

Table 3.1 Average Annual Exposure Data for Certain Categories of NRC Licensees 2008–2018

NRC License Category* and Program Code	Calendar Year	Number of Licensees Reporting	Number of Monitored Individuals	Number of Individuals with Measurable TEDE	Collective TEDE (person-rem)	Average TEDE (rem)	Average Measurable TEDE per Individual (rem)
Industrial Radiography 03310 03320	2008	62	2,976	2,593	1,461.405	0.49	0.56
	2009	65	2,662	2,307	1,317.982	0.50	0.57
	2010	57	2,377	2,034	1,297.300	0.55	0.64
	2011	64	2,545	2,210	1,608.821	0.63	0.73
	2012	67	2,670	2,275	1,508.792	0.57	0.66
	2013	60	2,925	2,506	1,547.351	0.53	0.62
	2014	57	3,288	2,862	1,778.171	0.54	0.62
	2015	69	3,426	2,908	1,695.040	0.49	0.58
	2016	64	3,035	2,635	1,270.459	0.42	0.48
	2017	62	3,389	2,912	1,709.858	0.50	0.59
	2018	61	3,876	3,303	1,967.879	0.51	0.60
Manufacturing and Distribution 02500 03211 03212 03214	2008	18	1,934	1,341	222.123	0.11	0.17
	2009	17	1,939	1,388	179.539	0.09	0.13
	2010	18	976	672	146.667	0.15	0.22
	2011	16	903	702	112.023	0.12	0.16
	2012	22	1,057	713	118.709	0.11	0.17
	2013	20	994	627	114.550	0.12	0.18
	2014	19	962	656	138.631	0.14	0.21
	2015	21	949	634	155.688	0.16	0.25
	2016	21	905	606	142.958	0.16	0.24
	2017	21	940	615	139.071	0.15	0.23
	2018	14	1,086	718	136.505	0.13	0.19
Independent Spent Fuel Storage 23100 23200	2008	2	53	21	1.248	0.02	0.06
	2009	2	72	34	1.465	0.02	0.04
	2010	2	73	39	1.337	0.02	0.03
	2011	2	54	25	1.449	0.03	0.06
	2012	2	42	15	1.099	0.03	0.07
	2013	2	53	18	1.533	0.03	0.09
	2014	2	51	22	3.192	0.06	0.15
	2015	2	57	20	1.102	0.02	0.06
	2016	2	57	22	0.579	0.01	0.03
	2017	2	67	20	0.631	0.01	0.03
	2018	2	70	17	1.740	0.02	0.10
Fuel Cycle Licenses - Fabrication, Processing, and Uranium Enrichment, and UF ₆ Production Plants 11400 21200 21210	2008	10	7,807	3,424	538.201	0.07	0.16
	2009	11	8,918	3,738	533.721	0.06	0.14
	2010	11	9,362	4,212	541.876	0.06	0.13
	2011	11	9,535	4,361	607.202	0.06	0.14
	2012	9	7,388	3,541	438.729	0.06	0.12
	2013	8	7,476	3,942	357.067	0.05	0.09
	2014	9	6,689	3,685	366.224	0.05	0.10
	2015	7	5,296	3,033	327.112	0.06	0.11
	2016	7	5,413	2,999	277.687	0.05	0.09
	2017	7	5,058	2,930	254.997	0.05	0.09
	2018	7	4,737	2,783	229.530	0.05	0.08
Commercial Light-Water Reactors (LWRs) ** 41111	2008	104	169,325	79,450	9,195.940	0.05	0.12
	2009	104	176,381	81,754	10,024.804	0.06	0.12
	2010	104	179,648	75,010	8,631.384	0.05	0.12
	2011	104	191,538	81,321	8,771.326	0.05	0.11
	2012	104	193,977	79,549	8,035.393	0.04	0.10
	2013	100	174,614	67,236	6,759.547	0.04	0.10
	2014	100	174,853	70,847	7,124.519	0.04	0.10
	2015	99	176,886	70,798	7,019.088	0.04	0.10
	2016	99	155,574	59,353	5,365.709	0.03	0.09
	2017	99	157,072	64,761	6,416.548	0.04	0.10
	2018	98	150,219	61,014	5,829.471	0.04	0.10
Grand Totals and Averages	2008	196	182,095	86,829	11,418.917	0.06	0.13
	2009	199	189,972	89,221	12,057.511	0.06	0.14
	2010	192	192,436	81,967	10,618.564	0.06	0.13
	2011	197	204,575	88,619	11,100.821	0.05	0.13
	2012	204	205,134	86,093	10,102.722	0.05	0.12
	2013	190	186,062	74,329	8,780.048	0.05	0.12
	2014	187	185,843	78,072	9,410.737	0.05	0.12
	2015	198	186,614	77,393	9,198.030	0.05	0.12
	2016	193	164,984	65,615	7,057.392	0.04	0.11
	2017	193	166,137	70,952	8,085.593	0.05	0.11
	2018	182	159,988	67,835	8,165.125	0.05	0.12

NOTE: The data shown in this table for all categories of licensees have not been adjusted to account for transient workers (see Section 5).

* These categories consist only of NRC licensees required to submit an annual report (see Section 2).

** This category includes all LWRs in commercial operation for a full year for each of the years indicated.

Table 3.2 Distribution of Annual Collective TEDE by License Category 2018

	Number of Individuals with TEDE in the Ranges (rem) *													Total Number Monitored	Number with Meas. Dose	Total Collective Dose (TEDE) (person-rem)	
License Category (Number of sites reporting)	No. Meas.	Meas. <0.025	0.025- 0.10	0.10- 0.25	0.25- 0.50	0.50- 0.75	0.75- 1.0	1.0- 2.0	2.0- 3.0	3.0- 4.0	4.0- 5.0	5.0- 6.0	>6.0				
INDUSTRIAL RADIOGRAPHY																	
Fixed Locations (2)	5	1	3	-	2	-	-	-	-	-	-	-	-	11	6	0.944	
Temporary Job Sites (59)	568	339	460	519	589	451	194	493	122	21	8	-	1	3,865	3,297	1,966.935	
Total (61)	573	340	463	519	591	451	294	493	122	21	8	0	1	3,876	3,303	1,967.879	
MANUFACTURING AND DISTRIBUTION																	
Type "A" Broad (2)	120	59	53	39	31	16	6	28	3	2	-	-	-	357	237	88.338	
Type "B" Broad and Other (0)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Nuclear Pharmacies (12)	248	202	158	73	36	7	1	1	3	-	-	-	-	729	481	48.167	
Total (14)	368	261	211	112	67	23	7	29	6	2	0	0	0	1,086	718	136.505	
INDEPENDENT SPENT FUEL STORAGE																	
Total (2)	53	10	3	1	2	1	0	0	0	0	0	0	0	70	17	1.740	
FUEL CYCLE**																	
Total (7)	1,954	1,415	677	407	229	47	3	5	0	0	0	0	0	4,737	2,783	229.530	
COMMERCIAL POWER REACTORS***																	
Boiling Water (33)	30,454	9,354	11,320	6,258	3,021	831	250	134	1	0	0	0	0	61,622	31,168	3,659.588	
Pressurized Water (65)	58,751	11,145	12,387	4,772	1,186	255	66	34	0	0	0	0	0	88,597	29,846	2,169.883	
Total (98)	89,205	20,499	23,707	11,030	4,207	1,086	316	168	1	0	0	0	0	150,219	61,014	5,829.471	
GRAND TOTALS	92,153	22,525	25,061	12,069	5,096	1,608	620	695	129	23	8	0	1	159,988	67,835	8,165.125	

NOTE: The data shown in this table for all categories of licensees have not been adjusted to account for transient workers (see Section 5).

* Dose values exactly equal to the values separating ranges are reported in the next higher range.

** This category includes fabrication, processing, and uranium enrichment plants (see Section 3.3.5).

*** This category includes all reactors in commercial operation for a full year during 2018.

Table 3.3 Annual Exposure Information for Industrial Radiography Licensees 2016–2018

Year	Type of License	Number of Licensees	Number of Monitored Individuals	Individuals with Measurable Dose	Collective Dose (person-rem)	Average Measurable Dose (rem)
2016	Fixed Location	2	14	6	0.835	0.14
	Temporary Job Sites	62	3,021	2,629	1,269.624	0.48
	Total	64	3,035	2,635	1,270.459	0.48
2017	Fixed Location	2	12	7	0.325	0.05
	Temporary Job Sites	60	3,377	2,905	1,709.533	0.59
	Total	62	3,389	2,912	1,709.858	0.59
2018	Fixed Location	2	11	6	0.944	0.16
	Temporary Job Sites	59	3,865	3,297	1,966.935	0.60
	Total	61	3,876	3,303	1,967.879	0.60

Table 3.4 Annual Exposure Information for Manufacturing and Distribution Licensees 2016–2018

Year	Type of License	Number of Licensees	Number of Monitored Individuals	Individuals with Measurable Dose	Collective Dose (person-rem)	Average Measurable Dose (rem)
2016	M & D - Type "A" Broad	2	310	231	111.394	0.48
	M & D - Type "B" Broad and Other	0	0	0	0.000	0.00
	M & D - Nuclear Pharmacies	19	595	375	31.564	0.08
	Total	21	905	606	142.958	0.24
2017	M & D - Type "A" Broad	2	315	205	99.578	0.49
	M & D - Type "B" Broad and Other	1	1	1	0.010	0.01
	M & D - Nuclear Pharmacies	18	624	409	39.483	0.10
	Total	21	940	615	139.071	0.23
2018	M & D - Type "A" Broad	2	357	237	88.338	0.37
	M & D - Type "B" Broad and Other	0	0	0	0.000	0.00
	M & D - Nuclear Pharmacies	12	729	481	48.167	0.10
	Total	14	1,086	718	136.505	0.19

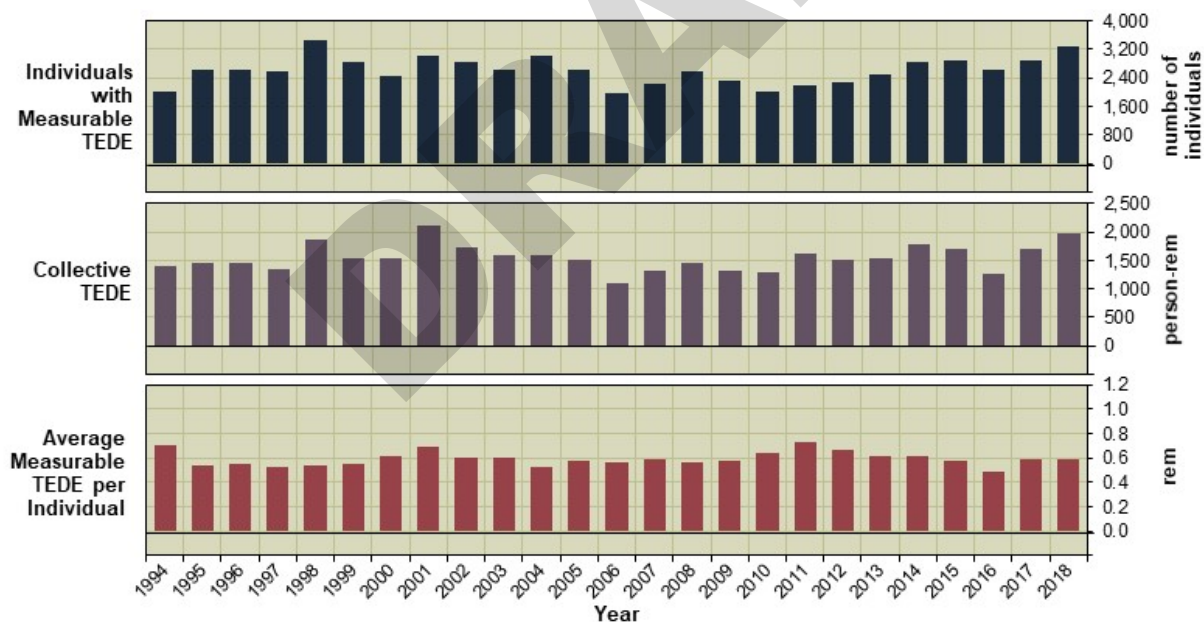


Figure 3.1 Individuals with measurable TEDE, collective TEDE, and average measurable TEDE for industrial radiography licensees 1994–2018

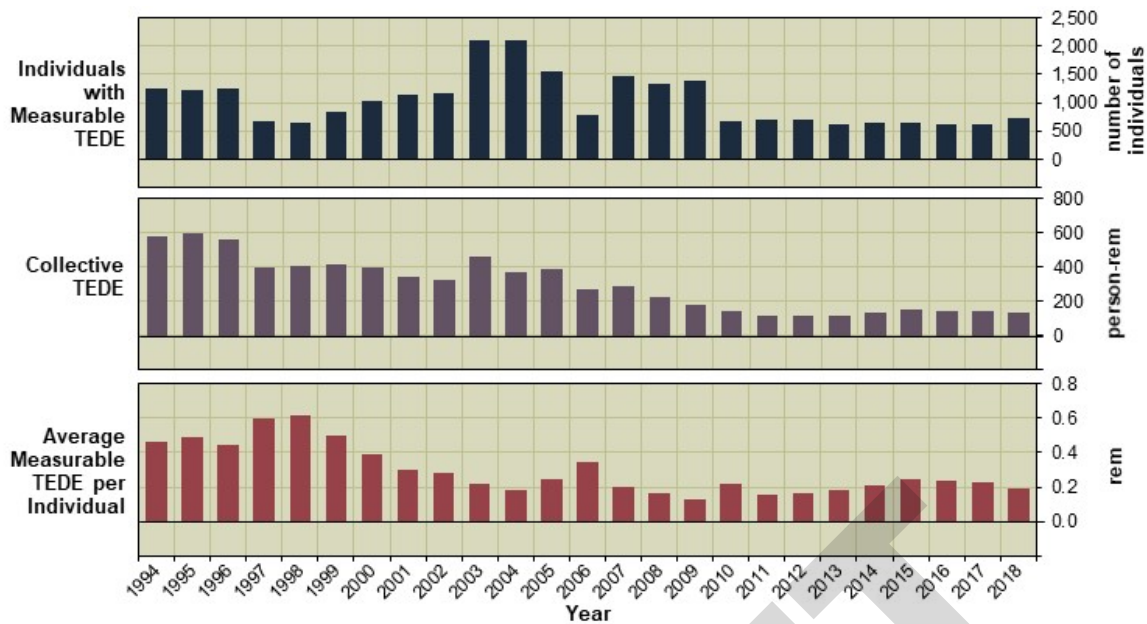


Figure 3.2 Individuals with measurable TEDE, collective TEDE, and average measurable TEDE

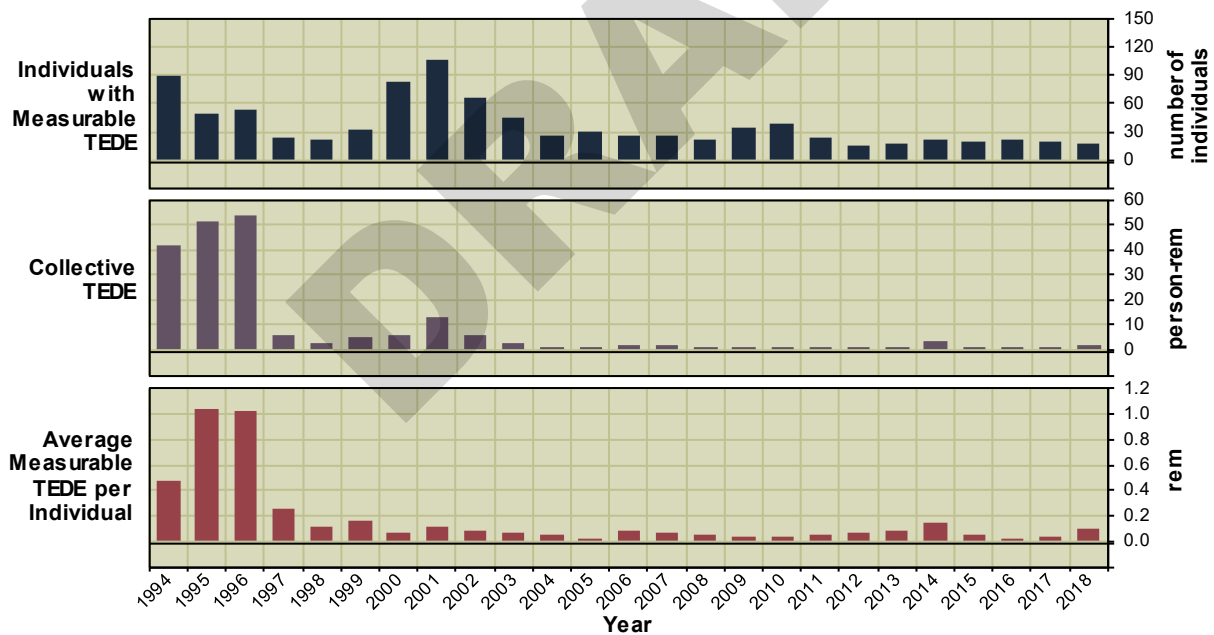


Figure 3.3 Individuals with measurable TEDE, collective TEDE, and average measurable TEDE for independent spent fuel storage installation licensees 1994–2018

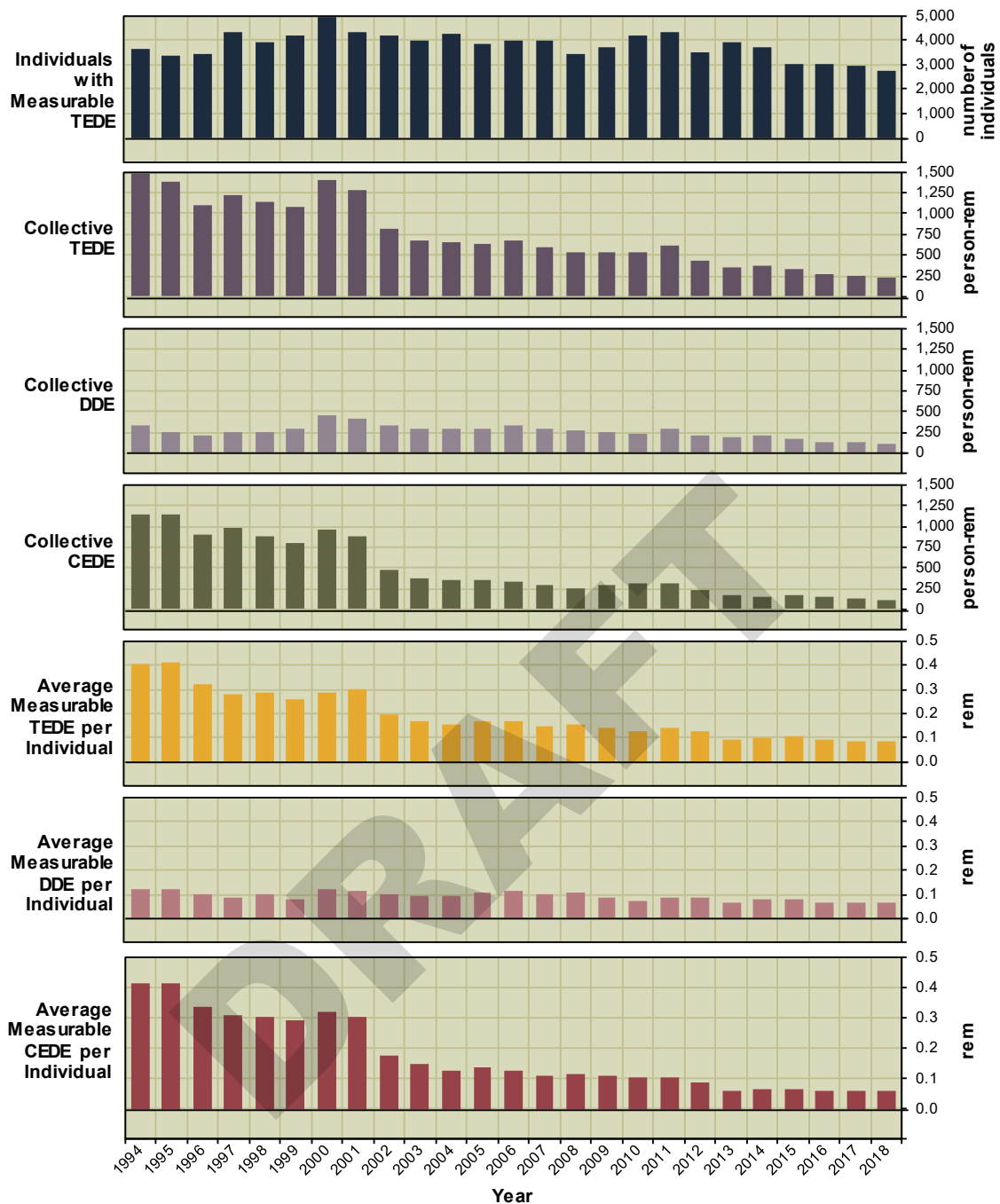


Figure 3.4 Annual exposure information for fuel cycle licensees 1994–2018

Table 3.5 Annual Exposure Information for Fuel Cycle Licensees 2016–2018

Year	Type of License	Number of Licensees	Number of Monitored Individuals	Individuals with Meas. TEDE	Collective TEDE (person-rem)	Average Meas. TEDE (rem)	Individuals with Meas. DDE	Collective DDE (person-rem)	Average Meas. DDE (rem)	Individuals with Meas. CEDE	Collective CEDE (person-rem)	Average Meas. CEDE (rem)
2016	Fuel Cycle	7	5,413	2,999	277.687	0.09	1,985	133.898	0.07	2,434	143.789	0.06
2017	Fuel Cycle	7	5,058	2,930	254.997	0.09	1,879	127.017	0.07	2,220	127.980	0.06
2018	Fuel Cycle	7	4,737	2,783	229.530	0.08	1,764	117.856	0.07	1,913	111.674	0.06

Table 3.6 Intake by Licensee Category and Radionuclide Mode of Intake—Ingestion and Other 2018

Mode	Licensee Category	Program Code	Radionuclide	Number of Intake Records	Collective Intake in Microcuries (sci. notation)
Ingestion	Nuclear Power Reactor	41111	Co-60	5	4.17E-01
Ingestion	Nuclear Power Reactor	41111	Mn-54	4	6.87E-01
Ingestion	Nuclear Power Reactor	41111	Zn-65	2	4.19E-01
Ingestion	Uranium Fuel Processing Plants	21210	U-234	1	2.87E-05

Table 3.7 Intake by Licensee Category and Radionuclide Mode of Intake—Inhalation 2018

Licensee Category	Program Code	Radionuclide	Pulmonary Clearance Class or Solubility Type	Number of Intake Records *	Collective Intake in Microcuries (sci. notation)
Nuclear Pharmacies	02500	I-123	D	6	8.62E-01
	02500	I-131	D	94	1.28E+00
Manufacturing and Distribution Type A Broad	03211	Co-60	Y	3	2.85E-01
	03211	I-131	D	6	9.40E-01
Uranium Hexafluoride (UF ₆) Production Plants	11400	Ac-227	D	2	2.00E-06
	11400	Ac-227	W	126	1.54E-04
	11400	Pa-231	W	128	1.56E-04
	11400	Pb-210	D	102	1.18E-04
	11400	Po-210	D	1	1.00E-06
	11400	Po-210	W	81	9.00E-05
	11400	Ra-226	W	217	4.10E-04
	11400	Ra-228	W	75	8.20E-05
	11400	Ra-228	W	323	4.13E-04
	11400	Th-228	W	75	8.20E-05
	11400	Th-228	W	323	4.13E-04
	11400	Th-230	D	2	5.00E-06
	11400	Th-230	W	287	4.18E-03
	11400	Th-230	W	572	1.66E-02
	11400	Th-230	W	814	3.68E-02
	11400	Th-230	Y	1	6.00E-06
	11400	Th-232	W	75	8.20E-05
	11400	Th-232	W	323	4.13E-04
	11400	Th-232	W	600	9.61E-04
	11400	U-234	D	3	4.58E-03
	11400	U-234	D	9	1.85E-03
	11400	U-234	D	3	4.66E-04
	11400	U-234	W	285	3.82E-01
	11400	U-234	W	571	1.53E+00
	11400	U-234	W	814	3.40E+00
	11400	U-234	Y	1	5.39E-04
	11400	U-235	D	3	2.14E-04
	11400	U-235	D	9	8.70E-05
	11400	U-235	D	3	2.20E-05
	11400	U-235	W	285	1.78E-02

NOTE: The data values shown bolded and in boxes represent the highest value in each category.

* An intake event may involve multiple nuclides; individuals may incur multiple intakes during the year. The number of intake records given here indicates the number of separate intake reports that were submitted on NRC Form 5 reports under 10 CFR 20.2206.

Table 3.7 Intake by Licensee Category and Radionuclide Mode of Intake—Inhalation 2018 (continued)

Licensee Category	Program Code	Radionuclide	Pulmonary Clearance Class or Solubility Type	Number of Intake Records *	Collective Intake in Microcuries (sci. notation)
Uranium Hexafluoride (UF ₆) Production Plants (continued)	11400	U-235	W	571	7.13E-02
	11400	U-235	W	814	1.58E-01
	11400	U-235	Y	1	2.50E-05
	11400	U-238	D	3	3.81E-03
	11400	U-238	D	9	1.54E-03
	11400	U-238	D	3	3.88E-04
	11400	U-238	W	285	3.18E-01
	11400	U-238	W	571	1.27E+00
	11400	U-238	W	814	2.83E+00
	11400	U-238	Y	1	4.49E-04
Uranium Fuel Processing Plants	21210	Am-241	W	26	1.09E-04
	21210	Pu-239	W	41	3.95E-04
	21210	Sr-90	S	220	2.57E-01
	21210	Th-228	W	51	4.30E-05
	21210	Th-232	W	2	1.00E-09
	21210	Th-232	Y	27	6.49E-04
	21210	U-232	W	1	4.00E-09
	21210	U-232	Y	103	9.33E-05
	21210	U-234	D	746	2.14E-01
	21210	U-234	S	223	4.19E-01
	21210	U-234	W	564	4.08E-02
	21210	U-234	Y	1,971	3.18E+00
	21210	U-235	D	155	3.57E-03
	21210	U-235	W	55	1.36E-03
	21210	U-235	Y	580	9.64E-02
	21210	U-236	D	653	2.76E-03
	21210	U-236	W	55	5.83E-05
	21210	U-236	Y	305	5.01E-03
	21210	U-238	D	211	2.69E-02
	21210	U-238	W	533	5.48E-03
	21210	U-238	Y	944	4.38E-01
Nuclear Power Reactor	41111	Am-241	W	1	1.25E-05
	41111	Co-58	Y	10	8.16E+00
	41111	Co-60	Y	10	5.72E-02
	41111	I-131	D	33	3.87E-01
	41111	Nb-95	Y	1	1.21E-01

NOTE: The data values shown bolded and in boxes represent the highest value in each category.

* An intake event may involve multiple nuclides, and individuals may incur multiple intakes during the year. The number of intake records given here indicates the number of separate intake reports that were submitted on NRC Form 5 reports under 10 CFR 20.2206.

Table 3.8 Collective and Average CEDE by Licensee Category 2018

Licensee Category	Licensee Name	License Number	Number with Meas. CEDE	Collective CEDE (person-rem)	Average Meas. CEDE (rem)
MANUFACTURING AND DISTRIBUTION					
02500	CARDINAL HEALTH	34-29200-01MD	14	0.015	0.001
02500	CARDINAL HEALTH	34-31473-02MD	1	0.002	0.002
02500	GE HEALTHCARE - KENTWOOD	21-26707-01MD	4	0.009	0.002
02500	GE HEALTHCARE - ST. LOUIS/OVERLAND	24-32462-01MD	1	0.001	0.001
03211	INTERNATIONAL ISOTOPES IDAHO, INC.	11-27680-01	9	0.084	0.009
Totals and Averages			29	0.111	0.004
UF₆ PRODUCTION					
11400	HONEYWELL PERFORMANCE MATERIALS AND TECHNOLOGY	SUB-0526	285	5.514	0.019
Totals and Averages			285	5.514	0.019
FUEL FABRICATION					
21210	BWXT NUCLEAR OPERATIONS GROUP, INC	SNM-0042	207	10.576	0.051
21210	FRAMATOME INC	SNM-1227	239	28.318	0.118
21210	GLOBAL NUCLEAR FUEL - AMERICAS, LLC	SNM-1097	362	19.261	0.053
21210	NUCLEAR FUEL SERVICES, INC.	SNM-0124	485	2.141	0.004
21210	WESTINGHOUSE ELECTRIC COMPANY, LLC	SNM-1107	335	45.864	0.137
Totals and Averages			1,628	106.160	0.065
COMMERCIAL LIGHT WATER REACTORS					
41111	DIABLO CANYON	DPR-80	1	0.006	0.006
41111	DUANE ARNOLD	DPR-49	4	0.016	0.004
41111	INDIAN POINT	DPR-05	1	0.002	0.002
41111	MILLSTONE	NPF-49	1	0.001	0.001
41111	WOLF CREEK	NPF-42	96	0.194	0.002
Totals and Averages			103	0.219	0.002
Grand Totals and Averages			2,045	112.004	0.055

NOTE: The data values shown bolded and in boxes represent the highest value in each category.

Table 3.9 Internal Dose (CEDE) Distribution 1994–2018

Year	Number of Individuals with CEDE in the Ranges (rem) *										Indiv. with Meas. CEDE	Collective CEDE (person-rem)	Average Meas. CEDE (rem)
	Meas. 0.020	0.020-0.100	0.100-0.250	0.250-0.500	0.500-0.750	0.750-1.0	1.0-2.0	2.0-3.0	3.0-4.0	4.0-5.0			
1994	3,425	577	287	683	237	141	293	69	2	-	5,714	1,170.453	0.205
1995	2,869	691	338	730	254	147	290	49	2	-	5,370	1,167.105	0.217
1996	3,096	598	305	584	324	138	187	22	2	2	5,258	931.799	0.177
1997	3,835	869	381	827	267	148	169	30	-	-	6,526	998.406	0.153
1998	3,310	932	426	746	246	140	153	21	2	-	5,976	922.935	0.154
1999	3,423	752	466	438	206	117	173	29	-	-	5,604	813.605	0.145
2000	3,275	1,001	570	383	216	98	224	58	7	1	5,833	988.640	0.169
2001	1,774	827	716	364	128	53	146	82	15	1	4,106	884.134	0.215
2002	1,760	746	647	531	144	33	23	3	-	-	3,887	494.821	0.127
2003	2,208	778	726	388	116	17	5	-	-	-	4,238	395.573	0.093
2004	1,989	838	657	381	105	17	3	-	-	-	3,990	375.021	0.094
2005	1,205	706	685	341	98	33	2	-	-	-	3,070	365.258	0.119
2006	1,302	726	686	346	96	18	3	-	-	-	3,177	346.918	0.109
2007	1,480	805	646	310	52	5	3	-	-	-	3,301	300.863	0.091
2008	1,008	761	526	303	41	8	4	-	-	-	2,651	267.415	0.101
2009	1,115	711	597	229	80	21	7	-	-	-	2,760	293.251	0.106
2010	1,216	884	669	210	67	30	6	-	-	-	3,082	308.332	0.100
2011	1,243	916	628	270	72	19	14	1	-	-	3,163	322.615	0.102
2012	1,158	933	554	155	52	6	3	-	-	-	2,861	232.462	0.081
2013	1,632	758	353	149	20	1	-	-	-	-	2,913	164.799	0.057
2014	1,175	829	417	86	24	1	-	-	-	-	2,532	157.191	0.062
2015	1,036	838	442	103	16	-	-	-	-	-	2,435	162.670	0.067
2016	1,100	920	407	69	7	-	-	-	-	-	2,503	144.627	0.058
2017	1,073	766	324	99	6	-	-	-	-	-	2,268	128.373	0.057
2018	1,159	489	297	99	1	-	-	-	-	-	2,045	112.004	0.055

* Dose values exactly equal to the values separating ranges are reported in the next higher range.

Table 4.1 Summary of Information Reported by Commercial Boiling-Water Reactors 1994–2018

Year	Number of Reactors Included*	No. of Individuals with Measurable Dose**	Annual Collective Dose (person-rem)	Average Measurable Dose per Individual (rem)**	Average Collective Dose per Reactor (person-rem)	Average No. Individuals with Measurable Doses per Reactor**	Electricity Generated*** (MW-yr)	Average Collective Dose per MW-yr (person-rem/MW-yr)	Average Electricity Generated per Reactor (MW-yr)	Average Maximum Dependable Capacity Net (MWe)	Maximum Dependable Capacity Achieved
1994	37	39,171	12,098	0.31	327	1,059	22,139.0	0.55	598	801	75%
1995	37	35,686	9,471	0.27	256	964	24,737.0	0.38	669	835	80%
1996	37	37,792	9,466	0.25	256	1,021	24,322.2	0.39	657	838	78%
1997	37	34,021	7,603	0.22	205	919	22,866.1	0.33	618	845	73%
1998	36	32,899	6,829.296	0.21	190	914	23,781.2	0.29	661	874	76%
1999	35	31,482	6,434.430	0.20	184	899	26,962.6	0.24	770	885	87%
2000	35	31,186	6,089.676	0.20	174	891	28,476.9	0.21	814	893	91%
2001	35	28,797	4,835.397	0.17	138	823	28,730.4	0.17	821	895	92%
2002	35	30,978	6,107.767	0.20	175	885	29,460.0	0.21	842	907	93%
2003	35	30,759	5,659.434	0.18	162	879	29,094.4	0.19	831	912	91%
2004	35	33,948	5,450.982	0.16	156	970	29,424.8	0.19	841	893	94%
2005	35	33,544	5,995.975	0.18	171	958	29,386.8	0.20	840	946	89%
2006	35	34,159	4,989.761	0.15	143	976	30,238.4	0.17	864	954	91%
2007	35	37,515	5,388.416	0.14	154	1,072	30,189.3	0.18	863	955	90%
2008	35	34,642	4,522.413	0.13	129	990	31,248.3	0.14	893	957	93%
2009	35	36,207	5,282.869	0.15	151	1,034	30,762.7	0.17	879	959	92%
2010	35	37,214	4,807.656	0.13	137	1,063	31,274.6	0.15	894	961	93%
2011	35	38,202	4,976.503	0.13	142	1,091	30,549.7	0.16	873	937	93%
2012	35	38,164	4,200.281	0.11	120	1,090	30,485.4	0.14	871	968	90%
2013	35	36,513	4,459.270	0.12	127	1,043	31,221.1	0.14	892	967	92%
2014	35	33,706	3,798.108	0.11	109	963	31,904.2	0.12	912	976	93%
2015	34	35,346	4,155.273	0.12	122	1,040	31,720.1	0.13	933	992	94%
2016	34	31,299	3,339.055	0.11	98	921	31,464.8	0.11	925	995	93%
2017	34	32,234	4,007.342	0.12	118	948	31,820.0	0.13	936	995	94%
2018	33	31,168	3,659.588	0.12	111	944	30,722.7	0.12	931	1,008	92%

* Includes only those reactors that had been in commercial operation for at least 1 full year as of December 31 of each of the indicated years.

** Figures are not adjusted for the multiple reporting of transient individuals (see Section 5).

*** Beginning in 1997, the electricity reflects the net electricity generated.

Table 4.2 Summary of Information Reported by Commercial Pressurized-Water Reactors 1994–2018

Year	Number of Reactors Included*	No. of Individuals with Measurable Dose**	Annual Collective Dose (person-rem)	Average Measurable Dose per Individual (rem)**	Average Collective Dose per Reactor (person-rem)	Average No. Individuals with Measurable Doses per Reactor**	Electricity Generated*** (MW-yr)	Average Collective Dose per MW-yr (person-rem/MW-yr)	Average Electricity Generated per Reactor (MW-yr)	Average Maximum Dependable Capacity Net (MWe)	Maximum Dependable Capacity Achieved
1994	70	44,283	9,574	0.22	137	633	52,397.6	0.18	749	928	81%
1995	70	49,985	11,762	0.24	168	714	54,138.2	0.22	773	929	83%
1996	72	46,852	9,417	0.20	131	651	55,337.8	0.17	769	935	82%
1997	72	50,690	9,546	0.19	133	704	48,985.3	0.19	680	943	72%
1998	69	38,586	6,358.096	0.16	92	559	53,288.7	0.12	772	942	82%
1999	69	43,938	7,231.281	0.16	105	637	56,235.0	0.13	815	942	87%
2000	69	42,922	6,562.006	0.15	95	622	57,529.9	0.11	834	943	88%
2001	69	38,773	6,273.155	0.16	91	562	58,822.4	0.11	852	946	90%
2002	69	42,264	6,018.423	0.14	87	613	59,369.7	0.10	860	947	91%
2003	69	44,054	6,296.136	0.14	91	638	57,920.6	0.11	839	949	88%
2004	69	35,901	4,916.915	0.14	71	520	60,398.7	0.08	875	943	93%
2005	69	44,583	5,459.832	0.12	79	646	59,790.9	0.09	867	955	91%
2006	69	46,106	6,031.425	0.13	87	668	59,751.3	0.10	866	960	90%
2007	69	42,015	4,731.597	0.11	69	609	61,955.6	0.08	898	961	93%
2008	69	44,808	4,673.527	0.10	68	649	60,586.0	0.08	878	964	91%
2009	69	45,547	4,741.935	0.10	69	660	60,467.9	0.08	876	966	91%
2010	69	37,796	3,823.728	0.10	55	548	60,859.4	0.06	882	967	91%
2011	69	43,119	3,795.601	0.09	55	625	59,682.5	0.06	865	937	92%
2012	69	41,385	3,835.112	0.09	56	600	57,272.5	0.07	830	974	85%
2013	65	30,723	2,300.277	0.07	35	473	58,785.5	0.04	904	987	92%
2014	65	37,141	3,326.411	0.09	51	571	59,262.2	0.06	912	989	92%
2015	65	35,452	2,863.815	0.08	44	545	59,377.2	0.05	913	990	92%
2016	65	28,054	2,026.654	0.07	31	432	60,052.5	0.03	924	1,001	92%
2017	65	32,527	2,409.206	0.07	37	500	60,148.9	0.04	925	1,001	92%
2018	65	29,846	2,169.883	0.07	34	459	61,113.7	0.04	940	1,002	94%

* Includes only those reactors that had been in commercial operation for at least 1 full year as of December 31 of each of the indicated years.

** Figures are not adjusted for the multiple reporting of transient individuals (see Section 5).

*** Beginning in 1997, the electricity reflects the net electricity generated.

Table 4.3 Summary of Information Reported by Commercial Light-Water Reactors 1994–2018

Year	Number of Reactors Included*	No. of Individuals with Measurable Dose**	Annual Collective Dose (person-rem)	Average Measurable Dose per Individual (rem)**	Average Collective Dose per Reactor (person-rem)	Average No. Individuals with Measurable Doses per Reactor**	Electricity Generated*** (MW-yr)	Average Collective Dose per MW-yr (person-rem/MW-yr)	Average Electricity Generated per Reactor (MW-yr)	Average Maximum Dependable Capacity Net (MWe)	Maximum Dependable Capacity Achieved
1994	107	83,454	21,672	0.26	203	780	74,536.6	0.29	697	884	79%
1995	107	85,671	21,233	0.25	198	801	78,875.2	0.27	737	896	82%
1996	109	84,644	18,883	0.22	173	777	79,660.0	0.24	731	902	81%
1997	109	84,711	17,149	0.20	157	777	71,851.4	0.24	659	910	72%
1998	105	71,485	13,187.392	0.18	126	681	77,069.9	0.17	734	918	80%
1999	104	75,420	13,665.711	0.18	131	725	83,197.6	0.16	800	923	87%
2000	104	74,108	12,651.682	0.17	122	713	86,006.8	0.15	827	926	89%
2001	104	67,570	11,108.552	0.16	107	650	87,552.8	0.13	842	929	91%
2002	104	73,242	12,126.190	0.17	117	704	88,829.7	0.14	854	934	91%
2003	104	74,813	11,955.570	0.16	115	719	87,015.0	0.14	837	936	89%
2004	104	69,849	10,367.897	0.15	100	672	89,823.5	0.12	864	926	93%
2005	104	78,127	11,455.807	0.15	110	751	89,177.7	0.13	857	952	90%
2006	104	80,265	11,021.186	0.14	106	772	89,989.7	0.12	865	958	90%
2007	104	79,530	10,120.013	0.13	97	765	92,144.9	0.11	886	959	92%
2008	104	79,450	9,195.940	0.12	88	764	91,834.3	0.10	883	961	92%
2009	104	81,754	10,024.804	0.12	96	786	91,230.6	0.11	877	964	91%
2010	104	75,010	8,631.384	0.12	83	721	92,134.0	0.09	886	965	92%
2011	104	81,321	8,771.326	0.11	84	782	90,232.2	0.10	868	967	90%
2012	104	79,549	8,035.393	0.10	77	765	87,757.9	0.09	844	972	87%
2013	100	67,236	6,759.547	0.10	68	672	90,006.6	0.08	900	980	92%
2014	100	70,847	7,124.519	0.10	71	708	91,166.4	0.08	912	985	93%
2015	99	70,798	7,019.088	0.10	71	715	91,097.3	0.08	920	991	93%
2016	99	59,353	5,365.709	0.09	54	600	91,517.3	0.06	924	999	93%
2017	99	64,761	6,416.548	0.10	65	654	91,968.8	0.07	929	999	93%
2018	98	61,014	5,829.471	0.10	59	623	91,836.4	0.06	937	1,004	93%

* Includes only those reactors that had been in commercial operation for at least 1 full year as of December 31 of each of the indicated years.

** Figures are not adjusted for the multiple reporting of transient individuals (see Section 5).

*** Beginning in 1997, the electricity reflects the net electricity generated.

Table 4.4a Summary of Distribution of Annual Doses* at Commercial Light-Water Reactors 1994–2018**

Year	Number of Individuals with Annual Doses* in the Ranges (rem) *** Note: Numbers of individuals shown have not been adjusted for the multiple reporting of transient individuals (see Section 5).												Total Number Monitored	Number with Measurable Exposure	Collective Dose (person-rem)	Average Measurable Dose (person-rem)
	No. Measurable Exposure	Measurable <0.1	0.10-0.25	0.25-0.50	0.50-0.75	0.75-1.0	1.0-2.0	2.0-3.0	3.0-4.0	4.0-5.0	5.0-6.0	>6.0				
1994	85,145	36,528	18,633	14,246	6,800	3,502	3,323	215	6	-	-	-	168,398	83,253	21,534.000	0.259
1995	81,032	38,575	20,245	15,279	6,884	3,336	3,077	125	5	-	-	-	168,558	87,526	21,674.000	0.248
1996	78,197	39,426	19,955	14,201	5,809	2,648	2,342	68	-	-	-	-	162,646	84,449	18,874.000	0.223
1997	80,163	41,759	19,951	13,396	5,394	2,240	1,671	59	3	-	-	-	164,636	84,473	17,136.000	0.203
1998	77,080	37,039	17,189	10,467	3,930	1,562	1,129	35	-	-	-	-	148,431	71,351	13,169.366	0.185
1999	74,867	39,663	18,063	10,964	3,994	1,569	1,141	24	2	-	-	-	150,287	75,420	13,665.711	0.181
2000	73,793	40,301	17,598	10,310	3,525	1,375	976	23	-	-	-	-	147,901	74,108	12,651.682	0.171
2001	73,206	37,461	16,078	9,231	2,930	1,060	747	63	-	-	-	-	140,776	67,570	11,108.552	0.164
2002	76,270	41,588	16,752	9,426	3,121	1,245	1,003	105	2	-	-	-	149,512	73,242	12,126.190	0.166
2003	77,889	42,720	17,231	9,589	3,139	1,233	864	37	-	-	-	-	152,702	74,813	11,955.570	0.160
2004	80,473	41,583	15,626	8,245	2,733	978	668	16	-	-	-	-	150,322	69,849	10,367.897	0.148
2005	82,574	46,444	17,754	9,191	2,934	1,104	683	17	-	-	-	-	160,701	78,127	11,455.807	0.147
2006	84,558	48,571	18,269	9,312	2,675	904	532	2	-	-	-	-	164,823	80,265	11,021.186	0.137
2007	84,551	49,998	17,672	8,294	2,329	824	402	11	-	-	-	-	164,081	79,530	10,120.013	0.127
2008	89,875	51,831	17,337	7,578	1,847	583	269	5	-	-	-	-	169,325	79,450	9,195.940	0.116
2009	94,627	52,670	17,417	8,352	2,161	741	413	-	-	-	-	-	176,381	81,754	10,024.804	0.123
2010	104,638	49,571	16,042	6,656	1,801	602	333	5	-	-	-	-	179,648	75,010	8,631.384	0.115
2011	110,217	55,407	16,651	6,753	1,675	559	276	-	-	-	-	-	191,538	81,321	8,771.326	0.108
2012	114,428	55,735	15,593	6,072	1,509	385	242	13	-	-	-	-	193,977	79,549	8,035.393	0.101
2013	107,378	47,190	13,158	5,088	1,227	380	191	2	-	-	-	-	174,614	67,236	6,759.547	0.101
2014	104,006	50,110	13,650	5,231	1,167	421	235	33	-	-	-	-	174,853	70,847	7,124.519	0.101
2015	106,088	50,067	13,856	4,980	1,230	421	242	2	-	-	-	-	176,886	70,798	7,019.088	0.099
2016	96,221	43,386	10,938	3,829	865	243	92	-	-	-	-	-	155,574	59,353	5,365.709	0.090
2017	92,311	45,920	12,376	4,745	1,184	382	154	-	-	-	-	-	157,072	64,761	6,416.548	0.099
2018	89,205	44,206	11,030	4,207	1,086	316	168	1	-	-	-	-	150,219	61,014	5,829.471	0.096

* These doses are annual TEDE doses.

** Summary of reports submitted in accordance with 10 CFR 20.2206 by BWRs and PWRs that had been in commercial operation for at least 1 full year as of December 31 of each of the indicated years. Figures shown have not been adjusted for the multiple reporting of transient individuals (see Table 4.4b and Section 5).

*** Dose values exactly equal to the values separating ranges are reported in the next higher range.

Table 4.4b Summary of Distribution of Annual Doses* at Commercial Light-Water Reactors, Adjusted for Transients 1994–2018**

Year	Number of Individuals with Annual Doses* in the Ranges (rem) *** Note: Numbers of individuals shown have been adjusted for the multiple reporting of transient individuals (see Section 5).												Total Number Monitored	Number with Measurable Exposure	Collective Dose (person-rem)	Average Measurable Dose (person-rem)
	No. Measurable Exposure	Measurable <0.1	0.10-0.25	0.25-0.50	0.50-0.75	0.75-1.0	1.0-2.0	2.0-3.0	3.0-4.0	4.0-5.0	5.0-6.0	>6.0				
1994	67,700	29,847	14,841	11,716	6,124	3,586	4,222	508	40	-	-	-	138,584	70,884	21,534.000	0.304
1995	61,505	29,588	15,097	12,020	6,121	3,300	3,906	595	133	2	-	-	132,267	70,762	21,674.000	0.306
1996	58,292	30,021	14,831	11,340	5,418	2,831	3,194	408	67	-	-	-	126,402	68,110	18,874.000	0.277
1997	58,647	31,751	14,881	10,902	5,228	2,447	2,598	286	41	-	-	-	126,781	68,134	17,136.000	0.252
1998	57,041	27,905	12,829	8,802	3,930	1,839	1,829	182	15	1	-	-	114,373	57,332	13,169.366	0.230
1999	55,121	29,271	13,278	9,017	3,806	1,908	1,898	245	18	-	-	-	114,562	59,441	13,665.711	0.230
2000	53,324	28,480	12,921	8,679	3,571	1,644	1,734	186	18	-	-	-	110,557	57,233	12,651.682	0.221
2001	52,636	27,246	11,491	7,659	2,907	1,323	1,392	221	53	-	-	-	104,928	52,292	11,108.552	0.212
2002	53,440	28,523	11,610	7,668	3,004	1,479	1,820	320	35	1	-	-	107,900	54,460	12,126.190	0.223
2003	54,028	29,161	11,971	8,190	3,253	1,527	1,651	184	18	-	-	-	109,983	55,955	11,955.570	0.214
2004	57,420	28,863	11,178	7,335	2,873	1,233	1,190	188	13	-	-	-	110,293	52,873	10,367.897	0.196
2005	56,709	31,035	12,422	7,813	3,106	1,537	1,490	147	3	-	-	-	114,262	57,553	11,455.807	0.199
2006	57,546	32,439	12,687	7,802	2,971	1,415	1,407	82	2	-	-	-	116,351	58,805	11,021.186	0.187
2007	57,314	32,706	11,961	7,396	2,714	1,284	1,100	97	9	-	-	-	114,581	57,267	10,120.013	0.177
2008	61,336	33,832	12,322	6,786	2,430	1,026	922	38	-	-	-	-	118,692	57,356	9,195.940	0.160
2009	66,310	35,877	12,318	7,317	2,562	1,174	1,144	68	4	-	-	-	126,774	60,464	10,024.804	0.166
2010	74,218	33,873	11,670	6,356	2,231	946	832	42	3	-	-	-	130,171	55,953	8,631.384	0.154
2011	78,090	36,745	12,119	6,307	2,226	1,008	837	23	-	-	-	-	137,355	59,265	8,771.326	0.148
2012	79,222	36,990	11,943	5,904	1,962	774	672	37	-	-	-	-	137,504	58,282	8,035.393	0.138
2013	76,261	32,326	10,166	5,231	1,680	674	430	18	-	-	-	-	126,786	50,525	6,759.547	0.134
2014	73,390	32,917	10,285	5,212	1,685	695	589	58	-	-	-	-	124,831	51,441	7,124.519	0.138
2015	71,980	31,806	10,208	5,034	1,686	708	647	27	3	-	-	-	122,099	50,119	7,019.088	0.140
2016	67,685	29,063	8,736	4,196	1,236	429	332	16	1	-	-	-	111,694	44,009	5,365.709	0.122
2017	62,882	29,448	9,210	4,695	1,666	671	532	11	-	-	-	-	109,115	46,233	5,365.709	0.116
2018	59,356	28,012	8,146	4,205	1,488	663	462	20	2	-	-	-	102,354	42,998	5,829.471	0.136

* These doses are annual TEDE doses.

** Summary of reports submitted in accordance with 10 CFR 20.2206 by BWRs and PWRs that had been in commercial operation for at least 1 full year as of December 31 of each of the indicated years.

*** Dose values exactly equal to the values separating ranges are reported in the next higher range.

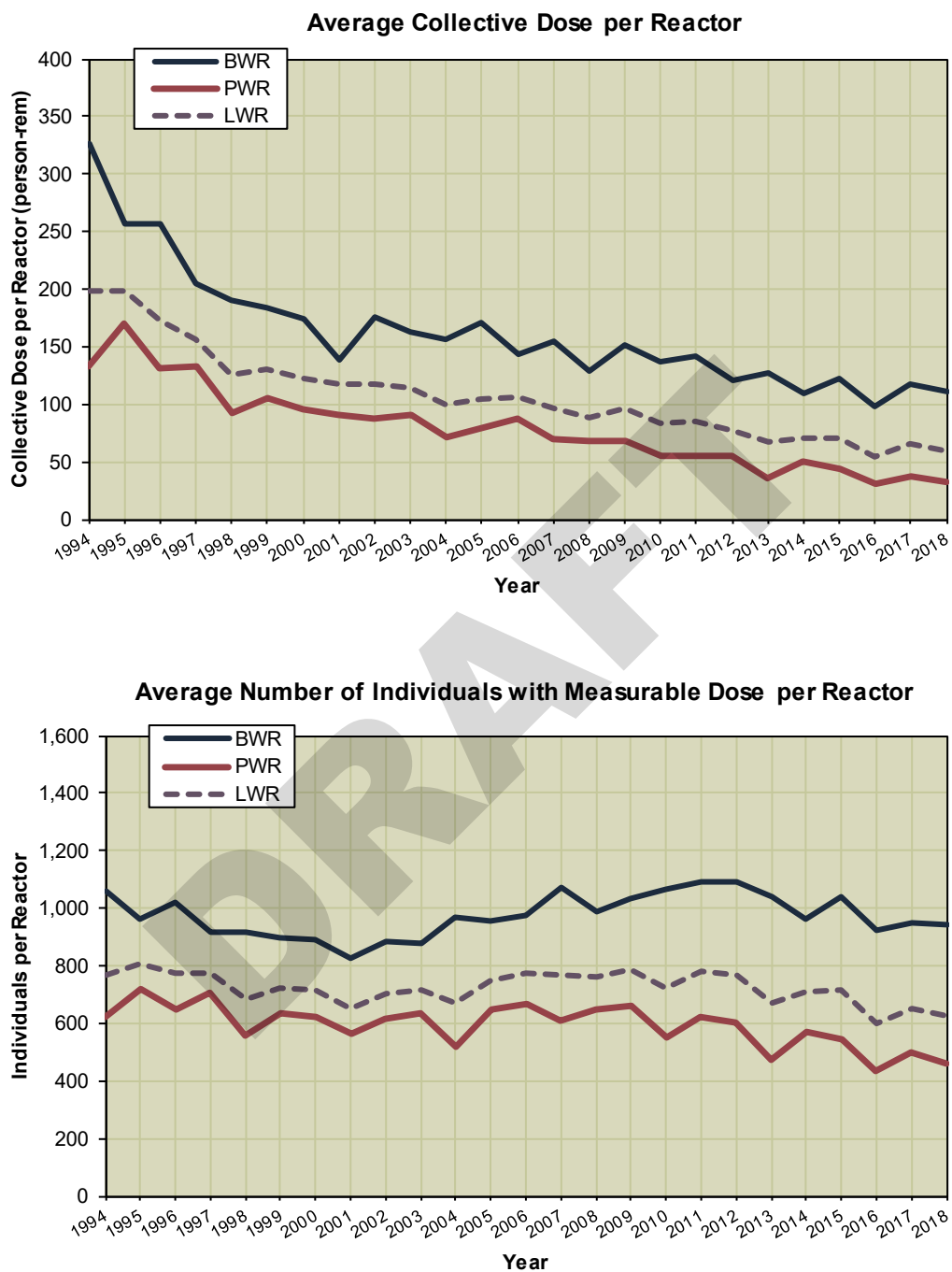
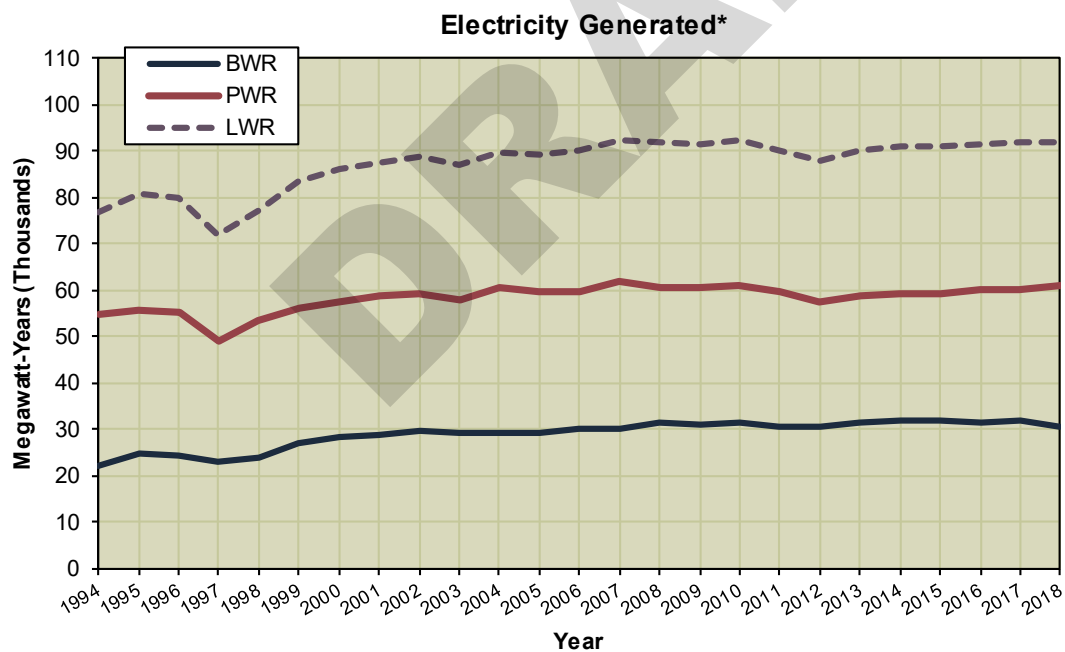
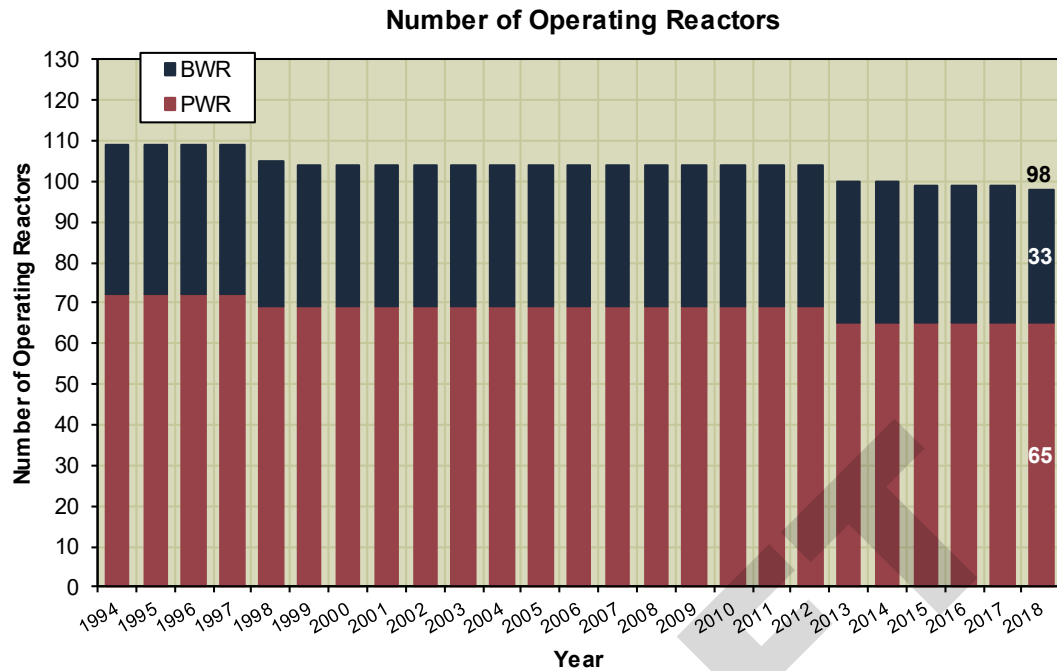
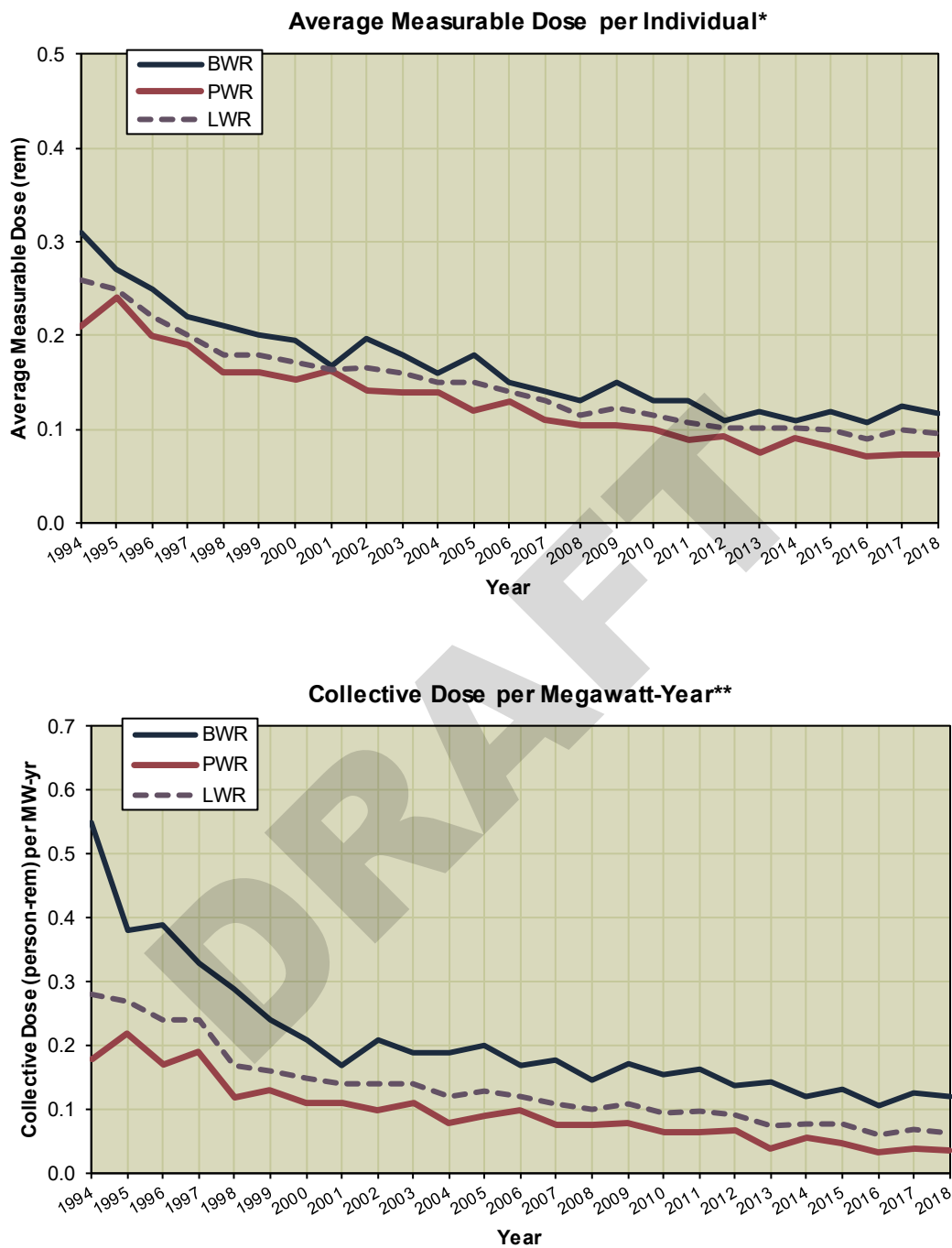


Figure 4.1 Average collective dose per reactor and average number of individuals with measurable dose per reactor 1994–2018



* Gross electricity is shown for 1994–1996, net electricity is shown for 1997–2018.

Figure 4.2 Number of operating reactors and electricity generated 1994–2018



* Not adjusted for transient workers. See Section 5.

** Gross electricity is shown for 1994–1996, net electricity is shown for 1997–2018.

Figure 4.3 Average measurable dose per individual and collective dose per megawatt-year 1994–2018

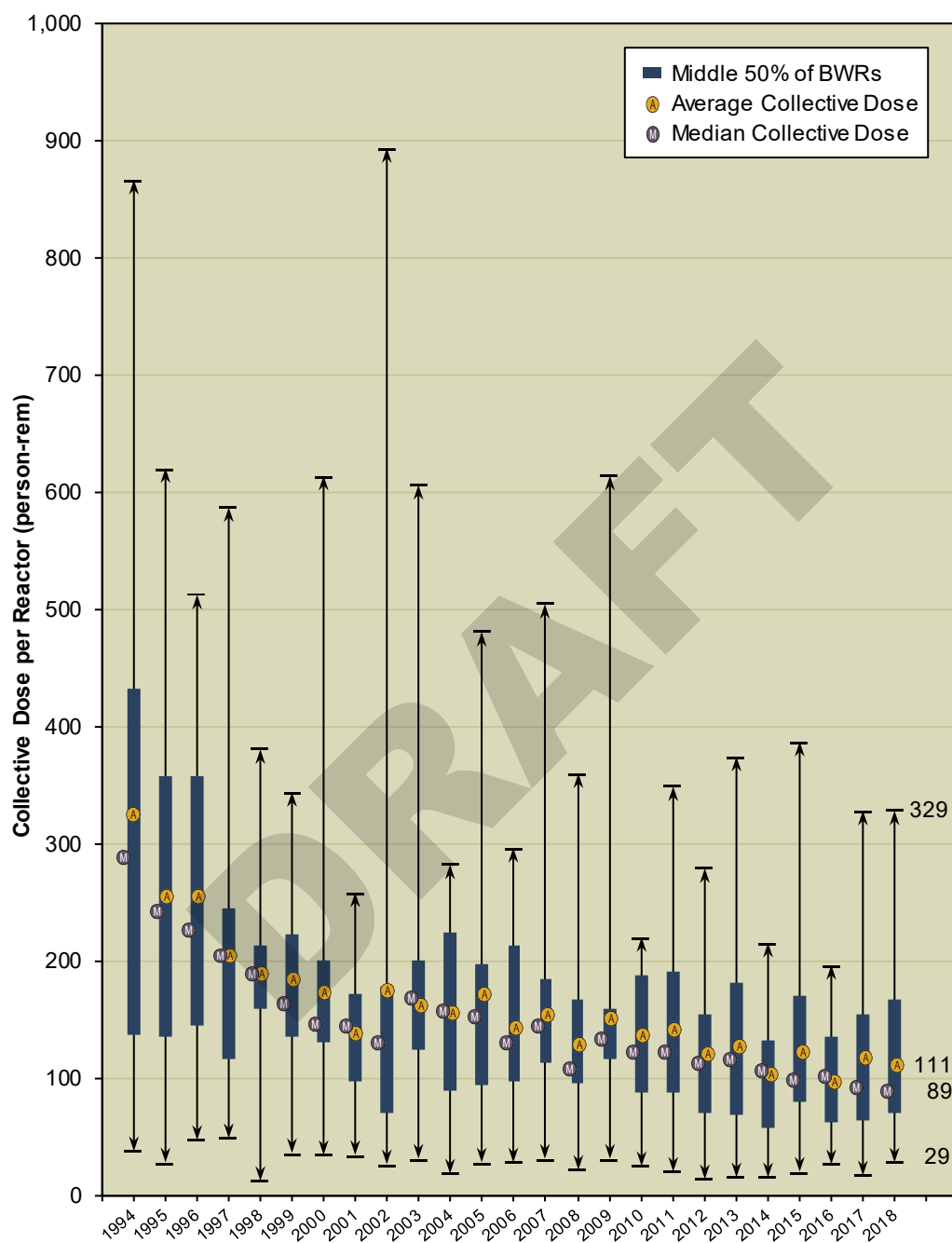


Figure 4.4a Average, median, and extreme values of the collective dose per BWR reactor 1994–2018

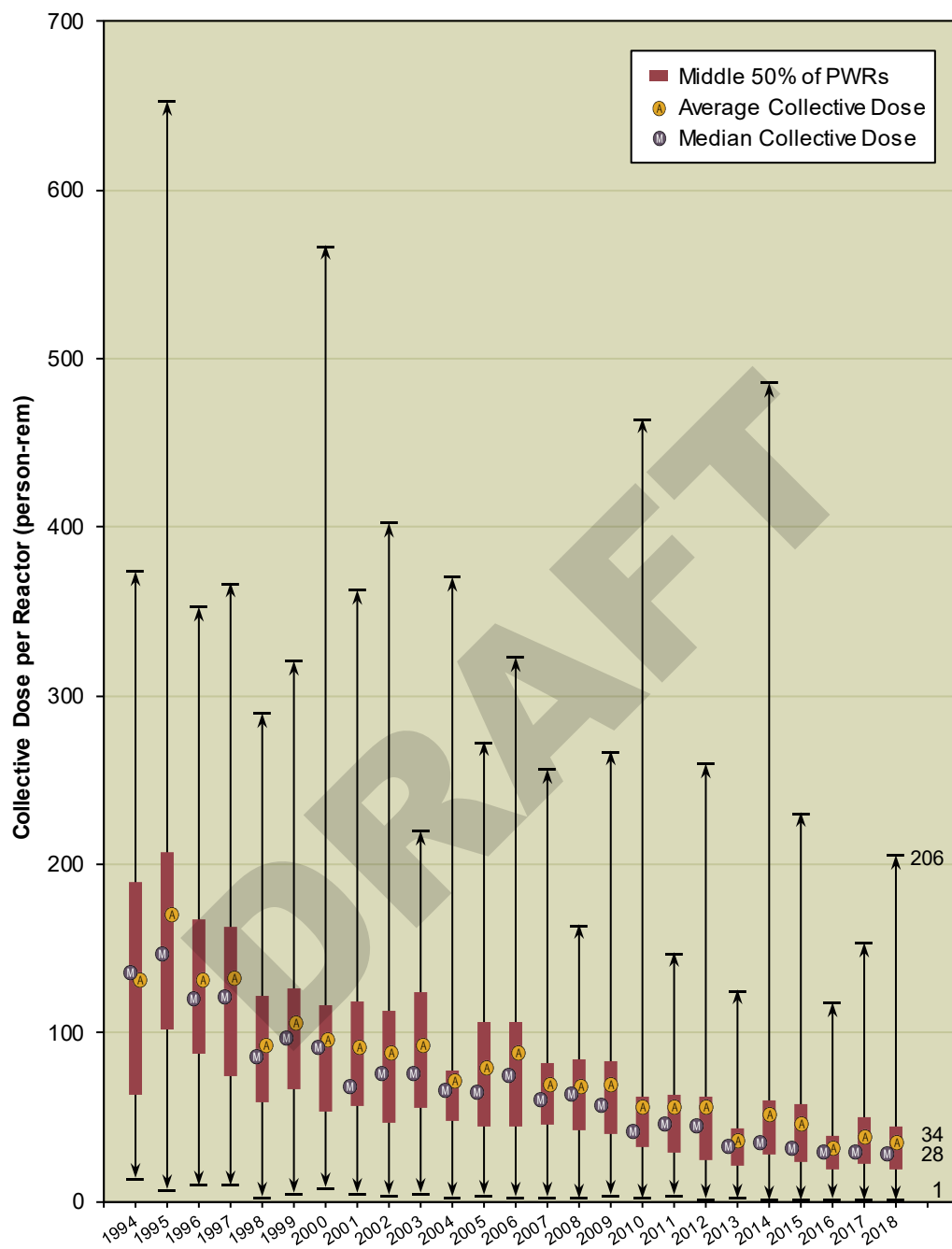


Figure 4.4b Average, median, and extreme values of the collective dose per PWR reactor 1994–2018

Table 4.5 Three-Year Totals and Averages Listed in Ascending Order of Collective TEDE per BWR 2016–2018

Plant Name*	Reactor Years	Three-year Collective TEDE per Reactor Year 2016-2018 (person-rem)	Three-year Collective TEDE per Site (person-rem)	Number of Workers with Measurable TEDE	Average TEDE per Worker (rem)	Total MW-Yrs	Average TEDE per MW-Yr (rem)
MONTICELLO	3	57.866	173.599	1,401	0.124	1,869.3	0.09
DRESDEN 2,3	6	64.987	389.924	5,689	0.069	5,303.4	0.07
DUANE ARNOLD	3	68.644	205.933	2,053	0.100	1,690.8	0.12
LIMERICK 1,2	6	71.931	431.588	5,110	0.084	6,557.1	0.07
HATCH 1,2	6	77.276	463.655	4,092	0.113	4,975.1	0.09
QUAD CITIES 1,2	6	79.658	477.945	5,441	0.088	5,312.0	0.09
PILGRIM 1	3	82.006	246.017	2,966	0.083	1,701.0	0.14
COLUMBIA GENERATING	3	83.386	250.158	2,804	0.089	3,135.0	0.08
CLINTON	3	88.537	265.610	2,958	0.090	2,930.6	0.09
SUSQUEHANNA 1,2	6	91.689	550.131	5,007	0.110	6,936.2	0.08
BRUNSWICK 1,2	6	94.421	566.524	5,047	0.112	5,181.0	0.11
PEACH BOTTOM 2,3	6	96.229	577.372	5,593	0.103	7,454.1	0.08
HOPE CREEK 1	3	107.282	321.850	3,666	0.088	3,411.1	0.09
COOPER STATION	3	119.565	358.695	2,686	0.134	2,108.1	0.17
NINE MILE POINT 1,2	6	130.573	783.435	4,985	0.157	5,351.7	0.15
PERRY	3	131.318	393.954	2,017	0.195	3,533.2	0.11
GRAND GULF	3	133.971	401.914	3,282	0.122	2,326.2	0.17
RIVER BEND 1	3	137.909	413.726	2,605	0.159	2,420.3	0.17
BROWNS FERRY 1,2,3	9	139.255	1,253.297	9,285	0.135	9,102.4	0.14
FITZPATRICK	3	140.683	422.048	2,969	0.142	2,119.7	0.20
LASALLE 1,2	6	209.774	1,258.642	8,400	0.150	6,558.7	0.19
FERMI 2	3	216.286	648.858	5,377	0.121	2,887.2	0.22
Totals and Averages	99	-	10,854.875	93,433	0.116	92,864.2	0.12
Average per Reactor-Year	-	109.645	-	944	-	938.0	-

* Sites where not all reactors had completed 3 full years of commercial operations as of December 31, 2018, are not included.

Table 4.6 Three-Year Totals and Averages Listed in Ascending Order of Collective TEDE per PWR 2016–2018

Plant Name*	Reactor Years	Three-year Collective TEDE per Reactor Year 2016-2018 (person-rem)	Three-year Collective TEDE per Site (person-rem)	Number of Workers with Measurable TEDE	Average TEDE per Worker (rem)	Total MW-Yrs	Average TEDE per MW-Yr (rem)
OCONEE 1,2,3	9	16.433	147.900	3,286	0.045	7,336.7	0.02
PALO VERDE 1,2,3	9	17.754	159.787	3,390	0.047	10,923.5	0.01
DIABLO CANYON 1,2	6	19.610	117.657	2,312	0.051	6,302.0	0.02
PRAIRIE ISLAND 1,2	6	20.022	120.131	1,822	0.066	2,968.3	0.04
FARLEY 1,2	6	21.258	127.546	2,124	0.060	4,859.3	0.03
SEABROOK	3	21.427	64.281	1,047	0.061	3,517.3	0.02
WATERFORD 3	3	21.750	65.250	1,247	0.052	3,287.2	0.02
WATTS BAR 1,2 **	5**	23.416	117.081	2,042	0.057	4,952.4	0.02
CALLAWAY 1	3	24.565	73.694	1,240	0.059	3,246.8	0.02
HARRIS 1	3	25.276	75.829	1,295	0.059	2,661.0	0.03
GINNA	3	25.329	75.986	1,155	0.066	1,648.3	0.05
SOUTH TEXAS 1,2	6	26.319	157.912	1,749	0.090	7,316.7	0.02
BYRON 1,2	6	27.836	167.013	2,779	0.060	6,712.8	0.02
BEAVER VALLEY 1,2	6	28.776	172.654	2,448	0.071	5,158.1	0.03
BRAIDWOOD 1,2	6	29.911	179.463	2,711	0.066	6,748.6	0.03
VOGTLE 1,2	6	30.981	185.883	2,357	0.079	6,734.5	0.03
POINT BEACH 1,2	6	31.334	188.001	1,791	0.105	3,417.7	0.06
CALVERT CLIFFS 1,2	6	31.945	191.668	2,465	0.078	5,121.6	0.04
COOK 1,2	6	32.038	192.225	2,990	0.064	5,772.1	0.03
CATAWBA 1,2	6	32.773	196.635	2,853	0.069	6,626.1	0.03
COMANCHE PEAK 1,2	6	33.220	199.321	2,240	0.089	6,634.3	0.03
THREE MILE ISLAND 1	3	34.047	102.141	1,396	0.073	2,429.2	0.04
SUMMER 1	3	34.140	102.421	1,752	0.058	2,618.5	0.04
SURRY 1,2	6	36.714	220.281	2,596	0.085	4,823.9	0.05
NORTH ANNA 1,2	6	36.845	221.068	2,583	0.086	5,393.3	0.04
TURKEY POINT 3,4	6	39.260	235.557	2,676	0.088	4,589.8	0.05
MILLSTONE 2,3	6	40.472	242.833	2,751	0.088	5,715.8	0.04
ROBINSON 2	3	41.480	124.441	1,974	0.063	2,013.7	0.06
MCGUIRE 1,2	6	42.541	255.248	3,689	0.069	6,682.9	0.04
ST. LUCIE 1,2	6	43.445	260.670	3,204	0.081	5,431.9	0.05
INDIAN POINT 2,3	6	43.977	263.861	4,580	0.058	5,328.0	0.05
SEQUOYAH 1,2	6	45.732	274.390	3,331	0.082	6,073.1	0.05
SALEM 1,2	6	46.256	277.538	3,374	0.082	6,026.5	0.05
WOLF CREEK 1	3	55.650	166.950	2,792	0.060	3,205.0	0.05
ARKANSAS 1,2	6	55.664	333.983	5,454	0.061	4,443.9	0.08
DAVIS-BESSE 1	3	57.032	171.096	1,807	0.095	2,471.6	0.07
PALISADES	3	122.031	366.093	1,927	0.190	2,122.7	0.17
Totals and Averages	194	-	6,594.488	91,229	0.072	181,315.1	0.04
Average per Reactor-Year	-	33.992	-	470	-	934.6	-

* Sites where not all reactors had completed 3 full years of commercial operation as of December 31, 2018, are not included.

** Watts Bar 2 came online in October of 2016 and even though the unit has not completed 3 full years of commercial operation as of December 31, 2018, it is included in the total because Watts Bar 1 and 2 report together.

Table 4.7 Three-Year Collective TEDE per Reactor-Year for BWRs 2016–2018

	Plant Name	Three-Year Coll. TEDE per Reactor Year 2016-2018	Percent Change From 2015-2017	2015-2017 Quartile (if changed)
1st Quartile	MONTICELLO	57.866	-37% ▼	2
	DRESDEN 2,3	64.987	-5% ▼	-
	DUANE ARNOLD	68.644	39% ▲	-
	LIMERICK 1,2	71.931	-1% ▼	-
	HATCH 1,2	77.276	-6% ▼	2
	QUAD CITIES 1,2	79.658	-2% ▼	-
2nd Quartile	PILGRIM 1	82.006	-42% ▼	4
	COLUMBIA GENERATING	83.386	-50% ▼	4
	CLINTON	88.537	-7% ▼	-
	SUSQUEHANNA 1,2	91.689	-10% ▼	3
	BRUNSWICK 1,2	94.421	-8% ▼	3
3rd Quartile	PEACH BOTTOM 2,3	96.229	-27% ▼	-
	HOPE CREEK 1	107.282	-6% ▼	-
	COOPER STATION	119.565	42% ▲	2
	NINE MILE POINT 1,2	130.573	40% ▲	2
	PERRY	131.318	-48% ▼	4
4th Quartile	GRAND GULF	133.971	54% ▲	2
	RIVER BEND 1	137.909	-12% ▼	-
	BROWNS FERRY 1,2,3	139.255	20% ▲	3
	FITZPATRICK	140.683	100% ▲	1
	LASALLE 1,2	209.774	-11% ▼	-
	FERMI 2	216.286	17% ▲	-
	Average per Reactor-Year	109.645	-3% ▼	

← Average 109.645

Table 4.8 Three-Year Collective TEDE per Reactor-Year for PWRs 2016–2018

	Plant Name	Three-Year Coll. TEDE per Reactor Year 2016-2018	Percent Change From 2015-2017	2015-2017 Quartile (if changed)
1st Quartile	OCONEE 1,2,3	16.433	-7% ▼	-
	PALO VERDE 1,2,3	17.754	-10% ▼	-
	DIABLO CANYON 1,2	19.610	-18% ▼	-
	PRAIRIE ISLAND 1,2	20.022	-17% ▼	-
	FARLEY 1,2	21.258	-13% ▼	-
	SEABROOK	21.427	-49% ▼	3
	WATERFORD 3	21.750	-50% ▼	3
	WATTS BAR 1,2	23.416	-35% ▼	3
	CALLAWAY 1	24.565	0% ▲	-
	HARRIS 1	25.276	-26% ▼	2
2nd Quartile	GINNA	25.329	5% ▲	1
	SOUTH TEXAS 1,2	26.319	-8% ▼	1
	BYRON 1,2	27.836	-10% ▼	-
	BEAVER VALLEY 1,2	28.776	-11% ▼	-
	BRAIDWOOD 1,2	29.911	5% ▲	1
	VOGTLE 1,2	30.981	-7% ▼	-
	POINT BEACH 1,2	31.334	-2% ▼	-
	CALVERT CLIFFS 1,2	31.945	6% ▲	1
	COOK 1,2	32.038	6% ▲	-
3rd Quartile	CATAWBA 1,2	32.773	-5% ▼	2
	COMANCHE PEAK 1,2	33.220	-1% ▼	2
	THREE MILE ISLAND 1	34.047	-62% ▼	4
	SUMMER 1	34.140	-13% ▼	-
	SURRY 1,2	36.714	-23% ▼	4
	NORTH ANNA 1,2	36.845	6% ▲	2
	TURKEY POINT 3,4	39.260	-11% ▼	4
	MILLSTONE 2,3	40.472	1% ▲	-
	ROBINSON 2	41.480	5% ▲	-
4th Quartile	MCGUIRE 1,2	42.541	-4% ▼	-
	ST. LUCIE 1,2	43.445	-22% ▼	-
	INDIAN POINT 2,3	43.977	12% ▲	3
	SEQUOYAH 1,2	45.732	-5% ▼	-
	SALEM 1,2	46.256	6% ▲	3
	WOLF CREEK 1	55.650	-1% ▼	-
	ARKANSAS 1,2	55.664	0% ▼	-
	DAVIS-BESSE 1	57.032	41% ▲	3
	PALISADES	122.031	-6% ▼	-
	Average per Reactor-Year	33.993	-9% ▼	

← Average 33.993

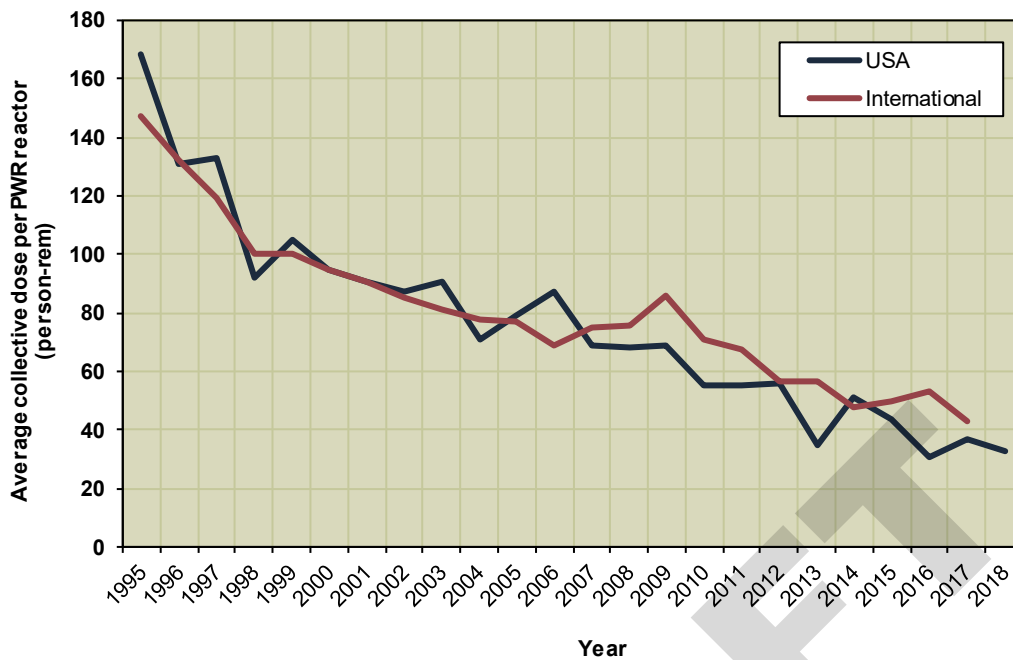


Figure 4.5 Average collective dose per PWR reactor 1995–2018

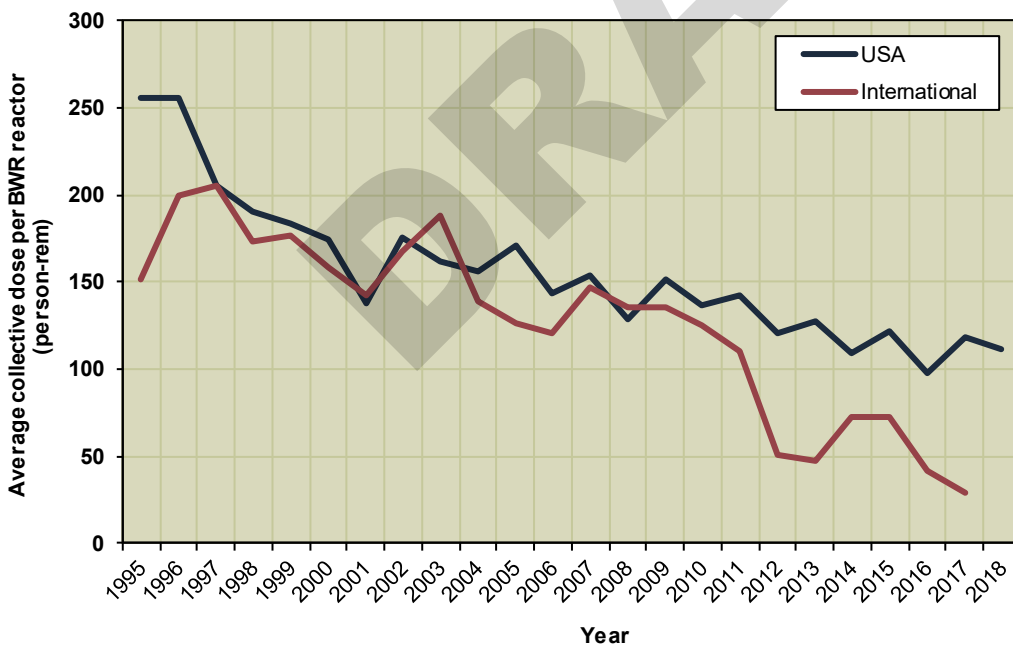


Figure 4.6 Average collective dose per BWR reactor 1995–2018

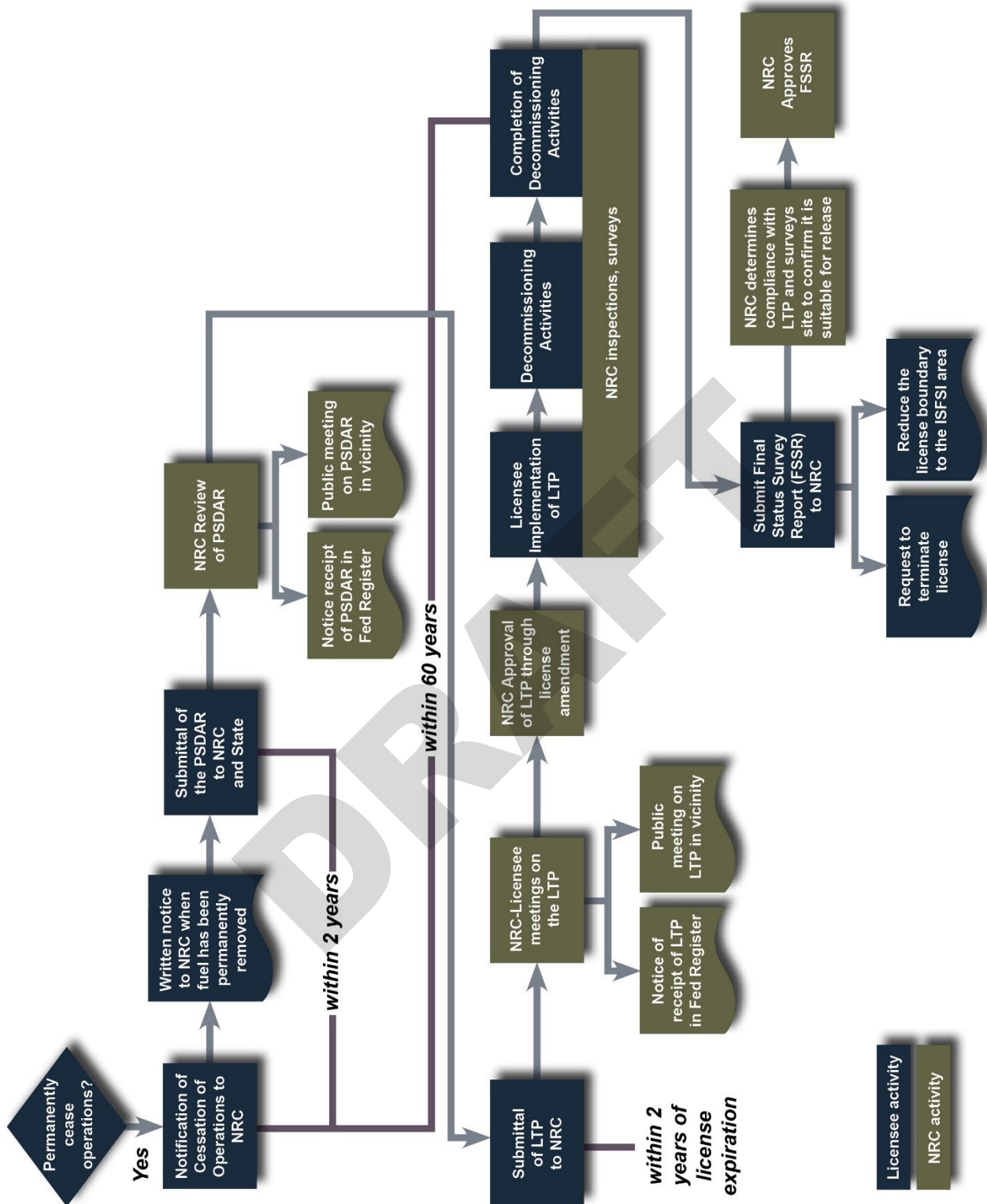


Figure 4.7 D&D process flowchart

Table 4.9 Plants No Longer in Operation 2018

Plant Name	Date of First Commercial Operation	Ceased Operations	License Termination Plan Approved by NRC	PSDAR Submitted	Plant Status	Completion of Decommissioning
CRYSTAL RIVER 3	3/1977	2/2013	TBD	12/2013	SAFSTOR	2074
DRESDEN 1	8/1/1960	10/1978	TBD	6/1998	SAFSTOR	2036
FERMI 1	5/10/1963	9/1972	TBD	4/1998	SAFSTOR	2032
FORT CALHOUN	6/20/1974	10/2016	TBD	3/2017	SAFSTOR	2065
HUMBOLDT BAY 3	8/1/1963	7/1976	5/2016	2/1998	DECON	2019
INDIAN POINT 1	8/1962	10/1974	TBD	1/1996	SAFSTOR	2026
KEWAUNEE	6/1974	5/2013	TBD	2/2013	SAFSTOR	2073
LA CROSSE	11/1/1969	4/1987	TBD	5/1991	DECON	2019
MILLSTONE 1	3/1971	7/1998	TBD	6/1999	SAFSTOR	2056
OYSTER CREEK	12/1969	9/2018	TBD	6/2018	SAFSTOR	2078
PEACH BOTTOM 1	6/1/1967	10/1974	TBD	6/1998	SAFSTOR	2034
SAN ONOFRE 1	1/1/1968	11/1992	TBD	12/1998	SAFSTOR	2030
SAN ONOFRE 2	8/1983	6/2013	TBD	9/2014	DECON	2030
SAN ONOFRE 3	4/1984	6/2013	TBD	9/2014	DECON	2030
THREE MILE ISLAND 2	12/30/1978	3/1979	TBD	6/2013	Post-Defueling Monitored Storage	2036
VERMONT YANKEE	11/30/1972	12/2014	TBD	12/2014	SAFSTOR	2073
ZION 1	12/31/1973	2/1997	9/2018	2/2000	DECON	2020
ZION 2	9/17/1974	9/1996	9/2018	2/2000	DECON	2020
DECOMMISSIONING COMPLETED						
BIG ROCK POINT	3/29/1963	8/1997	TBD	9/1997	ISFSI only	2007
HADDAM NECK	1/1968	12/1996	TBD	8/1997	ISFSI only	2007
MAINE YANKEE	12/1972	12/1996	TBD	8/1997	ISFSI only	2005
RANCHO SECO	4/17/1975	6/1989	TBD	3/1997	ISFSI only	2009
TROJAN	5/20/1976	11/1992	2/2001	8/1995	ISFSI only	2004
YANKEE ROWE	7/1961	10/1991	TBD	-	ISFSI only	2007

NOTE: Information regarding the latest decommissioning status of plants listed in this table can be found in Status of the Decommissioning Program: 2017 Annual Report from the NRC's public library under ADAMS Accession No. ML17276B120. Rows displayed in gray represent plants that have completed decommissioning [Refs. 21–22].

TBD = To Be Determined.

SAFSTOR = (often considered 'delayed DECON'): a nuclear facility that is maintained and monitored in a condition that allows the radioactivity to decay; afterwards, it is dismantled.

DECON = (immediate dismantlement): soon after the nuclear facility closes, equipment, structures, and portions of the facility containing radioactive contaminants are removed or decontaminated to a level that permits release of the property and termination of the NRC license.

Table 5.1 Effects of Transient Individuals on Annual Statistical Compilations 2018

License Category	Number of Individuals with TEDE in the Ranges (rem)*												Total Number Monitored	Number with Measurable TEDE	Collective TEDE (person-rem)	Average Meas. TEDE (rem)
	No Measurable Exposure	Measurable <0.10	0.10-0.25	0.25-0.50	0.50-0.75	0.75-1.0	1.0-2.0	2.0-3.0	3.0-4.0	4.0-5.0	5.0-6.0	>6.0				
COMMERCIAL LIGHT-WATER REACTORS																
(1) Form 5 Summation	89,205	44,206	11,030	4,207	1,086	316	168	1	-	-	-	-	150,219	61,014	5,829.471	0.10
(2) Transients, As Reported	37,891	25,172	6,985	2,690	687	194	85	-	-	-	-	-	73,704	35,813	3,630.988	0.10
(3) Transients, Actual	8,042	8,978	4,101	2,688	1,089	541	379	19	2	-	-	-	25,839	17,797	3,630.988	0.20
Corrected Distribution (1-[2-3]) **	59,356	28,012	8,146	4,205	1,488	663	462	20	2	-	-	-	102,354	42,998	5,829.471	0.14
ALL LICENSEES																
(1) Form 5 Summation	92,153	47,586	12,069	5,096	1,608	620	695	129	23	8	-	1	159,988	67,835	8,165.125	0.12
(2) Transients, As Reported	38,967	25,636	7,126	2,772	721	206	92	2	-	-	-	-	75,522	36,555	3,744.886	0.10
(3) Transients, Actual	8,230	9,131	4,180	2,758	1,119	555	393	25	3	1	-	-	26,395	18,165	3,744.886	0.21
Corrected Distribution (1-[2-3]) **	61,416	31,081	9,123	5,082	2,006	969	996	152	26	9	-	1	110,861	49,445	8,165.125	0.17

* Dose values exactly equal to the values separating ranges are reported in the next higher range.

** The corrected distribution only applies to the number of individuals.

Table 6.1 Summary of Annual Dose Distributions for Certain* NRC Licensees 2008–2018

Year	Total Number of Monitored Individuals		Individuals with Dose (TEDE) ***			
			< 2 rem	> 2 rem	< 5 rem	> 5 rem
	Reported Number	Corrected Number **	%	Number	%	Number
2008	182,095	132,273	99.9%	169	100%	-
2009	189,972	139,381	99.9%	181	100%	-
2010	192,436	142,523	99.9%	185	100%	-
2011	204,575	149,971	99.9%	199	100%	-
2012	205,134	148,316	99.9%	207	100%	-
2013	186,062	138,233	99.8%	142	100%	-
2014	185,843	135,817	99.8%	224	100%	-
2015	186,614	131,827	99.9%	133	99.9%	2
2016	164,984	121,129	99.9%	81	100%	-
2017	166,526	118,715	99.9%	164	99.9%	2
2018	159,988	110,861	99.8%	188	99.9%	1

* Licensees required to submit radiation exposure reports to the NRC under 10 CFR 20.2206.

** This column lists the actual number of persons who may have been counted more than once because they worked at more than one facility during the calendar year (see Section 5).

*** Data for 2008–2018 are based on the distribution of individual doses after adjusting for the multiple counting of transient individuals (see Section 5).

Table 6.2 Maximum Occupational Doses for Each Exposure Category* 2018

Dose Category**	Annual Dose Limit 10CFR20***	Maximum Dose Reported (rem)	Max Dose Percent of the Limit	Number of Individuals with Measurable Dose	Number of Individuals >25% of the Limit	Number of Individuals >50% of the Limit	Number of Individuals >75% of the Limit	Number of Individuals >95% of the Limit	Number of Individuals > Limit
SDE-ME	50 rem	40.344	81%	43,348	52	10	-	-	-
SDE-WB	50 rem	11.855	24%	48,995	-	-	-	-	-
LDE	15 rem	11.907	79%	47,759	15	1	-	-	-
CEDE		0.500		2,045					
CDE		4.177		2,051					
DDE		11.904		48,745					
TEDE	5 rem	11.904	238%	49,769	675	86	13	3	1
TODE	50 rem	11.904	24%	49,599	-	-	-	-	-

* Only records reported by licensees required to report under 10 CFR 20.2206 are included. Numbers have been adjusted for the multiple reporting of transient individuals.

** SDE-ME = shallow dose equivalent to the maximally exposed extremity

SDE-WB = shallow dose equivalent to the whole body

LDE = lens dose equivalent to the lens of the eye

CEDE = committed effective dose equivalent

CDE = committed dose equivalent

DDE = deep dose equivalent

TEDE = total effective dose equivalent

TODE = total organ dose equivalent

*** Shaded boxes represent dose categories that do not have specific dose limits defined in 10 CFR Part 20.