	17	WE 14 X 14 B&W	27
GE BWR/2,3 9 X 9 GE-11	17		
GE BWR/2,3 10 X 10 GE-12	18		

WESTINGHOUSE 15 X 15	28	Haddam Neck	39
WE 15 X 15 WE Standard	28	Haddam Neck 15 X 15 WE	39
WE 15 X 15 WE LOPAR	28	Haddam Neck 15 x 15 NUMEC Zr	39
WE 15 X 15 WE OFA	28	Haddam Neck 15 X 15 NUMEC SS	39
WE 15 X 15 WE Vantage 5	29	Haddam Neck 15 X 15 GULF Zr	39
WE 15 X 15 ANF	29	Haddam Neck 15 X 15 GULF SS	40
WE 15 X 15 ANF Part Length	28	Haddam Neck 15 X 15 B&W SS	40
WE 15 X 15 B&W Mark BW	29	Haddam Neck 15 X 15 B&W Zr	40
WESTINGHOUSE 17 X 17	30	Humboldt Bay	41
WE 17 X 17 WE LOPAR	30	Humboldt Bay 7 X 7 GE Type I	41
WE 17 X 17 WE OFA	30	Humboldt Bay 7 x 7 GE Type II	41
WE 17 X 17 WE Vantage 5	30	Humboldt Bay 6 X 6 GE	41
WE 17 X 17 WE Vantage +	30	Humboldt Bay 6 X 6 ANF	41
WE 17 X 17 WE Vantage 5H	31		
WE 17 X 17 ANF	31	Indian Point 1	42
WE 17 X 17 B&W Mark BW	31	Indian Point 1 13 X 14 B&W	42
		Indian Point 1 13 X 14 WE	42
SOUTH TEXAS	32	LaCrosse	43
SOUTH TEXAS 17 X 17 WE	32	LaCrosse 10 X 10 AC	43
		LaCrosse 10 X 10 ANF	43
Big Rock Point	33	Palisades	44
Big Rock Point 12 X 12 GE	33	Palisades 15 X 15 CE	44
Big Rock Point 11 X 11 GE	33	Palisades 15 X 15 ANF	44
Big Rock Point 9 X 9 GE	33		
Big Rock Point 7 X 7 GE	33	St. Lucie 2	45
Big Rock Point 8 X 8 GE	34	St. Lucie 2 16 X 16 CE	45
Big Rock Point 9 X 9 ANF	34		
Big Rock Point 11 X 11 ANF	34	San Onofre 1	46
Big Rock Point 11 X 11 NFS	34	San Onofre 1 14 X 14 WE	46
		San Onofre 1 14 X 14 WE Zr	46
Dresden 1	35	Yankee Rowe	47
Dresden 1 6 X 6 GE Type I	35	Yankee Rowe 17 X 18 WE	47
Dresden 1 7 x 7 GE Type II	35	Yankee Rowe 15 X 16 UNC	47
Dresden 1 6 x 6 GE Type III-B	35	Yankee Rowe 15 X 16 ANF	47
Dresden 1 6 x 6 GE Type III-F	36	Yankee Rowe 15 X 16 CE	47
Dresden 1 6 x 6 GE Type V	36		
Dresden 1 7 x 7 GE SA-1	36		
Dresden 1 8 x 8 GE PF Fuels	36		
Dresden 1 6 X 6 UNC	37		
Dresden 1 6 X 6 ANF	37		
Fort Calhoun	38		
Ft. Calhoun 14 X 14 CE	38		
Ft. Calhoun 14 X 14 ANF	38		
Ft. Calhoun 14 x 14 WE	38		

Index to Fuel Assembly Types by Fuel Vendor and Fuel Design

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UNITED NUCLEAR CORPORATION

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CLASS: B&W 15 X 15

Type Reactor: PWR
 Number of Reactors in this Class: 8
 Overall Assembly Length: 165.7 in.
 Overall Assembly Width: 8.54 in.

MANUFACTURER:	Babcock & Wilcox	Babcock & Wilcox	Babcock & Wilcox	Babcock & Wilcox
ARRAY SIZE:	15 X 15	15 X 15	15 X 15	15 X 15
VERSION:	Mark B	Mark B2	Mark B3	Mark B4
CURRENT EIA CODE:	15BMB	15B2	15B3	15B4
NEW EIA CODE:	B1515B4	B1515B2	B1515B3	B1515B4
ASSM. LENGTH (in.):	165.625	165.625	165.625	165.625
PITCH (in.)	0.568	0.568	0.568	0.568
URANIUM/ASSEMBLY (kg.)	464	464	464	464
FUEL RODS:	208		208	208
FUEL ROD DIAMETER (in.):	0.430		0.430	0.430
FUEL ROD LENGTH (in.):	153.68		153.68	153.68
ACTIVE FUEL LENGTH (in.):	141.8		141.8	141.8
CLAD MATERIAL:	Zircaloy-4	Zircaloy-4	Zircaloy-4	Zircaloy-4
CLAD THICKNESS (in.):	0.0265		0.0265	0.0265
FILL PRESSURE (psig):			415	415
PELLET DIAMETER (in.):	0.3686		0.3686	0.3686
FUEL DENSITY (%):	95		95	95
PLENUM LENGTH (in.):	11.720		11.720	11.720
-----USAGE DATA-----				
APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	567	96	611	2071
FUTURE DISCHARGES:	No	No	No	Yes
DISTINGUISHING FEATURES:	Inconel grids; specific design yet to be identified.		Increased fuel density, spring type spacer.	Prepressurized fuel

CLASS: B&W 15 X 15

Type Reactor: PWR
 Number of Reactors in this Class: 8
 Overall Assembly Length: 165.7 in.
 Overall Assembly Width: 8.54 in.

MANUFACTURER:	Babcock & Wilcox	Babcock & Wilcox	Babcock & Wilcox	Babcock & Wilcox
ARRAY SIZE:	15 X 15	15 X 15	15 X 15	15 X 15
VERSION:	Mark B4Z	Mark B5	Mark B5Z	Mark B6
CURRENT EIA CODE:	15B4Z	15B5	15B5Z	15B6
NEW EIA CODE:	B1515B4Z	B1515B5	B1515B5Z	B1515B6
ASSM. LENGTH (in.):	165.625	165.625	165.625	165.625
PITCH (in.)	0.568	0.568	0.568	0.568
URANIUM/ASSEMBLY (kg.)	464	464	464	464
FUEL RODS:	208	208	208	208
FUEL ROD DIAMETER (in.):	0.430	0.430	0.430	0.430
FUEL ROD LENGTH (in.):	153.68	153.68	153.68	153.68
ACTIVE FUEL LENGTH (in.):	141.8	141.8	141.8	141.8
CLAD MATERIAL:	Zircaloy-4	Zircaloy-4	Zircaloy-4	Zircaloy-4
CLAD THICKNESS (in.):	0.0265	0.0265	0.0265	0.0265
FILL PRESSURE (psig):	415	415	415	415
PELLET DIAMETER (in.):	0.3686	0.3686	0.3686	0.3686
FUEL DENSITY (%) :	95	95	95	95
PLENUM LENGTH (in.):	11.720	11.720	11.720	11.720
-----USAGE DATA-----				
APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	36	56	43	0
FUTURE DISCHARGES:	Yes	Yes	Yes	Yes
DISTINGUISHING FEATURES:	Mark B4 fuel with Zircaloy Spacers	Revised end fitting	Mark B5 fuel with Zircaloy Spacers	Zircaloy spacers, skirtless upper end spacer, removable top nozzle.

CLASS: B&W 15 X 15

Type Reactor: PWR
 Number of Reactors in this Class: 8
 Overall Assembly Length: 165.7 in.
 Overall Assembly Width: 8.54 in.

MANUFACTURER:	Babcock & Wilcox	Babcock & Wilcox	Babcock & Wilcox	Babcock & Wilcox
ARRAY SIZE:	15 X 15	15 X 15	15 X 15	15 X 15
VERSION:	Mark B7	Mark B8	Mark BEB	Mark BGd
CURRENT EIA CODE:	15B7	15B8	15BEB	15BGd
NEW EIA CODE:	B1515B7	B1515B8	B1515BEB	B1515BGd
ASSM. LENGTH (in.):	165.625	165.625	165.625	165.625
PITCH (in.)	0.568	0.568	0.568	0.568
URANIUM/ASSEMBLY (kg.)	464	464	464	430
FUEL RODS:	208	208	208	208
FUEL ROD DIAMETER (in.):	0.430	0.430	0.430	0.430
FUEL ROD LENGTH (in.):	153.68	153.68	153.68	153.68
ACTIVE FUEL LENGTH (in.):	141.8	141.8	141.8	141.8
CLAD MATERIAL:	Zircaloy-4	Zircaloy-4	Zircaloy-4	Zircaloy-4
CLAD THICKNESS (in.):	0.0265	0.0265	0.0265	0.0265
FILL PRESSURE (psig):	415	415	415	415
PELLET DIAMETER (in.):	0.3686	0.3686	0.3686	0.3686
FUEL DENSITY (%) :	95	95	95	95
PLENUM LENGTH (in.):	11.720	11.720	11.720	11.720
-----USAGE DATA-----				
APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	0	0	4	4
FUTURE DISCHARGES:	Yes	Yes	No	No
DISTINGUISHING FEATURES:	Mark B6 features plus shorter lower end fitting, longer fuel rod, increased plenum volume.	Debris fretting resistant fuel rod design, reduced prepressurization.	Extended burnup LTA	LTA with integral gadolinia absorbers in fuel rods.

CLASS: B&W 15 X 15

Type Reactor: PWR
Number of Reactors in this Class: 8
Overall Assembly Length: 165.7 in.
Overall Assembly Width: 8.54 in.

MANUFACTURER: Westinghouse
ARRAY SIZE: 15 x 15
VERSION:
CURRENT EIA CODE: -----
NEW EIA CODE: B1515W
ASSM. LENGTH (in.):
PITCH (in.)
URANIUM/ASSEMBLY (kg.)
FUEL RODS:
FUEL ROD DIAMETER (in.):
FUEL ROD LENGTH (in.):
ACTIVE FUEL LENGTH (in.):
CLAD MATERIAL:
CLAD THICKNESS (in.):
FILL PRESSURE (psig):
PELLET DIAMETER (in.):
FUEL DENSITY (%) :
PLENUM LENGTH (in.):

-----USAGE DATA-----

APPROXIMATE NUMBER
DISCHARGED TO
12/31/88:
FUTURE DISCHARGES: LTA IN 1991
DISTINGUISHING
FEATURES:

CLASS: B&W 17 X 17

Type Reactor: PWR
Number of Reactors in this Class: 3
Overall Assembly Length: 165.7 in.
Overall Assembly Width: 8.54 in.

MANUFACTURER: Babcock & Wilcox
ARRAY SIZE: 17 X 17
VERSION: Mark C
CURRENT EIA CODE: 17BMC
NEW EIA CODE: B1717B
ASSM. LENGTH (in.): 165.71875
PITCH (in.): 0.502
URANIUM/ASSEMBLY (kg.): 456
FUEL RODS: 264
FUEL ROD DIAMETER (in.): 0.379
FUEL ROD LENGTH (in.): 152.688
ACTIVE FUEL LENGTH (in.): 143.0
CLAD MATERIAL: Zircaloy-4
CLAD THICKNESS (in.): 0.0240
FILL PRESSURE (psig): 435
PELLET DIAMETER (in.): 0.3232
FUEL DENSITY (%): 95
PLENUM LENGTH (in.): 9.520

-----USAGE DATA-----

APPROXIMATE NUMBER
DISCHARGED TO
12/31/88: 4
FUTURE DISCHARGES: Possible
DISTINGUISHING
FEATURES: LTAs used at Oconee.

CLASS: CE 14 X 14

Type Reactor: PWR
 Number of Reactors in this Class: 5
 Overall Assembly Length: 157 in.
 Overall Assembly Width: 8.1 in.

MANUFACTURER:	Combustion Engineering ANF (Exxon)	Westinghouse
ARRAY SIZE:	14 X 14	14 X 14
VERSION:	Standard	Comb. Eng.
CURRENT EIA CODE:	14CST	14ECE
NEW EIA CODE:	C1414C	C1414A
ASSM. LENGTH (in.):	157.	157.24
PITCH (in.)	0.580	0.580
URANIUM/ASSEMBLY (kg.)	386	381
FUEL RODS:	164	176
FUEL ROD DIAMETER (in.):	0.440	0.440
FUEL ROD LENGTH (in.):	147	146.484
ACTIVE FUEL LENGTH (in.):	137	134.06
CLAD MATERIAL:	Zircaloy-4	Zircaloy-4
CLAD THICKNESS (in.):	0.028	0.031
FILL PRESSURE (psig):	300-450	375
PELLET DIAMETER (in.):	0.3765	0.370
FUEL DENSITY (%):	94-95	94
PLENUM LENGTH (in.):	8.375	95

-----USAGE DATA-----

APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	2810	323	189
FUTURE DISCHARGES:	Yes	Yes	Yes
DISTINGUISHING FEATURES:	Vendor	Vendor	Vendor

CLASS: CE 16 X 16

Type Reactor: PWR
 Number of Reactors in this Class: 4
 Overall Assembly Length: 176.8 in.
 Overall Assembly Width: 8.1 in.

MANUFACTURER: Combustion Engineering
 ARRAY SIZE: 16 X 16
 VERSION:
 CURRENT EIA CODE: 16CSD
 NEW EIA CODE: c1616C
 ASSM. LENGTH (in.): 176.803
 PITCH (in.): 0.506
 URANIUM/ASSEMBLY (kg.): 426
 FUEL RODS: 224
 FUEL ROD DIAMETER (in.): 0.382
 FUEL ROD LENGTH (in.): 161
 ACTIVE FUEL LENGTH (in.): 150
 CLAD MATERIAL: Zircaloy-4
 CLAD THICKNESS (in.): 0.025
 FILL PRESSURE (psig): 300-450
 PELLET DIAMETER (in.): 0.325
 FUEL DENSITY (%): 94-95
 PLENUM LENGTH (in.): 9.527

-----USAGE DATA-----

APPROXIMATE NUMBER
 DISCHARGED TO
 12/31/88: 1043
 FUTURE DISCHARGES: Yes
 DISTINGUISHING
 FEATURES:

CLASS: CE SYSTEM 80

Type Reactor: PWR
Number of Reactors in this Class: 4
Overall Assembly Length: 178.3 in.
Overall Assembly Width: 8.1 in.

MANUFACTURER:	Combustion Engineering
ARRAY SIZE:	16 X 16
VERSION:	System 80
CURRENT EIA CODE:	16CS8
NEW EIA CODE:	C1616CS8
ASSM. LENGTH (in.):	178.250
PITCH (in.)	0.506
URANIUM/ASSEMBLY (kg.)	426
FUEL RODS:	220
FUEL ROD DIAMETER (in.):	0.382
FUEL ROD LENGTH (in.):	161
ACTIVE FUEL LENGTH (in.):	150
CLAD MATERIAL:	Zircaloy-4
CLAD THICKNESS (in.):	0.025
FILL PRESSURE (psig):	300-450
PELLET DIAMETER (in.):	0.325
FUEL DENSITY (%):	94-95%
PLENUM LENGTH (in.):	9.527

-----USAGE DATA-----

APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	188
FUTURE DISCHARGES:	Yes
DISTINGUISHING FEATURES:	

CLASS: GE BWR/2,3

Type Reactor: BWR
 Number of Reactors in this Class: 9
 Overall Assembly Length: 171.2 in.
 Overall Assembly Width: 5.44 in.*

MANUFACTURER:	General Electric	General Electric	General Electric	ANF (Exxon)
ARRAY SIZE:	7 X 7	7 X 7	7 X 7	7 X 7
VERSION:	GE-2a	GE-2b	GE-3	GE
CURRENT EIA CODE:	07G14	07G21	07G31	07EGE
NEW EIA CODE:	G2307G2a	G2307G2b	G2307G3	G2307A
ASSM. LENGTH (in.):	171.125	171.2	171.125	171.25
PITCH (in.)	0.738	0.738	0.738	0.738
URANIUM/ASSEMBLY (kg.)	196	193	0	184
FUEL RODS:	49	49	49	48
FUEL ROD DIAMETER (in.):	0.570	0.563	0.563	0.570
FUEL ROD LENGTH (in.):		156.1		158.15
ACTIVE FUEL LENGTH (in.):	144	144.0	144.0	144
CLAD MATERIAL:	Zircaloy-2	Zircaloy-2	Zircaloy-2	Zircaloy-2
CLAD THICKNESS (in.):	0.0355	0.032	0.037	0.036-0.046
FILL PRESSURE (psig):	0	0	0	0
PELLET DIAMETER (in.):	0.488	0.487	0.477	0.49
FUEL DENSITY (%) :	94-95	93-95	94-95	95%
PLENUM LENGTH (in.):	11.25	11.24	11.0	
-----USAGE DATA-----				
APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	1672	5047	394	260
FUTURE DISCHARGES:	No	No	No	No
DISTINGUISHING FEATURES:	Fuel rod diameter and cladding thickness.	Fuel rod diameter and cladding thickness.	Cladding thickness and hydrogen getter; Reduced weight per assembly.	Vendor; array size. Used at Oyster Creek.

* Width given is for a fuel bundle with an 80 mil channel attached. Width does not include channel fastener clips or spacer buttons. For information on these items, see Section 2.2.8 (NFA Hardware).

CLASS: GE BWR/2,3

Type Reactor: BWR
 Number of Reactors in this Class: 9
 Overall Assembly Length: 171.2 in.
 Overall Assembly Width: 5.44 in.*

MANUFACTURER:	General Electric	General Electric	General Electric	General Electric
ARRAY SIZE:	8 x 8	8 x 8	8 x 8	8 x 8
VERSION:	GE-4	GE-5	Pressurized	Barrier
CURRENT EIA CODE:	08G41	08G51	08G61	08G71
NEW EIA CODE:	G2308G4	G2308G5	G2308GP	G2308GB
ASSM. LENGTH (in.):	171.125	171.125	171.125	171.125
PITCH (in.)	0.640	0.640	0.640	0.640
URANIUM/ASSEMBLY (kg.)	183	177	176	176
FUEL RODS:	63	62	62	62
FUEL ROD DIAMETER (in.):	0.493	0.483	0.483	0.483
FUEL ROD LENGTH (in.):				
ACTIVE FUEL LENGTH (in.):	144.0	145.24	145.24	145.24
CLAD MATERIAL:	Zircaloy-2	Zircaloy-2	Zircaloy-2	Zircaloy-2
CLAD THICKNESS (in.):	0.034	0.032	0.032	0.032
FILL PRESSURE (psig):	0	0	30	30
PELLET DIAMETER (in.):	0.416	0.410	0.410	0.410
FUEL DENSITY (%) :	95.0	95.0	95.0	95.0
PLENUM LENGTH (in.):	11.24	9.48	9.48	9.48

-----USAGE DATA-----

APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	3876	792	1836	248
FUTURE DISCHARGES:	No	No	Yes	Yes
DISTINGUISHING FEATURES:	First 8 x 8 array; 1 water rod	Added second water rod and axial natural U blankets.	Prepressurized fuel rod to 3 Atm.	Zirconium barrier fuel.

* Width given is for a fuel bundle with an 80 mil channel attached. Width does not include channel fastener clips or spacer buttons. For information on these items, see Section 2.2.8 (NFA Hardware).

CLASS: GE BWR/2,3

Type Reactor: BWR
 Number of Reactors in this Class: 9
 Overall Assembly Length: 171.2 in.
 Overall Assembly Width: 5.44 in.*

MANUFACTURER:	General Electric	General Electric	General Electric	General Electric
ARRAY SIZE:	8 X 8	8 X 8	8 X 8	9 X 9
VERSION:	GE-8a	GE-9	GE-10	GE-11
CURRENT EIA CODE:	08G81	08G91	-	-
NEW EIA CODE:	G2308G8a	G2308G9	G2308G10	GE2309G11
ASSM. LENGTH (in.):				
PITCH (in.)				
URANIUM/ASSEMBLY (kg.)				
FUEL RODS:	60	60	60	74
FUEL ROD DIAMETER (in.):				
FUEL ROD LENGTH (in.):				
ACTIVE FUEL LENGTH (in.):	145.24	145.24	145.24	
CLAD MATERIAL:	Zircaloy-2	Zircaloy-2	Zircaloy-2	Zircaloy-2
CLAD THICKNESS (in.):				
FILL PRESSURE (psig):				
PELLET DIAMETER (in.):				
FUEL DENSITY (%):				
PLENUM LENGTH (in.):				
	-----USAGE DATA-----			
APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	0	0	0	0
FUTURE DISCHARGES:	Yes	Yes	Yes	Yes
DISTINGUISHING FEATURES:	GE-8 fuel; up to 6 water rods; fuel prepressurization to 5 Atm.	GE-9 fuel; single, large-diameter water rod; ferrule-type spacers.	GE-10 fuel; GE-9 features plus new interactive fuel channel.	GE-11 fuel; 9 x 9 fuel rod array with 2 large- diameter water rods, 9 part-length fuel rods.

* Width given is for a fuel bundle with an 80 mil channel attached. Width does not include channel fastener clips or spacer buttons. For information on these items, see Section 2.2.8 (NFA Hardware).

CLASS: GE BWR/2,3

Type Reactor: BWR
 Number of Reactors in this Class: 9
 Overall Assembly Length: 171.2 in.
 Overall Assembly Width: 5.44 in.*

MANUFACTURER:	General Electric	General Electric	ANF (Exxon)	ANF (Exxon)
ARRAY SIZE:	10 X 10	9 X 9	8 X 8	8 x 8
VERSION:	GE-12	GE-13	JP-3	Pressurized
CURRENT EIA CODE:	-	-	08EG3	08AP
NEW EIA CODE:	G2310G12	G2309G13	G2308A	G2308AP
ASSM. LENGTH (in.):			171.29	
PITCH (in.)			0.641	
URANIUM/ASSEMBLY (kg.)			174	
FUEL RODS:			63	
FUEL ROD DIAMETER (in.):			0.484	
FUEL ROD LENGTH (in.):			158.665	
ACTIVE FUEL LENGTH (in.):			145.24	
CLAD MATERIAL:	Zircaloy-2	Zircaloy-2	Zircaloy-2	Zircaloy-2
CLAD THICKNESS (in.):			0.36	
FILL PRESSURE (psig):			45	
PELLET DIAMETER (in.):			0.4195	
FUEL DENSITY (%):			94.5	
PLENUM LENGTH (in.):			10.020	

-----USAGE DATA-----

APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	0	0	684	0
FUTURE DISCHARGES:	Yes	Yes	Yes	Yes
DISTINGUISHING FEATURES:	GE-12 fuel; 10 X 10 fuel rod array, part- length fuel rods, low pressure drop spacer.	GE-13 fuel; 9 X 9 fuel rod array, increased U content, choice of active fuel lengths.	Vendor, array size; fuel rods were not prepressurized.	Vendor, array size; prepressurized fuel rods.

* Width given is for a fuel bundle with an 80 mil channel attached. Width does not include channel fastener clips or spacer buttons. For information on these items, see Section 2.2.8 (NFA Hardware).

CLASS: GE BWR/2,3

Type Reactor: BWR
 Number of Reactors in this Class: 9
 Overall Assembly Length: 171.2 in.
 Overall Assembly Width: 5.44 in.*

MANUFACTURER:	ANF (Exxon)	ANF (Exxon)	ANF (Exxon)	ANF (Exxon)
ARRAY SIZE:	9 X 9	9 X 9	9 X 9	9 X 9
VERSION:	JP-3	9-5	IX	9X
CURRENT EIA CODE:	09EG3	09A95	-	-
NEW EIA CODE:	G2309A	G2309A5	G2309AIX	G2309A9X
ASSM. LENGTH (in.):	171.29			
PITCH (in.)	0.572			
URANIUM/ASSEMBLY (kg.)	168			
FUEL RODS:	79		72	72
FUEL ROD DIAMETER (in.):	0.424			
FUEL ROD LENGTH (in.):	159.07			
ACTIVE FUEL LENGTH (in.):	145.24			
CLAD MATERIAL:	Zircaloy-2	Zircaloy-2	Zircaloy-2	Zircaloy-2
CLAD THICKNESS (in.):	0.030			
FILL PRESSURE (psig):	60.0			
PELLET DIAMETER (in.):	0.3565			
FUEL DENSITY (%):	94.5			
PLENUM LENGTH (in.):	9.580			

-----USAGE DATA-----

APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	0	0	0	0
FUTURE DISCHARGES:	Yes	Yes	Yes	Yes
DISTINGUISHING FEATURES:	Vendor, array size; two water rods.	Vendor, array size, five water rods.	Vendor, array size, water channel in place of 9 fuel rods, barrier fuel.	Vendor, array size, water channel in place of 9 fuel rods.

* Width given is for a fuel bundle with an 80 mil channel attached. Width does not include channel fastener clips or spacer buttons. For information on these items, see Section 2.2.8 (NFA Hardware).

CLASS: GE BWR/4-6

Type Reactor: BWR
 Number of Reactors in this Class: 28
 Overall Assembly Length: 176.2 in.
 Overall Assembly Width: 5.44 in.*

MANUFACTURER:	General Electric	General Electric	General Electric	General Electric
ARRAY SIZE:	7 X 7	7 X 7	7 X 7	8 X 8
VERSION:	GE-2	GE-3a	GE-3b	GE-4a
CURRENT EIA CODE:	07G22	07G32	07G33	08G42
NEW EIA CODE:	G4607G2	G4607G3a	G4607G3b	G4608G4a
ASSM. LENGTH (in.):	175.87	175.87	175.87	175.87
PITCH (in.)	0.738			0.640
URANIUM/ASSEMBLY (kg.)	193	188	190	184
FUEL RODS:	49	49	49	63
FUEL ROD DIAMETER (in.):	0.563	0.563	0.563	0.493
FUEL ROD LENGTH (in.):				
ACTIVE FUEL LENGTH (in.):	144	144	146.0	144.0
CLAD MATERIAL:	Zircaloy-2	Zircaloy-2	Zircaloy-2	Zircaloy-2
CLAD THICKNESS (in.):	0.032	0.037	0.037	0.034
FILL PRESSURE (psig):	0	0	0	0
PELLET DIAMETER (in.):	0.487	0.477	0.477	0.416
FUEL DENSITY (%):	93-95	94	94	95.0
PLENUM LENGTH (in.):	16	16	14	16
-----USAGE DATA-----				
APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	1142	3752	1184	1784
FUTURE DISCHARGES:	No	No	No	No
DISTINGUISHING FEATURES:	Fuel rod diameter and cladding thickness.	Cladding thickness and hydrogen getter; Reduced weight per assembly. Active fuel length.	Cladding thickness and hydrogen getter; Reduced weight per assembly. Active fuel length	First 8 x 8 array; 1 water rod, active fuel length.

* Width given is for a fuel bundle with an 80 mil channel attached. Width does not include channel fastener clips or spacer buttons. For information on these items, see Section 2.2.8 (NFA Hardware).

CLASS: GE BWR/4-6

Type Reactor: BWR

Number of Reactors in this Class: 28

Overall Assembly Length: 176.2 in.

Overall Assembly Width: 5.44 in.*

MANUFACTURER:	General Electric	General Electric	General Electric	General Electric
ARRAY SIZE:	8 x 8	8 x 8	8 x 8	8 x 8
VERSION:	GE-4b	GE-5	Pressurized	Barrier
CURRENT EIA CODE:	08G43	08G52	08G62	08G72
NEW EIA CODE:	G4608G4b	G4608G5	G4608GP	G4608GB
ASSM. LENGTH (in.):	175.87	175.87	175.87	175.87
PITCH (in.)	0.640	0.640	0.640	0.640
URANIUM/ASSEMBLY (kg.)	186	183	183	183
FUEL RODS:	63	62	62	62
FUEL ROD DIAMETER (in.):	0.493	0.483	0.483	0.483
FUEL ROD LENGTH (in.):				
ACTIVE FUEL LENGTH (in.):	146	150.0	150.0	150.0
CLAD MATERIAL:	Zircaloy-2	Zircaloy-2	Zircaloy-2	Zircaloy-2
CLAD THICKNESS (in.):	0.034	0.032	0.032	0.032
FILL PRESSURE (psig):	0	0	30	30
PELLET DIAMETER (in.):	0.416	0.410	0.410	0.410
FUEL DENSITY (%) :	95	95.0	95.0	95.0
PLENUM LENGTH (in.):	14	9.48	9.48	9.48

-----USAGE DATA-----

APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	1787	3455	6591	775
FUTURE DISCHARGES:	No	No	Yes	Yes
DISTINGUISHING FEATURES:	First 8 x 8 array; 1 water rod, active fuel length.	Added second water rod and natural U axial blankets.	Prepressurized fuel rod to 3 Atm.	Zirconium barrier fuel.

* Width given is for a fuel bundle with an 80 mil channel attached. Width does not include channel fastener clips or spacer buttons. For information on these items, see Section 2.2.8 (NFA Hardware).

CLASS: GE BWR/4-6

Type Reactor: BWR

Number of Reactors in this Class: 28

Overall Assembly Length: 176.2 in.

Overall Assembly Width: 5.44 in.*

MANUFACTURER:	General Electric	General Electric	General Electric	General Electric
ARRAY SIZE:	8 X 8	8 X 8	8 X 8	9 X 9
VERSION:	GE-8	GE-9	GE-10	GE-11
CURRENT EIA CODE:	08G82	08G92	-	-
NEW EIA CODE:	G4608G8	G4608G9	G4608G10	G4609G11
ASSM. LENGTH (in.):				
PITCH (in.)				
URANIUM/ASSEMBLY (kg.)				
FUEL RODS:	60	60	60	74
FUEL ROD DIAMETER (in.):				
FUEL ROD LENGTH (in.):				
ACTIVE FUEL LENGTH (in.):	150	150		
CLAD MATERIAL:	Zircaloy-2	Zircaloy-2	Zircaloy-2	Zircaloy-2
CLAD THICKNESS (in.):				
FILL PRESSURE (psig):				
PELLET DIAMETER (in.):				
FUEL DENSITY (%):				
PLENUM LENGTH (in.):				
-----USAGE DATA-----				
APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	0	0	0	0
FUTURE DISCHARGES:	Yes	Yes	Yes	Yes
DISTINGUISHING FEATURES:	GE-8 fuel; up to 4 water rods, active fuel length, fuel prepressurization to 5 Atm.	GE-9 fuel; single, large-diameter water rod; ferrule-type spacers.	GE-10 fuel; GE-9 features plus new interactive fuel channel.	GE-11 fuel; 9 x 9 fuel rod array with 2 large-diameter water rod, 9 part-length fuel rods.

* Width given is for a fuel bundle with an 80 mil channel attached. Width does not include channel fastener clips or spacer buttons. For information on these items, see Section 2.2.8 (NFA Hardware).

CLASS: GE BWR/4-6

Type Reactor: BWR
 Number of Reactors in this Class: 28
 Overall Assembly Length: 176.2 in.
 Overall Assembly Width: 5.44 in.*

MANUFACTURER:	General Electric	General Electric	ANF (Exxon)	ANF (Exxon)
ARRAY SIZE:	10 x 10	9 x 9	8 x 8	8 x 8
VERSION:	GE-12	GE-13	JP-4,5	Pressurized
CURRENT EIA CODE:	-	-	OBEG4	OBAP
NEW EIA CODE:	G4610G12	G4609G13	G4608A	G4608AP
ASSM. LENGTH (in.):			176.05	
PITCH (in.)			0.641	
URANIUM/ASSEMBLY (kg.)			177	
FUEL RODS:			62	
FUEL ROD DIAMETER (in.):			0.484	
FUEL ROD LENGTH (in.):			163.424	
ACTIVE FUEL LENGTH (in.):			150.00	
CLAD MATERIAL:	Zircaloy-2	Zircaloy-2	Zircaloy-2	Zircaloy-2
CLAD THICKNESS (in.):			0.036	
FILL PRESSURE (psig):			30.0	
PELLET DIAMETER (in.):				
FUEL DENSITY (%):			94.5	
PLENUM LENGTH (in.):			10.024	
-----USAGE DATA-----				
APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	0	0	0	0
FUTURE DISCHARGES:	Yes	Yes	Yes	Yes
DISTINGUISHING FEATURES:	GE-12 fuel; 10 x 10 fuel rod array, part- length fuel rods, low pressure drop spacer.	GE-13 fuel; 9 x 9 fuel rod array, increased U content, part-length fuel rods, choice of active fuel lengths.	Vendor, array size; fuel rods were not prepressurized.	Vendor, array size; prepressurized fuel rods.

* Width given is for a fuel bundle with an 80 mil channel attached. Width does not include channel fastener clips or spacer buttons. For information on these items, see Section 2.2.8 (NFA Hardware).

CLASS: GE BWR/4-6

Type Reactor: BWR
 Number of Reactors in this Class: 28
 Overall Assembly Length: 176.2 in.
 Overall Assembly Width: 5.44 in.*

MANUFACTURER:	Westinghouse	ANF (Exxon)	ANF (Exxon)	ANF (Exxon)
ARRAY SIZE:	8 X 8	9 X 9	9 X 9	9 X 9
VERSION:	QUAD +	JP-4,5	9-5	IX
CURRENT EIA CODE:	08WQ+	09EG4	09A95	09AIX
NEW EIA CODE:	G4608W	G4609A	G4609A5	G4609AIX
ASSM. LENGTH (in.):	175.5	176.058		
PITCH (in.)	0.609	0.572		
URANIUM/ASSEMBLY (kg.)				
FUEL RODS:	64	79	76	72
FUEL ROD DIAMETER (in.):	0.458	0.424		
FUEL ROD LENGTH (in.):	160.6	163.84		
ACTIVE FUEL LENGTH (in.):	150.0	150.0		
CLAD MATERIAL:	Zircaloy-2	Zircaloy-2	Zircaloy-2	Zircaloy-2
CLAD THICKNESS (in.):	0.029	0.03		
FILL PRESSURE (psig):		60.0		
PELLET DIAMETER (in.):	0.3913			
FUEL DENSITY (%):	95	94.5		
PLENUM LENGTH (in.):	10.0	9.578		
-----USAGE DATA-----				
APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	0	0	0	0
FUTURE DISCHARGES:	No	Yes	Yes	Yes
DISTINGUISHING FEATURES:	QUAD+ design with integral water cross design.	Vendor, array size two water rods.	Vendor, array size, five water rods.	Vendor, array size, water channel in place of 9 fuel rods.

* Width given is for a fuel bundle with an 80 mil channel attached. Width does not include channel fastener clips or spacer buttons. For information on these items, see Section 2.2.8 (NFA Hardware).

CLASS: GE BWR/4-6

Type Reactor: BWR
 Number of Reactors in this Class: 28
 Overall Assembly Length: 176.2 in.
 Overall Assembly Width: 5.44 in.*

MANUFACTURER:	ANF (Exxon)	ABB Atom
ARRAY SIZE:	9 x 9	10 x 10
VERSION:	9X	SVEA 96
CURRENT EIA CODE:	09A9X	-
NEW EIA CODE:	G4609A9X	G4610C
ASSM. LENGTH (in.):		
PITCH (in.)		
URANIUM/ASSEMBLY (kg.)		
FUEL RODS:	72	96
FUEL ROD DIAMETER (in.):		
FUEL ROD LENGTH (in.):		
ACTIVE FUEL LENGTH (in.):		
CLAD MATERIAL:		
CLAD THICKNESS (in.):		
FILL PRESSURE (psig):		
PELLET DIAMETER (in.):		
FUEL DENSITY (%) :		
PLENUM LENGTH (in.):		

-----USAGE DATA-----

APPROXIMATE NUMBER
 DISCHARGED TO

12/31/88: 0 0

FUTURE DISCHARGES: Yes Yes

DISTINGUISHING FEATURES:	Vendor, fuel rod array, water channel in place of 9 fuel rod positions.	Vendor, fuel rod array, water cross and water channel with 5 minibundles.
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* Width given is for a fuel bundle with an 80 mil channel attached. Width does not include channel fastener clips or spacer buttons. For information on these items, see Section 2.2.8 (NFA Hardware).

CLASS: WE 14 X 14

Type Reactor: PWR
 Number of Reactors in this Class: 6
 Overall Assembly Length: 159.8 in.
 Overall Assembly Width: 7.76 in.

MANUFACTURER:	Westinghouse	Westinghouse	Westinghouse	ANF (Exxon)
ARRAY SIZE:	14 X 14	14 X 14	14 X 14	14 X 14
VERSION:	Standard	LOPAR	OFA	Westinghouse
CURRENT EIA CODE:	14WZS	14WZZ	14WOF	14EWE
NEW EIA CODE:	W1414W	W1414WL	W1414WO	W1414A
ASSM. LENGTH (in.):	159.71	159.71	159.71	160.13
PITCH (in.)	0.556	0.556	0.556	0.556
URANIUM/ASSEMBLY (kg.)	389	389	336	379
FUEL RODS:	179	179	179	179
FUEL ROD DIAMETER (in.):	0.422	0.422	0.400	0.424
FUEL ROD LENGTH (in.):	148.55-152.40	148.55-152.40	148.61-151.85	149.10
ACTIVE FUEL LENGTH (in.):	141.20-145.20	141.20-145.20	135.20-144.00	142.00
CLAD MATERIAL:	Zircaloy-4	Zircaloy-4	Zircaloy-4	Zircaloy-4
CLAD THICKNESS (in.):	0.0225	0.0225	0.0243	0.03
FILL PRESSURE (psig):	0 - 460	0 - 460	250 - 350	290
PELLET DIAMETER (in.):	0.3640-0.3674	0.3640-0.3674	0.3444	0.3505
FUEL DENSITY (%) :	91-95	91-95	95	94
PLENUM LENGTH (in.):	6.990		7.158	5.900

-----USAGE DATA-----

APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	581	1376	88	559
FUTURE DISCHARGES:	No	Yes	Yes	Yes
DISTINGUISHING FEATURES:	Stainless steel guide tubes and Inconel spacers.	Zircaloy guide tubes and Inconel spacers.	Zircaloy spacers, optimized fuel rod diameter.	Vendor

CLASS: WE 14 X 14

Type Reactor: PWR
 Number of Reactors in this Class: 6
 Overall Assembly Length: 159.8 in.
 Overall Assembly Width: 7.76 in.

MANUFACTURER:	ANF (Exxon)	Babcock & Wilcox	Westinghouse
ARRAY SIZE:	14 X 14	14 x 14	14 x 14
VERSION:	Top Rod	Ginna	Vantage 5
CURRENT EIA CODE:	14ETR	14BST	-----
NEW EIA CODE:	W1414ATR	W1414B	W1414WV5
ASSM. LENGTH (in.):	160.13		
PITCH (in.)	0.556		
URANIUM/ASSEMBLY (kg.)	365		
FUEL RODS:	179		
FUEL ROD DIAMETER (in.):	0.417		
FUEL ROD LENGTH (in.):	152.00		
ACTIVE FUEL LENGTH (in.):	144.00		
CLAD MATERIAL:	Zircaloy-4		
CLAD THICKNESS (in.):	0.0295		
FILL PRESSURE (psig):	305		
PELLET DIAMETER (in.):			
FUEL DENSITY (%) :	94.0		
PLENUM LENGTH (in.):	7.280		

-----USAGE DATA-----

APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	299	2	
FUTURE DISCHARGES:	Yes	No	Yes
DISTINGUISHING FEATURES:	Vendor, gadolinia in fuel rods.	Vendor	

CLASS: WE 15 X 15

Type Reactor: PWR
 Number of Reactors in this Class: 10
 Overall Assembly Length: 159.8 in.
 Overall Assembly Width: 8.44 in.

MANUFACTURER:	Westinghouse	Westinghouse	Westinghouse	ANF (Exxon)
ARRAY SIZE:	15 X 15	15 X 15	15 X 15	15 x 15
VERSION:	Standard	LOPAR	OFA	Part Length
CURRENT EIA CODE:	15WZS	15WZZ	15WOF	-
NEW EIA CODE:	W1515W	W1515WL	W1515WO	W1515APL
ASSM. LENGTH (in.):		159.71	159.765	
PITCH (in.)		0.563	0.563	
URANIUM/ASSEMBLY (kg.)		456	463	
FUEL RODS:		204	204	
FUEL ROD DIAMETER (in.):		0.422	0.422	
FUEL ROD LENGTH (in.):		148.59-151.88	151.85	
ACTIVE FUEL LENGTH (in.):		142.00-144.00	144.00	
CLAD MATERIAL:		Zircaloy-4	Zircaloy-4	
CLAD THICKNESS (in.):		0.0242	0.0242	
FILL PRESSURE (psig):		0 - 475	275 - 350	
PELLET DIAMETER (in.):		0.3659	0.3659	
FUEL DENSITY (%) :		95	95	
PLENUM LENGTH (in.):		8.200	8.200	
-----USAGE DATA-----				
APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	1395	3149	266	
FUTURE DISCHARGES:	No	Yes	Yes	
DISTINGUISHING FEATURES:	Stainless steel guide tubes and Inconel spacers.	Zircaloy guide tubes and Inconel spacers.	Zircaloy spacers, optimized fuel rod diameter.	Bottom 42 inches of fuel rod is stainless steel.

CLASS: WE 15 X 15

Type Reactor: PWR
 Number of Reactors in this Class: 10
 Overall Assembly Length: 159.8 in.
 Overall Assembly Width: 8.44 in.

MANUFACTURER:	ANF (Exxon)	Babcock & Wilcox	Westinghouse
ARRAY SIZE:	15 x 15	15 x 15	15 x 15
VERSION:	Westinghouse	Mark BW	Vantage 5
CURRENT EIA CODE:	15EWE	15BBW	----
NEW EIA CODE:	W1515A	W1515B	W1515W5
ASSM. LENGTH (in.):	159.7		
PITCH (in.)	0.563		
URANIUM/ASSEMBLY (kg.)	432		
FUEL RODS:	204		
FUEL ROD DIAMETER (in.):	0.424		
FUEL ROD LENGTH (in.):	152.065		
ACTIVE FUEL LENGTH (in.):	144.00		
CLAD MATERIAL:	Zircaloy-4		
CLAD THICKNESS (in.):	0.030		
FILL PRESSURE (psig):	290		
PELLET DIAMETER (in.):	0.3565		
FUEL DENSITY (%) :	94		
PLENUM LENGTH (in.):	6.800		

-----USAGE DATA-----

APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	743	0	
FUTURE DISCHARGES:	Yes	Future LTA (1991)	Yes
DISTINGUISHING FEATURES:	Vendor	Vendor	

CLASS: WE 17 X 17

Type Reactor: PWR
 Number of Reactors in this Class: 34
 Overall Assembly Length: 159.8 in.
 Overall Assembly Width: 8.44 in.

MANUFACTURER:	Westinghouse	Westinghouse	Westinghouse	Westinghouse
ARRAY SIZE:	17 X 17	17 X 17	17 X 17	17 X 17
VERSION:	LOPAR	OFA	Vantage 5	Vantage +
CURRENT EIA CODE:	17WST	17WOF	17WVA	17WV+
NEW EIA CODE:	W1717W	W1717WO	W1717WV5	W1717WV+
ASSM. LENGTH (in.):	159.765	159.765	160.1	
PITCH (in.)	0.496	0.496	0.496	
URANIUM/ASSEMBLY (kg.)	464	426	423	
FUEL RODS:	264	264	264	
FUEL ROD DIAMETER (in.):	0.374	0.360	0.36	
FUEL ROD LENGTH (in.):	151.560-151.635	151.560-151.635	152.3	
ACTIVE FUEL LENGTH (in.):	144.00	144.00	144	
CLAD MATERIAL:	Zircaloy-4	Zircaloy-4	Zircaloy-4	ZIRLO
CLAD THICKNESS (in.):	0.0225	0.0225	0.0225	
FILL PRESSURE (psig):	275 - 500	275 - 350		
PELLET DIAMETER (in.):	0.3225	0.3088	0.3088	
FUEL DENSITY (%) :	95	95	95	
PLENUM LENGTH (in.):	6.300	6.900	7.405	
-----USAGE DATA-----				
APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	5106	628	4	0
FUTURE DISCHARGES:	Yes	Yes	Yes	Yes
DISTINGUISHING FEATURES:	Original WE 17 x 17 fuel.	Zircaloy spacers, optimized fuel rod diameter.	Integral burnable absorbers, removable top nozzle, axial U blankets, increased burnup, flow mixers.	ZIRLO cladding.

CLASS: WE 17 X 17

Type Reactor: PWR
 Number of Reactors in this Class: 34
 Overall Assembly Length: 159.8 in.
 Overall Assembly Width: 8.44 in.

MANUFACTURER:	Westinghouse	ANF (Exxon)	Babcock & Wilcox
ARRAY SIZE:	17 x 17	17 X 17	17 x 17
VERSION:	Vantage 5H	Westinghouse	Mark BW
CURRENT EIA CODE:	17WVH	17EWE	17BBW
NEW EIA CODE:	W1717WVH	W1717A	W1717B
ASSM. LENGTH (in.):		159.71	
PITCH (in.)		0.496	
URANIUM/ASSEMBLY (kg.)		401	
FUEL RODS:		264	
FUEL ROD DIAMETER (in.):		0.360	
FUEL ROD LENGTH (in.):		152.00	
ACTIVE FUEL LENGTH (in.):		144.00	
CLAD MATERIAL:		Zircaloy-4	
CLAD THICKNESS (in.):		0.025	
FILL PRESSURE (psig):		290	
PELLET DIAMETER (in.):		0.303	
FUEL DENSITY (%):		94	
PLENUM LENGTH (in.):		7.260	

-----USAGE DATA-----

APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	139	0
FUTURE DISCHARGES:	Possible	Yes
DISTINGUISHING FEATURES:	Vendor	Vendor

CLASS: SOUTH TEXAS

Type Reactor: PWR
Number of Reactors in this Class: 2
Overall Assembly Length: 199 in.
Overall Assembly Width: 8.43 in.

MANUFACTURER: Westinghouse
ARRAY SIZE: 17 X 17
VERSION: XLR
CURRENT EIA CODE: 17WXL
NEW EIA CODE: XST17W
ASSM. LENGTH (in.): 199
PITCH (in.): 0.496
URANIUM/ASSEMBLY (kg.)
FUEL RODS:
FUEL ROD DIAMETER (in.): 0.374
FUEL ROD LENGTH (in.): 176.642
ACTIVE FUEL LENGTH (in.):
CLAD MATERIAL: Zircaloy-4
CLAD THICKNESS (in.): 0.0225
FILL PRESSURE (psig):
PELLET DIAMETER (in.): 0.322
FUEL DENSITY (%):
PLENUM LENGTH (in.):

-----USAGE DATA-----

APPROXIMATE NUMBER
DISCHARGED TO
12/31/88: 0
FUTURE DISCHARGES: Yes
DISTINGUISHING
FEATURES:

CLASS: Big Rock Point

Type Reactor: BWR
 Number of Reactors in this Class: 1
 Overall Assembly Length: 84.0 in.
 Overall Assembly Width: 6.52 in.

MANUFACTURER:	General Electric	General Electric	General Electric	General Electric
ARRAY SIZE:	12 X 12	11 X 11	9 X 9	7 X 7
VERSION:	Big Rock Pt			Centermelt
CURRENT EIA CODE:	-----	11GBR	09GBR	07GBR
NEW EIA CODE:	XBR12G	XBR11G	XBR09G	XBR07G
ASSM. LENGTH (in.):				
PITCH (in.)		0.577	0.707	
URANIUM/ASSEMBLY (kg.)			138	
FUEL RODS:		121	81	
FUEL ROD DIAMETER (in.):		0.449	0.5625	
FUEL ROD LENGTH (in.):				
ACTIVE FUEL LENGTH (in.):		70	70	
CLAD MATERIAL:		Zircaloy-2	Zircaloy-2	
CLAD THICKNESS (in.):		0.034	0.040	
FILL PRESSURE (psig):				
PELLET DIAMETER (in.):			0.471	
FUEL DENSITY (%) :		94	94	
PLENUM LENGTH (in.):				
-----USAGE DATA-----				
APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	0	6	143	4
FUTURE DISCHARGES:	No	No	No	No
DISTINGUISHING FEATURES:		Vendor, array size.	Vendor, array size.	Vendor, array size, centermelt fuel.

CLASS: Big Rock Point

Type Reactor: BWR

Number of Reactors in this Class: 1

Overall Assembly Length: 84.0 in.

Overall Assembly Width: 6.52 in.

MANUFACTURER:	General Electric	ANF (Exxon)	ANF (Exxon)	Nuclear Fuel Services
ARRAY SIZE:	8 X 8	9 X 9	11 X 11	11 X 11
VERSION:	Centermelt			
CURRENT EIA CODE:	08GBR	09EBR	11EBR	11NBR
NEW EIA CODE:	XBR08G	XBR09A	XBR11A	XBR11N
ASSM. LENGTH (in.):		82	83.970	
PITCH (in.)		0.707	0.577	
URANIUM/ASSEMBLY (kg.)			132	
FUEL RODS:			117	
FUEL ROD DIAMETER (in.):		0.5625	0.449	
FUEL ROD LENGTH (in.):			78.601	
ACTIVE FUEL LENGTH (in.):		68	70.00	
CLAD MATERIAL:		Zircaloy-2	Zircaloy-2	
CLAD THICKNESS (in.):			0.034	
FILL PRESSURE (psig):			30.0	
PELLET DIAMETER (in.):				
FUEL DENSITY (%) :			94%	
PLENUM LENGTH (in.):			4.301	
-----USAGE DATA-----				
APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	2	4	145	8
FUTURE DISCHARGES:	No	No	Yes	No
DISTINGUISHING FEATURES:	Vendor, array size, centermelt fuel.	Vendor, array size.	Vendor, array size.	Vendor

CLASS: Dresden 1

Type Reactor: BWR
 Number of Reactors in this Class: 1
 Overall Assembly Length: 134.4 in.
 Overall Assembly Width: 4.28 in.

MANUFACTURER:	General Electric	General Electric	General Electric
ARRAY SIZE:	6 X 6	7 x 7	6 x 6
VERSION:	Type I		Type III-B
CURRENT EIA CODE:	-----	07G	06G3B
NEW EIA CODE:	XDR06G	XDR07G	XDR06G3B
ASSM. LENGTH (in.):			
PITCH (in.)			
URANIUM/ASSEMBLY (kg.)			
FUEL RODS:	36		
FUEL ROD DIAMETER (in.):			
FUEL ROD LENGTH (in.):			
ACTIVE FUEL LENGTH (in.):			
CLAD MATERIAL:			
CLAD THICKNESS (in.):			
FILL PRESSURE (psig):			
PELLET DIAMETER (in.):			
FUEL DENSITY (%):			
PLENUM LENGTH (in.):			

-----USAGE DATA-----

APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	1	0	163
FUTURE DISCHARGES:	No	No	No
DISTINGUISHING FEATURES:	Type I fuel. Initial core load.		

CLASS: Dresden 1

Type Reactor: BWR
 Number of Reactors in this Class: 1
 Overall Assembly Length: 134.4 in.
 Overall Assembly Width: 4.28 in.

MANUFACTURER:	General Electric	General Electric	General Electric	General Electric
ARRAY SIZE:	6 x 6	6 x 6	7 x 7	8 x 8
VERSION:	Type III-F	Type V	SA-1	PF Fuels
CURRENT EIA CODE:	06G3F	06G5	07Gs	08G
NEW EIA CODE:	XDR06G3F	XDR06G5	XDR07GS	XDR08G
ASSM. LENGTH (in.):				
PITCH (in.)				
URANIUM/ASSEMBLY (kg.)				
FUEL RODS:				
FUEL ROD DIAMETER (in.):				
FUEL ROD LENGTH (in.):				
ACTIVE FUEL LENGTH (in.):				
CLAD MATERIAL:				
CLAD THICKNESS (in.):				
FILL PRESSURE (psig):				
PELLET DIAMETER (in.):				
FUEL DENSITY (%):				
PLENUM LENGTH (in.):				

-----USAGE DATA-----

APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	96	0	1
FUTURE DISCHARGES:	No	No	No
DISTINGUISHING FEATURES:			

CLASS: Dresden 1

Type Reactor: BWR
 Number of Reactors in this Class: 1
 Overall Assembly Length: 134.4 in.
 Overall Assembly Width: 4.28 in.

MANUFACTURER:	United Nuclear	ANF (Exxon)
ARRAY SIZE:	6 X 6	6 X 6
VERSION:	Dresden 1	Dresden-1
CURRENT EIA CODE:	06UGD	06EGE
NEW EIA CODE:	XDR06U	XDR06A
ASSM. LENGTH (in.):		134.32
PITCH (in.)		0.694
URANIUM/ASSEMBLY (kg.)		95
FUEL RODS:		35
FUEL ROD DIAMETER (in.):		0.5645
FUEL ROD LENGTH (in.):		116.65
ACTIVE FUEL LENGTH (in.):		108.25
CLAD MATERIAL:		Zircaloy-2
CLAD THICKNESS (in.):		0.036-0.046
FILL PRESSURE (psig):		0
PELLET DIAMETER (in.):		
FUEL DENSITY (%) :		93.5
PLENUM LENGTH (in.):		

-----USAGE DATA-----

APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	458	66
FUTURE DISCHARGES:	No	No
DISTINGUISHING FEATURES:		Vendor

CLASS: Ft. Calhoun

Type Reactor: PWR
 Number of Reactors in this Class: 1
 Overall Assembly Length: 146 in.
 Overall Assembly Width: 8.1 in.

MANUFACTURER:	Combustion Engineering ANF (Exxon)	Westinghouse
ARRAY SIZE:	14 X 14	14 X 14
VERSION:	Fort Calhoun	Fort Calhoun
CURRENT EIA CODE:	14CFC	14EFC
NEW EIA CODE:	XFC14C	XFC14A
ASSM. LENGTH (in.):	146	147
PITCH (in.)	0.580	
URANIUM/ASSEMBLY (kg.)	376	352
FUEL RODS:	168	
FUEL ROD DIAMETER (in.):	0.440	
FUEL ROD LENGTH (in.):	137	
ACTIVE FUEL LENGTH (in.):	128	
CLAD MATERIAL:	Zircaloy-4	
CLAD THICKNESS (in.):	0.028	
FILL PRESSURE (psig):	300-450	
PELLET DIAMETER (in.):	0.3765	
FUEL DENSITY (%) :	94-95%	
PLENUM LENGTH (in.):	7.010	

-----USAGE DATA-----

APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	290	136	0
FUTURE DISCHARGES:	Possible	Yes	Future Reload
DISTINGUISHING FEATURES:			

CLASS: Haddam Neck

Type Reactor: PWR
 Number of Reactors in this Class: 1
 Overall Assembly Length: 137.1 in.
 Overall Assembly Width: 8.42 in.

MANUFACTURER:	Westinghouse	NUMEC	NUMEC	Gulf
ARRAY SIZE:	15 x 15	15 x 15	15 x 15	15 x 15
VERSION:		Zircaloy	St. Steel	Zircaloy
CURRENT EIA CODE:	15WSS	15MZ	15MS	15IZ
NEW EIA CODE:	XHN15W	XHN15MZ	XHN15MS	XHN15IZ
ASSM. LENGTH (in.):	137.06			
PITCH (in.)	0.563			
URANIUM/ASSEMBLY (kg.)	413			
FUEL RODS:	204			
FUEL ROD DIAMETER (in.):	0.422			
FUEL ROD LENGTH (in.):	126.52-126.72			
ACTIVE FUEL LENGTH (in.):	120.00-122.00			
CLAD MATERIAL:	St.Steel 304			
CLAD THICKNESS (in.):	0.0165			
FILL PRESSURE (psig):	0			
PELLET DIAMETER (in.):	0.3895			
FUEL DENSITY (%) :	93			
PLENUM LENGTH (in.):				

-----USAGE DATA-----

APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	309	2	2	2
FUTURE DISCHARGES:	No	No	No	No
DISTINGUISHING FEATURES:				

CLASS: Haddam Neck

Type Reactor: PWR
 Number of Reactors in this Class: 1
 Overall Assembly Length: 137.1 in.
 Overall Assembly Width: 8.42 in.

MANUFACTURER:	Gulf	Babcock & Wilcox	Babcock & Wilcox
ARRAY SIZE:	15 x 15	15 X 15	15 x 15
VERSION:	St. Steel	St. Steel	Zircaloy
CURRENT EIA CODE:	151S	15BWH	
NEW EIA CODE:	XHN151S	XHN15B	XHN15BZ
ASSM. LENGTH (in.):		137.06	
PITCH (in.)		0.563	
URANIUM/ASSEMBLY (kg.)		409	
FUEL RODS:		204	
FUEL ROD DIAMETER (in.):		0.422	
FUEL ROD LENGTH (in.):		126.68	
ACTIVE FUEL LENGTH (in.):		120.5	
CLAD MATERIAL:		St.Steel 304	Zircaloy-4
CLAD THICKNESS (in.):		0.0165	
FILL PRESSURE (psig):		40	
PELLET DIAMETER (in.):		0.3825	
FUEL DENSITY (%) :		95	
PLENUM LENGTH (in.):		4.810	
-----USAGE DATA-----			
APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	1	418	
FUTURE DISCHARGES:	No	Yes	Yes
DISTINGUISHING FEATURES:			Zircaloy fuel rods.

CLASS: Humboldt Bay

Type Reactor: BWR
 Number of Reactors in this Class: 1
 Overall Assembly Length: 95 in.
 Overall Assembly Width: 4.67 in.

MANUFACTURER:	General Electric	General Electric	General Electric	ANF (Exxon)
ARRAY SIZE:	7 X 7	7 x 7	6 X 6	6 X 6
VERSION:	Type I	Type II	Type III	Humboldt Bay
CURRENT EIA CODE:	07G13	07G2	06G12	06EGH
NEW EIA CODE:	XHB07G	XHB07G2	XHB06G	XHB06A
ASSM. LENGTH (in.):	95		95	95
PITCH (in.)	0.631		0.740	
URANIUM/ASSEMBLY (kg.)	76		76	
FUEL RODS:	49		36	36
FUEL ROD DIAMETER (in.):	0.486		0.563	
FUEL ROD LENGTH (in.):	83.2			
ACTIVE FUEL LENGTH (in.):	79.0		77.5	
CLAD MATERIAL:	Zircaloy-2		Zircaloy-2	
CLAD THICKNESS (in.):	0.033		0.032	
FILL PRESSURE (psig):	0		0	
PELLET DIAMETER (in.):	0.411		0.488	
FUEL DENSITY (%) :	94.3		94.3	
PLENUM LENGTH (in.):	3.5		5.2	

-----USAGE DATA-----

APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	0	88	176	126
FUTURE DISCHARGES:	No	No	No	No
DISTINGUISHING FEATURES:				

CLASS: Indain Point

Type Reactor: PWR

Number of Reactors in this Class: 1

Overall Assembly Length: 138.8 in.

Overall Assembly Width: 6.27 in.

MANUFACTURER:	Babcock & Wilcox	Westinghouse
ARRAY SIZE:	13 X 14	13 X 14
VERSION:		
CURRENT EIA CODE:	-----	14WIP
NEW EIA CODE:	XIP14B	XIP14W
ASSM. LENGTH (in.):		
PITCH (in.)		
URANIUM/ASSEMBLY (kg.)		
FUEL RODS:		
FUEL ROD DIAMETER (in.):		
FUEL ROD LENGTH (in.):		
ACTIVE FUEL LENGTH (in.):		
CLAD MATERIAL:		
CLAD THICKNESS (in.):		
FILL PRESSURE (psig):		
PELLET DIAMETER (in.):		
FUEL DENSITY (%) :		
PLENUM LENGTH (in.):		

-----USAGE DATA-----

APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	0	160
FUTURE DISCHARGES:	No	No
DISTINGUISHING FEATURES:	Vendor	Vendor

CLASS: LaCrosse

Type Reactor: BWR
 Number of Reactors in this Class: 1
 Overall Assembly Length: 102.5 in.
 Overall Assembly Width: 5.62 in.

MANUFACTURER:	Allis Chalmers	ANF (Exxon)
ARRAY SIZE:	10 x 10	10 x 10
VERSION:		AC
CURRENT EIA CODE:	10AST	10EAC
NEW EIA CODE:	XLC10L	XLC10A
ASSM. LENGTH (in.):		102.45
PITCH (in.)	0.565	0.557
URANIUM/ASSEMBLY (kg.)		108
FUEL RODS:	100	96
FUEL ROD DIAMETER (in.):	0.396	0.394
FUEL ROD LENGTH (in.):		89.98
ACTIVE FUEL LENGTH (in.):		83.00
CLAD MATERIAL:	St.Steel 348H	St.Steel 348H
CLAD THICKNESS (in.):	0.020	0.022
FILL PRESSURE (psig):		0
PELLET DIAMETER (in.):	0.350	
FUEL DENSITY (%) :	95	94%
PLENUM LENGTH (in.):		3.890
-----USAGE DATA-----		
APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	155	178
FUTURE DISCHARGES:	No	No
DISTINGUISHING FEATURES:	Vendor	Vendor

CLASS: Palisades

Type Reactor: PWR

Number of Reactors in this Class: 1

Overall Assembly Length: 147.5 in.

Overall Assembly Width: 8.2 in.

MANUFACTURER:	Combustion Engineering ANF (Exxon)	
ARRAY SIZE:	15 X 15	15 X 15
VERSION:	Palisades	Comb. Eng.
CURRENT EIA CODE:	15CPR	15ECE
NEW EIA CODE:	XPA15C	XPA15A
ASSM. LENGTH (in.):	147.5	148.852
PITCH (in.)	0.550	0.550
URANIUM/ASSEMBLY (kg.)	413	401
FUEL RODS:	204	216
FUEL ROD DIAMETER (in.):	0.418	0.417
FUEL ROD LENGTH (in.):	140.00	139.423
ACTIVE FUEL LENGTH (in.):	132	131.80
CLAD MATERIAL:	Zircaloy-4	Zircaloy-4
CLAD THICKNESS (in.):	0.026	0.030
FILL PRESSURE (psig):	300-450	306
PELLET DIAMETER (in.):	0.3580	
FUEL DENSITY (%):	94-95%	94.0
PLENUM LENGTH (in.):		

-----USAGE DATA-----

APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	273	324
FUTURE DISCHARGES:	Possible	Yes
DISTINGUISHING FEATURES:	Vendor	Vendor

CLASS: St. Lucie 2

Type Reactor: PWR
 Number of Reactors in this Class: 1
 Overall Assembly Length: 158.2 in.
 Overall Assembly Width: 8.1 in.

MANUFACTURER:	Combustion Engineering
ARRAY SIZE:	16 X 16
VERSION:	Lucie 2
CURRENT EIA CODE:	16CSL
NEW EIA CODE:	XSL16C
ASSM. LENGTH (in.):	158.129
PITCH (in.)	0.506
URANIUM/ASSEMBLY (kg.)	390
FUEL RODS:	224
FUEL ROD DIAMETER (in.):	0.382
FUEL ROD LENGTH (in.):	146.499
ACTIVE FUEL LENGTH (in.):	136.7
CLAD MATERIAL:	Zircaloy-4
CLAD THICKNESS (in.):	0.025
FILL PRESSURE (psig):	300-450
PELLET DIAMETER (in.):	0.325
FUEL DENSITY (%) :	94-95%
PLENUM LENGTH (in.):	8.158

-----USAGE DATA-----

APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	236
FUTURE DISCHARGES:	Yes
DISTINGUISHING FEATURES:	

2A-46

CLASS: San Onofre 1

Type Reactor: PWR
Number of Reactors in this Class: 1
Overall Assembly Length: 137.1 in.
Overall Assembly Width: 7.76 in.

MANUFACTURER:	Westinghouse	Westinghouse
ARRAY SIZE:	14 X 14	14 x 14
VERSION:		Zircaloy
CURRENT EIA CODE:	14WSS	
NEW EIA CODE:	XS014W	XS014WZ
ASSM. LENGTH (in.):	137.06	
PITCH (in.)	0.556	
URANIUM/ASSEMBLY (kg.)	373	
FUEL RODS:	180	
FUEL ROD DIAMETER (in.):	0.422	
FUEL ROD LENGTH (in.):	126.13-126.68	
ACTIVE FUEL LENGTH (in.):	120.00	
CLAD MATERIAL:	St.Steel 304	Zircaloy-4
CLAD THICKNESS (in.):	0.0165	
FILL PRESSURE (psig):	0 - 300	
PELLET DIAMETER (in.):	0.3835	
FUEL DENSITY (%) :	93-95	
PLENUM LENGTH (in.):		

-----USAGE DATA-----

APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	468	
FUTURE DISCHARGES:	Yes	Yes
DISTINGUISHING FEATURES:	St. Steel Clad	Zircaloy fuel rods.

CLASS: Yankee Rowe

Type Reactor: PWR
 Number of Reactors in this Class: 1
 Overall Assembly Length: 111.8 in.
 Overall Assembly Width: 7.62 in.

MANUFACTURER:	Westinghouse	United Nuclear	ANF (Exxon)	Combustion Engineering
ARRAY SIZE:	17 X 18	15 X 16	15 X 16	15 X 16
VERSION:		Yankee Rowe	Westinghouse	Yankee Rowe
CURRENT EIA CODE:	18WYR	16UYR	16EYR	16CYR
NEW EIA CODE:	XYR18W	XYR16U	XYR16A	XYR16C
ASSM. LENGTH (in.):			111.775	111.785
PITCH (in.)			0.472	0.472
URANIUM/ASSEMBLY (kg.)			236	231
FUEL RODS:			231	231
FUEL ROD DIAMETER (in.):			0.365	
FUEL ROD LENGTH (in.):			95.340	95
ACTIVE FUEL LENGTH (in.):			91.00	91
CLAD MATERIAL:			Zircaloy-4	Zircaloy-4
CLAD THICKNESS (in.):			0.024	0.026
FILL PRESSURE (psig):			250	300-450
PELLET DIAMETER (in.):				0.3105
FUEL DENSITY (%) :			94.0	94-95%
PLENUM LENGTH (in.):				1.55
-----USAGE DATA-----				
APPROXIMATE NUMBER DISCHARGED TO 12/31/88:	76	73	228	40
FUTURE DISCHARGES:	No	No	Possible	Yes
DISTINGUISHING FEATURES:	Vendor	Vendor	Vendor	Vendor

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