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Protecting People and the Environment

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Volume 45

Occupational Radiation Exposure at Commercial Nuclear Power Reactors and Other Facilities 2023

Fifty-Sixth Annual Report

Office of Nuclear Regulatory Research

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PREVIOUS REPORTS IN THIS SERIES

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NUREG-0713 Occupational Radiation Exposure at Commercial Nuclear Power Reactors and Other Facilities, 2022, Vol. 44, U.S. Nuclear Regulatory Commission, October 2024.

Previous reports in the NUREG-0714 series, which are now combined with NUREG-0713, are as follows:

WASH-1350-R1/ WASH-1350 R6 First through Sixth Annual Reports of the Operation of the U.S. AEC's Centralized Ionizing Radiation Exposure Records and Reporting System, U.S. Atomic Energy Commission.
NUREG-75/108 Seventh Annual Occupational Radiation Exposure Report for Certain NRC Licensees, 1974, U.S. Nuclear Regulatory Commission, October 1975.
NUREG-0119 Eighth Annual Occupational Radiation Exposure Report for 1975, U.S. Nuclear Regulatory Commission, October 1976.
NUREG-0322 Ninth Annual Occupational Radiation Exposure Report for 1976, U.S. Nuclear Regulatory Commission, October 1977.
NUREG-0463 Tenth Annual Occupational Radiation Exposure Report for 1977, U.S. Nuclear Regulatory Commission, October 1978.
NUREG-0593 Eleventh Annual Occupational Radiation Exposure Report for 1978, U.S. Nuclear Regulatory Commission, January 1981.
NUREG-0714 Twelfth Annual Occupational Radiation Exposure Report for 1979, Vol. 1, U.S. Nuclear Regulatory Commission, August 1982.
NUREG-0714 Occupational Radiation Exposure, Thirteenth and Fourteenth Annual Reports, 1980 and 1981, Vols. 2 and 3, U.S. Nuclear Regulatory Commission, October 1983.
NUREG-0714 Occupational Radiation Exposure, Fifteenth and Sixteenth Annual Reports, 1982 and 1983, Vols. 4 and 5, U.S. Nuclear Regulatory Commission, October 1985.

ABSTRACT

This report summarizes the occupational exposure data maintained in the U.S. Nuclear Regulatory Commission (NRC) Radiation Exposure Information and Reporting System (REIRS) database. The bulk of the information in this report was compiled from the 2023 annual reports submitted by five of the seven categories[1] of NRC licensees subject to the reporting requirements of Title 10 of the *Code of Federal Regulations* 20.2206, "Reports of individual monitoring." The annual reports submitted by these licensees consist of radiation exposure records for each monitored individual. These records are analyzed for trends and presented in this report in terms of collective dose and the distribution of dose across the monitored individuals.

Annual reports for 2023 were received from a total of **169** NRC licensees from the five categories included in this report. Collectively, these reports indicate that **135,562** individuals were monitored, **58,916** of whom received a measurable dose (a dose that is reported as a positive value; see table 3-1). With the data adjusted to account for transient individuals, there were **93,489** unique individuals monitored, **42,048** of whom received a measurable dose (see section 5).

The collective dose incurred by these individuals was **7,616** person-rem (76,160 person-millisieverts [mSv]), which represents a **17 percent increase** from the 2022 value (see table 3-1). The 2023 collective dose is **9 percent higher** than the 5-year average of **6,955** person-rem (2018–2022), which is not a statistically significant change.[2] The increase in collective dose in 2023 was due to increases in four categories: industrial radiography licensees (**60 percent increase**), commercial nuclear power reactor licensees (**9 percent increase**), fuel cycle licensees (**8 percent increase**), and manufacturing and distribution licensees (**5 percent increase**). Relative to the 5-year average of collective dose for their respective categories, only fuel cycle licensees and manufacturing and distribution licensees exhibited statistically significant changes in dose.

The number of individuals receiving a measurable dose increased by **2 percent** from 2022 and was **3 percent below** the 5-year average but was not statistically significant. With the data adjusted to account for transient individuals, the average measurable dose in 2023 was **0.16 rem** (1.6 mSv), which is higher than the 2022 value of **0.14 rem** (1.4 mSv) in 2022, and but does not represent a statistically significant change from the 5-year average. (The average measurable dose is defined as the total effective dose equivalent divided by the number of individuals receiving a measurable dose.)

In calendar year 2023, the average annual collective dose per reactor for light-water reactor (LWR) licensees was **60** person-rem (600 person-mSv). This is a **9 percent increase** from the value reported for 2022 (table 4-3) but does not represent a statistically significant change from the 5-year average. The total number of outage hours at commercial nuclear power plants decreased slightly from 2022 to 2023. The collective dose for the LWR licensee category increased by **467** person-rem (4,670 person-mSv), from **5,085** person-rem (50,850 person-mSv) in 2022 to **5,552** person-rem (55,520 person-mSv) in 2023.

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1 The seven categories are (1) commercial nuclear power reactors and test reactor facilities, (2) industrial radiographers, (3) fuel processors (including uranium enrichment facilities), fabricators, and reprocessors, (4) facilities involved in manufacturing and distribution of byproduct material, (5) independent spent fuel storage installations, (6) facilities for land disposal of low-level waste, and (7) geologic repositories for high-level waste. Because there are currently no geologic repositories for high-level waste currently licensed and no NRC-licensed low-level waste disposal facilities currently in operation, this report considers only five categories.

2 Section 2.2 of this report presents additional statistical comparisons.

The average annual collective dose per reactor was **116** person-rem (1,160 person-mSv) for the **31** boiling-water reactors (BWRs) and **32** person-rem (320 person-mSv) for the **61** pressurized-water reactors (PWRs). The 2023 value for BWRs is **12 percent higher** than the 5-year average annual collective dose per BWR, which represents a statistically significant increase. The 2023 value for PWRs is **3 percent higher** than the 5-year average annual collective dose per PWR, which does not represent a statistically significant increase.

There were **22,171** individuals monitored by two or more licensees during the monitoring year. The assessment of the average measurable dose per individual is adjusted each year to account for the reporting of measurable doses for transient individuals by multiple licensees. The adjustments to account for transient individuals are noted in the footnotes for the applicable figures and tables.

FOREWORD

Through this annual report, the U.S. Nuclear Regulatory Commission (NRC) supports openness in its regulatory processes by providing the public with accurate and timely information about the radiation protection programs of NRC licensees. Toward that end, NUREG-0713, Volume 45, summarizes the 2023 occupational radiation exposure data maintained in the NRC Radiation Exposure Information and Reporting System (REIRS) database. The data used in this report are obtained through required and voluntary reporting to REIRS by April 30 of each year and then processed and evaluated before the report is made available for public use.

Seven categories of NRC licensees are required to report annually on individual exposure in accordance with Title 10 of the *Code of Federal Regulations* 20.2206, “Reports of individual monitoring.” These categories are (1) commercial nuclear power reactors and test reactor facilities, (2) industrial radiographers, (3) fuel processors (including uranium enrichment facilities), fabricators, and reprocessors, (4) facilities involved in manufacturing and distribution of byproduct material, (5) independent spent fuel storage installations, (6) facilities for land disposal of low-level waste and (7) geologic repositories for high-level waste. Because the NRC has not licensed any geologic repositories for high-level waste and all low-level waste disposal facilities are regulated by Agreement States, this report considers only the first five categories of licensees. It thus reflects the occupational radiation exposure data that the NRC received from 169 licensees.

The data submitted by licensees consist of radiation exposure records for each monitored individual. Accounting for transient individuals who worked at two or more facilities during the year, 93,489 individuals were monitored and 42,048 received a measurable dose in 2023. This report analyzes and presents these records in terms of collective dose and the distribution of dose across monitored individuals.

PREFACE

A number of U.S. Nuclear Regulatory Commission (NRC) licensees have asked how the NRC staff uses the occupational radiation exposure data that are compiled from the individual exposure reports required by Title 10 of the *Code of Federal Regulations* 20.2206, "Reports of individual monitoring." In combination with information from other sources, the principal use of the data is to provide facts about routine occupational exposures to radiation and radioactive material that occur in connection with certain NRC-licensed activities, for use in making decisions that impact public health and safety. Specifically, the NRC staff uses the data for the following purposes:

- The data permits the evaluation of trends, both favorable and unfavorable, in the outcomes of licensee implementation of the NRC's radiation protection framework.

- The data assist in the evaluation of the radiological risk associated with certain categories of NRC-licensed activities and are used for comparative analyses of radiation protection performance (e.g., U.S./foreign, boiling-water reactors/pressurized-water reactors, civilian/military, facility/facility, nuclear industry/other industries).

- The data are used within the NRC's Reactor Oversight Process to risk-inform inspection planning. They are also used in the significance determination process to disposition inspection findings in a risk-informed manner.

- The data are analyzed to make evidence-based decisions related to radiation exposure of transient individuals.

- The data are used to establish priorities for the use of NRC health physics resources, including research, standards development, regulatory program development, and inspections conducted at NRC-licensed facilities.

- The data enable the NRC to provide evidence-based responses to congressional and administrative inquiries and to questions raised by the public.

- The data are used to provide radiation exposure histories for individuals who were exposed to radiation at NRC-licensed facilities.

- The data provide information that may be used to conduct epidemiologic studies.

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ABBREVIATIONS AND ACRONYMS

10 CFR	Title 10 of the *Code of Federal Regulations*
Ac	actinium
AEC	U.S. Atomic Energy Commission
ALARA	as low as is reasonably achievable
Am	americium
Bq	becquerel
BRP	Big Rock Point
BWR	boiling-water reactor
C	carbon
CDE	committed dose equivalent
CEDE	committed effective dose equivalent
CFR	*Code of Federal Regulations*
Ci	curie
Cm	curium
Co	cobalt
Cr	chromium
CR-3	Crystal River Nuclear Generating Plant, Unit 3
DAEC	Duane Arnold Energy Center
DDE	deep dose equivalent
DECON	decontamination and dismantlement
DOE	U.S. Department of Energy
DP	decommissioning plan
DPC	Dairyland Power Cooperative
ENOI	Entergy Nuclear Operations, Inc.
ERDA	Energy Research and Development Administration
Fe	iron
FSSR	final status survey report
H	hydrogen
HBPP	Humboldt Bay Power Plant
HDI	Holtec Decommissioning International, LLC
I	iodine
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
INPO	Institute of Nuclear Power Operations

IP1	Indian Point Nuclear Generating Station, Unit 1
IP3	Indian Point Nuclear Generating Station, Unit 3
IPEC	Indian Point Energy Center
ISFSI	independent spent fuel storage installation
ISOE	Information System on Occupational Exposure
ISOEDAT	Information System on Occupational Exposure Database
LACBWR	La Crosse Boiling-Water Reactor
LDE	lens dose equivalent to the lens of the eye
LS	LaCrosse Solutions, LLC
LTP	license termination plan
LWR	light-water reactor
M&D	manufacturing and distribution
Mn	manganese
mSv	millisievert
MW	megawatts
MWe	megawatts electric
MW-hr	megawatt-hour
MWt	megawatt-thermal
MW-yr	megawatt-year
Nb	niobium
NEA	Nuclear Energy Agency
NextEra	NextEra Energy Duane Arnold, LLC
Ni	nickel
NMSS	Office of Nuclear Material Safety and Safeguards
NRC	U.S. Nuclear Regulatory Commission
NS	Nuclear Ship
OECD	Organisation for Economic Co-operation and Development
OPPD	Omaha Public Power District
OCEP	Oyster Creek Environmental Protection, LLC
Pa	protactinium
Pb	lead
Po	polonium
PSDAR	postshutdown decommissioning activities report
Pu	plutonium
PWR	pressurized-water reactor
Ra	radium
REIRS	Radiation Exposure Information and Reporting System

SAFSTOR	safe storage
SCE	Southern California Edison
SDE-ME	shallow dose equivalent to the maximally exposed extremity
SDE-WB	shallow dose equivalent to the whole body
SG	steam generator
SONGS	San Onofre Nuclear Generating Station
Sr	strontium
Sv	sievert
TBD	to be determined
TEDE	total effective dose equivalent
Th	thorium
TMI	Three Mile Island
TODE	total organ dose equivalent
U	uranium
UF_6	uranium hexafluoride
VBWR	Vallecitos Boiling-Water Reactor
Zn	zinc
ZNPS	Zion Nuclear Power Station
Zr	zirconium

1 INTRODUCTION

1.1 Background

One of the basic purposes of the Atomic Energy Act of 1954, as amended, and the implementing regulations in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 20, "Standards for Protection Against Radiation" [Ref. 1], is to protect public health and safety, including the health and safety of the employees of licensees operating under those regulations.

On November 4, 1968, the U.S. Atomic Energy Commission (AEC) published an amendment to 10 CFR Part 20 requiring the reporting of a statistical summary of occupational radiation exposure information (but not individual exposure records) to a central repository at AEC Headquarters. At that time, there were only four categories[1] of AEC licensees required to report. These licensees' facilities were considered to have the greatest potential for significant occupational doses. Licensees were required to report the total number of individuals who were monitored per dose range (in accordance with the former 10 CFR 20.407 which addresses personnel monitoring reports) and provide cumulative radiation exposure reports for individuals no longer employed (in accordance with the former 10 CFR 20.40 which addresses reports of personnel monitoring upon termination of employment or work). Occupational exposure data were extracted from these reports and entered into the AEC Radiation Exposure Information and Reporting System (REIRS), a computer system that was maintained at the Oak Ridge National Laboratory Computer Technology Center in Oak Ridge, Tennessee, until May 1990.

At that time, the data were transferred to a database management system and are now maintained at the Oak Ridge Institute for Science and Education, which is managed by Oak Ridge Associated Universities. The computerization of these data facilitates their collection and analysis. The data maintained in REIRS have been summarized and published in a report every year since 1969. Annual reports for each of the years 1969 through 1973 presented the data reported by both AEC licensees and contractors and were published in six documents designated as WASH-1350-R1 through WASH-1350-R6.

In January 1975, with the separation of the AEC into the Energy Research and Development Administration (ERDA) and the U.S. Nuclear Regulatory Commission (NRC), each agency assumed responsibility for collecting and maintaining occupational radiation exposure information reported by the facilities under its jurisdiction. The annual reports published by the NRC on occupational exposure for calendar year 1974 and subsequent years do not contain information pertaining to ERDA facilities or contractors. Comparable information for facilities and contractors under ERDA, now the U.S. Department of Energy (DOE), is collected and published by the DOE Office of Environment, Safety and Health Reporting and Analysis within the Office of Environment, Health, Safety and Security in Germantown, Maryland.

In 1982 and 1983, 10 CFR 20.408(a) was amended to require three additional categories of NRC licensees to submit annual statistical exposure reports and individual termination exposure reports: (1) geologic repositories for high-level radioactive waste, (2) independent spent fuel storage installations (ISFSIs), and (3) facilities for the land disposal of low-level radioactive waste. Of these additional categories, this document presents the exposure information that was reported

[1] These four categories were (1) commercial nuclear power reactors, (2) industrial radiographers, (3) fuel processors (including uranium enrichment facilities as of 1997), fabricators, and reprocessors, and (4) facilities involved in manufacturing and distribution of specified quantities of byproduct material.

by NRC licensees for only the ISFSI category, because there are no geologic repositories for high-level waste currently licensed, and there are no low-level waste land disposal facilities currently in operation that report to the NRC.

In May 1991, the NRC revised 10 CFR Part 20 to redefine the radiation monitoring and reporting requirements for its licensees. Instead of submitting annual reports summarizing the total number of individuals who were monitored (as under 10 CFR 20.407) and termination reports (as under 10 CFR 20.408), licensees were required to submit an annual report of the dose received by each monitored individual under 10 CFR 20.2206, "Reports of individual monitoring." Licensees were to implement the new requirements no later than January 1994. The regulations in 10 CFR 20.1502, "Conditions requiring individual monitoring of external and internal occupational dose," specify the relevant conditions. Each licensee is also required, under 10 CFR 20.2106, "Records of individual monitoring results," to maintain records of the results of such monitoring until the Commission terminates the license.

This report summarizes information reported for the current year and the previous 10 years. More licensee-specific data for the previous 10 years, such as the annual reports submitted by each commercial nuclear power reactor under the former 10 CFR 20.407 and 10 CFR 20.2206 (after 1993) and their technical specifications (before Volume 20 of this report), can be found in the documents listed under "Previous Reports in This Series" on page ii of this report. Additional operating data and statistics for each commercial nuclear power reactor for the years 1973 through 1982 may be found in a series of reports entitled "Nuclear Power Plant Operating Experience" [Refs. 2–10]. These documents are available for viewing at all NRC public document rooms, as well as on the NRC public website (https://www.nrc.gov). They may also be purchased from the National Technical Information Service or the U.S. Government Printing Office, as explained in section 7.

1.2 Radiation Exposure Information on the Internet

In May 1995, the NRC began disseminating radiation exposure information on a public website linked to the main NRC website. Currently, the NRC's website at (https://reirs.nrc-gateway.gov/) allows interested parties to access the data electronically rather than in the most recently published NUREG-0713 document. The REIRS website contains up-to-date information on radiation exposure, as well as information and guidance on reporting radiation exposure information to the NRC. Interested parties may read the documents online or download information for further analysis. REIRView, a software package designed to validate a licensee's annual data submittal, is available for downloading on the website. There are also links to other websites dealing with the topics of radiation and health physics. Individuals may submit requests for their dose records contained in REIRS on the website. In addition, organizations that have provided documentation to the NRC may submit requests for dose records contained in REIRS on the website.

The NRC intends to continue disseminating radiation exposure information on the web and will focus more resources on distributing information electronically than on publishing hard-copy reports.

The home page of the NRC's main website is at the following URL:

https://www.nrc.gov

The URL for NRC radiation exposure information is the following:

https://reirs.nrc-gateway.gov

The home page for the NRC REIRS Dashboard is at the following URL:

https://www.nrc.gov/about-nrc/radiation/health-effects/info/reirs-dashboard.html

Comments on this report or on the NRC's radiation exposure website should be directed as follows:

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2 LIMITATIONS OF THE DATA

2.1 Limitations

All the figures in this report relating to exposures and occupational doses are based on the results and interpretations of the readings of various types of personnel-monitoring devices employed by each licensee. These data, obtained from routine personnel-monitoring programs, assist in characterizing the radiation exposure incident to individuals' work and are used in evaluating the licensee's radiation protection program.

Monitoring requirements are specified in 10 CFR 20.1502, which requires licensees to monitor individuals at levels sufficient to demonstrate compliance with occupational dose limits. As a minimum, monitoring must be provided for (1) adults likely to receive, in 1 year from sources external to the body, a dose in excess of 10 percent of the applicable limits in 10 CFR 20.1201(a), and (2) all individuals entering an area of high or very high radiation. Separate dose limits have been established for minors, declared pregnant women, and members of the public. Depending on the administrative policy of each licensee, persons such as visitors and administrative individuals may also be provided with monitoring devices, even though the probability of their exposure to measurable levels of radiation is extremely small.

Pursuant to 10 CFR 20.2206(b), certain categories of licensees must submit annual reports of the results of individual monitoring they have conducted for each individual for whom monitoring was required by 10 CFR 20.1502. Beyond this requirement, many licensees elect to report the doses for every individual monitored. This practice increases the number of individuals—both those with measurable dose and those without measurable dose—that are considered in this report and contributes to the representativeness and statistical power of the data presented herein. For the purposes of this NUREG, the number of individuals reported as having "no measurable dose"[2] is shown separately and is subtracted from the total number of monitored individuals to determine the number of individuals with measurable dose. The number of individuals with measurable dose is then used to calculate the average measurable dose.

This report can be obtained from the NRC's website at https://reirs.nrc-gateway.gov/. The report does not include compilations of nonoccupational exposures, such as exposures received by medical patients from x-rays, fluoroscopy, or accelerators.

This report contains information reported by NRC licensees. Because the NRC licenses all commercial nuclear power reactors, fuel processors and fabricators, and ISFSIs in the United States, the information shown for these categories reflects all relevant activity in the United States. This is not the case, however, for the remaining categories of industrial radiography, manufacturing and distribution (M&D) of specified quantities of byproduct material, and low-level waste disposal. Many facilities that conduct these types of activities are regulated by Agreement States. Agreement States license and regulate more than eight times as many such facilities as does the NRC. Agreement States are not required to adopt the reporting requirements in 10 CFR 20.2206. As a result, Agreement State licensees are not required to submit occupational dose reports to the NRC.

[2] The number of individuals with measurable dose includes any individual with a total effective dose equivalent (TEDE) greater than zero rem. Individuals reported with zero dose, or no detectable dose, are included in the number of individuals with no measurable exposure.

Although some Agreement State licensees voluntarily submit occupational dose reports to the NRC, these results are not included in the analyses in sections 3, 5, and 6 of this report. NUREG 2118, Volume 1, "Occupational Radiation Exposure at Agreement State-Licensed Materials Facilities, 1997–2010," issued July 2012 [Ref. 11], provides information on occupational radiation exposures at Agreement State-licensed facilities.

The average dose per individual, as well as the dose distributions shown for groups of licensees, may also be affected by the multiple reporting of "transient" individuals—those who were monitored by two or more licensees during the year. Licensees are only required to report the doses received by individuals at their licensed facilities. Section 5 contains an analysis that adjusts the data to account for transient individuals.

When examining the annual statistical data, it is important to note that not all the personnel included in the report were necessarily monitored throughout the entire year. Many licensees, such as radiography and commercial nuclear power reactor licensees, may monitor numerous individuals for periods of much less than a year.

Care should be taken when referencing the collective totals presented in this report. The differences between the totals presented for all licensees that reported and those for only the licensees that are required to report should be noted. Section 1.1 gives the categories of licensees that are required to report to REIRS. Many licensees that are not required to report to REIRS nevertheless do so voluntarily for the sake of convenient recordkeeping, or they have reported in the past and have decided to continue this practice. Appendix A, Table A-2, "Other Facilities Reporting to the NRC," lists these licensees.

The data in this report are subject to change, because licensees may submit corrections or additions to data for previous years, although such revisions are uncommon.

All dose equivalent values in this report are given in units of rem in accordance with the general provisions for records in 10 CFR 20.2101(a):

1 rem = 0.01 sievert (Sv)
1 rem = 10 millisievert (mSv)
1 curie (Ci) = 3.7 X 10^{10} becquerel (Bq)

2.2 Statistical Comparisons

For statistical comparisons of averages, a two-sided one-sample t-test with a 0.05 significance level (i.e., 95 percent confidence) is used to determine whether the difference between the two averages is statistically significant. For values that are not averages, such as total collective dose, a 95 percent confidence interval is calculated for the 5-year average from the previous 5 years (not including the year currently under consideration), based on the normal distribution. If the value for the current year falls within the 95 percent confidence interval for the 5-year average, then the difference between the current-year value and the 5-year average is not considered statistically significant; if the current-year value falls outside the 95 percent confidence interval (i.e., below the lower limit or above the upper limit), then the difference is considered statistically significant.

The following gives the two-sided one-sample t test formula:

$$t = \frac{\overline{X} - \mu}{\frac{s}{\sqrt{n}}}$$

where

t = calculated *t*-statistic
$\bar{X}$ = sample mean
μ = population mean
s = sample standard deviation
n = sample number

Example:

We wish to determine whether the average measurable dose for a type of nuclear reactor differs significantly from the previous 5-year average. The 5-year mean for the average measurable dose is 0.080. The population mean is the current year's average measurable dose, 0.060. The sample standard deviation is 0.01, and the sample number is 5. Using the formula above, we obtain a *t*-value of 4.472:

$$t = \frac{0.080 - 0.060}{\frac{0.01}{2.236}} = 4.472$$

The associated two-tailed probability value (as obtained from a table of values for Student's t-distribution) is 0.006, which indicates that the difference is statistically significant at a 0.05 significance level.

It should be noted that this report does not analyze the uncertainties associated with dosimetry and dose measurement, as the NRC does not require licensees to report the information necessary for such an analysis. The inferences and statements presented in this report are based on the data as reported by the licensees, which do not include uncertainty values for the dosimetric calculations. All statistical inferences are made at the population level (i.e., from aggregated doses for a licensee or group of licensees). More information on the NRC's statistical practices can be found in NUREG-1475, Revision 1, "Applying Statistics," issued March 2011 [Ref. 12].

3 ANNUAL PERSONNEL MONITORING REPORTS – 10 CFR 20.2206

3.1 Definition of Terms and Methodologies

3.1.1 Number of Licensees Reporting

Table 3-1 gives the number of licensees in each of the seven[3] categories that are required to report under 10 CFR 20.2206. The first column gives the NRC license category and the corresponding program codes. The program code is a five-digit number the NRC assigns to each licensee to designate the major activity or principal use authorized in the license. Program code descriptions and definitions are available on the NRC's public website at https://www.nrc.gov/materials/miau/mat-toolkits.html. In 2020, the NRC revised the program codes representing industrial radiography licensees. Industrial radiography licensees previously reported in NUREG-0713 under "Temporary Job Sites" are now reported under either "1–5 Temporary Job Sites" or "6–20 Temporary Job Sites."

The third column in table 3-1 shows the number of licensees that have filed reports under 10 CFR 20.2206 during the past 11 years. All commercial nuclear power reactor licensees, fuel processors and fabricators, and ISFSI licensees must report occupational exposures to the NRC, even if they are in an Agreement State.

Many companies that conduct industrial radiography and M&D activities are in and regulated by Agreement States and are therefore not subject to the reporting requirements of 10 CFR 20.2206. However, industrial radiography and M&D licensees that are licensed and regulated by the NRC must report occupational exposures to the NRC. Appendix A, table A-1, lists all nonreactor licensees that reported occupational exposure data to the NRC in 2023.

3.1.2 Number of Monitored Individuals

The term "number of monitored individuals" in this report refers to the total number of individuals that NRC licensees reported as being monitored for exposure to external or internal radiation during the year. This number includes both individuals for whom monitoring is required and individuals for whom monitoring was voluntarily conducted and reported (e.g., workers receiving a minimal dose below the monitoring threshold, visitors, service representatives, contract individuals, and administrative individuals).

The total number of monitored individuals was determined from the number of unique personal identification numbers submitted per licensee. Uniqueness is defined by the combination of identification number and identification type [Ref. 13].

3.1.3 Number of Individuals with Measurable TEDE

The number of individuals with a measurable TEDE includes any individual with a total effective dose equivalent (TEDE) that is reported as a positive value.

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[3] These categories are (1) commercial nuclear power reactors and test reactor facilities, (2) industrial radiographers, (3) fuel processors (including uranium enrichment facilities), fabricators, and reprocessors, (4) facilities involved in M&D of byproduct material, (5) ISFSIs, (6) facilities for land disposal of low-level waste, and (7) geologic repositories for high-level waste. There are currently no NRC licensees involved in low-level waste disposal and no geologic repositories for high-level waste.

Table 3-1 Average Annual Exposure Data for Certain Categories of NRC Licensees

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 04312 04313	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
	2019	60	3,732	3,152	1,668.408	0.45	0.53
	2020	56	3,058	2,577	1,130.511	0.37	0.44
	2021	43	2,331	1,996	789.140	0.34	0.40
	2022	48	2,523	2,137	962.450	0.38	0.45
	2023	51	3,241	2,817	1,541.161	0.48	0.55
Manufacturing and Distribution 02500 03211 03212 03214	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
	2019	16	1,188	804	147.927	0.12	0.18
	2020	13	1,112	799	134.045	0.12	0.17
	2021	16	1,258	896	181.531	0.14	0.20
	2022	16	1,287	998	182.718	0.14	0.18
	2023	17	1,300	1,034	192.289	0.15	0.19
Independent Spent Fuel Storage 23100 23200	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
	2019	2	79	28	1.939	0.02	0.07
	2020	2	59	19	0.454	0.01	0.02
	2021	2	76	20	0.795	0.01	0.04
	2022	3	96	27	1.891	0.02	0.07
	2023	2	93	15	0.994	0.01	0.07
Fuel Cycle Licenses – Fabrication, Processing, and Uranium Enrichment, and UF_6 Production Plants 11400 21200 21210	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
	2019	7	4,347	2,690	250.522	0.06	0.09
	2020	7	3,900	2,755	244.264	0.06	0.09
	2021	7	4,267	2,769	238.564	0.06	0.09
	2022	7	4,933	3,464	304.805	0.06	0.09
	2023	7	6,036	4,001	329.353	0.05	0.08
Commercial LWRs** 41111	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
	2019	96	134,897	53,615	5,080.795	0.04	0.09
	2020	95	125,010	52,820	4,899.128	0.04	0.09
	2021	93	122,681	50,667	5,303.198	0.04	0.10
	2022	92	125,338	51,010	5,085.286	0.04	0.10
	2023	92	124,892	51,049	5,552.061	0.05	0.12
Grand Totals and Averages	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	190	159,355	67,341	7,909.670	0.05	0.12
	2018	182	159,988	67,835	8,165.125	0.05	0.12
	2019	174	143,026	59,765	6,590.069	0.05	0.11
	2020	163	132,942	58,501	6,109.158	0.05	0.10
	2021	167	131,520	57,293	6,755.062	0.05	0.12
	2022	166	134,177	57,636	6,537.150	0.05	0.11
	2023	169	135,562	58,916	7,615.858	0.06	0.13

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

* These categories include only NRC licensees required to submit an annual report (see section 2)

** This category includes all light-water reactors (LWRs) that had been in commercial operation for at least a full year as of December 31 of the year under consideration.

3.1.4 Collective Dose

Unless otherwise specified, this report uses the term “collective dose” to denote the sum of the TEDE received by all monitored individuals within a category. This definition is used because 10 CFR 20.2206 requires that the TEDE be reported. Collective doses are reported in units of person-rem.

Before the implementation of the revised dose-reporting requirements of 10 CFR 20.2206 in 1994, the collective dose, in some cases, was calculated from the dose distributions by multiplying the number of individuals reported in each dose range by the midpoint of that dose range and then summing the products. This procedure relied on the assumption that the midpoint of the range was equal to the arithmetic mean of the individual doses incurred within the range. Experience has shown that the actual mean of the individual doses falling within each dose range is generally less than the midpoint of the range. For this reason, the collective doses calculated by this procedure may be approximately 10 percent higher than the sum of the actual individual doses. Because of this change in methodology, care should be taken when comparing the collective dose values provided for 1994 to 2023 (which reflect the sum of the actual doses) with the collective dose values for years before 1994.

In addition, before 1994, doses included only the external whole-body dose, with no internal dose contribution. Although the contribution of internal dose to the TEDE is minimal for most licensees, it should be considered when comparing collective doses for 1994 and later with collective doses for years before 1994. One notable exception is for fuel fabrication facilities, where the committed effective dose equivalent (CEDE), in some cases, contributes the majority of the TEDE (see section 3.3.5).

3.1.5 Average Individual Dose

The average individual dose is obtained by dividing the collective dose by the total number of monitored individuals. This figure is usually less than the average measurable dose, because it includes the individuals who received zero or less than measurable doses.

3.1.6 Average Measurable Dose

The average measurable dose is obtained by dividing the collective TEDE by the number of individuals with a measurable dose. This is the average most commonly used in this and other reports when examining trends and comparing doses received by individuals in various segments of the nuclear industry.

3.2 Annual Total Effective Dose Equivalent Distributions

Table 3-2 is a statistical compilation of the occupational dose reports by category of licensee (see section 3.3 for a description of each license category). The dose distributions are generated by summing the TEDE for each individual and counting the number of individuals in each dose range. In several license categories, a large number of individuals received doses that were less than measurable. Individuals monitored by commercial nuclear power reactor licensees accounted for 87 percent of the reported individuals with measurable doses in 2023 (as shown in table 3-2). These individuals received 73 percent of the total collective dose.

Table 3-2 Distribution of Annual Collective TEDE by License Category 2023

License Category (Number of Sites Reporting)	Number of Individuals with TEDE in Range (rem) *											Total Number Monitored	Number with Meas. TEDE	Total Collective Dose (TEDE) (person-rem)
	No. Meas.	Meas. <0.01	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			
INDUSTRIAL RADIOGRAPHY														
Fixed Locations (2)	4	7	1	-	-	-	-	-	-	-	-	12	8	0.409
1–5 Temporary Job Sites (45)	319	556	338	356	252	174	359	83	24	4	-	2,465	2,146	1,314.182
6–20 Temporary Job Sites (4)	101	204	137	173	76	35	35	2	1	-	-	764	663	226.570
Total (51)	**424**	**767**	**476**	**529**	**328**	**209**	**394**	**85**	**25**	**4**	**-**	**3,241**	**2,817**	**1,541.161**
MANUFACTURING AND DISTRIBUTION														
Broad-Type A (2)	45	247	62	40	15	11	31	11	-	-	-	465	420	134.366
Broad-Type B and Other (0)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nuclear Pharmacies (15)	221	443	116	36	13	3	3	-	-	-	-	835	614	57.923
Total (17)	**266**	**690**	**178**	**76**	**28**	**14**	**34**	**11**	**-**	**-**	**-**	**1,300**	**1,034**	**192.289**
INDEPENDENT SPENT FUEL STORAGE														
Total (2)	**78**	**11**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**93**	**15**	**0.994**
FUEL CYCLE*														
Total (7)	**2,035**	**3,047**	**537**	**307**	**93**	**13**	**1**	**-**	**-**	**-**	**-**	**6,036**	**4,001**	**329.353**
COMMERCIAL POWER REACTORS**														
Boiling Water (31)	22,051	16,651	5,310	2,625	879	377	288	5	-	-	-	48,186	26,135	3,607.444
Pressurized Water (61)	51,792	19,074	4,325	1,215	234	46	20	-	-	-	-	76,706	24,914	1,944.617
Total (92)	**73,843**	**35,725**	**9,635**	**3,840**	**1,113**	**423**	**308**	**5**	**-**	**-**	**-**	**124,892**	**51,049**	**5,552.061**
GRAND TOTALS	**76,646**	**40,240**	**10,828**	**4,754**	**1,562**	**659**	**737**	**101**	**25**	**4**	**-**	**135,562**	**58,916**	**7,615.858**

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

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

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

*** This category includes all reactors that had been in commercial operation for a full year as of December 31, 2023. Vogtle 3 became operational on July 31, 2023, and is not included in the data shown.

3.3 Summary of Occupational Dose Data by Licensee Category

3.3.1 Industrial Radiography Licensees—Fixed Location and Temporary Job Sites

Industrial radiography licenses are issued to allow the use of sealed radioactive materials, usually in exposure devices or cameras that primarily emit gamma rays for nondestructive testing of pipeline weld joints, steel structures, boilers, aircraft and ship parts, and other high-stress alloy parts. Some firms are licensed to conduct such activities in one location, usually in a permanent facility designed and shielded for radiography; others perform radiography at temporary job sites in the field. The radioisotopes most commonly used are cobalt-60 and iridium-192. As shown in table 3-1, the NRC received annual reports from 51 industrial radiography licensees in 2023. Table 3-3 summarizes the data reported by these licensees for 2023, as well as the corresponding data from industrial radiography licensees for 2021 and 2022 for comparison. As noted earlier, in 2020 the NRC revised its program codes, which affected the categorization of industrial radiography licensees. The program code previously labeled in NUREG-0713 as "Industrial Radiography Temporary Job Sites" is now split into "1–5 Temporary Job Sites" and "6–20 Temporary Job Sites."

Table 3-3 Annual Exposure Information for Industrial Radiography Licensees, 2021–2023

Year	Type of License	Number of Licensees	Number of Monitored Individuals	Number of Individuals with Measurable Dose	Collective Dose (person-rem)	Average Measurable Dose (rem)
2021	Fixed Location	2	10	9	2.513	0.28
	1–5 Temporary Job Sites	37	1,243	1,070	527.537	0.49
	6–20 Temporary Job Sites	4	1,078	917	259.090	0.28
	Total	**43**	**2,331**	**1,996**	**789.140**	**0.40**
2022	Fixed Location	2	11	6	1.565	0.26
	1–5 Temporary Job Sites	42	1,699	1,449	747.824	0.52
	6–20 Temporary Job Sites	4	813	682	213.061	0.31
	Total	**48**	**2,523**	**2,137**	**962.450**	**0.45**
2023	Fixed Location	2	12	8	0.409	0.05
	1–5 Temporary Job Sites	45	2,465	2,146	1,314.182	0.61
	6–20 Temporary Job Sites	4	764	663	226.570	0.34
	Total	**51**	**3,241**	**2,817**	**1,541.161**	**0.55**

High exposures in radiography can be directly attributed to the type and location of the radiography field work. For example, some locations, such as oil drilling platforms and aerial tanks, offer the radiographer little shielding and may not allow for the use of distance to reduce exposure. A relatively small number of exposed individuals involved in radiography activities usually receive average measurable doses that are higher than those received by individuals under other license categories.

Figure 3-1 shows the number of individuals with a measurable dose, the total collective dose, and the average measurable dose per individual for industrial radiography licensees from 1994 through 2023. In 2023, three more licensees reported in the category "1–5 Temporary Job Sites" than had done so in 2022. As this category generally accounts for more than half of the individuals monitored, many of the dose parameters increased from 2022 to 2023. In particular, the number of individuals with a measurable TEDE increased by 32 percent, and the collective TEDE increased by 60 percent. However, the 2023 values for these parameters do not represent a statistically significant change from the 5-year averages (2,633 individuals with a measurable TEDE, and a collective TEDE of 1,304 person-rem [13,040 person-mSv]). Similarly, the average measurable TEDE increased by 22 percent to 0.55 rem (5.5 mSv) in 2023 but does not represent a statistically significant increase from the 5-year average of 0.48 rem (4.8 mSv).

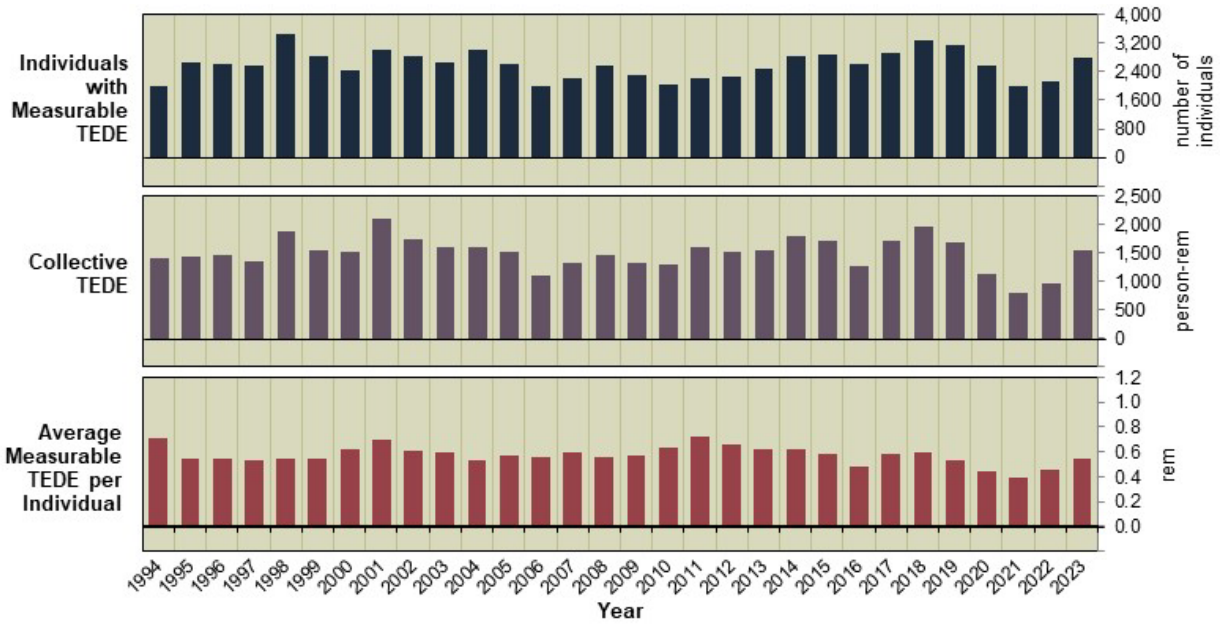


Figure 3-1 Number of Individuals with Measurable TEDE, Collective TEDE, and Average Measurable TEDE for Industrial Radiography Licensees, 1994–2023

3.3.2 Manufacturing and Distribution Licensees—Broad-Type A, Broad-Type B, Other, and Nuclear Pharmacies

M&D licenses are issued to allow the manufacture and distribution of radionuclides in various forms for diverse purposes. The products are usually distributed to organizations or companies specifically licensed by the NRC. Type A specific licenses of broad scope (Broad-Type A licenses) are issued to larger organizations that may use many different radionuclides in many ways and that have a comprehensive radiation protection program. Some Broad-Type A licensees are medical suppliers that process, package, or distribute such products as diagnostic test kits, radioactive surgical implants, and tagged radiochemicals for use in medical research, diagnosis, and therapy. Broad-Type B licenses involve the processing, encapsulation, packaging, and distribution of radionuclides purchased in bulk quantities from production reactors and cyclotrons. Major products include gamma radiography sources, cobalt irradiation sources, well-logging sources, sealed sources for gauges and smoke detectors, and radiochemicals for nonmedical research. Note that no Broad-Type B licensees have reported to the NRC since 2010. M&D Other licenses are usually issued to smaller organizations requiring more restrictive licenses. These licenses are usually more specific in identifying each radionuclide, the chemical and physical form, and the authorized activities and users. A third category of licensees, nuclear pharmacies, are involved in the compounding and dispensing of radioactive materials for use in nuclear medicine procedures.

Table 3-4 presents the annual data that were reported by the three types of licensees for 2021, 2022, and 2023. As shown in the table, the average measurable TEDE is generally the highest for the Broad-Type A licensees, of which there are only two among the NRC's active licensees: Curium US, LLC, and International Isotopes Idaho, Inc. These two licensees also accounted for 70 percent of the total collective TEDE in 2023.

Table 3-4 and figure 3-2 both show the number of individuals with measurable doses, the total collective TEDE, and the average measurable dose per individual for Broad-Type A licensees,

Broad-Type B and Other, and Nuclear Pharmacy licensees. From 2022 to 2023, the number of individuals with a measurable dose increased by 4 percent and the collective TEDE increased by 5 percent. The number of individuals with a measurable TEDE in 2023 was significantly higher (23 percent higher) than the 5-year average of 843. The collective TEDE in 2023 was significantly higher (23 percent higher) than the 5-year average of 157 rem. The average measurable TEDE in 2023 (0.19 rem) was nearly the same as the 5-year average of 0.18 rem.

Table 3-4 Annual Exposure Information for Manufacturing and Distribution Licensees 2021–2023

Year	Type of License	Number of Licensees	Number of Monitored Individuals	Number of Individuals with Measurable TEDE	Collective TEDE (person-rem)	Average Measurable TEDE (rem)
2021	M&D—Broad-Type A	2	418	346	134.309	0.39
	M&D—Broad-Type B and Other	0	0	0	0.000	0.00
	M&D—Nuclear Pharmacies	14	840	550	47.222	0.09
	Total	**16**	**1,258**	**896**	**181.531**	**0.20**
2022	M&D—Broad-Type A	2	443	393	129.751	0.33
	M&D—Broad-Type B and Other	0	0	0	0.000	0.00
	M&D—Nuclear Pharmacies	14	844	605	52.967	0.09
	Total	**16**	**1,287**	**998**	**182.718**	**0.18**
2023	M&D—Broad-Type A	2	465	420	134.366	0.32
	M&D—Broad-Type B and Other	0	0	0	0.000	0.00
	M&D—Nuclear Pharmacies	15	835	614	57.923	0.09
	Total	**17**	**1,300**	**1,034**	**192.289**	**0.19**

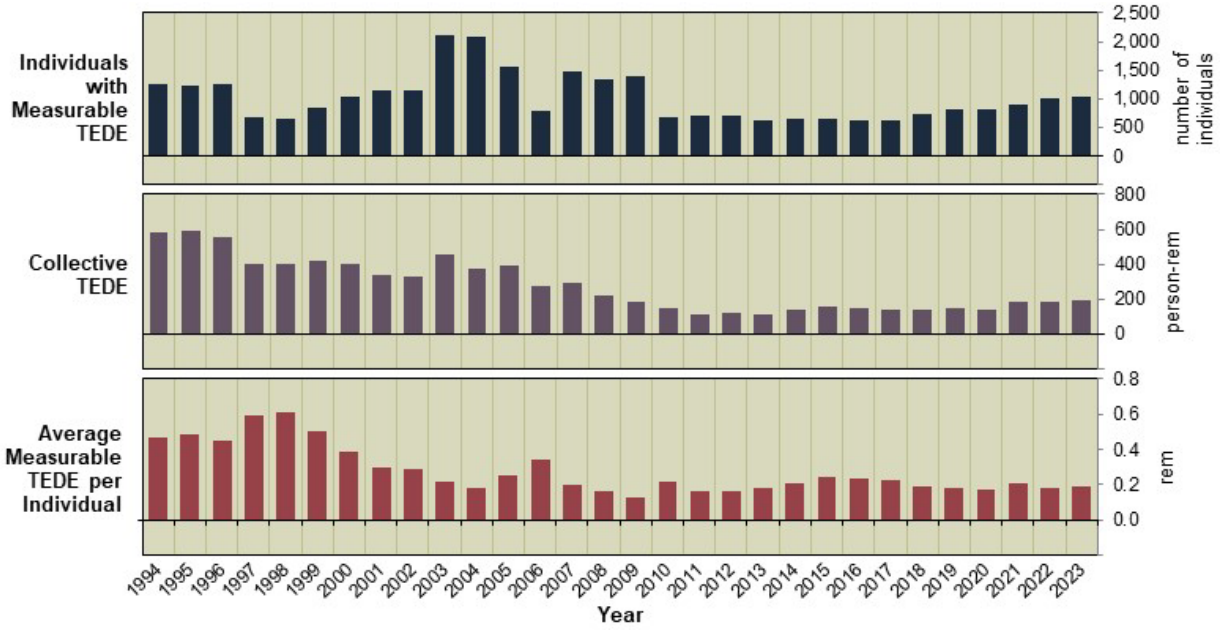


Figure 3-2 Number of Individuals with Measurable TEDE, Collective TEDE, and Average Measurable TEDE for Manufacturing and Distribution Licensees 1994–2023

3.3.3 Low-Level Waste Disposal Licensees

Low-level waste disposal licenses are issued to allow the receipt, possession, and disposal of low-level radioactive waste at land disposal facilities. Licensees must have the appropriate facilities to receive waste from places such as hospitals and laboratories, store them for a short time, and dispose of them in a properly prepared burial ground. Since 1999, all licensees that have conducted these activities have been in Agreement States, which have primary regulatory authority over the licensees' activities; therefore, there are no NRC low-level waste licensees that report radiation exposure data to REIRS.

3.3.4 Independent Spent Fuel Storage Installation Licensees

The NRC issues ISFSI licenses to allow the possession of spent fuel and associated radioactive materials from commercial nuclear power reactors for the purpose of storage. According to 10 CFR 72.3, "Definitions" [Ref. 14], spent fuel means the following:

> [Fuel] that has been withdrawn from a nuclear reactor following irradiation, has undergone at least one year's decay since being used as a source of energy in a power reactor, and has not been chemically separated into its constituent elements by reprocessing. Spent fuel includes special nuclear material, byproduct material, source material, and other radioactive materials associated with fuel assemblies.

The spent fuel that is removed from the reactor is initially stored in a spent fuel pool and usually cooled for at least 5 years in the pool before it is transferred to dry cask storage at an ISFSI. The NRC has authorized transfer as early as 3 years after removal from the reactor; however, the industry norm is approximately 10 years. An ISFSI provides interim storage, protection, and safeguarding of spent fuel pending its final disposal.

Most ISFSI facilities are located on site at commercial nuclear power reactors. Consequently, the occupational dose information for an ISFSI facility is usually included with the dose information reported by the commercial nuclear power reactor licensee and is not reported separately to the NRC. Since 2005, only two ISFSI licensees have been reporting dose information to the NRC: the GE Morris facility, located in Illinois, and the Trojan ISFSI, located in Oregon. The GE Morris facility is the only spent fuel pool that is not located at an existing or former reactor site; its ISFSI license has been renewed until 2042. The Trojan nuclear power reactor has been decommissioned and is no longer in commercial operation; however, the ISFSI facility at Trojan remains in operation, and the licensee reports occupational dose information to the NRC under the ISFSI license, which has been renewed until 2059. In addition, in 2022, the Rancho Seco ISFSI, based in Sacramento County, California, began reporting under an ISFSI license. Appendix A, table A-1, summarizes the occupational dose information reported by these three licensees.

Figure 3-3 shows the number of individuals with a measurable TEDE, the total collective TEDE, and the average measurable TEDE per individual for ISFSI facilities. Table 3-1 shows that the number of individuals with a measurable TEDE decreased from 27 in 2022 to 15 in 2023. The collective TEDE decreased by 47 percent, from 1.891 person-rem in 2022 to 0.994 person-rem in 2023, but this decrease was not statistically significant. The average measurable TEDE per individual remained the same, at 0.07 rem, in both 2022 and 2023. The average measurable TEDE in 2023 was not significantly different from the 5-year average of 0.06 rem.

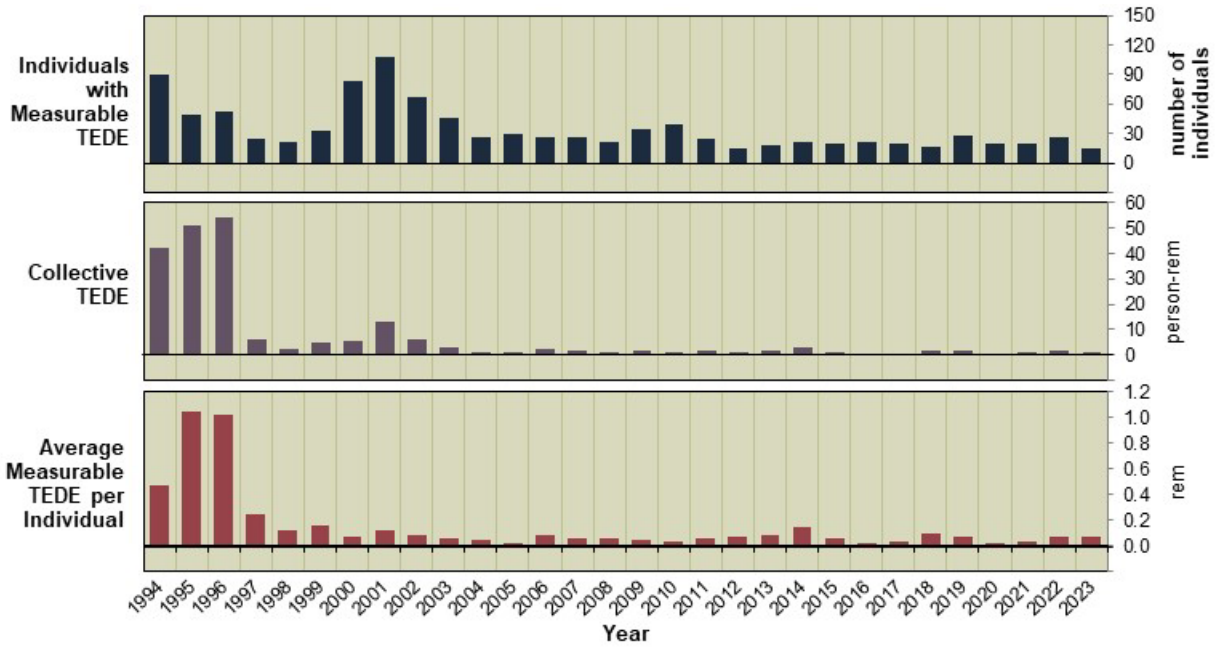


Figure 3-3 Number of Individuals with Measurable TEDE, Collective TEDE, and Average Measurable TEDE for ISFSI Licensees, 1994–2023

3.3.5 Fuel Cycle Licensees

The NRC licenses fuel cycle facilities to process and handle special nuclear material, source material, or both. These forms of nuclear material are highly regulated to ensure their safe use and security. The use and handling of special nuclear material are described in 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material" [Ref. 15]. While most of the exposure discussed in this section is from reactor fuel production, some exposure may also result from the use of special nuclear material in education, research, and homeland security.

Most fuel cycle licenses are issued to allow reactor fuel processing, enrichment, and fabrication. Fuel cycle facilities vary in both purpose and technology, as different facilities encompass different stages of the nuclear fuel cycle. The fuel cycle facilities that are currently operational engage in fall into three categories: uranium enrichment, uranium conversion, and fuel fabrication.

Figure 3-4 shows the number of individuals with a measurable TEDE, the total collective TEDE, and the average measurable TEDE per individual for fuel cycle licensees. The collective deep dose equivalent (DDE), the average measurable DDE, the collective CEDE, and the average measurable CEDE are also shown, because they contribute significantly to the TEDE for fuel fabrication facilities.

Table 3-5 shows that seven licensed fuel cycle facilities (engaged in fabrication, processing, uranium enrichment, and uranium hexafluoride [UF_6] production) reported to the NRC in 2023. From 2022 to 2023, the collective TEDE increased by 8 percent and the collective DDE increased by 13 percent; the collective CEDE remained the same. When compared to the 5-year average, the increases in collective TEDE and collective DDE were statistically significant.

Four fuel cycle licensees reported decreases in collective TEDE, while three reported increases. Of the three licensees reporting increases from 2022 to 2023, Honeywell Performance Materials reported the largest increase (67 percent).

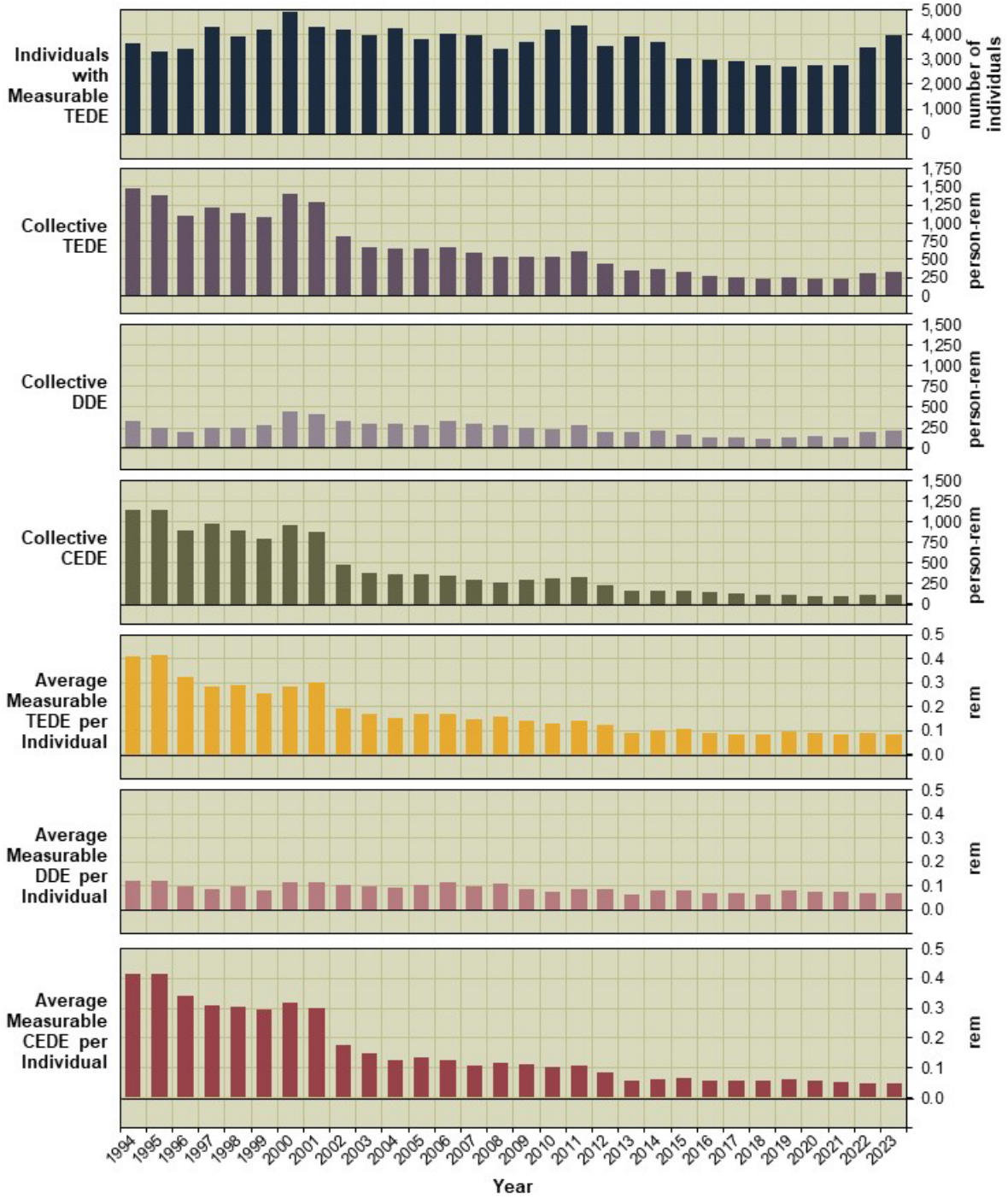


Figure 3-4 Annual Exposure Information for Fuel Cycle Licensees, 1994–2023

Table 3-5 Annual Exposure Information for Fuel Cycle Licensees 2021–2023

Year	Type of License	Number of Licensees	Number of Monitored Individuals	Number of Individuals with Meas. TEDE	Collective TEDE (person-rem)	Average Meas. TEDE (rem)	Number of Individuals with Meas. DDE	Collective DDE (person-rem)	Average Meas. DDE (rem)	Number of Individuals with Meas. CEDE	Collective CEDE (person-rem)	Average Meas. CEDE (rem)
2021	Fuel Cycle	7	4,267	2,769	238.564	0.09	1,920	141.244	0.07	1,841	97.320	0.05
2022	Fuel Cycle	7	4,933	3,464	304.805	0.09	2,757	194.757	0.07	2,296	110.048	0.05
2023	Fuel Cycle	7	6,036	4,001	329.353	0.08	3,218	219.769	0.07	2,364	109.676	0.05

3.3.6 Light-Water Reactor Licensees

The NRC licenses light-water reactor (LWR) facilities to use special nuclear material in reactors to produce heat to generate electricity to be sold to consumers. There are two major types of commercial LWRs in the United States: pressurized-water reactors (PWRs) and boiling-water reactors (BWRs). Both types use water as the primary coolant.

Table 3-1 shows the number of licensees, number of monitored individuals, number of individuals with a measurable TEDE, total collective TEDE, average collective TEDE, and average measurable TEDE per individual for LWR facilities that had been in commercial operation for at least 1 full year at the end of each of the years 2013 through 2023. The data for each year do not include reactors that were permanently shut down or that had been in commercial operation for less than 1 full year by the end of that year. The one exception is Indian Point 2 (PWR), which closed in April 2020: because the licensee reported the dose for that unit in combination with that of Indian Point 3, the two units were jointly reported as operational in 2020. In 2021, Indian Point 3 (PWR) was added to the shutdown reactor list, so both units were removed from the operational list. In 2022, Palisades (PWR) was removed from the operational list. Vogtle 3, which became operational July 31, 2023, is not included in the data, as it had been operational less than 1 full year as of the end of 2023. As of the publishing date of this report, several utilities have expressed interest in restarting reactors that were previously planned for decommissioning. Although these activities do not affect the data for 2023, future reports in this series may reflect changes in the status of reactors that were previously considered permanently shut down.

The data in table 3-1 have not been adjusted to account for the multiple counting of transient individuals (see section 5).

Appendix B presents the reported dose distribution of individuals monitored at each plant site for the year 2023 in alphabetical order by plant name. Sections 4 and 5 provide more details and analyses of the annual dose information reported by commercial nuclear power reactors.

3.3.7 Other Facilities Reporting to the NRC

Appendix A, table A-2, provides data for additional facilities that submitted occupational radiation dose reports to the NRC in 2023. These facilities are not among the seven categories of licensees required to report under 10 CFR 20.2206 and are not included in the analyses presented in this report. However, the data from these facilities may be of interest to researchers and are included in this report for completeness.

3.4 Summary of Intake and Internal Dose Data by Licensee Category

All internal dose estimates use the amount of intake as the basis for the calculation. The intake is the total amount of radioactive material that enters the human body, and internal dose (as defined

in 10 CFR 20.1003, “Definitions”) is the portion of the dose equivalent received from radioactive material taken into the body. For each intake recorded, licensees are required to list the radionuclide that was taken into the body, pulmonary clearance class, intake mode, and amount of the intake. Under 10 CFR 20.2206, licensees reporting intake data must complete and submit to the NRC an NRC Form 5, “Occupational Dose Record for a Monitoring Period”; its equivalent paper document; or an electronic document containing this information.

Tables 3-6 and 3-7 summarize the intake data reported to the NRC for 2023. The data are categorized by licensee type and radionuclide type. Table 3-6 lists the intakes for which the mode of intake into the body was recorded as ingestion or “other,” such as absorption through skin or injection through a puncture or wound.

Table 3-6 Intake by Licensee Category and Radionuclide—Mode of Intake: Ingestion or Other, 2023

Mode	Licensee Category	Program Code	Radionuclide	Number of Intake Records	Collective Intake (microcuries) (sci. notation)
Ingestion	Nuclear Power Reactors	41111	Co-58	1	5.54E-02
	Nuclear Power Reactors	41111	Co-60	**3**	**6.34E-01**

NOTE: The data values shown in bold and boxed represent the highest value in each category.

Table 3-7 lists the intakes for which the mode of intake was inhalation from ambient airborne radioactive material in the workplace. These intakes are categorized according to their pulmonary clearance class or pulmonary solubility type, which describes the clearance half-time from the pulmonary region of the lung into the blood and gastrointestinal tract. Pulmonary clearance classes are recorded as D, W, or Y (days, weeks, or years), while pulmonary solubility types are recorded as F, M, or S (fast, medium, or slow). The nomenclature used depends on whether the licensee is following International Commission on Radiological Protection (ICRP) Publication 30, “Limits for Intakes of Radionuclides by Workers,” issued in 1972 [Ref. 16], which is described in 10 CFR Part 20, or ICRP Publication 68, “Dose Coefficients for Intakes of Radionuclides by Workers,” issued in 1994 [Ref. 17]. The former uses pulmonary clearance classes (D, W, Y), while the latter uses pulmonary solubility types (F, M, S). The amount of material taken into the body is given in microcuries, a unit of measure of the quantity of radioactive material. For each licensee category, the maximum number of intake records and the maximum intake are shown in bold in the table and boxed for ease of reference.

Table 3-7 Intake by Licensee Category and Radionuclide—Mode of Intake: Inhalation, 2023

Licensee Category	Program Code	Radionuclide	Pulmonary Clearance Class or Solubility Type	Number of Intake Records *	Collective Intake (microcuries) (sci. notation)
Nuclear Pharmacies	02500	I-123	W	16	2.14E-01
	02500	I-131	D	4	8.60E-01
	02500	I-131	W	**89**	**2.59E+00**
Nuclear Power Reactors	41111	Ag-110M	Y	2	5.60E-02
	41111	Am-241	W	1	1.65E-05
	41111	C-14	Y	2	5.20E-05
	41111	Co-60	Y	31	1.49E+00
	41111	Cs-137	D	3	3.00E-02
	41111	Fe-55	D	4	3.44E-01
	41111	H-3	V	**58**	**1.06E+03**
	41111	Mn-54	D	1	5.90E-02
	41111	Ni-59	W	2	3.30E-04
	41111	Ni-63	D	4	5.00E-01
	41111	P-239	Y	1	2.04E-05
	41111	Pu-241	W	2	1.73E-05
	41111	Sr-90	Y	1	1.40E-02
Uranium Fuel Processing Plants	21210	Am-241	M	50	4.10E-05
	21210	Pu-239	M	69	1.57E-04
	21210	Sr-90	S	295	5.84E-01
	21210	Th-232	M	12	4.56E-04
	21210	Th-232	S	4	3.38E-05
	21210	U-232	Y	64	2.46E-04
	21210	U-234	D	88	6.82E-02
	21210	U-234	F	727	1.01E-01
	21210	U-234	M	595	9.75E-03
	21210	U-234	S	**1,760**	**1.84E+00**
	21210	U-234	W	35	4.45E-02
	21210	U-234	Y	465	5.93E-01
	21210	U-235	D	82	2.43E-03
	21210	U-235	S	277	5.13E-02
	21210	U-235	W	35	1.65E-03
	21210	U-235	Y	201	2.03E-02
	21210	U-236	D	82	1.04E-04
	21210	U-236	F	683	1.00E-03
	21210	U-236	S	47	4.89E-04
	21210	U-236	W	35	7.06E-05
	21210	U-236	Y	201	8.54E-03
	21210	U-238	D	88	9.34E-03
	21210	U-238	M	530	2.91E-04
	21210	U-238	S	279	1.80E-01
	21210	U-238	W	35	6.04E-03
	21210	U-238	Y	465	7.81E-02

NOTE: The data values shown in bold and boxed 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 using NRC Form 5 under 10 CFR 20.2206.

Table 3-7 Intake by Licensee Category and Radionuclide—Mode of Intake: Inhalation, 2023 (continued)

Licensee Category	Program Code	Radionuclide	Pulmonary Clearance Class or Solubility Type	Number of Intake Records *	Collective Intake (microcuries) (sci. notation)
Uranium Hexafluoride (UF_6) Production Plants	11400	Ac-227	D	2	2.00E-06
	11400	Ac-227	W	301	5.93E-04
	11400	Pa-231	D	2	2.00E-06
	11400	Pa-231	W	301	5.93E-04
	11400	Pb-210	D	2	2.00E-06
	11400	Pb-210	W	265	4.67E-04
	11400	Po-210	D	2	2.00E-06
	11400	Po-210	W	231	3.69E-04
	11400	Ra-226	D	4	7.00E-06
	11400	Ra-226	W	449	1.45E-03
	11400	Ra-228	D	1	1.00E-06
	11400	Ra-228	W	211	3.33E-04
	11400	Th-228	D	1	1.00E-06
	11400	Th-228	W	211	3.33E-04
	11400	Th-230	D	11	7.30E-05
	11400	Th-230	W	727	1.50E-02
	11400	Th-232	D	1	1.00E-06
	11400	Th-232	W	211	3.33E-04
	11400	U-234	D	11	6.78E-03
	11400	U-234	W	**738**	**1.38E+00**
	11400	U-235	D	11	3.16E-04
	11400	U-235	W	**738**	6.44E-02
	11400	U-238	D	11	5.66E-03
	11400	U-238	W	**738**	1.15E+00

NOTE: The data values shown in bold and boxed 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 using NRC Form 5 under 10 CFR 20.2206.

Table 3-8 lists the number of individuals with a measurable CEDE, the collective CEDE, and the average measurable CEDE per individual for each licensee category. From 2022 to 2023, the number of individuals with a measurable CEDE increased by 96 to 2,473, which is significantly higher than the 5-year average of 2,042. Almost all of the internal dose reported in 2023 (99 percent of the total collective CEDE) was due to fuel fabrication facilities, which contributed 89.824 person-rem, together with the UF_6 production facility, which contributed 19.852 person-rem. The average measurable CEDE for fuel fabrication facilities was slightly lower in 2023 than in 2022, at 0.055 rem per individual, which is below the 5-year average of 0.060 rem. The fuel fabrication licensee with the highest doses reported a collective CEDE of 38.190 person-rem and an average measurable CEDE of 0.138 rem per individual. These doses were due to the exposure of individuals to uranium during the processing and fabrication of uranium fuel.

Table 3-8 Collective and Average CEDE by Licensee Category, 2023

Licensee Category	Licensee Name	License Number	Number with Meas. CEDE	Collective CEDE (person-rem)	Average Meas. CEDE (rem)
MANUFACTURING AND DISTRIBUTION FACILITIES					
02500	CARDINAL HEALTH	34-29200-01MD	**30**	0.067	0.002
02500	CARDINAL HEALTH	34-31473-02MD	4	0.004	0.001
02500	PHARMALOGIC MT, INC.	09-29398-01MD	2	**0.193**	**0.097**
02500	RLS—KENTWOOD	21-26707-01MD	1	0.006	0.006
	RLS—LIVONIA	21-24828-01MD	3	0.017	0.006
	Totals and Averages		**40**	**0.287**	**0.007**
UF_6 PRODUCTION FACILITIES					
11400	HONEYWELL PERFORMANCE MATERIALS AND TECHNOLOGY	SUB-0526	**738**	**19.852**	**0.027**
	Totals and Averages		**738**	**19.852**	**0.027**
FUEL FABRICATION FACILITIES					
21210	BWX TECHNOLOGIES, INC	SNM-0042	278	9.943	0.036
21210	FRAMATOME INC	SNM-1227	201	17.365	0.086
21210	GLOBAL NUCLEAR FUEL—AMERICAS, LLC	SNM-1097	266	20.912	0.079
21210	NUCLEAR FUEL SERVICES, INC.	SNM-0124	**604**	3.414	0.006
21210	WESTINGHOUSE ELECTRIC COMPANY, LLC	SNM-1107	277	**38.190**	**0.138**
	Totals and Averages		**1,626**	**89.824**	**0.055**
COMMERCIAL LIGHT-WATER REACTORS					
41111	ARKANSAS	DPR-51	2	0.015	0.008
41111	BRUNSWICK	DPR-62	1	0.011	**0.011**
41111	RIVER BEND	NPF-47	24	**0.158**	0.007
41111	WATERFORD	NPF-38	**39**	0.070	0.002
41111	MILLSTONE	NPF-49	3	0.013	0.004
	Totals and Averages		69	0.267	0.004
Grand Totals and Averages			**2,473**	**110.230**	**0.045**

NOTE: The data values shown in bold and boxed represent the highest value in each category.

Table 3-9 shows the distribution of internal doses (CEDE) from 1994 to 2023 for licensees required to report under 10 CFR 20.2206. For the purposes of this table, a measurable CEDE is defined as any reported value greater than zero. As noted above, the vast majority of the internal doses reported were received by individuals working at fuel fabrication facilities. From 2022 to 2023, the collective CEDE for all licensees decreased by less than 1 percent, while the number of individuals with a measurable CEDE increased by 4 percent. The collective CEDE in 2023 was not significantly higher than the 5-year average of 106.581 person-rem. The number of individuals with a measurable CEDE in 2023 (2,473) was significantly higher than the 5-year average of 2,042. The collective CEDE in all facilities decreased slightly from 110.594 person-rem in 2022 to 110.230 person-rem in 2023. The average measurable CEDE in 2023 was 0.045 rem, which was less than the 2022 value of 0.047 rem and significantly lower than the 5-year average of 0.053 rem.

Table 3-9 Internal Dose (CEDE) Distribution, 1994–2023

Year	Number of Individuals with CEDE in Range (rem) *										Number 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	1001	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
2019	1,096	482	318	91	3	1	-	-	-	-	1,991	111.187	0.056
2020	978	484	291	75	2	-	-	-	-	-	1,830	99.151	0.054
2021	1,141	475	268	81	2	1	-	-	-	-	1,968	99.971	0.051
2022	1,352	665	266	90	4	0	-	-	-	-	2,377	110.594	0.047
2023	1,446	657	302	65	3	0	-	-	-	-	2,473	110.230	0.045

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

4 COMMERCIAL POWER REACTORS

4.1 Introduction

General trends in occupational radiation exposure at commercial nuclear power reactors are best analyzed within the context of other pertinent information. In this section, some of the tables and appendices that summarize dose data also show the type, capacity, amount of electricity generated, and age of the reactor. Dose data are then presented as a function of these data.

4.2 Definition of Terms and Sources of Data

4.2.1 Number of Reactors

The numbers of reactors shown in tables 4-1, 4-2, and 4-3 are the numbers of BWRs, PWRs, and LWRs that were in commercial operation during the year listed. These are the numbers of reactors upon which the average number of individuals with a measurable dose and the average collective dose per reactor are based. Excluded are the reactors that had not yet completed a full year of commercial operation during the year listed and the reactors that were permanently shut down. The date that each reactor was declared to be in commercial operation was taken from the monthly operating report data provided by the Institute of Nuclear Power Operations (INPO) [Ref. 18].

Although Indian Point 2 was permanently shut down in April 2020, its dose was reported in combination with that of Indian Point 3 and was therefore included in the analysis for 2020. In April 2021, Indian Point 3 ceased operation. Therefore, in 2021, the number of active PWRs dropped from 64 to 62. In 2022, Palisades ceased commercial operation, dropping the number of active PWRs from 62 to 61. The dose information for these reactors and for others that are no longer in commercial operation is listed at the end of appendix B, and the status of plants no longer in operation can be found in appendix E.

Watts Bar Unit 2 began commercial power operation on November 21, 2016, and its dose information was reported with that of Watts Bar Unit 1 beginning in 2017. Vogtle 3 became operational on July 31, 2023, and was not included in the 2023 analysis because it had not yet completed a full year of commercial operation as of December 31, 2023.

As of the publishing date of this report, several utilities have expressed interest in restarting reactors that were previously planned for decommissioning. Although these activities do not affect the data for 2023, future reports in this series may reflect changes in the status of reactors that were previously considered permanently shut down.

4.2.2 Electricity Generated

The number of megawatt-years (MW-yr) of electricity generated each year by each reactor is presented graphically in appendix D. This number was obtained by dividing the number of megawatt-hours (MW-hr) of electricity generated each year by each reactor by 8,760, the number of hours in a year, except for leap years, for which the number is 8,784 hours. The number of megawatt-hours of electricity generated each year by each reactor was obtained from INPO's monthly operating report data [Ref. 18].

For the years 1973 to 1996, the reported data on electricity generated reflect the gross electricity output of each reactor. For 1997 to 2023, the data reflect the net electricity output, which is the gross electricity output minus the amount used for plant operations. This change is due to a revision to the NRC's power generation reporting requirements.

Tables 4-1, 4-2, and 4-3 give the total amount of electricity generated by all BWRs, PWRs, and LWRs in each year, which is obtained by summing the amounts generated by individual reactors (as given in appendix D). These totals are divided by the number of operating reactors included in each year to yield the average amount of electricity generated per reactor, which is also shown in the tables.

As shown in table 4-3, in 2020 the net electricity generated at LWRs dropped below 90,000 MW-yr for the first time since 2012. From 2022 to 2023, the net electricity generated increased by 1 percent, to 88,109 MW-yr; this does not represent a statistically significant increase from the 5-year average. Also, from 2022 to 2023, power production decreased at 23 reactor sites, increased at 26 reactor sites, and stayed the same at 5 reactor sites. River Bend 1 had the largest percentage decrease in power production (47 percent), while Fermi 2 experienced a 40 percent increase in power production. The number of outage days in 2023 was 2 percent lower than in 2022 and was lower than the 5-year average, although not significantly. Prairie Island 1 and 2 were shut down for 175 days for refueling and other reasons. River Bend 1 and Millstone 2 and 3 were each offline for more than 100 days, mainly for refueling.

As shown in table 4-3, the average amount of electricity generated per reactor (across all LWRs) increased slightly from 955 MW-yr in 2022 to 958 MW-yr in 2023. This value was not significantly higher than the 5-year average of 950 MW-yr.

4.2.3 Average Collective Dose per Megawatt-Year

Tables 4-1, 4-2, and 4-3 present the average collective dose per megawatt-year for each year, for all BWRs, PWRs, and LWRs, respectively. This value is calculated by dividing the total collective dose (TEDE) for the year (in person-rem) by the number of megawatt-years of electricity generated that year. It measures the dose incurred by individuals at commercial nuclear power reactors in relation to the amount of electricity produced by those reactors. Appendix C presents the average collective dose per megawatt-year for each reactor site individually.

As previously stated, the data for the years 1973 to 1996 reflect the gross electricity output of each reactor, while the data for the years 1997 to 2023 reflect the net electricity output.

In 2023, the average collective dose per megawatt-year across all LWRs remained steady at 0.06 person-rem/MW-yr. This value is not significantly higher than the 5-year average.

4.2.4 Average Maximum Dependable Capacity

The average maximum dependable capacity for each year, as shown in tables 4-1, 4-2, and 4-3, is calculated by dividing the sum of the net maximum dependable capacities of the reactors in megawatts (net megawatts electric [MWe]) by the number of reactors included that year. The net maximum dependable capacity is defined as the gross electrical output measured at the output terminals of the turbine generator during the most restrictive seasonal conditions, less the normal station service loads. The net maximum dependable capacity of each plant was obtained from INPO's Monthly Operating Report Data [Ref. 18].

The average maximum dependable capacity in 2023 is 1,043 MWe for BWRs, 1,013 for PWRs, and 1,022 for LWRs.

4.2.5 Percentage of Maximum Dependable Capacity Achieved

Table 4-3 shows the percentage of maximum dependable capacity achieved for all LWRs. This parameter indicates the overall power generation performance of LWRs, relative to the maximum dependable capacity that was available in a given year. It is calculated by dividing the average amount of electricity generated per reactor by the average maximum dependable capacity for each year.

The decrease in maximum dependable capacity from 1996 to 1997 was due to the change from measuring the gross electricity generated to measuring the net electricity generated. The percentage of maximum dependable capacity for LWRs increased slightly from 93 percent in 2022 to 94 percent in 2023.

Table 4-1 Summary of Information Reported by Commercial BWRs 1994–2023

Year	Number of Reactors Included*	Number of Individuals with Measurable Dose**	Annual Collective Dose (person-rem)	Average Measurable Dose per Individual (rem)**	Average Collective Dose per Reactor (person-rem)	Average Number of Individuals with Measurable Dose 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	31,169	3,659.588	0.12	111	945	30,722.7	0.12	931	1,008	92%
2019	32	29,100	3,372.909	0.12	105	909	31,237.4	0.11	976	1,018	96%
2020	31	26,398	2,946.746	0.11	95	852	30,249.1	0.10	976	1,032	95%
2021	31	26,540	3,345.582	0.13	108	856	30,946.5	0.11	998	1,043	96%
2022	31	25,318	3,111.590	0.12	100	817	30,335.1	0.10	979	1,042	94%
2023	31	26,135	3,607.444	0.14	116	843	30,465.2	0.12	983	1,043	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 data on electricity generated indicate the net electricity generated.

Table 4-2 Summary of Information Reported by Commercial PWRs, 1994–2023

Year	Number of Reactors Included*	Number of Individuals with Measurable Dose**	Annual Collective Dose (person-rem)	Average Measurable Dose per Individual (rem)**	Average Collective Dose per Reactor (person-rem)	Average Number of Individuals with Measurable Dose 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	29,845	2,169.883	0.07	34	459	61,113.7	0.04	940	1,002	94%
2019	64	24,515	1,707.886	0.07	27	383	60,400.6	0.03	944	1,008	94%
2020	64	26,422	1,952.382	0.07	31	413	59,648.7	0.03	932	1,008	92%
2021	62	24,127	1,957.616	0.08	32	389	57,834.3	0.03	933	1,008	93%
2022	61	25,692	1,973.696	0.08	32	421	57,506.2	0.03	943	1,013	93%
2023	61	24,914	1,944.617	0.08	32	408	57,643.9	0.03	945	1,013	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 data on electricity generated indicate the net electricity generated.

Table 4-3 Summary of Information Reported by All Commercial LWRs, 1994–2023

Year	Number of Reactors Included*	Number of Individuals with Measurable Dose**	Annual Collective Dose (person-rem)	Average Measurable Dose per Individual (rem)**	Average Collective Dose per Reactor (person-rem)	Average Number of Individuals with Measurable Dose 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%
2019	96	53,615	5,080.795	0.09	53	558	91,638.0	0.06	955	1,011	94%
2020	95	52,820	4,899.128	0.09	52	556	89,897.8	0.05	946	1,016	93%
2021	93	50,667	5,303.198	0.10	57	545	88,780.8	0.06	955	1,020	94%
2022	92	51,010	5,085.286	0.10	55	554	87,841.3	0.06	955	1,023	93%
2023	92	51,049	5,552.061	0.11	60	555	88,109.0	0.06	958	1,022	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 data on electricity generated indicate the net electricity generated.

4.3 Annual Total Effective Dose Equivalent Distributions

Table 4-4a summarizes the distribution of the annual TEDE received by individuals (not adjusted to account for transient individuals) at all commercial LWRs during each of the years 1994 through 2023. This distribution is the sum of the annual dose distributions reported by each LWR licensee each year. As previously noted, appendix B shows the distribution reported at each LWR site for 2023. The data for each year in table 4-4a include only those reactors that had been in operation for at least a full year at the end of that year. From 2022 to 2023, the total collective dose (TEDE) increased by 9 percent to a value of 5,552 person-rem.

Each year, this report identifies the reactors with the largest increases and decreases in collective dose since the previous year and identifies the main reasons for these changes. The changes generally are driven by increases or decreases in the number and duration of outages at each site. During an outage, more individuals are working in radiation areas, which increases the collective dose. This is particularly true during a refueling outage, which entails opening the reactor vessel by removing the vessel head and transferring spent fuel to the spent fuel pool. In addition, licensees usually schedule maintenance and inspections during refueling outages, which tends to increase the collective dose. The collective dose for a site is typically much lower in years when the site does not have a refueling outage.

Among PWRs, Ginna had the largest percentage increase in collective dose from 2022 to 2023, with doses of 1.808 person-rem in 2022 and 53.989 person-rem in 2023. The site had a 21.2-day refueling outage in 2023, and no outage days in 2022. Overall, PWRs experienced a 1 percent decrease in collective dose from 2022 to 2023, which coincided with a 9 percent decrease in the total number of outage days, from 1,767 days in 2022 to 1,689 days in 2023. The number of outage days at PWRs in 2023 ranged from 0 to 175.

Among BWRs, Perry had the largest percentage increase in collective dose from 2022 to 2023, with a collective dose of 44.100 person-rem and 8.6 outage days in 2022, and a collective dose of 425.393 person-rem and 63.4 total outage days (comprising refueling and other outages) in 2023. LaSalle also had a large increase in collective dose from 2022 to 2023, due to a 24-day refueling outage in 2023. Grand Gulf had a 90 percent decrease in collective dose, with a collective dose of 183.014 person-rem and 98.4 outage days in 2022, and a collective dose of 17.410 person-rem and 15.8 total outage days in 2023.

Across all LWRs, the number of refueling outage hours decreased by 7 percent from 2022 to 2023 (with a decrease of less than 1 percent for BWRs and a decrease of 9 percent for PWRs).

Table 4-4b summarizes the distribution of the annual TEDE received by unique individuals (i.e., with the collective data adjusted to account for transient individuals) at all commercial LWRs during each of the years 1994 through 2023. The data do not include reactors that were permanently shut down or reactors that had not been in commercial operation for a full year by the end of the year listed. Section 5 gives a detailed analysis of the impact of transient individuals on the distribution of annual doses in 2023.

Table 4-4a Summary of Distribution of Annual Doses* at Commercial LWRs,* 1994–2023

Year	Number of Individuals with TEDE in Range (rem)**											Total Number Monitored	Number with Measurable Exposure	Collective TEDE (person-rem)	Average Measurable TEDE (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				
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
2019	81,282	39,068	9,512	3,636	942	300	156	1	-	-	-	134,897	53,615	5,080.795	0.095
2020	72,190	39,021	9,254	3,192	815	320	217	1	-	-	-	125,010	52,820	4,899.128	0.093
2021	72,014	36,168	9,206	3,521	999	478	286	9	-	-	-	122,681	50,667	5,303.198	0.105
2022	74,328	36,262	9,837	3,500	886	338	185	2	-	-	-	125,338	51,010	5,085.286	0.100
2023	73,843	35,725	9,635	3,840	1,113	423	308	5	-	-	-	124,892	51,049	5,552.061	0.109

* Data are from reports submitted in accordance with 10 CFR 20.2206 for 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 have not been adjusted to account for transient individuals (see table 4-4b and section 5).

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

Table 4-4b Summary of Distribution of Annual Doses* at Commercial LWRs,* Adjusted for Transient Individuals, 1994–2023

Year	Number of Individuals with TEDE in Range (rem)**											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				
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	6,416.548	0.139
2018	59,356	28,012	8,146	4,205	1,488	663	462	20	2	-	-	102,354	42,998	5,829.471	0.136
2019	55,718	25,322	7,167	3,798	1,272	554	402	4	-	-	-	94,237	38,519	5,080.795	0.132
2020	50,006	25,125	6,962	3,416	1,154	532	457	13	-	-	-	87,665	37,659	4,899.128	0.130
2021	48,780	22,249	6,640	3,489	1,292	676	646	24	-	-	-	83,796	35,016	5,303.198	0.151
2022	49,530	21,948	7,233	3,712	1,231	555	462	19	-	-	-	84,690	35,160	5,085.286	0.145
2023	49,291	21,363	6,708	3,568	1,404	679	732	39	-	-	-	83,784	34,493	5,552.061	0.161

* Summary of reports submitted in accordance with 10 CFR 20.2206 for 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.

4.4 Average Annual Total Effective Dose Equivalent

Some of the data presented in tables 4-1, 4-2, and 4-3 are graphically displayed in figure 4-1. This figure shows that the average collective dose and average number of individuals with measurable dose are consistently higher for BWRs than for PWRs. BWRs generally have higher collective doses because they produce electricity by using steam issuing directly from the reactor to drive turbines, so that radioactivity is present in both the reactor and the turbine systems. PWR systems are designed to keep the radioactivity within the reactor vessel and primary system and not in the turbine systems.

In 2023, the average collective dose per reactor was 116 person-rem for BWRs and 32 person-rem for PWRs. From 2022 to 2023, the average collective dose per reactor increased by 16 percent for BWRs—a statistically significant increase relative to the 5-year average—and remained static for PWRs. Across all LWRs, the average collective dose per reactor increased by 9 percent, from 55 person-rem in 2022 to 60 person-rem in 2023. However, as of 2023, this value has remained below 90 person-rem for 14 years in a row, and overall, it has been decreasing since 1994, which suggests that licensees have been successfully implementing as low as is reasonably achievable (ALARA) dose reduction processes at their facilities.

In 2023, for BWRs, the average number of individuals with a measurable dose per reactor increased to 843, which represents a statistically insignificant decrease from the 5-year average of 876. For PWRs, individuals with a measurable dose per reactor decreased to 408, which represents a statistically insignificant decrease from the 5-year average of 413. Across all LWRs, the average number of individuals with a measurable dose per reactor increased to 555, which again represents a statistically insignificant decrease from the 5-year average of 567.

Figures 4-2 and 4-3 show plots of most of the other information presented in tables 4-1, 4-2, and 4-3. Table 4-3 shows the net electricity generated across all LWRs increased slightly from 87,841 MW-yr in 2022 to 88,109 MW-yr in 2023, while the number of operating reactors (92) remained the same. The net electricity generated in 2023 was not significantly lower than the 5-year average. Table 4-3 also shows the total collective dose across all LWRs increased from 5,085 person-rem in 2022 to 5,552 person-rem in 2023; the 2023 value was not significantly different from the 5-year average. Finally, table 4-4b shows that the average measurable dose per individual (adjusted to account for transient individuals) increased slightly to 0.161 rem in 2023. The average collective dose across all LWRs in 2023 was 0.06 person-rem per megawatt-year, which is not significantly higher than the 5-year average.

The downward trend in doses since 1994 can be attributed to several factors. For example, utilities have completed the tasks initiated in response to the lessons learned from the 1979 Three Mile Island accident, and they are continuing efforts to avoid and reduce exposure. Also, most utilities have established programs to collect and share information about exposure control processes, techniques, and procedures.

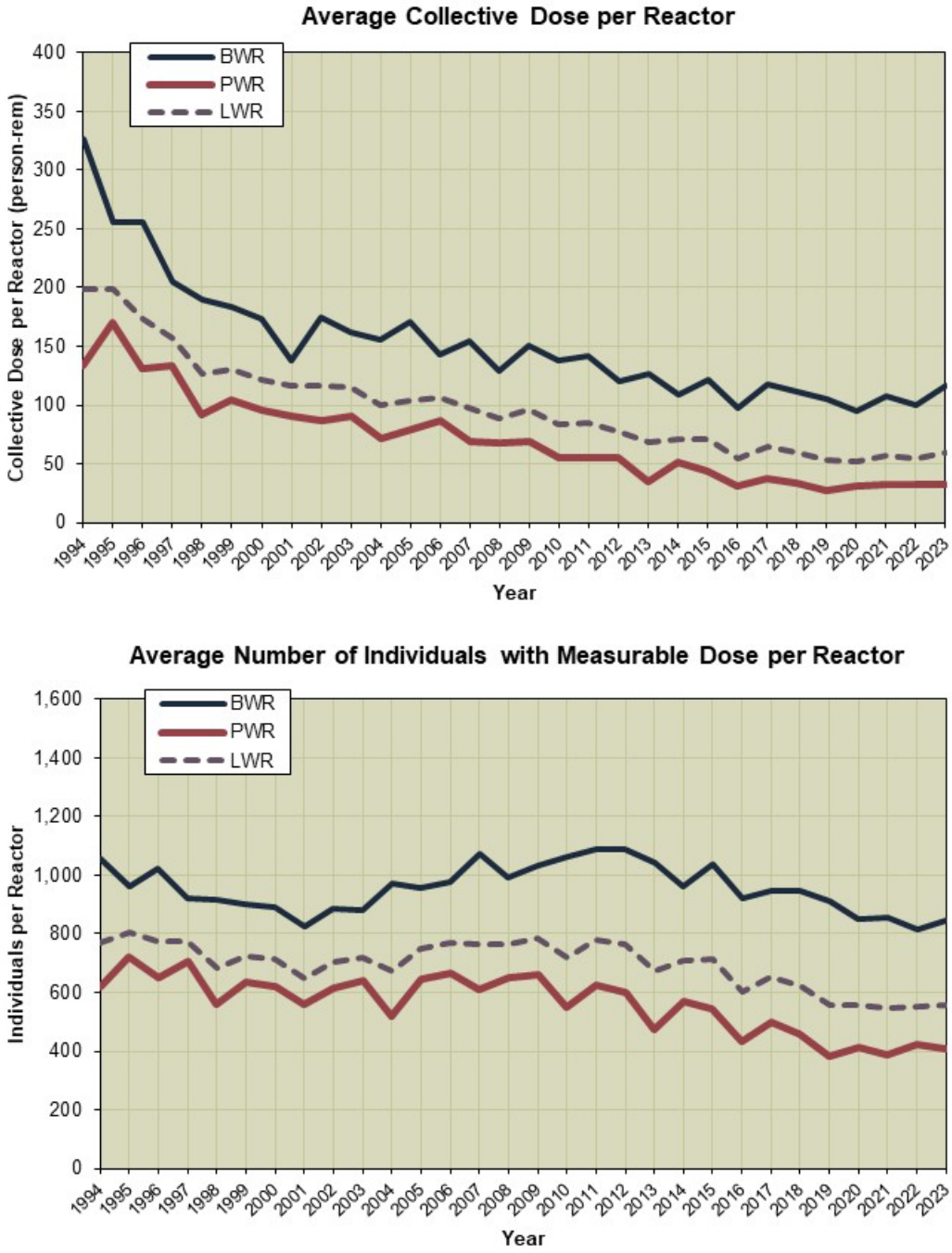
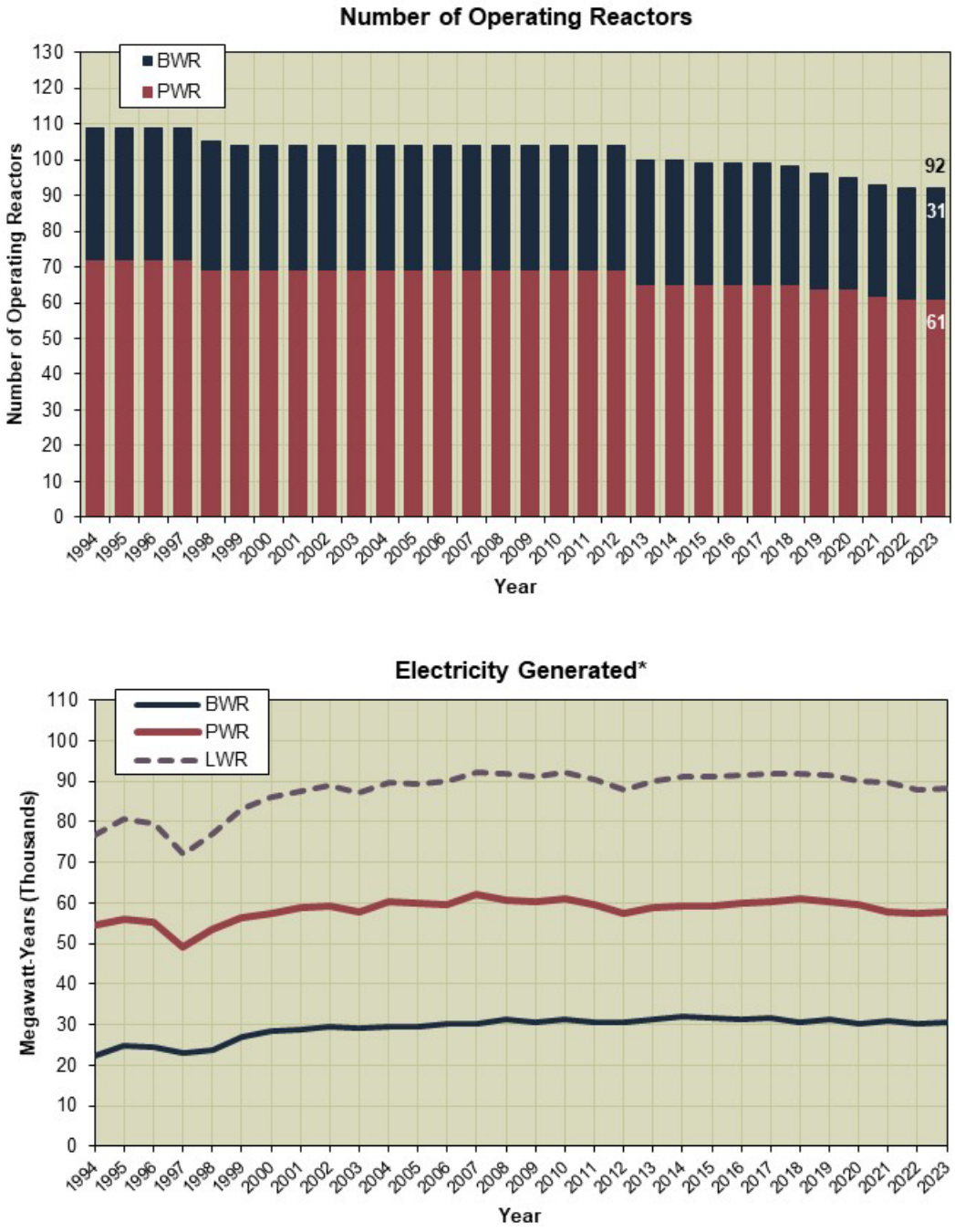
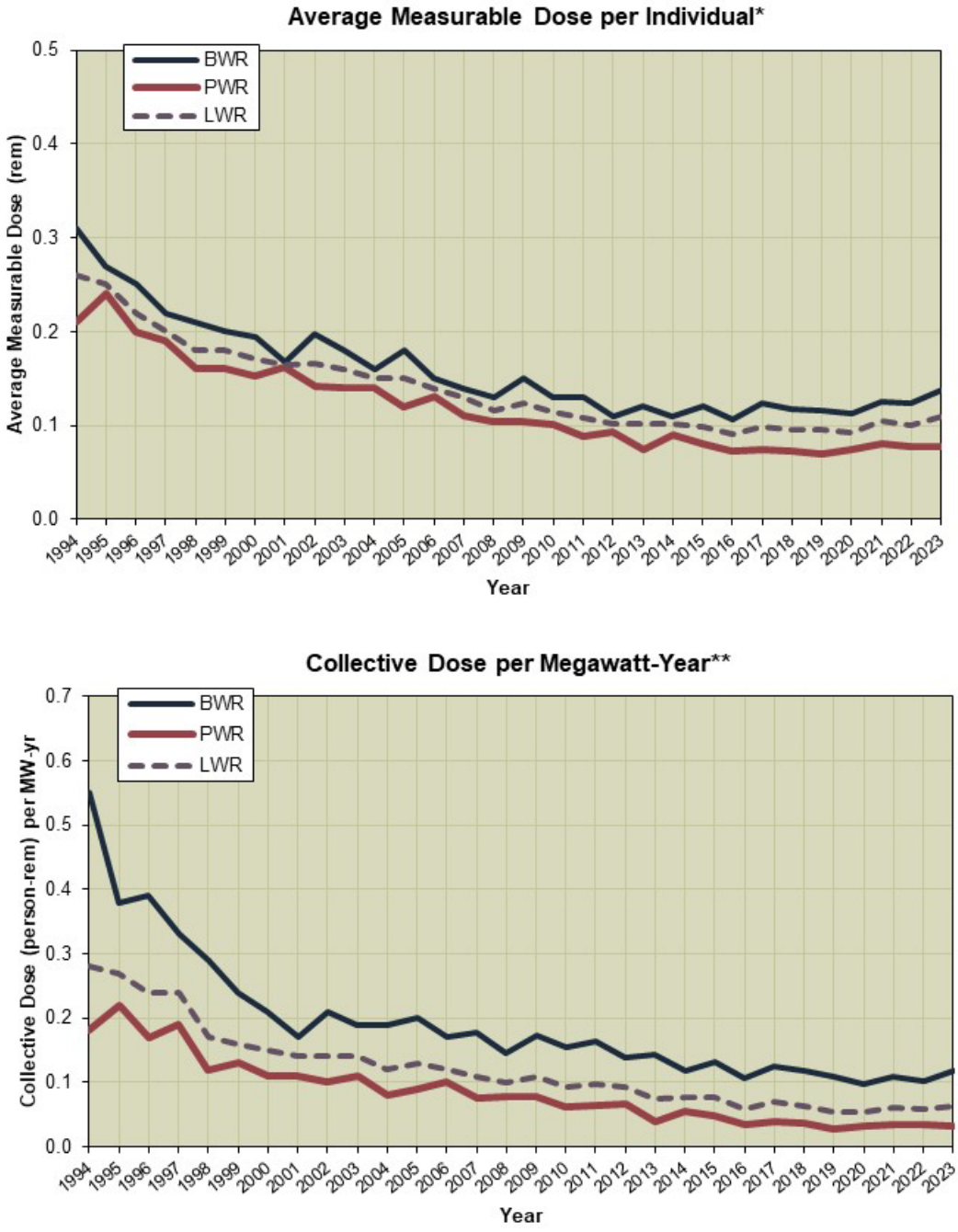


Figure 4-1 Average Collective Dose per Reactor and Average Number of Individuals with Measurable Dose per Reactor, 1994–2023



* Gross electricity is shown for 1994–1996, net electricity is shown for 1997–2023.

Figure 4-2 Number of Operating Reactors and Electricity Generated, 1994–2023



* Not adjusted to account for transient individuals; see section 5.
** Gross electricity is shown for 1994–1996; net electricity is shown for 1997–2023.

Figure 4-3 Average Measurable Dose per Individual and Collective Dose per Megawatt-Year, 1994–2023

To shed light on any other possible trends, figures 4-4a and 4-4b display the average and median values of the collective dose per reactor for BWRs and for PWRs for the years 1994 through 2023. The median values are included here for statistical completeness and are not used in other sections of this report. The range of values reported each year is shown by a vertical line, with a small bar at each end marking the two extreme values.

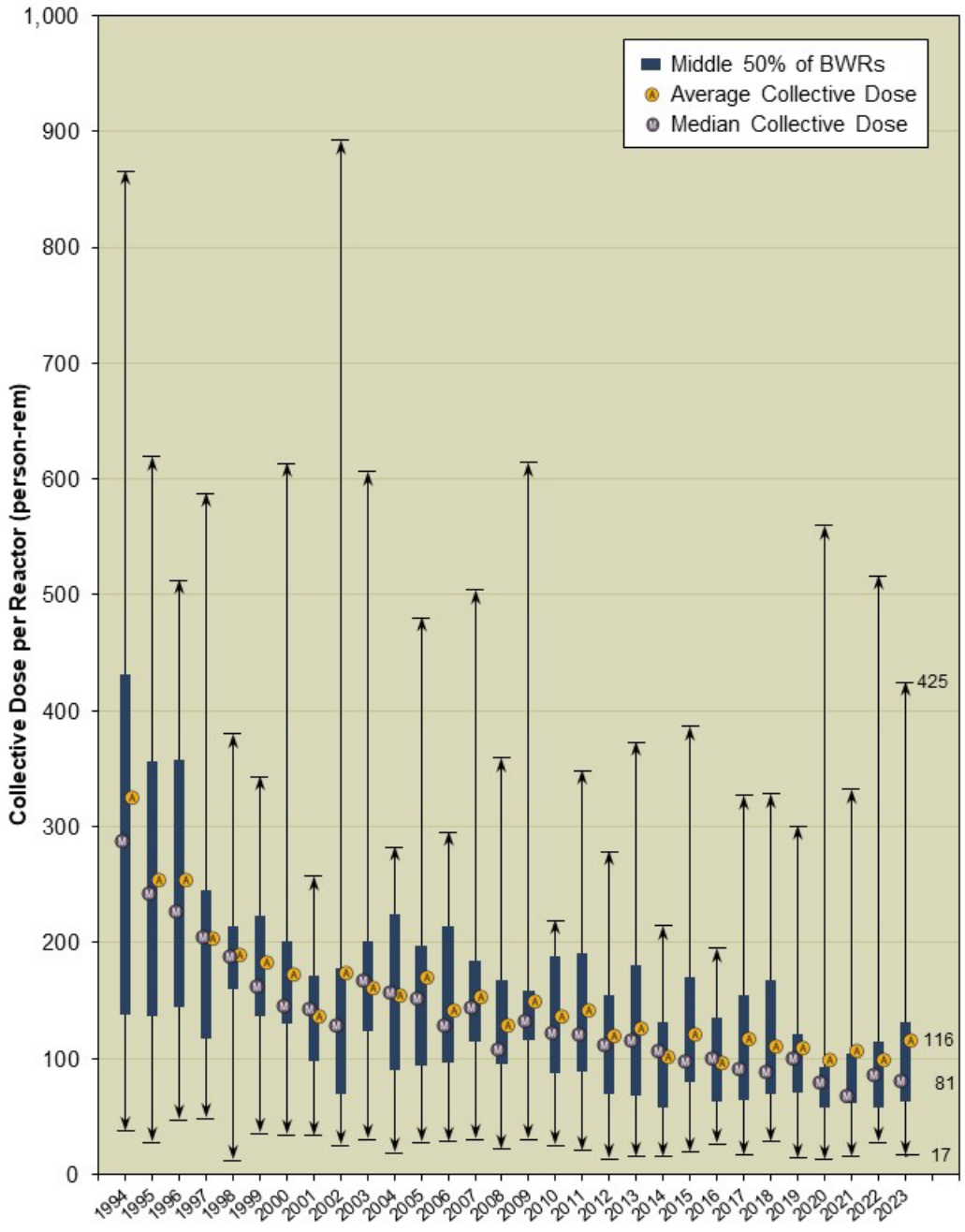


Figure 4-4a Average, Median, and Extreme Values of the Collective Dose per BWR, 1994–2023

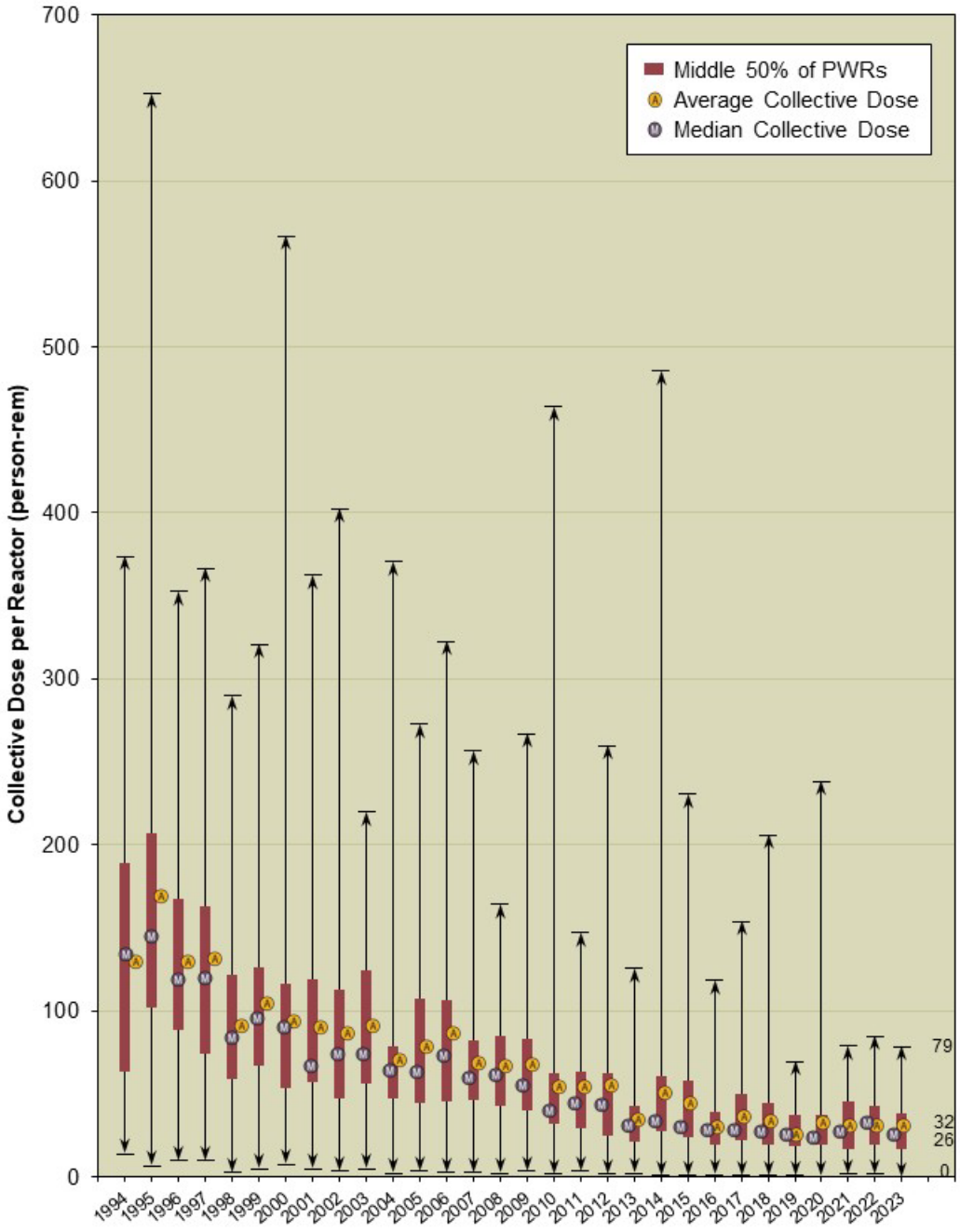


Figure 4-4b Average, Median, and Extreme Values of the Collective Dose per PWR, 1994–2023

The rectangles in figures 4-4a and 4-4b indicate the values corresponding to the plants ranked in the 25th through the 75th percentiles. (These rankings are based on annual collective dose values, not the 3-year rolling average that is discussed in section 4.5.) The median collective dose for BWRs decreased from 87 person-rem in 2022 to 81 person-rem in 2023; this change was not statistically significant. The median collective dose for PWRs decreased from 33 person-rem in 2022 to 26 person-rem in 2023, which is not significantly lower than the 5-year average median value of 28 person-rem. Furthermore, in 2023, the middle 50 percent of the BWRs reported

collective doses between 63 and 132 person-rem, while the middle 50 percent of the PWRs reported collective doses between 16 and 38 person-rem.

As the figures show, nearly every year, the median collective dose has been less than the average, which indicates that more reactors have collective doses below the average than above it. This is a result of the wide difference between the maximum and minimum annual collective doses at power plants and the fact that some plants accrue higher collective doses during refueling outages. The plants that have outages during the year (and thus higher collective doses) increase the average collective dose, but do not significantly increase the median.

4.5 Three-Year Average Collective Total Effective Dose Equivalent per Reactor

The 3-year average collective dose per reactor is one of the metrics that the NRC uses in its Reactor Oversight Process and Significance Determination Process. Tables 4-5 and 4-6 list the sites that had been in commercial operation for at least 3 years as of December 31, 2023, and show the values of several parameters for each site. These tables also give averages for each type of reactor.

Based on the 93 reactor-years of operation accumulated over the 3-year period from 2021 to 2023 by the 31 BWRs listed, the average 3-year collective TEDE per reactor was found to be 108 person-rem, the average measurable TEDE per individual was 0.129 rem, and the average collective TEDE per megawatt-year was 0.11 rem. For BWRs, there was a statistically significant increase in the average measurable TEDE per individual relative to the 5-year average.

Based on the 183 reactor-years of operation accumulated over the 3-year period from 2021 to 2023 at the 61 PWRs listed, the average 3-year collective TEDE per reactor was 32 person-rem, the average measurable TEDE per individual was 0.079 rem, and the average collective TEDE per megawatt-year was 0.03 rem. For PWRs, there was a statistically significant increase in the average measurable TEDE per individual relative to the 5-year average.

In addition to the data in tables 4-5 and 4-6, the NRC uses each site's quartile ranking as a factor in planning the number of inspection hours to be assigned to it. For this reason, this report includes tables 4-7 and 4-8 (for BWRs and PWRs, respectively), which show each plant's name, its 3-year collective TEDE per reactor-year, the percentage change in the 3-year average from the previous 3-year period, and the plant's quartile ranking from the previous period (if the ranking has changed).

Table 4-5 Three-Year Totals and Averages for BWRs, in Ascending Order of Collective TEDE per Reactor, 2021–2023

Plant Name*	Reactor-Years	Three-Year Collective TEDE per Reactor-Year, 2021–2023 (person-rem)	Three-Year Collective TEDE per Site (person-rem)	Number of Workers with Measurable TEDE	Average TEDE per Worker (rem)	Total Electricity Output (MW-yrs)	Average TEDE per MW-Yr (rem)
HATCH 1,2	6	52.492	314.953	3,346	0.094	4,913.2	0.06
COOPER STATION	3	55.252	165.757	1,680	0.099	2,217.5	0.07
FITZPATRICK	3	63.697	191.090	1,654	0.116	2,441.1	0.08
PEACH BOTTOM 2,3	6	64.269	385.612	4,315	0.089	7,608.4	0.05
DRESDEN 2,3	6	65.405	392.431	5,413	0.072	5,209.1	0.08
LIMERICK 1,2	6	68.769	412.612	4,791	0.086	6,572.0	0.06
SUSQUEHANNA 1,2	6	75.983	455.897	3,425	0.133	6,861.5	0.07
GRAND GULF	3	83.772	251.316	2,516	0.100	3,685.7	0.07
NINE MILE POINT 1,2	6	86.344	518.064	4,205	0.123	5,338.4	0.10
BROWNS FERRY 1,2,3	9	87.977	791.790	7,513	0.105	10,411.5	0.08
CLINTON	3	98.901	296.703	2,716	0.109	2,931.0	0.10
HOPE CREEK 1	3	100.511	301.532	2,730	0.110	3,229.9	0.09
QUAD CITIES 1,2	6	101.665	609.987	5,323	0.115	5,254.3	0.12
BRUNSWICK 1,2	6	104.876	629.255	4,395	0.143	5,309.9	0.12
MONTICELLO	3	110.516	331.547	2,139	0.155	1,750.2	0.19
RIVER BEND 1	3	178.371	535.113	4,033	0.133	2,302.6	0.23
COLUMBIA GENERATING	3	188.376	565.128	3,613	0.156	3,056.0	0.18
FERMI 2	3	222.121	666.363	4,599	0.145	2,902.2	0.23
PERRY	3	243.050	729.149	2,949	0.247	3,226.6	0.23
LASALLE 1,2	6	253.386	1,520.317	6,638	0.229	6,525.7	0.23
Totals and Averages	**93**	**-**	**10,064.616**	**77,993**	**0.129**	**91,746.8**	**0.11**
Average per Reactor-Year	**-**	**108.222**	**-**	**839**	**-**	**986.5**	**-**

* Sites where not all reactors had completed 3 full years of commercial operations as of December 31, 2023, are not included.

Table 4-6 Three-Year Totals and Averages for PWRs, in Ascending Order of Collective TEDE per Reactor, 2021–2023

Plant Name*	Reactor-Years	Three-Year Collective TEDE per Reactor-Year, 2021–2023 (person-rem)	Three-Year Collective TEDE per Site (person-rem)	Number of Workers with Measurable TEDE	Average TEDE per Worker (rem)	Total Electricity Output (MW-yrs)	Average TEDE per MW-Yr (rem)
HARRIS 1	3	12.348	37.045	896	0.041	2,790.0	0.01
PALO VERDE 1,2,3	9	14.251	128.257	2,565	0.050	10,855.1	0.01
DIABLO CANYON 1,2	6	15.109	90.656	1,727	0.052	5,935.4	0.02
OCONEE 1,2,3	9	15.110	135.987	3,080	0.044	7,486.1	0.02
FARLEY 1,2	6	18.546	111.277	1,790	0.062	4,879.8	0.02
DAVIS-BESSE 1	3	19.249	57.748	994	0.058	2,540.5	0.02
CALLAWAY 1	3	19.948	59.843	1,014	0.059	2,557.4	0.02
SUMMER 1	3	21.038	63.113	1,126	0.056	2,637.6	0.02
BYRON 1,2	6	21.502	129.011	2,317	0.056	6,755.3	0.02
PRAIRIE ISLAND 1,2	6	22.996	137.977	1,672	0.083	2,894.5	0.05
ROBINSON 2	3	23.812	71.435	1,032	0.069	2,148.0	0.03
CALVERT CLIFFS 1,2	6	24.814	148.886	2,213	0.067	5,114.5	0.03
NORTH ANNA 1,2	6	24.837	149.021	2,045	0.073	5,183.6	0.03
SOUTH TEXAS 1,2	6	25.865	155.187	1,784	0.087	7,383.0	0.02
BRAIDWOOD 1,2	6	28.041	168.243	2,754	0.061	6,820.1	0.02
SEABROOK	3	28.243	84.730	1,184	0.072	3,460.2	0.02
GINNA	3	29.765	89.296	1,250	0.071	1,641.9	0.05
COOK 1,2	6	30.809	184.851	2,244	0.082	6,076.2	0.03
BEAVER VALLEY 1,2	6	31.869	191.216	1,915	0.100	5,039.2	0.04
ST. LUCIE 1,2	6	34.415	206.488	2,328	0.089	5,520.8	0.04
VOGTLE 1,2	6	35.151	210.907	2,240	0.094	6,619.1	0.03
MILLSTONE 2,3	6	39.026	234.157	2,564	0.091	5,422.3	0.04
SEQUOYAH 1,2	6	39.224	235.342	3,350	0.070	6,359.5	0.04
SURRY 1,2	6	39.418	236.509	2,392	0.099	4,675.9	0.05
COMANCHE PEAK 1,2	6	42.217	253.301	2,140	0.118	6,666.1	0.04
POINT BEACH 1,2	6	42.630	255.780	1,683	0.152	3,396.7	0.08
CATAWBA 1,2	6	42.803	256.815	2,571	0.100	6,474.7	0.04
TURKEY POINT 3,4	6	44.038	264.228	2,622	0.101	4,777.3	0.06
WOLF CREEK 1	3	46.954	140.862	1,871	0.075	3,180.2	0.04
MCGUIRE 1,2	6	47.153	282.920	3,418	0.083	6,534.4	0.04
SALEM 1,2	6	48.112	288.672	2,730	0.106	6,483.6	0.04
ARKANSAS 1,2	6	48.719	292.314	4,084	0.072	4,892.0	0.06
WATERFORD 3	3	51.042	153.125	2,056	0.074	2,909.8	0.05
WATTS BAR 1,2	6	61.029	366.174	4,974	0.074	6,072.8	0.06
Totals and Averages	**183**	**-**	**5,871.373**	**74,625**	**0.079**	**172,183.6**	**0.03**
Average per Reactor-Year	**-**	**32.084**	**-**	**408**	**-**	**940.9**	**-**

NOTE: These data do not include Palisades, which closed in May 2022.

* Sites where not all reactors had completed 3 full years of commercial operation as of December 31, 2023, are not included.

Table 4-7 Three-Year Collective TEDE per Reactor-Year for BWRs, 2021–2023

	Plant Name	Three-Year Coll. TEDE per Reactor-Year, 2021–2023	Percentage Change from 2020–2022	2020–2022 Quartile (If Changed)
1st Quartile	HATCH 1,2	52.492	-10% ▼	-
	COOPER STATION	55.252	-31% ▼	2
	FITZPATRICK	63.697	-39% ▼	3
	PEACH BOTTOM 2,3	64.269	-8% ▼	2
	DRESDEN 2,3	65.405	11% ▲	-
2nd Quartile	LIMERICK 1,2	68.769	3% ▲	1
	SUSQUEHANNA 1,2	75.983	7% ▲	-
	GRAND GULF	83.772	-46% ▼	4
	NINE MILE POINT 1,2	86.344	-15% ▼	3
	BROWNS FERRY 1,2,3	87.977	-12% ▼	3
3rd Quartile	CLINTON	98.901	98% ▲	1
	HOPE CREEK 1	100.511	4% ▲	-
	QUAD CITIES 1,2	101.665	11% ▲	2
	BRUNSWICK 1,2	104.876	20% ▲	2
	MONTICELLO	110.516	66% ▲	1
4th Quartile	RIVER BEND 1	178.371	91% ▲	3
	COLUMBIA GENERATING	188.376	57% ▲	-
	FERMI 2	222.121	-42% ▼	-
	PERRY	243.050	118% ▲	-
	LASALLE 1,2	253.386	39% ▲	-
	Average per Reactor-Year	**108.222**	**7% ▲**	

< *Average 108.222*

Table 4-8 Three-Year Collective TEDE per Reactor-Year for PWRs, 2021–2023

	Plant Name	Three-Year Coll. TEDE per Reactor-Year, 2021–2023	Percentage Change from 2020–2022	2020–2022 Quartile (If Changed)
1st Quartile	HARRIS 1	12.348	0%	-
	PALO VERDE 1,2,3	14.251	12% ▲	-
	DIABLO CANYON 1,2	15.109	12% ▲	-
	OCONEE 1,2,3	15.110	-15% ▼	-
	FARLEY 1,2	18.546	-17% ▼	-
	DAVIS-BESSE 1	19.249	-40% ▼	3
	CALLAWAY 1	19.948	-3% ▼	-
	SUMMER 1	21.038	1% ▲	-
	BYRON 1,2	21.502	1% ▲	-
2nd Quartile	PRAIRIE ISLAND 1,2	22.996	53% ▲	1
	ROBINSON 2	23.812	-39% ▼	3
	CALVERT CLIFFS 1,2	24.814	-2% ▼	-
	NORTH ANNA 1,2	24.837	-2% ▼	-
	SOUTH TEXAS 1,2	25.865	-9% ▼	-
	BRAIDWOOD 1,2	28.041	16% ▲	-
	SEABROOK	28.243	19% ▲	-
	GINNA	29.765	9% ▲	-
3rd Quartile	COOK 1,2	30.809	0%	2
	BEAVER VALLEY 1,2	31.869	18% ▲	2
	ST. LUCIE 1,2	34.415	-4% ▼	-
	VOGTLE 1,2	35.151	-8% ▼	-
	MILLSTONE 2,3	39.026	26% ▲	-
	SEQUOYAH 1,2	39.224	-2% ▼	4
	SURRY 1,2	39.418	12% ▲	-
	COMANCHE PEAK 1,2	42.217	13% ▲	-
4th Quartile	POINT BEACH 1,2	42.630	7% ▲	-
	CATAWBA 1,2	42.803	6% ▲	-
	TURKEY POINT 3,4	44.038	7% ▲	-
	WOLF CREEK 1	46.954	1% ▲	-
	MCGUIRE 1,2	47.153	30% ▲	3
	SALEM 1,2	48.112	-2% ▼	-
	ARKANSAS 1,2	48.719	5% ▲	-
	WATERFORD 3	51.042	24% ▲	-
	WATTS BAR 1,2	61.029	12% ▲	-
	Average per Reactor-Year	**32.084**	**5%** ▲	

< Average 32.084

NOTE: These data do not include Palisades, which closed in May 2022.

4.6 International Occupational Radiation Exposure

In 1992, the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development (NEA/OECD), with sponsorship from the International Atomic Energy Agency (IAEA), created the Information System on Occupational Exposure (ISOE) Program as an international forum for representatives from nuclear electric utilities and regulatory agencies to share dose reduction information, operational experience, and information to optimize radiological protection at commercial nuclear power plants. The ISOE database (ISOEDAT) includes occupational exposure information for 354 operating units and 71 units in cold shutdown or some stage of decommissioning in 31 countries, covering about 90 percent of the world's operating commercial nuclear power reactors. One of the purposes of ISOEDAT is to allow comparison of radiation protection effectiveness and trends among the participating countries and among the various types of commercial nuclear power reactors.

As part of its international cooperative research program, the NRC joined the ISOE Program as a regulatory member in December 1994. The NRC's REIRS database is the U.S. counterpart to ISOEDAT on the global scale. Since joining the ISOE Program, the NRC has leveraged its experience in data management and analysis of the REIRS database to provide input to the NEA/OECD and the IAEA on ways to streamline certain ISOEDAT methods for capturing, maintaining, and displaying data.

Figures 4-5 and 4-6 show the average collective dose per reactor for both U.S. reactors and international reactors covered by ISOEDAT. For international PWRs, the average collective dose per reactor increased from 49 to 51 person-rem in 2023, while the average for U.S. reactors remained 32 person-rem. For international BWRs, the average collective dose per reactor decreased to 24 person-rem in 2023, which is approximately 21 percent of the average for U.S. BWRs (116 person-rem per reactor).

It should be noted that the information from reactor sites in Japan has been affected by the Fukushima Dai-ichi event that occurred in 2011. Following the earthquake and tsunami at the Fukushima Dai-ichi and Dai-ni reactor sites, all Japanese reactors were shut down to assess safety concerns. While these plants ceased power production, they were still officially counted as "operational" reactors. Their collective dose decreased significantly, as most operational activities were not required when the reactors were not producing power. Similarly, the ISOEDAT data for German reactors includes reactors the German government shut down in 2011 following the Fukushima event. These shutdowns significantly reduced the average collective dose per reactor, as operational activities ceased. The decreases in average collective dose per reactor in Japan and Germany have reduced the overall international averages for both PWRs and BWRs since 2011. In particular, because the Japan data represent a large proportion (30 percent) of the overall data for BWRs, the decrease in the average collective dose per BWR in Japan is the primary factor in the decrease in average collective dose per reactor for international BWRs since 2011, as illustrated in figure 4-6.

The data used for these figures were compiled from the ISOEDAT online database. The NEA publishes an annual report, "Occupational Exposures at Nuclear Power Plants," that is available on the ISOE website at www.isoe-network.net [Ref. 19].

Figure 4-5 Average Collective Dose per PWR, 1995–2023

Figure 4-6 Average Collective Dose per BWR, 1995–2023

4.7 Decommissioning of Commercial Nuclear Power Reactors

The NRC regulates the decommissioning of commercial nuclear power reactors. The purpose of the NRC's Decommissioning Program is to ensure that (1) NRC-licensed sites are decommissioned in a safe, timely, and effective manner so that they can be returned to beneficial use, and (2) stakeholders are informed about and involved in the decommissioning process as appropriate.

The NRC's Office of Nuclear Material Safety and Safeguards (NMSS) has project management responsibilities for decommissioning commercial nuclear power reactors. The NRC's decommissioning activities for commercial nuclear power reactors include project management, technical review of licensee submittals in support of decommissioning, the issuance of license amendments and exemptions in support of each stage of decommissioning, inspections of decommissioning activities, support for the development of rulemaking guidance, public outreach efforts, international activities, and participation in industry conferences and workshops. The NMSS staff regularly coordinates with other offices on issues affecting all commercial nuclear power reactors, both operating and decommissioning, and specifically on the ISFSIs at reactor sites undergoing decommissioning [Ref. 20].

4.7.1 Decommissioning Process

The decommissioning process begins when a licensee decides to permanently cease operations. The major steps that comprise the commercial nuclear power reactor decommissioning process are notification of cessation of operations; submittal and review of the post shutdown decommissioning activities report (PSDAR); submittal, review, and approval of the license termination plan (LTP); implementation of the LTP; and completion of decommissioning. The flowchart in figure 4-7 illustrates the decommissioning process.

4.7.2 Notification

When a licensee has decided to permanently cease operations, it is required to submit a written notification to the NRC. In addition, the licensee must notify the NRC in writing once fuel has been permanently removed from the reactor vessel.

4.7.3 Post Shutdown Decommissioning Activities Report

Within 2 years of cessation of operations, the licensee must submit a PSDAR to the NRC and a copy to the affected State(s). The PSDAR must include a description and schedule for the planned decommissioning activities, an estimate of the expected costs, and a discussion of the means for concluding that the environmental impacts associated with site-specific decommissioning activities will be bound by appropriate, previously issued environmental impact statements. The NRC will provide notice of receipt of the PSDAR in the *Federal Register* and make the PSDAR available for public comment. In addition, the NRC will hold a public meeting in the vicinity of the licensee's facility to discuss the PSDAR.

4.7.4 License Termination Plan

Each commercial nuclear power reactor licensee must submit an application for termination of its license. An LTP must be submitted at least 2 years before the license termination date. The NRC and licensee hold pre submittal meetings to agree on the format and content of the LTP. These meetings are intended to improve the efficiency of the LTP development and review process. The

LTP must include the following: a site characterization; the identification of remaining dismantlement activities; plans for site remediation; detailed plans for the final radiation survey; a description of the end use of the site, if restricted; an updated site-specific estimate of remaining decommissioning costs; and a supplement to the environmental report describing any new information or significant environmental change associated with the licensee's proposed termination activities. In addition, the licensee must demonstrate that it will meet the applicable requirements of the License Termination Rule in 10 CFR Part 20, Subpart E, "Radiological Criteria for License Termination."

The NRC will provide notice of receipt of the LTP in the *Federal Register* and make the LTP available for public comment. In addition, the NRC will hold a public meeting in the vicinity of the licensee's facility to discuss the LTP and the LTP review process.

4.7.5 Implementation of the License Termination Plan

After approval of the LTP, the licensee or responsible party must complete decommissioning in accordance with the approved LTP. The NRC staff will periodically inspect the decommissioning activities at the site to ensure compliance with the LTP. These inspections will normally include in-process and confirmatory radiological surveys.

Decommissioning must be completed within 60 years of permanent cessation of operations, unless otherwise approved by the NRC.

4.7.6 Completion of Decommissioning

At the conclusion of decommissioning activities, the licensee will submit a final status survey report, which identifies the final radiological conditions of the site and requests that the NRC either (1) terminate the license under 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities" [Ref. 21], or (2) reduce the 10 CFR Part 50 license boundary to the footprint of the ISFSI. For decommissioning commercial nuclear power reactors with no ISFSI or an ISFSI holding a specific license under 10 CFR Part 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater than Class C Waste," completion of reactor decommissioning will result in the termination of the 10 CFR Part 50 license. The NRC will approve the final status survey report and the licensee's request if it determines that the licensee has met both of the following conditions: (1) the remaining dismantlement has been performed in accordance with the approved LTP, and (2) the final radiation survey and associated documentation demonstrate that the facility and site are suitable for release in accordance with the License Termination Rule.

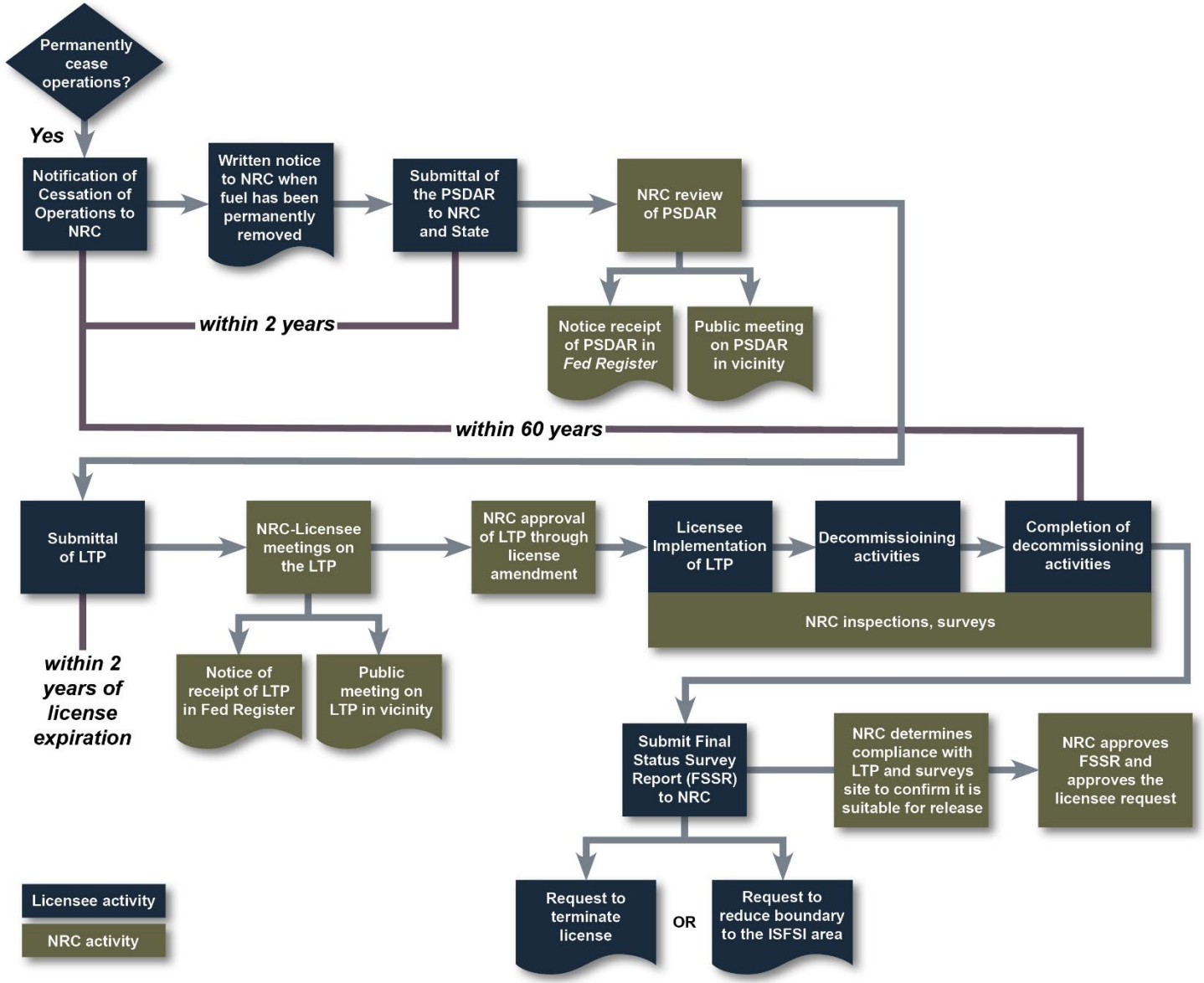


Figure 4-7 Commercial Nuclear Power Reactor Decommissioning Process Flowchart

4.7.7 Status of Decommissioning Activities at Commercial Nuclear Power Reactors

While 92 commercial nuclear power reactors are currently in operation, several shutdown power reactors have undergone the decommissioning process. As more commercial nuclear power reactors permanently shut down, either because they have reached the end of their operating license or for other reasons, there will be a commensurate increase in activities involving radiation exposure related to decommissioning. For this reason, there is an increased need to provide further information on plants undergoing decommissioning.

Appendix B contains a list of the plants that are no longer in commercial operation as of 2023, along with the dose distribution and collective dose for these plants. (It should be noted that these plants may be in different stages of decommissioning, so a comparison of the dose at one plant versus another would not be meaningful.) In addition, appendix B lists the plant units that are no longer in commercial operation but report along with other units at the site. (Under the licensing conditions and reporting requirements, it is permissible to report the information for all units at one site together in one report.) Table 4-9 lists the plants that have ceased operation and have changed operational status as of the date shown [Ref. 22]. Appendix E describes the decommissioning activities currently underway at each of these plants, as well as the total collective TEDE for each plant, based on available data through 2023.

Table 4-9 Plants No Longer in Operation, 2023

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	12/1/1976	2/2013	TBD	6/2019	DECON	2026-2030
DRESDEN 1	8/1/1960	10/1978	TBD	6/1998	SAFSTOR	2036
DUANE ARNOLD	2/1/1975	8/2020	TBD	4/2020	SAFSTOR	2080
FERMI 1	5/10/1963	9/1972	TBD	4/1998	SAFSTOR	2032
FORT CALHOUN	8/9/1973	10/2016	TBD	12/2019	DECON	2026
INDIAN POINT 1	8/1/1962	10/1974	TBD	12/2019	DECON	2026
INDIAN POINT 2	7/1/1974	4/2020	TBD	12/2019	DECON	2033
INDIAN POINT 3	8/30/1976	4/2021	TBD	12/2019	DECON	2033
KEWAUNEE	12/1/1973	5/2013	TBD	5/2013	DECON	2073
MILLSTONE 1	12/28/1970	7/1998	TBD	6/1999	SAFSTOR	2056
OYSTER CREEK	12/1/1969	9/2018	TBD	6/2018	DECON	2025
PALISADES	12/31/1971	5/2022	TBD	12/2020	SAFSTOR	2041
PEACH BOTTOM 1	6/1/1967	10/1974	TBD	6/1998	SAFSTOR	2034
PILGRIM 1	12/1/1972	5/2019	TBD	11/2018	DECON	2027
SAN ONOFRE 1	1/1/1968	11/1992	TBD	12/1998	DECON	2030
SAN ONOFRE 2	1/1/1983	6/2013	TBD	9/2014	DECON	2031
SAN ONOFRE 3	1/1/1984	6/2013	TBD	9/2014	DECON	2031
THREE MILE ISLAND 1	9/2/1974	9/2019	TBD	4/2019	SAFSTOR	2079
THREE MILE ISLAND 2	12/30/1978	3/1979	TBD	12/2019	DECON	2037
VERMONT YANKEE	11/30/1972	12/2014	TBD	4/2017	DECON	2026-2030
ZION 1	12/31/1973	2/1997	9/2018	3/2008	DECON	2024
ZION 2	9/17/1974	9/1996	9/2018	3/2008	DECON	2024
REACTOR DECOMMISSIONING COMPLETED* **						
BIG ROCK POINT	3/29/1963	8/1997	TBD	9/1997	ISFSI only	2007
HADDAM NECK	12/27/1974	12/1996	TBD	8/1997	ISFSI only	2007
HUMBOLDT BAY 3	8/1/1963	7/1976	2012	2/1998	ISFSI only	2021****
LACROSSE	11/1/1969	4/1987	TBD	5/1991	ISFSI only	2023
MAINE YANKEE	6/29/1973	8/1997	TBD	8/1997	ISFSI only	2005
RANCHO SECO	4/17/1975	6/1989	5/2008	3/1997	ISFSI only	2009
TROJAN	5/20/1976	11/1992	2/2001	8/1995	ISFSI only	2004****
YANKEE ROWE	12/24/1963	10/1991	TBD	-	ISFSI only	2007

* Plant status as of 2023.
** Including the generally licensed ISFSI.
*** Not including ISFSI.
**** 10 CFR Part 72 ISFSI, 10 CFR Part 50 license terminated.

NOTE: Information on the latest decommissioning status of plants listed in this table can be found in SECY-23-0098, “Status of the Decommissioning Program—2023 Annual Report,” dated December 5, 2023 (Agencywide Documents Access and Management System Accession No. ML23262B468) [Ref. 22]. Rows displayed in gray represent plants that have completed decommissioning [Refs. 22–24].

TBD: To be determined.

SAFSTOR (often considered “delayed DECON”): The nuclear facility 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 or transitions out of SAFSTOR, 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.

5 TRANSIENT INDIVIDUALS AT NRC-LICENSED FACILITIES

The following analysis examines the data for individuals who had Form 5 dose records at more than one NRC-licensed facility during the monitoring year. These individuals are defined as transient because they worked at more than one facility during the monitoring year.

The term “monitoring year” is used here in accordance with the definition given in 10 CFR 20.1003, which defines a “year” as follows:

> [The] period of time beginning in January used to determine compliance with the provisions of [10 CFR Part 20]. The licensee may change the starting date of the year used to determine compliance by the licensee provided that the change is made at the beginning of the year and that no day is omitted or duplicated in consecutive years.

The data reported for individuals who were monitored at two or more different facilities within one monitoring year may be useful in many ways. For example, the total number of transient individuals and the individual doses they received can be determined by examining these data.

Additionally, by examining the distribution of the doses received by transient individuals, one can determine how the inclusion of these individuals in two or more licensees’ annual reports has affected the annual summary data for commercial nuclear power reactors (as reported in appendix B) and for all NRC licensees combined (one of the issues mentioned in section 2). Individuals who have been monitored at multiple facilities within the same year are reported separately on each licensee’s dose records. Thus, for example, an individual who visits five different facilities in a year will appear in the annual summary data (not adjusted for transients) as five different people. However, if the dose records are summed per individual (i.e., adjusting for transients), then the summary data will correctly identify the individual as one person, with a total annual dose equal to the sum of the doses they received at the five facilities they visited. The unadjusted and adjusted summary data will therefore reflect the same total collective dose, but they will show different values for the total number of individuals, their dose distributions, and average doses.

Table 5-1 shows the actual distribution of transient individual doses for 2023, as determined from the NRC Form 5 reports, and compares it with the reported distribution of the doses of these individuals as they would have appeared in a simple summation of licensees’ annual reports. (In 2023, 98 percent of all transient individuals were reported by commercial nuclear power reactor licensees, and the rest by other licensees. For this reason, the data for commercial nuclear power reactor licensees are shown separately in table 5-1.)

For example, table 5-1 shows that, according to the initial summation of Form 5 reports across all licensees (see row 2b, “Transients, as Reported”), in 2023 there were five individuals who received doses between 2.0 and 3.0 rem. However, accounting for the doses received by individuals across multiple facilities (see row 3b, “Transients, Actual”), the corrected distribution indicated that there were 41 transient individuals who received doses between 2.0 and 3.0 rem. Correcting for transients also affected the average measurable dose calculated for these individuals, nearly doubling it: the average measurable dose for transient individuals was 0.12 rem according to the initial summation and 0.25 rem according to the corrected distribution. Across all reporting licensees, transient individuals represented 27 percent of the workforce that received a measurable dose.

It should be noted that this analysis does not account for individuals who may have been exposed at facilities that are not required to report to the NRC (see section 1), such as facilities regulated by Agreement States or DOE.

One purpose of the REIRS database, which tracks occupational radiation exposures at NRC-licensed facilities, is to identify individuals who may have exceeded the occupational radiation dose limits because of multiple exposures at different facilities throughout the year. The REIRS database stores the radiation dose information for each individual under the individual's unique identification number and identification type [Ref. 1, section 1.1], and includes the sum of the doses received by that individual at all facilities visited during the monitoring year. An individual whose total dose exceeded the regulatory limit of 5 rem per year (TEDE) would be identified in table 5-1 in the dose range greater than 5 rem. In 2023, across all licensees, 137 unique individuals received doses between 2 and 3 rem, 25 individuals received between 3 and 4 rem, and 4 individuals received between 4 and 5 rem. As reported by NRC licensees to the REIRS database in 2023, no individuals received doses exceeding the regulatory limit of 5 rem. Section 6 contains more information on individuals who received doses in excess of the NRC regulatory limits.

Table 5-1 Effects of Transient Individuals on Annual Statistical Compilations 2023

License Category	Number of Individuals with TEDE in Range (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				
COMMERCIAL LIGHT-WATER REACTORS															
(1a) Form 5 Summation	73,843	35,725	9,635	3,840	1,113	423	308	5	-	-	-	124,892	51,049	5,552.061	0.11
(2a) Transients, as Reported	30,893	21,485	6,508	2,643	795	292	191	4	-	-	-	62,811	31,918	3,736.453	0.12
(3a) Transients, Actual	6,341	7,123	3,581	2,371	1,086	548	615	38	-	-	-	21,703	15,362	3,736.453	0.24
Corrected Distribution (1- [2 - 3]) **	**49,291**	**21,363**	**6,708**	**3,568**	**1,404**	**679**	**732**	**39**	**-**	**-**	**-**	**83,784**	**34,493**	**5,552.061**	**0.16**
ALL LICENSEES															
(1b) Form 5 Summation	76,646	40,240	10,828	4,754	1,562	659	737	101	25	4	-	135,562	58,916	7,615.858	0.13
(2b) Transients, as Reported	31,690	21,860	6,614	2,716	837	305	216	5	1	-	-	64,244	32,554	3,868.092	0.12
(3b) Transients, Actual	6,485	7,261	3,623	2,420	1,114	571	655	41	1	-	-	22,171	15,686	3,868.092	0.25
Corrected Distribution (1- [2 - 3]) **	**51,441**	**25,641**	**7,837**	**4,458**	**1,839**	**925**	**1,176**	**137**	**25**	**4**	**-**	**93,489**	**42,048**	**6,537.150**	**0.16**

* Dose values exactly equal to the values separating ranges are reported in the next higher range.
** The corrected distribution applies only to the number of individuals and is calculated by the total number in (1) minus the difference between (2) and (3).

6 EXPOSURES OF PERSONNEL IN EXCESS OF REGULATORY LIMITS

6.1 Reporting Categories

Doses in excess of regulatory limits are sometimes referred to as “overexposures.” The phrase “doses in excess of regulatory limits” is preferred to “overexposures” because the latter suggests that an individual has been subjected to an unacceptable biological risk, which may or may not be the case.

Regulations in 10 CFR 20.2202, “Notification of incidents,” and 10 CFR 20.2203, “Reports of exposures, radiation levels, and concentrations of radioactive material exceeding the constraints or limits,” require that all licensees submit reports of all incidents involving personnel radiation doses that exceed certain levels, thereby providing for investigations and corrective actions, as necessary. Based on the magnitude of the dose, the occurrence may be placed into one of three categories:

(1) Category A:

10 CFR 20.2202(a)(1)—To any individual, a TEDE of 25 rem or more, a lens dose equivalent of 75 rem or more, or a shallow dose equivalent to the skin or extremities of 250 rad or more. The Commission must be notified immediately of these events, and the U.S. Congress is notified annually through the NRC’s Abnormal Occurrence Report.

(2) Category B:

10 CFR 20.2202(b)(1)—To any individual, a TEDE exceeding 5 rem, a lens dose equivalent exceeding 15 rem, or a shallow dose equivalent to the skin or extremities exceeding 50 rem. The Commission must be notified of such events within 24 hours of their discovery.

(3) Category C:

10 CFR 20.2203—In addition to the notification required by 10 CFR 20.2202 (Category A or B events), each licensee must submit a written report within 30 days of learning of any of the following occurrences:

a. any incident for which notification is required by 10 CFR 20.2202

b. doses that exceed the limits in 10 CFR 20.1201, 10 CFR 20.1207, 10 CFR 20.1208, or 10 CFR 20.1301 (for adults, minors, the embryo/fetus of a declared pregnant woman, or members of the public, respectively) or any applicable limit in the license

c. levels of radiation or concentrations of radioactive material that exceed any applicable license limit for restricted areas or that, for unrestricted areas, are in excess of 10 times any applicable limit stated in 10 CFR Part 20 or in the license (whether or not involving a dose of any individual in excess of the limits in 10 CFR 20.1301, “Dose limits for individual members of the public”)

d. for licensees subject to the provisions of the U.S. Environmental Protection Agency’s generally applicable environmental radiation standards in 40 CFR Part 190, “Environmental Radiation Protection Standards for Nuclear Power Operations” [Ref. 24], levels of radiation or releases of radioactive material more than those standards or license conditions related to those standards

Occurrences reported as Category A, B, or C typically undergo review and evaluation by the licensee, NRC inspectors, and NRC Headquarters staff. Preliminary dose estimates submitted by licensees are often conservatively high and do not represent the final (legal) dose of record assigned for the event. It is therefore not uncommon for a dose reported as exceeding a regulatory limit to be reassessed and ultimately categorized as not having exceeded a regulatory limit. In other cases, the exposure event may not be identified until a later date, such as during the next scheduled audit or inspection of the licensee's event records.

6.2 Summary of Occupational Radiation Doses in Excess of NRC Regulatory Limits

The exposure events summary presented here is for events that occurred in 2023. Events that have been reassessed and determined not to involve a dose in excess of a regulatory limit are not included in this report. Events that occurred in prior years have been added to the summary in the year of their occurrence. The reader should note that the summary represents a snapshot of the status of events as of the publication date of this report. The events identified may not correlate exactly with previous or future reports, because of the review cycle and possible reassessment of events.

It is important to note that this summary of events includes the following:

- occupational radiation doses in excess of the annual 5-rem regulatory limit
- events at NRC-licensed facilities
- the dose of record assigned to an individual

It **does not** include the following:

- medical events as defined in 10 CFR Part 35, "Medical Use of Byproduct Material" [Ref. 25]
- doses in excess of the regulatory limits to the general public
- Agreement State-licensed activities or DOE facilities
- exposures to dosimeters that, upon evaluation, have been determined to be high dosimeter readings only and have not been assigned to an individual as the dose of record by the licensee

In 2023, no Category A occurrences, Category B occurrences, or Category C occurrences were reported under the licensed activities included in this report.

6.3 Summary of Annual Dose Distributions for Certain NRC Licensees

Table 6-1 summarizes the annual occupational dose records reported to the NRC, as required by 10 CFR 20.2206, by certain categories of NRC licensees. The table shows that for the past 11 years, more than 99 percent of the individuals receiving doses have received less than 2 rem.

6.4 Maximum Occupational Radiation Doses Below NRC Regulatory Limits

Certain researchers have expressed interest in a list of the maximum doses received at NRC licensee facilities that do not exceed the regulatory limits. This information could provide insight into ways to improve licensees' radiation protection programs. Table 6-2 shows the maximum doses received for each dose category required to be reported to the NRC. The table also gives the number of doses that were within 25, 50, 75, and 95 percent of regulatory limits. As shown in the table, 71 individuals received doses exceeding 50 percent of the TEDE limit, 7 individuals received doses exceeding 75 percent of the TEDE limit, and no individuals received doses

exceeding 95 percent of the TEDE limit. The other dose category for which some individuals received doses exceeding 50 percent of the dose limit was the shallow dose equivalent to the maximally exposed extremity (SDE-ME).

Table 6-1 Summary of Annual Dose Distributions for Certain NRC Licensees,* 2013–2023

Year	Total Number of Monitored Individuals		Individuals with Dose (TEDE) ***			
			< 2 rem	> 2 rem	< 5 rem	> 5 rem
	Reported Number	Corrected Number **	%	Number	%	Number
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
2019	144,243	102,182	99.9%	110	100%	-
2020	133,139	94,779	99.9%	74	99.9%	2
2021	130,613	90,470	99.9%	84	100%	-
2022	134,177	107,070	99.9%	92	100%	-
2023	135,562	93,489	99.8%	166	100%	-

* Licensees required to submit radiation exposure reports to the NRC under 10 CFR 20.2206.
** The values in this column have been corrected to account for transient individuals (i.e., individuals who may have been counted more than once because they worked at more than one facility during the monitoring year; see section 5).
*** The data for 2013–2023 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,* 2023

Dose Category**	Annual Dose Limit, 10 CFR 20***	Maximum Annual Dose Reported (rem)	Max Dose Percentage of Limit	Number of Individuals with Measurable Dose	Number of Individuals with >25% of Limit	Number of Individuals with >50% of Limit	Number of Individuals with >75% of Limit	Number of Individuals with >95% of Limit	Number of Individuals with Dose > Limit
SDE-ME	50 rem	39.398	79%	36,069	67	13	2	-	-
SDE-WB	50 rem	4.711	9%	42,194	-	-	-	-	-
LDE	15 rem	4.713	31%	41,545	8	-	-	-	-
CEDE		0.514		2,473					
CDE		4.229		2,060					
DDE		4.668		42,114					
TEDE	5 rem	4.668	93%	42,087	794	71	7	-	-
TODE	50 rem	5.524	11%	41,806	-	-	-	-	-

* 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.

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[1] Report is available for purchase from the National Technical Information Service, Springfield, Virginia, 22161, and from the Superintendent of Documents, U.S. Government Publishing Office, P.O. Box 37082, Washington, DC 20402-9328.

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18. Institute of Nuclear Power Operations (INPO), monthly operating report data, compiled by Idaho National Laboratory’s Risk Assessment and Management Services Department under contract to the NRC.

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APPENDIX A

ANNUAL TOTAL EFFECTIVE DOSE EQUIVALENT FOR NONREACTOR NRC LICENSEES AND OTHER FACILITIES REPORTING TO THE NRC

2023

APPENDIX A

Table A-1 Annual Total Effective Dose Equivalent (TEDE) for Nonreactor NRC Licensees

PROGRAM CODE— LICENSEE NAME	LICENSE #	Number of Individuals with Whole-Body Doses in the Ranges (rem)*											Total Number Monitored	Number with Meas. Dose	Total Collective TEDE (person-rem)	Average Meas. TEDE (rem)
		No Meas. Exposure	Meas. <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				
INDUSTRIAL RADIOGRAPHY—FIXED LOCATION—03310																
HARRISON STEEL CASTINGS CO.	13-02141-01	3	4	-	-	-	-	-	-	-	-	-	**7**	4	0.090	0.023
METALTEK INTERNATIONAL	24-26136-01	1	3	1	-	-	-	-	-	-	-	-	5	4	**0.319**	**0.080**
Total	**2**	**4**	**7**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**12**	**8**	**0.409**	**0.051**
INDUSTRIAL RADIOGRAPHY—TEMPORARY JOB SITE—03320																
ACUREN INSPECTION	22-27593-01	35	53	37	32	19	6	9	1	-	-	-	192	157	50.337	0.321
ADVEX CORPORATION	45-16452-01	-	3	-	-	-	-	-	-	-	-	-	3	3	0.058	0.019
ALASKA INDUSTRIAL X-RAY	50-16084-01	-	-	4	3	-	2	-	-	-	-	-	9	9	3.468	0.385
AMERICAN ENGINEERING TESTING, INC.	22-20271-02	-	1	-	2	1	-	-	-	-	-	-	4	4	1.437	0.359
AMERICAN PIPING INSPECTION	35-35011-01	34	59	53	64	45	35	97	32	17	1	-	**437**	**403**	**366.291**	0.909
APPLIED TECHNICAL SERVICES, INC.	10-35278-01	-	1	2	1	-	-	-	-	-	-	-	4	4	0.838	0.210
AEGUS INSPECTION SOLUTIONS, INC.	04-29076-02	27	43	15	19	18	13	18	1	-	-	-	154	127	60.780	0.479
CALUMET TESTING SERVICES	13-16347-01	2	2	1	-	2	-	-	-	-	-	-	7	5	1.654	0.331
CONCRETE IMAGING, INC.	47-31316-01	-	2	1	2	-	-	1	-	-	-	-	6	6	2.335	0.389
CONSUMERS ENERGY LAB. SERVICES	21-08606-03	10	11	6	5	2	1	-	-	-	-	-	35	25	5.142	0.206
DIAMOND TECHNICAL SERVICES INC	37-31259-01	-	3	4	-	2	-	2	-	-	-	-	11	11	4.293	0.390
DOMINION NDT SERVICES, INC.	45-35118-01	1	3	-	-	2	1	2	-	-	-	-	9	8	5.069	0.634
ELECTRIC BOAT CORPORATION	06-01781-03	22	67	-	-	-	-	-	-	-	-	-	89	67	0.948	0.014
ENGINEERING & INSPECTIONS—HAWAII	53-27731-01	-	-	-	-	1	1	2	-	-	-	-	4	4	4.186	1.047
H & H X-RAY SERVICES, INC.	17-19236-01	27	16	13	19	18	8	14	1	-	-	-	116	89	50.496	0.567
HIGH COUNTRY FABRICATION	49-29300-01	-	4	-	-	2	-	1	-	-	-	-	7	7	2.619	0.374
HIGH MOUNTAIN INSPECTION SERVICES	49-26808-02	2	16	8	5	8	3	23	7	4	1	-	77	75	80.363	**1.072**
HUNTINGTON INGALLS, INC.	45-09428-02	21	48	4	1	-	-	-	-	-	-	-	74	53	2.188	0.041
HUNTINGTON INGALLS, INC.	45-09428-03	4	3	-	-	-	-	-	-	-	-	-	7	3	0.006	0.002
INTEGRITY TESTLAB	07-30791-01	1	11	5	5	6	6	5	-	-	-	-	39	38	18.717	0.493
INTERTEK ASSET INTEGRITY MGMT, INC.	17-29308-01	3	-	1	1	1	-	1	-	-	-	-	7	4	2.733	0.683
J CORE DRILLING, INC.	45-30846-01	3	2	-	-	-	-	-	-	-	-	-	5	2	0.043	0.022

NOTE: The data values shown in bold and boxed represent the highest value in each category. These values have not been adjusted for the multiple counting of transient workers (see section 5).

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

APPENDIX A
Table A-1 Annual TEDE for Nonreactor NRC Licensees (continued)

PROGRAM CODE— LICENSEE NAME	LICENSE #	Number of Individuals with Whole-Body Doses in the Ranges (rem)*											Total Number Monitored	Number with Meas. Dose	Total Collective TEDE (person-rem)	Average Meas. TEDE (rem)
		No Meas. Exposure	Meas. <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				
INDUSTRIAL RADIOGRAPHY—TEMPORARY JOB SITE—03320 (Continued)																
JRGO, LLC.	04-24888-01	2	4	1	-	-	-	-	-	-	-	-	7	5	0.307	0.061
MARYLAND Q.C. LABORATORIES, INC.	19-28683-01	4	5	2	-	1	-	-	-	-	-	-	12	8	1.050	0.131
MATERIALS INTEGRITY, INC.	50-27722-01	2	2	-	-	-	-	-	-	-	-	-	4	2	0.063	0.032
METALS TESTING SERVICES, INC.	37-29406-02	13	7	11	8	6	4	10	3	-	-	-	62	49	34.341	0.701
MID AMERICAN INSPECTION SERVICES	21-26060-01	-	2	5	10	3	-	1	-	-	-	-	21	21	7.473	0.356
NONDESTRUCTIVE & VISUAL INSPECTION	17-29410-01	-	-	2	3	3	4	14	4	-	-	-	30	30	34.610	**1.154**
PREMIER TECHNOLOGY, INC.	11-27746-01	3	1	-	-	-	-	-	-	-	-	-	4	1	0.021	0.021
PRIME NDT SERVICES, INC.	37-23370-01	12	20	26	24	26	19	23	-	-	-	-	150	138	79.238	0.574
PROTECT, LLC.	15-29301-02	16	28	32	52	31	27	65	21	1	1	-	274	258	223.615	0.867
QUALITY CONTROL INSPECTION & TESTING LABORATORIES	11-29245-01	1	-	1	2	-	-	-	-	-	-	-	4	3	0.829	0.276
QUALITY INSPECTION & TESTING	17-35492-01	-	1	5	4	3	2	-	-	-	-	-	15	15	5.999	0.400
QUALITY INSPECTION & TESTING	50-29038-014	-	1	2	3	-	-	-	-	-	-	-	6	6	1.683	0.281
RELIABLE TESTING SERVICES	24-35592-01	4	2	3	-	-	-	-	-	-	-	-	9	5	0.572	0.114
RNDT, INC.	37-30942-02	3	1	3	5	3	5	5	-	1	-	-	26	23	19.381	0.843
SHAW PIPELINE SERVICES, INC.	35-23193-03	20	65	42	38	14	5	4	-	-	-	-	188	168	40.825	0.243
SI-TECH LABS	45-24882-01	3	3	-	-	-	-	-	-	-	-	-	6	3	0.094	0.031
ST. LOUIS TESTING LABORATORIES, INC	24-00188-02	5	5	1	3	1	2	2	1	-	-	-	20	15	8.935	0.596
STANLEY INSPECTION	35-35301-01	9	24	19	20	14	6	13	5	-	-	-	110	101	55.393	0.548
TERRACON CONSULTANTS	24-35241-01	1	-	-	1	1	-	1	-	-	-	-	4	3	2.572	0.857
TESTING TECHNOLOGIES, INC.	45-25007-01	3	3	4	2	2	1	-	-	-	-	-	15	12	3.464	0.289
THERMAL ENGINEERING INTERNATIONAL	24-19500-01	5	-	-	-	-	-	-	-	-	-	-	5	-	-	-
TVA ADMIN PROGRAM	41-06832-06	8	3	1	1	-	-	-	-	-	-	-	13	5	0.563	0.113
XCEL NDT LLC	15-35544-01	13	31	24	21	17	23	46	7	1	1	-	184	171	129.153	0.755
Total	**45**	**319**	**556**	**338**	**356**	**252**	**174**	**359**	**83**	**24**	**4**	**-**	**2,465**	**2,146**	**1,314.182**	**0.612**
INDUSTRIAL RADIOGRAPHY—MULTIPLE LOCATIONS – 04312																
JAN X-RAY SERVICES, INC.	21-16560-01	51	35	31	50	27	17	16	1	1	-	-	229	178	**81.487**	**0.458**
KAKIVIK ASSET MANAGEMENT	50-27667-01	1	8	8	20	11	4	1	-	-	-	-	53	52	20.318	0.391
MISTRAS GROUP, INC.	12-16559-02	21	105	54	54	20	3	12	-	-	-	-	**269**	**248**	65.145	0.263
TEAM INDUSTRIAL SERVICES, INC.	42-32219-01	28	56	44	49	18	11	6	1	-	-	-	213	185	59.620	0.322
Total	**4**	**101**	**204**	**137**	**173**	**76**	**35**	**35**	**2**	**1**	**-**	**-**	**764**	**663**	**226.570**	**0.342**

NOTE: The data values shown in bold and boxed represent the highest value in each category. These values have not been adjusted for the multiple counting of transient workers (see section 5).

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

APPENDIX A
Table A-1 Annual TEDE for Nonreactor NRC Licensees (continued)

PROGRAM CODE— LICENSEE NAME	LICENSE #	Number of Individuals with Whole-Body Doses in the Ranges (rem)*											Total Number Monitored	Number with Meas. Dose	Total Collective TEDE (person-rem)	Average Meas. TEDE (rem)
		No Meas. Exposure	Meas. <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				
MANUFACTURING AND DISTRIBUTION—NUCLEAR PHARMACIES—02500																
ADVANCED ISOTOPES OF IDHAO	11-29216-01MD	-	-	2	1	-	-	-	-	-	-	-	3	3	0.858	0.286
ADVANCED ISOTOPES OF MONTANA	11-35661-01MD	-	3	-	-	-	-	-	-	-	-	-	3	3	0.176	0.059
CARDINAL HEALTH	34-29200-01MD	138	333	88	20	8	-	-	-	-	-	-	**587**	**449**	**34.048**	0.076
CARDINAL HEALTH	34-31473-02MD	2	10	3	2	-	-	-	-	-	-	-	17	15	1.607	0.107
JUBILANT RADIOPHARMA	09-32781-02MD	9	16	1	-	-	-	-	-	-	-	-	26	17	0.443	0.026
JUBILANT RADIOPHARMA	09-32781-04MD	-	1	8	3	-	-	-	-	-	-	-	12	12	2.441	0.203
MID-AMERICA ISOTOPES, INC.	24-26241-01MD	17	11	2	2	-	-	1	-	-	-	-	33	16	2.828	0.177
PHARMALOGIC MT, INC.	09-29398-01MD	9	18	-	2	-	-	-	-	-	-	-	29	20	1.135	0.057
PHARMALOGIC PUERTO RICO	52-25361-01MD	-	10	5	4	2	3	2	-	-	-	-	26	26	9.478	**0.365**
PHARMALOGIC WY, INC.	49-27629-01MD	9	5	-	-	-	-	-	-	-	-	-	14	5	0.060	0.012
RADIOPHARMACY OF INDIANAPOLIS	13-32637-01MD	14	6	-	1	3	-	-	-	-	-	-	24	10	2.329	0.209
RADIOPHARMACY, INC.	13-26246-01MD	13	13	2	1	-	-	-	-	-	-	-	29	16	1.065	0.070
RLS (USA), INC.	21-24828-01MD	5	9	2	-	-	-	-	-	-	-	-	16	11	0.719	0.091
RLS (USA), INC.	21-26707-01MD	2	2	1	-	-	-	-	-	-	-	-	5	3	0.271	0.063
RLS (USA), INC.	24-32462-01MD	3	6	2	-	-	-	-	-	-	-	-	11	8	0.465	0.030
Total	**15**	**221**	**443**	**116**	**36**	**13**	**3**	**3**	**-**	**-**	**-**	**-**	**835**	**614**	**57.923**	**0.094**
MANUFACTURING AND DISTRIBUTION—TYPE "A" BROAD—03211																
INTERNATIONAL ISOTOPES IDAHO, INC.	11-27680-01MD	-	18	5	1	2	2	11	1	3	-	-	43	43	33.835	**0.787**
CURIUM US, LLC.	24-04206-01	45	229	57	39	13	9	20	10	-	-	-	**422**	**377**	**100.531**	0.267
Total	**2**	**45**	**247**	**62**	**40**	**15**	**11**	**31**	**11**	**-**	**-**	**-**	**465**	**420**	**134.366**	**0.320**
INDEPENDENT SPENT FUEL STORAGE INSTALLATION—23200																
GENERAL ELECTRIC - MORRIS ISFSI	SNM-2500	5	11	2	2	-	-	-	-	-	-	-	20	**15**	**0.994**	0.066
PORTLAND GENERAL ELECTRIC CO.	SNM-2509	73	-	-	-	-	-	-	-	-	-	-	**73**	-	-	**-**
Total	**2**	**78**	**11**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**93**	**15**	**0.994**	**0.066**
URANIUM HEXAFLUORIDE (UF_6) PRODUCTION PLANTS—11400																
HONEYWELL INTERNATIONAL, INC.	SUB-0526	3	613	155	39	7	3	-	-	-	-	-	**820**	**817**	**67.542**	**0.083**
Total	**1**	**3**	**613**	**155**	**39**	**7**	**3**	**-**	**-**	**-**	**-**	**-**	**820**	**817**	**67.542**	**0.083**

NOTE: The data values shown in bold and boxed represent the highest value in each category. These values have not been adjusted for the multiple counting of transient workers (see section 5).

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

APPENDIX A

Table A-1 Annual TEDE for Nonreactor NRC Licensees (continued)

PROGRAM CODE— LICENSEE NAME	LICENSE #	Number of Individuals with Whole-Body Doses in the Ranges (rem)*											Total Number Monitored	Number with Meas. Dose	Total Collective TEDE (person-rem)	Average Meas. TEDE (rem)
		No Meas. Exposure	Meas. <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				
FUEL CYCLE URANIUM ENRICHMENT PLANTS —21200																
CENTRUSENERGY	SNM-2011	169	4	-	-	-	-	-	-	-	-	-	**173**	**4**	**0.052**	**0.013**
Total	**1**	**169**	**4**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**173**	**4**	**0.052**	**0.013**
FUEL CYCLE FUEL FABRICATION FACILITIES —21210																
BWXT NUCLEAR OPERATIONS GROUP, INC	SNM-0042	53	273	17	-	2	-	-	-	-	-	-	345	292	12.042	0.041
FRAMATOME INC.	SNM-1227	810	1,062	74	41	4	-	-	-	-	-	-	**1,991**	**1,181**	39.141	0.033
GLOBAL NUCLEAR FUEL - AMERICAS, LLC	SNM-1097	163	307	124	100	28	7	-	-	-	-	-	729	566	88.464	0.156
NUCLEAR FUEL SERVICES, INC.	SNM-0124	725	587	27	-	-	-	-	-	-	-	-	1,339	614	10.046	0.016
WESTINGHOUSE ELECTRIC COMPANY	SNM-1107	112	201	140	127	52	6	1	-	-	-	-	639	527	**112.066**	**0.213**
Total	**5**	**1,863**	**2,430**	**382**	**268**	**86**	**13**	**1**	**-**	**-**	**-**	**-**	**5,043**	**3,180**	**261.759**	**0.082**

NOTE: The data values shown in bold and boxed represent the highest value in each category. These values have not been adjusted for the multiple counting of transient workers (see section 5).

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

APPENDIX A
Table A-2 Other Facilities Reporting to the NRC

PROGRAM CODE— LICENSEE NAME	LICENSE #	Number of Individuals with Whole-Body Doses in the Ranges (rem)*											Total Number Monitored	Number with Meas. Dose	Total Collective TEDE (person-rem)	Average Meas. TEDE (rem)
		No Meas. Exposure	Meas. <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				
HIGH DOSE RATE REMOTE AFTERLOADER—02230																
BOZEMAN DEACONESS FOUNDATION	25-10994-04	33	45	9	7	2	2	2	-	-	-	-	**100**	**67**	**10.555**	**0.158**
Total	**1**	**33**	**45**	**9**	**7**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**100**	**67**	**10.555**	**0.158**
OTHER SERVICES—03225																
VEGA AMERICAS, INC.	34-00639-04	15	15	5	2	-	-	-	-	-	-	-	**37**	**22**	**1.680**	**0.076**
Total	**1**	**15**	**15**	**5**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**37**	**22**	**1.680**	**0.076**
MASTER MATERIALS—ISSUED TO GOVERNMENT AGENCIES—03614																
NAVY, DEPARTMENT OF THE	45-23645-01NA	31	75	-	-	-	-	-	-	-	-	-	**106**	**75**	**0.550**	**0.007**
Total	**1**	**31**	**75**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**106**	**75**	**0.550**	**0.007**
RESEARCH AND DEVELOPMENT, OTHER—03620																
APS TECHNOLOGY	06-35157-01	3	-	-	-	-	-	-	-	-	-	-	**3**	**-**	**-**	**-**
FRAMATOME INC.	27-05861-02	-	13	-	-	-	-	-	-	-	-	-	**13**	**13**	**0.077**	**0.006**
Total	**2**	**3**	**13**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**16**	**13**	**0.077**	**0.006**
WASTE DISPOSAL SERVICE PROCESSING AND/OR REPACKAGING—03234																
ENERGYSOLUTIONS	39-35044-01	5	-	-	-	-	-	-	-	-	-	-	**5**	**-**	**-**	**-**
Total	**1**	**5**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**5**	**-**	**-**	**-**
TEST REACTOR FACILITIES—42140*																
NAT'L INSTITUTE OF STANDARDS & TECH	TR-5	26	99	13	4	-	-	-	-	-	-	-	**142**	**116**	**4.991**	**0.043**
Total	**1**	**26**	**99**	**13**	**4**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**142**	**116**	**4.991**	**0.043**
TEST REACTOR MISCELLANEOUS—42150																
AEROTEST OPERATIONS, INC.	R-98	6	-	-	-	-	-	-	-	-	-	-	**6**	**-**	**-**	**-**
Total	**1**	**6**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**6**	**-**	**-**	**-**

NOTE: The data values shown in bold and boxed represent the highest value in each category. These values have not been adjusted for the multiple counting of transient workers (see section 5).

* Dose values exactly equal to the values separating ranges are reported in the next higher range.
** Test reactor facilities are required to report to the NRC, but only two facilities report under this category and one of the facilities is in decommissioning.

APPENDIX B

ANNUAL DOSES AT LICENSED NUCLEAR POWER FACILITIES

2023

APPENDIX B

Table B-1 Annual Doses* at Licensed Nuclear Power Facilities

PLANT NAME	TYPE	Number of Individuals with Annual Doses* in the Ranges (rem)**											Total Number Monitored	Number with Meas. Dose	Total Collective TEDE per Site (person-rem)
		No Meas. Exposure	Meas. <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			
ARKANSAS 1, 2	PWR	1,433	804	151	56	7	-	-	-	-	-	-	2,451	1,018	71.024
BEAVER VALLEY 1, 2	PWR	1,689	313	157	46	10	7	1	-	-	-	-	2,223	534	67.344
BRAIDWOOD 1, 2	PWR	1,831	813	119	14	1	-	-	-	-	-	-	2,778	947	52.194
BROWNS FERRY 1, 2, 3	BWR	1,066	1,527	387	206	36	8	6	-	-	-	-	3,236	2,170	219.547
BRUNSWICK 1, 2	BWR	1,311	886	338	201	72	40	21	-	-	-	-	2,869	1,558	263.343
BYRON 1, 2	PWR	1,849	775	144	24	-	-	-	-	-	-	-	2,792	943	56.179
CALLAWAY 1	PWR	1,254	348	33	2	-	-	-	-	-	-	-	1,637	383	18.353
CALVERT CLIFFS 1, 2	PWR	1,237	541	133	32	1	-	-	-	-	-	-	1,944	707	52.076
CATAWBA 1, 2	PWR	1,755	556	161	24	1	-	-	-	-	-	-	2,497	742	54.066
CLINTON	BWR	1,738	876	299	122	41	11	2	-	-	-	-	3,089	1,351	160.062
COLUMBIA GENERATING	BWR	987	852	281	166	76	36	6	-	-	-	-	2,404	1,417	223.459
COMANCHE PEAK 1, 2	PWR	1,460	505	143	65	18	3	-	-	-	-	-	2,194	734	75.828
COOK 1, 2	PWR	1,624	546	76	4	-	-	-	-	-	-	-	2,250	626	29.717
COOPER STATION	BWR	618	263	37	9	1	-	-	-	-	-	-	928	310	17.111
DAVIS-BESSE 1	PWR	628	134	12	-	-	-	-	-	-	-	-	774	146	3.717
DIABLO CANYON 1, 2	PWR	1,737	544	124	8	-	-	-	-	-	-	-	2,413	676	40.149
DRESDEN 2, 3	BWR	1,560	1,365	358	115	15	4	-	-	-	-	-	3,417	1,857	160.044
FARLEY 1, 2	PWR	1,481	369	54	8	-	-	-	-	-	-	-	1,912	431	23.531
FERMI 2	BWR	417	833	172	61	23	4	4	-	-	-	-	1,514	1,097	85.843
FITZPATRICK	BWR	555	193	63	24	2	-	-	-	-	-	-	837	282	26.406
GINNA	PWR	1,105	445	146	29	6	-	-	-	-	-	-	1,731	626	53.989
GRAND GULF	BWR	1,174	277	49	4	-	-	-	-	-	-	-	1,504	330	17.410
HARRIS 1	PWR	823	17	-	-	-	-	-	-	-	-	-	840	17	0.286
HATCH 1, 2	BWR	1,481	774	226	69	7	1	1	-	-	-	-	2,559	1,078	93.435
HOPE CREEK 1	BWR	273	197	46	21	7	2	1	-	-	-	-	547	274	27.804
LASALLE 1, 2	BWR	1,133	1,069	486	322	183	111	125	2	-	-	-	3,431	**2,298**	**606.160**
LIMERICK 1, 2	BWR	1,450	1,102	264	109	12	-	-	-	-	-	-	2,937	1,487	126.851
MCGUIRE 1, 2	PWR	1,586	1,000	336	90	25	2	-	-	-	-	-	3,039	1,453	136.164
MILLSTONE 2, 3	PWR	1,641	778	238	121	32	2	1	-	-	-	-	2,813	1,172	130.298
MONTICELLO	BWR	998	572	194	112	47	20	12	-	-	-	-	1,955	957	153.784
NINE MILE POINT 1, 2	BWR	1,205	1,036	330	129	33	7	3	-	-	-	-	2,743	1,538	165.169
NORTH ANNA 1, 2	PWR	2,403	581	90	26	2	1	-	-	-	-	-	3,103	700	43.326

NOTE: The data values shown bolded and in boxes represent the highest value in each category. Totals corrected for transients are on page B-2.

* These doses are annual total effective dose equivalent (TEDE) doses.

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

APPENDIX B
Table B-1 Annual Doses* at Licensed Nuclear Power Facilities (continued)

PLANT NAME	TYPE	Number of Individuals with Annual Doses* in the Ranges (rem)**											Total Number Monitored	Number with Meas. Dose	Total Collective TEDE per Site (person-rem)
		No Meas. Exposure	Meas. <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			
OCONEE 1, 2, 3	PWR	2,264	886	52	1	-	-	-	-	-	-	-	3,203	939	36.862
PALO VERDE 1, 2, 3	PWR	2,763	684	123	20	2	-	-	-	-	-	-	3,592	829	49.159
PEACH BOTTOM 2, 3	BWR	1,277	1,120	304	101	19	-	1	-	-	-	-	2,822	1,545	138.048
PERRY	BWR	784	574	365	306	124	71	67	3	-	-	-	2,294	1,510	425.393
POINT BEACH 1, 2	PWR	703	418	164	64	13	9	11	-	-	-	-	1,382	679	94.647
PRAIRIE ISLAND 1, 2	PWR	878	463	147	62	4	3	-	-	-	-	-	1,557	679	67.649
QUAD CITIES 1, 2	BWR	1,195	1,138	515	200	45	9	5	-	-	-	-	3,107	1,912	241.929
RIVER BEND 1	BWR	1,181	1,297	314	221	98	40	24	-	-	-	-	3,175	1,994	292.989
ROBINSON 2	PWR	847	65	1	-	-	-	-	-	-	-	-	913	66	1.809
SALEM 1, 2	PWR	1,550	1,114	258	122	42	12	5	-	-	-	-	3,103	1,553	157.558
SEABROOK	PWR	792	450	115	25	1	-	-	-	-	-	-	1,383	591	42.118
SEQUOYAH 1, 2	PWR	1,762	921	92	23	3	-	-	-	-	-	-	2,801	1,039	50.812
SOUTH TEXAS 1, 2	PWR	1,493	361	88	17	-	-	-	-	-	-	-	1,959	466	32.683
ST LUCIE 1, 2	PWR	1,395	475	76	21	16	4	-	-	-	-	-	1,987	592	50.211
SUMMER 1	PWR	1,230	446	52	24	2	1	-	-	-	-	-	1,755	525	31.904
SURRY 1, 2	PWR	2,593	547	165	48	9	-	1	-	-	-	-	3,363	770	66.319
SUSQUEHANNA 1, 2	BWR	1,648	700	282	127	38	13	10	-	-	-	-	2,818	1,170	162.657
TURKEY POINT 3, 4	PWR	1,239	625	287	64	11	1	-	-	-	-	-	2,227	988	100.934
VOGTLE 1, 2***	PWR	3,184	594	190	45	2	-	-	-	-	-	-	**4,015**	831	68.062
WATERFORD 3	PWR	1,107	571	134	52	13	1	1	-	-	-	-	1,879	772	66.602
WATTS BAR 1, 2	PWR	1,731	1,164	263	78	13	-	-	-	-	-	-	3,249	1,518	116.163
WOLF CREEK 1	PWR	725	221	1	-	-	-	-	-	-	-	-	947	222	2.884
Total BWRs (31 Units)	**BWR**	**22,051**	**16,651**	**5,310**	**2,625**	**879**	**377**	**288**	**5**	**-**	**-**	**-**	**48,186**	**26,135**	**3,607.444**
Total PWRs (61 Units)	**PWR**	**51,792**	**19,074**	**4,325**	**1,215**	**234**	**46**	**20**	**-**	**-**	**-**	**-**	**76,706**	**24,914**	**1,944.617**
Total LWRs (92 Units)	**LWR**	**73,843**	**35,725**	**9,635**	**3,840**	**1,113**	**423**	**308**	**5**	**-**	**-**	**-**	**124,892**	**51,049**	**5,552.061**
Corrected for Transients †	**LWR**	**49,291**	**21,363**	**6,708**	**3,568**	**1,404**	**679**	**732**	**39**	**-**	**-**	**-**	**83,784**	**34,493**	**5,552.061**

* These doses are annual TEDE doses.

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

*** Vogtle Unit 3 became operational in July 2023. It is not included in the count of operating reactors for 2023 because it did not complete a full year of operation, but the dose for Unit 3 is included in the total dose for Units 1 and 2.

† Totals are corrected for transients and include all light-water reactors in commercial operation for a full year.

APPENDIX B
Table B-1 Annual Doses* at Licensed Nuclear Power Facilities (continued)

PLANT NAME	TYPE	Number of Individuals with Annual Doses* in the Ranges (rem)**											Total Number Monitored	Number with Meas. Dose	Total Collective TEDE per Site (person-rem)
		No Meas. Exposure	Meas. <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			
REACTORS NO LONGER IN COMMERCIAL OPERATION															
CRYSTAL RIVER 3	PWR	130	128	31	18	11	7	16	4	-	-	-	345	215	60.224
DUANE ARNOLD	BWR	23	12	4	-	-	-	-	-	-	-	-	39	16	0.832
FERMI 1	FBR	39	-	-	-	-	-	-	-	-	-	-	39	-	-
FORT CALHOUN	PWR	399	105	34	39	15	6	26	8	-	-	-	632	233	93.416
GE ESADA VALLECITOS	EVESR	No longer required to report.													
GE VALLECITOS	VBWR	111	61	6	2	2	-	-	-	-	-	-	182	71	3.974
HUMBOLDT BAY 3	BWR	No operations occurred in 2023.													
INDIAN POINT 2, 3	PWR	424	411	103	82	42	33	36	2	-	-	-	1,133	709	160.589
KEWAUNEE	PWR	379	16	-	-	-	-	-	-	-	-	-	395	16	0.251
LACROSSE	BWR	17	13	-	-	-	-	-	-	-	-	-	30	13	0.043
OYSTER CREEK	BWR	177	43	36	17	9	4	6	-	-	-	-	292	115	30.409
PALISADES	PWR	446	19	9	2	-	-	-	-	-	-	-	476	30	2.377
PEACH BOTTOM 1	HTGR	No longer required to report.													
PILGRIM 1	BWR	40	185	34	17	12	9	3	1	-	-	-	301	261	39.024
SAN ONOFRE 1, 2, 3	PWR	507	196	73	56	28	15	12	-	-	-	-	887	380	83.794
SAVANNAH, NUCLEAR SHIP	NS	No longer required to report.													
THREE MILE ISLAND 1	PWR	141	66	1	-	-	-	-	-	-	-	-	208	67	2.635
THREE MILE ISLAND 2	PWR	143	52	16	21	6	11	21	-	-	-	-	270	127	54.456
VERMONT YANKEE	BWR	57	57	13	5	8	6	12	14	10	1	-	183	126	106.459
ZION 1, 2	PWR	78	5	-	-	-	-	-	-	-	-	-	83	5	0.081
Total Reporting* **	**16**	**3,111**	**1,369**	**360**	**259**	**133**	**91**	**132**	**29**	**10**	**1**	**-**	**5,495**	**2,384**	**638.564**
REACTORS NO LONGER IN COMMERCIAL OPERATION, REPORTED WITH OTHER UNITS															
DRESDEN 1	BWR	Reported with Dresden Units 2, 3.													
INDIAN POINT 1	BWR	Reported with Indian Point Units 2, 3.													
MILLSTONE 1	PWR	Reported with Millstone Units 2, 3.													
REACTORS NO LONGER IN COMMERCIAL OPERATION, DECOMMISSIONED															
BIG ROCK POINT	BWR	29	-	-	-	-	-	-	-	-	-	-	29	-	-
HADDAM NECK	PWR	34	14	-	-	-	-	-	-	-	-	-	48	14	0.329
MAINE YANKEE	PWR	37	5	-	-	-	-	-	-	-	-	-	42	5	0.061
RANCHO SECO	PWR	Reported as ISFSI (See appendix A, Rancho Seco ISFSI).													
TROJAN	PWR	No longer required to report.													
YANKEE ROWE	PWR	43	1	-	-	-	-	-	-	-	-	-	44	1	0.016
Total Reporting* **	**4**	**143**	**20**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**163**	**20**	**0.406**

NOTE: Totals corrected for transients are on page B-2.

* These doses are annual TEDE doses.
** Dose values exactly equal to the values separating ranges are reported in the next higher range.
*** These numbers are for the reactors no longer in commercial operation that report their doses separately (i.e., do not report their doses with other units).

APPENDIX C

PERSONNEL, DOSE, AND POWER GENERATION SUMMARY

1969–2023

Sections 3.1 and 4.2 of the main document discuss the methods used to collect and calculate the information in this appendix.

PERSONNEL, DOSE, AND POWER GENERATION SUMMARY
1969–2023

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
ARKANSAS 1, 2	1975	588.0	76.5	147	21	0.14	0.04
Docket 50-313, 50-368;	1976	464.6	56.6	476	289	0.61	0.62
DPR-51; NPF-6	1977	610.3	76.8	601	256	0.43	0.42
1st commercial operation	1978	627.2	77.5	722	189	0.26	0.30
12/74, 3/80	1979	397.0	55.3	1,321	369	0.28	0.93
Type—PWRs	1980	452.8	63.7	1,233	342	0.28	0.76
Capacity—836, 988 MWe	1981	1,104.7	68.3	2,225	1,102	0.50	1.00
	1982	905.4	58.6	1,608	803	0.50	0.89
	1983	915.0	54.7	2,109	1,397	0.66	1.53
	1984	1,289.1	77.4	1,742	806	0.46	0.63
	1985	1,192.3	73.6	1,262	286	0.23	0.24
	1986	1,070.3	66.9	2,135	1,141	0.53	1.07
	1987	1,366.1	88.9	1,123	382	0.34	0.28
	1988	1,070.3	69.4	2,421	1,387	0.57	1.30
	1989	1,066.3	72.0	2,063	711	0.34	0.67
	1990	1,351.9	84.2	2,493	762	0.31	0.56
	1991	1,515.8	88.4	2,064	351	0.17	0.23
	1992	1,352.1	77.4	3,114	876	0.28	0.65
	1993	1,606.0	91.3	1,981	268	0.14	0.17
	1994	1,662.8	93.6	1,361	172	0.13	0.10
	1995	1,397.0	82.7	2,259	386	0.17	0.28
	1996	1,596.0	89.5	1,441	203	0.14	0.13
	1997	1,621.9	95.9	1,195	119	0.10	0.07
	1998	1,494.6	88.1	1,249	166.599	0.13	0.11
	1999	1,477.3	86.9	1,463	183.997	0.13	0.12
	2000	1,329.2	79.5	1,977	242.326	0.12	0.18
	2001	1,684.0	95.8	1,082	106.040	0.10	0.06
	2002	1,659.0	91.8	1,581	265.337	0.17	0.16
	2003	1,675.8	93.1	973	99.003	0.10	0.06
	2004	1,759.5	95.0	1,227	106.172	0.09	0.06
	2005	1,560.0	84.5	2,335	475.784	0.20	0.30
	2006	1,739.8	95.0	1,184	143.296	0.12	0.08
	2007	1,769.3	96.0	1,387	105.310	0.08	0.06
	2008	1,614.8	89.7	1,791	196.047	0.11	0.12
	2009	1,733.7	95.5	1,139	102.732	0.09	0.06
	2010	1,716.6	93.7	1,388	99.376	0.07	0.06
	2011	1,621.9	90.5	1,526	116.884	0.08	0.07
	2012	1,764.5	96.2	931	43.908	0.05	0.02
	2013	1,366.6	74.3	1,098	50.041	0.05	0.04
	2014	1,654.6	92.3	1,372	71.561	0.05	0.04
	2015	1,582.0	87.5	1,881	136.727	0.07	0.09
	2016	1,535.7	84.0	1,674	111.105	0.07	0.07
	2017	1,451.4	83.4	1,757	86.504	0.05	0.06
	2018	1,456.8	81.8	1,970	136.374	0.07	0.09
	2019	1,553.8	85.3	1,459	84.085	0.06	0.05
	2020	1,720.4	94.1	1,151	56.708	0.05	0.03
	2021	1,547.5	86.9	1,787	134.669	0.08	0.09
	2022	1,634.7	88.9	1,279	86.621	0.07	0.05
	2023	1,709.8	94.4	1,018	71.024	0.07	0.04
BEAVER VALLEY 1, 2	1977	355.6	57.0	331	87	0.26	0.24
Docket 50-334, 50-412;	1978	304.2	40.8	646	190	0.29	0.62
DPR-66; NPF-73	1979	221.0	40.0	704	132	0.19	0.60
1st commercial operation	1980	39.8	6.8	1,817	553	0.30	13.89
10/76, 11/87	1981	573.4	73.6	1,237	229	0.19	0.40
Type—PWRs	1982	326.7	41.6	1,755	599	0.34	1.83
Capacity—908, 905 MWe	1983	561.2	68.2	1,485	772	0.52	1.38
	1984	576.7	71.8	1,393	504	0.36	0.87
	1985	717.7	91.9	619	60	0.10	0.08
	1986	581.3	70.7	1,575	627	0.40	1.08
	1987	684.1	83.8	1,282	210	0.16	0.31
	1988	1,386.1	87.4	1,764	530	0.30	0.38

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
BEAVER VALLEY 1, 2 (continued)	1989	1,017.4	69.6	2,349	1,378	0.59	1.35
	1990	1,271.0	85.3	1,675	348	0.21	0.27
	1991	1,267.5	78.6	1,689	495	0.29	0.39
	1992	1,441.9	89.1	1,414	289	0.20	0.20
	1993	1,157.9	73.1	2,087	621	0.30	0.54
	1994	1,514.6	88.6	487	44	0.09	0.03
	1995	1,389.2	83.1	1,536	453	0.29	0.33
	1996	1,269.0	76.5	1,688	449	0.27	0.35
	1997	1,159.3	72.1	1,391	306	0.22	0.26
	1998	523.1	33.5	700	59.311	0.08	0.11
	1999	1,353.7	85.9	841	99.461	0.12	0.07
	2000	1,378.7	87.3	1,730	337.867	0.20	0.25
	2001	1,500.8	92.3	1,202	184.361	0.15	0.12
	2002	1,548.0	95.4	1,048	90.479	0.09	0.06
	2003	1,437.0	88.4	1,623	277.168	0.17	0.19
	2004	1,593.1	96.3	1,270	156.509	0.12	0.10
	2005	1,590.4	96.7	978	79.055	0.08	0.05
	2006	1,385.6	84.0	2,174	370.146	0.17	0.27
	2007	1,664.1	96.0	955	86.595	0.09	0.05
	2008	1,670.2	94.4	991	83.394	0.08	0.05
	2009	1,599.3	89.6	1,504	224.516	0.15	0.14
	2010	1,714.2	95.6	750	49.983	0.07	0.03
	2011	1,705.5	95.1	831	72.206	0.09	0.04
	2012	1,622.6	90.4	1,272	125.166	0.10	0.08
	2013	1,687.4	93.3	746	41.712	0.06	0.02
	2014	1,684.6	92.5	907	62.951	0.07	0.04
	2015	1,659.6	91.1	1,115	95.208	0.09	0.06
	2016	1,737.4	94.8	687	44.146	0.06	0.03
	2017	1,747.9	95.5	776	53.706	0.07	0.03
	2018	1,672.8	93.0	985	74.802	0.08	0.04
	2019	1,764.4	96.9	461	25.416	0.06	0.01
	2020	1,757.2	96.7	570	38.612	0.07	0.02
	2021	1,641.6	90.6	883	93.727	0.11	0.06
	2022	1,683.8	92.7	498	30.145	0.06	0.02
	2023	1,713.8	94.3	534	67.344	0.13	0.04
BIG ROCK POINT[1] Docket 50-155; DPR-6 1st commercial operation 3/63 Type—BWR Capacity—(67) MWe	1969	48.1	---	165	136	0.82	2.83
	1970	43.5	---	290	194	0.67	4.46
	1971	44.4	---	260	184	0.71	4.14
	1972	43.5	---	195	181	0.93	4.16
	1973	50.9	---	241	285	1.18	5.60
	1974	40.7	70.3	281	276	0.98	6.78
	1975	35.1	59.8	300	180	0.60	5.13
	1976	29.5	50.1	488	289	0.59	9.80
	1977	43.6	73.4	465	334	0.72	7.66
	1978	48.5	77.9	285	175	0.61	3.61
	1979	13.0	23.5	623	455	0.73	35.00
	1980	48.9	79.0	599	354	0.59	7.24
	1981	56.9	90.6	479	160	0.33	2.81
	1982	43.6	70.8	521	328	0.63	7.52
	1983	42.3	71.0	493	263	0.53	6.22
	1984	50.3	78.6	297	155	0.52	3.08
	1985	43.8	73.5	435	291	0.67	6.64
	1986	61.0	95.5	202	84	0.42	1.38
	1987	45.3	71.0	251	222	0.88	4.90
	1988	46.1	72.8	303	170	0.56	3.69
	1989	50.2	79.0	418	177	0.42	3.53
	1990	51.3	77.2	351	232	0.66	4.52
	1991	59.1	85.2	435	226	0.52	3.82
	1992	32.7	54.5	496	277	0.56	8.47
	1993	51.2	79.4	419	152	0.36	2.97
	1994	49.5	75.3	310	119	0.38	2.40
	1995	62.2	95.0	205	54	0.26	0.87

[1] Big Rock Point ceased operations in August 1997 and is no longer included in the count of operating reactors. Parentheses indicate plant capacity when the plant was operational.

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
BIG ROCK POINT[1]	1996	41.5	76.5	1,688	449	0.27	0.35
(continued)	1997	22.4	54.1	258	55	0.21	2.46
	1998	---	---	432	104.130	0.24	---
	1999	---	---	285	86.577	0.30	---
	2000	---	---	226	89.271	0.40	---
	2001	---	---	167	47.556	0.28	---
	2002	---	---	170	43.538	0.26	---
	2003	---	---	336	121.045	0.36	---
	2004	---	---	227	57.599	0.25	---
	2005	---	---	223	20.227	0.09	---
	2006	---	---	27	0.382	0.01	---
	2007	---	---	---	---	---	---
	2008	---	---	---	---	---	---
	2009	---	---	---	---	---	---
BRAIDWOOD 1, 2	1989	1,381.8	75.4	1,460	296	0.20	0.21
Docket 50-456, 50-457;	1990	1,740.2	84.1	1,081	186	0.17	0.11
NPF-72, NPF-77	1991	1,377.2	68.9	1,641	550	0.34	0.40
1st commercial operation	1992	1,885.9	89.0	1,059	228	0.22	0.12
7/88, 10/88	1993	1,899.3	86.9	1,043	273	0.26	0.14
Type—PWRs	1994	1,666.1	77.2	1,237	298	0.24	0.18
Capacity—1,166, 1,144 MWe	1995	1,914.7	85.4	1,134	236	0.21	0.12
	1996	1,854.9	82.1	1,356	334	0.25	0.18
	1997	1,863.3	85.4	1,693	321	0.19	0.17
	1998	1,979.1	88.9	1,869	259.236	0.14	0.13
	1999	2,161.6	95.8	1,153	145.976	0.13	0.07
	2000	2,142.8	94.9	1,562	194.126	0.12	0.09
	2001	2,186.4	95.8	881	100.570	0.11	0.05
	2002	2,284.0	96.8	975	90.716	0.09	0.04
	2003	2,279.9	95.6	1,572	244.860	0.16	0.11
	2004	2,277.8	97.3	986	94.942	0.10	0.04
	2005	2,253.7	96.6	926	88.084	0.10	0.04
	2006	2,234.1	95.0	1,624	199.168	0.12	0.09
	2007	2,244.0	96.0	1,258	98.040	0.08	0.04
	2008	2,252.5	96.3	1,235	103.180	0.08	0.05
	2009	2,195.0	93.8	1,397	142.066	0.10	0.06
	2010	2,111.9	94.0	870	63.856	0.07	0.03
	2011	2,257.5	96.8	1,071	70.165	0.07	0.03
	2012	2,141.0	92.1	1,818	167.655	0.09	0.08
	2013	2,244.2	96.2	633	31.847	0.05	0.01
	2014	2,313.9	97.3	866	42.493	0.05	0.02
	2015	2,250.0	94.9	986	52.468	0.05	0.02
	2016	2,265.9	96.0	733	39.695	0.05	0.02
	2017	2,281.4	96.4	1,052	78.668	0.07	0.03
	2018	2,201.3	93.8	926	61.100	0.07	0.03
	2019	2,311.8	97.9	532	19.553	0.04	0.01
	2020	2,325.5	97.9	626	29.324	0.05	0.01
	2021	2,223.1	94.9	1,137	82.673	0.07	0.04
	2022	2,300.9	97.7	670	33.376	0.05	0.01
	2023	2,296.1	97.5	947	52.194	0.06	0.02
BROWNS FERRY 1,[2] **2, 3**	1975	161.7	17.8	2,743	347	0.13	2.15
Docket 50-259, 50-260, 50-296;	1976	337.6	26.9	2,530	232	0.09	0.69
DPR-33, DPR-52, DPR-68	1977	1,327.5	73.7	1,985	876	0.44	0.66
1st commercial operation	1978	1,992.1	73.5	2,479	1,776	0.72	0.89
8/74, 3/75, 3/77	1979	2,393.0	79.1	2,869	1,593	0.56	0.67
Type—BWRs	1980	2,182.1	73.6	2,838	1,768	0.62	0.81
Capacity—1,227, 1,208,	1981	2,132.9	69.5	3,497	2,398	0.69	1.12
1,227 MWe	1982	2,025.4	67.6	3,360	2,230	0.66	1.10
	1983	1,641.0	54.3	3,410	3,375	0.99	2.06
	1984	1,431.9	54.2	3,172	1,954	0.62	1.36
	1985	368.2	11.9	2,854	1,164	0.41	3.16

[1] Big Rock Point ceased operations in August 1997 and is no longer included in the count of operating reactors. Parentheses indicate plant capacity when the plant was operational.

[2] All three Browns Ferry units were placed on administrative hold in 1985. Units 2 and 3 were restarted in 1991 and 1995, respectively. Browns Ferry Unit 1 was restarted during 2007.

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
BROWNS FERRY 1,[2] 2, 3 (continued)	1986	---	---	3,074	1,054	0.34	---
	1987	---	---	3,184	1,186	0.37	---
	1988	---	---	3,390	1,158	0.34	---
	1989	---	---	2,707	657	0.24	---
	1990	---	---	2,725	1,311	0.48	---
	1991	445.0	17.7	1,831	356	0.19	0.80
	1992	979.9	32.2	2,670	519	0.19	0.53
	1993	675.1	66.8	3,594	870	0.24	1.29
	1994	860.2	83.4	3,362	861	0.26	1.00
	1995	1,165.8	98.6	2,567	413	0.16	0.35
	1996	1,972.8	93.0	1,904	389	0.20	0.20
	1997	1,928.8	90.2	2,268	522	0.23	0.27
	1998	1,961.9	87.7	1,612	367.716	0.23	0.19
	1999	2,091.0	85.1	1,741	446.941	0.26	0.21
	2000	2,143.8	97.1	1,657	333.215	0.20	0.16
	2001	2,074.0	90.7	1,525	293.879	0.19	0.14
	2002	2,069.0	95.4	1,977	357.573	0.18	0.17
	2003	2,014.5	93.6	2,608	602.535	0.23	0.30
	2004	2,104.7	95.5	3,242	672.714	0.21	0.32
	2005	2,044.2	94.3	3,743	636.282	0.17	0.31
	2006	2,040.1	94.0	3,618	641.154	0.18	0.31
	2007	2,420.2	90.0	3,027	554.314	0.18	0.23
	2008	2,837.4	88.5	2,633	482.127	0.18	0.17
	2009	2,933.1	91.2	2,188	348.257	0.16	0.12
	2010	2,828.0	92.3	2,825	556.749	0.20	0.20
	2011	2,845.8	87.9	2,079	296.642	0.14	0.10
	2012	2,969.2	91.2	3,139	464.325	0.15	0.16
	2013	3,050.0	93.5	2,543	382.609	0.15	0.13
	2014	3,052.3	94.0	2,401	389.854	0.16	0.13
	2015	3,158.6	96.4	2,282	288.063	0.13	0.09
	2016	2,992.6	93.3	3,077	404.585	0.13	0.14
	2017	3,179.0	96.9	2,819	350.062	0.12	0.11
	2018	2,930.8	90.5	3,389	498.650	0.15	0.17
	2019	3,381.3	93.8	2,617	362.997	0.14	0.11
	2020	3,284.8	91.8	2,729	324.007	0.12	0.10
	2021	3,544.9	95.1	2,852	310.720	0.11	0.09
	2022	3,347.7	92.8	2,491	261.523	0.10	0.08
	2023	3,518.9	96.0	2,170	219.547	0.10	0.06
BRUNSWICK 1, 2 Docket 50-324, 50-325; DPR-62, DPR-71 1st commercial operation 3/77, 11/75 Type—BWRs Capacity—938, 932 MWe	1976	297.2	56.0	1,265	326	0.26	1.10
	1977	291.1	55.7	1,512	1,120	0.74	3.85
	1978	1,173.1	83.7	1,458	1,004	0.69	0.86
	1979	810.0	60.1	2,891	2,602	0.90	3.21
	1980	687.2	52.2	3,788	3,870	1.02	5.63
	1981	925.2	56.9	3,854	2,638	0.68	2.85
	1982	540.3	50.3	4,957	3,792	0.76	7.02
	1983	636.7	44.3	5,602	3,475	0.62	5.46
	1984	761.3	51.5	5,046	3,260	0.65	4.28
	1985	822.2	58.4	4,057	2,804	0.69	3.41
	1986	1,051.3	69.1	3,370	1,909	0.57	1.82
	1987	1,152.4	80.6	3,052	1,419	0.46	1.23
	1988	990.8	70.1	2,648	1,747	0.66	1.76
	1989	990.9	65.8	3,844	1,786	0.46	1.80
	1990	991.6	67.8	3,182	1,548	0.49	1.56
	1991	952.8	64.5	2,586	778	0.30	0.82
	1992	375.9	27.9	2,690	623	0.23	1.66
	1993	470.0	33.8	2,921	872	0.30	1.86
	1994	1,268.4	83.0	3,049	999	0.33	0.79
	1995	1,411.7	92.9	2,657	683	0.26	0.48
	1996	1,261.1	85.9	2,784	716	0.26	0.57
	1997	1,474.0	94.1	2,212	411	0.19	0.28
	1998	1,521.0	94.3	2,005	395.526	0.20	0.26

[2] All three Browns Ferry units were placed on administrative hold in 1985. Units 2 and 3 were restarted in 1991 and 1995, respectively. Browns Ferry Unit 1 was restarted during 2007.

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
BRUNSWICK 1, 2 (continued)	1999	1,494.7	92.8	1,818	418.417	0.23	0.28
	2000	1,571.2	95.6	1,648	321.785	0.20	0.20
	2001	1,576.0	95.8	1,623	302.812	0.19	0.19
	2002	1,568.0	94.5	1,743	275.534	0.16	0.18
	2003	1,676.9	95.6	1,794	248.622	0.14	0.15
	2004	1,690.6	94.5	2,140	244.577	0.11	0.14
	2005	1,654.9	92.2	1,944	305.978	0.16	0.18
	2006	1,661.2	90.0	2,103	280.465	0.13	0.17
	2007	1,714.9	92.0	2,186	290.093	0.13	0.17
	2008	1,694.5	91.7	2,546	354.212	0.14	0.21
	2009	1,647.9	89.6	2,683	350.347	0.13	0.21
	2010	1,690.7	91.3	3,227	407.424	0.13	0.24
	2011	1,662.7	90.5	2,778	381.057	0.14	0.23
	2012	1,629.3	89.4	3,368	369.873	0.11	0.23
	2013	1,650.6	89.9	3,978	361.148	0.09	0.22
	2014	1,750.6	94.5	3,498	261.897	0.07	0.15
	2015	1,745.6	93.7	2,660	230.570	0.09	0.13
	2016	1,756.7	95.7	1,756	167.236	0.10	0.10
	2017	1,754.6	96.0	1,748	216.013	0.12	0.12
	2018	1,669.7	93.2	1,543	183.275	0.12	0.11
	2019	1,680.0	91.5	1,673	222.735	0.13	0.13
	2020	1,713.0	93.0	1,471	159.738	0.11	0.09
	2021	1,765.9	94.5	1,396	178.105	0.13	0.10
	2022	1,756.5	95.3	1,441	187.807	0.13	0.11
	2023	1,787.5	96.0	1,558	263.343	0.17	0.15
BYRON 1, 2 Docket 50-454, 50-455; NPF-37, NPF-66 1st commercial operation 9/85, 8/87 Type—PWRs Capacity—1,157, 1,127 MWe	1986	894.5	88.6	1,081	76	0.07	0.08
	1987	650.9	70.9	1,826	769	0.42	1.18
	1988	1,534.7	86.3	1,222	459	0.38	0.30
	1989	1,812.6	90.2	1,109	172	0.16	0.09
	1990	1,567.3	78.8	1,396	434	0.31	0.28
	1991	1,816.3	89.9	1,077	268	0.25	0.15
	1992	1,888.4	90.1	1,021	199	0.19	0.11
	1993	1,785.6	83.5	1,370	432	0.32	0.24
	1994	1,953.3	90.7	962	280	0.29	0.14
	1995	1,900.6	85.5	1,107	306	0.28	0.16
	1996	1,758.4	79.3	1,610	455	0.28	0.26
	1997	1,856.7	86.6	1,546	241	0.16	0.13
	1998	1,869.8	85.9	1,809	275.221	0.15	0.15
	1999	2,064.2	92.3	1,478	239.102	0.16	0.12
	2000	2,196.9	97.4	959	193.871	0.20	0.09
	2001	2,301.5	97.8	719	59.451	0.08	0.03
	2002	2,205.0	93.8	1,287	195.013	0.15	0.09
	2003	2,294.8	97.2	824	87.129	0.11	0.04
	2004	2,277.4	97.7	906	89.147	0.10	0.04
	2005	2,175.6	94.2	1,542	199.812	0.13	0.09
	2006	2,223.3	95.0	1,163	134.497	0.12	0.06
	2007	2,152.1	93.0	1,311	128.797	0.10	0.06
	2008	2,203.7	94.6	1,483	140.809	0.09	0.06
	2009	2,250.9	96.7	985	83.443	0.08	0.04
	2010	2,266.6	97.4	922	56.425	0.06	0.02
	2011	2,077.9	91.0	1,849	244.104	0.13	0.12
	2012	2,085.4	94.6	924	50.973	0.06	0.02
	2013	2,231.4	96.8	1,002	57.708	0.06	0.03
	2014	2,197.8	94.2	1,184	80.774	0.07	0.04
	2015	2,222.8	96.8	878	42.935	0.05	0.02
	2016	2,237.5	96.0	884	54.012	0.06	0.02
	2017	2,186.4	93.7	1,280	87.846	0.07	0.04
	2018	2,288.9	97.9	615	25.155	0.04	0.01
	2019	2,296.6	97.9	693	36.322	0.05	0.02
	2020	2,228.9	95.7	972	54.661	0.06	0.02
	2021	2,279.6	97.6	509	21.402	0.04	0.01
	2022	2,253.6	96.8	865	51.43	0.06	0.02
	2023	2,222.1	95.2	943	56.179	0.06	0.03

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
CALLAWAY 1	1985	967.4	90.0	964	36	0.04	0.04
Docket 50-483;	1986	865.2	81.3	1,052	225	0.21	0.26
NPF-30	1987	759.0	71.1	1,082	393	0.36	0.52
1st commercial operation 12/84	1988	1,069.2	93.4	353	27	0.08	0.03
Type—PWR	1989	1,000.3	85.4	1,055	283	0.27	0.28
Capacity—1,190 MWe	1990	960.7	84.1	1,134	442	0.39	0.46
	1991	1,193.1	99.7	280	21	0.08	0.02
	1992	967.5	83.0	1,133	336	0.30	0.35
	1993	1,002.9	86.4	1,126	225	0.20	0.22
	1994	1,196.4	100.0	191	14	0.07	0.01
	1995	989.6	84.7	1,062	187	0.18	0.19
	1996	1,066.0	90.5	980	248	0.25	0.23
	1997	1,022.2	100.0	248	12	0.05	0.01
	1998	972.2	91.3	929	200.729	0.22	0.21
	1999	981.3	88.7	1,098	320.554	0.29	0.33
	2000	1,137.5	99.8	244	16.058	0.07	0.01
	2001	954.5	86.7	873	106.782	0.12	0.11
	2002	955.0	86.2	983	95.648	0.10	0.10
	2003	1,104.3	96.2	252	8.297	0.03	0.01
	2004	892.8	78.9	1,124	120.621	0.11	0.14
	2005	913.2	80.7	1,600	222.629	0.14	0.24
	2006	1,152.8	95.0	225	6.308	0.03	0.01
	2007	1,069.7	89.0	1,079	73.236	0.07	0.07
	2008	1,067.6	89.8	729	45.738	0.06	0.04
	2009	1,170.3	97.6	164	4.821	0.03	---
	2010	1,029.9	84.8	800	58.735	0.07	0.06
	2011	1,071.7	88.9	838	80.215	0.10	0.07
	2012	1,220.2	100.0	169	4.525	0.03	---
	2013	959.9	80.9	680	43.123	0.06	0.04
	2014	1,061.3	88.0	649	37.173	0.06	0.04
	2015	1,192.2	99.1	96	3.128	0.03	---
	2016	1,078.3	89.8	641	46.770	0.07	0.04
	2017	951.9	80.3	507	23.713	0.05	0.02
	2018	1,216.6	100.0	84	3.211	0.04	---
	2019	1,053.4	87.3	436	37.630	0.09	0.04
	2020	890.4	74.5	388	20.082	0.05	0.02
	2021	493.8	41.5	77	3.32	0.04	0.01
	2022	1,013.9	84.2	554	38.17	0.07	0.04
	2023	1,049.7	87.2	383	18.353	0.05	0.02
CALVERT CLIFFS 1, 2	1976	753.4	95.2	507	74	0.15	0.10
Docket 50-317, 50-318;	1977	583.0	72.1	2,265	547	0.24	0.94
DPR-53, DPR-69	1978	1,188.5	75.8	1,391	500	0.36	0.42
1st commercial operation	1979	1,161.0	74.0	1,428	805	0.56	0.69
5/75, 4/77	1980	1,309.9	84.1	1,496	677	0.45	0.52
Type—PWRs	1981	1,379.7	83.1	1,555	607	0.39	0.44
Capacity—877, 855 MWe	1982	1,238.3	73.7	1,805	1,057	0.59	0.85
	1983	1,397.2	81.6	1,915	668	0.35	0.48
	1984	1,389.4	79.3	1,369	479	0.35	0.34
	1985	1,189.8	68.4	1,598	694	0.43	0.58
	1986	1,530.0	87.2	1,296	347	0.27	0.23
	1987	1,207.3	71.8	1,384	412	0.30	0.34
	1988	1,397.7	81.0	1,296	291	0.22	0.21
	1989	333.6	20.1	1,786	346	0.19	1.04
	1990	161.1	11.0	2,019	304	0.15	1.89
	1991	1,085.0	64.7	1,974	132	0.07	0.12
	1992	1,271.2	73.9	1,979	330	0.17	0.26
	1993	1,462.1	83.9	1,462	405	0.28	0.28
	1994	1,342.1	79.4	1,482	454	0.31	0.34
	1995	1,542.8	89.9	1,203	235	0.20	0.15
	1996	1,438.5	82.4	1,167	239	0.20	0.17
	1997	1,499.6	89.1	1,091	229	0.21	0.15
	1998	1,523.1	89.3	1,042	186.887	0.18	0.12
	1999	1,521.4	90.1	1,134	191.778	0.17	0.13
	2000	1,575.7	92.7	912	134.689	0.15	0.09

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
CALVERT CLIFFS 1, 2 (continued)	2001	1,554.7	91.7	895	166.864	0.19	0.11
	2002	1,380.0	81.7	1,582	245.075	0.16	0.18
	2003	1,558.4	90.9	1,671	265.164	0.16	0.17
	2004	1,653.7	95.7	1,205	143.944	0.12	0.09
	2005	1,678.1	97.2	942	168.390	0.18	0.10
	2006	1,581.8	92.0	1,215	203.790	0.17	0.13
	2007	1,641.6	95.0	1,191	153.335	0.13	0.09
	2008	1,670.7	97.4	745	74.149	0.10	0.04
	2009	1,660.9	96.6	891	95.756	0.11	0.06
	2010	1,597.3	93.5	834	128.581	0.15	0.08
	2011	1,635.9	95.7	703	95.233	0.14	0.06
	2012	1,545.6	89.9	725	115.525	0.16	0.07
	2013	1,632.6	94.0	580	61.079	0.11	0.04
	2014	1,638.3	94.9	586	62.065	0.11	0.04
	2015	1,672.4	95.6	583	45.624	0.08	0.03
	2016	1,685.6	96.3	904	85.891	0.10	0.05
	2017	1,725.0	97.2	686	49.283	0.07	0.03
	2018	1,711.0	96.5	875	56.494	0.06	0.03
	2019	1,713.8	96.5	837	59.246	0.07	0.03
	2020	1,721.4	96.7	716	54.514	0.08	0.03
	2021	1,715.4	96.8	751	40.841	0.05	0.02
	2022	1,688.6	96.3	755	55.969	0.07	0.03
	2023	1,710.5	96.9	707	52.076	0.07	0.03
CATAWBA 1, 2 Docket 50-413, 50-414; NPF-35, NPF-52 1st commercial operation 6/85, 8/86 Type—PWRs Capacity—1,160, 1,150 MWe	1986	638.9	49.9	1,724	286	0.17	0.45
	1987	1,651.2	75.9	1,865	449	0.24	0.27
	1988	1,675.2	77.2	2,009	556	0.28	0.33
	1989	1,733.6	79.5	1,660	334	0.20	0.19
	1990	1,616.3	70.8	2,174	809	0.37	0.50
	1991	1,691.5	74.6	1,871	462	0.25	0.27
	1992	1,962.8	83.9	1,515	414	0.27	0.21
	1993	1,896.1	81.5	1,564	396	0.25	0.21
	1994	2,105.2	90.2	1,268	207	0.16	0.10
	1995	2,011.9	85.3	1,892	462	0.24	0.23
	1996	1,879.1	80.5	1,588	302	0.19	0.16
	1997	2,028.2	89.3	1,561	266	0.17	0.13
	1998	2,006.4	89.6	1,123	162.068	0.14	0.08
	1999	2,046.7	90.2	1,024	118.662	0.12	0.06
	2000	2,038.3	90.3	1,185	186.532	0.16	0.09
	2001	2,119.9	92.9	960	116.241	0.12	0.05
	2002	2,238.0	97.2	884	81.325	0.09	0.04
	2003	1,991.8	89.2	1,409	210.617	0.15	0.11
	2004	2,111.4	93.0	1,123	122.831	0.11	0.06
	2005	2,194.5	96.0	1,019	83.679	0.08	0.04
	2006	1,928.6	85.0	1,792	212.570	0.12	0.11
	2007	2,102.5	92.0	1,399	144.218	0.10	0.07
	2008	2,160.3	93.5	1,110	85.080	0.08	0.04
	2009	2,044.8	89.1	1,385	169.409	0.12	0.08
	2010	2,164.8	94.8	1,045	97.010	0.09	0.04
	2011	2,144.2	93.9	961	52.321	0.05	0.02
	2012	2,029.7	88.8	1,157	94.734	0.08	0.05
	2013	2,187.9	95.5	1,053	82.906	0.08	0.04
	2014	2,136.0	93.3	996	50.777	0.05	0.02
	2015	2,098.6	92.2	1,299	97.678	0.08	0.05
	2016	2,232.7	96.1	1,000	77.097	0.08	0.03
	2017	2,249.6	96.8	642	32.236	0.05	0.01
	2018	2,143.8	93.0	1,211	87.302	0.07	0.04
	2019	2,236.7	96.7	886	68.370	0.08	0.03
	2020	2,209.7	95.6	742	38.669	0.05	0.02
	2021	2,122.2	92.6	1,037	112.875	0.11	0.05
	2022	2,164.7	93.5	792	89.874	0.11	0.04
	2023	2,187.8	94.7	742	54.066	0.07	0.02

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
CLINTON	1988	701.3	84.2	769	130	0.17	0.19
Docket 50-461;	1989	348.3	48.5	1,196	372	0.31	1.07
NPF-62	1990	435.8	55.1	1,390	553	0.40	1.27
1st commercial operation 11/87	1991	722.7	80.8	1,010	233	0.23	0.32
Type—BWR	1992	589.7	68.6	1,195	431	0.36	0.73
Capacity—1,022 MWe	1993	701.5	79.6	1,253	498	0.40	0.71
	1994	883.3	94.8	409	63	0.15	0.07
	1995	731.1	83.0	1,182	316	0.27	0.43
	1996	634.7	66.7	1,154	350	0.30	0.55
	1997	---	---	738	172	0.23	---
	1998	---	---	866	144.140	0.17	---
	1999	537.0	63.5	637	87.489	0.14	0.16
	2000	784.2	87.8	1,248	253.382	0.20	0.32
	2001	896.8	98.5	329	33.770	0.10	0.04
	2002	872.0	90.5	1,418	208.094	0.15	0.24
	2003	990.5	99.1	372	57.118	0.15	0.06
	2004	910.8	92.6	1,622	282.833	0.17	0.31
	2005	989.1	97.4	298	36.019	0.12	0.04
	2006	939.9	92.0	1,649	295.720	0.18	0.32
	2007	1,049.2	100.0	310	30.618	0.10	0.03
	2008	973.0	93.3	1,381	205.086	0.15	0.21
	2009	1,014.6	96.6	435	48.009	0.11	0.05
	2010	983.1	93.5	1,540	219.954	0.14	0.22
	2011	989.9	94.4	1,683	228.447	0.14	0.23
	2012	1,067.1	100.0	215	14.250	0.07	0.01
	2013	950.2	91.9	1,182	128.781	0.11	0.14
	2014	1,038.6	98.8	186	17.866	0.10	0.02
	2015	922.9	94.1	1,197	97.634	0.08	0.11
	2016	1,017.8	97.2	480	33.218	0.07	0.03
	2017	954.1	91.9	1,341	154.579	0.12	0.16
	2018	958.7	92.3	1,137	77.813	0.07	0.08
	2019	957.6	91.2	1,372	158.832	0.12	0.17
	2020	1,080.2	100	201	13.216	0.07	0.01
	2021	959.0	92.0	1,011	108.836	0.11	0.11
	2022	1,053.0	99.2	354	27.805	0.08	0.03
	2023	919.0	88.5	1,351	160.062	0.12	0.17
COLUMBIA GENERATING[3]	1985	616.0	87.6	755	119	0.16	0.19
Docket 50-397;	1986	616.0	74.4	1,013	222	0.22	0.36
NPF-21	1987	639.0	70.8	1,201	406	0.34	0.64
1st commercial operation 12/84	1988	707.7	71.8	1,050	353	0.34	0.50
Type—BWR	1989	727.2	78.3	1,299	492	0.38	0.68
Capacity—1,131 MWe	1990	684.7	67.5	1,348	536	0.40	0.78
	1991	508.5	50.3	1,088	387	0.36	0.76
	1992	682.3	65.6	1,489	612	0.41	0.90
	1993	849.6	79.5	1,385	469	0.34	0.55
	1994	803.8	75.2	1,870	866	0.46	1.08
	1995	824.7	83.8	1,694	456	0.27	0.55
	1996	662.9	82.2	1,453	373	0.26	0.56
	1997	697.0	72.7	1,218	251	0.21	0.36
	1998	789.5	75.3	1,220	286.020	0.23	0.36
	1999	694.7	70.0	1,022	155.109	0.15	0.22
	2000	979.6	96.3	706	53.152	0.08	0.05
	2001	939.3	88.1	1,515	226.675	0.15	0.24
	2002	1,023.0	97.5	647	46.650	0.07	0.05
	2003	866.9	81.8	1,618	205.225	0.13	0.24
	2004	1,022.5	94.6	716	66.130	0.09	0.06
	2005	938.3	87.3	1,718	325.025	0.19	0.35
	2006	1,064.9	98.0	623	55.817	0.09	0.05
	2007	925.6	87.0	2,147	306.443	0.14	0.33
	2008	1,055.3	98.3	715	54.957	0.08	0.05
	2009	757.2	76.3	1,958	305.163	0.16	0.40
	2010	1,054.9	100.0	733	54.712	0.07	0.05
	2011	548.7	54.4	2,309	335.657	0.15	0.61

[3] Energy Northwest changed the name of Washington Nuclear 2 to Columbia Generating Station in 2001.

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
COLUMBIA GENERATING[3] (continued)	2012	1,062.6	97.6	1,155	45.462	0.04	0.04
	2013	965.9	88.4	1,787	223.809	0.13	0.23
	2014	1,084.2	100.0	775	33.771	0.04	0.03
	2015	931.6	87.0	2,088	289.135	0.14	0.31
	2016	1,098.8	97.8	586	26.825	0.05	0.02
	2017	927.9	87.7	1,724	180.255	0.10	0.19
	2018	1,108.3	98.6	494	43.078	0.09	0.04
	2019	1,012.2	89.7	1,389	190.694	0.14	0.19
	2020	1,075.7	100.0	250	18.453	0.07	0.02
	2021	971.6	87.6	1,573	312.807	0.20	0.32
	2022	1,124.6	100.0	623	28.862	0.05	0.03
	2023	959.8	88.4	1,417	223.459	0.16	0.23
COMANCHE PEAK 1, 2 Docket 50-445, 50-446; NPF-87, NPF-89 1st commercial operation 8/90, 8/93 Type—PWR Capacity—1,205, 1,195 MWe	1991	644.4	82.2	985	148	0.15	0.23
	1992	830.8	84.0	1,128	188	0.17	0.23
	1993	853.8	81.2	945	109	0.12	0.13
	1994	1,750.0	93.7	970	90	0.09	0.05
	1995	2,022.6	92.5	951	179	0.19	0.09
	1996	1,804.8	81.4	1,462	288	0.20	0.16
	1997	2,002.4	93.4	870	146	0.17	0.07
	1998	2,037.8	94.9	967	232.026	0.24	0.11
	1999	1,981.5	90.9	1,316	251.276	0.19	0.13
	2000	2,104.7	95.3	759	77.679	0.10	0.04
	2001	2,085.9	94.7	853	114.968	0.13	0.06
	2002	1,887.0	86.9	1,106	225.317	0.20	0.12
	2003	2,020.6	91.6	639	66.313	0.10	0.03
	2004	2,169.5	95.1	864	135.388	0.16	0.06
	2005	2,099.6	91.5	1,365	242.481	0.18	0.12
	2006	2,271.3	97.0	686	59.959	0.09	0.03
	2007	2,151.3	93.0	1,616	219.799	0.14	0.10
	2008	2,189.7	94.3	1,037	168.836	0.16	0.08
	2009	2,299.3	96.7	938	51.420	0.05	0.02
	2010	2,316.8	96.3	1,037	70.807	0.07	0.03
	2011	2,216.8	92.6	1,580	154.716	0.10	0.07
	2012	2,279.9	94.6	1,001	66.742	0.07	0.03
	2013	2,353.5	96.8	745	45.237	0.06	0.02
	2014	2,141.7	88.6	1,123	139.246	0.12	0.07
	2015	2,294.6	94.7	641	42.889	0.07	0.02
	2016	2,340.7	96.0	624	36.648	0.06	0.02
	2017	1,947.3	81.5	1,052	120.996	0.12	0.06
	2018	2,346.3	96.5	554	41.677	0.08	0.02
	2019	2,219.0	93.0	790	58.051	0.07	0.03
	2020	2,240.3	93.0	651	45.754	0.07	0.02
	2021	2,230.6	92.7	786	139.957	0.18	0.06
	2022	2,263.1	94.5	620	37.516	0.06	0.02
	2023	2,172.4	91.5	734	75.828	0.10	0.03
COOK 1, 2 Docket 50-315, 50-316; DPR-58, DPR-74 1st commercial operation 8/75, 7/78 Type—PWRs Capacity—1,048, 1,184 MWe	1976	807.4	83.1	395	116	0.29	0.14
	1977	573.0	76.1	802	300	0.37	0.52
	1978	744.8	73.6	778	336	0.43	0.45
	1979	1,373.0	65.3	1,445	718	0.50	0.52
	1980	1,552.4	74.1	1,345	493	0.37	0.32
	1981	1,557.3	73.4	1,341	656	0.49	0.42
	1982	1,461.6	69.8	1,527	699	0.46	0.48
	1983	1,456.5	71.2	1,418	658	0.46	0.45
	1984	1,526.0	75.3	1,559	762	0.49	0.50
	1985	925.4	47.6	1,984	945	0.48	1.02
	1986	1,307.1	73.4	1,774	745	0.42	0.57
	1987	1,199.5	70.2	1,696	666	0.39	0.56
	1988	1,160.4	63.5	2,266	867	0.38	0.75
	1989	1,433.1	72.8	1,575	493	0.31	0.34
	1990	1,318.5	67.9	1,851	580	0.31	0.44
	1991	1,837.4	90.2	815	69	0.08	0.04
	1992	760.9	50.8	1,954	492	0.25	0.65
	1993	1,927.7	98.5	587	44	0.07	0.02

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Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
COOK 1, 2 (continued)	1994	1,105.2	65.2	1,748	479	0.27	0.43
	1995	1,656.0	82.1	1,310	203	0.15	0.12
	1996	1,938.9	92.7	1,114	214	0.19	0.11
	1997	1,189.7	59.7	1,864	550	0.30	0.46
	1998	---	---	1,155	104.638	0.09	---
	1999	---	---	1,662	171.479	0.10	---
	2000	560.1	28.1	2,506	337.584	0.13	0.60
	2001	1,794.3	89.2	423	27.290	0.06	0.02
	2002	1,756.0	87.3	1,624	278.001	0.17	0.16
	2003	1,557.6	75.7	1,408	209.526	0.15	0.13
	2004	1,909.2	91.4	1,015	156.213	0.15	0.08
	2005	1,989.0	95.0	852	91.192	0.11	0.05
	2006	1,790.5	86.0	1,780	312.214	0.18	0.17
	2007	1,983.7	93.0	1,310	238.829	0.18	0.12
	2008	1,711.8	80.8	971	76.460	0.08	0.04
	2009	950.5	45.3	693	40.007	0.06	0.04
	2010	1,786.1	86.7	1,116	83.276	0.07	0.05
	2011	1,981.5	94.2	842	57.169	0.07	0.03
	2012	2,017.5	94.7	754	49.112	0.07	0.02
	2013	1,858.5	87.1	1,187	103.772	0.09	0.06
	2014	2,012.7	94.3	727	53.798	0.07	0.03
	2015	1,885.7	87.4	626	29.827	0.05	0.02
	2016	1,753.5	82.3	1,123	93.715	0.08	0.05
	2017	2,008.2	89.7	830	57.999	0.07	0.03
	2018	2,010.4	90.5	825	40.511	0.05	0.02
	2019	1,844.7	84.4	1,071	82.888	0.08	0.04
	2020	2,085.5	94.2	494	29.391	0.06	0.01
	2021	2,050.3	92.9	541	34.791	0.06	0.02
	2022	1,897.8	86.1	1,077	120.343	0.11	0.06
	2023	2,128.1	95.8	626	29.717	0.05	0.01
COOPER STATION Docket 50-298; DPR-46 1st commercial operation 7/74 Type—BWR Capacity—765 MWe	1975	456.4	83.6	579	117	0.20	0.26
	1976	433.3	75.5	763	350	0.46	0.81
	1977	538.2	86.2	315	198	0.63	0.37
	1978	576.0	91.0	297	158	0.53	0.27
	1979	591.0	87.6	426	221	0.52	0.37
	1980	448.3	71.2	785	859	1.09	1.92
	1981	457.1	71.2	935	579	0.62	1.27
	1982	622.3	84.6	743	542	0.73	0.87
	1983	396.6	63.3	1,383	1,293	0.93	3.26
	1984	411.9	67.2	1,598	799	0.50	1.94
	1985	127.3	21.5	1,980	1,333	0.67	10.47
	1986	480.0	74.7	895	320	0.36	0.67
	1987	652.3	96.2	549	103	0.19	0.16
	1988	493.4	67.9	942	251	0.27	0.51
	1989	564.3	76.2	1,202	343	0.29	0.61
	1990	602.0	79.4	1,174	379	0.32	0.63
	1991	566.3	78.8	1,099	405	0.37	0.72
	1992	731.0	96.4	463	84	0.18	0.11
	1993	436.1	58.8	1,130	391	0.35	0.90
	1994	262.2	35.1	333	79	0.24	0.30
	1995	486.5	66.8	1,095	228	0.21	0.47
	1996	742.1	97.9	468	48	0.10	0.06
	1997	622.8	84.4	1,125	174	0.15	0.28
	1998	555.9	75.9	977	181.858	0.19	0.33
	1999	743.2	98.1	318	47.815	0.15	0.06
	2000	539.2	74.2	963	199.589	0.21	0.37
	2001	592.7	80.9	1,309	168.665	0.13	0.28
	2002	719.0	98.6	362	38.739	0.11	0.05
	2003	511.4	74.1	882	135.249	0.15	0.26
	2004	702.6	94.7	481	47.064	0.10	0.07
	2005	670.8	89.4	1,266	275.652	0.22	0.41
	2006	674.7	90.0	1,265	270.135	0.21	0.40
	2007	761.6	99.0	730	49.902	0.07	0.07
	2008	679.0	89.9	1,715	359.926	0.21	0.53

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
COOPER STATION (continued)	2009	654.6	86.6	1,638	254.032	0.16	0.39
	2010	775.4	100.0	773	61.303	0.08	0.08
	2011	658.5	84.8	1,737	349.247	0.20	0.53
	2012	662.9	87.6	1,800	279.301	0.16	0.42
	2013	776.5	100.0	548	35.870	0.07	0.05
	2014	675.3	88.8	1,274	202.670	0.16	0.30
	2015	776.1	99.4	408	27.634	0.07	0.04
	2016	676.1	88.2	1,291	195.518	0.15	0.29
	2017	789.1	100.0	394	30.193	0.08	0.04
	2018	642.9	84.5	996	132.984	0.13	0.21
	2019	793.6	100.0	286	14.463	0.05	0.02
	2020	706.5	91.5	924	93.227	0.10	0.13
	2021	785.5	100.0	313	15.685	0.05	0.02
	2022	641.4	87.7	1,057	132.961	0.13	0.21
	2023	790.6	100.0	310	17.111	0.06	0.02
CRYSTAL RIVER 3[4] Docket 50-302; DPR-72 1st commercial operation 12/76 Type—PWR Capacity—(860) MWe	1978	311.5	41.4	643	321	0.50	1.03
	1979	453.0	58.9	1,150	495	0.43	1.09
	1980	404.1	53.2	1,053	625	0.59	1.55
	1981	490.4	62.2	1,120	408	0.36	0.83
	1982	589.8	76.0	780	177	0.23	0.30
	1983	452.1	58.8	1,720	552	0.32	1.22
	1984	774.2	94.5	549	49	0.09	0.06
	1985	344.2	47.6	1,976	689	0.35	2.00
	1986	319.5	41.8	1,057	472	0.45	1.48
	1987	436.0	60.9	1,384	488	0.35	1.12
	1988	690.2	84.0	569	64	0.11	0.09
	1989	352.8	48.8	880	234	0.27	0.66
	1990	497.8	63.8	1,441	476	0.33	0.96
	1991	654.6	82.0	821	116	0.14	0.18
	1992	632.1	76.1	1,403	424	0.30	0.67
	1993	722.4	85.0	683	60	0.09	0.08
	1994	711.9	84.3	1,079	228	0.21	0.32
	1995	866.3	100.0	209	8	0.04	0.01
	1996	290.8	37.7	1,192	353	0.30	1.21
	1997	---	---	973	179	0.18	---
	1998	739.9	90.3	313	19.298	0.06	0.03
	1999	727.5	87.8	1,324	251.077	0.19	0.35
	2000	819.4	97.6	257	14.649	0.06	0.02
	2001	741.6	89.2	902	147.946	0.16	0.20
	2002	831.0	99.4	128	5.039	0.04	0.01
	2003	749.0	90.8	961	126.554	0.13	0.17
	2004	831.4	98.1	131	4.044	0.03	---
	2005	723.0	88.5	939	122.608	0.13	0.17
	2006	793.8	95.0	138	4.474	0.03	0.01
	2007	761.7	91.0	1,135	184.554	0.16	0.24
	2008	796.9	93.7	282	16.110	0.06	0.02
	2009	615.0	72.5	1,705	222.344	0.13	0.36
	2010	---	---	666	31.922	0.05	---
	2011	---	---	251	8.292	0.03	---
	2012	---	---	94	1.876	0.02	---
	2013	---	---	40	0.794	0.02	---
	2014	---	---	26	0.696	0.03	---
	2015	---	---	20	0.700	0.04	---
	2016	---	---	95	14.746	0.16	---
	2017	---	---	68	4.133	0.06	---
	2018	---	---	25	1.215	0.05	---
	2019	---	---	2	0.022	0.01	---
	2020	---	---	42	2.268	0.05	---
	2021	---	---	161	16.733	0.10	---
	2022	---	---	77	18.750	0.24	---
	2023	0.0	0.0	215	60.224	0.28	---

[4] Crystal River ceased power generation in 2010 due to problems associated with containment building delamination. In June 2013, it was decided that it would not be put in commercial operation again. Therefore, it is no longer included in the count of operating reactors. Parentheses indicate plant capacity when the plant was operational.

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
DAVIS-BESSE 1	1978	326.4	48.7	421	48	0.11	0.15
Docket 50-346;	1979	381.0	67.0	304	30	0.10	0.08
NPF-3	1980	256.4	36.2	1,283	154	0.12	0.60
1st commercial operation 7/78	1981	531.4	67.4	578	58	0.10	0.11
Type—PWR	1982	390.8	51.5	1,350	164	0.12	0.42
Capacity—894 MWe	1983	592.1	73.0	718	80	0.11	0.14
	1984	518.5	62.5	1,088	177	0.16	0.34
	1985	238.3	31.2	718	71	0.10	0.30
	1986	3.3	1.3	981	124	0.13	37.58
	1987	618.0	89.6	625	47	0.08	0.08
	1988	144.1	27.1	1,183	307	0.26	2.13
	1989	880.0	98.6	404	38	0.09	0.04
	1990	500.0	56.7	1,377	489	0.36	0.98
	1991	703.6	81.8	1,000	216	0.22	0.31
	1992	915.2	100.0	287	19	0.07	0.02
	1993	729.5	83.4	1,244	348	0.28	0.48
	1994	768.4	88.0	861	144	0.17	0.19
	1995	920.4	100.0	256	7	0.03	0.01
	1996	775.8	85.3	949	167	0.18	0.22
	1997	820.0	94.0	213	10	0.05	0.01
	1998	699.8	83.2	980	155.269	0.16	0.22
	1999	841.3	95.6	397	27.951	0.07	0.03
	2000	770.8	87.3	1,109	168.044	0.15	0.22
	2001	875.6	100.0	119	5.505	0.05	0.01
	2002	106.0	12.6	1,983	402.766	0.20	3.80
	2003	---	---	1,047	219.696	0.21	---
	2004	657.8	77.6	161	6.594	0.04	0.01
	2005	817.1	93.3	577	51.332	0.09	0.06
	2006	727.8	84.0	1,331	204.201	0.15	0.28
	2007	879.7	100.0	189	7.088	0.04	0.01
	2008	777.5	89.4	985	106.603	0.11	0.14
	2009	868.7	95.7	115	3.621	0.03	---
	2010	598.0	67.1	1,649	464.095	0.28	0.78
	2011	723.7	80.7	1,182	73.360	0.06	0.10
	2012	808.5	90.0	659	43.071	0.07	0.05
	2013	876.6	96.6	92	2.558	0.03	---
	2014	681.8	74.1	2,029	200.466	0.10	0.29
	2015	901.1	99.5	32	0.995	0.03	---
	2016	730.0	84.7	996	118.472	0.12	0.16
	2017	899.1	100.0	69	1.621	0.02	---
	2018	842.5	93.7	742	51.003	0.07	0.06
	2019	894.9	98.9	175	11.405	0.07	0.01
	2020	825.1	93.0	698	42.228	0.06	0.05
	2021	888.4	99.4	123	7.811	0.06	0.01
	2022	740.5	84.3	725	46.220	0.06	0.06
	2023	911.6	100.0	146	3.717	0.03	0.00
DIABLO CANYON 1, 2	1986	641.5	80.6	1,260	304	0.24	0.47
Docket 50-275, 50-323;	1987	1,688.6	83.0	1,170	336	0.29	0.20
DPR-80, DPR-82	1988	1,386.1	67.6	1,826	877	0.48	0.63
1st commercial operation	1989	1,899.0	87.5	1,646	465	0.28	0.24
5/85, 3/86	1990	1,952.6	91.0	1,441	323	0.22	0.17
Type—PWRs	1991	1,809.6	83.8	2,040	546	0.27	0.30
Capacity—1,122, 1,118 MWe	1992	1,995.7	90.9	1,850	459	0.25	0.23
	1993	2,008.6	91.4	1,508	281	0.19	0.14
	1994	1,832.6	83.3	2,317	590	0.25	0.32
	1995	1,950.3	90.0	1,615	286	0.18	0.15
	1996	2,003.6	90.7	1,462	176	0.12	0.09
	1997	1,948.7	92.7	1,331	219	0.16	0.11
	1998	1,955.1	92.8	1,313	173.238	0.13	0.09
	1999	1,902.8	90.1	1,566	448.634	0.29	0.24
	2000	1,940.1	92.0	1,057	180.792	0.17	0.09
	2001	2,067.7	96.4	1,074	117.804	0.11	0.06
	2002	1,860.0	88.4	1,016	148.690	0.15	0.08
	2003	1,970.7	91.6	1,004	135.482	0.13	0.07

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
DIABLO CANYON 1, 2 (continued)	2004	1,736.3	83.5	1,230	254.367	0.21	0.15
	2005	2,022.4	94.8	955	124.469	0.13	0.06
	2006	2,109.0	94.0	1,086	82.248	0.08	0.04
	2007	2,131.4	95.0	1,269	111.866	0.09	0.05
	2008	1,952.1	87.7	2,121	235.034	0.11	0.12
	2009	1,873.0	85.3	2,534	337.831	0.13	0.18
	2010	2,115.2	94.7	1,367	125.457	0.09	0.06
	2011	2,131.1	94.6	747	31.625	0.04	0.01
	2012	2,023.0	91.8	894	43.531	0.05	0.02
	2013	2,064.1	92.4	760	28.767	0.04	0.01
	2014	1,947.1	88.8	979	67.599	0.07	0.03
	2015	2,116.8	94.9	807	57.244	0.07	0.03
	2016	2,162.2	95.7	794	37.734	0.05	0.02
	2017	2,051.4	92.0	787	47.910	0.06	0.02
	2018	2,088.4	94.6	718	32.013	0.04	0.02
	2019	1,851.7	84.1	774	51.135	0.07	0.03
	2020	1,871.3	84.1	550	30.260	0.06	0.02
	2021	1,892.3	86.3	394	13.204	0.03	0.01
	2022	2,015.5	91.2	657	37.303	0.06	0.02
	2023	2,027.6	93.1	676	40.149	0.06	0.02
DRESDEN 1,[5] **2, 3** Docket 50-010, 50-237, 50-249; DPR-2, DPR-19, DPR-25 1st commercial operation 8/60, 6/70, 11/71 Type—BWRs Capacity—(197), 870, 869 MWe	1969	99.7	---	---	286	---	2.87
	1970	163.1	---	---	143	---	0.88
	1971	394.5	---	---	715	---	1.81
	1972	1,243.7	---	---	728	---	0.59
	1973	1,112.2	---	1,341	939	0.70	0.84
	1974	842.5	54.9	1,594	1,662	1.04	1.97
	1975	708.1	54.6	2,310	3,423	1.48	4.83
	1976	1,127.2	80.8	1,746	1,680	0.96	1.49
	1977	1,132.9	77.0	1,862	1,694	0.91	1.50
	1978	1,242.2	79.5	1,946	1,529	0.79	1.23
	1979	1,013.0	74.7	2,407	1,800	0.75	1.78
	1980	1,074.4	55.0	2,717	2,105	0.77	1.96
	1981	1,035.7	51.5	2,331	2,802	1.20	2.71
	1982	1,085.3	77.9	2,572	2,923	1.14	2.69
	1983	913.6	65.6	2,854	3,582	1.26	3.92
	1984	789.8	55.3	2,261	1,774	0.78	2.25
	1985	903.0	64.5	2,817	1,686	0.60	1.87
	1986	740.5	52.6	3,111	2,668	0.86	3.60
	1987	933.9	74.0	2,052	1,145	0.56	1.23
	1988	1,014.7	75.8	2,414	1,409	0.58	1.39
	1989	1,184.2	83.1	2,259	1,131	0.50	0.96
	1990	1,107.8	76.6	2,235	1,400	0.63	1.26
	1991	675.2	60.7	2,044	1,005	0.49	1.49
	1992	872.4	75.4	1,812	619	0.34	0.71
	1993	960.1	68.5	2,751	1,655	0.60	1.72
	1994	690.2	51.7	2,336	833	0.36	1.21
	1995	643.1	49.8	2,482	875	0.35	1.36
	1996	612.6	47.7	1,788	456	0.26	0.74
	1997	1,096.2	79.5	2,747	467	0.17	0.43
	1998	1,354.7	90.6	2,311	426.918	0.18	0.32
	1999	1,410.9	92.5	3,243	591.443	0.18	0.42
	2000	1,506.4	97.3	2,341	261.684	0.11	0.17
	2001	1,427.4	94.5	2,769	400.702	0.14	0.28
	2002	1,547.0	95.7	2,819	355.011	0.13	0.23
	2003	1,555.9	93.5	2,098	356.572	0.17	0.23
	2004	1,405.5	84.8	2,044	381.054	0.19	0.27
	2005	1,550.8	92.0	2,006	258.799	0.13	0.17
	2006	1,649.0	96.0	2,042	289.167	0.14	0.18
	2007	1,658.8	97.0	2,310	275.697	0.12	0.17
	2008	1,638.0	95.9	2,307	198.153	0.09	0.12

[5] Dresden 1 ceased power generation in 1978, and in 1985, it was decided that it would not be put in commercial operation again. Therefore, it is no longer included in the count of operating reactors. Parentheses indicate plant capacity when the plant was operational.

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
DRESDEN 1,[5] 2, 3 (continued)	2009	1,628.7	95.4	1,932	231.688	0.12	0.14
	2010	1,665.9	96.3	2,152	213.825	0.10	0.13
	2011	1,679.7	96.7	2,382	236.427	0.10	0.14
	2012	1,685.5	96.3	2,084	139.615	0.07	0.08
	2013	1,759.9	96.8	1,823	136.942	0.08	0.08
	2014	1,727.8	95.9	1,782	116.933	0.07	0.07
	2015	1,734.4	95.8	1,900	138.864	0.07	0.08
	2016	1,763.2	97.8	1,878	141.827	0.08	0.08
	2017	1,763.3	97.5	1,928	129.266	0.07	0.07
	2018	1,776.9	98.1	1,883	118.831	0.06	0.07
	2019	1,721.7	96.6	2,155	202.866	0.09	0.12
	2020	1,767.1	97.5	2,004	121.878	0.06	0.07
	2021	1,707.4	95.5	1,949	116.532	0.06	0.07
	2022	1,759.0	97.1	1,607	115.855	0.07	0.07
	2023	1,742.7	97.0	1,857	160.044	0.09	0.09
DUANE ARNOLD Docket 50-331; DPR-49 1st commercial operation 2/74 Type—BWR Capacity—602 MWe	1976	305.2	78.0	350	105	0.30	0.34
	1977	353.6	78.9	538	299	0.56	0.85
	1978	149.2	33.2	1,112	974	0.88	6.53
	1979	352.0	78.0	757	275	0.36	0.78
	1980	339.1	73.3	1,108	671	0.61	1.98
	1981	277.7	69.8	1,286	790	0.61	2.84
	1982	278.5	74.7	524	229	0.44	0.82
	1983	283.0	62.9	1,468	1,135	0.77	4.01
	1984	329.4	72.9	611	189	0.31	0.57
	1985	236.2	53.8	1,414	1,112	0.79	4.71
	1986	365.5	82.0	476	187	0.39	0.51
	1987	308.4	64.7	1,094	667	0.61	2.16
	1988	386.5	75.2	1,136	614	0.54	1.59
	1989	388.5	79.0	425	194	0.46	0.50
	1990	367.4	75.8	1,460	861	0.59	2.34
	1991	503.7	94.5	336	202	0.60	0.40
	1992	416.5	81.9	1,043	502	0.48	1.21
	1993	393.4	79.5	1,043	407	0.39	1.03
	1994	498.6	94.0	493	120	0.24	0.24
	1995	452.5	83.8	1,129	357	0.32	0.79
	1996	476.8	90.7	1,093	270	0.25	0.57
	1997	474.4	94.4	352	63	0.18	0.13
	1998	438.3	86.6	1,019	236.693	0.23	0.54
	1999	416.6	84.3	834	201.196	0.24	0.48
	2000	507.3	98.4	317	44.181	0.14	0.09
	2001	439.5	86.8	898	137.564	0.15	0.31
	2002	522.0	94.4	319	35.061	0.11	0.07
	2003	455.2	84.8	829	124.402	0.15	0.27
	2004	561.2	98.3	220	18.993	0.09	0.03
	2005	517.4	90.5	879	139.622	0.16	0.27
	2006	581.7	99.0	254	29.392	0.12	0.05
	2007	515.8	88.0	1,062	183.609	0.17	0.36
	2008	601.4	100.0	276	24.187	0.09	0.04
	2009	534.1	91.3	960	140.206	0.15	0.26
	2010	508.1	86.9	1,093	200.601	0.18	0.39
	2011	595.3	98.6	400	29.663	0.07	0.05
	2012	494.9	84.9	1,169	134.515	0.12	0.27
	2013	598.6	100.0	262	16.414	0.06	0.03
	2014	474.0	86.0	1,043	121.986	0.12	0.26
	2015	598.6	100.0	391	20.441	0.05	0.03
	2016	536.8	92.5	1,106	110.613	0.10	0.21
	2017	595.2	99.3	228	17.336	0.08	0.03
	2018	558.8	94.7	697	77.984	0.11	0.14
	2019	597.7	99.6	187	15.569	0.08	0.03
	2020	---	---	191	16.486	0.09	---
	2021	---	---	125	7.837	0.06	---
	2022	---	---	106	21.068	0.20	---
	2023	0.0	0.0	16	0.832	0.05	---

[5] Dresden 1 ceased power generation in 1978, and in 1985, it was decided that it would not be put in commercial operation again. Therefore, it is no longer included in the count of operating reactors. Parentheses indicate plant capacity when the plant was operational.

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
FARLEY 1, 2	1978	713.8	86.5	527	108	0.20	0.15
Docket 50-348, 50-364;	1979	211.0	28.6	1,227	643	0.52	3.05
NPF-2, NPF-8	1980	557.3	69.3	1,330	435	0.33	0.78
1st commercial operation	1981	310.2	41.4	1,331	512	0.38	1.65
12/77, 7/81	1982	1,271.5	79.2	1,453	484	0.33	0.38
Type—PWRs	1983	1,356.5	83.0	1,938	1,021	0.53	0.75
Capacity—874, 883 MWe	1984	1,447.0	86.6	2,046	902	0.44	0.62
	1985	1,368.2	81.1	2,551	799	0.31	0.58
	1986	1,409.4	83.8	2,314	858	0.37	0.61
	1987	1,369.7	84.7	1,871	598	0.32	0.44
	1988	1,567.7	92.3	1,840	552	0.30	0.35
	1989	1,402.9	84.6	2,206	749	0.34	0.53
	1990	1,464.0	86.7	1,700	457	0.27	0.31
	1991	1,464.0	88.1	1,645	648	0.39	0.44
	1992	1,331.7	81.8	2,018	805	0.40	0.60
	1993	1,455.5	88.3	1,284	333	0.26	0.23
	1994	1,587.2	93.0	1,035	250	0.24	0.16
	1995	1,311.2	83.8	1,574	460	0.29	0.35
	1996	1,549.2	90.9	1,150	232	0.20	0.15
	1997	1,449.7	89.0	1,105	278	0.25	0.19
	1998	1,313.9	80.9	1,380	431.821	0.31	0.33
	1999	1,436.0	91.4	1,102	190.463	0.17	0.13
	2000	1,430.1	88.6	1,683	359.855	0.21	0.25
	2001	1,384.3	84.4	1,810	320.509	0.18	0.23
	2002	1,558.0	93.5	772	96.431	0.12	0.06
	2003	1,592.6	95.3	788	111.016	0.14	0.07
	2004	1,496.8	89.4	1,141	107.227	0.09	0.07
	2005	1,564.2	93.3	810	67.826	0.08	0.04
	2006	1,602.7	94.0	747	66.189	0.09	0.04
	2007	1,495.8	88.0	1,226	139.716	0.11	0.09
	2008	1,602.6	94.4	669	40.833	0.06	0.03
	2009	1,595.2	94.1	657	41.851	0.06	0.03
	2010	1,503.4	89.0	1,321	121.313	0.09	0.08
	2011	1,647.4	95.1	723	37.510	0.05	0.02
	2012	1,680.7	95.8	563	29.817	0.05	0.02
	2013	1,609.4	92.8	775	53.212	0.07	0.03
	2014	1,655.9	94.5	713	37.703	0.05	0.02
	2015	1,631.0	93.6	888	55.942	0.06	0.03
	2016	1,563.7	90.0	957	59.840	0.06	0.04
	2017	1,690.0	96.1	575	31.351	0.05	0.02
	2018	1,605.6	94.2	592	36.355	0.06	0.02
	2019	1,613.8	92.3	896	63.320	0.07	0.04
	2020	1,686.7	95.4	628	46.633	0.07	0.03
	2021	1,710.4	96.1	670	43.420	0.06	0.03
	2022	1,484.6	83.8	689	44.326	0.06	0.03
	2023	1,684.8	93.8	431	23.531	0.05	0.01
FERMI 2	1989	624.0	68.5	1,270	255	0.20	0.41
Docket 50-341;	1990	848.2	84.7	462	83	0.18	0.10
NPF-43	1991	739.0	77.0	1,223	228	0.19	0.31
1st commercial operation 1/88	1992	874.3	81.3	1,213	245	0.20	0.28
Type—BWR	1993	984.3	92.9	360	35	0.10	0.04
Capacity—1,094 MWe	1994	---	2.2	1,130	213	0.19	---
	1995	618.3	86.9	390	28	0.07	0.05
	1996	577.5	69.1	1,402	157	0.11	0.27
	1997	637.0	66.6	623	49	0.08	0.08
	1998	815.8	79.9	1,362	207.593	0.15	0.25
	1999	1,082.7	99.5	461	36.152	0.08	0.03
	2000	939.6	87.6	1,266	145.964	0.12	0.16
	2001	975.0	90.9	1,202	168.689	0.14	0.17
	2002	1,059.0	98.7	463	38.235	0.08	0.04
	2003	925.3	86.9	1,207	168.138	0.14	0.18
	2004	962.3	90.0	1,302	145.090	0.11	0.15
	2005	998.1	91.7	538	61.626	0.11	0.06
	2006	855.9	83.0	1,430	181.300	0.13	0.21

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
FERMI 2	2007	950.2	87.0	1,484	194.039	0.13	0.20
(continued)	2008	1,094.5	99.5	460	35.186	0.08	0.03
	2009	847.8	79.3	1,497	148.846	0.10	0.18
	2010	885.0	86.4	1,625	146.490	0.09	0.17
	2011	1,017.9	95.7	387	24.080	0.06	0.02
	2012	589.3	65.2	1,420	144.973	0.10	0.25
	2013	754.5	93.0	704	26.179	0.04	0.03
	2014	891.5	85.9	1,806	199.698	0.11	0.22
	2015	838.6	75.8	1,866	234.853	0.13	0.28
	2016	1,045.0	96.2	779	54.761	0.07	0.05
	2017	993.0	91.2	2,025	265.082	0.13	0.27
	2018	849.2	78.3	2,451	329.015	0.13	0.39
	2019	1,128.6	100.0	1,417	65.282	0.05	0.06
	2020	---	---	---	---	---	---
	2021	1,070.1	98.4	1,073	63.345	0.06	0.06
	2022	762.8	74.0	2,429	517.175	0.21	0.68
	2023	1,069.3	95.0	1,097	85.843	0.08	0.08
FITZPATRICK	1976	489.0	71.6	600	202	0.34	0.41
Docket 50-333;	1977	460.5	68.4	1,380	1,080	0.78	2.35
DPR-59	1978	497.0	72.1	904	909	1.01	1.83
1st commercial operation 7/75	1979	349.0	50.8	850	859	1.01	2.46
Type—BWR	1980	509.5	70.3	2,056	2,040	0.99	4.00
Capacity—813 MWe	1981	562.9	74.7	2,490	1,425	0.57	2.53
	1982	583.6	75.0	2,322	1,190	0.51	2.04
	1983	546.2	70.6	1,715	1,090	0.64	2.00
	1984	576.2	76.8	1,610	971	0.60	1.69
	1985	492.3	63.7	1,845	1,051	0.57	2.13
	1986	711.2	90.6	1,185	411	0.35	0.58
	1987	496.2	70.3	1,578	940	0.60	1.89
	1988	514.0	69.0	1,553	786	0.51	1.53
	1989	727.5	92.3	1,027	377	0.37	0.52
	1990	543.8	72.6	1,536	884	0.58	1.63
	1991	399.7	53.4	1,269	333	0.26	0.83
	1992	---	---	2,374	674	0.28	---
	1993	559.6	81.7	1,427	232	0.16	0.41
	1994	588.4	83.2	1,595	322	0.20	0.55
	1995	569.8	74.5	1,249	327	0.26	0.57
	1996	623.3	83.1	1,384	357	0.26	0.57
	1997	756.2	95.9	662	91	0.14	0.12
	1998	562.8	78.0	1,781	357.826	0.20	0.64
	1999	749.7	95.5	558	68.409	0.12	0.09
	2000	685.9	88.4	1,267	300.997	0.24	0.44
	2001	807.2	98.9	665	63.229	0.10	0.08
	2002	751.0	93.3	1,234	230.523	0.19	0.31
	2003	793.0	97.9	298	51.156	0.17	0.06
	2004	735.0	92.1	1,091	186.055	0.17	0.25
	2005	802.9	96.3	382	62.697	0.16	0.08
	2006	771.5	93.0	1,527	234.425	0.15	0.30
	2007	790.1	96.0	526	58.741	0.11	0.07
	2008	761.7	92.9	1,430	184.772	0.13	0.24
	2009	844.5	100.0	487	35.119	0.07	0.04
	2010	726.2	91.3	1,429	219.887	0.15	0.30
	2011	826.9	100.0	513	35.217	0.07	0.04
	2012	691.1	87.2	1,546	169.886	0.11	0.25
	2013	780.8	98.9	603	39.392	0.07	0.05
	2014	665.4	87.8	1,674	135.890	0.08	0.20
	2015	842.7	100.0	250	20.785	0.08	0.02
	2016	668.7	95.4	362	28.304	0.08	0.04
	2017	705.8	89.0	1,139	162.196	0.14	0.23
	2018	745.2	92.6	1,456	231.548	0.16	0.31
	2019	839.5	100.0	381	24.160	0.06	0.03
	2020	752.2	92.6	1,180	149.183	0.13	0.20
	2021	844.5	100.0	237	23.553	0.10	0.03
	2022	754.9	94.4	1,135	141.131	0.12	0.19
	2023	841.7	100.0	282	26.406	0.09	0.03

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
FORT CALHOUN[6]	1975	252.3	67.4	469	294	0.63	1.17
Docket 50-285;	1976	265.9	69.5	516	313	0.61	1.18
DPR-40	1977	351.8	79.4	535	297	0.56	0.84
1st commercial operation 8/73	1978	342.3	75.1	596	410	0.69	1.20
Type—PWR	1979	440.0	95.7	451	126	0.28	0.29
Capacity—(482) MWe	1980	242.3	60.4	891	668	0.75	2.76
	1981	260.9	72.3	822	458	0.56	1.76
	1982	418.0	89.7	604	217	0.36	0.52
	1983	330.4	73.1	860	433	0.50	1.31
	1984	279.2	59.9	913	563	0.62	2.02
	1985	367.0	73.7	982	373	0.38	1.02
	1986	431.8	94.3	756	75	0.10	0.17
	1987	366.0	75.4	1,247	388	0.31	1.06
	1988	315.5	74.1	1,594	272	0.17	0.86
	1989	395.7	89.2	1,210	93	0.08	0.24
	1990	290.0	64.2	760	290	0.38	1.00
	1991	391.1	91.7	284	57	0.20	0.15
	1992	303.4	65.9	802	272	0.34	0.90
	1993	369.7	80.8	713	157	0.22	0.42
	1994	492.8	99.6	211	23	0.11	0.05
	1995	402.8	83.2	627	139	0.22	0.35
	1996	374.9	79.5	740	226	0.31	0.60
	1997	435.9	93.6	258	41	0.16	0.09
	1998	387.7	82.5	788	223.847	0.28	0.58
	1999	409.2	89.2	676	158.843	0.23	0.39
	2000	443.8	93.5	249	35.215	0.14	0.08
	2001	401.2	88.3	770	225.891	0.29	0.56
	2002	434.0	92.3	742	163.806	0.22	0.38
	2003	399.6	87.0	914	212.422	0.23	0.53
	2004	463.5	97.0	215	21.574	0.10	0.05
	2005	332.4	72.2	1,069	272.876	0.26	0.82
	2006	353.9	75.0	1,591	289.100	0.18	0.82
	2007	499.9	100.0	100	3.990	0.04	0.01
	2008	400.4	82.2	839	96.155	0.11	0.24
	2009	422.7	87.0	870	110.918	0.13	0.26
	2010	486.5	98.5	171	9.763	0.06	0.02
	2011	134.4	26.8	1,042	79.226	0.08	0.59
	2012	---	---	494	39.377	0.08	---
	2013	10.9	3.6	678	63.853	0.09	5.86
	2014	477.7	97.7	159	5.053	0.03	0.01
	2015	402.5	81.5	747	75.987	0.10	0.19
	2016	---	---	166	11.255	0.07	---
	2017	---	---	72	2.770	0.04	---
	2018	---	---	74	6.939	0.09	---
	2019	---	---	110	11.120	0.10	---
	2020	---	---	167	16.272	0.10	---
	2021	---	---	304	95.322	0.31	---
	2022	---	---	331	41.344	0.12	---
	2023	0.0	0.0	233	93.416	0.40	---
GINNA	1971	327.8	---	340	430	1.26	1.31
Docket 50-244;	1972	293.6	---	677	1,032	1.52	3.51
DPR-18	1973	409.5	---	319	224	0.70	0.55
1st commercial operation 7/70	1974	253.7	62.4	884	1,225	1.39	4.83
Type—PWR	1975	365.2	76.7	685	538	0.79	1.47
Capacity—560 MWe	1976	248.8	58.2	758	636	0.84	2.56
	1977	365.6	85.5	530	401	0.76	1.10
	1978	386.5	80.6	657	450	0.68	1.16
	1979	355.0	72.8	878	592	0.67	1.67
	1980	370.5	76.0	1,073	708	0.66	1.91
	1981	399.0	82.1	925	655	0.71	1.64
	1982	289.0	58.8	1,117	1,140	1.02	3.94
	1983	365.0	74.6	969	855	0.88	2.34

[6] Fort Calhoun ceased power generation in October 2016 and is no longer included in the count of operating reactors. Parentheses indicate plant capacity when the plant was operational.

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
GINNA (continued)	1984	378.1	77.2	713	395	0.55	1.04
	1985	436.7	87.9	845	426	0.50	0.98
	1986	433.3	87.4	901	357	0.40	0.82
	1987	459.0	91.5	773	344	0.45	0.75
	1988	423.1	87.4	897	295	0.33	0.70
	1989	369.2	75.9	1,254	605	0.48	1.64
	1990	414.3	84.4	991	347	0.35	0.84
	1991	418.6	86.7	947	328	0.35	0.78
	1992	417.6	86.9	832	261	0.31	0.63
	1993	419.6	86.3	856	193	0.23	0.46
	1994	405.3	83.2	679	138	0.20	0.34
	1995	437.0	89.6	738	136	0.18	0.31
	1996	347.9	71.1	976	168	0.17	0.48
	1997	444.6	91.8	533	81	0.15	0.18
	1998	491.8	100.0	161	14.892	0.09	0.03
	1999	403.4	85.6	641	175.173	0.27	0.43
	2000	434.2	91.6	429	76.435	0.18	0.18
	2001	488.0	100.0	140	10.156	0.07	0.02
	2002	438.0	91.3	535	80.432	0.15	0.18
	2003	440.4	91.1	510	74.533	0.15	0.17
	2004	490.5	99.5	111	7.486	0.07	0.02
	2005	455.0	93.9	564	72.841	0.13	0.16
	2006	470.2	94.0	514	44.580	0.09	0.09
	2007	564.4	99.0	111	4.412	0.04	0.01
	2008	540.1	94.5	976	101.996	0.10	0.19
	2009	529.2	94.3	633	41.809	0.07	0.08
	2010	564.9	98.9	75	3.168	0.04	0.01
	2011	492.1	86.4	931	100.711	0.11	0.20
	2012	523.9	92.1	654	54.636	0.08	0.10
	2013	570.0	99.1	104	3.434	0.03	0.01
	2014	532.2	93.5	621	58.380	0.09	0.11
	2015	544.5	95.1	415	24.163	0.06	0.04
	2016	575.6	100.0	79	1.882	0.02	---
	2017	536.3	94.5	614	46.173	0.08	0.09
	2018	536.4	94.9	462	27.931	0.06	0.05
	2019	570.1	99.5	57	2.023	0.04	---
	2020	494.6	87.1	520	46.280	0.09	0.09
	2021	536.5	94.9	560	33.499	0.06	0.06
	2022	575.2	100.0	64	1.808	0.03	---
	2023	530.2	93.6	626	53.989	0.09	0.10
GRAND GULF Docket 50-416; NPF-29 1st commercial operation 7/85 Type—BWR Capacity—1,428 MWe	1986	494.7	60.9	1,486	436	0.29	0.88
	1987	920.7	82.2	1,358	420	0.31	0.46
	1988	1,136.6	96.7	692	147	0.21	0.13
	1989	932.6	80.0	1,972	498	0.25	0.53
	1990	883.5	78.9	1,765	482	0.27	0.55
	1991	1,085.2	94.0	699	94	0.13	0.09
	1992	969.0	83.7	2,032	484	0.24	0.50
	1993	936.4	81.5	1,807	332	0.18	0.35
	1994	1,143.2	96.6	455	56	0.12	0.05
	1995	952.9	80.4	1,589	342	0.22	0.36
	1996	1,096.2	88.7	1,564	357	0.23	0.33
	1997	1,234.9	100.0	514	105	0.20	0.09
	1998	1,049.2	88.9	1,410	303.695	0.22	0.29
	1999	962.1	81.3	1,180	226.277	0.19	0.23
	2000	1,217.5	99.4	289	34.877	0.12	0.03
	2001	1,129.8	93.0	1,109	185.214	0.17	0.16
	2002	1,145.0	93.6	1,060	176.396	0.17	0.15
	2003	1,241.2	98.6	290	31.250	0.11	0.03
	2004	1,165.2	92.2	1,243	158.112	0.13	0.14
	2005	1,147.3	91.9	1,326	167.914	0.13	0.15
	2006	1,233.7	98.0	1,016	59.935	0.06	0.05
	2007	1,070.5	88.0	1,750	177.884	0.10	0.17
	2008	1,072.1	89.5	1,843	167.859	0.09	0.16
	2009	1,255.5	100.0	521	30.721	0.06	0.02

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
GRAND GULF (continued)	2010	1,102.0	91.5	1,822	188.370	0.10	0.17
	2011	1,180.0	100.0	530	21.084	0.04	0.02
	2012	835.2	67.8	2,446	276.378	0.11	0.33
	2013	1,231.1	92.2	396	35.449	0.09	0.03
	2014	1,173.5	89.5	1,726	181.746	0.11	0.15
	2015	1,337.8	98.2	587	25.241	0.04	0.02
	2016	682.8	52.4	1,443	194.755	0.13	0.29
	2017	849.1	75.4	538	40.251	0.07	0.05
	2018	794.3	69.4	1,284	166.908	0.13	0.21
	2019	1,259.4	93.8	948	35.139	0.04	0.03
	2020	742.7	62.6	2,628	227.519	0.09	0.31
	2021	1,344.3	97.0	762	50.892	0.07	0.04
	2022	1,000.1	74.9	1,424	183.014	0.13	0.18
	2023	1,341.3	95.7	330	17.410	0.05	0.01
HADDAM NECK[7] Docket 50-213; DPR-61 1st commercial operation 1/68 Type—PWR Capacity—(560) MWe	1969	438.5	---	138	106	0.77	0.24
	1970	424.7	---	734	689	0.94	1.62
	1971	502.2	---	289	342	1.18	0.68
	1972	515.6	---	355	325	0.92	0.63
	1973	293.1	---	951	697	0.73	2.38
	1974	521.4	91.2	550	201	0.37	0.39
	1975	494.3	89.9	795	703	0.88	1.42
	1976	482.9	82.5	644	449	0.70	0.93
	1977	480.7	83.9	894	641	0.72	1.33
	1978	563.4	98.6	216	117	0.54	0.21
	1979	493.0	87.5	1,226	1,162	0.95	2.36
	1980	426.8	75.0	1,860	1,353	0.73	3.17
	1981	487.5	84.3	1,554	1,036	0.67	2.13
	1982	543.9	93.4	559	126	0.23	0.23
	1983	453.7	77.8	1,645	1,384	0.84	3.05
	1984	404.0	71.7	1,430	1,216	0.85	3.01
	1985	556.1	98.4	384	101	0.26	0.18
	1986	294.8	53.6	1,945	1,567	0.81	5.32
	1987	304.6	54.0	1,763	750	0.43	2.46
	1988	397.4	70.3	735	237	0.32	0.60
	1989	356.4	67.2	1,455	596	0.41	1.67
	1990	142.7	32.2	979	421	0.43	2.95
	1991	444.4	76.4	1,168	590	0.51	1.33
	1992	465.2	80.1	797	202	0.25	0.43
	1993	448.6	81.6	1,004	408	0.41	0.91
	1994	455.6	77.7	463	135	0.29	0.30
	1995	439.4	77.7	1,006	442	0.44	1.01
	1996	331.8	55.7	673	175	0.26	0.53
	1997	-1.3	---	219	11	0.05	---
	1998	---	---	423	93.743	0.22	---
	1999	---	---	545	108.602	0.20	---
	2000	---	---	555	262.192	0.47	---
	2001	---	---	361	95.348	0.26	---
	2002	---	---	258	51.668	0.20	---
	2003	---	---	400	82.022	0.21	---
	2004	---	---	564	91.981	0.16	---
	2005	---	---	350	36.479	0.10	---
	2006	---	---	124	11.883	0.10	---
	2007	---	---	---	---	---	---
	2008	---	---	1	0.011	0.01	---
	2009	---	---	1	0.010	0.01	---
	2010	---	---	2	0.024	0.01	---
	2011	---	---	6	0.364	0.06	---
	2012	---	---	2	0.024	0.01	---
	2013	---	---	9	0.182	0.02	---
	2014	---	---	11	0.185	0.02	---
	2015	---	---	13	0.204	0.02	---
	2016	---	---	15	0.244	0.02	---

[7] Haddam Neck (also known as Connecticut Yankee) ceased operations on December 4, 1996, and is no longer in the count of operating reactors. Parentheses indicate plant capacity when the plant was operational.

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
HADDAM NECK[7]	2017	---	---	11	0.182	0.02	---
(continued)	2018	---	---	15	0.250	0.02	---
	2019	---	---	---	---	---	---
	2020	---	---	11	0.457	0.04	---
	2021	---	---	22	0.658	0.03	---
	2022	---	---	---	---	---	---
	2023	0.0	0.0	14	0.329	0.02	---
HARRIS 1	1988	652.9	75.0	721	169	0.23	0.26
Docket 50-400;	1989	690.6	79.5	929	156	0.17	0.23
NPF-63	1990	776.4	89.6	453	85	0.19	0.11
1st commercial operation 5/87	1991	724.8	81.5	872	226	0.26	0.31
Type—PWR	1992	661.8	74.9	930	213	0.23	0.32
Capacity—964 MWe	1993	913.0	99.7	327	31	0.09	0.03
	1994	740.8	82.7	1,089	222	0.20	0.30
	1995	731.1	83.8	1,068	174	0.16	0.24
	1996	860.6	95.4	444	17	0.04	0.02
	1997	673.6	80.4	1,131	149	0.13	0.22
	1998	766.2	90.4	931	133.497	0.14	0.17
	1999	827.0	97.9	247	15.538	0.06	0.02
	2000	783.0	92.5	888	100.981	0.11	0.13
	2001	611.2	72.4	1,586	252.241	0.16	0.41
	2002	892.0	99.4	145	6.674	0.05	0.01
	2003	823.9	93.2	786	68.463	0.09	0.08
	2004	797.9	88.2	747	57.103	0.08	0.07
	2005	902.9	99.5	164	8.483	0.05	0.01
	2006	802.4	89.0	917	87.225	0.10	0.11
	2007	845.1	94.0	870	64.808	0.07	0.08
	2008	890.4	97.4	192	10.356	0.05	0.01
	2009	845.1	92.7	742	41.401	0.06	0.05
	2010	808.3	89.0	1,069	82.578	0.08	0.10
	2011	926.0	100.0	157	4.724	0.03	0.01
	2012	810.8	87.4	1,066	79.845	0.07	0.10
	2013	786.3	85.4	861	54.874	0.06	0.07
	2014	918.8	97.5	52	1.275	0.02	---
	2015	830.2	88.4	875	57.978	0.07	0.07
	2016	857.7	91.1	687	43.876	0.06	0.05
	2017	937.1	99.7	12	0.217	0.02	---
	2018	866.2	90.0	596	31.736	0.05	0.04
	2019	868.8	90.0	626	37.223	0.06	0.04
	2020	944.7	97.8	30	0.458	0.02	---
	2021	916.0	93.7	476	18.621	0.04	0.02
	2022	891.2	92.8	403	18.138	0.05	0.02
	2023	982.8	100.0	17	0.286	0.02	0.00
HATCH 1, 2	1976	496.3	83.8	630	134	0.21	0.27
Docket 50-321, 50-366;	1977	446.8	66.3	1,303	465	0.36	1.04
DPR-57; NPF-5	1978	513.0	72.8	1,304	248	0.19	0.48
1st commercial operation	1979	401.0	54.6	2,131	582	0.27	1.45
12/75, 9/79	1980	1,008.7	70.9	1,930	449	0.23	0.45
Type—BWRs	1981	870.9	64.3	2,899	1,337	0.46	1.54
Capacity—876, 883 MWe	1982	768.0	56.6	3,418	1,460	0.43	1.90
	1983	934.7	68.6	3,428	1,299	0.38	1.39
	1984	658.6	47.3	4,110	2,218	0.54	3.37
	1985	1,211.0	79.6	2,841	818	0.29	0.68
	1986	872.0	64.8	3,486	1,497	0.43	1.72
	1987	1,295.4	89.7	2,202	816	0.37	0.63
	1988	1,001.4	70.4	2,509	1,401	0.56	1.40
	1989	1,271.1	87.1	1,350	556	0.41	0.44
	1990	1,268.0	83.5	2,902	1,455	0.50	1.15
	1991	1,152.4	77.4	2,508	1,161	0.46	1.01
	1992	1,293.8	88.6	1,615	550	0.34	0.43
	1993	1,189.6	85.5	1,733	669	0.39	0.56
	1994	1,289.0	87.1	2,243	864	0.39	0.67
	1995	1,376.3	90.6	1,458	488	0.33	0.35

[7] Haddam Neck (also known as Connecticut Yankee) ceased operations on December 4, 1996, and is no longer in the count of operating reactors. Parentheses indicate plant capacity when the plant was operational.

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
HATCH 1, 2 (continued)	1996	1,519.6	94.0	1,495	441	0.29	0.29
	1997	1,374.7	88.1	1,945	722	0.37	0.53
	1998	1,458.4	91.7	1,610	320.469	0.20	0.22
	1999	1,487.4	90.0	1,866	328.583	0.18	0.22
	2000	1,515.0	88.7	1,913	401.891	0.21	0.27
	2001	1,603.0	93.5	1,407	230.242	0.16	0.14
	2002	1,600.0	94.0	1,299	214.441	0.17	0.13
	2003	1,606.3	94.5	1,295	168.281	0.13	0.10
	2004	1,641.3	95.3	1,209	180.129	0.15	0.11
	2005	1,562.1	91.3	1,288	207.295	0.16	0.13
	2006	1,604.9	94.0	1,405	259.313	0.18	0.16
	2007	1,626.5	94.0	1,341	137.273	0.10	0.08
	2008	1,584.0	92.7	1,397	189.433	0.14	0.12
	2009	1,416.5	83.2	1,310	186.013	0.14	0.13
	2010	1,586.9	93.0	1,734	245.797	0.14	0.15
	2011	1,550.4	93.1	1,681	176.976	0.11	0.11
	2012	1,637.5	94.5	1,592	191.189	0.12	0.12
	2013	1,578.1	92.1	1,348	140.994	0.10	0.09
	2014	1,656.4	95.6	1,608	189.428	0.12	0.11
	2015	1,654.9	95.6	1,584	83.419	0.05	0.05
	2016	1,672.1	95.8	1,669	222.865	0.13	0.13
	2017	1,658.8	95.7	1,126	101.422	0.09	0.06
	2018	1,644.2	95.9	1,297	139.368	0.11	0.08
	2019	1,588.7	92.3	1,154	94.104	0.08	0.06
	2020	1,595.6	92.4	1,413	129.170	0.09	0.08
	2021	1,617.4	94.2	1,065	94.042	0.09	0.06
	2022	1,657.5	95.7	1,203	127.476	0.11	0.08
	2023	1,638.3	94.9	1,078	93.435	0.09	0.06
HOPE CREEK 1	1987	869.2	86.4	589	117	0.20	0.13
Docket 50-354;	1988	832.7	80.7	1,734	287	0.17	0.34
NPF-57	1989	791.1	77.8	1,873	465	0.25	0.59
1st commercial operation 12/86	1990	966.4	91.6	1,394	196	0.14	0.20
Type—BWR	1991	882.5	84.2	1,700	373	0.22	0.42
Capacity—1,172 MWe	1992	841.9	80.8	1,694	436	0.26	0.52
	1993	1,049.2	97.8	688	98	0.14	0.09
	1994	852.0	81.2	1,779	326	0.18	0.38
	1995	844.5	79.8	1,571	196	0.12	0.23
	1996	806.9	77.4	1,069	158	0.15	0.20
	1997	731.8	77.8	1,747	350	0.20	0.48
	1998	993.2	98.0	620	54.816	0.09	0.06
	1999	879.1	86.7	1,111	279.063	0.25	0.32
	2000	827.8	87.9	1,236	188.295	0.15	0.23
	2001	918.2	91.1	1,532	156.180	0.10	0.17
	2002	1,007.0	99.2	220	25.922	0.12	0.03
	2003	826.6	84.6	1,597	139.295	0.09	0.17
	2004	688.6	71.3	2,440	239.540	0.10	0.35
	2005	874.9	88.6	881	67.063	0.08	0.08
	2006	983.8	93.0	2,135	133.570	0.06	0.14
	2007	929.3	91.0	2,221	191.068	0.09	0.21
	2008	1,139.1	100.0	999	34.510	0.03	0.03
	2009	1,111.4	93.3	2,090	169.362	0.08	0.15
	2010	1,082.0	92.1	1,985	160.910	0.08	0.15
	2011	1,199.3	99.4	426	24.677	0.06	0.02
	2012	1,091.3	93.4	2,207	153.866	0.07	0.14
	2013	1,040.3	89.7	2,019	150.568	0.07	0.14
	2014	1,187.9	98.8	853	36.543	0.04	0.03
	2015	1,078.9	91.7	2,915	169.862	0.06	0.16
	2016	1,100.4	92.8	1,661	139.883	0.08	0.13
	2017	1,216.7	100.0	412	31.919	0.08	0.03
	2018	1,094.0	92.6	1,593	150.044	0.09	0.14
	2019	1,000.8	89.2	1,356	169.220	0.12	0.17
	2020	1,211.6	100	175	16.625	0.10	0.01
	2021	1,040.0	91.6	1,242	141.166	0.11	0.14
	2022	1,053.6	90.7	1,214	132.562	0.11	0.13
	2023	1,136.3	97.2	274	27.804	0.10	0.02

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
HUMBOLDT BAY[8]	1969	44.6	---	125	164	1.31	3.68
Docket 50-133;	1970	49.3	---	115	209	1.82	4.24
DPR-7	1971	39.6	---	140	292	2.09	7.37
1st commercial operation 8/63	1972	43.1	---	127	253	1.99	5.87
Type—BWR	1973	50.1	---	210	266	1.27	5.31
Capacity—(63) MWe	1974	43.4	83.8	296	318	1.07	7.33
	1975	45.3	83.9	265	339	1.28	7.48
	1976	23.5	46.4	523	683	1.31	29.06
	1977	---	---	1,063	1,905	1.79	---
	1978	---	---	320	335	1.05	---
	1979	---	---	135	31	0.23	---
	1980	---	---	142	22	0.15	---
	1981	---	---	75	9	0.12	---
	1982	---	---	71	19	0.27	---
	1983	---	---	84	17	0.20	---
	1984			“Data not available”			
	1985	---	---	178	51	0.29	---
	1986	---	---	115	50	0.43	---
	1987			“Data not available”			
	1988	---	---	10	1	0.10	---
	1989	---	---	---	---	---	---
	1990	---	---	---	---	---	---
	1991	---	---	---	---	---	---
	1992	---	---	8	---	---	---
	1993	---	---	24	1	0.04	---
	1994	---	---	21	1	0.05	---
	1995	---	---	42	2	0.05	---
	1996	---	---	66	5	0.08	---
	1997	---	---	105	16	0.15	---
	1998	---	---	38	0.929	0.02	---
	1999	---	---	28	0.720	0.03	---
	2000	---	---	20	0.911	0.05	---
	2001	---	---	10	0.360	0.04	---
	2002	---	---	18	1.504	0.08	---
	2003	---	---	14	0.351	0.03	---
	2004	---	---	11	0.454	0.04	---
	2005	---	---	11	0.547	0.05	---
	2006	---	---	40	4.086	0.10	---
	2007	---	---	45	3.271	0.07	---
	2008	---	---	56	2.051	0.04	---
	2009	---	---	30	0.631	0.02	---
	2010	---	---	136	7.691	0.06	---
	2011	---	---	158	6.709	0.04	---
	2012	---	---	156	15.859	0.10	---
	2013	---	---	172	24.121	0.14	---
	2014	---	---	125	12.381	0.10	---
	2015	---	---	54	4.391	0.08	---
	2016	---	---	---	---	---	---
	2017	---	---	---	---	---	---
	2018	---	---	---	---	---	---
INDIAN POINT 1,[9] **2, 3**[10]	1969	206.2	---	---	298	---	1.45
Docket 50-3, 50-247, 50-286;	1970	43.3	---	---	1,639	---	37.85
DPR-5, DPR-26, DPR-64	1971	154.0	---	---	768	---	4.99
1st commercial operation	1972	142.3	---	---	967	---	6.80
8/62, 7/74, 8/76	1973	---	---	2,998	5,262	1.76	---
Type—PWRs	1974	556.1	59.4	1,019	910	0.89	1.64
Capacity—(265), (998),	1975	584.4	74.8	891	705	0.79	1.21
(1,030) MWe	1976	273.9	34.8	1,590	1,950	1.23	7.12
	1977	1,278.3	75.3	1,391	1,070	0.77	0.84
	1978	1,172.3	67.8	1,909	2,006	1.05	1.71

[8] Humboldt Bay had been shut down since 1976, and in 1983, Pacific Gas and Electric Company announced its intention to decommission the unit. Therefore, it is no longer included in the count of operating reactors. Parentheses indicate plant capacity when the plant was operational.

[9] Indian Point 1 was defueled in 1975, and in 1984, it was decided that it would not be placed in operation again. Therefore, it is no longer included in the count of operating reactors. Parentheses indicate plant capacity when the plant was operational.

[10] Indian Point 3 was purchased by a different utility in 1979 and subsequently reported its dose separately. Indian Point 1, 2, and 3 have been owned by the same utility since 2001 and report together.

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
INDIAN POINT 1,[9] 2	1979	574.0	71.4	1,349	1,279	0.95	2.23
Docket 50-3, 50-247;	1980	510.8	64.8	1,577	971	0.62	1.90
DPR-5, DPR-26	1981	367.5	46.0	2,595	2,731	1.05	7.43
1st commercial operation	1982	532.4	65.4	2,144	1,635	0.76	3.07
8/62, 7/74	1983	702.6	84.0	1,057	486	0.46	0.69
Type—PWRs	1984	416.7	51.9	2,919	2,644	0.91	6.35
Capacity—(265), (998) MWe	1985	791.4	95.7	708	192	0.27	0.24
	1986	457.5	56.2	1,926	1,250	0.65	2.73
	1987	611.4	73.4	1,980	1,217	0.61	1.99
	1988	719.3	86.9	890	235	0.26	0.33
	1989	532.5	64.6	2,093	1,436	0.69	2.70
	1990	618.0	66.6	1,061	608	0.57	0.98
	1991	461.2	55.7	1,810	1,468	0.81	3.18
	1992	930.9	99.1	489	97	0.20	0.10
	1993	702.1	75.7	1,514	675	0.45	0.96
	1994	903.8	100.0	381	48	0.13	0.05
	1995	582.4	70.8	1,690	548	0.32	0.94
	1996	927.8	94.8	388	54	0.14	0.06
	1997	360.6	45.1	1,340	367	0.27	1.02
	1998	282.8	31.5	1,154	289.600	0.25	1.02
	1999	831.8	88.2	350	40.931	0.12	0.05
	2000	115.4	13.0	2,003	567.224	0.28	4.92
	2001	887.2	97.2	399	22.067	0.06	0.02
	2002	860.0	91.3	1,361	248.487	0.18	0.29
	2003	953.0	98.9	241	11.778	0.05	0.01
	2004	---	---	156	3	0.02	---
INDIAN POINT 1[9]	2005	---	---	151	6.692	0.04	---
Docket 50-3;	2006	---	---	193	7.670	0.04	---
DPR-05	2007	---	---	210	2.554	0.01	---
1st commercial operation 8/62	2008	---	---	234	4.322	0.02	---
Type—PWR	2009	---	---	140	0.404	---	---
Capacity—(265) MWe	2010	---	---	157	0.833	0.01	---
	2011	---	---	103	0.262	---	---
	2012	---	---	106	0.343	---	---
	2013	---	---	3	0.283	0.09	---
INDIAN POINT 3[10]	1979	574.0	66.5	808	636	0.79	1.11
Docket 50-286;	1980	367.3	53.2	977	308	0.32	0.84
DPR-64	1981	367.5	59.8	677	364	0.54	0.99
1st commercial operation 8/76	1982	171.5	22.5	1,477	1,226	0.83	7.15
Type—PWR	1983	7.8	2.6	941	607	0.65	77.82
Capacity—(1,030) MWe	1984	714.4	76.3	658	230	0.35	0.32
	1985	566.5	66.0	1,093	570	0.52	1.01
	1986	655.3	73.4	588	202	0.34	0.31
	1987	574.6	62.7	1,308	500	0.38	0.87
	1988	792.5	83.3	451	93	0.21	0.12
	1989	587.8	61.1	1,800	876	0.49	1.49
	1990	595.3	62.9	1,066	358	0.34	0.60
	1991	862.8	87.5	299	40	0.13	0.05
	1992	561.7	61.4	1,003	212	0.21	0.38
	1993	140.5	14.9	478	60	0.13	0.43
	1994	---	---	529	58	0.11	---
	1995	174.8	21.4	638	67	0.11	0.38
	1996	695.3	74.8	289	22	0.08	0.03
	1997	495.1	54.9	1,608	234	0.15	0.47
	1998	874.0	95.3	213	14.774	0.07	0.02
	1999	829.8	88.3	893	116.920	0.13	0.14
	2000	960.0	99.3	143	8.693	0.06	0.01
	2001	903.9	93.1	1,014	118.115	0.12	0.13
	2002	960.0	98.5	156	6.797	0.04	0.01
	2003	866.2	89.8	902	96.059	0.11	0.11

[9] Indian Point 1 was defueled in 1975, and in 1984, it was decided that it would not be placed in operation again. Therefore, it is no longer included in the count of operating reactors. Parentheses indicate plant capacity when the plant was operational.

[10] Indian Point 3 was purchased by a different utility in 1979 and subsequently reported its dose separately. Indian Point 1, 2, and 3 have been owned by the same utility since 2001 and report together.

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
INDIAN POINT 2, 3[10]	2004	1,851.1	191.0	1,370	199.862	0.15	0.11
Docket 50-247, 50-286;	2005	1,922.2	191.7	1,363	85.280	0.06	0.04
DPR-26, DPR-64	2006	1,936.0	191.0	1,634	289.701	0.18	0.15
1st commercial operation	2007	1,899.3	188.0	1,971	109.969	0.06	0.06
7/74, 8/76	2008	1,977.2	192.6	1,456	142.728	0.10	0.07
Type—PWRs	2009	1,884.2	187.5	1,853	79.090	0.04	0.04
Capacity—(998), (1,030) MWe	2010	1,859.2	183.6	1,962	200.382	0.10	0.11
	2011	1,938.8	95.1	1,185	63.267	0.05	0.03
	2012	1,921.0	94.7	1,289	109.807	0.09	0.06
	2013	1,946.6	95.6	1,297	74.038	0.06	0.04
	2014	1,973.1	96.5	1,313	142.195	0.11	0.07
	2015	1,870.1	92.6	1,277	60.475	0.05	0.03
	2016	1,723.7	85.9	958	72.915	0.08	0.04
	2017	1,740.7	86.6	1,899	102.735	0.05	0.06
	2018	1,863.6	92.0	1,624	88.211	0.05	0.05
	2019	1,905.9	93.7	1,552	51.414	0.03	0.03
	2020	1,354.8	100.0	804	25.855	0.03	0.02
	2021	---	---	671	22.790	---	---
	2022	---	---	580	96.677	---	---
	2023	0.0	0.0	709	160.589	0.23	---
KEWAUNEE[11]	1975	401.9	88.2	104	28	0.27	0.07
Docket 50-305;	1976	405.9	78.9	381	270	0.71	0.67
DPR-43	1977	425.0	79.9	312	140	0.45	0.33
1st commercial operation 12/73	1978	466.6	89.5	335	154	0.46	0.33
Type—PWR	1979	412.0	79.0	343	127	0.37	0.31
Capacity—(556) MWe	1980	433.8	82.1	401	165	0.41	0.38
	1981	451.8	86.7	383	141	0.37	0.31
	1982	458.4	87.6	353	101	0.29	0.22
	1983	444.1	83.7	445	165	0.37	0.37
	1984	455.3	85.7	482	139	0.29	0.31
	1985	443.1	82.4	519	176	0.34	0.40
	1986	461.7	85.8	502	169	0.34	0.37
	1987	480.0	89.7	755	226	0.30	0.47
	1988	467.5	88.3	705	210	0.30	0.45
	1989	449.1	84.9	570	239	0.42	0.53
	1990	468.8	87.9	490	145	0.30	0.31
	1991	441.8	83.4	495	221	0.45	0.50
	1992	471.4	88.0	450	122	0.27	0.26
	1993	457.1	86.8	436	106	0.24	0.23
	1994	475.6	88.8	364	72	0.20	0.15
	1995	455.6	87.8	415	109	0.26	0.24
	1996	380.4	71.8	474	126	0.27	0.33
	1997	269.8	56.0	278	56	0.20	0.21
	1998	423.0	87.2	384	88.205	0.23	0.21
	1999	505.1	100.0	103	5.055	0.05	0.01
	2000	432.6	88.8	394	99.864	0.25	0.23
	2001	394.1	80.8	1,110	200.245	0.18	0.51
	2002	509.0	97.4	102	4.449	0.04	0.01
	2003	473.5	90.5	439	73.108	0.17	0.15
	2004	441.0	81.0	565	91.168	0.16	0.21
	2005	346.4	62.7	97	4.000	0.04	0.01
	2006	419.4	77.0	539	74.734	0.14	0.18
	2007	528.0	95.0	145	11.126	0.08	0.02
	2008	499.5	88.9	598	92.951	0.16	0.19
	2009	515.4	92.0	595	56.215	0.09	0.11
	2010	569.7	100.0	135	4.690	0.03	0.01
	2011	524.5	92.3	757	79.396	0.10	0.15
	2012	514.1	90.9	585	39.093	0.07	0.08
	2013	---	---	114	4.915	0.04	---
	2014	---	---	57	1.964	0.03	---

[10] Indian Point 3 was purchased by a different utility in 1979 and subsequently reported its dose separately. Indian Point 1, 2, and 3 have been owned by the same utility since 2001 and report together.

[11] Kewaunee ceased operations in May 2013 and is no longer included in the count of operating reactors. Parentheses indicate plant capacity when the plant was operational.

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
KEWAUNEE[11] (continued)	2015	---	---	7	0.156	0.02	---
	2016	---	---	5	0.092	0.02	---
	2017	---	---	64	6.167	0.10	---
	2018	---	---	8	1.002	0.13	---
	2019	---	---	2	0.021	0.01	---
	2020	---	---	---	---	---	---
	2021	---	---	2	0.011	---	---
	2022	---	---	3	0.019	---	---
	2023	0.0	0.0	16	0.251	0.02	---
LA CROSSE[12] Docket 50-409; DPR-45 1st commercial operation 11/69 Type—BWR Capacity—(48) MWe	1970	15.3	---	---	111	---	7.25
	1971	33.1	---	218	158	0.72	4.77
	1972	29.2	---	151	172	1.14	5.89
	1973	24.4	---	157	221	1.41	9.06
	1974	37.9	81.0	115	139	1.21	3.67
	1975	32.0	69.6	165	234	1.42	7.31
	1976	21.2	47.6	118	110	0.93	5.19
	1977	11.3	33.7	141	225	1.60	19.91
	1978	21.6	62.0	182	164	0.90	7.59
	1979	24.0	71.8	153	186	1.22	7.75
	1980	26.4	68.5	124	218	1.76	8.26
	1981	29.6	76.0	187	123	0.66	4.16
	1982	17.2	44.6	148	205	1.39	11.92
	1983	24.8	59.7	160	313	1.96	12.62
	1984	38.5	80.5	288	252	0.88	6.55
	1985	39.2	86.7	373	173	0.46	4.41
	1986	19.6	46.1	260	290	1.12	14.80
	1987	---	---	127	68	0.54	---
	1988	---	---	49	31	0.63	---
	1989	---	---	60	15	0.25	---
	1990	---	---	51	9	0.18	---
	1991	---	---	42	8	0.19	---
	1992	---	---	28	6	0.21	---
	1993	---	---	48	8	0.17	---
	1994	---	---	65	8	0.12	---
	1995	---	---	31	3	0.10	---
	1996	---	---	25	4	0.16	---
	1997	---	---	23	2	0.09	---
	1998	---	---	27	1.530	0.06	---
	1999	---	---	66	3.725	0.06	---
	2000	---	---	37	3.548	0.10	---
	2001	---	---	45	2.782	0.06	---
	2002	---	---	47	2.314	0.05	---
	2003	---	---	65	1.836	0.03	---
	2004	---	---	56	0.918	0.02	---
	2005	---	---	51	8.139	0.16	---
	2006	---	---	---	---	---	---
	2007	---	---	86	37.092	0.43	---
	2008	---	---	40	1.759	0.04	---
	2009	---	---	48	1.307	0.03	---
	2010	---	---	78	2.971	0.04	---
	2011	---	---	110	5.296	0.05	---
	2012	---	---	100	7.652	0.08	---
	2013	---	---	51	3.411	0.07	---
	2014	---	---	59	5.499	0.09	---
	2015	---	---	22	1.587	0.07	---
	2016	---	---	34	3.904	0.11	---
	2017	---	---	58	6.356	0.11	---
	2018	---	---	21	0.633	0.03	---
	2019	---	---	---	---	---	---
	2020	---	---	---	---	---	---

[11] Kewaunee ceased operations in May 2013 and is no longer included in the count of operating reactors. Parentheses indicate plant capacity when the plant was operational.

[12] La Crosse ceased operations in 1987 and will not be put in commercial operation again. Therefore, it is no longer included in the count of operating reactors. Parentheses indicate plant capacity when the plant was operational.

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
LA CROSSE[12]	2021	---	---	3	0.009	---	---
(continued)	2022	---	---	---	---	---	---
	2023	0.0	0.0	13	0.043	0.00	---
LASALLE 1, 2	1984	677.8	77.8	1,245	252	0.20	0.37
Docket 50-373, 50-374;	1985	987.9	53.0	1,635	685	0.42	0.69
NPF-11, NPF-18	1986	929.5	50.6	1,614	898	0.56	0.97
1st commercial operation	1987	1,030.0	59.3	1,744	1,396	0.80	1.36
1/84, 6/84	1988	1,317.6	71.6	2,737	2,471	0.90	1.88
Type—BWRs	1989	1,503.5	73.1	2,475	1,386	0.56	0.92
Capacity—1,111, 1,111 MWe	1990	1,754.3	84.6	1,830	948	0.52	0.54
	1991	1,837.0	86.7	1,985	806	0.41	0.44
	1992	1,447.4	72.0	2,418	1,167	0.48	0.81
	1993	1,542.0	76.0	1,701	854	0.50	0.55
	1994	1,580.0	77.6	1,812	726	0.40	0.46
	1995	1,696.6	82.1	1,623	512	0.32	0.30
	1996	1,053.8	54.3	2,782	819	0.29	0.78
	1997	---	---	1,661	316	0.19	---
	1998	380.9	19.3	2,099	422.249	0.20	1.11
	1999	1,671.9	81.8	2,689	576.354	0.21	0.34
	2000	2,138.6	97.1	1,831	260.320	0.14	0.12
	2001	2,223.8	98.9	535	82.721	0.15	0.04
	2002	2,040.0	92.1	2,012	449.587	0.22	0.22
	2003	2,100.2	94.8	2,253	464.427	0.21	0.22
	2004	2,162.1	96.0	2,366	359.470	0.15	0.17
	2005	2,130.4	95.0	2,097	334.558	0.16	0.16
	2006	2,181.3	97.0	2,006	248.454	0.12	0.11
	2007	2,166.7	98.0	1,953	228.373	0.12	0.11
	2008	2,145.8	96.4	2,402	217.567	0.09	0.10
	2009	2,141.0	95.7	1,986	296.659	0.15	0.14
	2010	2,184.1	96.5	2,386	384.434	0.16	0.18
	2011	2,198.2	96.1	2,805	340.529	0.12	0.15
	2012	2,230.8	96.9	1,973	224.711	0.11	0.10
	2013	2,141.6	94.1	1,960	383.622	0.20	0.18
	2014	2,141.0	94.0	2,151	366.524	0.17	0.17
	2015	2,132.9	95.7	2,492	501.666	0.20	0.24
	2016	2,185.5	96.0	2,653	338.985	0.13	0.16
	2017	2,158.5	94.5	2,824	570.389	0.20	0.26
	2018	2,214.7	96.3	2,923	349.268	0.12	0.16
	2019	2,218.6	97.1	2,295	309.129	0.13	0.14
	2020	2,248.4	97.7	2,097	182.552	0.09	0.08
	2021	2,112.4	92.5	2,454	666.001	0.27	0.32
	2022	2,193.7	96.2	1,886	248.156	0.13	0.11
	2023	2,219.6	96.8	2,298	606.160	0.26	0.27
LIMERICK 1, 2	1987	636.1	70.2	2,156	174	0.08	0.27
Docket 50-352, 50-353;	1988	794.9	96.5	950	52	0.05	0.07
NPF-39, NPF-85	1989	628.4	66.0	1,818	266	0.15	0.42
1st commercial operation	1990	1,527.7	78.2	1,422	175	0.12	0.11
2/86, 1/90	1991	1,810.9	86.8	1,151	106	0.09	0.06
Type—BWRs	1992	1,741.4	84.8	1,559	330	0.21	0.19
Capacity—1,099, 1,108 MWe	1993	1,913.2	91.6	1,287	217	0.17	0.11
	1994	1,944.4	94.9	1,543	275	0.18	0.14
	1995	1,957.1	93.0	1,581	260	0.16	0.13
	1996	2,026.2	93.3	1,654	234	0.14	0.12
	1997	2,001.7	95.8	1,463	234	0.16	0.12
	1998	1,907.2	89.5	1,854	357.139	0.19	0.19
	1999	2,089.6	94.2	1,800	271.547	0.15	0.13
	2000	2,154.9	95.8	1,279	260.611	0.20	0.12
	2001	2,205.9	97.3	1,127	210.336	0.19	0.10
	2002	2,197.0	97.1	1,248	160.324	0.13	0.07
	2003	2,213.6	97.2	1,298	147.047	0.11	0.07
	2004	2,218.9	97.6	1,265	149.433	0.12	0.07
	2005	2,168.9	96.3	1,460	187.609	0.13	0.09

[12] La Crosse ceased operations in 1987 and will not be put in commercial operation again. Therefore, it is no longer included in the count of operating reactors. Parentheses indicate plant capacity when the plant was operational.

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
LIMERICK 1, 2 (continued)	2006	2,207.2	97.0	1,509	193.429	0.13	0.09
	2007	2,185.8	96.0	1,570	197.104	0.13	0.09
	2008	2,169.2	96.0	1,393	176.825	0.13	0.08
	2009	2,211.4	97.2	1,606	234.742	0.15	0.11
	2010	2,165.2	96.7	1,525	167.797	0.11	0.08
	2011	2,112.7	94.5	2,007	184.415	0.09	0.09
	2012	2,071.4	92.8	2,011	159.812	0.08	0.08
	2013	2,235.7	96.8	1,663	133.531	0.08	0.06
	2014	2,182.1	94.8	1,523	138.396	0.09	0.06
	2015	2,165.6	95.9	1,516	124.787	0.08	0.06
	2016	2,219.1	96.3	1,626	126.799	0.08	0.06
	2017	2,123.1	93.4	1,808	183.736	0.10	0.09
	2018	2,214.9	97.2	1,676	121.053	0.07	0.05
	2019	2,213.1	97.2	1,906	157.471	0.08	0.07
	2020	2,212.3	97.5	1,396	116.596	0.08	0.05
	2021	2,204.3	97.5	1,560	123.712	0.08	0.06
	2022	2,188.0	96.7	1,744	162.049	0.09	0.07
	2023	2,179.7	97.1	1,487	126.851	0.09	0.06
MAINE YANKEE[13] Docket 50-309; DPR-36 1st commercial operation 12/72 Type—PWR Capacity—(860) MWe	1973	408.7	---	782	117	0.15	0.29
	1974	432.6	68.7	619	420	0.68	0.97
	1975	542.9	79.9	440	319	0.73	0.59
	1976	712.2	95.0	244	85	0.35	0.12
	1977	617.6	82.2	508	245	0.48	0.40
	1978	642.7	84.1	638	420	0.66	0.65
	1979	537.0	68.4	393	154	0.39	0.29
	1980	527.0	72.2	735	462	0.63	0.88
	1981	624.2	78.2	868	424	0.49	0.68
	1982	542.5	69.1	1,295	619	0.48	1.14
	1983	677.1	83.6	592	165	0.28	0.24
	1984	605.7	74.4	1,262	884	0.70	1.46
	1985	635.4	79.2	1,009	700	0.69	1.10
	1986	737.6	87.8	495	100	0.20	0.14
	1987	478.1	65.3	1,100	722	0.66	1.51
	1988	591.9	79.1	1,058	725	0.69	1.22
	1989	819.2	93.7	375	99	0.26	0.12
	1990	573.0	71.0	1,359	682	0.50	1.19
	1991	738.1	86.6	426	105	0.25	0.14
	1992	631.7	79.1	1,189	461	0.39	0.73
	1993	674.8	79.8	1,016	377	0.37	0.56
	1994	782.8	90.9	297	84	0.28	0.11
	1995	23.6	3.7	1,167	653	0.56	27.67
	1996	602.9	78.1	408	56	0.14	0.09
	1997	---	---	991	153	0.15	---
	1998	---	---	438	163.008	0.37	---
	1999	---	---	365	135.057	0.37	---
	2000	---	---	490	121.133	0.25	---
	2001	---	---	412	68.121	0.17	---
	2002	---	---	452	66.226	0.15	---
	2003	---	---	342	43.775	0.13	---
	2004	---	---	190	21.313	0.11	---
	2005	---	---	2	0.048	0.02	---
	2006	---	---	---	---	---	---
	2007	---	---	---	---	---	---
	2008	---	---	1	0.013	0.01	---
	2009	---	---	3	0.137	0.05	---
	2010	---	---	1	0.084	0.08	---
	2011	---	---	2	0.060	0.03	---
	2012	---	---	6	0.238	0.04	---
	2013	---	---	4	0.186	0.05	---
	2014	---	---	3	0.079	0.03	---
	2015	---	---	9	0.176	0.02	---
	2016	---	---	2	0.038	0.02	---

[13] Maine Yankee ceased operations in August 1997 and is no longer included in the count of operating reactors. Parentheses indicate plant capacity when the plant was operational.

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
MAINE YANKEE[13] (continued)	2017	---	---	3	0.054	0.02	---
	2018	---	---	6	0.089	0.01	---
	2019	---	---	14	0.188	0.01	---
	2020	---	---	13	0.226	0.02	---
	2021	---	---	1	0.013	0.01	---
	2022	---	---	---	---	---	---
	2023	---	---	5	0.061	0.01	---
MCGUIRE 1, 2	1982	524.9	80.4	1,560	169	0.11	0.32
Docket 50-369, 50-370;	1983	558.3	55.4	1,751	521	0.30	0.93
NPF-9, NPF-17	1984	764.1	68.5	1,663	507	0.30	0.66
1st commercial operation	1985	808.4	77.0	2,217	771	0.35	0.95
12/81, 3/84	1986	1,360.0	60.1	2,326	1,015	0.44	0.75
Type—PWRs	1987	1,774.7	79.2	2,865	1,043	0.36	0.59
Capacity—1,158, 1,158 MWe	1988	1,830.7	80.2	2,808	1,104	0.39	0.60
	1989	1,810.2	80.8	1,994	620	0.31	0.34
	1990	1,340.3	61.3	2,289	727	0.32	0.54
	1991	1,945.1	85.0	1,723	361	0.21	0.19
	1992	1,696.8	74.4	1,619	418	0.26	0.25
	1993	1,470.4	66.2	1,685	463	0.27	0.31
	1994	1,848.0	80.2	1,637	397	0.24	0.21
	1995	2,132.3	92.9	1,259	138	0.11	0.06
	1996	1,881.8	82.8	1,622	238	0.15	0.13
	1997	1,558.2	73.0	2,193	492	0.22	0.32
	1998	2,139.8	95.1	1,045	142.245	0.14	0.07
	1999	1,961.7	88.9	1,274	256.524	0.20	0.13
	2000	2,100.1	94.2	940	132.513	0.14	0.06
	2001	2,113.3	93.9	963	136.581	0.14	0.06
	2002	2,051.0	91.7	1,167	180.618	0.15	0.09
	2003	2,156.2	96.0	841	71.323	0.08	0.03
	2004	2,075.7	91.8	1,116	196.193	0.18	0.09
	2005	1,993.9	89.2	1,401	173.972	0.12	0.09
	2006	2,100.2	93.0	1,218	108.285	0.09	0.05
	2007	2,011.4	89.0	1,375	156.035	0.11	0.08
	2008	1,943.3	86.2	1,613	165.767	0.10	0.09
	2009	2,170.6	95.3	1,165	79.773	0.07	0.04
	2010	2,151.9	94.8	1,225	81.321	0.07	0.04
	2011	2,038.3	89.9	1,648	119.637	0.07	0.06
	2012	2,045.6	90.4	1,222	62.690	0.05	0.03
	2013	2,157.3	94.4	1,447	109.423	0.08	0.05
	2014	2,008.0	87.0	1,760	138.257	0.08	0.07
	2015	2,230.1	95.5	1,074	49.399	0.05	0.02
	2016	2,269.9	96.1	1,201	67.654	0.06	0.03
	2017	2,145.6	92.0	1,607	147.589	0.09	0.07
	2018	2,267.4	96.2	881	40.005	0.05	0.02
	2019	2,236.1	96.6	858	54.230	0.06	0.02
	2020	2,174.3	92.6	1,061	70.343	0.07	0.03
	2021	2,244.5	96.0	922	59.253	0.06	0.03
	2022	2,226.6	94.6	1,043	87.503	0.08	0.04
	2023	2,063.3	88.7	1,453	136.164	0.09	0.07
MILLSTONE 1[14]	1972	377.6	---	612	596	0.97	1.58
Docket 50-245;	1973	225.1	---	1,184	663	0.56	2.95
DPR-21	1974	430.3	79.1	2,477	1,430	0.58	3.32
1st commercial operation 12/70	1975	465.4	75.6	2,587	2,022	0.78	4.34
Type—BWR	1976	449.8	76.1	1,387	1,194	0.86	2.65
Capacity—(641) MWe	1977	575.7	89.6	1,075	394	0.37	0.68
	1978	556.6	87.6	1,391	1,416	1.02	2.54
	1979	505.0	77.3	2,001	1,795	0.90	3.55
	1980	405.8	69.0	3,024	2,157	0.71	5.32
	1981	304.3	51.6	2,506	1,496	0.60	4.92

[13] Maine Yankee ceased operations in August 1997 and is no longer included in the count of operating reactors. Parentheses indicate plant capacity when the plant was operational.

[14] Millstone 1 ceased operations in 1998 and is no longer included in the count of operating reactors. Parentheses indicate plant capacity when the plant was operational. From 2008–2014, Millstone 1 voluntarily provided an estimate of the collective dose for Unit 1 but not the number of individuals with measurable dose.

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
MILLSTONE 1[14] (continued)	1982	490.2	79.9	1,370	929	0.68	1.90
	1983	640.1	95.6	309	244	0.79	0.38
	1984	516.1	78.8	1,992	836	0.42	1.62
	1985	548.5	83.6	732	608	0.83	1.11
	1986	626.8	95.4	389	150	0.39	0.24
	1987	523.4	79.6	1,588	684	0.43	1.31
	1988	658.8	98.6	327	144	0.44	0.22
	1989	554.6	84.2	852	462	0.54	0.83
	1990	608.3	91.6	365	131	0.36	0.22
	1991	213.1	35.4	1,154	409	0.35	1.92
	1992	431.8	68.1	348	99	0.28	0.23
	1993	627.9	96.8	305	81	0.27	0.13
	1994	394.0	63.6	1,321	391	0.30	0.99
	1995	520.6	80.0	910	620	0.68	1.19
	1996	---	---	747	431	0.58	---
	1997	-2.9	---	1,053	195	0.19	---
	1998	-2.7	---	347	12.741	0.04	---
	1999	---	---	397	9.790	0.02	---
	2000	---	---	478	59.955	0.13	---
	2001	---	---	414	14.946	0.04	---
	2002	---	---	185	4.151	0.02	---
	2003	---	---	195	10.675	0.05	---
	2004	---	---	147	11.152	0.08	---
	2005	---	---	145	0.897	0.01	---
	2006	---	---	4	0.607	0.15	---
	2007	---	---	33	0.901	0.03	---
	2008	---	---	---	0.222	---	---
	2009	---	---	---	0.114	---	---
	2010	---	---	---	0.142	---	---
	2011	---	---	---	0.265	---	---
	2012	---	---	---	0.137	---	---
	2013	---	---	---	0.313	---	---
	2014	---	---	---	0.313	---	---
	2015	---	---	---	---	---	---
	2016	---	---	---	---	---	---
	2017	---	---	---	---	---	---
MILLSTONE 2, 3	1976	545.7	78.7	620	168	0.27	0.31
Docket 50-336, 50-423;	1977	518.7	65.7	667	242	0.36	0.47
DPR-65; NPF-49	1978	536.6	67.3	1,420	1,444	1.02	2.69
1st commercial operation	1979	520.0	62.8	525	471	0.90	0.91
12/75, 4/86	1980	579.3	69.2	893	637	0.71	1.10
Type—PWRs	1981	722.4	82.6	890	531	0.60	0.74
Capacity—870, 1,223 MWe	1982	595.9	70.6	2,083	1,413	0.68	2.37
	1983	294.0	34.2	2,383	1,881	0.79	6.40
	1984	782.7	93.5	285	120	0.42	0.15
	1985	417.8	49.4	1,905	1,581	0.83	3.78
	1986	1,313.8	80.4	2,393	993	0.41	0.76
	1987	1,624.5	84.1	1,441	505	0.35	0.31
	1988	1,594.8	83.2	1,827	804	0.44	0.50
	1989	1,428.3	72.9	1,984	1,079	0.54	0.76
	1990	1,614.9	87.1	1,652	593	0.36	0.37
	1991	819.5	69.7	1,084	381	0.35	0.46
	1992	1,115.1	59.9	3,190	1,280	0.40	1.15
	1993	1,525.2	79.7	2,064	557	0.27	0.37
	1994	1,556.6	73.1	1,249	188	0.15	0.12
	1995	1,278.1	60.5	1,691	416	0.25	0.33
	1996	418.1	19.3	983	126	0.13	0.30
	1997	---	---	1,435	253	0.18	---
	1998	374.9	20.9	1,179	112.543	0.10	0.30
	1999	1,446.3	73.3	1,688	252.138	0.15	0.17
	2000	1,865.8	92.4	1,385	142.664	0.10	0.08

[14] Millstone 1 ceased operations in 1998 and is no longer included in the count of operating reactors. Parentheses indicate plant capacity when the plant was operational. From 2008–2014, Millstone 1 voluntarily provided an estimate of the collective dose for Unit 1 but not the number of individuals with measurable dose.

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
MILLSTONE 2, 3 (continued)	2001	1,759.3	92.0	1,327	174.238	0.13	0.10
	2002	1,703.0	87.5	1,548	292.197	0.19	0.17
	2003	1,834.6	91.0	1,274	322.923	0.25	0.18
	2004	1,887.5	95.0	803	136.459	0.17	0.07
	2005	1,777.1	88.8	1,329	202.490	0.15	0.11
	2006	1,898.5	93.0	1,160	174.164	0.15	0.09
	2007	1,875.1	94.0	1,150	163.780	0.14	0.09
	2008	1,761.1	87.7	1,467	272.693	0.19	0.15
	2009	1,906.1	89.6	983	159.203	0.16	0.08
	2010	1,916.8	93.1	718	81.589	0.11	0.04
	2011	1,822.7	87.7	1,044	169.417	0.16	0.09
	2012	1,948.9	92.2	726	73.270	0.10	0.04
	2013	1,954.5	94.6	747	64.232	0.09	0.03
	2014	1,812.7	87.5	1,250	160.502	0.13	0.09
	2015	1,992.4	95.0	818	63.940	0.08	0.03
	2016	1,896.1	93.1	856	64.125	0.07	0.03
	2017	1,888.0	91.2	1,118	112.598	0.10	0.06
	2018	1,931.7	91.5	777	66.110	0.09	0.03
	2019	1,914.9	94.8	715	47.673	0.07	0.02
	2020	1,798.0	87.1	1,028	82.459	0.08	0.05
	2021	1,970.8	94.4	685	50.289	0.07	0.03
	2022	1,886.3	91.8	707	53.570	0.08	0.03
	2023	1,565.2	77.8	1,172	130.298	0.11	0.08
MONTICELLO Docket 50-263; DPR-22 1st commercial operation 6/71 Type—BWR Capacity—628 MWe	1972	424.4	---	99	61	0.62	0.14
	1973	389.5	---	401	176	0.44	0.45
	1974	349.3	74.9	842	349	0.41	1.00
	1975	344.8	72.2	1,353	1,353	1.00	3.92
	1976	476.4	91.5	325	263	0.81	0.55
	1977	425.6	79.9	860	1,000	1.16	2.35
	1978	459.4	87.2	679	375	0.55	0.82
	1979	522.0	97.6	372	157	0.42	0.30
	1980	411.8	78.2	1,114	531	0.48	1.29
	1981	389.3	72.6	1,446	1,004	0.69	2.58
	1982	291.1	63.3	1,307	993	0.76	3.41
	1983	494.6	96.3	416	121	0.29	0.24
	1984	33.7	9.2	1,872	2,462	1.32	73.06
	1985	509.8	91.7	586	327	0.56	0.64
	1986	402.7	79.1	895	596	0.67	1.48
	1987	422.5	81.9	941	568	0.60	1.34
	1988	542.5	99.8	375	110	0.29	0.20
	1989	318.2	76.2	1,102	507	0.46	1.59
	1990	536.0	96.9	336	94	0.28	0.18
	1991	429.4	80.8	964	465	0.48	1.08
	1992	528.3	97.5	454	114	0.25	0.22
	1993	458.1	84.4	954	494	0.52	1.08
	1994	471.3	87.0	788	395	0.50	0.84
	1995	564.7	100.0	200	44	0.22	0.08
	1996	461.6	86.9	757	240	0.32	0.52
	1997	417.4	75.9	399	106	0.27	0.25
	1998	470.2	88.1	674	209.137	0.31	0.44
	1999	530.7	92.9	451	70.075	0.16	0.13
	2000	483.2	84.2	792	216.136	0.27	0.45
	2001	441.3	78.5	834	220.683	0.26	0.50
	2002	571.0	99.0	399	40.030	0.10	0.07
	2003	522.8	91.7	858	168.896	0.20	0.32
	2004	573.2	99.2	279	35.081	0.13	0.06
	2005	509.4	90.0	919	175.201	0.19	0.34
	2006	579.1	100.0	273	33.416	0.12	0.06
	2007	478.6	85.0	1,075	191.398	0.18	0.40
	2008	555.3	95.8	351	43.777	0.12	0.08
	2009	473.1	85.2	1,235	173.624	0.14	0.37
	2010	536.0	98.5	534	56.116	0.11	0.10
	2011	383.4	71.3	1,903	236.997	0.12	0.62
	2012	556.7	98.6	528	38.786	0.07	0.07

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
MONTICELLO (continued)	2013	342.3	62.5	1,247	198.968	0.16	0.58
	2014	493.6	95.0	282	35.306	0.13	0.07
	2015	532.4	85.5	846	130.057	0.15	0.24
	2016	639.0	100.0	313	28.547	0.09	0.04
	2017	589.0	92.2	815	115.814	0.14	0.20
	2018	641.3	100.0	273	29.238	0.11	0.05
	2019	566.7	91.9	1,055	128.425	0.12	0.23
	2020	638.5	100.0	249	21.790	0.09	0.03
	2021	570.0	91.2	808	133.174	0.16	0.23
	2022	633.0	99.3	374	44.589	0.12	0.07
	2023	547.2	88.1	957	153.784	0.16	0.28
NINE MILE POINT 1, 2 Docket 50-220, 50-410; DPR-63; NPF-69 1st commercial operation 12/69, 4/88 Type—BWRs Capacity—565, 1,277 MWe	1970	227.0	---	821	44	0.05	0.19
	1971	346.5	---	1,006	195	0.19	0.56
	1972	381.8	---	735	285	0.39	0.75
	1973	411.0	---	550	567	1.03	1.38
	1974	385.9	70.5	740	824	1.11	2.14
	1975	359.0	72.1	649	681	1.05	1.90
	1976	484.6	88.2	392	428	1.09	0.88
	1977	347.4	59.2	1,093	1,383	1.27	3.98
	1978	527.7	95.1	561	314	0.56	0.60
	1979	354.0	66.1	1,326	1,497	1.13	4.23
	1980	533.9	92.3	1,174	591	0.50	1.11
	1981	385.2	66.0	2,029	1,592	0.78	4.13
	1982	133.5	21.4	1,352	1,264	0.93	9.47
	1983	329.8	56.2	1,405	860	0.61	2.61
	1984	426.8	71.9	1,530	890	0.58	2.09
	1985	580.9	96.4	1,007	265	0.26	0.46
	1986	371.0	65.3	1,878	1,275	0.68	3.44
	1987	542.6	93.3	1,190	141	0.12	0.26
	1988	---	---	2,626	854	0.33	---
	1989	527.5	29.7	2,737	564	0.21	1.07
	1990	656.2	46.6	2,405	699	0.29	1.07
	1991	1,250.8	79.7	1,543	292	0.19	0.23
	1992	965.9	61.8	1,800	563	0.31	0.58
	1993	1,380.2	84.6	2,352	633	0.27	0.46
	1994	1,589.6	95.9	800	149	0.19	0.09
	1995	1,382.2	82.5	2,304	759	0.33	0.55
	1996	1,598.6	91.6	1,596	290	0.18	0.18
	1997	1,321.5	74.8	1,425	429	0.30	0.32
	1998	1,387.3	87.0	1,744	378.484	0.22	0.27
	1999	1,409.5	81.3	1,709	446.699	0.26	0.32
	2000	1,443.9	88.1	1,783	282.838	0.16	0.20
	2001	1,506.9	88.9	1,371	343.197	0.25	0.23
	2002	1,517.0	90.4	2,449	516.663	0.21	0.34
	2003	1,585.6	91.4	1,501	374.775	0.25	0.24
	2004	1,551.9	92.0	1,362	448.509	0.33	0.29
	2005	1,656.5	94.5	1,366	401.719	0.29	0.24
	2006	1,647.1	96.0	1,130	229.551	0.20	0.14
	2007	1,598.3	93.0	1,826	329.307	0.18	0.21
	2008	1,642.1	95.8	1,391	301.824	0.22	0.18
	2009	1,706.2	97.1	1,456	237.552	0.16	0.14
	2010	1,627.1	95.2	1,703	375.424	0.22	0.23
	2011	1,616.8	92.5	1,362	244.395	0.18	0.15
	2012	1,504.6	87.3	1,764	407.900	0.23	0.27
	2013	1,804.9	95.0	1,411	217.056	0.15	0.12
	2014	1,737.8	94.7	1,483	263.710	0.18	0.15
	2015	1,823.7	95.7	1,604	160.380	0.10	0.09
	2016	1,765.5	95.1	1,679	256.794	0.15	0.15
	2017	1,827.3	97.2	1,401	141.150	0.10	0.08
	2018	1,758.9	95.8	1,905	385.491	0.20	0.22
	2019	1,777.2	94.2	1,338	151.719	0.11	0.09
	2020	1,785.4	96.2	1,564	258.503	0.17	0.14
	2021	1,829.8	97.5	1,332	123.737	0.09	0.07
	2022	1,730.6	95.8	1,335	229.158	0.17	0.13
	2023	1,778.0	94.4	1,538	165.169	0.11	0.09

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
NORTH ANNA 1, 2	1979	507.0	61.7	2,025	449	0.22	0.89
Docket 50-338, 50-339;	1980	681.8	86.5	2,086	218	0.10	0.32
NPF-4, NPF-7	1981	1,241.9	71.5	2,416	680	0.28	0.55
1st commercial operation	1982	777.7	45.8	2,872	1,915	0.67	2.46
6/78, 12/80	1983	1,338.4	76.1	2,228	665	0.30	0.50
Type—PWRs	1984	1,021.3	58.8	3,062	1,945	0.64	1.90
Capacity—948, 944 MWe	1985	1,516.9	86.1	2,436	838	0.34	0.55
	1986	1,484.5	83.0	2,831	722	0.26	0.49
	1987	1,112.6	67.8	2,624	1,521	0.58	1.37
	1988	1,772.7	96.7	992	112	0.11	0.06
	1989	1,226.8	72.5	2,861	1,471	0.51	1.20
	1990	1,590.4	90.5	2,161	590	0.27	0.37
	1991	1,597.5	88.6	2,085	629	0.30	0.39
	1992	1,403.2	84.1	2,159	576	0.27	0.41
	1993	1,428.4	80.1	2,768	908	0.33	0.64
	1994	1,717.1	95.9	1,036	193	0.19	0.11
	1995	1,666.4	90.8	1,551	367	0.24	0.22
	1996	1,569.6	89.1	1,203	291	0.24	0.19
	1997	1,711.5	96.2	856	103	0.12	0.06
	1998	1,632.8	92.7	1,201	265.922	0.22	0.16
	1999	1,747.7	96.1	727	94.402	0.13	0.05
	2000	1,734.1	95.8	730	65.405	0.09	0.04
	2001	1,491.0	84.8	1,231	308.907	0.25	0.21
	2002	1,557.0	84.3	914	143.312	0.16	0.09
	2003	1,569.1	87.2	1,041	187.014	0.18	0.12
	2004	1,685.6	92.0	965	129.686	0.13	0.08
	2005	1,751.5	96.0	686	58.844	0.09	0.03
	2006	1,723.0	95.0	749	82.069	0.11	0.05
	2007	1,596.7	88.0	1,581	309.237	0.20	0.19
	2008	1,643.1	91.2	795	61.003	0.08	0.04
	2009	1,735.5	95.6	745	78.126	0.10	0.05
	2010	1,529.6	84.9	1,032	182.289	0.18	0.12
	2011	1,429.1	76.5	792	90.763	0.11	0.06
	2012	1,745.6	91.4	762	106.518	0.14	0.06
	2013	1,712.9	89.2	948	121.803	0.13	0.07
	2014	1,813.8	94.1	753	71.914	0.10	0.04
	2015	1,857.4	96.6	663	43.838	0.07	0.02
	2016	1,726.2	90.0	1,109	119.339	0.11	0.07
	2017	1,840.9	95.6	678	44.884	0.07	0.02
	2018	1,826.2	95.1	796	56.845	0.07	0.03
	2019	1,749.4	91.9	837	95.288	0.11	0.05
	2020	1,803.6	94.1	667	46.569	0.07	0.03
	2021	1,754.8	91.9	578	36.851	0.06	0.02
	2022	1,629.1	85.3	767	68.844	0.09	0.04
	2023	1,799.7	94.5	700	43.326	0.06	0.02
OCONEE 1, 2, 3	1974	650.6	60.1	844	517	0.61	0.79
Docket 50-269, 50-270, 50-287;	1975	1,838.3	75.5	829	497	0.60	0.27
DPR-38, DPR-47, DPR-55	1976	1,561.4	63.0	1,215	1,026	0.84	0.66
1st commercial operation	1977	1,566.4	65.9	1,595	1,329	0.83	0.85
7/73, 9/74, 12/74	1978	1,909.0	75.8	1,636	1,393	0.85	0.73
Type—PWRs	1979	1,708.0	67.7	2,100	1,001	0.48	0.59
Capacity—847, 848, 859 MWe	1980	1,703.7	70.1	2,124	1,055	0.50	0.62
	1981	1,661.5	66.8	2,445	1,211	0.50	0.73
	1982	1,293.1	52.5	2,445	1,792	0.73	1.39
	1983	2,141.5	82.2	1,902	1,207	0.63	0.56
	1984	2,242.9	85.7	2,085	1,106	0.53	0.49
	1985	2,036.3	80.5	2,729	1,304	0.48	0.64
	1986	1,995.6	79.0	2,499	949	0.38	0.48
	1987	1,962.6	82.4	2,672	1,142	0.43	0.58
	1988	2,228.9	87.2	2,672	871	0.33	0.39
	1989	2,188.6	85.4	2,205	684	0.31	0.31
	1990	2,405.2	91.4	1,948	404	0.21	0.17
	1991	2,275.0	86.7	1,966	551	0.28	0.24
	1992	2,110.7	82.0	1,954	612	0.31	0.29

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
OCONEE 1, 2, 3 (continued)	1993	2,399.2	91.3	1,499	237	0.16	0.10
	1994	2,144.3	82.2	1,923	537	0.28	0.25
	1995	2,366.1	89.5	1,586	304	0.19	0.13
	1996	1,847.9	70.3	1,479	257	0.17	0.14
	1997	1,563.7	67.7	1,379	223	0.16	0.14
	1998	1,989.1	81.3	1,695	366.028	0.22	0.18
	1999	2,264.5	90.3	1,568	202.025	0.13	0.09
	2000	2,321.0	91.6	1,686	272.697	0.16	0.12
	2001	2,167.6	86.8	2,002	579.209	0.29	0.27
	2002	2,355.0	92.5	1,723	224.672	0.13	0.10
	2003	2,177.7	86.3	2,180	245.349	0.11	0.11
	2004	2,125.2	84.1	2,295	367.891	0.16	0.17
	2005	2,349.5	92.3	1,516	148.694	0.10	0.06
	2006	2,274.8	90.0	1,859	221.222	0.12	0.10
	2007	2,347.8	92.0	1,915	252.936	0.13	0.11
	2008	2,298.5	90.9	1,924	186.335	0.10	0.08
	2009	2,385.7	92.6	1,830	180.868	0.10	0.08
	2010	2,391.1	93.3	1,953	193.088	0.10	0.08
	2011	2,321.6	90.7	2,142	182.261	0.09	0.08
	2012	2,351.0	91.8	1,777	131.442	0.07	0.06
	2013	2,400.1	93.1	1,549	106.414	0.07	0.04
	2014	2,419.3	94.1	2,005	109.011	0.05	0.05
	2015	2,504.5	97.4	1,339	69.050	0.05	0.03
	2016	2,417.5	93.9	1,179	53.398	0.05	0.02
	2017	2,488.4	96.7	966	37.301	0.04	0.01
	2018	2,430.8	94.4	1,141	57.201	0.05	0.02
	2019	2,498.3	97.0	715	31.137	0.04	0.01
	2020	2,459.2	94.6	1,155	61.604	0.05	0.03
	2021	2,535.0	97.6	796	32.452	0.04	0.01
	2022	2,411.5	93.7	1,345	66.673	0.05	0.03
	2023	2,539.6	97.6	939	36.862	0.04	0.01
OYSTER CREEK[15] Docket 50-219; DPR-16 1st commercial operation 12/69 Type—BWR Capacity—(619) MWe	1970	413.6	---	95	63	0.66	0.15
	1971	448.9	---	249	240	0.96	0.53
	1972	515.0	---	339	582	1.72	1.13
	1973	424.6	---	782	1,236	1.58	2.91
	1974	434.5	70.4	935	984	1.05	2.26
	1975	373.6	73.3	1,210	1,140	0.94	3.05
	1976	456.5	79.3	1,582	1,078	0.68	2.36
	1977	385.7	70.1	1,673	1,614	0.96	4.18
	1978	431.8	74.3	1,411	1,279	0.91	2.96
	1979	541.0	85.9	842	467	0.55	0.86
	1980	232.9	41.4	1,966	1,733	0.88	7.44
	1981	314.8	59.8	1,689	917	0.54	2.91
	1982	242.7	62.5	1,270	865	0.68	3.56
	1983	27.9	11.5	2,303	2,257	0.98	80.90
	1984	37.1	9.6	2,369	2,054	0.87	55.36
	1985	446.1	89.4	2,342	748	0.32	1.68
	1986	157.3	31.5	3,740	2,436	0.65	15.49
	1987	371.0	64.2	1,932	522	0.27	1.41
	1988	419.6	65.9	2,875	1,504	0.52	3.58
	1989	287.5	57.3	2,395	910	0.38	3.17
	1990	511.8	89.1	1,941	310	0.16	0.61
	1991	351.6	60.5	3,089	1,185	0.38	3.37
	1992	536.3	85.9	2,771	657	0.24	1.23
	1993	551.9	87.8	2,560	416	0.16	0.75
	1994	431.7	70.8	2,382	844	0.35	1.96
	1995	615.4	97.4	761	90	0.12	0.15
	1996	515.0	82.6	1,833	449	0.24	0.87
	1997	579.1	94.3	509	50	0.10	0.09
	1998	490.8	82.4	1,408	308.323	0.22	0.63
	1999	615.1	100.0	466	41.664	0.09	0.07

[15] Oyster Creek ceased operations in September 2018 and is no longer included in the count of operating reactors. Parentheses indicate plant capacity when the plant was operational.

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
OYSTER CREEK[15] (continued)	2000	444.9	83.3	2,044	614.379	0.30	1.38
	2001	595.0	97.6	442	45.817	0.10	0.08
	2002	573.0	94.0	1,468	265.810	0.18	0.46
	2003	598.4	97.2	416	43.363	0.10	0.07
	2004	551.8	91.6	1,346	226.880	0.17	0.41
	2005	611.9	99.5	316	27.813	0.09	0.05
	2006	530.2	90.0	1,443	189.950	0.13	0.36
	2007	579.7	97.0	464	46.590	0.10	0.08
	2008	531.0	91.0	1,511	211.932	0.14	0.40
	2009	568.3	96.4	382	37.272	0.10	0.07
	2010	525.7	89.9	1,655	206.284	0.12	0.39
	2011	604.8	98.0	434	46.984	0.11	0.08
	2012	537.1	88.5	1,359	165.164	0.12	0.31
	2013	584.1	96.5	299	29.981	0.10	0.05
	2014	551.8	91.2	1,160	145.487	0.13	0.26
	2015	602.3	97.7	275	22.710	0.08	0.04
	2016	523.4	87.5	1,286	133.603	0.10	0.26
	2017	619.8	99.5	249	17.511	0.07	0.03
	2018	---	---	357	37.887	0.11	---
	2019	---	---	123	21.886	0.18	---
	2020	---	---	181	22.755	0.13	---
	2021	---	---	350	67.601	0.19	---
	2022	---	---	167	49.829	0.30	---
	2023	---	---	115	30.409	0.26	---
PALISADES Docket 50-255; DPR-20 1st commercial operation 12/71 Type—PWR Capacity—777 MWe	1972	216.8	---	---	78	---	0.36
	1973	286.8	---	975	1,133	1.16	3.95
	1974	10.7	5.5	774	627	0.81	58.60
	1975	302.0	64.5	495	306	0.62	1.01
	1976	346.9	55.2	742	696	0.94	2.01
	1977	616.6	91.4	332	100	0.30	0.16
	1978	320.2	49.7	849	764	0.90	2.39
	1979	415.0	59.9	1,599	854	0.53	2.06
	1980	288.3	42.9	1,307	424	0.32	1.47
	1981	418.2	57.2	2,151	902	0.42	2.16
	1982	404.3	54.7	1,554	330	0.21	0.82
	1983	454.4	60.3	2,167	977	0.45	2.15
	1984	98.7	15.2	1,344	573	0.43	5.81
	1985	639.2	83.8	1,355	507	0.37	0.79
	1986	102.3	15.1	1,438	672	0.47	6.57
	1987	319.2	48.2	1,122	456	0.41	1.43
	1988	413.4	56.8	1,472	730	0.50	1.77
	1989	442.8	69.1	1,026	314	0.31	0.71
	1990	366.7	58.7	2,414	766	0.32	2.09
	1991	587.0	78.1	1,315	211	0.16	0.36
	1992	581.9	76.1	1,267	295	0.23	0.51
	1993	424.4	53.7	908	289	0.32	0.68
	1994	541.8	67.0	397	60	0.15	0.11
	1995	583.5	75.8	1,230	462	0.38	0.79
	1996	638.2	81.4	1,109	318	0.29	0.50
	1997	662.5	89.9	338	48	0.14	0.07
	1998	615.4	83.5	895	216.563	0.24	0.35
	1999	585.4	80.2	939	218.451	0.23	0.37
	2000	654.4	88.0	255	26.305	0.10	0.04
	2001	268.2	36.3	1,032	362.723	0.35	1.35
	2002	725.0	94.8	224	24.380	0.11	0.03
	2003	701.1	90.7	822	202.571	0.25	0.29
	2004	608.6	82.3	974	370.895	0.38	0.61
	2005	756.6	98.0	156	10.459	0.07	0.01
	2006	675.5	86.0	882	239.652	0.27	0.35
	2007	665.6	85.0	1,065	256.632	0.24	0.39
	2008	778.4	98.2	272	23.478	0.09	0.03
	2009	698.5	89.0	975	267.295	0.27	0.38

[15] Oyster Creek ceased operations in September 2018 and is no longer included in the count of operating reactors. Parentheses indicate plant capacity when the plant was operational.

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
PALISADES (continued)	2010	712.5	90.8	908	219.873	0.24	0.31
	2011	758.1	96.5	340	21.654	0.06	0.03
	2012	589.5	77.1	1,096	245.129	0.22	0.42
	2013	689.7	86.7	339	15.830	0.05	0.02
	2014	665.6	83.4	1,231	486.062	0.39	0.73
	2015	721.3	90.9	940	230.687	0.25	0.32
	2016	803.8	100.0	161	5.667	0.04	0.01
	2017	696.1	91.3	794	154.142	0.19	0.22
	2018	622.8	78.8	958	206.284	0.22	0.33
	2019	783.6	98.2	161	10.051	0.06	0.01
	2020	684.3	86.0	889	238.487	0.27	0.35
	2021	800.8	100.0	108	4.556	0.04	0.01
	2022	---	---	245	31.958	---	---
	2023	---	---	30	2.377	0.08	---
PALO VERDE 1, 2, 3 Docket 50-528, 50-529, 50-530; NPF-41, NPF-51, NPF-74 1st commercial operation 1/86, 9/86, 1/88 Type—PWRs Capacity—1,311, 1,314, 1,312 MWe	1987	1,638.1	66.1	1,792	669	0.37	0.41
	1988	1,700.9	65.5	2,173	688	0.32	0.40
	1989	965.3	26.5	2,615	720	0.28	0.75
	1990	2,500.9	67.5	2,236	499	0.22	0.20
	1991	3,043.9	78.9	2,242	605	0.27	0.20
	1992	3,102.3	82.0	1,981	541	0.27	0.17
	1993	2,677.1	74.3	2,124	592	0.28	0.22
	1994	2,827.6	79.1	2,048	462	0.23	0.16
	1995	3,265.2	85.6	1,875	482	0.26	0.15
	1996	3,482.7	90.0	1,717	302	0.18	0.09
	1997	3,369.2	92.2	1,585	246	0.16	0.07
	1998	3,454.4	93.2	1,410	192.425	0.14	0.06
	1999	3,471.2	93.2	1,275	146.328	0.11	0.04
	2000	3,458.6	93.0	1,279	158.105	0.12	0.05
	2001	3,280.2	88.6	1,361	182.043	0.13	0.06
	2002	3,513.0	94.0	1,343	140.057	0.10	0.04
	2003	3,254.4	88.6	1,943	210.842	0.11	0.06
	2004	3,201.4	86.3	1,324	199.016	0.15	0.06
	2005	2,937.6	80.4	2,014	200.300	0.10	0.07
	2006	2,741.1	79.0	1,585	151.516	0.10	0.06
	2007	3,058.5	81.0	2,372	148.660	0.06	0.05
	2008	3,330.0	86.1	1,706	159.913	0.09	0.05
	2009	3,500.2	89.6	1,695	97.902	0.06	0.03
	2010	3,561.6	90.9	1,655	112.612	0.07	0.03
	2011	3,570.5	91.9	1,248	61.374	0.05	0.02
	2012	3,635.5	93.6	1,126	59.593	0.05	0.02
	2013	3,588.0	91.8	1,164	93.713	0.08	0.03
	2014	3,689.9	94.1	1,085	60.002	0.06	0.02
	2015	3,711.7	94.1	1,142	57.996	0.05	0.02
	2016	3,680.7	93.6	1,177	64.796	0.06	0.02
	2017	3,691.8	94.1	1,088	53.888	0.05	0.01
	2018	3,551.0	91.5	1,036	41.103	0.04	0.01
	2019	3,643.8	92.6	937	41.262	0.04	0.01
	2020	3,601.9	91.4	908	35.139	0.04	0.01
	2021	3,610.7	93.0	865	37.023	0.04	0.01
	2022	3,645.3	92.8	871	42.075	0.05	0.01
	2023	3,599.1	92.7	829	49.159	0.06	0.01
PEACH BOTTOM 2, 3 Docket 50-277, 50-278; DPR-44, DPR-56 1st commercial operation 7/74, 12/74 Type—BWRs Capacity—1,232, 1,251 MWe	1975	1,234.3	80.9	971	228	0.23	0.18
	1976	1,379.2	73.0	2,136	840	0.39	0.61
	1977	1,052.4	58.7	2,827	2,036	0.72	1.93
	1978	1,636.3	84.0	2,244	1,317	0.59	0.80
	1979	1,740.0	84.5	2,276	1,388	0.61	0.80
	1980	1,374.2	66.3	2,774	2,302	0.83	1.68
	1981	1,161.8	58.0	2,857	2,506	0.88	2.16
	1982	1,583.3	76.9	2,734	1,977	0.72	1.25
	1983	824.7	41.0	3,107	2,963	0.95	3.59
	1984	1,165.8	57.5	3,313	2,450	0.74	2.10
	1985	682.7	37.5	4,209	3,354	0.80	4.91
	1986	1,395.0	71.7	2,454	1,080	0.44	0.77
	1987	365.7	20.3	4,363	2,195	0.50	6.00

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
PEACH BOTTOM 2, 3	1988	---	---	4,204	2,327	0.55	---
(continued)	1989	491.0	35.0	2,301	728	0.32	1.48
	1990	1,684.0	85.7	1,585	377	0.24	0.22
	1991	1,210.9	62.3	2,702	934	0.35	0.77
	1992	1,516.6	78.7	1,911	502	0.26	0.33
	1993	1,654.0	81.9	1,757	552	0.31	0.33
	1994	1,927.4	93.8	2,133	579	0.27	0.30
	1995	1,955.9	95.1	1,940	398	0.21	0.20
	1996	2,012.4	96.9	1,657	282	0.17	0.14
	1997	1,956.3	95.0	1,872	490	0.26	0.25
	1998	1,881.2	93.2	1,903	366.040	0.19	0.19
	1999	2,057.2	96.0	1,630	319.307	0.20	0.16
	2000	2,058.3	96.7	1,729	330.928	0.19	0.16
	2001	2,037.1	95.8	1,445	344.283	0.24	0.17
	2002	2,105.0	96.7	1,915	333.056	0.17	0.16
	2003	2,072.4	94.9	1,641	355.969	0.22	0.17
	2004	2,148.8	96.4	1,422	264.727	0.19	0.12
	2005	2,102.0	95.6	1,801	306.201	0.17	0.15
	2006	2,169.1	97.0	1,513	247.676	0.16	0.11
	2007	2,163.8	97.0	1,906	384.795	0.20	0.18
	2008	2,115.3	95.1	1,816	212.741	0.12	0.10
	2009	2,130.4	95.5	2,032	310.517	0.15	0.15
	2010	2,145.3	96.2	1,716	219.372	0.13	0.10
	2011	2,152.0	95.7	2,758	389.814	0.14	0.18
	2012	2,142.5	94.8	2,460	305.431	0.12	0.14
	2013	2,143.5	94.7	2,902	483.936	0.17	0.23
	2014	2,142.3	94.2	3,053	430.941	0.14	0.20
	2015	2,267.6	95.6	2,938	395.597	0.13	0.17
	2016	2,498.1	97.7	2,052	202.221	0.10	0.08
	2017	2,481.1	98.0	1,824	197.814	0.11	0.08
	2018	2,474.9	96.6	1,717	177.337	0.10	0.07
	2019	2,545.2	97.9	1,767	167.083	0.09	0.07
	2020	2,488.0	98.0	1,521	170.827	0.11	0.07
	2021	2,542.1	98.2	1,403	132.570	0.09	0.05
	2022	2,532.4	98.0	1,367	114.994	0.08	0.05
	2023	2,533.9	98.3	1,545	138.048	0.09	0.05
PERRY	1988	869.3	79.0	782	105	0.13	0.12
Docket 50-440;	1989	642.2	57.0	1,883	767	0.41	1.19
NPF-58	1990	792.7	67.1	1,537	638	0.42	0.80
1st commercial operation 11/87	1991	1,074.2	91.9	600	146	0.24	0.14
Type—BWR	1992	856.2	75.5	1,487	571	0.38	0.67
Capacity—1,240 MWe	1993	479.2	48.2	1,235	278	0.23	0.58
	1994	550.8	50.2	2,098	691	0.33	1.25
	1995	1,090.9	95.6	587	64	0.11	0.06
	1996	895.6	77.2	1,622	307	0.19	0.34
	1997	930.6	84.7	1,524	272	0.18	0.29
	1998	1,163.1	99.3	385	41.945	0.11	0.04
	1999	1,041.7	89.9	1,758	326.014	0.19	0.31
	2000	1,148.2	97.1	501	55.827	0.11	0.05
	2001	885.9	79.6	1,392	258.268	0.19	0.29
	2002	1,136.0	95.0	436	70.258	0.16	0.06
	2003	973.7	83.8	1,880	607.384	0.32	0.62
	2004	1,164.3	95.9	496	73.481	0.15	0.06
	2005	872.9	73.8	1,734	416.608	0.24	0.48
	2006	1,195.8	99.0	488	65.152	0.13	0.05
	2007	919.7	79.0	1,650	505.121	0.31	0.55
	2008	1,215.9	97.9	528	52.058	0.10	0.04
	2009	869.2	73.3	1,818	614.959	0.34	0.71
	2010	1,213.3	98.5	278	32.186	0.12	0.03
	2011	978.2	82.4	1,640	307.866	0.19	0.31
	2012	1,194.3	98.6	408	43.374	0.11	0.04
	2013	964.5	82.1	1,630	373.747	0.23	0.39
	2014	1,193.5	97.4	442	84.578	0.19	0.07
	2015	1,082.5	87.5	1,644	386.778	0.24	0.36

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
PERRY (continued)	2016	1,189.5	96.9	351	36.389	0.10	0.03
	2017	1,120.1	92.2	1,449	327.717	0.23	0.29
	2018	1,223.6	100.0	217	29.848	0.14	0.02
	2019	1,047.2	91.0	1,222	301.067	0.25	0.29
	2020	1254.7	100.0	202	31.161	0.15	0.02
	2021	1,107.7	91.3	1,140	259.656	0.23	0.23
	2022	1,179.7	98.2	299	44.100	0.15	0.04
	2023	939.2	84.8	1,510	425.393	0.28	0.45
PILGRIM 1[16] Docket 50-293; DPR-35 1st commercial operation 12/72 Type—BWR Capacity—(685) MWe	1973	484.0	---	230	126	0.55	0.26
	1974	234.1	39.2	454	415	0.91	1.77
	1975	308.1	71.3	473	798	1.69	2.59
	1976	287.8	60.7	1,317	2,648	2.01	9.20
	1977	316.6	61.4	1,875	3,142	1.68	9.92
	1978	519.5	83.1	1,667	1,327	0.80	2.55
	1979	574.0	89.4	2,458	1,015	0.41	1.77
	1980	360.3	56.2	3,549	3,626	1.02	10.06
	1981	408.9	65.9	2,803	1,836	0.66	4.49
	1982	389.9	63.9	2,854	1,539	0.54	3.95
	1983	559.5	87.2	2,326	1,162	0.50	2.08
	1984	1.4	0.4	4,542	4,082	0.90	2,915.71
	1985	587.3	91.5	2,209	893	0.40	1.52
	1986	121.9	18.8	2,635	874	0.33	7.17
	1987	---	---	4,710	1,579	0.34	---
	1988	---	---	2,073	392	0.19	---
	1989	204.6	64.1	1,797	207	0.12	1.01
	1990	503.5	82.1	1,898	225	0.12	0.45
	1991	406.3	65.8	2,836	605	0.21	1.49
	1992	561.0	85.4	1,332	281	0.21	0.50
	1993	513.7	80.9	1,328	435	0.33	0.85
	1994	453.6	71.4	758	200	0.26	0.44
	1995	531.7	80.7	1,294	482	0.37	0.91
	1996	631.3	95.4	517	116	0.22	0.18
	1997	492.1	80.7	1,655	588	0.36	1.19
	1998	650.5	100.0	530	71.446	0.13	0.11
	1999	510.7	84.4	1,222	344.270	0.28	0.67
	2000	627.5	98.3	422	50.797	0.12	0.08
	2001	585.6	91.0	1,113	179.585	0.16	0.31
	2002	657.0	100.0	463	38.280	0.08	0.06
	2003	566.6	87.5	1,437	250.192	0.17	0.44
	2004	676.1	99.5	427	41.109	0.10	0.06
	2005	623.2	93.7	1,212	206.089	0.17	0.33
	2006	665.4	100.0	654	43.531	0.07	0.07
	2007	584.5	90.0	1,407	240.526	0.17	0.41
	2008	668.1	99.0	377	22.568	0.06	0.03
	2009	616.0	91.7	1,301	264.215	0.20	0.43
	2010	675.5	100.0	303	25.739	0.08	0.04
	2011	580.5	89.0	1,179	241.402	0.20	0.42
	2012	669.0	99.4	284	21.620	0.08	0.03
	2013	493.9	80.4	1,188	176.012	0.15	0.36
	2014	658.6	98.9	421	36.716	0.09	0.06
	2015	570.0	86.9	1,392	218.609	0.16	0.38
	2016	617.9	94.7	634	44.242	0.07	0.07
	2017	576.1	88.2	1,614	162.998	0.10	0.28
	2018	507.0	83.8	629	38.777	0.06	0.08
	2019	---	---	367	18.041	0.05	---
	2020	---	---	179	62.086	0.35	---
	2021	---	---	233	39.887	0.17	---
	2022	---	---	153	23.888	0.16	---
	2023	---	---	261	39.024	0.15	---

[16] Pilgrim 1 ceased operations in June 2019 and is no longer included in the count of operating reactors. Parentheses indicate plant capacity when the plant was operational.

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
POINT BEACH 1, 2	1971	393.4	---	---	164	---	0.42
Docket 50-266, 50-301;	1972	378.3	---	---	580	---	1.53
DPR-24, DPR-27	1973	693.7	---	501	588	1.17	0.85
1st commercial operation	1974	760.2	81.3	400	295	0.74	0.39
12/70, 10/72	1975	801.2	82.9	339	459	1.35	0.57
Type—PWRs	1976	857.3	86.7	313	370	1.18	0.43
Capacity—576, 578 MWe	1977	873.9	87.3	417	430	1.03	0.49
	1978	914.4	90.9	336	320	0.95	0.35
	1979	808.0	80.8	610	644	1.06	0.80
	1980	727.2	82.5	561	598	1.07	0.82
	1981	760.4	83.6	773	596	0.77	0.78
	1982	757.2	84.3	767	609	0.79	0.80
	1983	648.2	72.7	1,702	1,403	0.82	2.16
	1984	788.9	78.6	1,372	789	0.58	1.00
	1985	831.3	82.5	671	482	0.72	0.58
	1986	858.9	85.7	664	402	0.61	0.47
	1987	857.5	85.5	720	554	0.77	0.65
	1988	899.3	88.6	734	410	0.56	0.46
	1989	847.8	85.5	736	504	0.68	0.59
	1990	875.5	86.5	617	378	0.61	0.43
	1991	874.8	87.1	724	265	0.37	0.30
	1992	866.7	85.8	617	256	0.41	0.30
	1993	911.0	90.0	559	186	0.33	0.20
	1994	914.5	91.2	548	170	0.31	0.19
	1995	858.4	86.1	548	190	0.35	0.22
	1996	831.6	84.7	1,029	276	0.27	0.33
	1997	186.8	21.8	670	92	0.14	0.49
	1998	649.7	69.7	881	169.253	0.19	0.26
	1999	806.0	83.1	962	194.489	0.20	0.24
	2000	872.0	88.7	765	138.989	0.18	0.16
	2001	915.9	93.4	740	131.667	0.18	0.14
	2002	909.0	91.1	945	180.654	0.19	0.20
	2003	917.2	92.1	627	84.965	0.14	0.09
	2004	912.3	90.1	627	109.515	0.17	0.12
	2005	782.5	78.1	851	128.646	0.15	0.16
	2006	977.2	96.0	453	39.597	0.09	0.04
	2007	958.5	94.0	535	52.023	0.10	0.05
	2008	889.4	87.8	958	144.021	0.15	0.16
	2009	902.3	92.9	766	93.270	0.12	0.10
	2010	952.8	93.8	869	95.695	0.11	0.10
	2011	796.2	75.8	1,027	159.684	0.16	0.20
	2012	1,114.3	95.2	581	69.755	0.12	0.06
	2013	1,135.3	95.9	547	63.146	0.12	0.06
	2014	1,079.4	91.4	759	127.523	0.17	0.12
	2015	1,142.9	95.8	446	47.473	0.11	0.04
	2016	1,159.0	96.8	515	57.294	0.11	0.05
	2017	1,102.0	93.1	755	87.479	0.12	0.08
	2018	1,156.7	97.2	511	43.228	0.08	0.04
	2019	1,145.3	96.4	533	74.485	0.14	0.07
	2020	1,116.1	93.8	634	77.997	0.12	0.07
	2021	1,138.5	96.4	490	70.910	0.14	0.06
	2022	1,152.6	96.3	514	90.223	0.18	0.08
	2023	1,105.6	93.4	679	94.647	0.14	0.09
PRAIRIE ISLAND 1, 2	1974	181.9	43.9	150	18	0.12	0.10
Docket 50-282, 50-306;	1975	836.0	83.3	477	123	0.26	0.15
DPR-42, DPR-60	1976	725.2	76.6	818	447	0.55	0.62
1st commercial operation	1977	922.9	87.2	718	300	0.42	0.33
12/73, 12/74	1978	941.1	92.2	546	221	0.40	0.23
Type—PWRs	1979	865.0	86.0	594	180	0.30	0.21
Capacity—522, 519 MWe	1980	800.7	79.9	983	353	0.36	0.44
	1981	844.9	80.5	836	329	0.39	0.39
	1982	944.9	90.4	645	229	0.36	0.24
	1983	921.1	86.8	654	233	0.36	0.25
	1984	972.4	91.7	546	147	0.27	0.15
	1985	882.6	84.0	1,082	416	0.38	0.47

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
PRAIRIE ISLAND 1, 2 (continued)	1986	930.6	90.3	818	255	0.31	0.27
	1987	969.6	91.6	593	135	0.23	0.14
	1988	932.0	89.1	732	199	0.27	0.21
	1989	1,001.8	94.7	476	99	0.21	0.10
	1990	925.4	89.2	737	188	0.26	0.20
	1991	1,023.3	95.6	586	98	0.17	0.10
	1992	811.6	76.2	845	211	0.25	0.26
	1993	978.3	90.7	532	106	0.20	0.11
	1994	996.9	91.5	478	109	0.23	0.11
	1995	1,023.2	93.9	499	107	0.21	0.10
	1996	992.1	91.4	558	112	0.20	0.11
	1997	817.6	81.4	753	174	0.23	0.21
	1998	860.3	83.4	582	116.649	0.20	0.14
	1999	989.3	93.8	542	72.496	0.13	0.07
	2000	992.2	93.1	632	106.091	0.17	0.11
	2001	900.8	85.8	691	124.708	0.18	0.14
	2002	987.0	93.6	969	127.713	0.13	0.13
	2003	1,006.1	96.4	594	61.137	0.10	0.06
	2004	940.4	89.9	1,186	143.806	0.12	0.15
	2005	952.5	90.8	782	84.337	0.11	0.09
	2006	926.4	89.0	1,103	137.352	0.12	0.15
	2007	1,014.8	98.0	130	6.276	0.05	0.01
	2008	924.3	88.9	1,060	126.723	0.12	0.14
	2009	942.2	89.9	560	53.590	0.10	0.06
	2010	1,002.6	94.9	661	54.933	0.08	0.05
	2011	982.4	92.0	678	58.029	0.09	0.06
	2012	803.8	76.7	909	119.166	0.13	0.15
	2013	881.8	86.0	1,383	129.989	0.09	0.15
	2014	957.0	91.1	768	70.860	0.09	0.07
	2015	842.2	81.2	802	62.441	0.08	0.07
	2016	944.5	87.9	705	48.078	0.07	0.05
	2017	998.3	95.0	558	34.322	0.06	0.03
	2018	1,025.5	95.5	559	37.731	0.07	0.04
	2019	1,043.4	96.9	417	24.593	0.06	0.02
	2020	1,037.0	96.2	370	20.018	0.05	0.02
	2021	1,036.0	96.3	516	46.326	0.09	0.04
	2022	1,044.6	96.6	477	24.002	0.05	0.02
	2023	813.9	76.2	679	67.649	0.10	0.08
QUAD CITIES 1, 2 Docket 50-254, 50-265; DPR-29, DPR-30 1st commercial operation 2/73, 3/73 Type—BWRs Capacity—887, 888 MWe	1974	958.1	72.3	678	482	0.71	0.50
	1975	833.6	68.4	1,083	1,618	1.49	1.94
	1976	951.2	73.1	1,225	1,651	1.35	1.74
	1977	970.1	84.0	907	1,031	1.14	1.06
	1978	1,124.5	88.6	1,207	1,618	1.34	1.44
	1979	1,075.0	84.6	1,688	2,158	1.28	2.01
	1980	866.9	64.4	3,089	4,838	1.57	5.58
	1981	1,156.9	81.1	2,246	3,146	1.40	2.72
	1982	1,018.7	76.0	2,314	3,757	1.62	3.69
	1983	1,088.5	79.2	1,802	2,491	1.38	2.29
	1984	994.6	65.7	1,678	1,579	0.94	1.59
	1985	1,268.0	82.7	1,184	990	0.84	0.78
	1986	1,093.2	71.0	1,451	950	0.65	0.87
	1987	1,126.6	75.3	1,429	720	0.50	0.64
	1988	1,173.7	84.1	1,486	827	0.56	0.70
	1989	1,196.3	85.9	1,721	900	0.52	0.75
	1990	1,148.9	77.8	2,186	1,028	0.47	0.89
	1991	1,044.5	73.2	1,722	509	0.30	0.49
	1992	960.8	68.0	2,413	1,157	0.48	1.20
	1993	974.9	67.0	2,150	849	0.39	0.87
	1994	681.5	48.7	2,163	1,128	0.52	1.66
	1995	1,002.5	70.4	2,041	736	0.36	0.73
	1996	876.6	60.1	2,248	1,025	0.46	1.17
	1997	935.3	66.5	2,474	654	0.26	0.70
	1998	794.8	55.1	2,177	760.596	0.35	0.96
	1999	1,476.5	95.9	1,000	200.556	0.20	0.14
	2000	1,410.4	93.9	2,840	893.766	0.31	0.63

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
QUAD CITIES 1, 2	2001	1,478.2	95.9	736	143.849	0.20	0.10
(continued)	2002	1,396.0	89.0	3,818	1,786.021	0.47	1.28
	2003	1,569.4	93.1	998	438.144	0.44	0.28
	2004	1,443.8	95.5	2,334	510.521	0.22	0.35
	2005	1,516.2	94.2	2,869	961.026	0.33	0.63
	2006	1,524.9	93.0	2,329	559.362	0.24	0.37
	2007	1,650.3	97.0	1,945	249.927	0.13	0.15
	2008	1,619.4	95.2	2,065	274.444	0.13	0.17
	2009	1,662.6	95.4	2,366	318.418	0.13	0.19
	2010	1,688.9	95.0	2,267	241.444	0.11	0.14
	2011	1,735.3	95.9	2,453	288.618	0.12	0.17
	2012	1,765.3	95.9	2,173	194.311	0.09	0.11
	2013	1,776.0	96.3	2,210	192.059	0.09	0.11
	2014	1,756.7	95.2	2,068	156.168	0.08	0.09
	2015	1,776.5	96.9	1,860	170.123	0.09	0.10
	2016	1,787.1	97.6	1,875	142.607	0.08	0.08
	2017	1,758.2	96.8	1,888	173.167	0.09	0.10
	2018	1,766.7	97.1	1,678	162.171	0.10	0.09
	2019	1,763.7	96.8	1,896	204.958	0.11	0.12
	2020	1,793.7	98.0	1,780	181.823	0.10	0.10
	2021	1,796.8	97.9	1,569	137.801	0.09	0.08
	2022	1,726.3	94.9	1,842	230.257	0.13	0.13
	2023	1,731.2	95.9	1,912	241.929	0.13	0.14
RANCHO SECO[17]	1976	268.1	30.4	297	58	0.20	0.22
Docket 50-312;	1977	706.4	77.1	515	391	0.76	0.55
DPR-54	1978	607.7	80.5	508	323	0.64	0.53
1st commercial operation 4/75	1979	687.0	91.1	287	126	0.44	0.18
Type—PWR	1980	530.9	60.4	890	412	0.46	0.78
Capacity—(873) MWe	1981	321.2	40.2	772	402	0.52	1.25
	1982	409.5	53.3	766	337	0.44	0.82
	1983	347.9	46.8	1,338	787	0.59	2.26
	1984	460.0	58.3	802	222	0.28	0.48
	1985	238.7	30.8	1,764	756	0.43	3.17
	1986	---	---	1,513	402	0.27	---
	1987	---	---	1,533	300	0.20	---
	1988	355.8	63.1	693	78	0.11	0.22
	1989	179.9	54.7	603	81	0.13	0.45
	1990	---	---	111	13	0.12	---
	1991	---	---	101	9	0.09	---
	1992	---	---	70	7	0.10	---
	1993	---	---	35	4	0.11	---
	1994	---	---	18	1	0.06	---
	1995	---	---	16	1	0.06	---
	1996	---	---	16	1	0.06	---
	1997	---	---	16	---	---	---
	1998	---	---	61	2.661	0.04	---
	1999	---	---	302	11.191	0.04	---
	2000	---	---	219	25.795	0.12	---
	2001	---	---	210	18.432	0.09	---
	2002	---	---	193	27.346	0.14	---
	2003	---	---	121	18.300	0.15	---
	2004	---	---	122	14.890	0.12	---
	2005	---	---	157	33.444	0.21	---
	2006	---	---	143	31.793	0.22	---
	2007	---	---	129	12.524	0.10	---
	2008	---	---	84	2.434	0.03	---
RIVER BEND 1	1987	605.2	68.4	1,268	378	0.30	0.62
Docket 50-458;	1988	880.7	94.3	513	107	0.21	0.12
NPF-47	1989	584.5	69.1	1,566	558	0.36	0.95
1st commercial operation 6/86	1990	682.2	78.0	1,616	489	0.30	0.72
Type—BWR	1991	814.7	87.2	780	144	0.18	0.18
Capacity—967 MWe	1992	336.1	39.7	2,022	710	0.35	2.11
	1993	640.0	71.6	847	180	0.21	0.28

[17] Rancho Seco ceased operations in June 1989 and is no longer in the count of operating reactors. Parentheses indicate plant capacity when the plant was operational.

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
RIVER BEND 1 (continued)	1994	595.7	64.9	2,209	519	0.23	0.87
	1995	967.1	99.6	667	85	0.13	0.09
	1996	836.1	85.3	2,093	473	0.23	0.57
	1997	778.8	86.3	1,671	347	0.21	0.45
	1998	894.2	96.2	466	57.749	0.12	0.06
	1999	651.2	75.2	1,327	343.858	0.26	0.53
	2000	837.1	89.7	1,104	216.053	0.20	0.26
	2001	889.3	93.6	1,249	207.614	0.17	0.23
	2002	965.0	98.5	373	35.145	0.09	0.04
	2003	871.3	92.7	1,296	216.950	0.17	0.25
	2004	845.6	90.1	1,378	235.749	0.17	0.28
	2005	890.5	94.4	498	55.816	0.11	0.06
	2006	853.7	92.0	1,494	214.409	0.14	0.25
	2007	823.0	92.0	1,131	131.373	0.12	0.16
	2008	724.8	78.7	1,809	311.697	0.17	0.43
	2009	895.6	92.6	1,978	219.446	0.11	0.25
	2010	955.1	98.9	888	40.356	0.05	0.04
	2011	878.6	91.9	1,880	211.212	0.11	0.24
	2012	890.2	94.5	648	34.178	0.05	0.04
	2013	867.6	90.8	1,915	188.331	0.10	0.22
	2014	935.8	98.1	343	16.138	0.05	0.02
	2015	791.6	87.9	888	128.492	0.14	0.16
	2016	811.5	86.6	532	71.142	0.13	0.09
	2017	804.5	87.7	1,500	273.004	0.18	0.34
	2018	804.3	88.6	573	69.580	0.12	0.09
	2019	750.5	86.0	1,447	255.918	0.18	0.34
	2020	913.6	106.9	366	37.420	0.10	0.04
	2021	850.5	98.7	1,542	208.460	0.14	0.25
	2022	950.0	100.0	497	33.664	0.07	0.04
	2023	502.1	60.4	1,994	292.989	0.15	0.58
ROBINSON 2 Docket 50-261; DPR-23 1st commercial operation 3/71 Type—PWR Capacity—759 MWe	1972	580.0	---	245	215	0.88	0.37
	1973	455.1	---	831	695	0.84	1.53
	1974	578.1	83.3	853	672	0.79	1.16
	1975	501.8	72.7	849	1,142	1.35	2.28
	1976	585.5	84.7	597	715	1.20	1.22
	1977	511.5	85.2	634	455	0.72	0.89
	1978	480.5	72.0	943	963	1.02	2.00
	1979	482.0	70.8	1,454	1,188	0.82	2.46
	1980	387.3	62.2	2,009	1,852	0.92	4.78
	1981	426.6	73.0	1,462	733	0.50	1.72
	1982	277.5	48.9	2,011	1,426	0.71	5.14
	1983	409.8	75.5	2,244	923	0.41	2.25
	1984	28.0	7.0	4,127	2,880	0.70	102.86
	1985	629.5	87.9	1,378	311	0.23	0.49
	1986	577.1	80.3	1,571	539	0.34	0.93
	1987	510.1	72.5	1,379	499	0.36	0.98
	1988	385.0	65.9	1,351	564	0.42	1.46
	1989	336.6	48.7	1,098	195	0.18	0.58
	1990	400.3	64.8	1,626	437	0.27	1.09
	1991	575.1	81.4	885	193	0.22	0.34
	1992	487.2	66.8	1,267	352	0.28	0.72
	1993	502.7	70.7	1,221	337	0.28	0.67
	1994	560.3	79.5	420	63	0.15	0.11
	1995	618.7	84.7	1,058	215	0.20	0.35
	1996	654.8	88.6	1,031	167	0.16	0.26
	1997	707.5	99.0	304	13	0.04	0.02
	1998	628.5	88.9	978	170.476	0.17	0.27
	1999	648.9	91.8	807	123.952	0.15	0.19
	2000	710.0	99.7	138	8.396	0.06	0.01
	2001	627.9	90.6	827	124.750	0.15	0.20
	2002	638.0	91.2	830	110.631	0.13	0.17
	2003	733.1	100.0	109	4.838	0.04	0.01
	2004	653.7	89.3	952	118.159	0.12	0.18
	2005	656.9	89.7	791	64.662	0.08	0.10

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
ROBINSON 2	2006	735.5	100.0	86	3.320	0.04	---
(continued)	2007	655.0	90.0	890	80.752	0.09	0.12
	2008	618.1	84.6	788	68.381	0.09	0.11
	2009	738.9	99.3	126	6.643	0.05	0.01
	2010	410.8	57.0	996	85.917	0.09	0.21
	2011	726.5	99.3	137	3.630	0.03	---
	2012	613.4	82.2	1,027	65.258	0.06	0.11
	2013	650.3	85.3	1,116	80.595	0.07	0.12
	2014	703.1	91.2	477	28.666	0.06	0.04
	2015	653.4	84.9	957	56.373	0.06	0.09
	2016	734.3	96.3	133	3.704	0.03	0.01
	2017	676.9	89.1	883	58.739	0.07	0.09
	2018	602.5	80.3	958	61.998	0.06	0.10
	2019	727.9	93.8	48	1.668	0.03	---
	2020	699.2	98.2	744	48.121	0.06	0.07
	2021	733.6	96.0	154	7.443	0.05	0.01
	2022	650.2	84.5	812	62.183	0.08	0.10
	2023	764.2	99.5	66	1.809	0.03	0.00
SALEM 1, 2	1978	546.4	55.6	574	122	0.21	0.22
Docket 50-272, 50-311;	1979	250.0	25.5	1,488	584	0.39	2.34
DPR-70, DPR-75	1980	680.6	69.2	1,704	449	0.26	0.66
1st commercial operation	1981	743.0	78.1	1,652	254	0.15	0.34
6/77, 10/81	1982	1,440.4	72.6	3,228	1,203	0.37	0.84
Type—PWRs	1983	742.0	30.5	2,383	581	0.24	0.78
Capacity—1,116, 1,134 MWe	1984	650.1	31.8	1,395	681	0.49	1.05
	1985	1,657.7	75.8	1,112	204	0.18	0.12
	1986	1,484.3	70.4	3,554	599	0.17	0.40
	1987	1,478.2	73.3	2,543	600	0.24	0.41
	1988	1,591.6	73.6	1,609	503	0.31	0.32
	1989	1,675.4	79.5	2,944	338	0.11	0.20
	1990	1,362.6	65.1	3,636	272	0.07	0.20
	1991	1,726.4	79.3	4,201	458	0.11	0.27
	1992	1,200.9	61.1	4,376	431	0.10	0.36
	1993	1,366.3	65.4	3,559	408	0.11	0.30
	1994	1,367.4	73.8	950	188	0.20	0.14
	1995	558.1	29.3	1,195	218	0.18	0.39
	1996	---	---	1,671	300	0.18	---
	1997	279.3	17.8	894	175	0.20	0.63
	1998	1,629.3	79.1	408	41.100	0.10	0.03
	1999	1,821.8	86.8	1,200	317.545	0.27	0.17
	2000	1,973.4	93.0	1,191	198.068	0.17	0.10
	2001	1,961.2	91.1	1,274	153.088	0.12	0.08
	2002	1,934.0	89.4	2,460	292.692	0.12	0.15
	2003	1,957.2	90.7	1,301	124.042	0.10	0.06
	2004	1,850.2	85.8	1,496	148.694	0.10	0.08
	2005	2,086.4	91.7	3,162	240.567	0.08	0.12
	2006	2,211.8	97.0	1,446	90.541	0.06	0.04
	2007	2,158.2	96.0	1,365	117.604	0.09	0.05
	2008	1,998.6	87.8	3,362	328.761	0.10	0.16
	2009	2,252.9	96.2	1,249	101.186	0.08	0.04
	2010	2,147.3	93.9	964	77.828	0.08	0.04
	2011	2,054.6	91.4	2,180	126.716	0.06	0.06
	2012	2,123.8	93.4	674	47.003	0.07	0.02
	2013	2,213.1	94.7	797	59.430	0.07	0.03
	2014	1,870.1	81.7	2,558	109.633	0.04	0.06
	2015	2,131.3	93.8	580	33.810	0.06	0.02
	2016	1,800.9	84.2	1,108	93.255	0.08	0.05
	2017	2,060.5	89.7	1,745	135.197	0.08	0.07
	2018	2,165.1	95.2	521	49.086	0.09	0.02
	2019	2,053.6	90.4	803	100.110	0.12	0.05
	2020	1,852.8	81.4	1,705	162.912	0.10	0.09
	2021	2,184.0	94.4	579	65.822	0.11	0.03
	2022	2,198.1	94.4	598	65.292	0.11	0.03
	2023	2,101.5	91.6	1,553	157.558	0.10	0.07

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
SAN ONOFRE 1,[18] 2, 3[19]	1969	314.1	---	123	42	0.34	0.13
Docket 50-206, 50-361, 50-362;	1970	365.9	---	251	155	0.62	0.42
DPR-13; NPF-10, NPF-15	1971	362.1	---	121	50	0.41	0.14
1st commercial operation	1972	338.5	---	326	256	0.79	0.76
1/68, 7/83, 4/84	1973	273.7	---	570	353	0.62	1.29
Type—PWRs	1974	377.8	86.1	219	71	0.32	0.19
Capacity—(436), (1,070),	1975	389.0	87.4	424	292	0.69	0.75
(1,080) MWe	1976	297.9	70.2	1,330	880	0.66	2.95
	1977	281.2	63.7	985	847	0.86	3.01
	1978	323.2	80.2	764	401	0.52	1.24
	1979	401.0	90.2	521	139	0.27	0.35
	1980	97.3	22.3	3,063	2,386	0.78	24.52
	1981	95.9	26.7	2,902	3,223	1.11	33.61
	1982	61.6	15.7	3,055	832	0.27	13.51
	1983	---	---	1,701	155	0.09	---
	1984	670.4	68.3	7,514	986	0.13	1.47
	1985	1,381.8	132.9	5,742	722	0.13	0.52
	1986	1,698.2	61.1	3,594	824	0.23	0.49
	1987	1,983.0	78.8	2,138	696	0.33	0.35
	1988	1,982.3	68.4	2,324	781	0.34	0.39
	1989	1,840.8	64.9	2,237	567	0.25	0.31
	1990	1,980.5	69.1	2,224	885	0.40	0.45
	1991	1,987.6	75.3	1,814	412	0.23	0.21
	1992	2,228.6	87.1	1,651	324	0.20	0.15
	1993	1,771.3	79.9	2,193	767	0.35	0.43
	1994	2,220.7	100.0	528	32	0.06	0.01
	1995	1,686.9	79.1	1,914	455	0.24	0.27
	1996	2,089.3	93.2	1,272	129	0.10	0.06
	1997	1,533.9	72.9	1,652	341	0.21	0.22
	1998	1,996.4	92.0	1,091	195.600	0.18	0.10
SAN ONOFRE 1[18]	1999	---	---	241	15.863	0.07	---
Docket 50-206;	2000	---	---	416	71.214	0.17	---
DPR-13	2001	---	---	338	57.785	0.17	---
1st commercial operation 1/68	2002	---	---	308	61.214	0.20	---
Type—PWR	2003	---	---	226	35.596	0.16	---
Capacity—(436) MWe	2004	---	---	169	14.899	0.09	---
	2005	---	---	198	20.624	0.10	---
	2006	---	---	183	22.490	0.12	---
	2007	---	---	20	0.417	0.02	---
	2008	---	---	2	0.043	0.02	---
SAN ONOFRE 2, 3[19]	1999	1,901.4	86.9	1,477	353.765	0.24	0.19
Docket 50-361, 50-362;	2000	2,067.2	94.7	1,073	115.499	0.11	0.06
NPF-10, NPF-15	2001	1,727.2	78.9	1,083	131.384	0.12	0.08
1st commercial operation	2002	2,056.0	93.4	1,140	136.443	0.12	0.07
7/83, 4/84	2003	2,084.3	94.0	1,275	163.804	0.13	0.08
Type—PWRs	2004	1,713.8	79.1	1,761	407.063	0.23	0.24
Capacity—(1,070), (1,080) MWe	2005	2,094.7	96.0	305	11.332	0.04	0.01
	2006	1,552.2	73.0	1,632	315.087	0.19	0.20
	2007	1,964.6	89.0	1,065	91.545	0.09	0.05
	2008	1,753.0	82.7	1,014	125.320	0.12	0.07
SAN ONOFRE 1,[18] 2, 3[19]	2009	1,774.5	79.9	1,575	178.131	0.11	0.10
Docket 50-206, 50-361, 50-362;	2010	1,578.9	75.3	1,642	199.399	0.12	0.13
DPR-13; NPF-10, NPF-15	2011	2,067.1	93.0	641	29.658	0.05	0.01
1st commercial operation	2012	115.2	5.4	2,150	221.463	0.10	1.92
1/68, 7/83, 4/84	2013	---	---	210	5.701	0.03	---
Type—PWRs	2014	---	---	68	1.369	0.02	---
Capacity—(436), (1,070),	2015	---	---	136	1.202	0.01	---
(1,080) MWe	2016	---	---	87	1.787	0.02	---
	2017	---	---	1	0.005	0.01	---
	2018	---	---	127	24.574	0.19	---

[18] San Onofre 1 ceased operations in November 1992 and is no longer in the count of operating reactors. Parentheses indicate plant capacity when plant was operational.

[19] San Onofre 2 and 3 ceased power generation in January 2012, and in June 2013, it was decided that they would not be put back into commercial operation. Therefore, they are no longer included in the count of operating reactors. Parentheses indicate plant capacities when plants were operational.

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
SAN ONOFRE 1,[18] 2, 3[19] (continued)	2019	---	---	76	12.774	0.17	---
	2020	---	---	203	31.108	0.15	---
	2021	---	---	240	26.697	0.11	---
	2022	---	---	296	32.718	0.11	---
	2023	---	---	380	83.794	0.22	---
SEABROOK	1991	810.4	75.9	699	92	0.13	0.11
Docket 50-443;	1992	932.4	81.3	806	147	0.18	0.16
NPF-86	1993	1,071.5	93.6	110	6	0.05	0.01
1st commercial operation 8/90	1994	736.4	63.5	852	113	0.13	0.15
Type—PWR	1995	995.5	87.5	800	102	0.13	0.10
Capacity—1,246 MWe	1996	1,168.6	99.6	206	10	0.05	0.01
	1997	907.0	79.8	1,571	186	0.12	0.21
	1998	957.6	84.5	559	18.509	0.03	0.02
	1999	991.5	87.5	1,339	105.723	0.08	0.11
	2000	901.8	79.3	1,158	70.091	0.06	0.08
	2001	989.6	89.1	423	8.672	0.02	0.01
	2002	1,058.0	92.8	1,095	66.583	0.06	0.06
	2003	1,055.9	93.6	981	70.953	0.07	0.07
	2004	1,158.6	100.0	291	5.858	0.02	0.01
	2005	1,076.4	91.5	1,034	52.216	0.05	0.05
	2006	1,072.8	89.0	1,246	76.583	0.06	0.07
	2007	1,228.7	100.0	349	4.332	0.01	---
	2008	1,064.4	86.9	1,297	74.992	0.06	0.07
	2009	1,006.4	86.5	1,233	87.372	0.07	0.09
	2010	1,245.4	100.0	335	4.488	0.01	---
	2011	954.5	80.5	1,156	65.593	0.06	0.07
	2012	932.2	87.8	1,092	53.636	0.05	0.06
	2013	1,247.3	100.0	291	2.442	0.01	---
	2014	1,160.7	93.8	1,056	39.983	0.04	0.03
	2015	1,082.6	88.3	1,219	96.053	0.08	0.09
	2016	1,228.4	98.8	59	1.672	0.03	---
	2017	1,140.4	92.0	519	29.191	0.06	0.03
	2018	1,148.5	92.7	464	33.418	0.07	0.03
	2019	1,245.0	100.0	69	1.084	0.02	---
	2020	1,126.1	91.1	516	28.464	0.06	0.03
	2021	1,125.1	90.8	509	40.122	0.08	0.04
	2022	1,246.7	100.0	84	2.490	0.03	---
	2023	1,088.4	88.6	591	42.118	0.07	0.04
SEQUOYAH 1, 2	1982	583.5	52.8	1,968	570	0.29	0.98
Docket 50-327, 50-328;	1983	1,663.7	75.1	1,769	491	0.28	0.30
DPR-77, DPR-79	1984	1,481.9	69.0	2,373	1,119	0.47	0.76
1st commercial operation	1985	1,151.3	51.3	1,853	1,072	0.58	0.93
7/81, 6/82	1986	---	---	1,738	527	0.30	---
Type—PWR	1987	---	---	2,080	420	0.20	---
Capacity—1,152, 1,140 MWe	1988	490.8	31.8	2,441	678	0.28	1.38
	1989	1,851.7	85.7	2,007	657	0.33	0.35
	1990	1,662.6	77.2	2,935	1,687	0.57	1.01
	1991	1,965.4	88.0	1,933	700	0.36	0.36
	1992	1,849.0	85.4	1,714	465	0.27	0.25
	1993	405.7	21.8	1,631	373	0.23	0.92
	1994	1,418.7	66.3	1,702	295	0.17	0.21
	1995	1,864.2	86.1	1,650	368	0.22	0.20
	1996	2,003.9	87.9	1,444	269	0.19	0.13
	1997	1,946.1	89.0	1,962	420	0.21	0.22
	1998	2,135.3	95.3	1,530	265.980	0.17	0.12
	1999	2,165.1	97.0	1,346	164.569	0.12	0.08
	2000	1,910.0	86.8	2,039	357.220	0.18	0.19
	2001	2,158.3	95.7	1,292	145.066	0.11	0.07
	2002	2,106.0	94.1	1,257	108.252	0.09	0.05
	2003	1,776.4	80.0	2,484	430.889	0.17	0.24

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Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
SEQUOYAH 1, 2	2004	2,135.2	93.9	1,161	85.941	0.07	0.04
(continued)	2005	2,162.9	94.9	1,125	95.133	0.08	0.04
	2006	2,054.9	91.0	1,752	242.016	0.14	0.12
	2007	2,129.1	94.0	1,197	123.540	0.10	0.06
	2008	2,153.6	94.3	960	83.730	0.09	0.04
	2009	2,026.8	90.1	1,415	166.776	0.12	0.08
	2010	2,054.9	92.2	828	56.956	0.07	0.03
	2011	2,133.3	95.3	1,354	109.417	0.08	0.05
	2012	1,888.2	84.6	2,555	290.840	0.11	0.15
	2013	2,108.1	94.2	666	44.478	0.07	0.02
	2014	2,156.7	95.5	842	77.569	0.09	0.04
	2015	1,884.9	87.0	1,484	136.826	0.09	0.07
	2016	1,971.4	88.8	1,133	105.764	0.09	0.05
	2017	2,080.7	94.0	831	47.200	0.06	0.02
	2018	2,021.0	90.8	1,367	121.426	0.09	0.06
	2019	2,062.2	93.1	846	76.085	0.09	0.04
	2020	2,180.3	96.6	847	56.282	0.07	0.03
	2021	2,015.4	89.8	1,312	117.287	0.09	0.06
	2022	2,149.2	95.6	999	67.243	0.07	0.03
	2023	2,194.9	96.3	1,039	50.812	0.05	0.02
SOUTH TEXAS 1, 2	1989	769.3	65.6	989	161	0.16	0.21
Docket 50-498, 50-499;	1990	1,504.1	65.9	1,136	206	0.18	0.14
NPF-76, NPF-80	1991	1,741.5	72.4	1,144	257	0.22	0.15
1st commercial operation	1992	2,096.0	83.8	923	147	0.16	0.07
8/88, 6/89	1993	163.1	8.3	1,138	251	0.22	1.54
Type—PWRs	1994	1,700.2	70.6	661	47	0.07	0.03
Capacity—1,251, 1,251 MWe	1995	2,294.2	89.9	1,485	291	0.20	0.13
	1996	2,465.9	95.0	1,145	137	0.12	0.06
	1997	2,265.5	93.6	1,583	273	0.17	0.12
	1998	2,379.4	96.9	1,171	183.977	0.16	0.08
	1999	2,219.7	91.6	1,328	259.770	0.20	0.12
	2000	2,180.0	89.7	1,372	231.634	0.17	0.11
	2001	2,262.7	92.2	1,325	237.645	0.18	0.11
	2002	2,173.0	87.5	1,510	329.091	0.22	0.15
	2003	1,796.3	72.1	909	143.495	0.16	0.08
	2004	2,437.1	96.0	842	119.834	0.14	0.05
	2005	2,258.5	90.0	1,268	247.655	0.20	0.11
	2006	2,439.6	95.0	1,078	150.323	0.14	0.06
	2007	2,527.3	96.0	881	91.613	0.10	0.04
	2008	2,452.1	92.3	1,181	187.295	0.16	0.08
	2009	2,444.5	91.9	1,138	79.687	0.07	0.03
	2010	2,418.7	91.5	867	79.159	0.09	0.03
	2011	2,333.3	87.7	1,153	139.274	0.12	0.06
	2012	2,122.4	79.8	611	49.104	0.08	0.02
	2013	2,062.4	78.4	832	59.736	0.07	0.03
	2014	2,363.4	90.0	422	34.576	0.08	0.01
	2015	2,224.5	85.5	900	83.993	0.09	0.04
	2016	2,481.9	94.9	426	32.837	0.08	0.01
	2017	2,467.1	94.6	620	55.025	0.09	0.02
	2018	2,367.7	91.0	703	70.050	0.10	0.03
	2019	2,515.3	95.9	676	56.887	0.08	0.02
	2020	2,504.0	95.5	593	48.458	0.08	0.02
	2021	2,386.5	91.4	662	51.686	0.08	0.02
	2022	2,506.1	95.6	656	70.818	0.11	0.03
	2023	2,490.4	95.6	466	32.683	0.07	0.01
ST. LUCIE 1, 2	1977	649.1	84.7	445	152	0.34	0.23
Docket 50-335, 50-389;	1978	606.4	76.5	797	337	0.42	0.56
DPR-67; NPF-16	1979	592.0	74.0	907	438	0.48	0.74
1st commercial operation	1980	627.9	77.5	1,074	532	0.50	0.85
12/76, 8/83	1981	599.1	72.7	1,473	929	0.63	1.55
Type—PWRs	1982	816.8	94.0	1,045	272	0.26	0.33
Capacity—981, 987 MWe	1983	290.3	15.4	2,211	1,204	0.54	4.15
	1984	1,183.0	69.6	2,090	1,263	0.60	1.07
	1985	1,445.8	82.5	1,971	1,344	0.68	0.93

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
ST. LUCIE 1, 2 (continued)	1986	1,588.6	89.1	1,279	491	0.38	0.31
	1987	1,407.9	81.9	2,012	951	0.47	0.68
	1988	1,639.7	93.0	1,448	611	0.42	0.37
	1989	1,493.1	85.1	1,414	495	0.35	0.33
	1990	1,188.4	70.0	1,876	777	0.41	0.65
	1991	1,592.8	90.8	1,282	479	0.37	0.30
	1992	1,511.9	87.3	1,251	264	0.21	0.17
	1993	1,227.6	77.7	1,462	492	0.34	0.40
	1994	1,424.8	85.0	1,896	505	0.27	0.35
	1995	1,306.6	76.0	1,498	413	0.28	0.32
	1996	1,473.4	86.5	1,433	385	0.27	0.26
	1997	1,394.6	83.6	2,314	646	0.28	0.46
	1998	1,572.5	94.2	1,170	134.459	0.11	0.09
	1999	1,569.1	93.8	1,107	176.878	0.16	0.11
	2000	1,630.0	96.0	990	98.691	0.10	0.06
	2001	1,527.5	91.6	1,375	228.071	0.17	0.15
	2002	1,633.0	96.6	992	155.946	0.16	0.10
	2003	1,524.7	91.5	937	141.734	0.15	0.09
	2004	1,492.0	89.3	1,157	159.436	0.14	0.11
	2005	1,408.4	85.1	2,262	406.171	0.18	0.29
	2006	1,542.4	93.0	1,226	119.963	0.10	0.08
	2007	1,302.1	78.0	2,447	409.958	0.17	0.31
	2008	1,566.5	92.7	1,127	112.234	0.10	0.07
	2009	1,490.6	88.8	1,139	132.861	0.12	0.09
	2010	1,440.2	88.4	1,357	197.359	0.15	0.14
	2011	1,200.9	77.3	2,050	295.228	0.14	0.25
	2012	1,139.5	70.6	1,750	185.426	0.11	0.16
	2013	1,783.4	90.3	964	74.926	0.08	0.04
	2014	1,805.7	90.9	1,068	121.092	0.11	0.07
	2015	1,720.9	87.2	1,477	188.087	0.13	0.11
	2016	1,779.5	89.8	920	76.628	0.08	0.04
	2017	1,875.3	94.2	933	71.123	0.08	0.04
	2018	1,777.1	89.9	1,107	112.919	0.10	0.06
	2019	1,709.5	85.5	729	53.336	0.07	0.03
	2020	1,917.9	95.8	620	59.808	0.10	0.03
	2021	1,782.0	90.0	969	108.386	0.11	0.06
	2022	1,859.6	93.9	767	47.891	0.06	0.03
	2023	1,879.2	94.8	592	50.211	0.08	0.03
SUMMER 1 Docket 50-395; NPF-12 1st commercial operation 1/84 Type—PWR Capacity—966 MWe	1984	504.6	61.1	1,120	295	0.26	0.58
	1985	627.7	71.6	1,201	379	0.32	0.60
	1986	853.7	95.3	392	23	0.06	0.03
	1987	618.7	71.0	1,075	560	0.52	0.91
	1988	605.3	69.1	1,127	511	0.45	0.84
	1989	652.4	83.1	374	52	0.14	0.08
	1990	730.0	83.9	1,090	376	0.34	0.52
	1991	642.5	82.9	984	291	0.30	0.45
	1992	892.6	97.4	249	27	0.11	0.03
	1993	728.3	84.0	1,121	297	0.26	0.41
	1994	536.7	69.5	1,549	374	0.24	0.70
	1995	899.8	97.2	257	13	0.05	0.01
	1996	850.4	90.3	701	97	0.14	0.11
	1997	829.7	89.8	820	163	0.20	0.20
	1998	934.8	98.8	285	13.513	0.05	0.01
	1999	842.0	89.4	827	120.172	0.15	0.14
	2000	723.9	76.6	933	166.561	0.18	0.23
	2001	769.3	83.3	486	69.398	0.14	0.09
	2002	840.0	87.9	685	59.644	0.09	0.07
	2003	837.0	87.4	745	70.828	0.10	0.08
	2004	938.4	96.8	200	10.085	0.05	0.01
	2005	850.3	88.9	734	72.454	0.10	0.09
	2006	858.6	90.0	676	61.333	0.09	0.07
	2007	967.9	100.0	75	2.691	0.04	---
	2008	817.2	84.8	623	49.091	0.08	0.06
	2009	784.5	82.6	767	56.050	0.07	0.07
	2010	968.8	99.4	104	2.129	0.02	---

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
SUMMER 1 (continued)	2011	847.7	87.6	598	31.580	0.05	0.04
	2012	829.0	85.3	766	82.261	0.11	0.10
	2013	955.5	97.2	172	5.113	0.03	0.01
	2014	789.4	82.6	934	110.929	0.12	0.14
	2015	812.3	83.8	811	64.958	0.08	0.08
	2016	988.4	100.0	137	2.862	0.02	---
	2017	789.2	81.3	856	50.308	0.06	0.06
	2018	840.9	86.4	718	49.251	0.07	0.06
	2019	941.6	96.2	135	4.557	0.03	---
	2020	882.1	91.6	468	30.997	0.07	0.04
	2021	798.8	82.8	465	27.699	0.06	0.03
	2022	980.7	100.0	136	3.510	0.03	---
	2023	858.1	88.1	525	31.904	0.06	0.04
SURRY 1, 2	1973	420.6	---	936	152	0.16	0.36
Docket 50-280, 50-281;	1974	717.4	49.8	1,715	884	0.52	1.23
DPR-32, DPR-37	1975	1,079.0	70.8	1,948	1,649	0.85	1.53
1st commercial operation	1976	930.7	60.4	2,753	3,165	1.15	3.40
12/72, 5/73	1977	1,139.0	72.2	1,860	2,307	1.24	2.03
Type—PWRs	1978	1,210.6	77.2	2,203	1,837	0.83	1.52
Capacity—838, 838 MWe	1979	343.0	42.3	5,065	3,584	0.71	10.45
	1980	568.2	40.3	5,317	3,836	0.72	6.75
	1981	907.6	59.3	3,753	4,244	1.13	4.68
	1982	1,323.3	88.5	1,878	1,490	0.79	1.13
	1983	916.2	61.3	2,754	3,220	1.17	3.51
	1984	1,026.7	71.0	3,198	2,247	0.70	2.19
	1985	1,166.4	78.2	3,206	1,815	0.57	1.56
	1986	1,080.5	69.0	3,763	2,356	0.63	2.18
	1987	1,132.7	72.7	2,675	712	0.27	0.63
	1988	750.4	50.0	3,184	1,542	0.48	2.05
	1989	489.3	33.0	3,100	836	0.27	1.71
	1990	1,276.4	83.9	1,947	575	0.30	0.45
	1991	1,271.9	84.5	1,547	510	0.33	0.40
	1992	1,396.3	88.9	1,660	539	0.32	0.39
	1993	1,283.1	84.6	1,402	383	0.27	0.30
	1994	1,320.9	85.2	1,530	378	0.25	0.29
	1995	1,333.0	84.2	1,883	406	0.22	0.30
	1996	1,562.9	93.1	983	209	0.21	0.13
	1997	1,380.3	87.1	1,335	320	0.24	0.23
	1998	1,476.2	91.6	1,165	188.831	0.16	0.13
	1999	1,483.0	93.5	995	137.891	0.14	0.09
	2000	1,490.0	92.7	1,197	193.169	0.16	0.13
	2001	1,441.5	89.5	1,243	328.650	0.26	0.23
	2002	1,557.0	96.0	799	87.778	0.11	0.06
	2003	1,255.9	79.7	1,628	325.729	0.20	0.26
	2004	1,537.9	94.6	1,028	119.654	0.12	0.08
	2005	1,506.7	94.2	877	87.717	0.10	0.06
	2006	1,427.0	90.0	1,227	234.978	0.19	0.16
	2007	1,516.2	94.0	1,111	207.130	0.19	0.14
	2008	1,536.6	95.7	1,069	150.269	0.14	0.10
	2009	1,485.1	93.1	1,241	193.703	0.16	0.13
	2010	1,503.7	93.7	958	111.129	0.12	0.07
	2011	1,487.4	88.1	1,121	113.718	0.10	0.08
	2012	1,549.9	91.6	1,205	168.755	0.14	0.11
	2013	1,644.4	95.7	770	67.528	0.09	0.04
	2014	1,636.1	95.2	743	57.491	0.08	0.04
	2015	1,345.9	80.1	1,275	182.980	0.14	0.14
	2016	1,667.9	96.8	645	44.432	0.07	0.03
	2017	1,647.0	96.0	781	58.012	0.07	0.04
	2018	1,509.0	88.6	1,170	117.837	0.10	0.08
	2019	1,617.9	94.4	714	52.101	0.07	0.03
	2020	1,634.7	95.7	632	40.143	0.06	0.02
	2021	1,506.8	89.6	849	100.997	0.12	0.07
	2022	1,589.8	93.6	773	69.193	0.09	0.04
	2023	1,579.3	93.1	770	66.319	0.09	0.04

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
SUSQUEHANNA 1, 2	1984	719.9	72.6	2,827	308	0.11	0.43
Docket 50-387, 50-388;	1985	1,452.2	76.4	3,669	1,106	0.30	0.76
NPF-14; NPF-22	1986	1,344.8	67.0	2,996	828	0.28	0.62
1st commercial operation	1987	1,749.5	85.3	2,548	621	0.24	0.35
6/83, 2/85	1988	1,691.0	83.5	1,904	516	0.27	0.31
Type—BWRs	1989	1,572.5	77.1	2,063	704	0.34	0.45
Capacity—1,257, 1,257 MWe	1990	1,746.9	85.4	1,691	440	0.26	0.25
	1991	1,878.0	89.8	1,844	507	0.27	0.27
	1992	1,604.2	79.7	1,885	724	0.38	0.45
	1993	1,602.1	77.3	1,488	335	0.23	0.21
	1994	1,814.4	85.4	1,580	442	0.28	0.24
	1995	1,850.8	85.3	1,773	476	0.27	0.26
	1996	1,998.7	90.7	1,430	289	0.20	0.14
	1997	1,918.9	89.6	1,646	433	0.26	0.23
	1998	1,879.6	88.3	1,575	360.778	0.23	0.19
	1999	1,896.0	89.6	1,787	431.397	0.24	0.23
	2000	1,994.6	92.6	1,812	331.163	0.18	0.17
	2001	2,027.6	94.2	1,807	288.413	0.16	0.14
	2002	1,973.0	91.6	1,890	259.968	0.14	0.13
	2003	2,050.8	93.4	1,934	250.096	0.13	0.12
	2004	2,058.8	92.7	2,144	272.202	0.13	0.13
	2005	2,086.6	93.5	1,898	181.360	0.10	0.09
	2006	2,040.4	91.0	1,873	184.901	0.10	0.09
	2007	2,089.2	93.0	2,303	263.021	0.11	0.13
	2008	2,174.1	94.2	1,895	192.892	0.10	0.09
	2009	2,231.1	94.7	1,956	266.597	0.14	0.12
	2010	2,121.6	90.4	1,950	176.161	0.09	0.08
	2011	1,992.0	82.2	1,847	168.968	0.09	0.08
	2012	1,936.5	81.4	2,140	175.881	0.08	0.09
	2013	2,166.2	88.6	1,861	233.532	0.13	0.11
	2014	2,153.1	87.3	1,956	214.467	0.11	0.10
	2015	2,354.3	93.3	1,763	206.154	0.12	0.09
	2016	2,217.2	89.4	2,210	237.336	0.11	0.11
	2017	2,375.6	95.1	1,440	165.468	0.11	0.07
	2018	2,343.4	95.2	1,357	147.327	0.11	0.06
	2019	2,394.1	96.2	1,239	141.078	0.11	0.06
	2020	2,287.7	95.2	1,543	132.342	0.09	0.06
	2021	2,282.3	94.1	1,259	144.788	0.12	0.06
	2022	2,290.3	94.8	996	148.452	0.15	0.06
	2023	2,288.9	94.6	1,170	162.657	0.14	0.07
THREE MILE ISLAND 1,[20] **2**[21]	1975	675.9	82.2	131	73	0.56	0.11
Docket 50-289, 50-320;	1976	530.0	65.4	819	286	0.35	0.54
DPR-50, DPR-73	1977	664.5	80.9	1,122	360	0.32	0.54
1st commercial operation	1978	690.0	85.1	1,929	504	0.26	0.73
9/74, 12/78	1979	266.0	21.9	3,975	1,392	0.35	5.23
Type—PWRs	1980	---	---	2,328	394	0.17	---
Capacity—(802), (880) MWe	1981	---	---	2,103	376	0.18	---
	1982	---	---	2,123	1,004	0.47	---
	1983	---	---	1,592	1,159	0.73	---
	1984	---	---	1,079	688	0.64	---
	1985	103.6	10.6	1,890	857	0.45	8.27
		Please see Three Mile Island 1 and Three Mile Island 2 for years 1986–2021					
	2022	0.0	0.0	237	35.368	0.15	---
THREE MILE ISLAND 1[20]	1986	585.2	70.9	1,360	213	0.16	0.36
Docket 50-289;	1987	610.7	73.6	1,259	149	0.12	0.24
DPR-50	1988	661.0	77.8	1,012	210	0.21	0.32
1st commercial operation 9/74	1989	871.3	100.0	670	54	0.08	0.06
Type—PWR	1990	645.5	84.6	1,319	264	0.20	0.41
Capacity—(802) MWe	1991	688.7	86.4	1,542	198	0.13	0.29

[20] Three Mile Island 1 resumed commercial power generation in October 1985 after being under regulatory restraint since 1979. Three Mile Island 1 ceased operations in September 2019 and is no longer included in the count of operating reactors. Parentheses indicate plant capacity when the plant was operational.

[21] Three Mile Island 2 has been shut down since the 1979 accident but was still included in the count of reactors through 1988, since the dose was still being accumulated to defuel and decontaminate the unit during this period. Parentheses indicate plant capacity when the plant was operational. From 2001–2015, Three Mile Island voluntarily provided an estimate of the collective dose for Unit 2 but not the number of individuals with measurable dose.

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
THREE MILE ISLAND 1[20] (continued)	1992	836.8	100.0	558	34	0.06	0.04
	1993	722.0	88.5	1,835	206	0.11	0.29
	1994	798.7	95.5	434	40	0.09	0.05
	1995	772.9	90.8	1,220	213	0.17	0.28
	1996	857.4	100.0	267	16	0.06	0.02
	1997	675.7	84.3	1,049	204	0.19	0.30
	1998	805.8	100.0	280	16.722	0.06	0.02
	1999	722.4	89.7	1,171	154.936	0.13	0.21
	2000	813.4	100.0	183	8.689	0.05	0.01
	2001	616.7	84.2	1,196	196.699	0.16	0.32
	2002	833.0	100.0	172	6.533	0.04	0.01
	2003	706.4	87.1	1,230	155.101	0.13	0.22
	2004	828.0	100.0	105	3.573	0.03	---
	2005	769.1	93.2	955	65.576	0.07	0.09
	2006	825.0	99.0	125	5.155	0.04	0.01
	2007	758.6	92.0	1,266	114.203	0.09	0.15
	2008	838.5	100.0	64	2.219	0.03	---
	2009	672.6	81.7	2,019	241.780	0.12	0.36
	2010	757.3	93.1	790	38.994	0.05	0.05
	2011	744.2	91.4	1,224	129.775	0.11	0.17
	2012	820.7	96.3	280	13.073	0.05	0.02
	2013	762.5	92.2	1,294	125.803	0.10	0.16
	2014	834.3	100.0	204	12.518	0.06	0.02
	2015	753.2	92.1	1,454	171.431	0.12	0.23
	2016	808.5	97.0	309	16.843	0.05	0.02
	2017	783.3	94.4	1,009	82.657	0.08	0.11
	2018	837.4	100.0	78	2.641	0.03	---
	2019	---	---	189	7.252	0.04	---
	2020	---	---	91	3.779	0.04	---
	2021	---	---	127	4.719	0.04	---
THREE MILE ISLAND 2[21] Docket 50-320; DPR-73 1st commercial operation 12/78 Type—PWR Capacity—(880) MWe	1986	---	---	1,497	915	0.61	---
	1987	---	---	1,378	977	0.71	---
	1988	---	---	1,247	917	0.74	---
	1989	---	---	1,014	639	0.63	---
	1990	---	---	484	136	0.28	---
	1991	---	---	153	37	0.24	---
	1992	---	---	315	157	0.50	---
	1993	---	---	167	33	0.20	---
	1994	---	---	259	7	0.03	---
	1995	---	---	191	2	0.01	---
	1996	---	---	122	2	0.02	---
	1997	---	---	232	1	---	---
	1998	---	---	105	0.697	0.01	---
	1999	---	---	203	0.512	---	---
	2000	---	---	70	0.401	0.01	---
	2001	---	---	---	0.228	---	---
	2002	---	---	---	---	---	---
	2003	---	---	---	0.260	---	---
	2004	---	---	---	0.216	---	---
	2005	---	---	---	---	---	---
	2006	---	---	---	0.372	---	---
	2007	---	---	---	0.082	---	---
	2008	---	---	---	0.138	---	---
	2009	---	---	---	0.113	---	---
	2010	---	---	---	0.359	---	---
	2011	---	---	---	0.291	---	---

[20] Three Mile Island 1 resumed commercial power generation in October 1985 after being under regulatory restraint since 1979. Three Mile Island 1 ceased operations in September 2019 and is no longer included in the count of operating reactors. Parentheses indicate plant capacity when the plant was operational.

[21] Three Mile Island 2 has been shut down since the 1979 accident but was still included in the count of reactors through 1988, since the dose was still being accumulated to defuel and decontaminate the unit during this time period. Parentheses indicate plant capacity when the plant was operational. From 2001–2015, Three Mile Island voluntarily provided an estimate of the collective dose for Unit 2 but not the number of individuals with measurable dose.

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
THREE MILE ISLAND 2[21] (continued)	2012	---	---	---	0.194	---	---
	2013	---	---	---	0.229	---	---
	2014	---	---	---	0.188	---	---
	2015	---	---	---	0.255	---	---
TROJAN[22] Docket 50-344; NPF-1 1st commercial operation 5/76 Type—PWR Capacity—(1,080) MWe	1977	792.0	92.6	591	174	0.29	0.22
	1978	205.5	20.6	711	319	0.45	1.55
	1979	631.0	58.1	736	258	0.35	0.41
	1980	727.5	72.5	1,159	421	0.36	0.58
	1981	775.6	74.1	1,311	609	0.46	0.79
	1982	579.5	60.8	977	419	0.43	0.72
	1983	494.2	62.4	969	307	0.32	0.62
	1984	567.0	54.4	1,042	433	0.42	0.76
	1985	829.1	76.7	852	363	0.43	0.44
	1986	852.4	79.7	1,321	381	0.29	0.45
	1987	525.5	54.0	1,209	363	0.30	0.69
	1988	758.6	67.5	1,408	401	0.28	0.53
	1989	666.8	61.9	1,360	421	0.31	0.63
	1990	732.4	66.3	1,169	258	0.22	0.35
	1991	181.6	16.1	1,496	567	0.38	3.12
	1992	553.9	68.4	567	84	0.15	0.15
	1993	---	68.4	54	21	0.39	---
	1994	---	---	51	9	0.18	---
	1995	---	---	141	44	0.31	---
	1996	---	---	112	41	0.37	---
	1997	---	---	227	41	0.18	---
	1998	---	---	283	46.417	0.16	---
	1999	---	---	274	51.504	0.19	---
	2000	---	---	127	17.631	0.14	---
	2001	---	---	14	1.091	0.08	---
	2002	---	---	13	0.536	0.04	---
	2003	---	---	105	23.996	0.23	---
	2004	---	---	5	0.079	0.02	---
TURKEY POINT 3, 4 Docket 50-250, 50-251; DPR-31, DPR-41 1st commercial operation 12/72, 9/73 Type—PWRs Capacity—837, 844 MWe	1973	401.9	---	444	78	0.18	0.19
	1974	953.6	---	794	454	0.57	0.48
	1975	1,003.7	74.9	1,176	876	0.74	0.87
	1976	974.2	71.2	1,647	1,184	0.72	1.22
	1977	979.5	72.1	1,319	1,036	0.79	1.06
	1978	1,000.2	78.8	1,336	1,032	0.77	1.03
	1979	811.0	62.4	2,002	1,680	0.84	2.07
	1980	990.6	73.6	1,803	1,651	0.92	1.67
	1981	654.0	46.8	2,932	2,251	0.77	3.44
	1982	915.7	65.2	2,956	2,119	0.72	2.31
	1983	878.4	62.8	2,930	2,681	0.92	3.05
	1984	946.7	68.5	2,010	1,255	0.62	1.33
	1985	1,034.9	74.7	1,905	1,253	0.66	1.21
	1986	754.1	54.9	1,808	946	0.52	1.25
	1987	431.3	36.6	1,980	1,371	0.69	3.18
	1988	809.8	59.5	1,841	738	0.40	0.91
	1989	689.9	56.8	1,625	433	0.27	0.63
	1990	933.1	69.0	2,099	730	0.35	0.78
	1991	258.2	21.0	2,087	939	0.45	3.64
	1992	968.9	75.5	1,374	325	0.24	0.34
	1993	1,244.8	91.0	1,271	275	0.22	0.22
	1994	1,172.9	87.2	1,489	476	0.32	0.41
	1995	1,320.3	94.6	1,142	215	0.19	0.16
	1996	1,307.8	94.0	1,157	187	0.16	0.14
	1997	1,220.9	88.6	1,581	414	0.26	0.34

[21] Three Mile Island 2 has been shut down since the 1979 accident but was still included in the count of reactors through 1988, since the dose was still being accumulated to defuel and decontaminate the unit during this time period. Parentheses indicate plant capacity when the plant was operational. From 2001–2015, Three Mile Island voluntarily provided an estimate of the collective dose for Unit 2 but not the number of individuals with measurable dose.

[22] Trojan ceased operations in 1992 and will not be put in commercial operation again. It is no longer in the count of operating reactors. Parentheses indicate plant capacity when the plant was operational. As of 2005, Trojan no longer reports under its reactor license but does report under its independent spent fuel storage installation license (see appendix A).

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
TURKEY POINT 3, 4 (continued)	1998	1,323.0	94.5	1,045	156.415	0.15	0.12
	1999	1,352.5	96.5	919	127.567	0.14	0.09
	2000	1,283.7	92.2	1,292	219.852	0.17	0.17
	2001	1,324.1	95.0	827	101.575	0.12	0.08
	2002	1,374.0	97.9	793	73.764	0.09	0.05
	2003	1,253.2	91.6	1,442	247.053	0.17	0.20
	2004	1,231.0	89.9	1,089	117.404	0.11	0.10
	2005	1,143.0	84.9	1,136	109.996	0.10	0.10
	2006	1,251.8	90.0	1,321	149.208	0.11	0.12
	2007	1,281.5	91.0	1,085	107.601	0.10	0.08
	2008	1,294.9	92.0	1,067	97.357	0.09	0.08
	2009	1,219.7	87.6	1,359	166.217	0.12	0.14
	2010	1,290.9	91.9	1,025	86.749	0.08	0.07
	2011	1,245.7	89.6	921	62.326	0.07	0.05
	2012	878.0	67.9	2,024	241.151	0.12	0.27
	2013	1,245.9	82.7	882	82.215	0.09	0.07
	2014	1,375.7	89.4	1,271	114.326	0.09	0.08
	2015	1,489.7	92.7	933	79.124	0.08	0.05
	2016	1,567.7	95.6	892	76.269	0.09	0.05
	2017	1,451.9	88.8	1,104	108.200	0.10	0.07
	2018	1,570.2	94.9	651	51.088	0.08	0.03
	2019	1,614.4	95.8	905	84.610	0.09	0.05
	2020	1,440.5	88.2	1,059	82.672	0.08	0.06
	2021	1,587.3	93.5	849	90.454	0.11	0.06
	2022	1,652.8	95.9	785	72.840	0.09	0.04
	2023	1,537.2	90.3	988	100.934	0.10	0.07
VERMONT YANKEE[23] Docket 50-271; DPR-28 1st commercial operation 11/72 Type—BWR Capacity—(605) MWe	1973	222.1	---	244	85	0.35	0.38
	1974	303.5	---	357	216	0.61	0.71
	1975	429.0	87.8	282	153	0.54	0.36
	1976	389.6	77.1	815	411	0.50	1.05
	1977	423.5	85.1	641	258	0.40	0.61
	1978	387.5	75.9	934	339	0.36	0.87
	1979	414.0	82.1	1,220	1,170	0.96	2.83
	1980	357.8	71.5	1,443	1,338	0.93	3.74
	1981	429.1	84.6	1,264	731	0.58	1.70
	1982	501.0	96.0	481	205	0.43	0.41
	1983	346.1	69.3	1,316	1,527	1.16	4.41
	1984	398.1	79.0	954	626	0.66	1.57
	1985	361.4	71.8	1,392	1,051	0.76	2.91
	1986	248.1	48.9	1,389	1,188	0.86	4.79
	1987	423.6	84.2	827	303	0.37	0.72
	1988	492.1	95.7	379	124	0.33	0.25
	1989	432.8	84.7	832	288	0.35	0.67
	1990	433.1	85.9	849	307	0.36	0.71
	1991	492.3	94.3	310	118	0.38	0.24
	1992	446.8	88.1	921	381	0.41	0.85
	1993	402.3	80.1	833	217	0.26	0.54
	1994	515.8	98.7	220	38	0.17	0.07
	1995	462.1	87.0	737	182	0.25	0.39
	1996	452.7	85.2	951	231	0.24	0.51
	1997	487.1	96.0	260	57	0.22	0.12
	1998	383.4	77.9	944	199.399	0.21	0.52
	1999	463.4	91.0	854	175.795	0.21	0.38
	2000	517.8	99.6	198	37.846	0.19	0.07
	2001	474.9	93.5	863	143.010	0.17	0.30
	2002	451.0	91.7	946	150.446	0.16	0.33
	2003	505.9	98.8	359	54.348	0.15	0.11
	2004	439.2	87.2	1,379	211.529	0.15	0.48
	2005	467.5	94.2	1,105	198.003	0.18	0.42
	2006	582.9	100.0	380	49.537	0.13	0.08
	2007	537.0	93.0	1,191	171.200	0.14	0.32

[23] Vermont Yankee ceased operations in December 2014 and is no longer in the count of operating reactors. Parentheses indicate plant capacity when the plant was operational.

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
VERMONT YANKEE[23] (continued)	2008	557.3	94.1	1,402	213.680	0.15	0.38
	2009	611.9	100.0	392	61.105	0.16	0.10
	2010	548.6	91.2	1,071	206.321	0.19	0.38
	2011	562.1	93.3	1,029	176.129	0.17	0.31
	2013	555.5	92.9	1,034	170.340	0.16	0.31
	2014	580.4	99.3	196	21.350	0.11	0.04
	2015	---	---	413	49.557	0.12	---
	2016	---	---	128	12.513	0.10	---
	2017	---	---	128	13.698	0.11	---
	2018	---	---	185	17.807	0.10	---
	2019	---	---	179	45.432	0.25	---
	2020	---	---	225	53.065	0.24	---
	2021	---	---	227	57.462	0.25	---
	2022	---	---	217	119.583	0.55	---
	2023	---	---	126	106.459	0.84	---
VOGTLE 1, 2[24] Docket 50-424; 50-425; NPF-68, NPF-81 1st commercial operation 6/87, 5/89 Type—PWRs Capacity—1,150, 1,152 MWe	1988	820.4	77.7	1,108	138	0.12	0.17
	1989	1,045.8	96.0	427	32	0.07	0.03
	1990	1,710.9	82.7	1,602	466	0.29	0.27
	1991	1,966.5	89.2	1,357	362	0.27	0.18
	1992	2,047.9	90.0	1,262	426	0.34	0.21
	1993	2,060.4	88.3	1,338	367	0.27	0.18
	1994	2,170.1	91.3	1,048	217	0.21	0.10
	1995	2,285.4	95.2	953	199	0.21	0.09
	1996	2,056.8	86.5	1,395	452	0.32	0.22
	1997	2,121.1	91.4	994	158	0.16	0.07
	1998	2,123.9	92.3	994	162.210	0.16	0.08
	1999	2,106.0	91.5	1,359	228.942	0.17	0.11
	2000	2,223.9	95.6	899	121.312	0.14	0.05
	2001	2,231.5	96.2	870	129.270	0.15	0.06
	2002	1,942.0	85.3	1,152	243.957	0.21	0.13
	2003	2,179.9	94.8	806	84.344	0.10	0.04
	2004	2,200.7	95.7	765	80.763	0.11	0.04
	2005	2,027.9	88.6	1,099	151.096	0.14	0.07
	2006	2,048.8	89.0	892	115.509	0.13	0.06
	2007	2,089.9	92.0	951	120.515	0.13	0.06
	2008	2,023.9	89.3	1,185	137.620	0.12	0.07
	2009	2,201.6	95.7	931	79.681	0.09	0.04
	2010	2,238.6	95.8	924	89.182	0.10	0.04
	2011	2,138.0	92.6	1,179	118.931	0.10	0.06
	2012	2,226.6	95.7	776	59.317	0.08	0.03
	2013	2,178.4	95.3	857	78.298	0.09	0.04
	2014	2,065.8	91.6	1,404	156.744	0.11	0.08
	2015	2,210.0	95.3	843	60.565	0.07	0.03
	2016	2,267.1	97.0	778	58.472	0.08	0.03
	2017	2,189.0	94.3	938	80.556	0.09	0.04
	2018	2,278.4	97.1	641	46.855	0.07	0.02
	2019	2,255.0	96.6	625	50.668	0.08	0.02
	2020	2,152.7	92.3	950	86.646	0.09	0.04
	2021	2,258.8	96.6	682	61.951	0.09	0.03
	2022	2,227.8	95.7	727	80.894	0.11	0.04
	2023	2,132.5	93.0	831	68.062	0.08	0.03
WATERFORD 3 Docket 50-382; NPF-38 1st commercial operation 9/85 Type—PWR Capacity—1,152 MWe	1986	875.7	79.1	1,244	223	0.18	0.25
	1987	891.8	82.5	959	156	0.16	0.17
	1988	784.3	75.4	1,246	259	0.21	0.33
	1989	909.8	82.6	1,306	265	0.20	0.29
	1990	1,027.9	92.8	432	47	0.11	0.05
	1991	870.6	79.8	1,301	364	0.28	0.42
	1992	909.6	83.2	1,213	226	0.19	0.25
	1993	1,088.3	99.4	195	15	0.08	0.01

[23] Vermont Yankee ceased operations in December 2014 and is no longer in the count of operating reactors. Parentheses indicate plant capacity when the plant was operational.

[24] Vogtle Unit 3 became operational in July 2023. It is not included in the count of operating reactors for 2023 because it did not complete a full year of operation, but the dose for Unit 3 is included in the total dose for Units 1 and 2.

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
WATERFORD 3	1994	949.1	87.0	1,167	191	0.16	0.20
(continued)	1995	927.4	83.4	1,092	153	0.14	0.16
	1996	1,064.8	94.2	342	27	0.08	0.03
	1997	767.2	71.2	1,186	148	0.13	0.19
	1998	984.1	91.9	282	24.032	0.09	0.02
	1999	849.5	79.6	833	123.198	0.15	0.15
	2000	965.1	88.8	825	131.701	0.16	0.14
	2001	1,086.0	99.6	91	4.677	0.05	---
	2002	1,007.0	93.2	811	109.439	0.13	0.11
	2003	968.0	90.9	710	95.332	0.13	0.10
	2004	1,099.1	100.0	60	2.517	0.04	---
	2005	900.9	80.2	902	136.318	0.15	0.15
	2006	1,059.3	92.0	1,190	109.682	0.09	0.10
	2007	1,130.2	96.0	469	20.125	0.04	0.02
	2008	1,030.7	88.0	1,268	134.221	0.11	0.13
	2009	1,023.4	88.0	1,479	255.088	0.17	0.25
	2010	1,173.1	100.0	216	4.913	0.02	---
	2011	1,020.8	90.4	1,144	100.053	0.09	0.10
	2012	897.1	78.0	1,919	260.202	0.14	0.29
	2013	1,071.6	93.7	130	3.129	0.02	---
	2014	1,046.4	91.5	965	69.462	0.07	0.07
	2015	959.5	85.1	979	65.826	0.07	0.07
	2016	1,152.5	98.4	248	3.392	0.01	---
	2017	959.1	83.8	894	60.728	0.07	0.06
	2018	1,175.6	100.0	98	1.130	0.01	---
	2019	869.0	75.8	931	69.780	0.07	0.08
	2020	1,023.0	88.9	705	37.090	0.05	0.04
	2021	1,119.5	96.7	127	1.999	0.02	---
	2022	897.6	77.9	1,157	84.524	0.07	0.09
	2023	892.7	77.2	772	66.602	0.09	0.07
WATTS BAR 1, 2	1997	867.6	83.8	1,103	113	0.10	0.13
Docket 50-390, 50-391;	1998	1,105.1	99.1	96	3.106	0.03	---
NPF-90, NPF-96	1999	943.1	87.2	975	98.946	0.10	0.10
1st commercial operation	2000	1,033.3	92.8	1,053	122.453	0.12	0.12
5/96, 10/16	2001	1,095.9	96.5	197	5.912	0.03	0.01
Type—PWR	2002	1,034.0	92.1	909	93.598	0.10	0.09
Capacity—1,157, 1,121 MWe	2003	973.3	86.7	1,392	165.741	0.12	0.17
	2004	1,122.1	99.1	220	5.893	0.03	0.01
	2005	1,003.7	90.0	1,244	143.506	0.12	0.14
	2006	764.5	70.0	2,070	322.682	0.16	0.42
	2007	1,150.6	100.0	128	4.414	0.03	---
	2008	923.5	83.2	887	70.648	0.08	0.08
	2009	1,051.1	92.1	853	63.846	0.07	0.06
	2010	1,111.7	98.3	129	6.193	0.05	0.01
	2011	939.6	85.4	900	51.021	0.06	0.05
	2012	969.5	86.5	1,002	62.779	0.06	0.06
	2013	1,137.9	99.5	85	2.616	0.03	---
	2014	1,003.4	89.0	600	28.268	0.05	0.03
	2015	964.5	87.5	976	64.320	0.07	0.07
	2016	1,284.1	97.8	189	4.489	0.02	---
	2017	1,558.2	69.6	1,074	75.672	0.07	0.05
	2018	2,110.1	92.3	779	36.920	0.05	0.02
	2019	2,018.4	88.8	832	45.017	0.05	0.02
	2020	2,007.9	90.6	1,186	76.820	0.06	0.04
	2021	2,018.8	92.5	1,329	86.650	0.07	0.04
	2022	1,918.2	83.4	2,127	163.361	0.08	0.09
	2023	2,135.8	92.8	1,518	116.163	0.08	0.05
WOLF CREEK 1	1986	832.8	73.3	682	143	0.21	0.17
Docket 50-482;	1987	778.8	71.1	675	138	0.20	0.18
NPF-42	1988	794.7	70.7	1,010	297	0.29	0.37
1st commercial operation 9/85	1989	1,108.4	99.5	186	18	0.10	0.02
Type—PWR	1990	940.2	81.0	798	195	0.24	0.21
Capacity—1,164 MWe	1991	707.6	71.9	1,010	331	0.33	0.47
	1992	1,010.8	86.7	446	78	0.17	0.08

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
WOLF CREEK 1 (continued)	1993	940.5	80.6	975	183	0.19	0.19
	1994	1,017.2	86.8	1,082	235	0.22	0.23
	1995	1,198.0	98.7	242	14	0.06	0.01
	1996	980.6	81.2	986	171	0.17	0.17
	1997	964.3	83.8	989	265	0.27	0.27
	1998	1,187.3	100.0	184	10.382	0.06	0.01
	1999	1,045.3	90.1	812	147.704	0.18	0.14
	2000	1,032.7	89.5	861	143.417	0.17	0.14
	2001	1,177.9	100.0	105	5.176	0.05	---
	2002	1,029.0	88.7	816	99.987	0.12	0.10
	2003	1,013.5	87.2	820	88.941	0.11	0.09
	2004	1,153.5	98.8	93	3.388	0.04	---
	2005	1,004.2	86.7	856	106.870	0.12	0.11
	2006	1,067.4	91.0	789	96.788	0.12	0.09
	2007	1,183.7	100.0	91	4.307	0.05	---
	2008	968.3	83.1	911	94.997	0.10	0.10
	2009	1,001.0	86.9	1,504	73.637	0.05	0.07
	2010	1,090.8	94.2	463	10.516	0.02	0.01
	2011	839.1	73.0	1,266	133.960	0.11	0.16
	2012	944.4	80.0	306	7.888	0.03	0.01
	2013	819.2	72.5	1,452	111.257	0.08	0.14
	2014	978.2	81.9	709	27.500	0.04	0.03
	2015	987.9	82.5	1,190	74.804	0.06	0.08
	2016	942.0	78.5	1,267	90.631	0.07	0.10
	2017	1,215.5	100.0	238	3.437	0.01	---
	2018	1,047.5	86.9	1,153	72.882	0.06	0.07
	2019	1,056.6	87.4	784	45.183	0.06	0.04
	2020	1,196.6	99.7	145	1.924	0.01	---
	2021	978.9	84.0	950	78.650	0.08	0.08
	2022	1,025.3	86.8	699	59.328	0.08	0.06
	2023	1,176.0	100.0	222	2.884	0.01	0.00
YANKEE ROWE[25] Docket 50-29; DPR-3 1st commercial operation 7/61 Type—PWR Capacity—(175) MWe	1969	138.3	---	193	215	1.11	1.55
	1970	146.1	---	355	255	0.72	1.75
	1971	173.5	---	155	90	0.58	0.52
	1972	78.7	---	282	255	0.90	3.24
	1973	127.1	---	133	99	0.74	0.78
	1974	111.3	---	243	205	0.84	1.84
	1975	145.1	82.4	249	116	0.47	0.80
	1976	152.2	89.8	152	59	0.39	0.39
	1977	124.6	73.9	725	356	0.49	2.86
	1978	145.0	81.0	565	282	0.50	1.94
	1979	149.0	81.6	441	127	0.29	0.85
	1980	35.6	22.0	502	213	0.42	5.98
	1981	109.0	74.4	515	302	0.59	2.77
	1982	108.6	73.4	814	474	0.58	4.36
	1983	163.5	91.4	395	68	0.17	0.42
	1984	124.8	71.4	654	348	0.53	2.79
	1985	144.3	85.3	653	211	0.32	1.46
	1986	169.7	95.0	384	45	0.12	0.27
	1987	138.7	82.7	593	217	0.37	1.56
	1988	136.4	85.2	738	227	0.31	1.66
	1989	159.4	92.9	496	62	0.13	0.39
	1990	101.1	61.5	702	246	0.35	2.43
	1991	121.2	72.3	162	40	0.25	0.33
	1992	---	---	324	94	0.29	---
	1993	---	---	313	163	0.52	---
	1994	---	---	222	156	0.70	---
	1995	---	---	191	78	0.41	---
	1996	---	---	239	95	0.40	---
	1997	---	---	323	65	0.20	---
	1998	---	---	125	4.603	0.04	---

[25] Yankee Rowe ceased operations as of October 1991 and will not be put in commercial operation again. It is no longer in the count of operating reactors. Parentheses indicate plant capacity when the plant was operational.

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
YANKEE ROWE[25] (continued)	1999	---	---	83	2.291	0.02	---
	2000	---	---	38	2.406	0.06	---
	2001	---	---	48	3.969	0.08	---
	2002	---	---	128	20.024	0.16	---
	2003	---	---	136	30.934	0.23	---
	2004	---	---	70	6.502	0.09	---
	2005	---	---	63	1.456	0.02	---
	2006	---	---	45	0.975	0.02	---
	2007	---	---	---	---	---	---
	2008	---	---	1	0.019	0.02	---
	2009	---	---	5	0.114	0.02	---
	2010	---	---	3	0.083	0.03	---
	2011	---	---	8	0.113	0.01	---
	2012	---	---	1	0.013	0.01	---
	2013	---	---	2	0.043	0.02	---
	2014	---	---	10	0.145	0.01	---
	2015	---	---	25	0.463	0.02	---
	2016	---	---	5	0.073	0.01	---
	2017	---	---	7	0.112	0.02	---
	2018	---	---	4	0.045	0.01	---
	2019	---	---	7	0.113	0.02	---
	2020	---	---	18	0.266	0.01	---
	2021	---	---	22	0.428	0.02	---
	2022	---	---	-	---	---	---
	2023	---	---	1	0.016	0.02	---
ZION 1, 2[26] Docket 50-295; 50-304; DPR-39, DPR-48 1st commercial operation 12/73, 9/74 Type—PWRs Capacity—(1,040), (1,040) MWe	1974	425.3	71.1	306	56	0.18	0.13
	1975	1,181.5	74.9	436	127	0.29	0.11
	1976	1,134.9	61.9	774	571	0.74	0.50
	1977	1,358.6	75.0	784	1,003	1.28	0.74
	1978	1,613.5	80.2	1,104	1,017	0.92	0.63
	1979	1,238.0	67.6	1,472	1,274	0.87	1.03
	1980	1,411.2	74.1	1,363	920	0.67	0.65
	1981	1,366.9	72.3	1,754	1,720	0.98	1.26
	1982	1,186.4	64.3	1,575	2,103	1.34	1.77
	1983	1,222.3	69.4	1,285	1,311	1.02	1.07
	1984	1,389.9	69.6	1,110	786	0.71	0.57
	1985	1,187.9	62.9	1,498	1,166	0.78	0.98
	1986	1,462.0	73.2	967	474	0.49	0.32
	1987	1,337.0	71.0	1,046	653	0.62	0.49
	1988	1,549.1	78.3	1,926	1,260	0.65	0.81
	1989	1,514.1	77.6	1,282	624	0.49	0.41
	1990	860.4	46.9	1,385	696	0.50	0.81
	1991	1,125.7	58.2	902	173	0.19	0.15
	1992	1,128.8	59.0	1,732	1,043	0.60	0.92
	1993	1,458.2	70.9	1,772	643	0.36	0.44
	1994	1,224.9	59.9	1,176	306	0.26	0.25
	1995	1,471.6	72.4	1,807	797	0.44	0.54
	1996	1,538.4	75.8	1,567	437	0.28	0.28
	1997	123.2	7.1	924	119	0.13	0.97
	1998	---	---	246	12.417	0.05	---
	1999	---	---	67	4.194	0.06	---
	2000	---	---	26	3.015	0.12	---
	2001	---	---	6	0.274	0.05	---
	2002	---	---	12	0.276	0.02	---
	2003	---	---	2	0.049	0.02	---
	2004	---	---	6	0.167	0.03	---
	2005	---	---	5	0.109	0.02	---
	2006	---	---	7	0.109	0.02	---
	2007	---	---	8	0.224	0.03	---

[25] Yankee Rowe ceased operations as of October 1991 and will not be put in commercial operation again. It is no longer in the count of operating reactors. Parentheses indicate plant capacity when the plant was operational.

[26] Zion Units 1 and 2 ceased operations in 1997 and 1996, respectively, and are no longer included in the count of operating reactors. Parentheses indicate plant capacity when the plants were operational.

Reporting Organization	Year	Megawatt Years (MW-yr)	Unit Availability Factor	Total Personnel with Measurable Doses	Collective Dose per Site (person-rem)	Average Measurable Dose (rem)	Collective Dose/ MW-yr
ZION 1, 2[26] (continued)	2008	---	---	7	0.147	0.02	---
	2009	---	---	---	---	---	---
	2010	---	---	17	0.562	0.03	---
	2011	---	---	128	28.794	0.22	---
	2012	---	---	183	75.801	0.41	---
	2013	---	---	218	44.689	0.20	---
	2014	---	---	358	78.730	0.22	---
	2015	---	---	340	142.605	0.42	---
	2016	---	---	194	45.788	0.24	---
	2017	---	---	75	4.542	0.06	---
	2018	---	---	7	0.085	0.01	---
	2019	---	---	4	0.123	0.03	---
	2020	---	---	---	---	---	---
	2021	---	---	4	0.048	---	---
	2022	---	---	3	0.041	0.01	---
	2023	---	---	5	0.081	0.02	---

[26] Zion Units 1 and 2 ceased operations in 1997 and 1996, respectively, and are no longer included in the count of operating reactors. Parentheses indicate plant capacity when the plants were operational.

APPENDIX D

DOSE PERFORMANCE TRENDS BY REACTOR SITE

1973–2023

Appendix D only contains data on plants still operating in 2023.

DOSE PERFORMANCE TRENDS BY REACTOR SITE 1973–2023

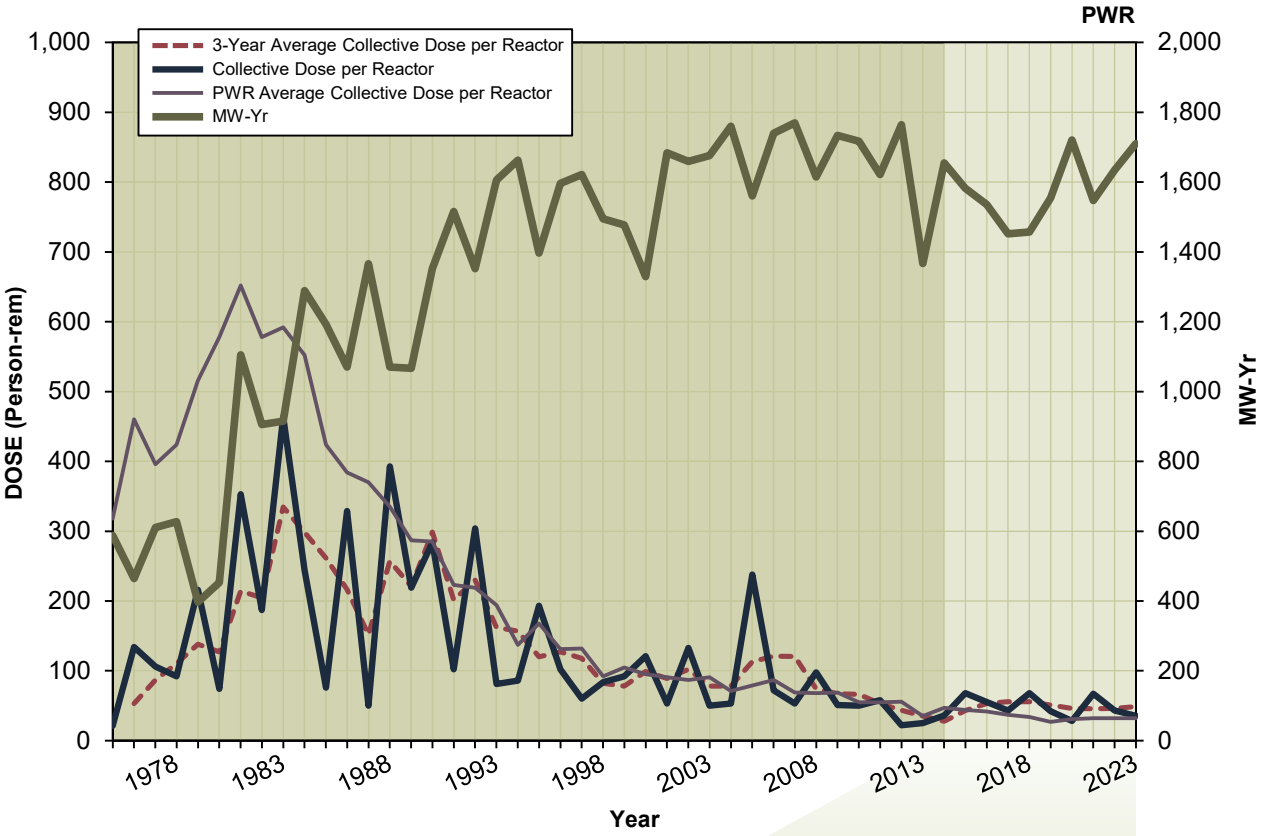
GRAPHICAL REPRESENTATION OF DOSE TRENDS IN APPENDIX D

Each page of appendix D presents a graph of selected dose performance trends from 1973 through 2023. The graphs illustrate the history of the collective dose per reactor for the site, the rolling 3-year average collective dose per reactor, and the electricity generated at the site. These data are plotted, beginning with each plant's first full year of commercial operation and continuing through 2023. Data for years when a plant was not in commercial operation have been included when available; however, any data reported before 1973 are not included. The data on the 3-year average collective dose per reactor are included because they provide an overall indication of each plant's general trend in collective dose.

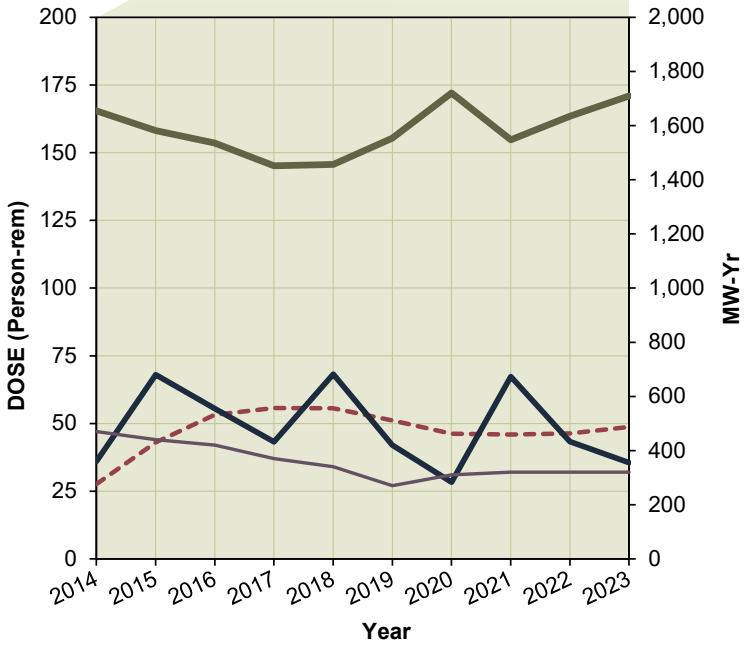
The 3-year average collective dose per reactor is also one of the metrics used by the U.S. Nuclear Regulatory Commission in the Reactor Oversight Process to evaluate a licensee's as low as is reasonably achievable program. This average is determined by summing the collective dose per reactor for the current year and the previous 2 years and then dividing this sum by 3, which is the number of years considered. Depicting dose trends by using a 3-year average reduces the sporadic effects on annual doses of refueling operations (usually an 18- to 24-month cycle) and occasional high-dose maintenance activities and provides a more representative depiction of collective dose trends over the life of a plant. The graph also shows the annual average collective dose per reactor for all reactors of the same type.

ARKANSAS 1, 2

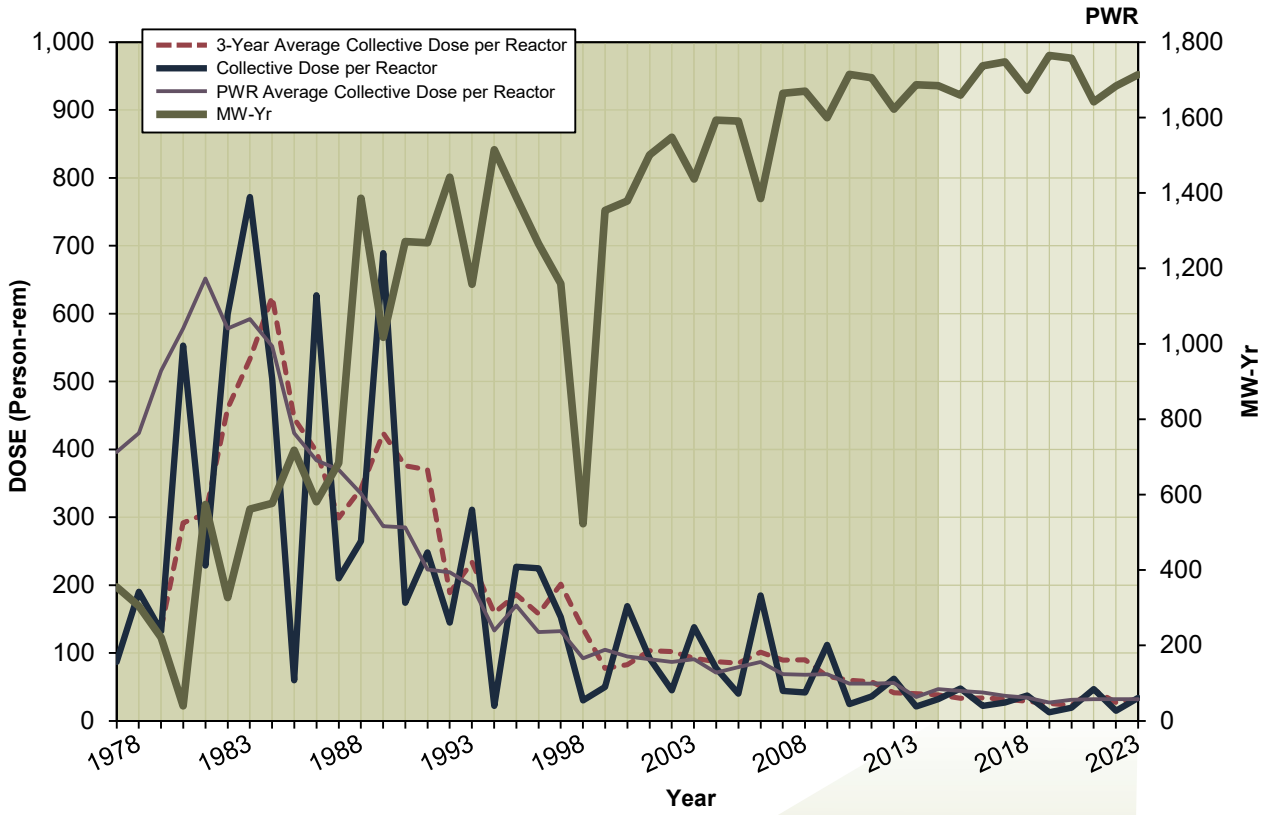
Dose Performance Trends



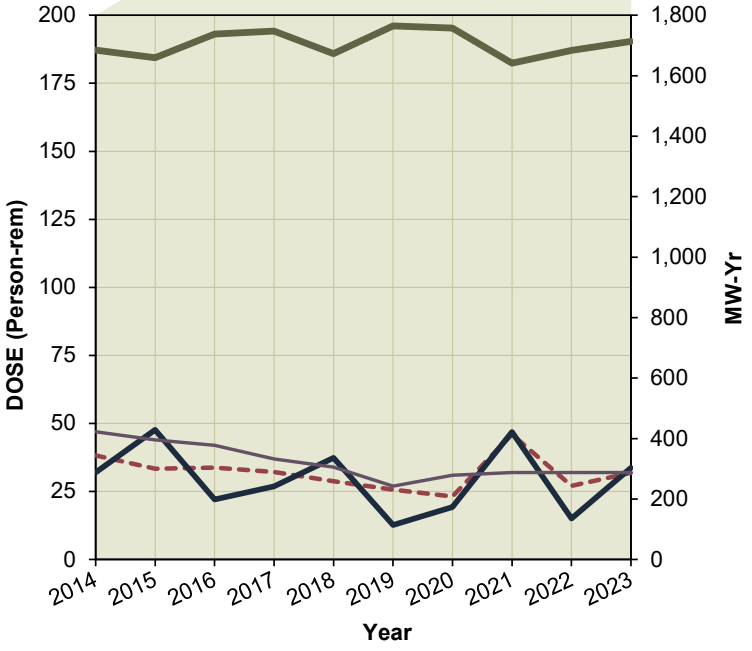
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	27.585	36.000	1,654.6
2015	43.055	68.000	1,582.0
2016	53.232	55.553	1,535.7
2017	55.723	43.250	1,451.4
2018	55.664	68.187	1,456.8
2019	51.161	42.043	1,553.8
2020	46.195	28.354	1,720.4
2021	45.910	67.335	1,547.5
2022	46.333	43.311	1,634.7
2023	48.719	35.512	1,709.8



BEAVER VALLEY 1, 2
Dose Performance Trends

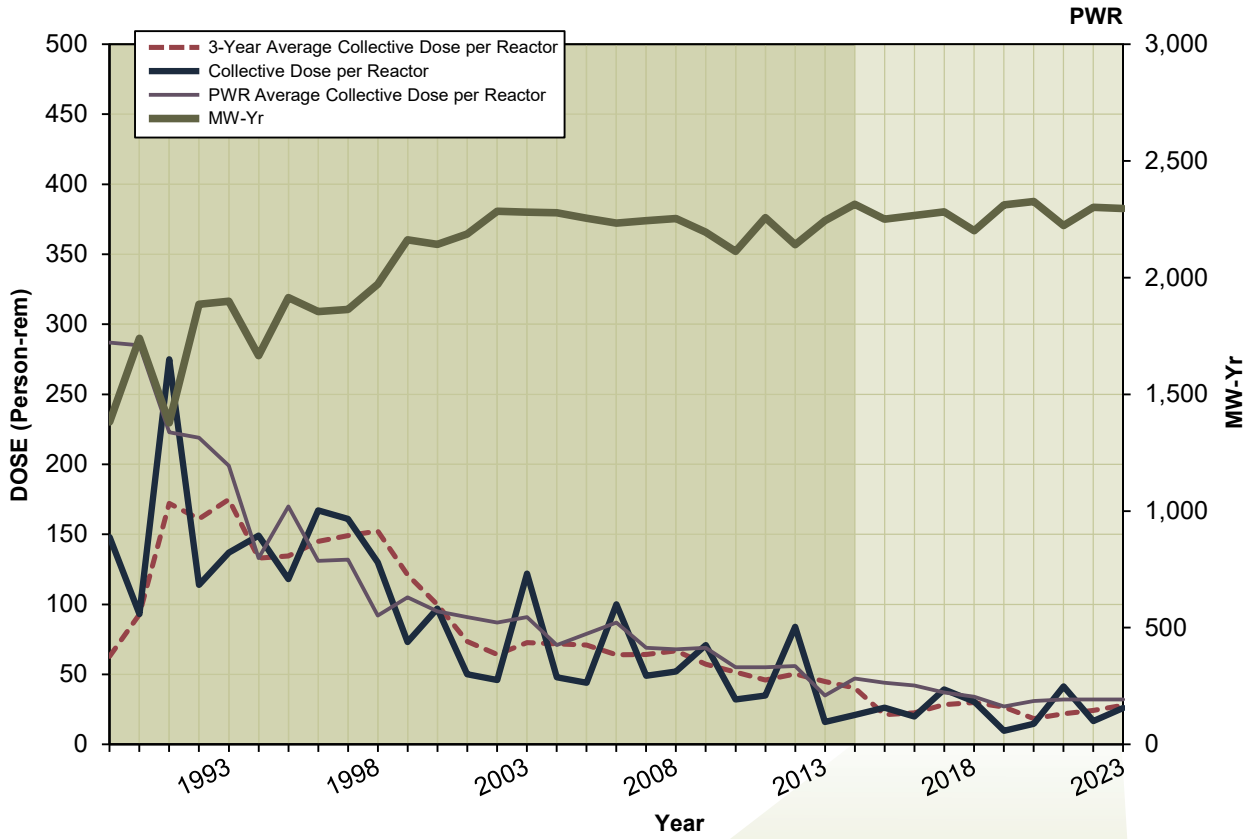


Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	38.305	32.000	1,684.6
2015	33.312	47.604	1,659.6
2016	33.718	22.073	1,737.4
2017	32.177	26.853	1,747.9
2018	28.776	37.401	1,672.8
2019	25.654	12.708	1,764.4
2020	23.138	19.306	1,757.2
2021	45.910	46.864	1,641.6
2022	27.081	15.073	1,683.8
2023	31.869	33.670	1,713.8

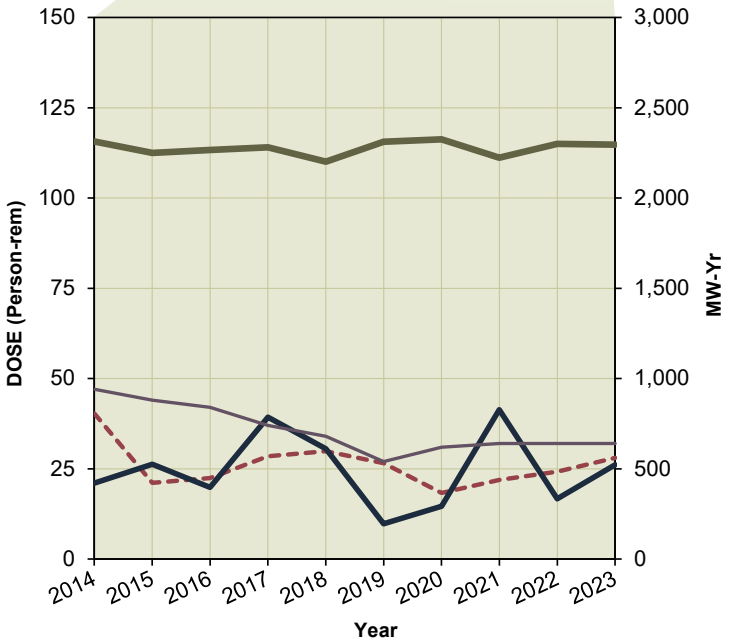


BRAIDWOOD 1, 2

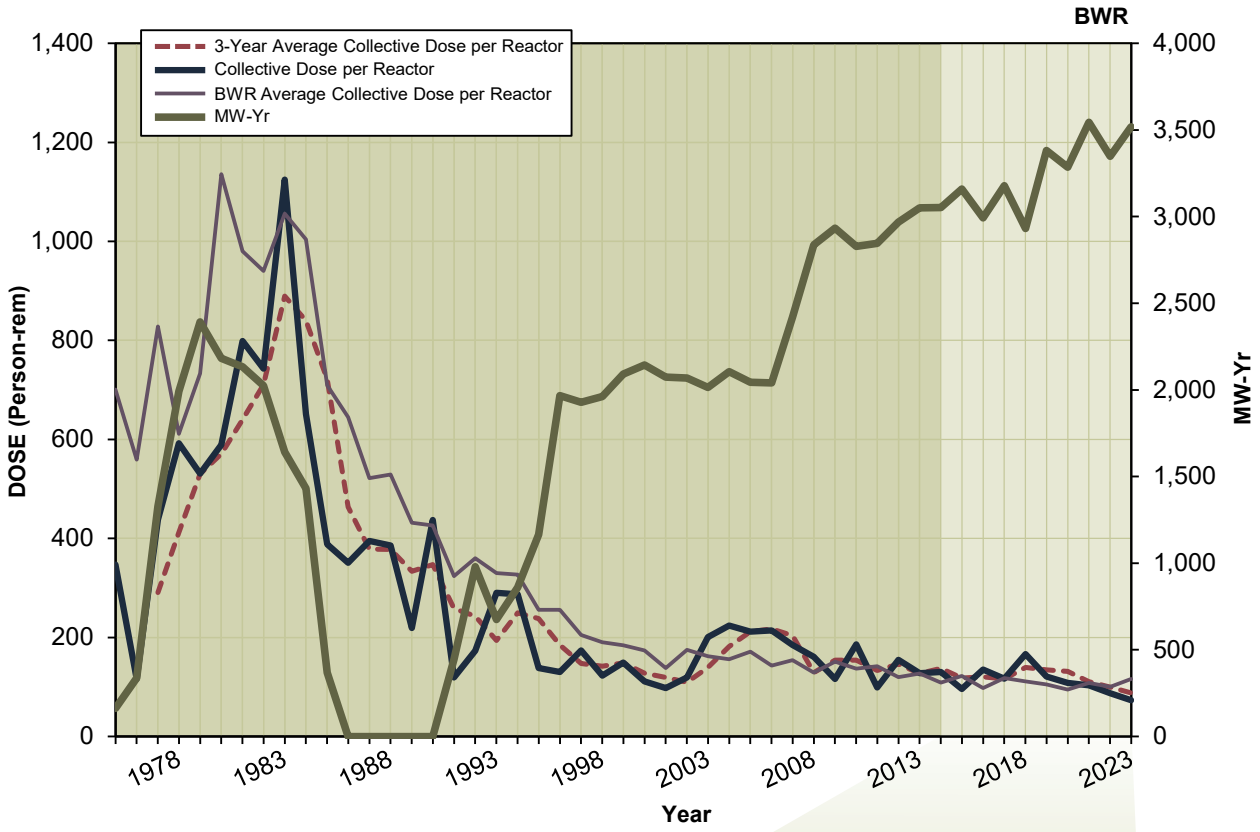
Dose Performance Trends



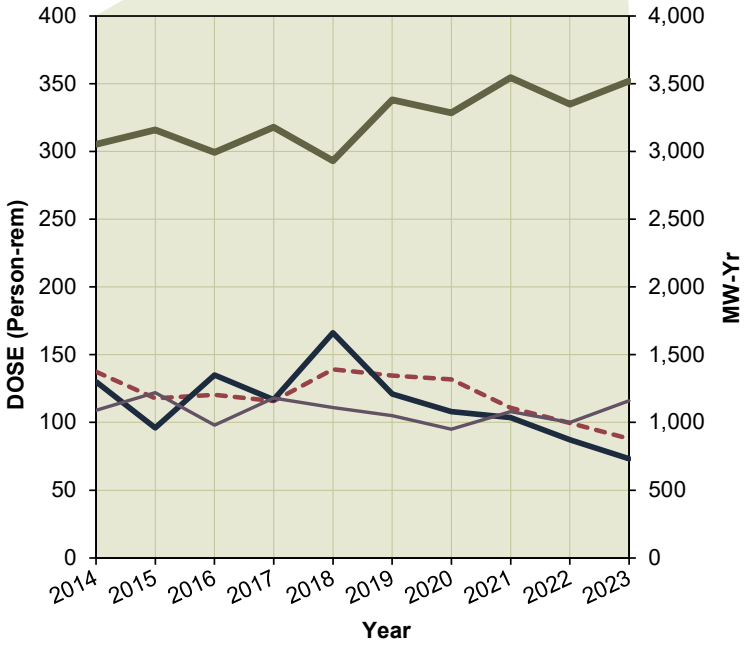
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	40.333	21.000	2,313.9
2015	21.135	26.234	2,250.0
2016	22.443	19.848	2,265.9
2017	28.472	39.334	2,281.4
2018	29.911	30.550	2,201.3
2019	26.554	9.777	2,311.8
2020	18.330	14.662	2,325.5
2021	21.925	41.337	2,223.1
2022	24.229	16.688	2,300.9
2023	28.041	26.100	2,296.1



BROWNS FERRY 1, 2, 3*
Dose Performance Trends



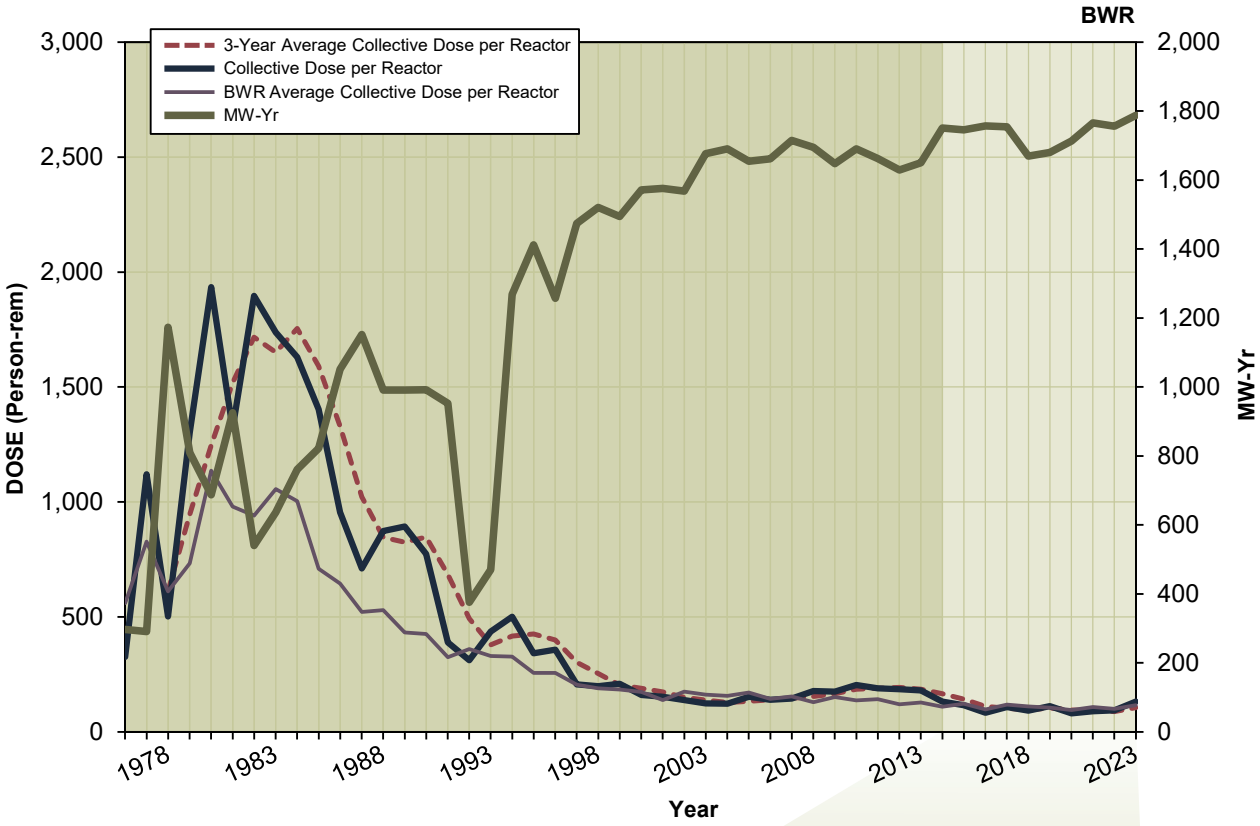
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	137.421	130.000	3,052.3
2015	117.836	96.021	3,158.6
2016	120.278	134.862	2,992.6
2017	115.857	116.687	3,179.0
2018	139.255	166.217	2,930.8
2019	134.634	120.999	3,381.3
2020	131.739	108.002	3,284.8
2021	110.858	103.573	3,544.9
2022	99.583	87.174	3,347.7
2023	87.977	73.180	3,518.9



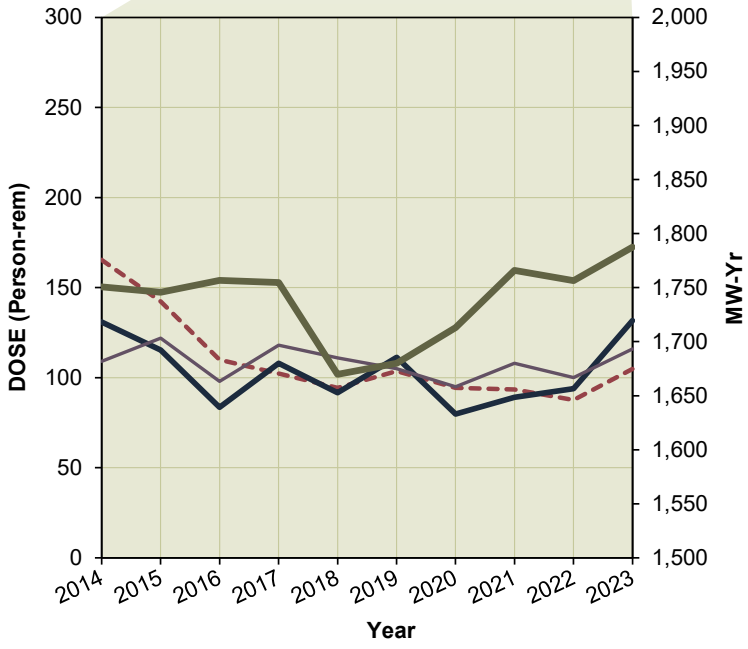
*Browns Ferry Unit 1 resumed power generation in 2007.

BRUNSWICK 1, 2

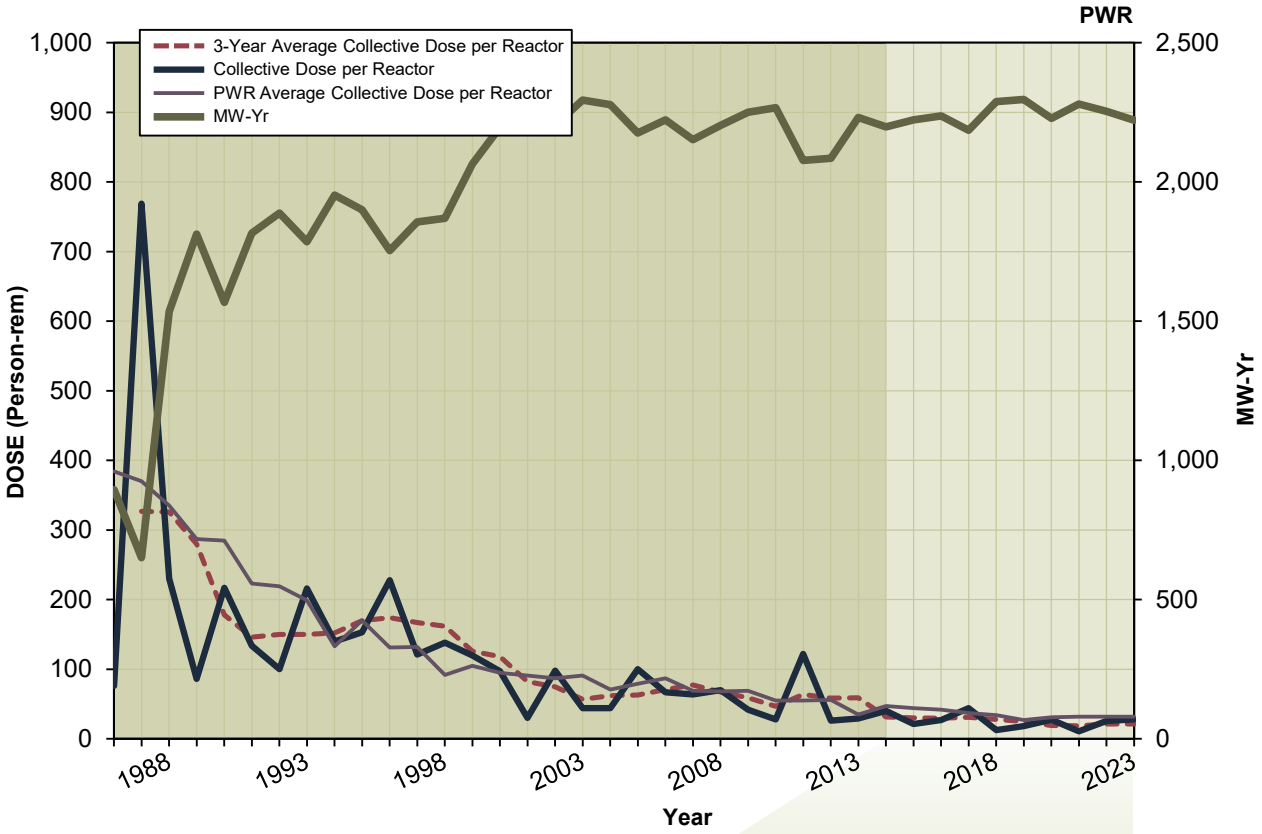
Dose Performance Trends



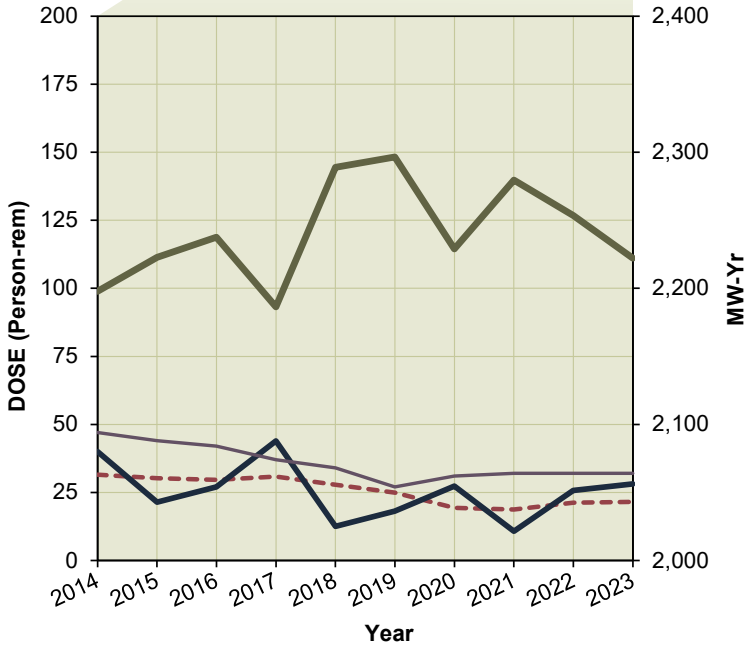
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	165.487	130.952	1,750.6
2015	142.270	115.285	1,745.6
2016	109.952	83.618	1,756.7
2017	102.303	108.007	1,754.6
2018	94.421	91.638	1,669.7
2019	103.671	111.368	1,680.0
2020	94.291	79.869	1,713.0
2021	93.430	89.053	1,765.9
2022	87.608	93.904	1,756.5
2023	104.876	131.670	1,787.5



BYRON 1, 2
Dose Performance Trends

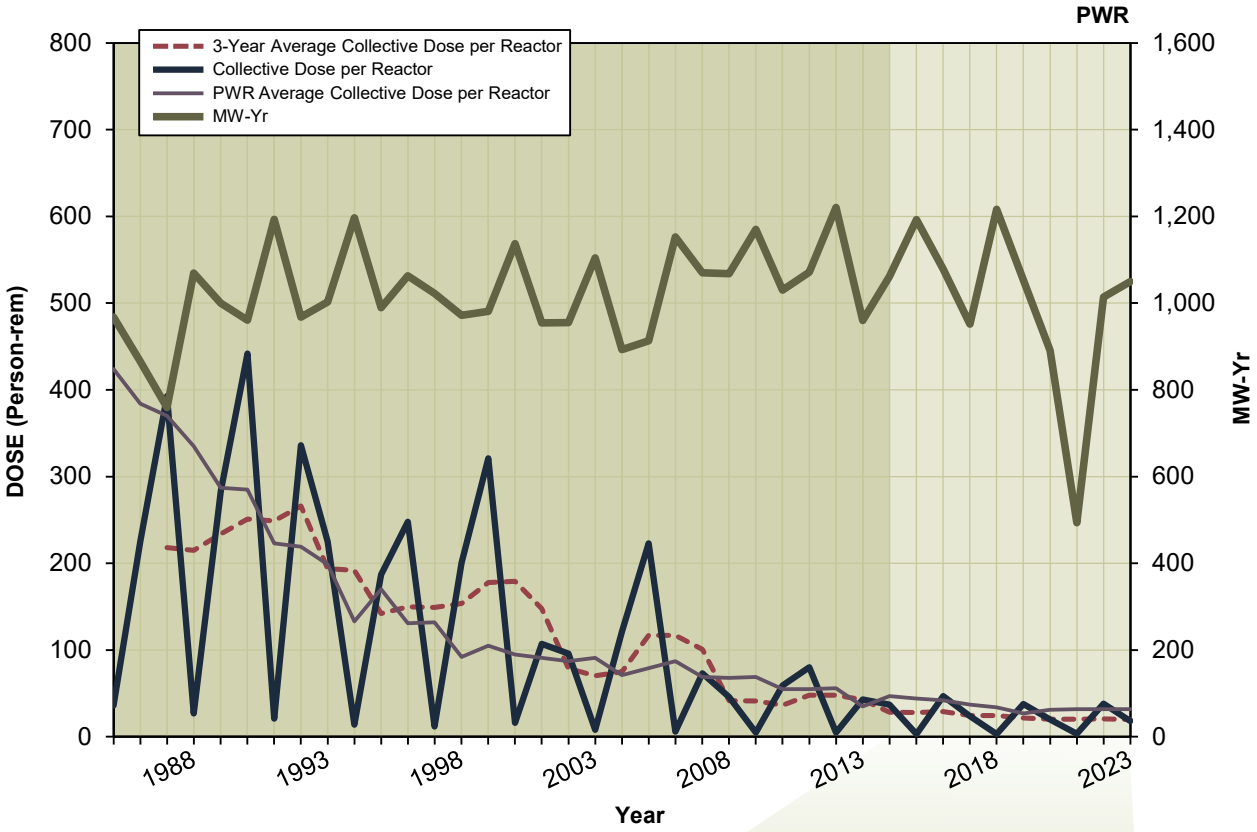


Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	31.567	40.000	2,197.8
2015	30.236	21.468	2,222.8
2016	29.620	27.006	2,237.5
2017	30.799	43.923	2,186.4
2018	27.836	12.578	2,288.9
2019	24.887	18.161	2,296.6
2020	19.356	27.331	2,228.9
2021	18.731	10.701	2,279.6
2022	21.249	25.715	2,253.6
2023	21.502	28.090	2,222.1

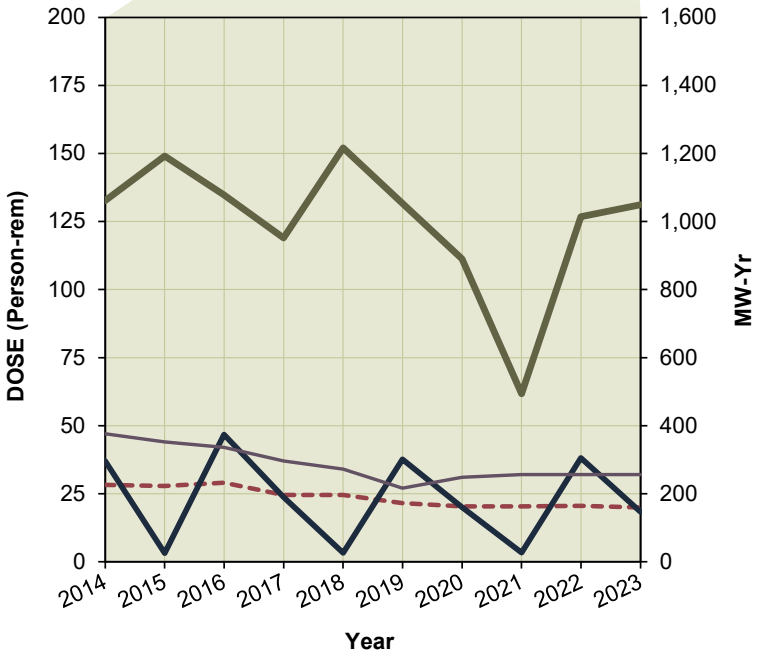


CALLAWAY 1

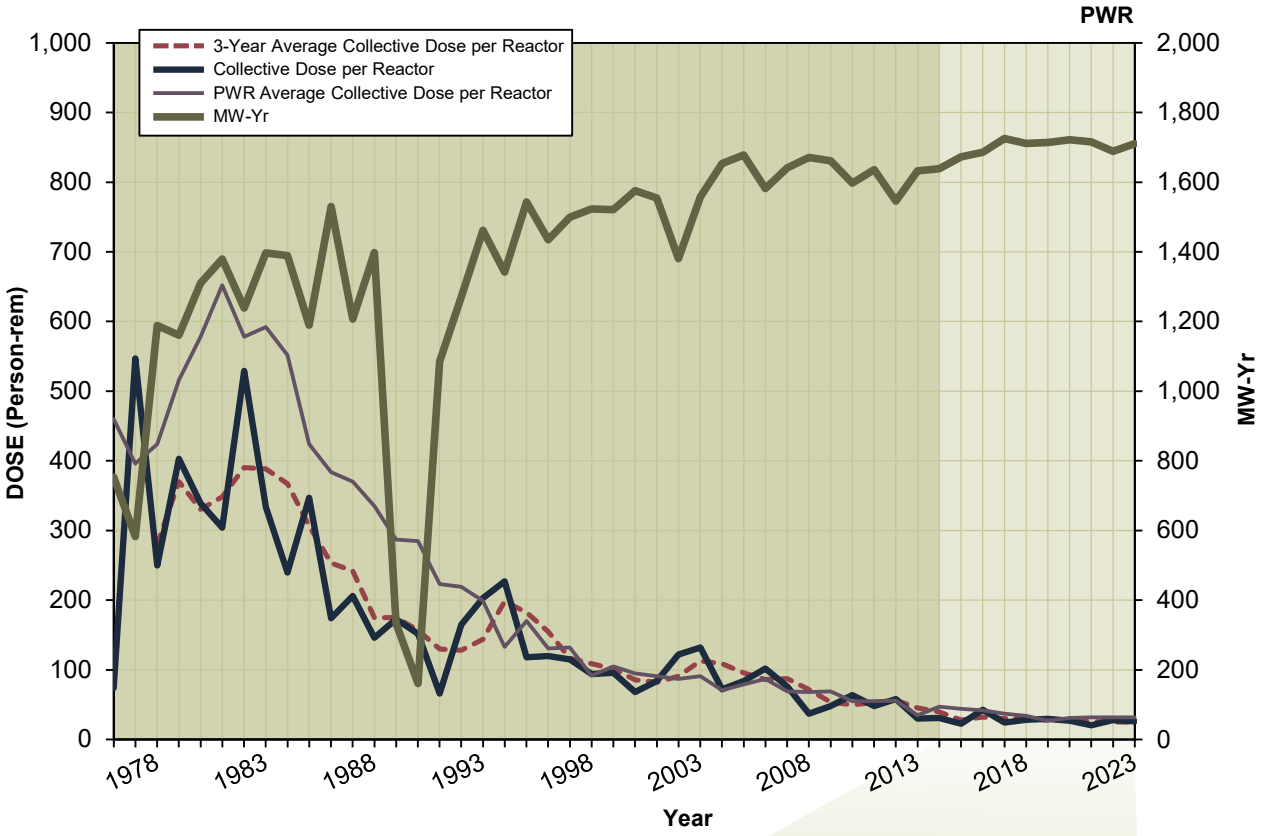
Dose Performance Trends



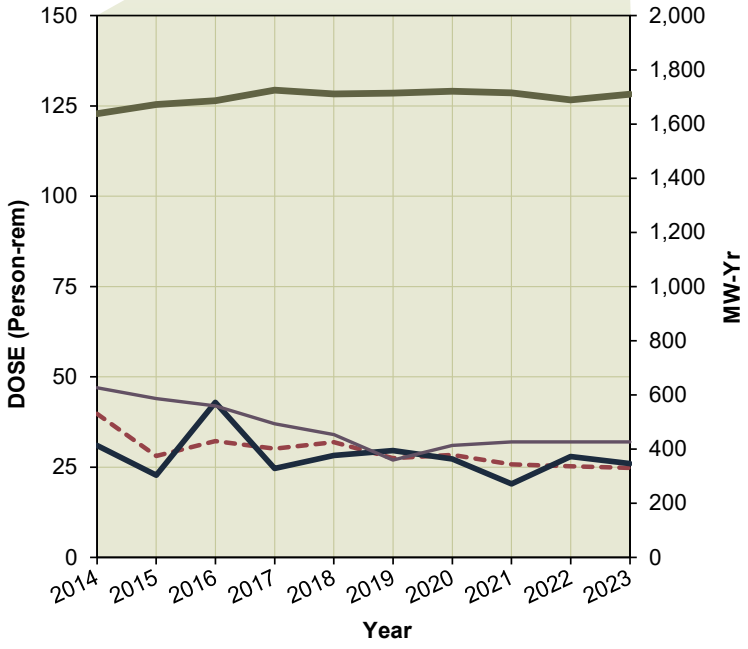
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	28.274	37.000	1,061.3
2015	27.808	3.128	1,192.2
2016	29.024	46.770	1,078.3
2017	24.537	23.713	951.9
2018	24.565	3.211	1,216.6
2019	21.518	37.630	1,053.4
2020	20.308	20.082	890.4
2021	20.344	3.320	493.8
2022	20.524	38.170	1,013.9
2023	19.948	18.353	1,049.7



CALVERT CLIFFS 1, 2
Dose Performance Trends

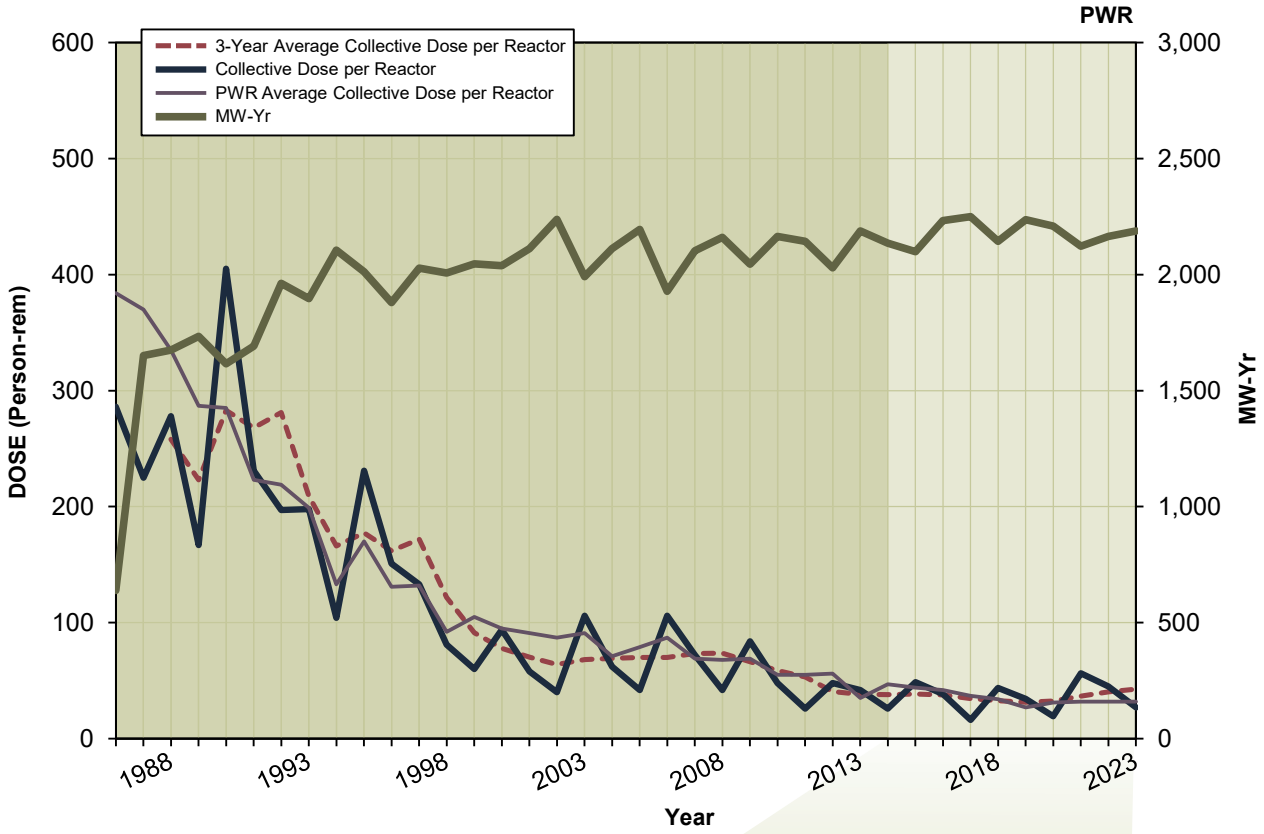


Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	39.778	31.000	1,638.3
2015	28.128	22.812	1,672.4
2016	32.263	42.946	1,685.6
2017	30.133	24.642	1,725.0
2018	31.945	28.247	1,711.0
2019	27.504	29.623	1,713.8
2020	28.376	27.257	1,721.4
2021	25.767	20.421	1,715.4
2022	25.221	27.985	1,688.6
2023	24.814	26.040	1,710.5

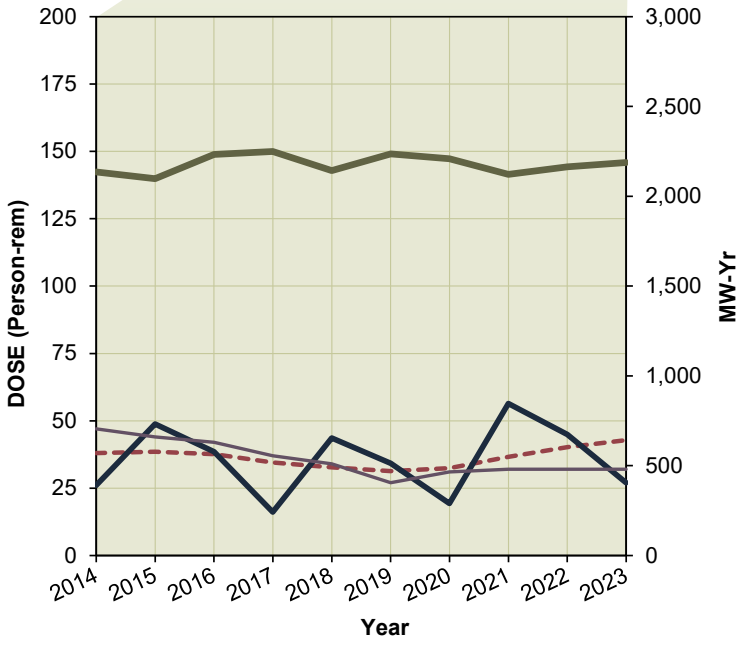


CATAWBA 1, 2

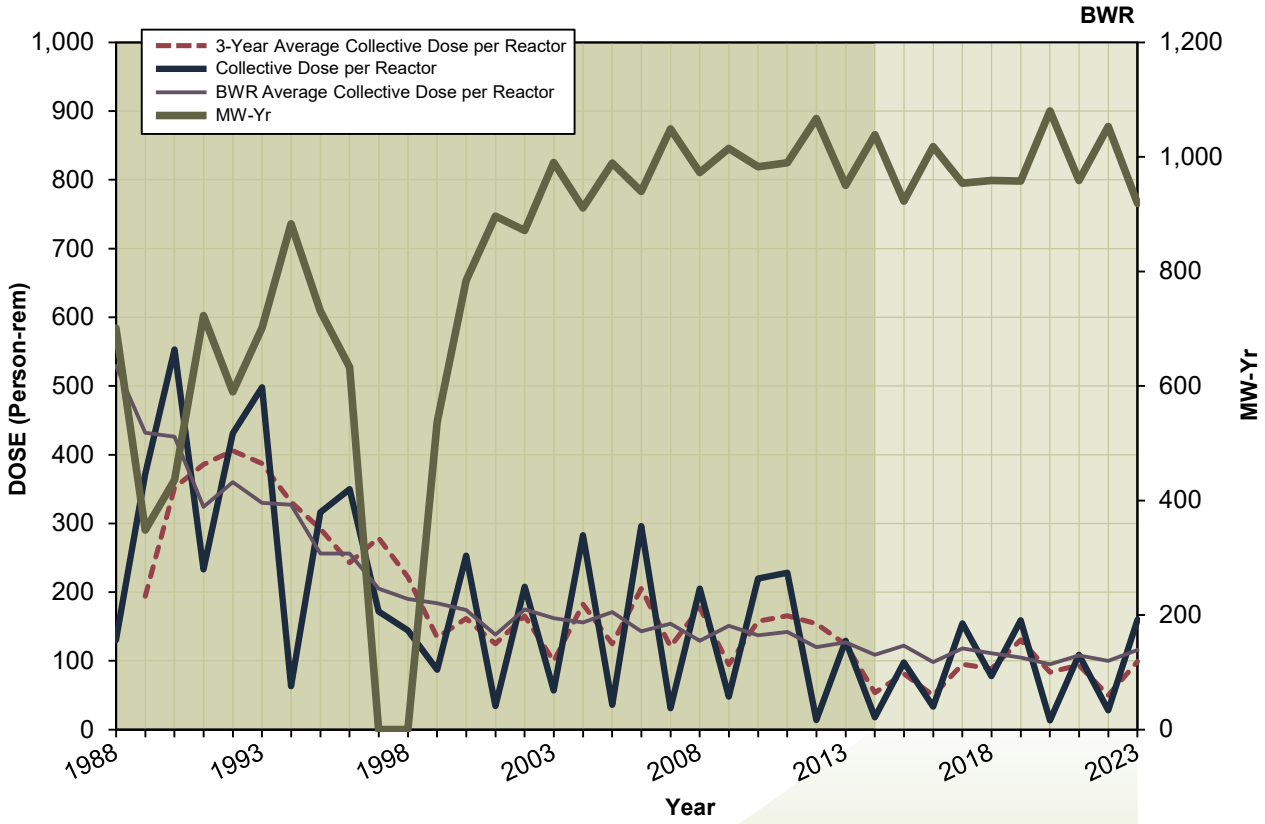
Dose Performance Trends



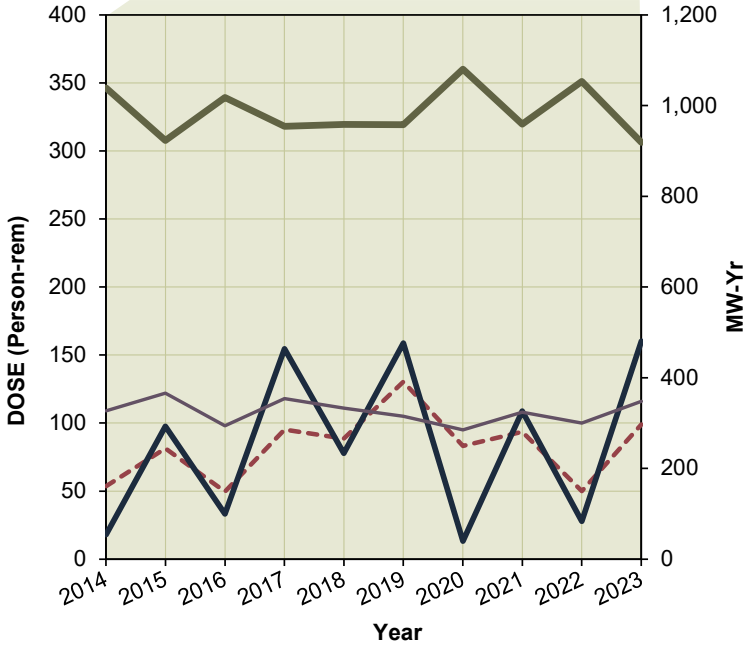
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	38.070	26.000	2,136.0
2015	38.560	48.839	2,098.6
2016	37.592	38.549	2,232.7
2017	34.502	16.118	2,249.6
2018	32.773	43.651	2,143.8
2019	31.318	34.185	2,236.7
2020	32.390	19.335	2,209.7
2021	36.652	56.438	2,122.2
2022	40.236	44.937	2,164.7
2023	42.803	27.030	2,187.8



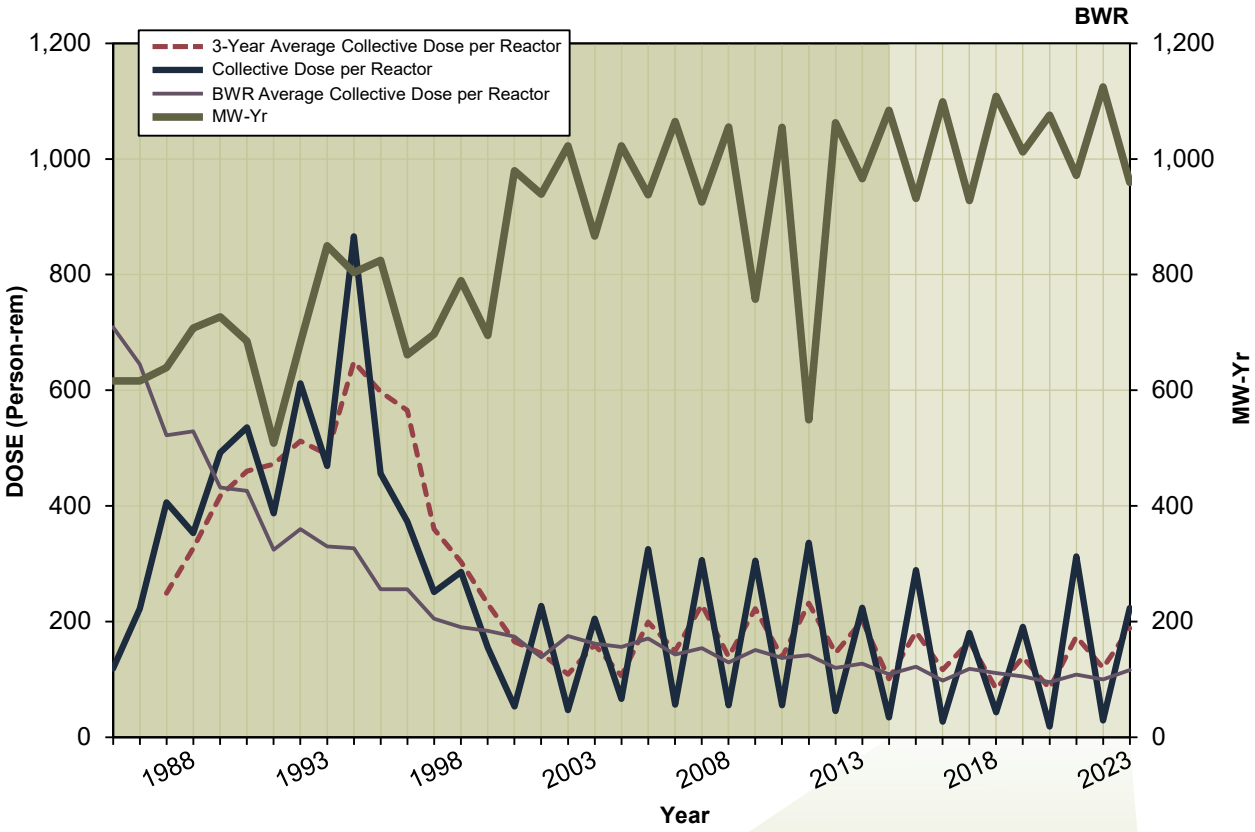
CLINTON
Dose Performance Trends



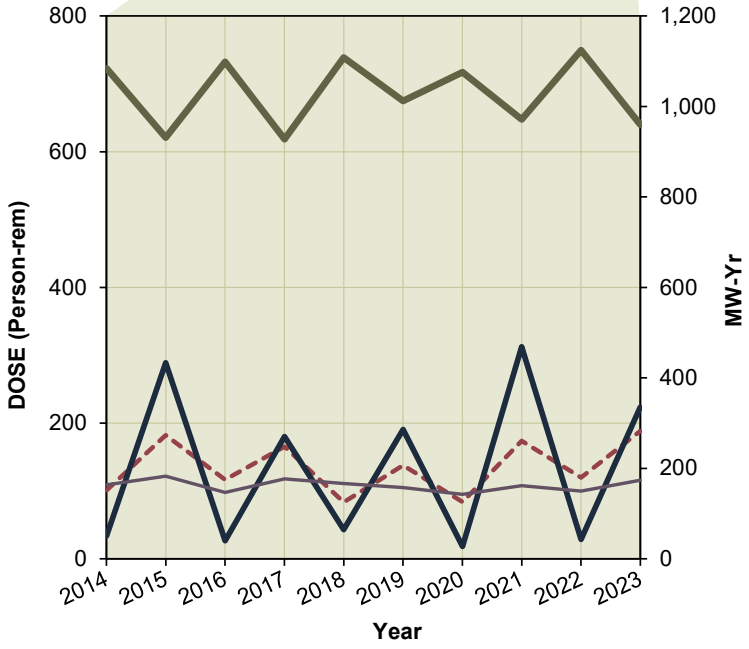
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	53.632	18.000	1,038.6
2015	81.427	97.634	922.9
2016	49.573	33.218	1,017.8
2017	95.144	154.579	954.1
2018	88.537	77.813	958.7
2019	130.408	158.832	957.6
2020	83.287	13.216	1,080.2
2021	93.628	108.836	959.0
2022	49.952	27.805	1,053.0
2023	98.901	160.062	919.0



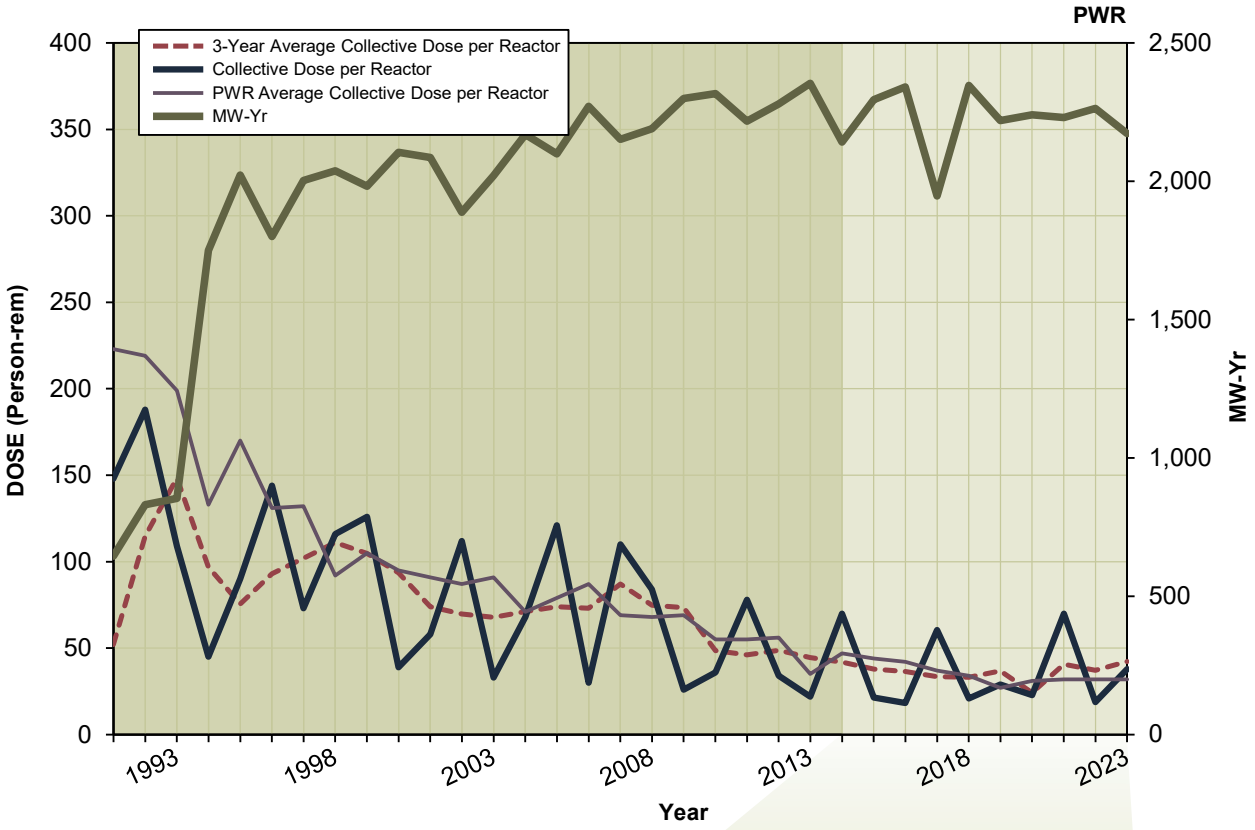
COLUMBIA GENERATING
Dose Performance Trends



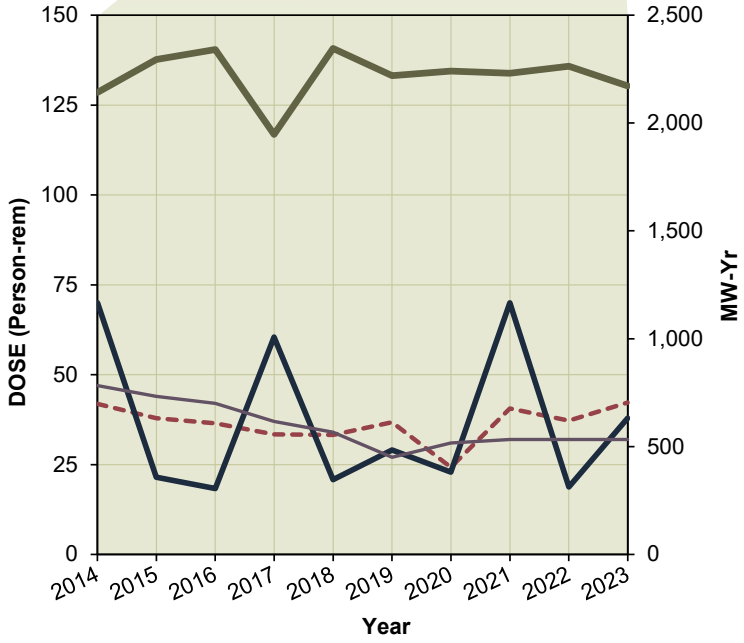
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	101.033	34.000	1,084.2
2015	182.257	289.135	931.6
2016	116.577	26.825	1,098.8
2017	165.405	180.255	927.9
2018	83.386	43.078	1,108.3
2019	138.009	190.694	1,012.2
2020	84.075	18.453	1,075.7
2021	173.985	312.807	971.6
2022	120.041	28.862	1,124.6
2023	188.376	223.459	959.8



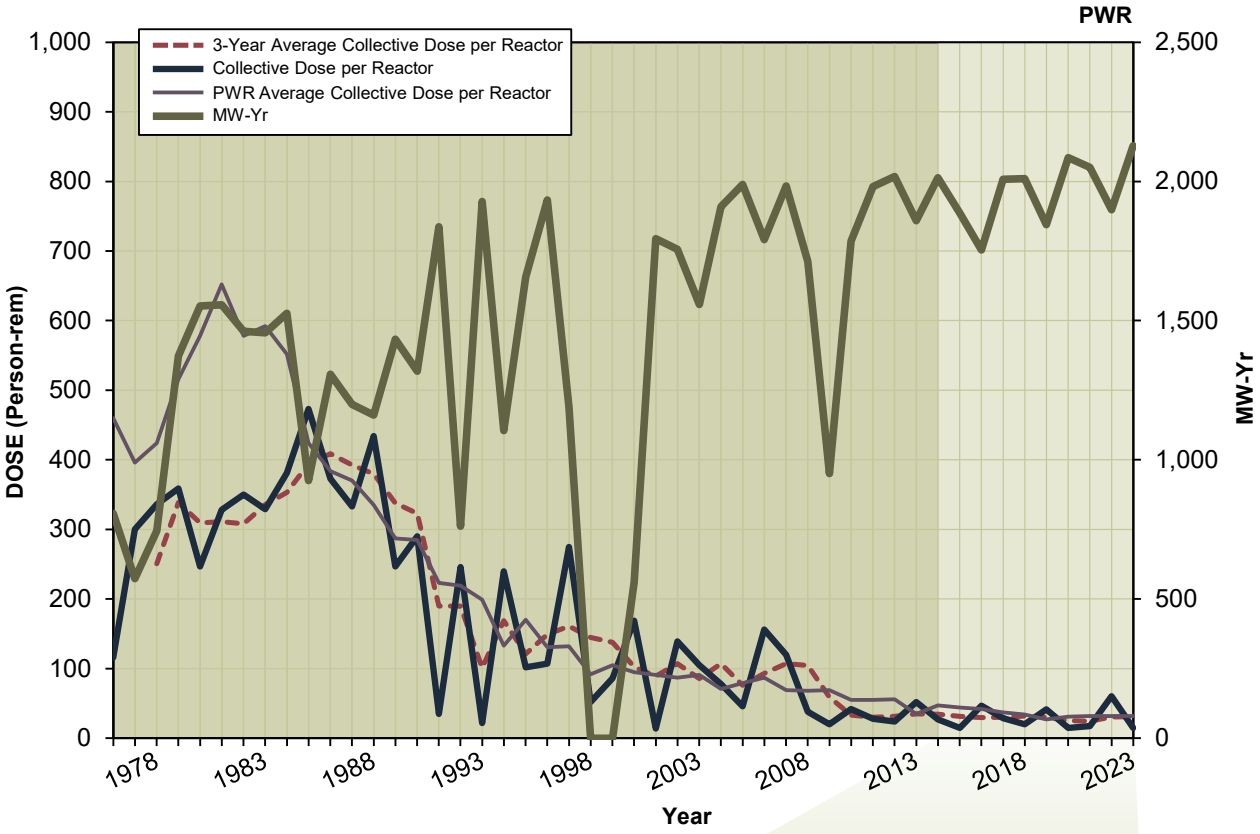
COMANCHE PEAK 1, 2
Dose Performance Trends



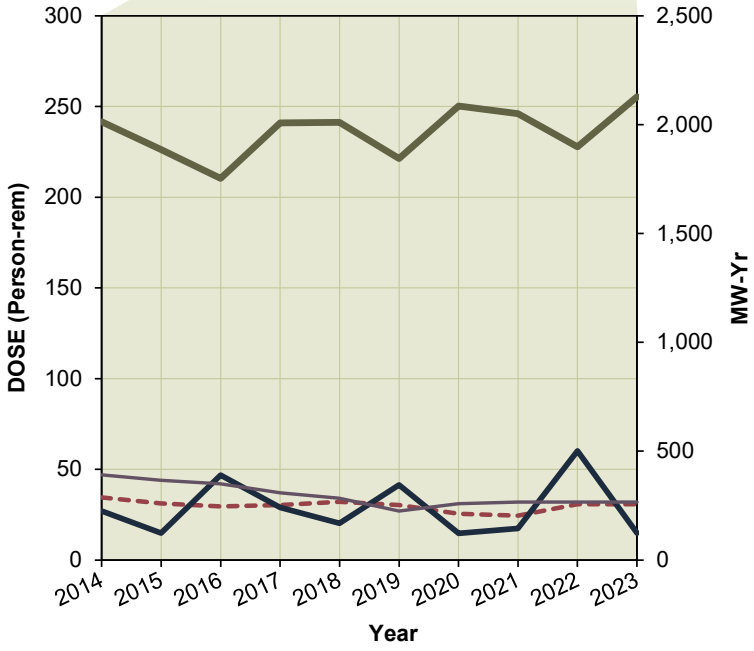
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	41.871	70.000	2,141.7
2015	37.895	21.445	2,294.6
2016	36.464	18.324	2,340.7
2017	33.422	60.498	1,947.3
2018	33.220	20.839	2,346.3
2019	36.787	29.026	2,219.0
2020	24.247	22.877	2,240.3
2021	40.627	69.979	2,230.6
2022	37.205	18.758	2,263.1
2023	42.217	37.910	2,172.4



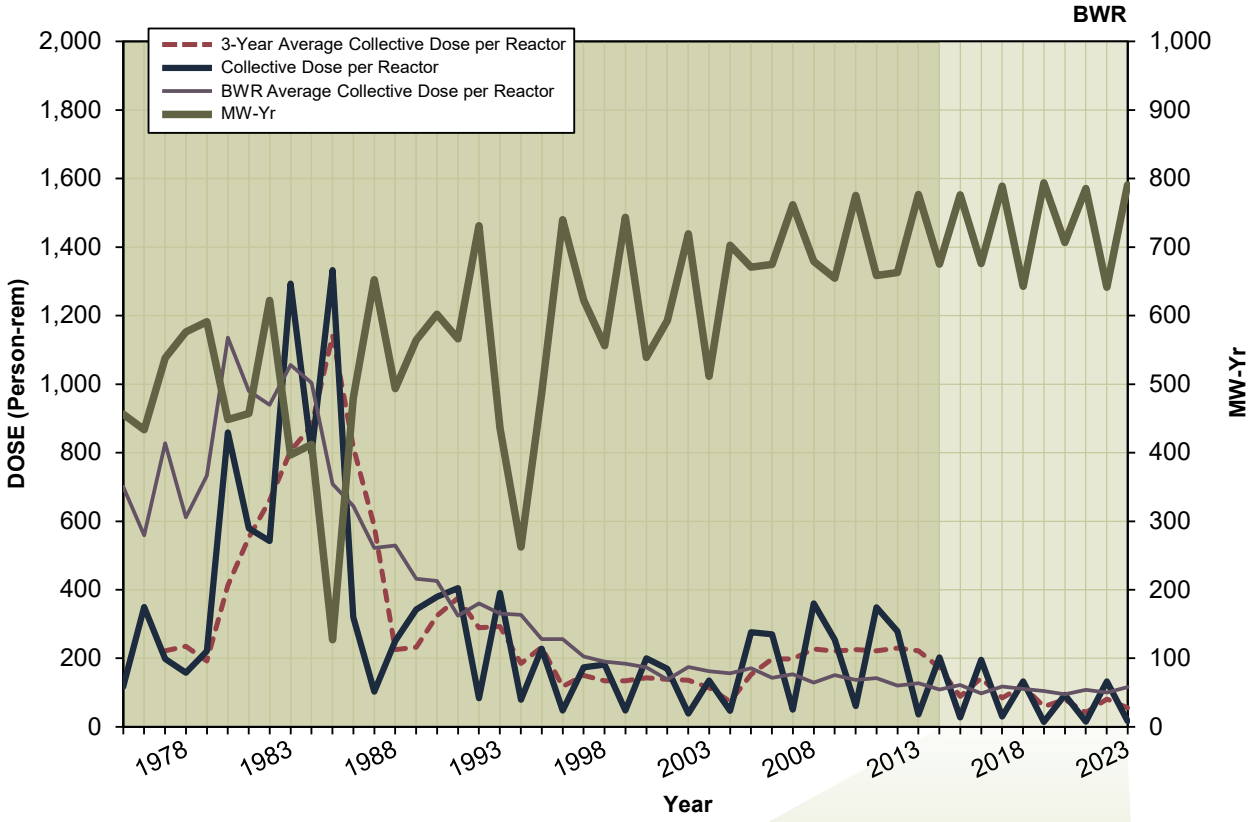
COOK 1, 2
Dose Performance Trends



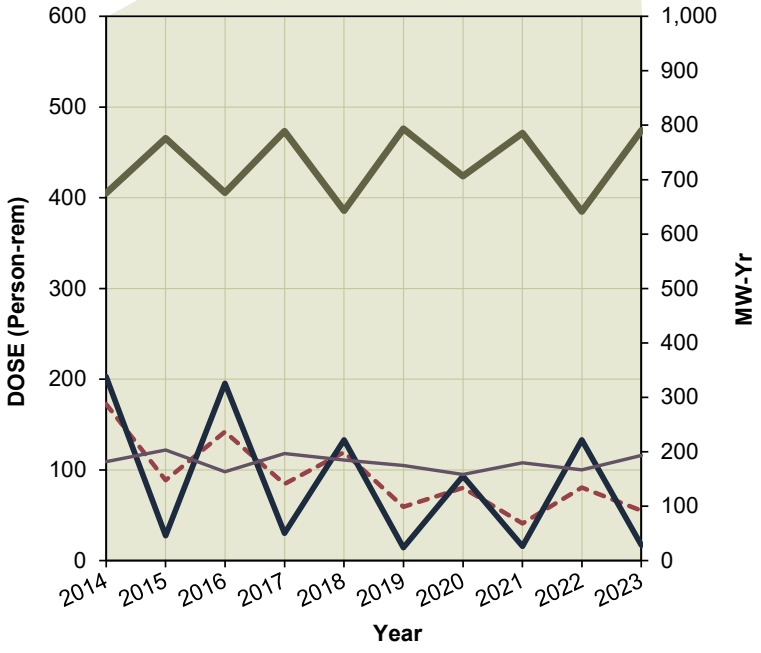
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	34.447	27.000	2,012.7
2015	31.233	14.914	1,885.7
2016	29.557	46.858	1,753.5
2017	30.257	29.000	2,008.2
2018	32.038	20.256	2,010.4
2019	30.233	41.444	1,844.7
2020	25.465	14.696	2,085.5
2021	24.512	17.396	2,050.3
2022	30.754	60.172	1,897.8
2023	30.809	14.860	2,128.1



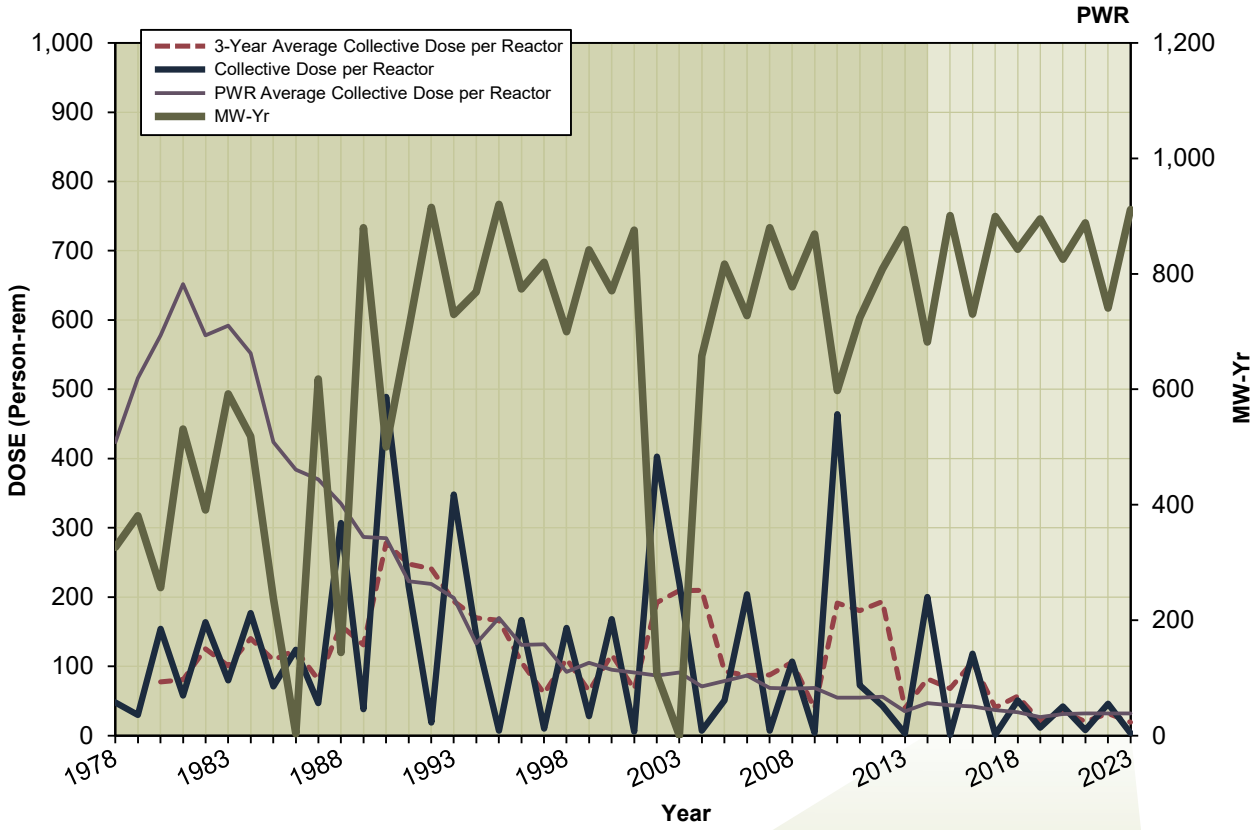
COOPER STATION
Dose Performance Trends



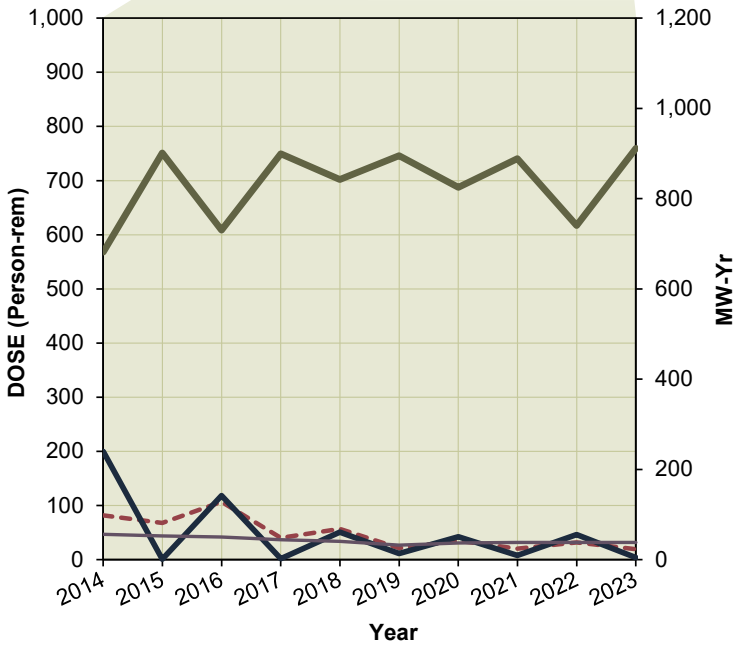
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	172.614	203.000	675.3
2015	88.725	27.634	776.1
2016	141.941	195.518	676.1
2017	84.448	30.193	789.1
2018	119.565	132.984	642.9
2019	59.213	14.463	793.6
2020	80.225	93.227	706.5
2021	41.125	15.685	785.5
2022	80.624	132.961	641.4
2023	55.252	17.111	790.6



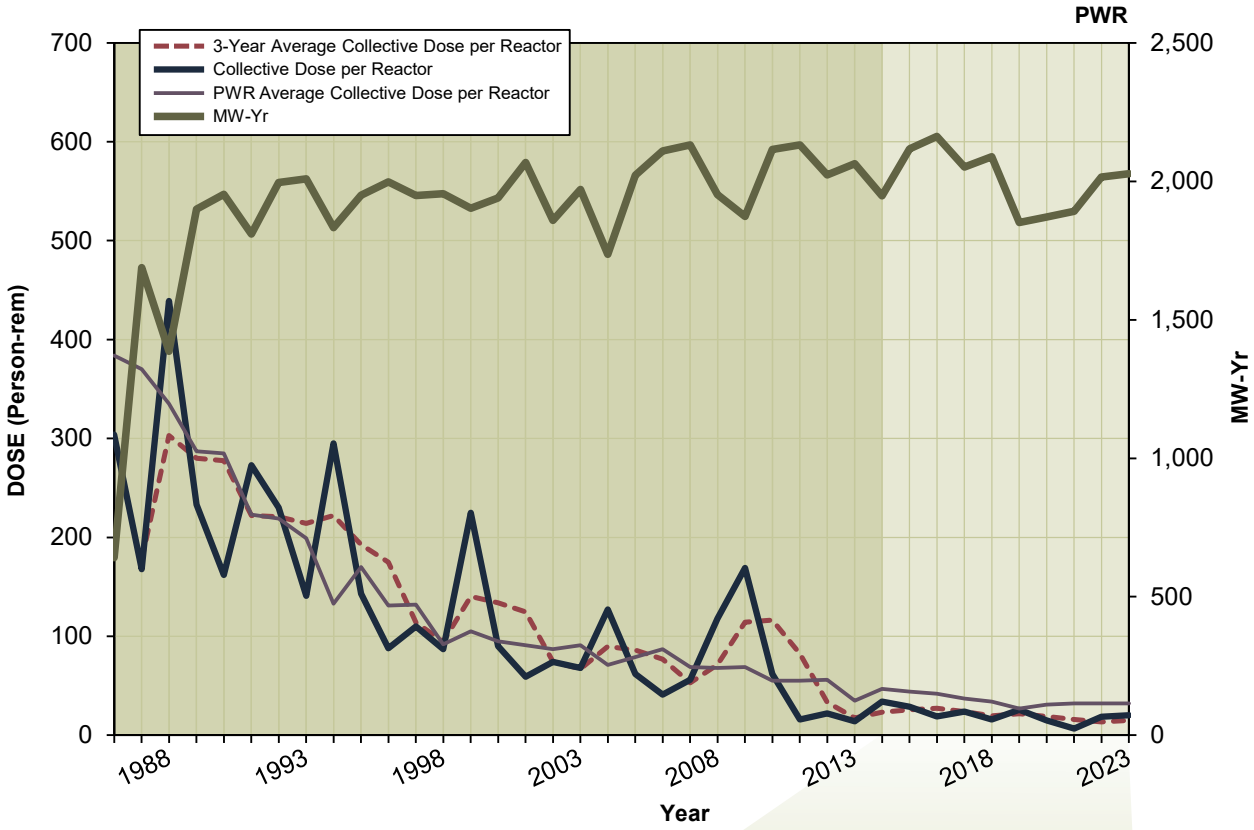
DAVIS-BESSE 1
Dose Performance Trends



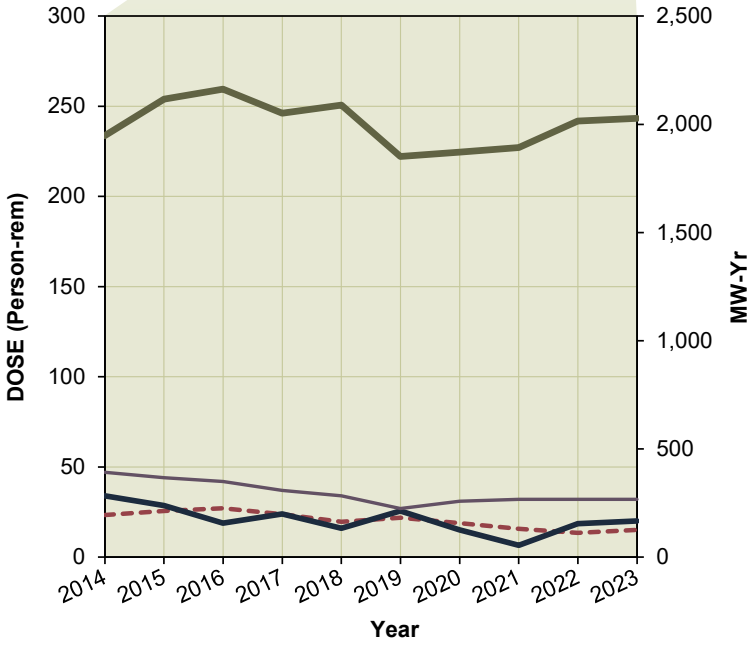
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	82.032	200.000	681.8
2015	68.006	0.995	901.1
2016	106.644	118.472	730.0
2017	40.363	1.621	899.1
2018	57.032	51.003	842.5
2019	21.343	11.405	894.9
2020	34.879	42.228	825.1
2021	20.481	7.811	888.4
2022	32.086	46.220	740.5
2023	19.249	3.717	911.6



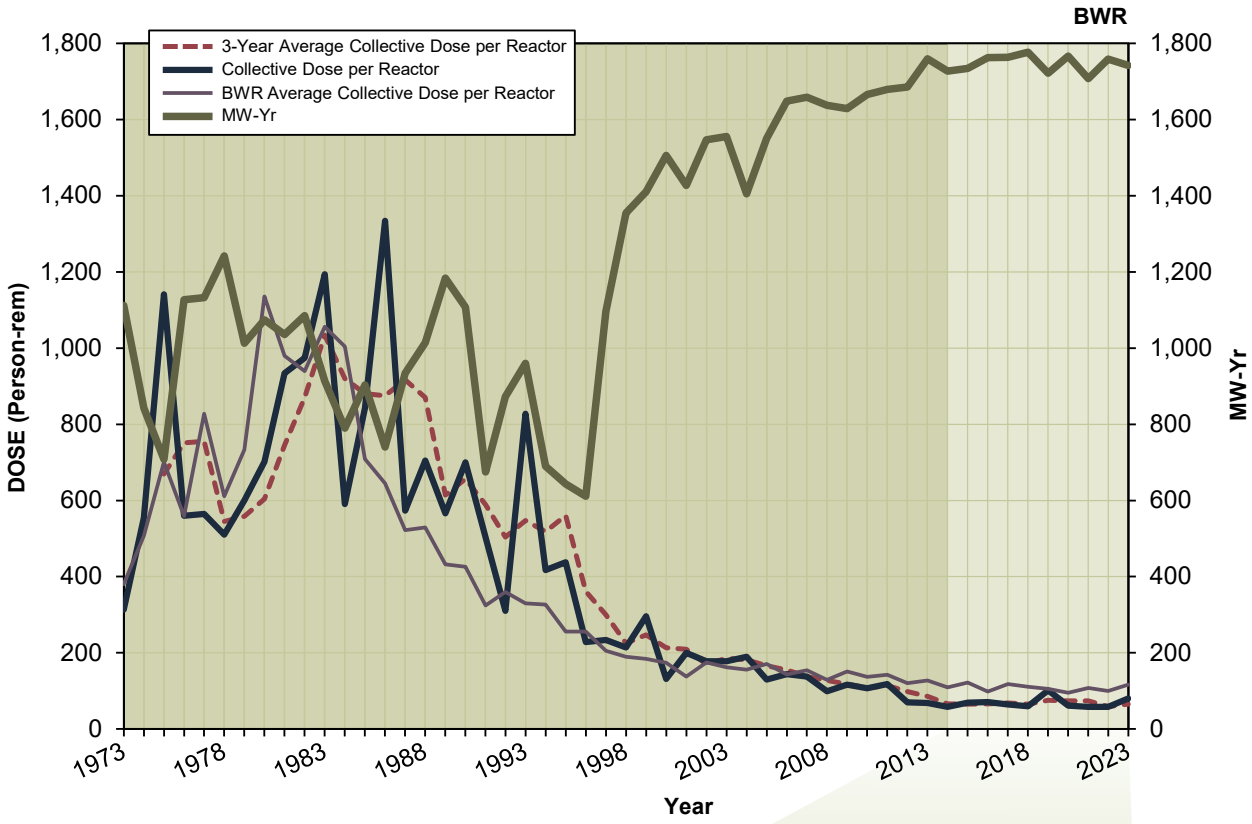
DIABLO CANYON 1, 2
Dose Performance Trends



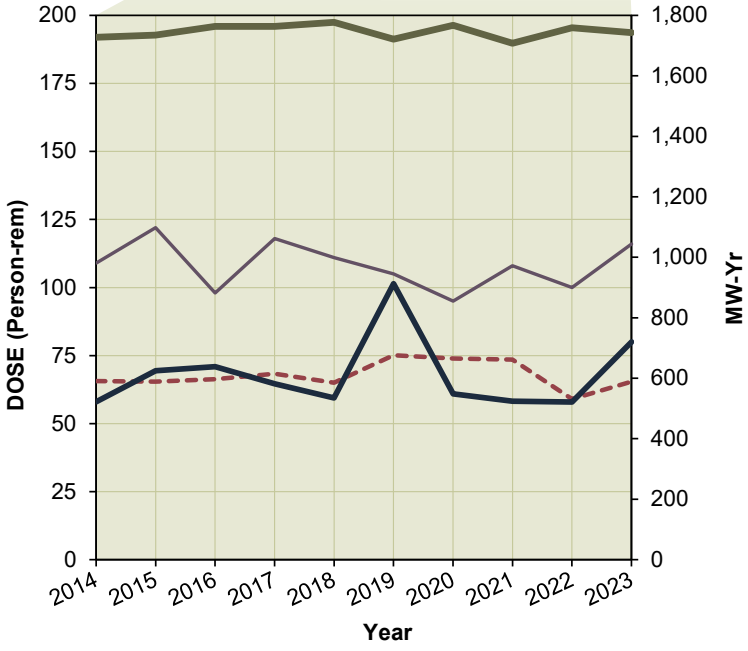
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	23.316	34.000	1,947.1
2015	25.602	28.622	2,116.8
2016	27.096	18.867	2,162.2
2017	23.815	23.955	2,051.4
2018	19.610	16.007	2,088.4
2019	21.843	25.568	1,851.7
2020	18.901	15.130	1,871.3
2021	15.767	6.602	1,892.3
2022	13.461	18.652	2,015.5
2023	15.109	20.070	2,027.6



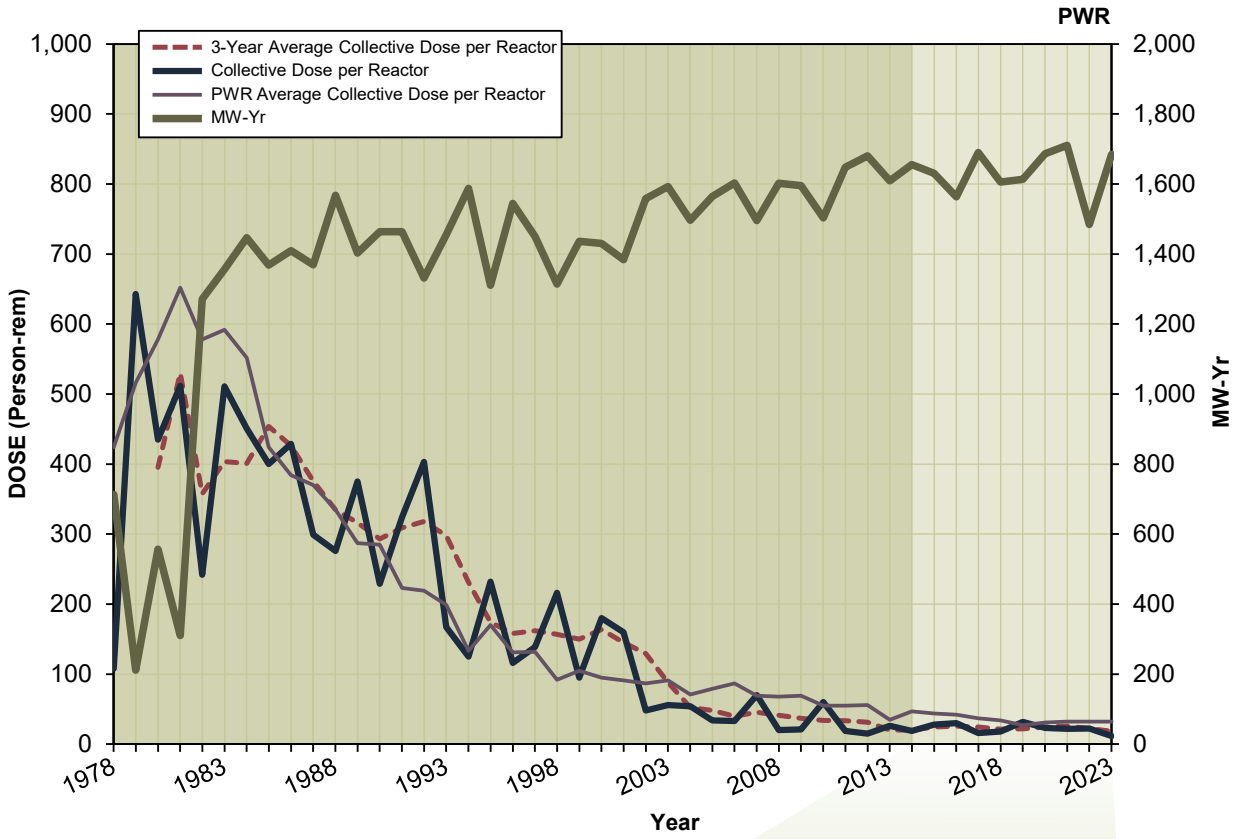
DRESDEN 2, 3
Dose Performance Trends



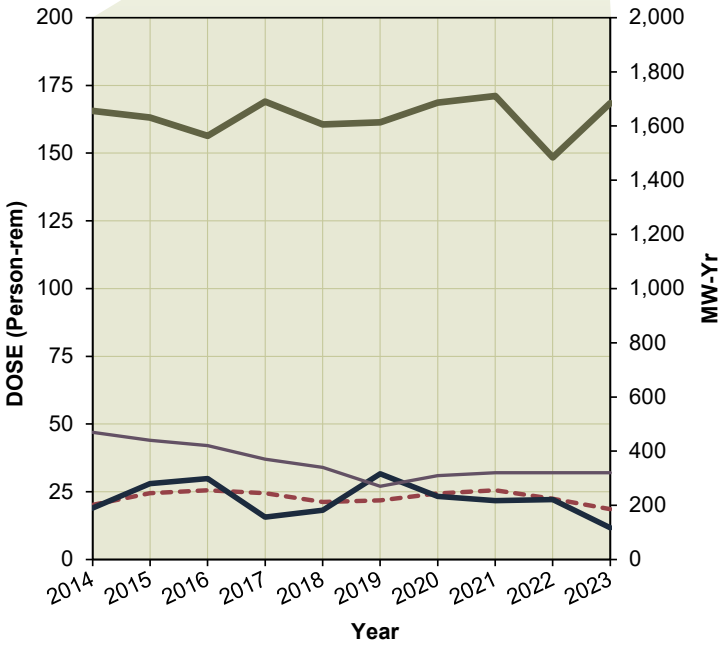
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	65.582	58.000	1,727.8
2015	65.457	69.432	1,734.4
2016	66.271	70.914	1,763.2
2017	68.326	64.633	1,763.3
2018	64.987	59.416	1,776.9
2019	75.161	101.433	1,721.7
2020	73.929	60.939	1,767.1
2021	73.546	58.266	1,707.4
2022	59.044	57.928	1,759.0
2023	65.405	80.020	1,742.7



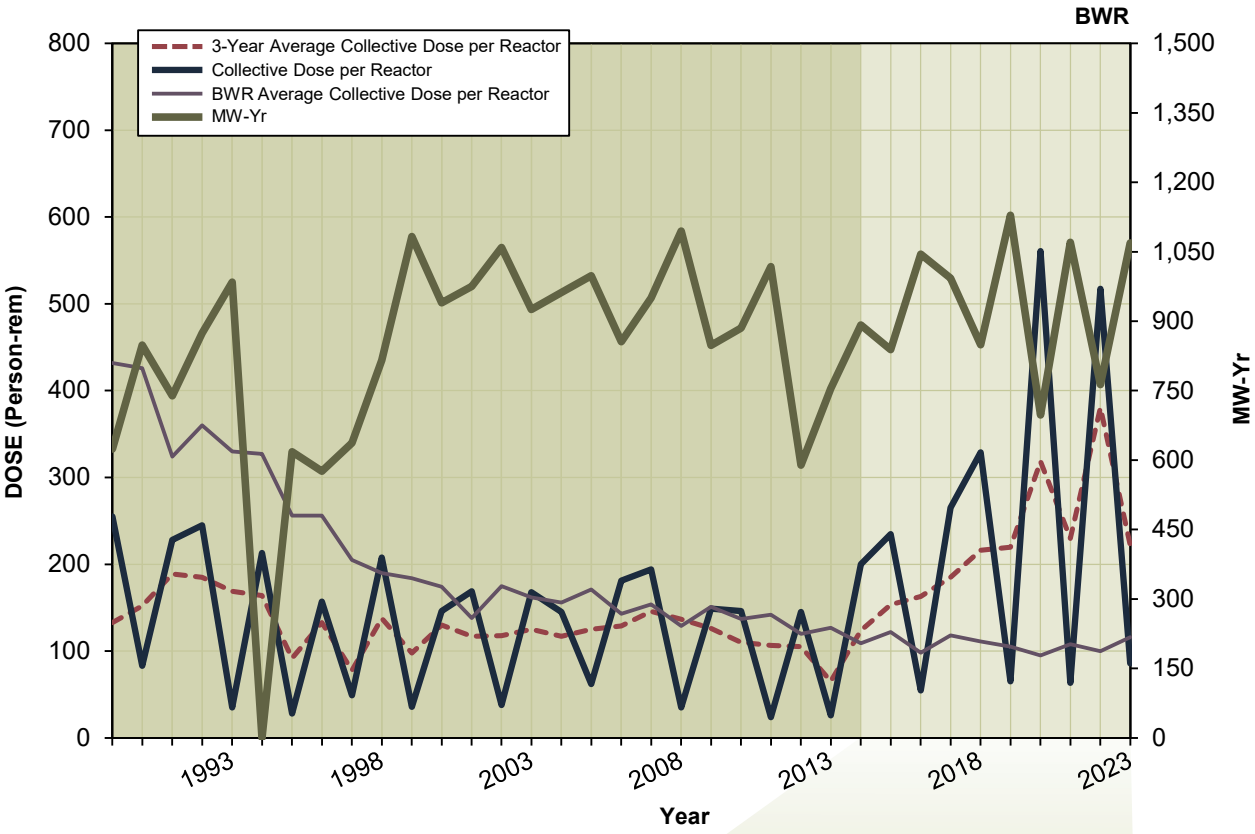
FARLEY 1, 2
Dose Performance Trends



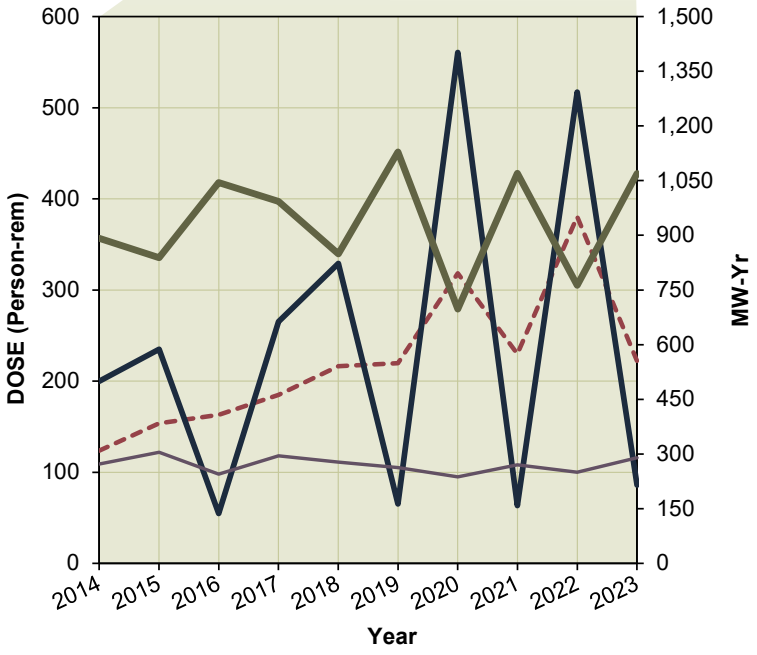
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	20.122	19.000	1,655.9
2015	24.476	27.971	1,631.0
2016	25.581	29.920	1,563.7
2017	24.522	15.676	1,690.0
2018	21.258	18.178	1,605.6
2019	21.837	31.660	1,613.8
2020	24.385	23.317	1,686.7
2021	25.562	21.710	1,710.4
2022	22.397	22.163	1,484.6
2023	18.546	11.770	1,684.8



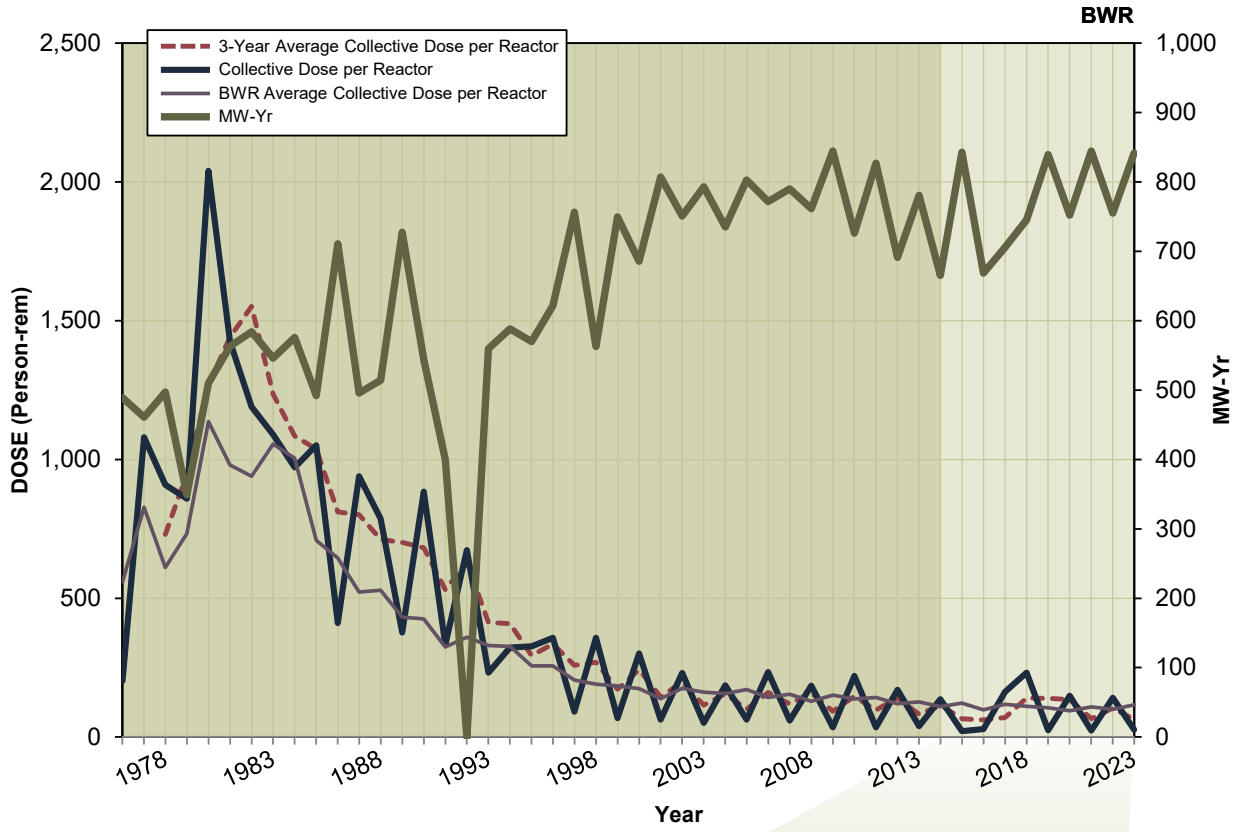
FERMI 2
Dose Performance Trends



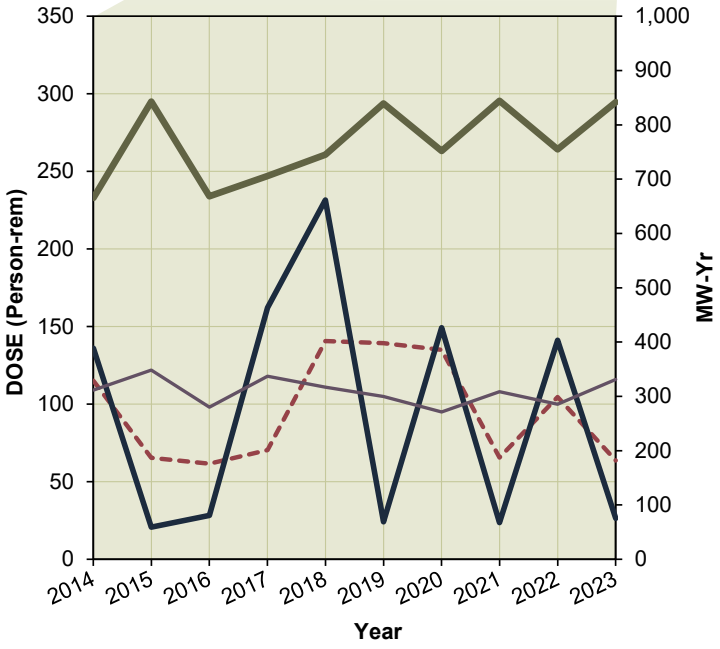
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	123.617	200.000	891.5
2015	153.577	234.853	838.6
2016	163.104	54.761	1,045.0
2017	184.899	265.082	993.0
2018	216.286	329.015	849.2
2019	219.793	65.282	1,128.6
2020	318.338	560.716	697.4
2021	229.781	63.345	1,070.1
2022	380.412	517.175	762.8
2023	222.121	85.843	1,069.3



FITZPATRICK
Dose Performance Trends

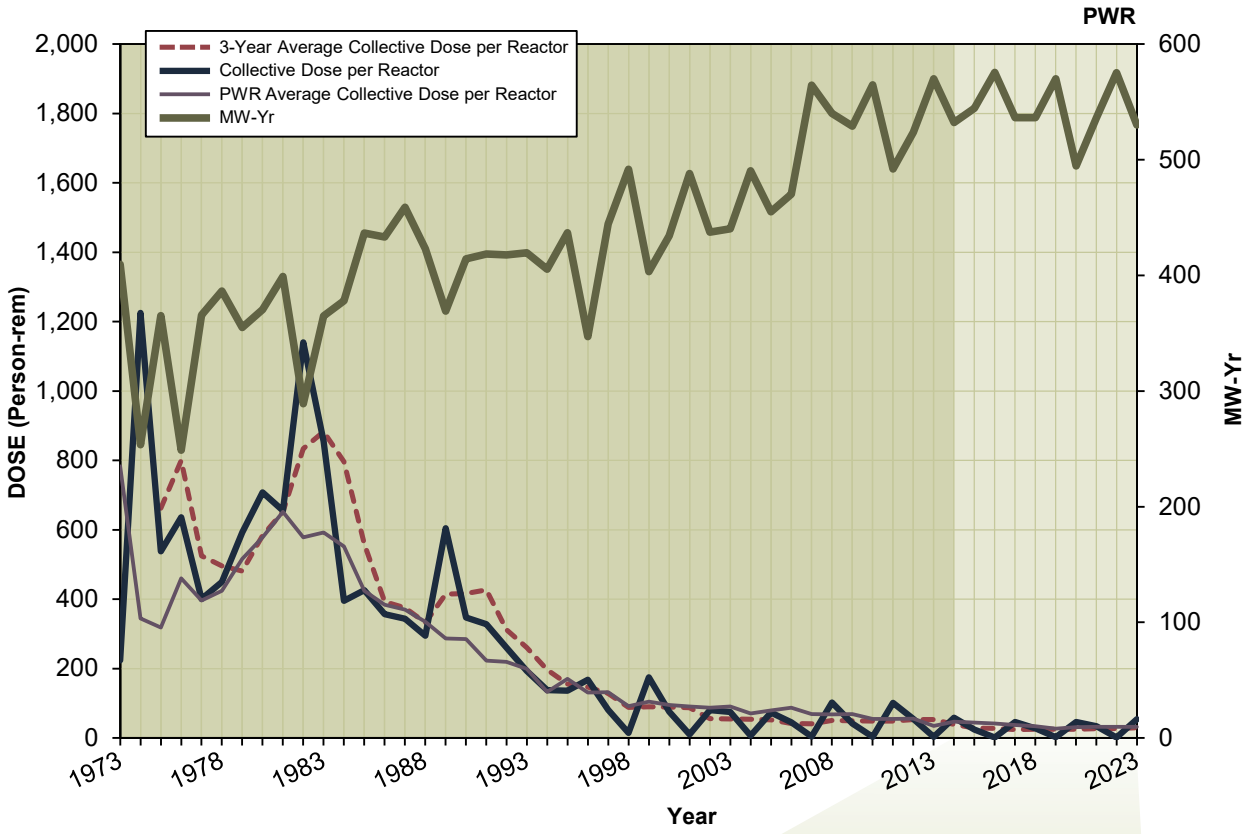


Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	115.056	136.000	665.4
2015	65.356	20.785	842.7
2016	61.660	28.304	668.7
2017	70.428	162.196	705.8
2018	140.683	231.548	745.2
2019	139.301	24.160	839.5
2020	134.964	149.183	752.2
2021	65.632	23.553	844.5
2022	104.622	141.131	754.9
2023	63.697	26.406	841.7

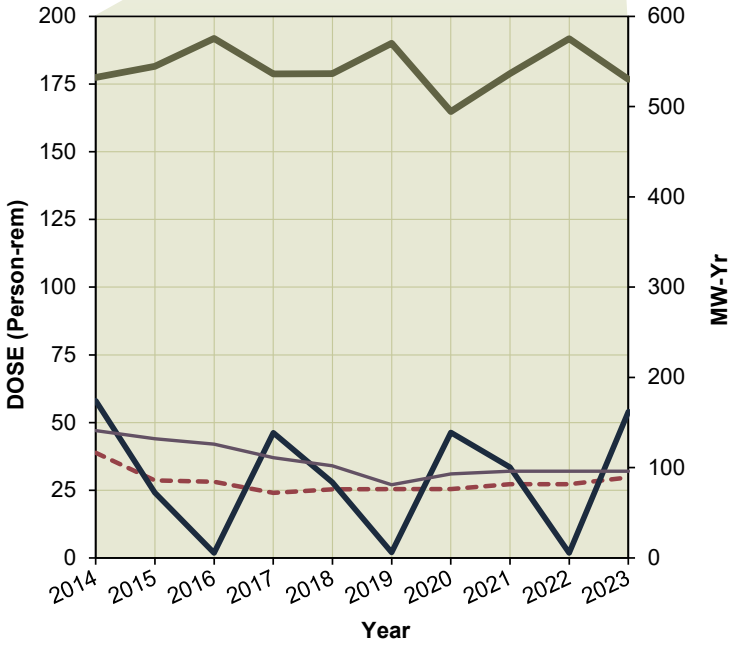


GINNA

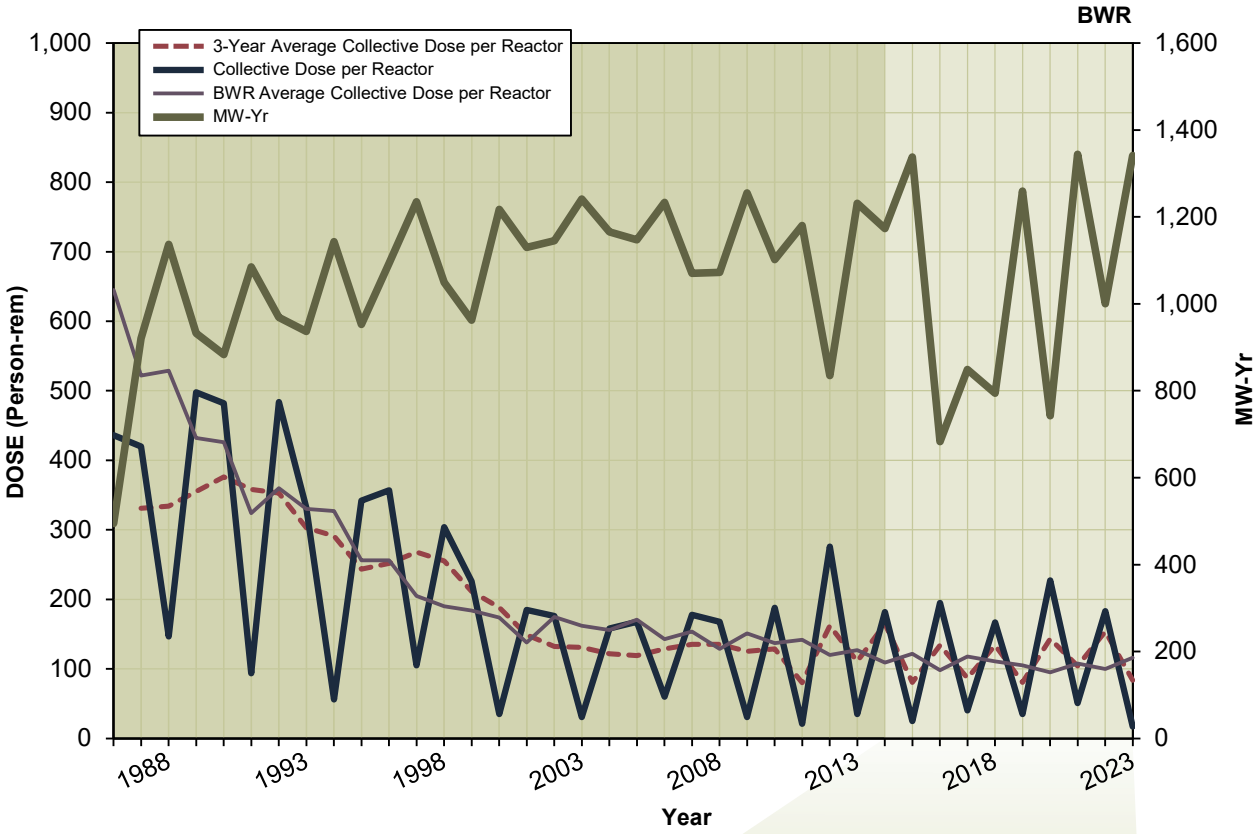
Dose Performance Trends



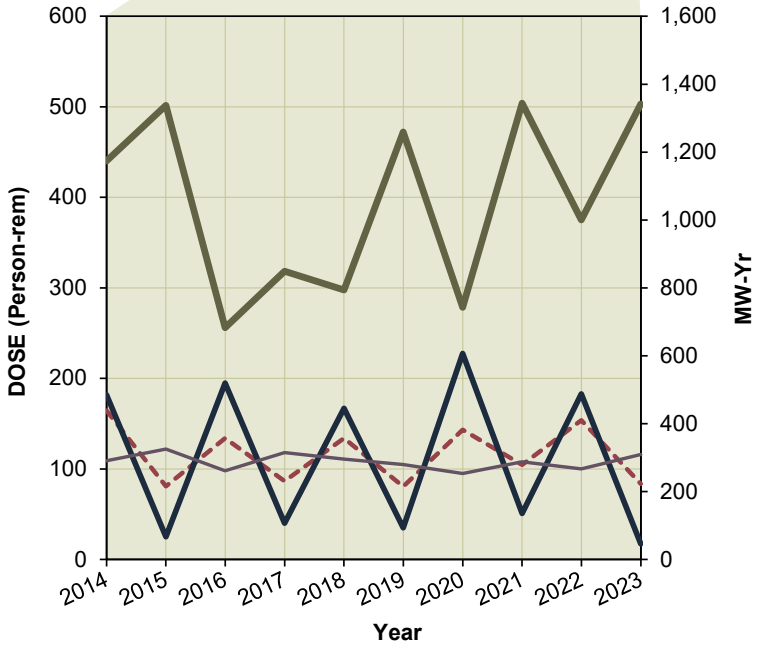
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	38.817	58.000	532.2
2015	28.659	24.163	544.5
2016	28.142	1.882	575.6
2017	24.073	46.173	536.3
2018	25.329	27.931	536.4
2019	25.376	2.023	570.1
2020	25.411	46.280	494.6
2021	27.267	33.499	536.5
2022	27.196	1.808	575.2
2023	29.765	53.989	530.2



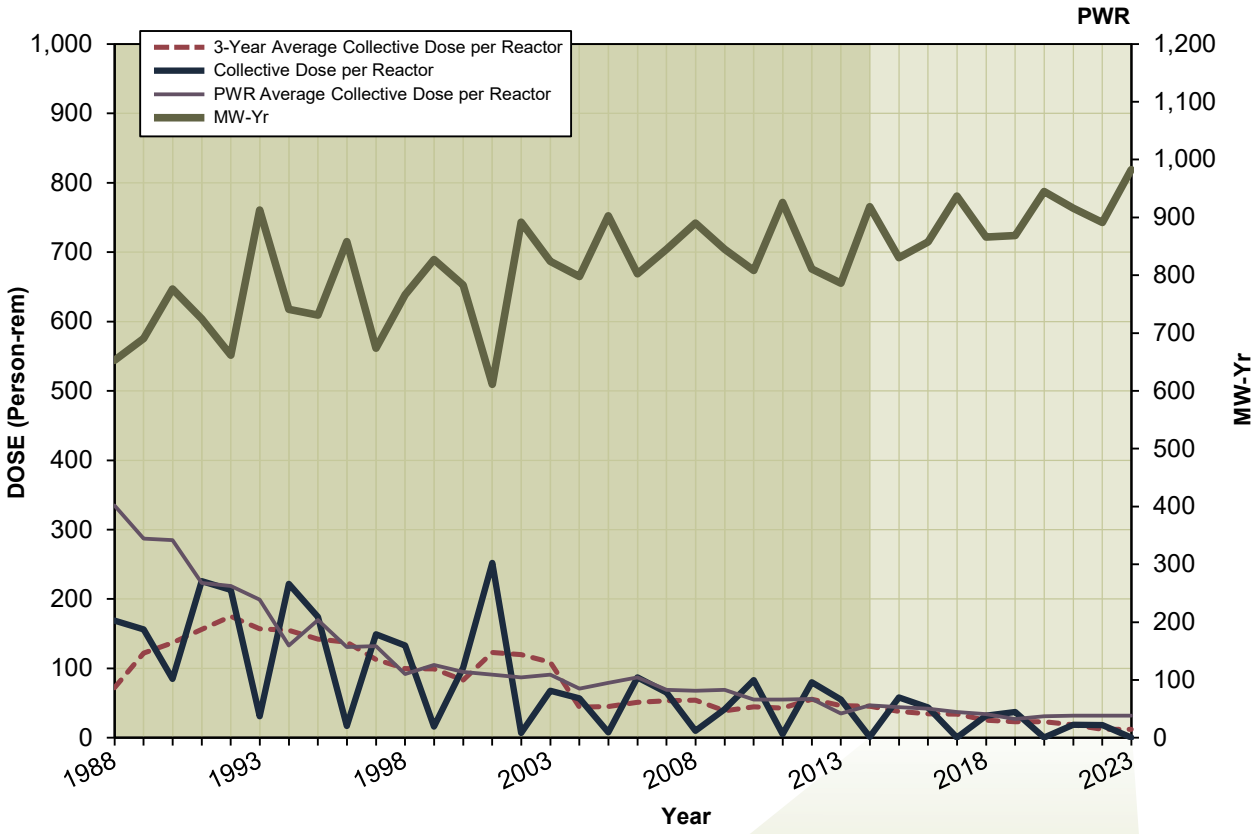
GRAND GULF
Dose Performance Trends



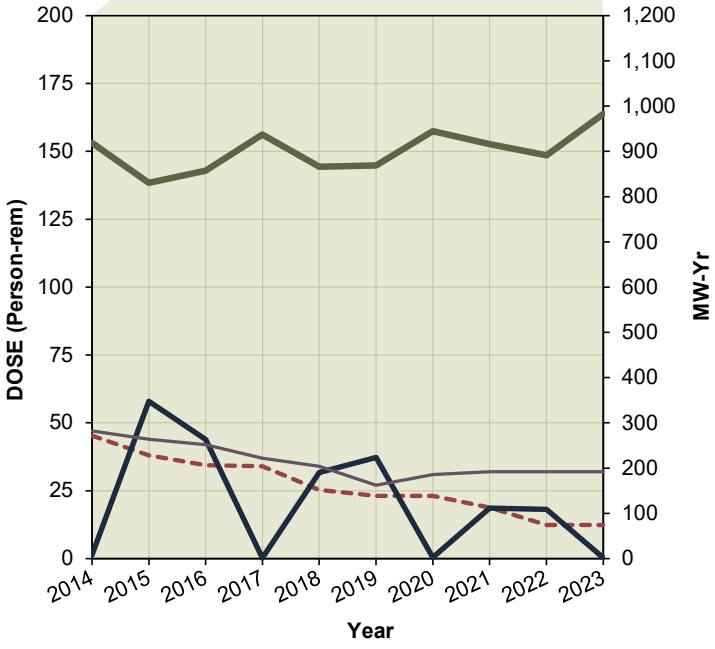
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	164.524	182.000	1,173.5
2015	80.812	25.241	1,337.8
2016	133.914	194.755	682.8
2017	86.749	40.251	849.1
2018	133.971	166.908	794.3
2019	80.766	35.139	1,259.4
2020	143.189	227.519	742.7
2021	104.517	50.892	1,344.3
2022	153.808	183.014	1,000.1
2023	83.772	17.410	1,341.3



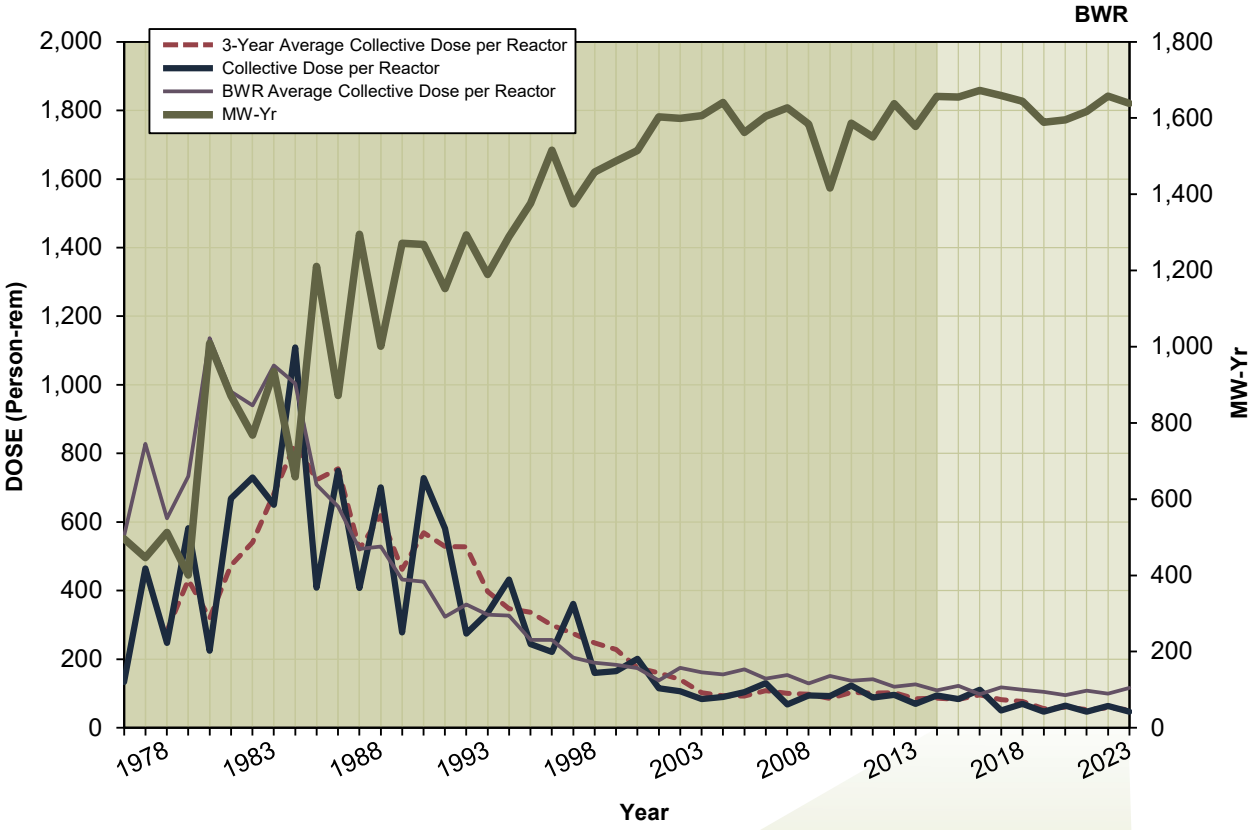
HARRIS 1
Dose Performance Trends



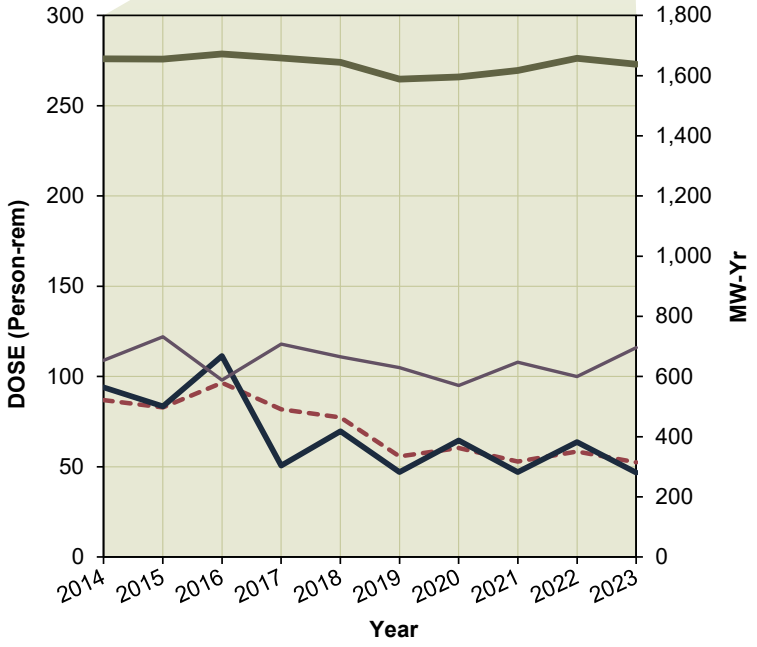
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	45.336	1.289	918.8
2015	38.047	57.978	830.2
2016	34.381	43.876	857.7
2017	34.024	0.217	937.1
2018	25.276	31.736	866.2
2019	23.059	37.223	868.8
2020	23.139	0.458	944.7
2021	18.767	18.621	916.0
2022	12.406	18.138	891.2
2023	12.348	0.286	982.8



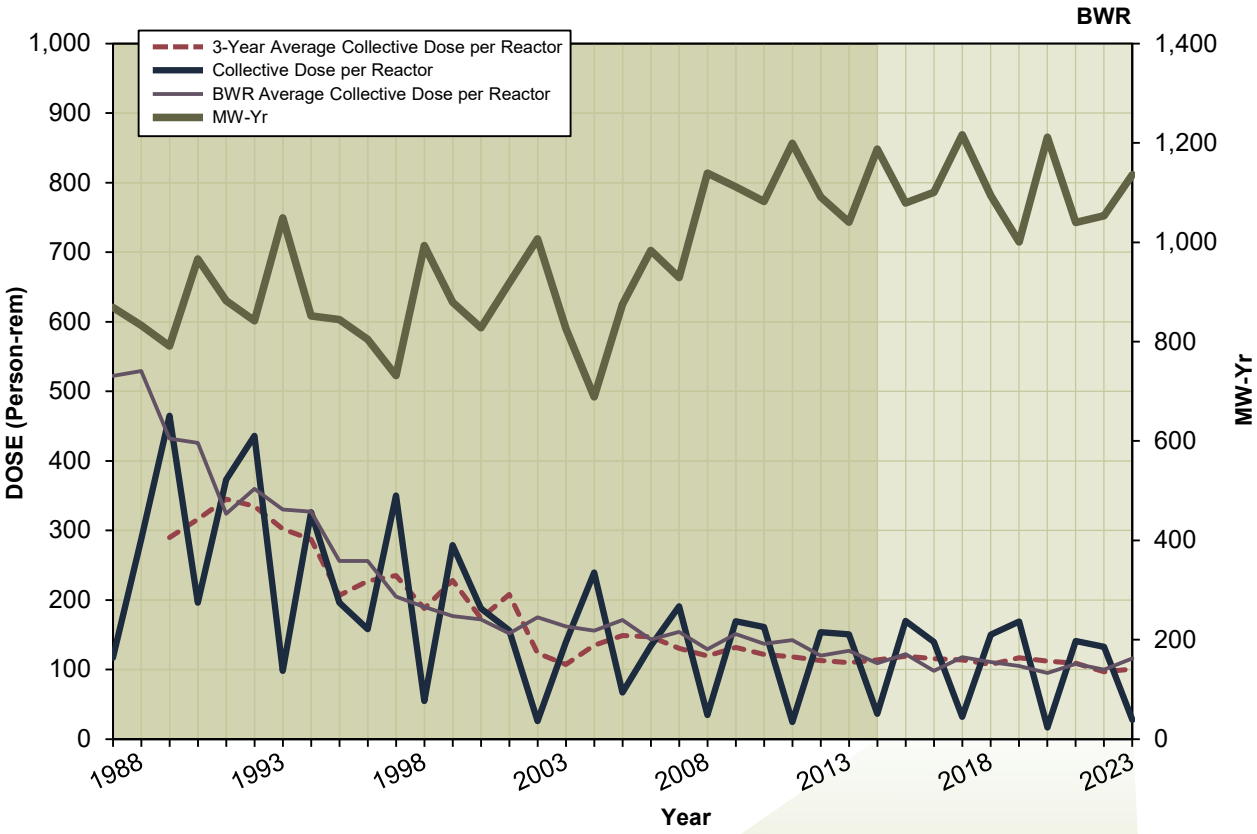
HATCH 1, 2
Dose Performance Trends



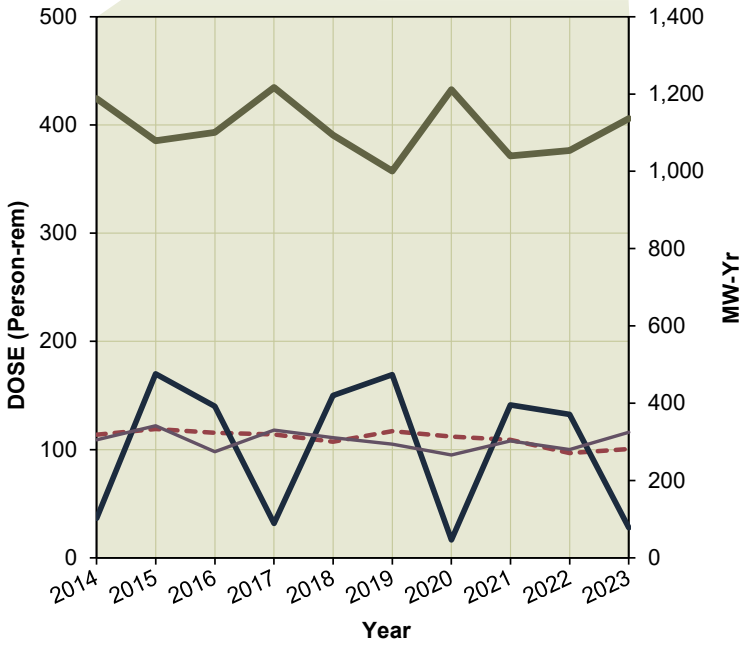
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	86.935	94.000	1,656.4
2015	82.877	83.500	1,654.9
2016	96.522	111.433	1,672.1
2017	81.854	50.711	1,658.8
2018	77.276	69.684	1,644.2
2019	55.816	47.052	1,588.7
2020	60.440	64.585	1,595.6
2021	52.886	47.021	1,617.4
2022	58.448	63.738	1,657.5
2023	52.492	46.720	1,638.3



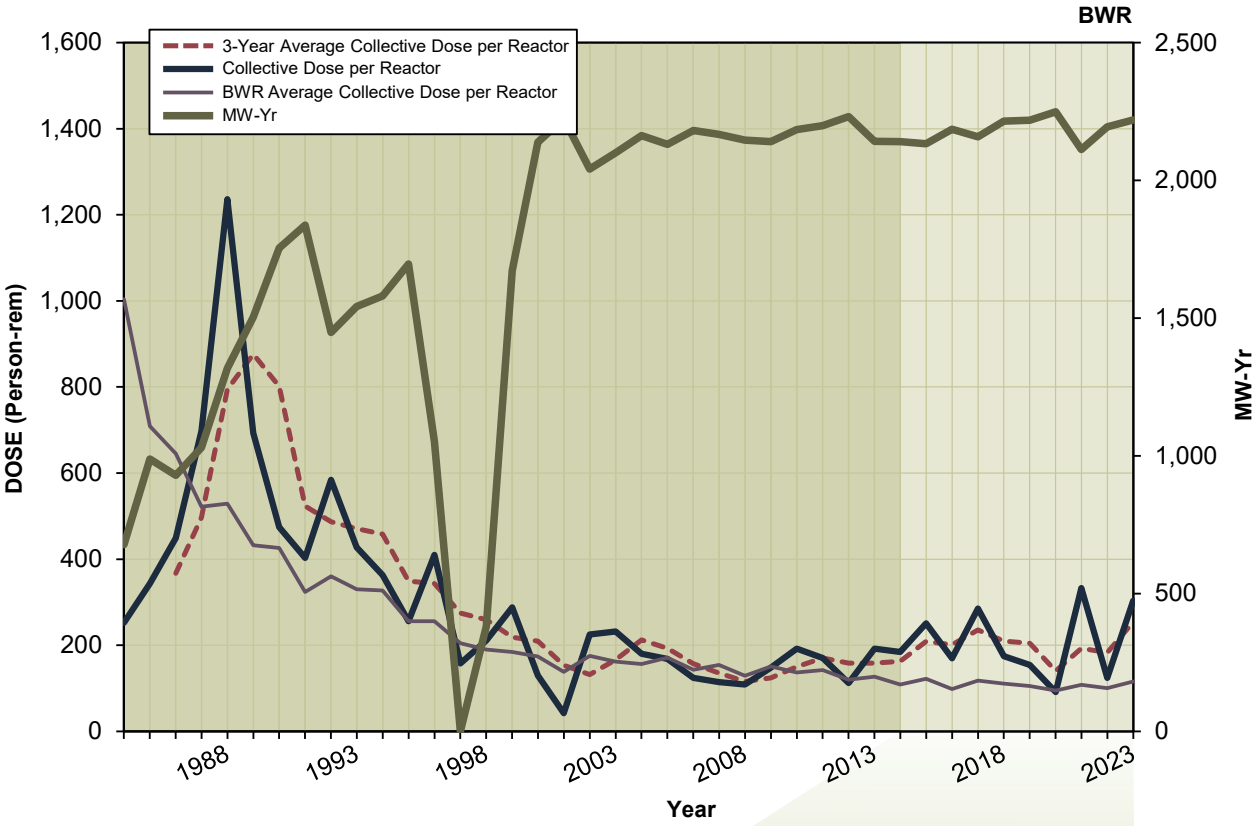
HOPE CREEK 1
Dose Performance Trends



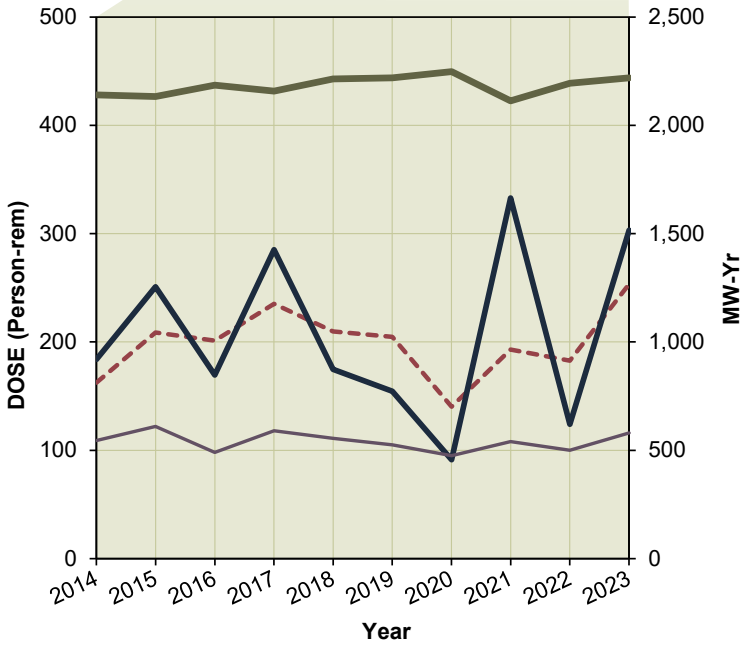
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	113.659	36.543	1,187.9
2015	118.991	169.862	1,078.9
2016	115.429	139.883	1,100.4
2017	113.888	31.919	1,216.7
2018	107.282	150.044	1,094.0
2019	117.061	169.220	1,000.8
2020	111.963	16.625	1,211.6
2021	109.004	141.166	1,040.0
2022	96.784	132.562	1,053.6
2023	100.511	27.804	1,136.3



LASALLE 1, 2
Dose Performance Trends

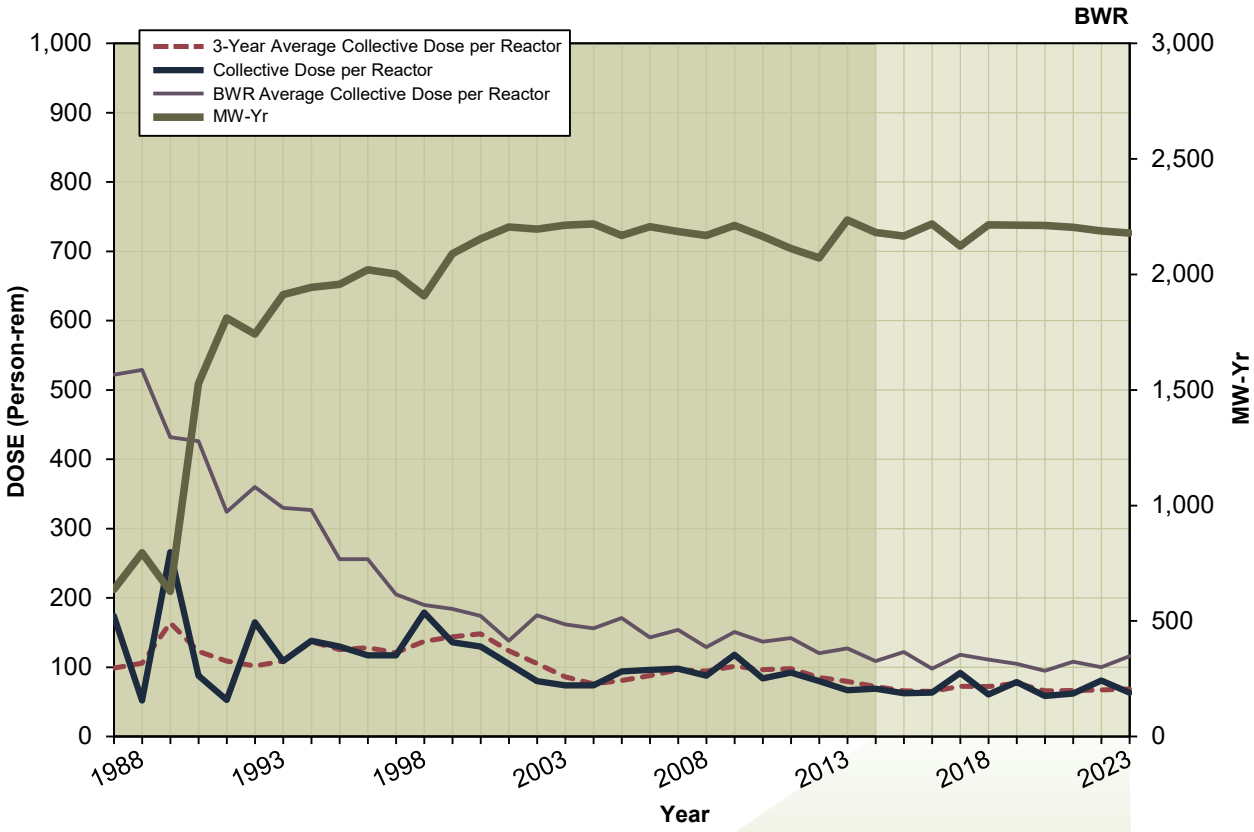


Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	162.476	184.000	2,141.0
2015	208.635	250.833	2,132.9
2016	201.196	169.493	2,185.5
2017	235.173	285.195	2,158.5
2018	209.774	174.634	2,214.7
2019	204.798	154.565	2,218.6
2020	140.158	91.276	2,248.4
2021	192.947	333.001	2,112.4
2022	182.785	124.078	2,193.7
2023	253.386	303.080	2,219.6

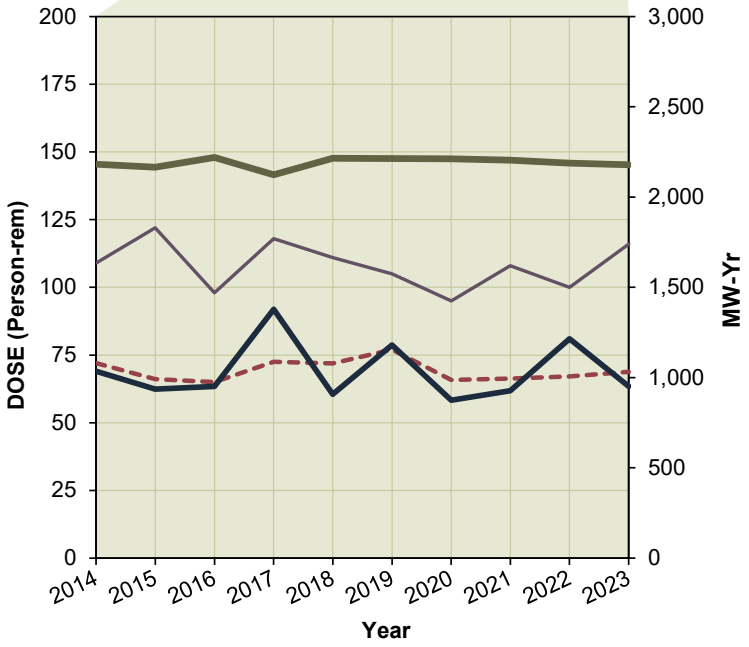


LIMERICK 1, 2

Dose Performance Trends

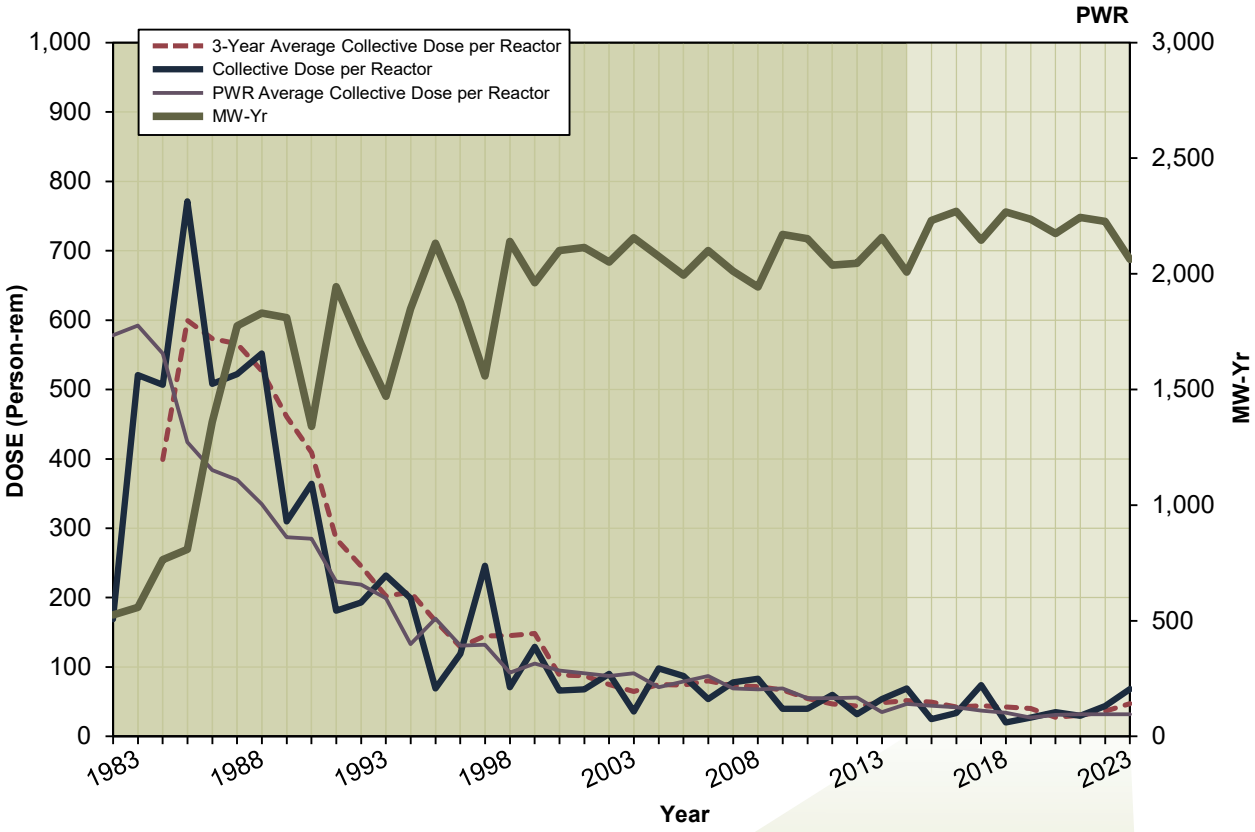


Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	71.957	69.000	2,182.1
2015	66.119	62.394	2,165.6
2016	64.997	63.400	2,219.1
2017	72.554	91.868	2,123.1
2018	71.931	60.527	2,214.9
2019	77.043	78.736	2,213.1
2020	65.853	58.298	2,212.3
2021	66.297	61.856	2,204.3
2022	67.060	81.025	2,188.0
2023	68.769	63.430	2,179.7

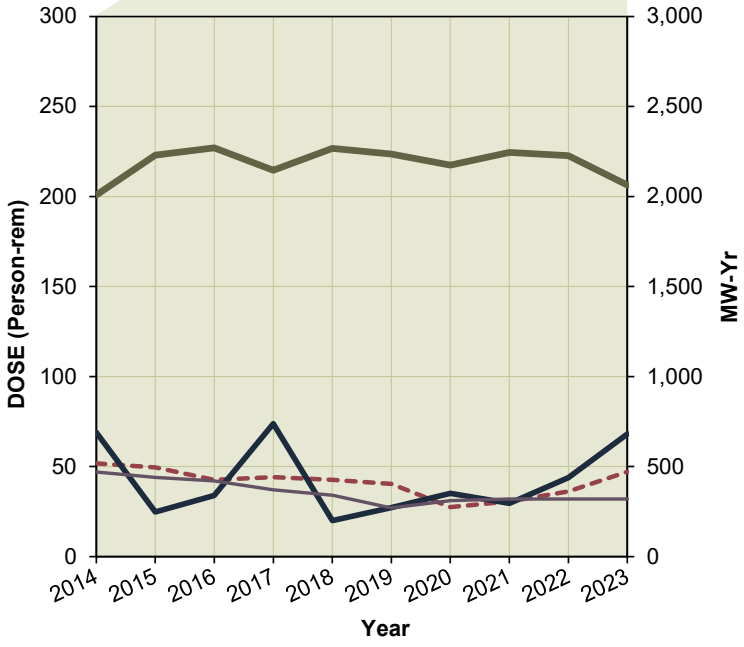


MCGUIRE 1, 2

Dose Performance Trends

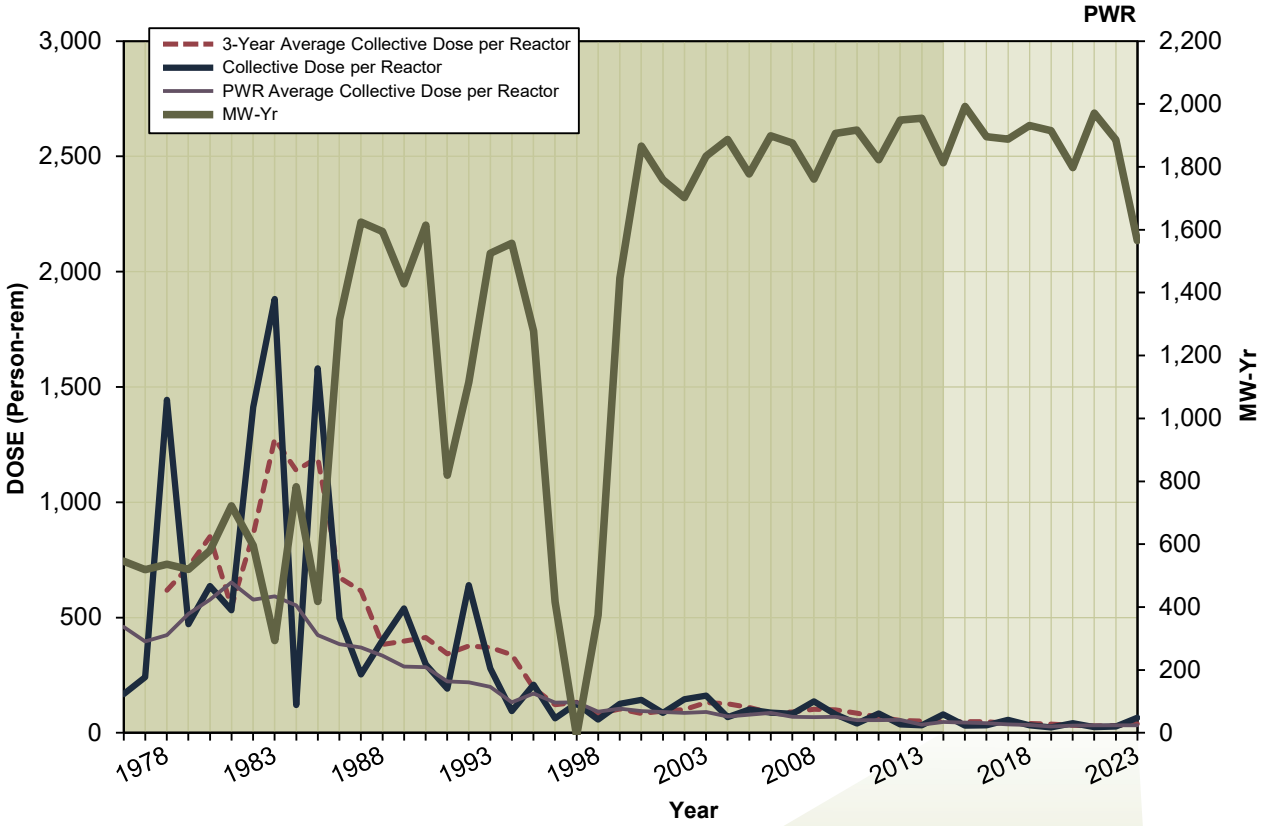


Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	51.728	69.000	2,008.0
2015	49.513	24.700	2,230.1
2016	42.552	33.827	2,269.9
2017	44.107	73.795	2,145.6
2018	42.541	20.003	2,267.4
2019	40.304	27.115	2,236.1
2020	27.430	35.172	2,174.3
2021	30.638	29.627	2,244.5
2022	36.183	43.752	2,226.6
2023	47.153	68.080	2,063.3

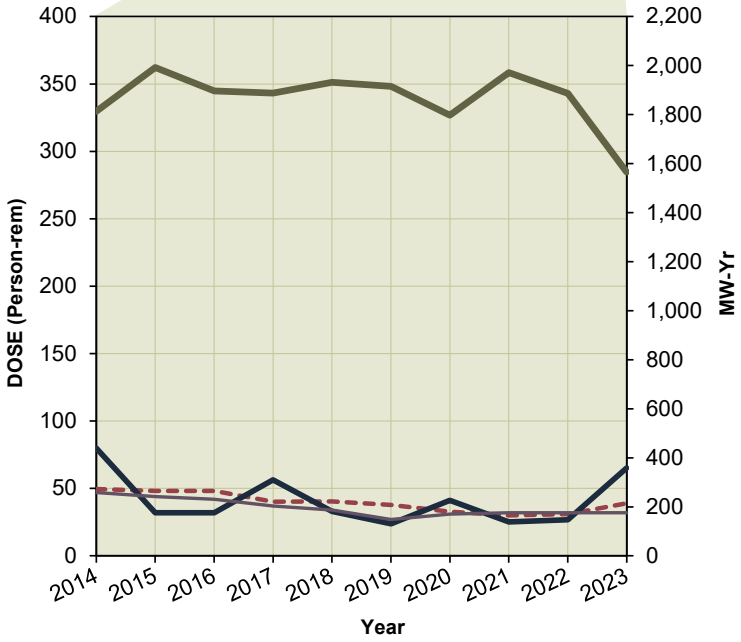


MILLSTONE 2, 3

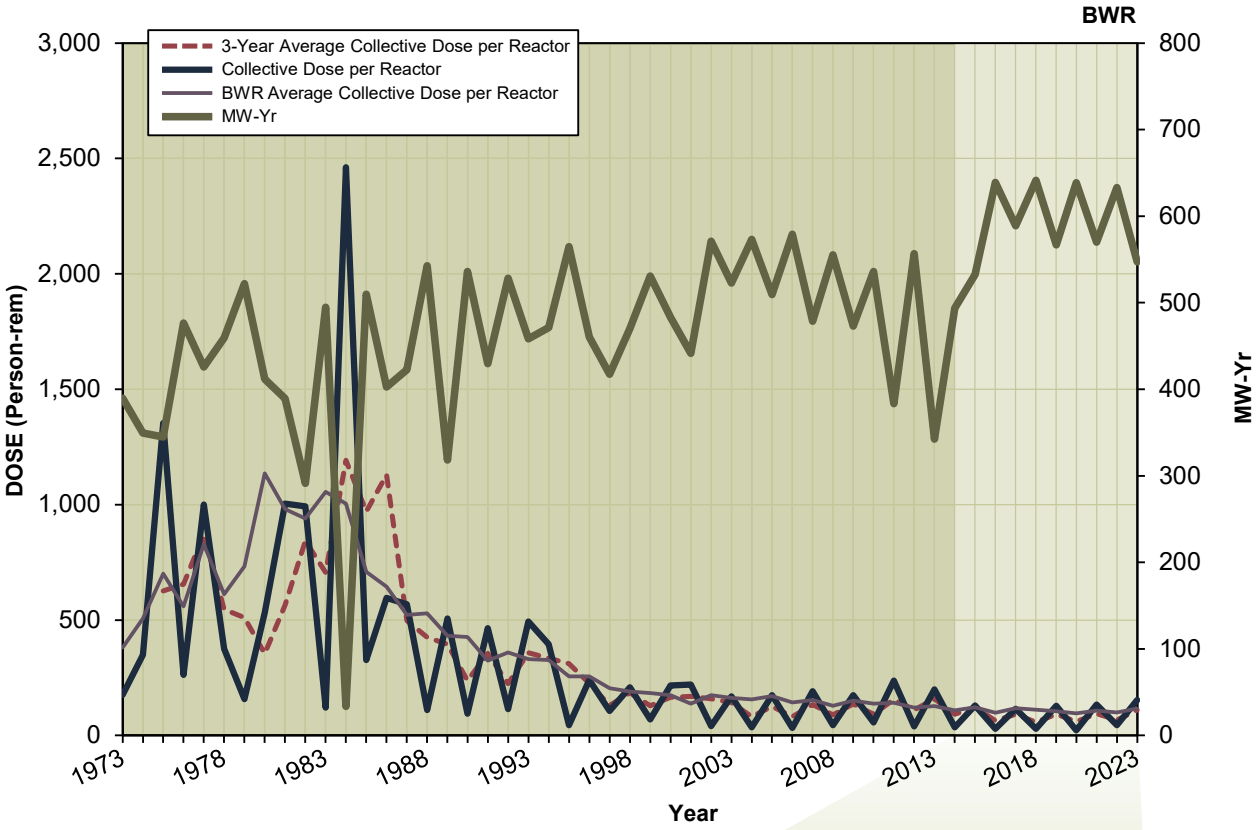
Dose Performance Trends



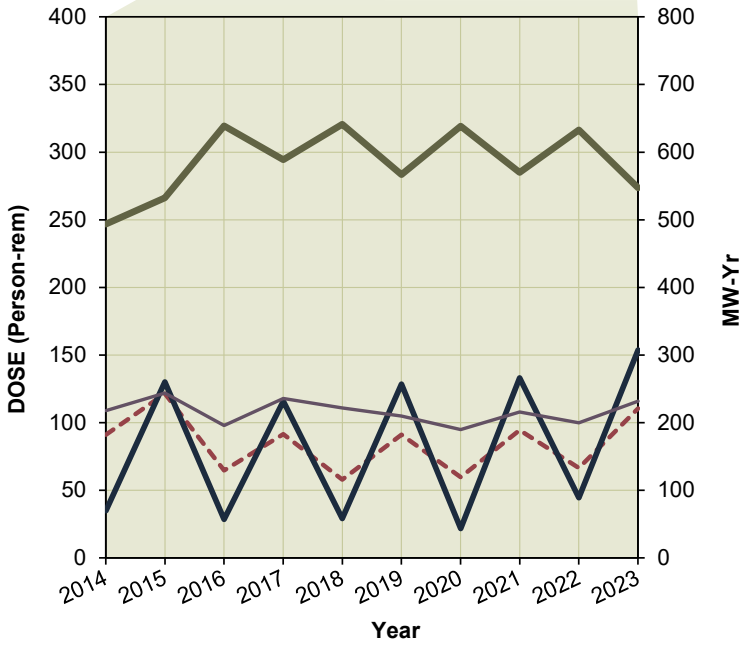
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	49.667	80.000	1,812.7
2015	48.112	31.970	1,992.4
2016	48.095	32.063	1,896.1
2017	40.111	56.299	1,888.0
2018	40.472	33.055	1,931.7
2019	37.730	23.837	1,914.9
2020	32.707	41.230	1,798.0
2021	30.070	25.145	1,970.8
2022	31.053	26.785	1,886.3
2023	39.026	65.150	1,565.2



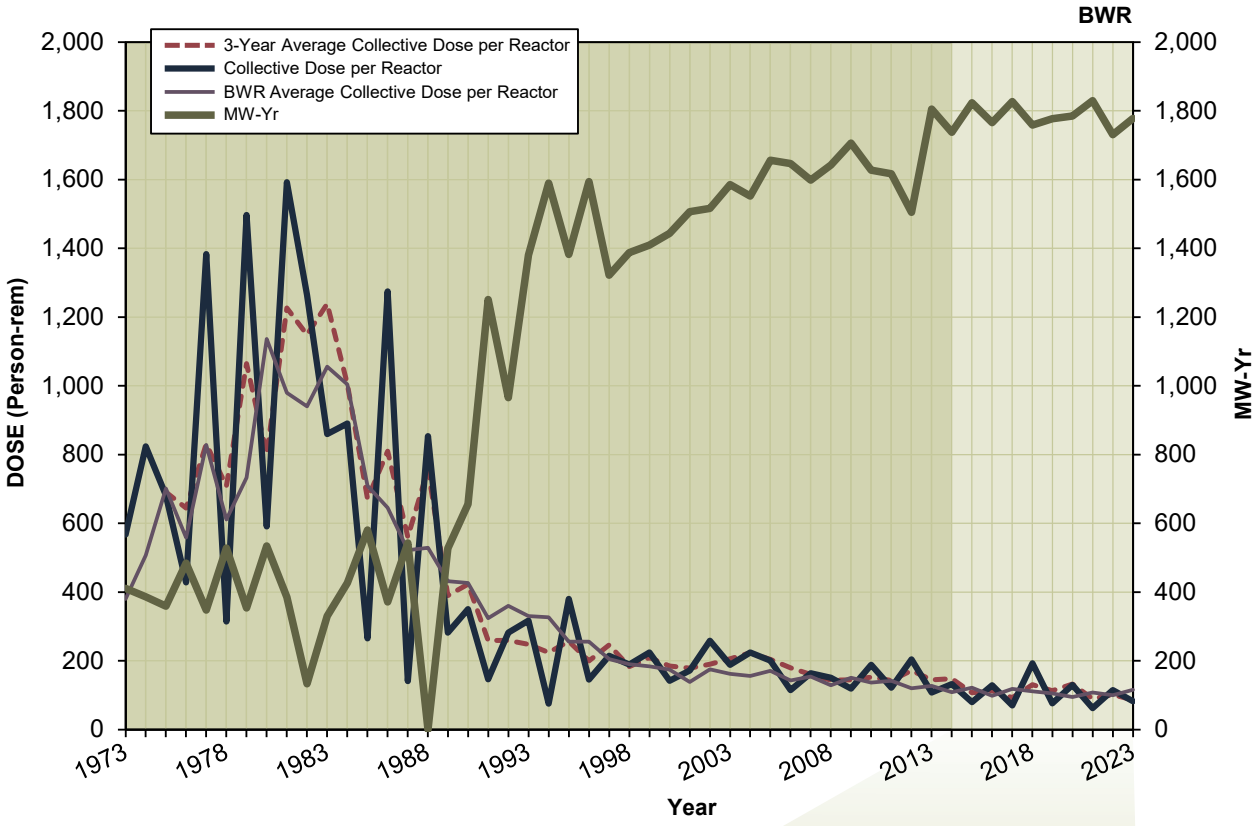
MONTICELLO
Dose Performance Trends



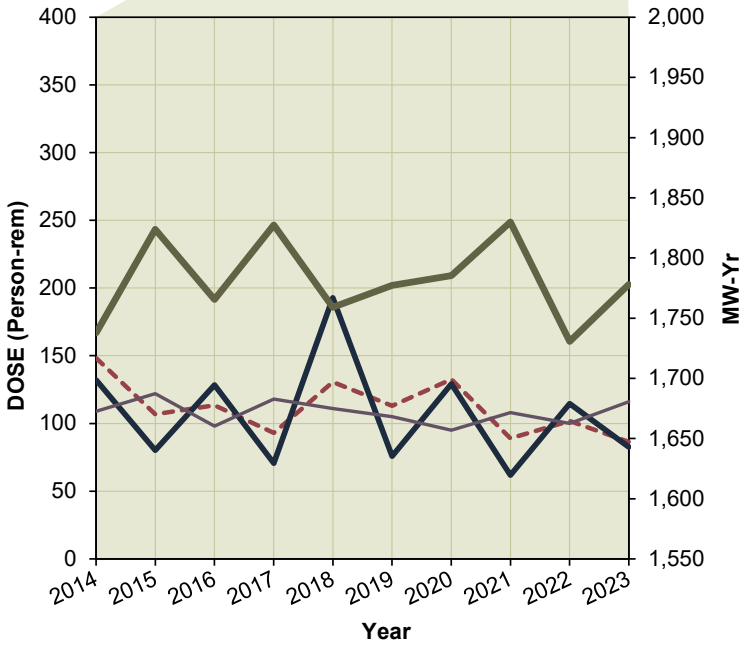
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	91.020	35.000	493.6
2015	121.444	130.057	532.4
2016	64.637	28.547	639.0
2017	91.473	115.814	589.0
2018	57.866	29.238	641.3
2019	91.159	128.425	566.7
2020	59.818	21.790	638.5
2021	94.463	133.174	570.0
2022	66.518	44.589	633.0
2023	110.516	153.784	547.2



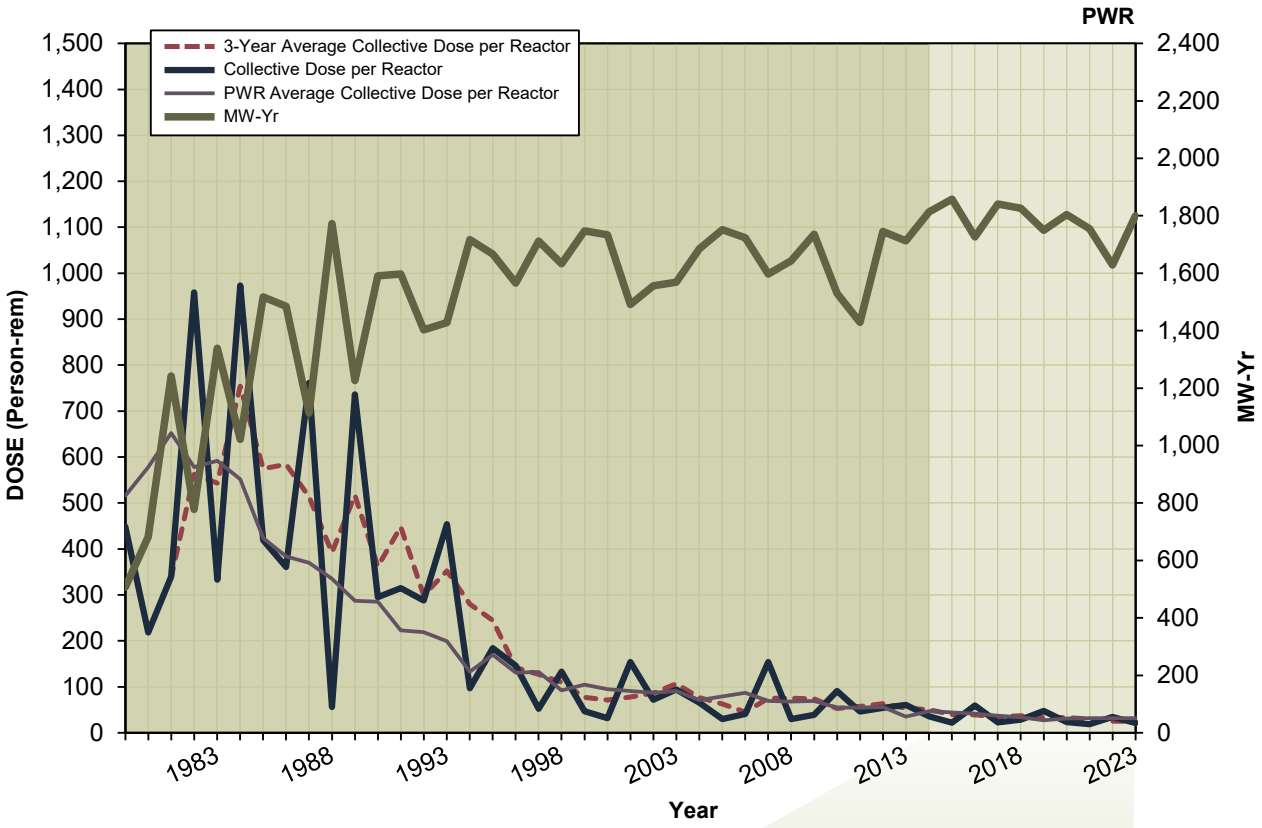
NINE MILE POINT 1, 2
Dose Performance Trends



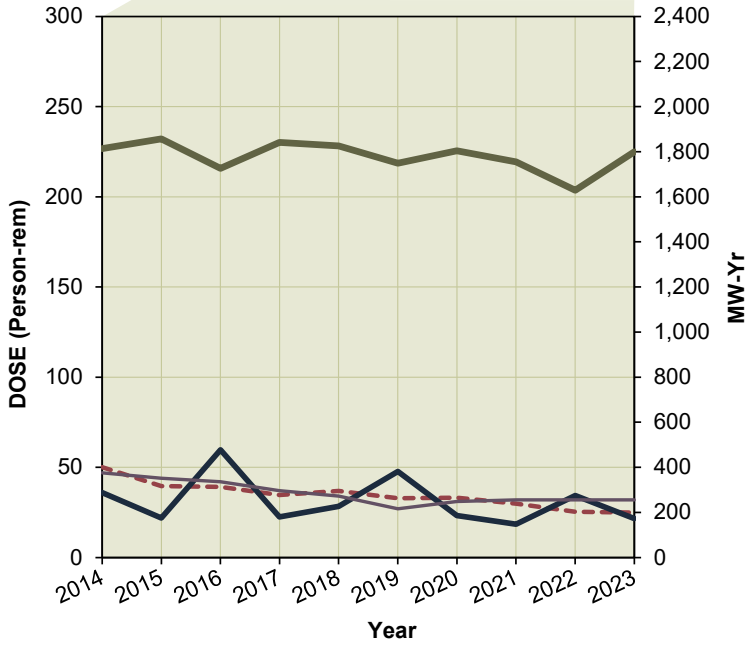
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	148.111	132.000	1,737.8
2015	106.858	80.190	1,823.7
2016	113.481	128.397	1,765.5
2017	93.054	70.575	1,827.3
2018	130.573	192.746	1,758.9
2019	113.060	75.860	1,777.2
2020	132.619	129.252	1,785.4
2021	88.993	61.869	1,829.8
2022	101.900	114.579	1,730.6
2023	86.344	82.580	1,778.0



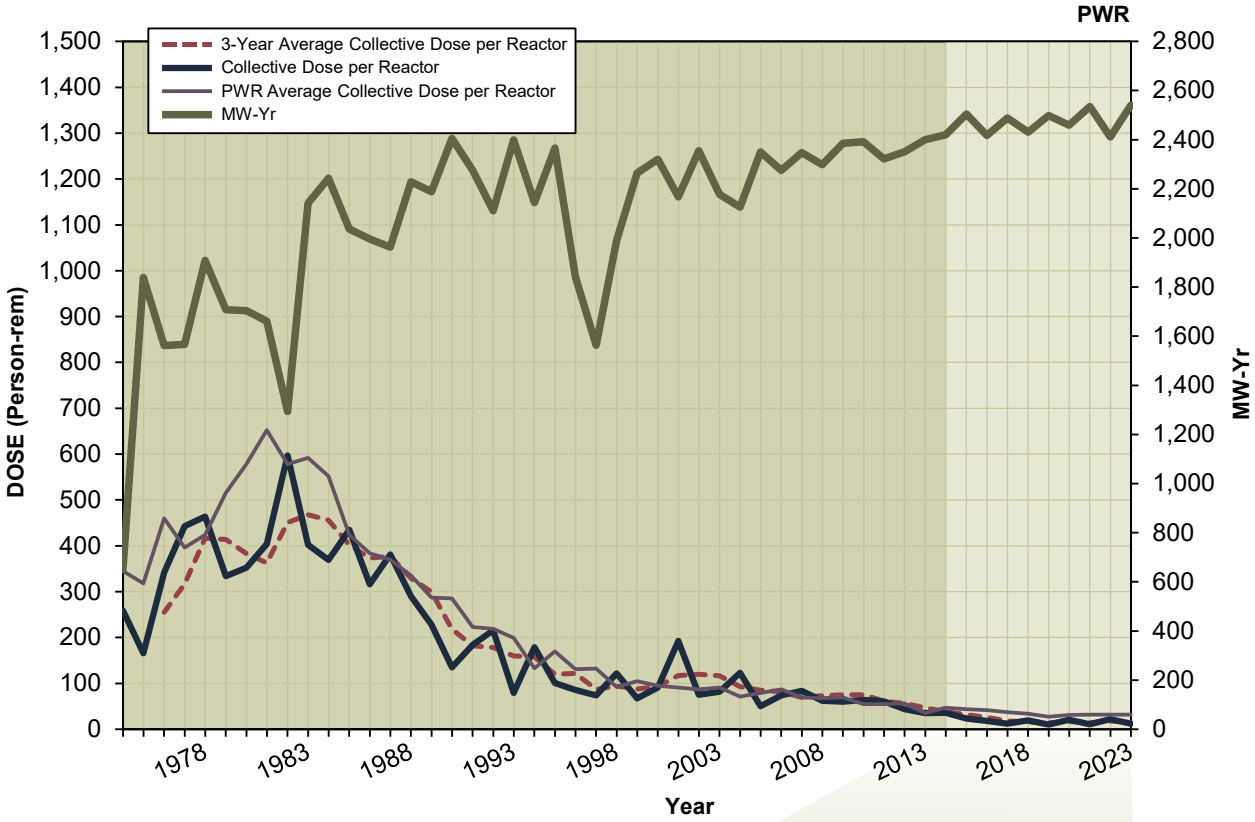
NORTH ANNA 1, 2
Dose Performance Trends



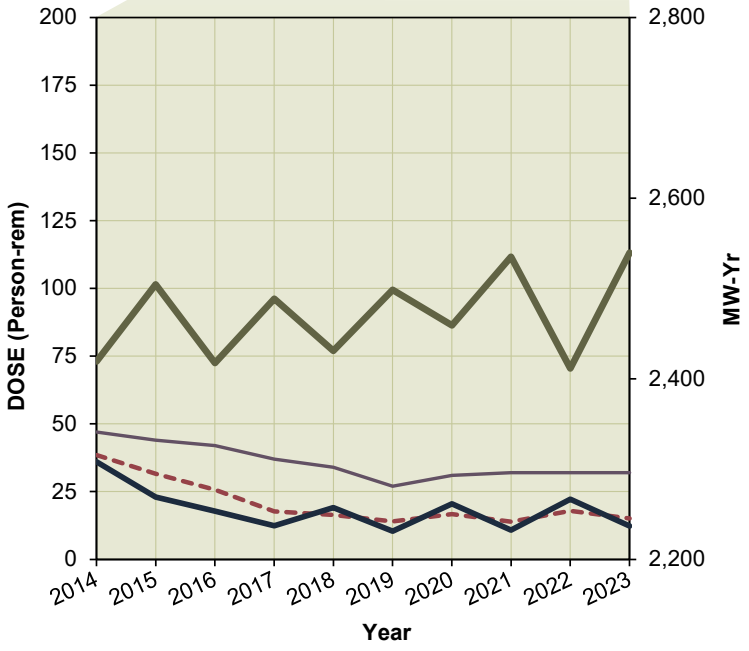
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	50.039	36.000	1,813.8
2015	39.593	21.919	1,857.4
2016	39.182	59.670	1,726.2
2017	34.677	22.442	1,840.9
2018	36.845	28.423	1,826.2
2019	32.836	47.644	1,749.4
2020	33.117	23.285	1,803.6
2021	29.785	18.426	1,754.8
2022	25.377	34.422	1,629.1
2023	24.837	21.660	1,799.7



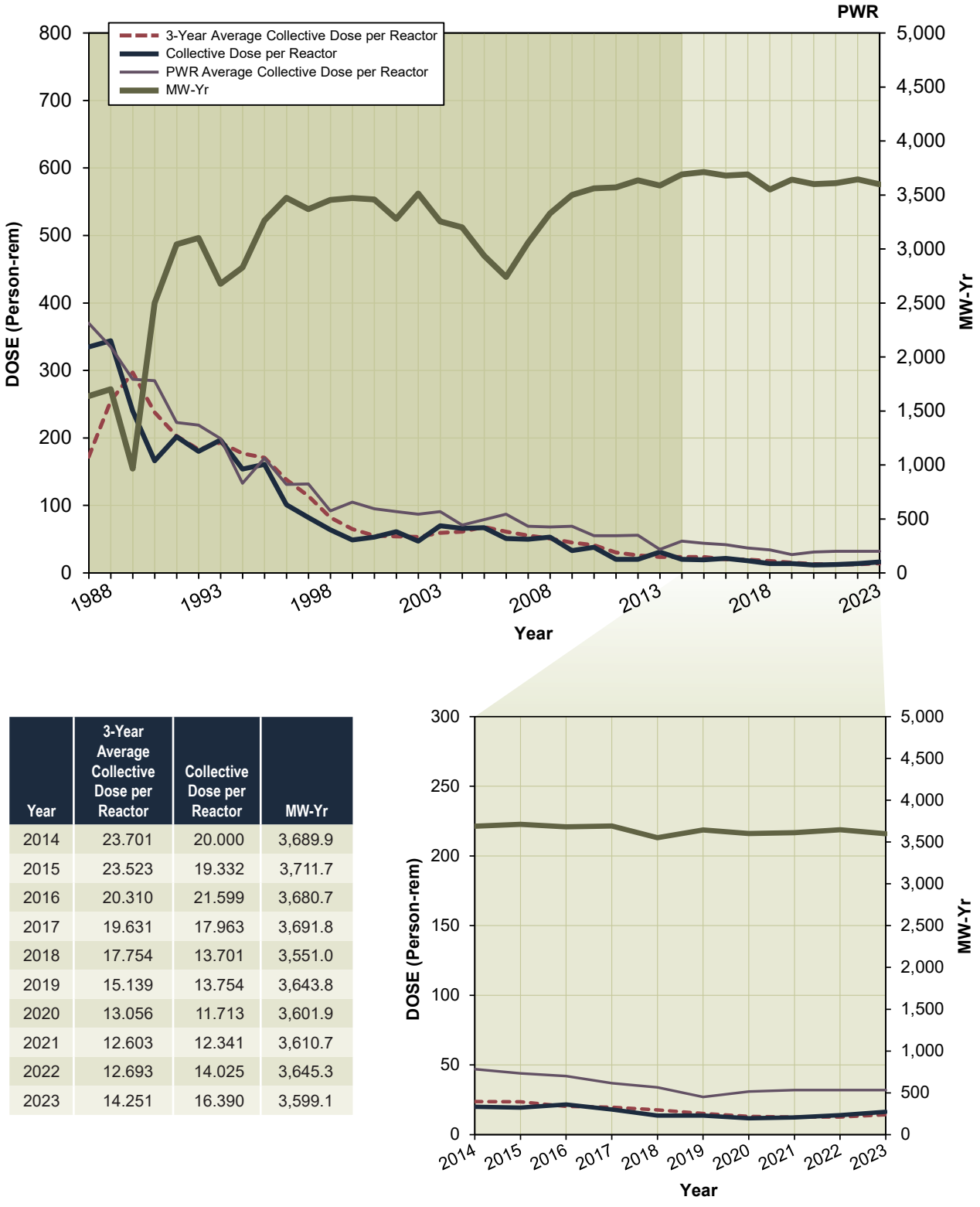
OCONEE 1, 2, 3
Dose Performance Trends



Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	38.541	36.000	2,419.3
2015	31.608	23.017	2,504.5
2016	25.718	17.799	2,417.5
2017	17.750	12.434	2,488.4
2018	16.433	19.067	2,430.8
2019	13.960	10.379	2,498.3
2020	16.660	20.535	2,459.2
2021	13.910	10.817	2,535.0
2022	17.859	22.224	2,411.5
2023	15.110	12.290	2,539.6



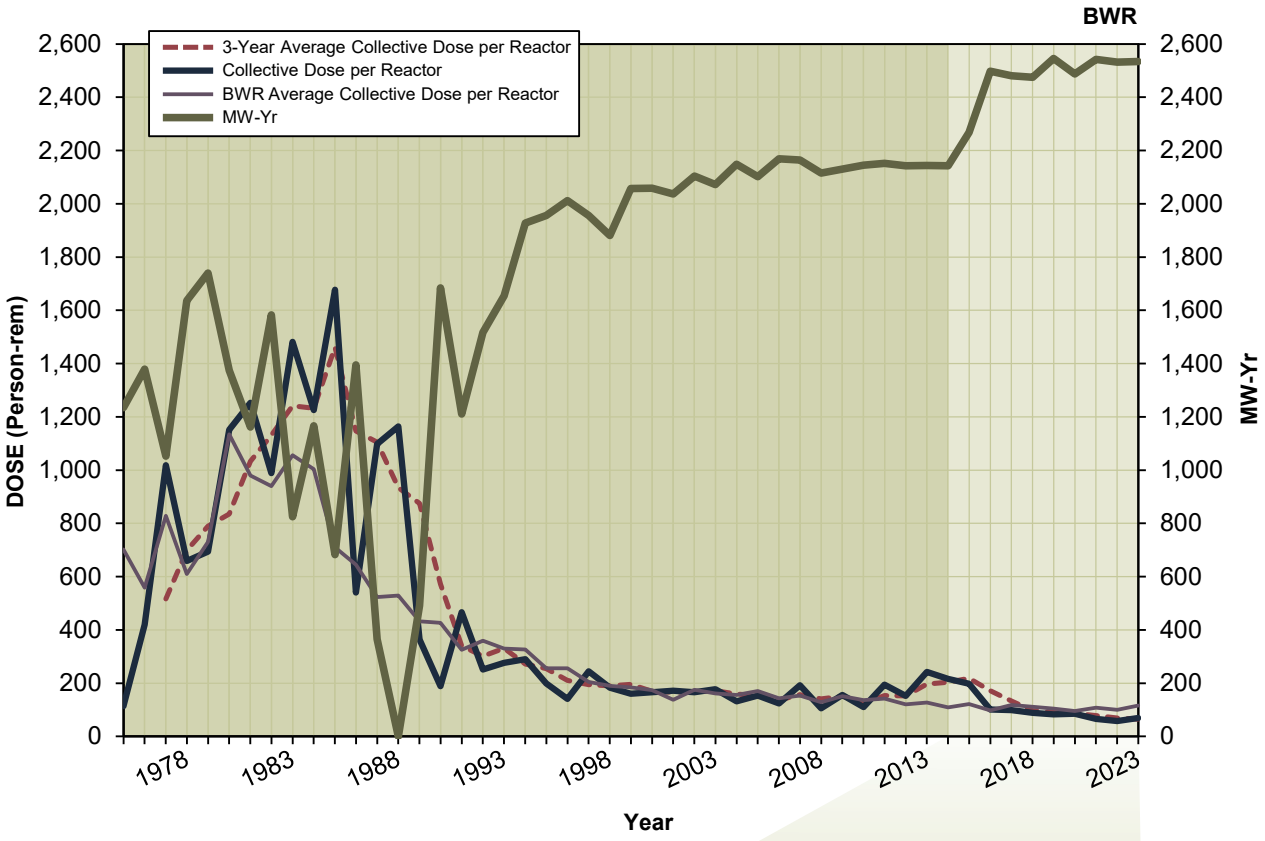
PALO VERDE 1, 2, 3
Dose Performance Trends



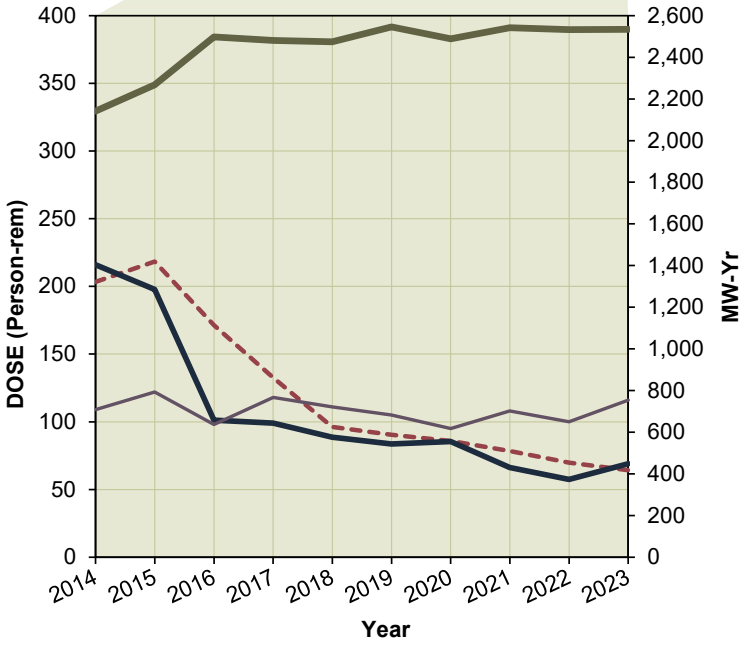
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	23.701	20.000	3,689.9
2015	23.523	19.332	3,711.7
2016	20.310	21.599	3,680.7
2017	19.631	17.963	3,691.8
2018	17.754	13.701	3,551.0
2019	15.139	13.754	3,643.8
2020	13.056	11.713	3,601.9
2021	12.603	12.341	3,610.7
2022	12.693	14.025	3,645.3
2023	14.251	16.390	3,599.1

PEACH BOTTOM 2, 3

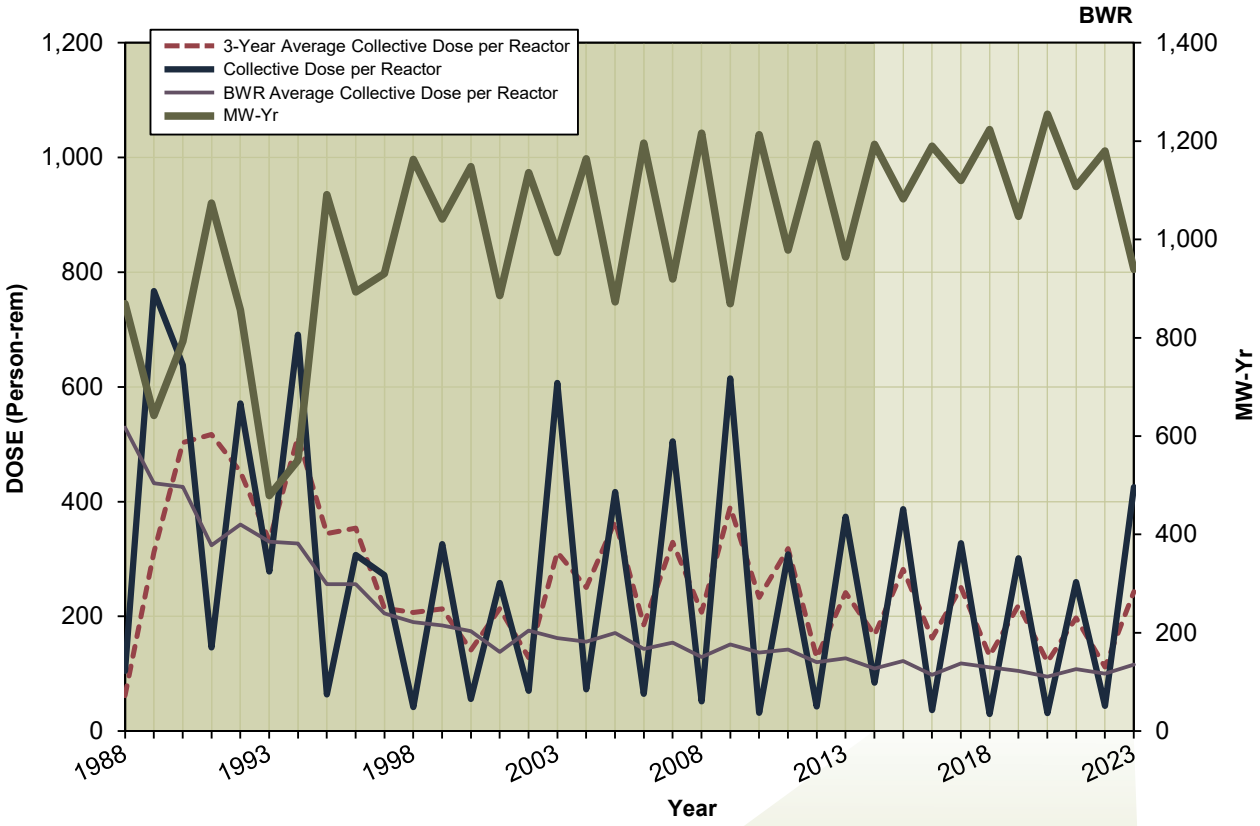
Dose Performance Trends



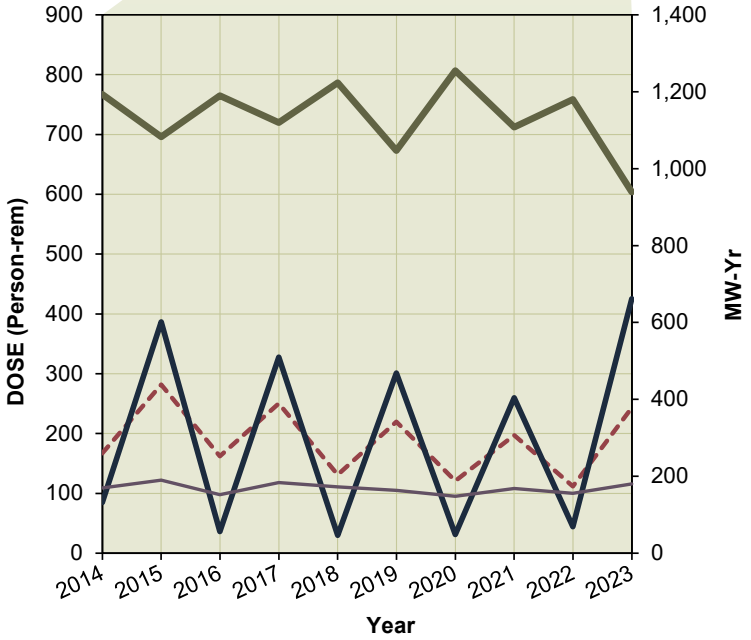
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	203.385	216.000	2,142.3
2015	218.412	197.799	2,267.6
2016	171.460	101.111	2,498.1
2017	132.605	98.907	2,481.1
2018	96.229	88.669	2,474.9
2019	90.372	83.542	2,545.2
2020	85.875	85.414	2,488.0
2021	78.413	66.285	2,542.1
2022	69.732	57.497	2,532.4
2023	64.269	69.020	2,533.9



PERRY
Dose Performance Trends

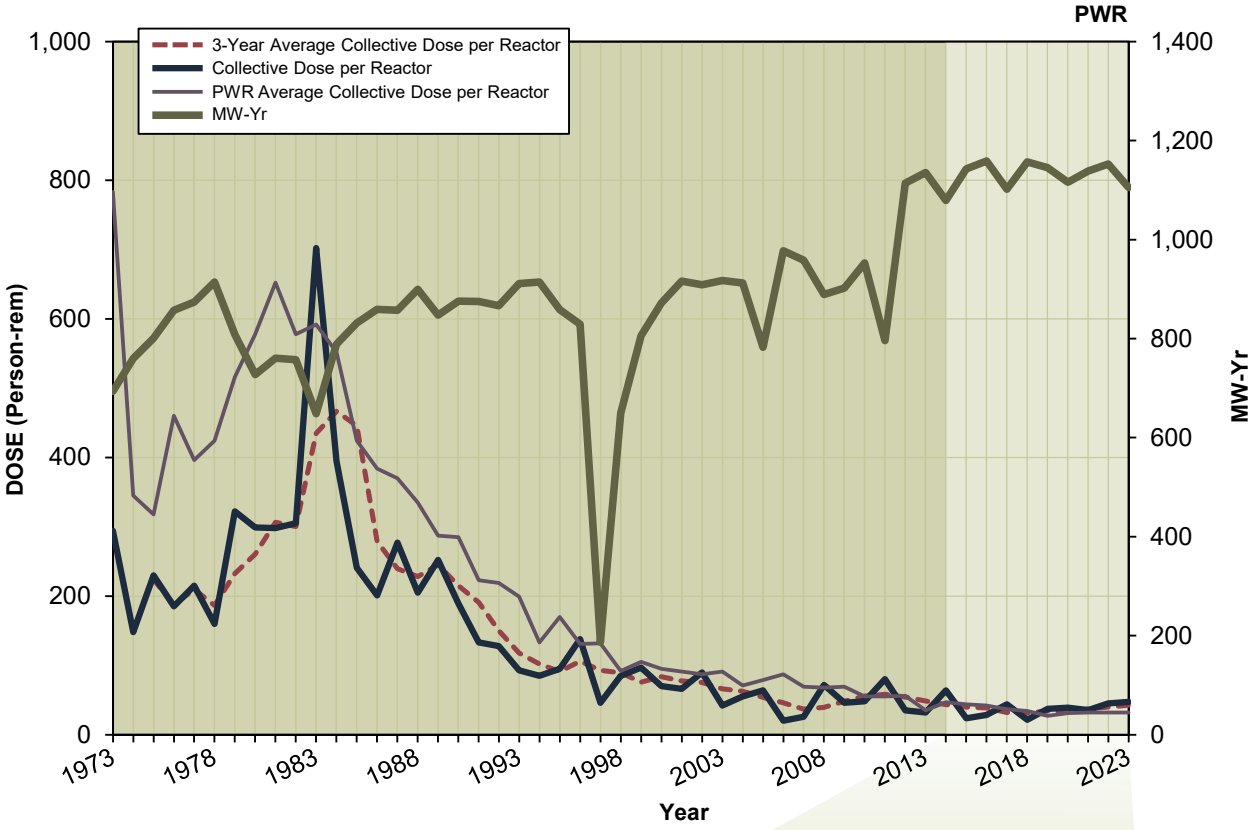


Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	167.246	84.617	1,193.5
2015	281.714	386.778	1,082.5
2016	162.261	36.389	1,189.5
2017	250.295	327.717	1,120.1
2018	131.318	29.848	1,223.6
2019	219.544	301.067	1,047.2
2020	120.692	31.161	1,254.7
2021	197.295	259.656	1,107.7
2022	111.639	44.100	1,179.7
2023	243.050	425.393	939.2

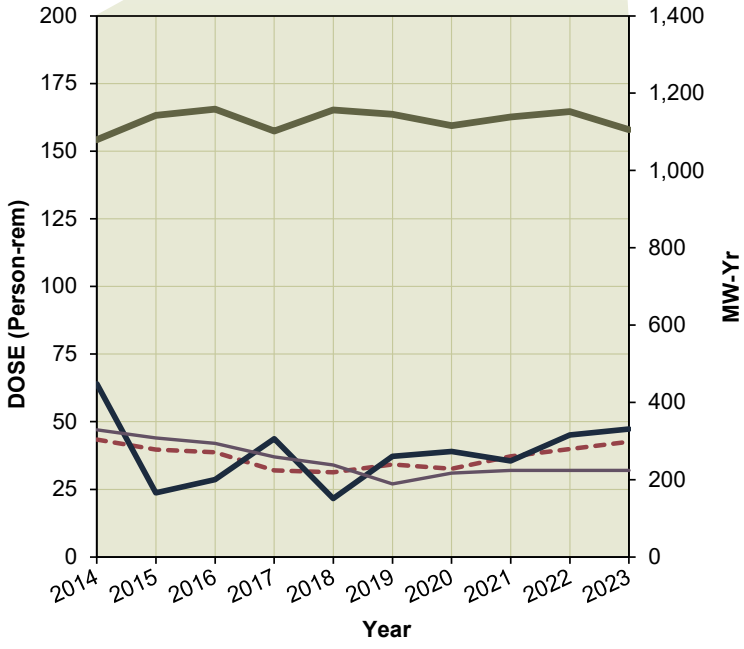


POINT BEACH 1, 2

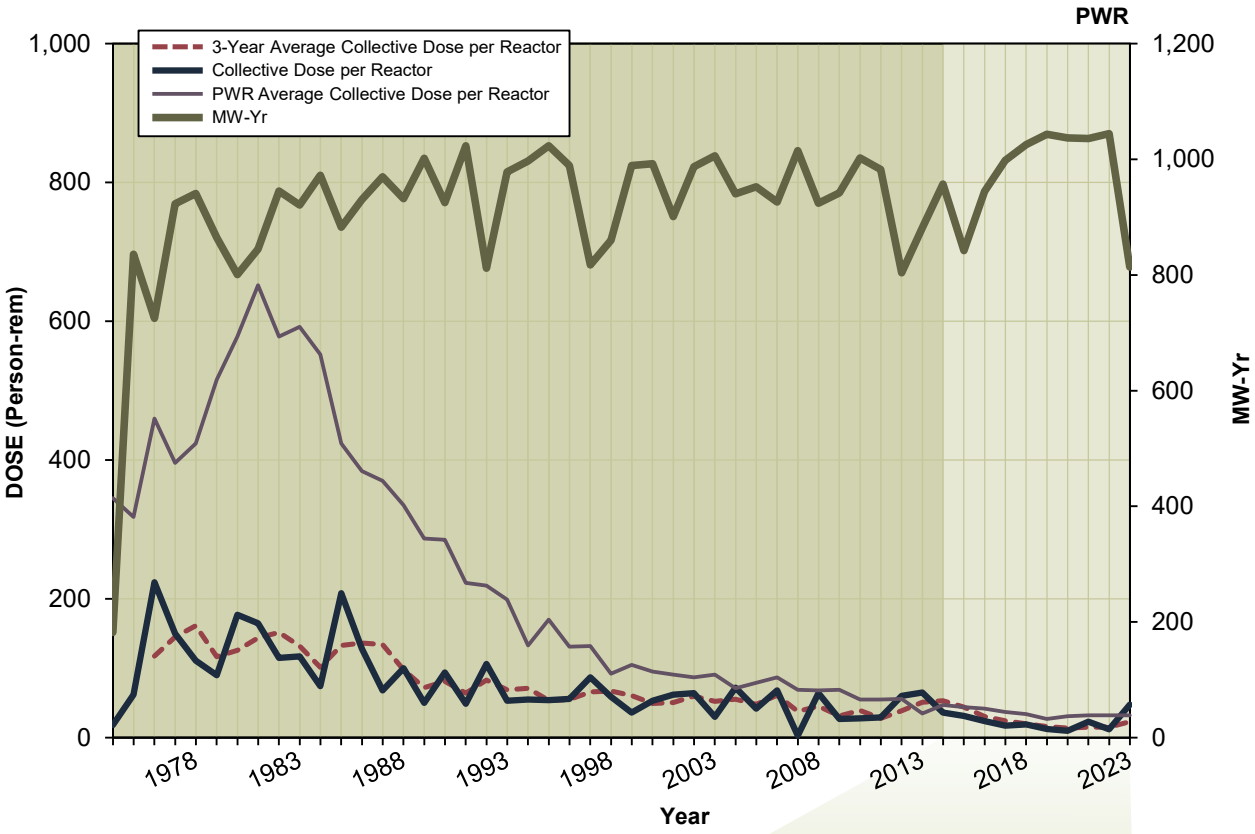
Dose Performance Trends



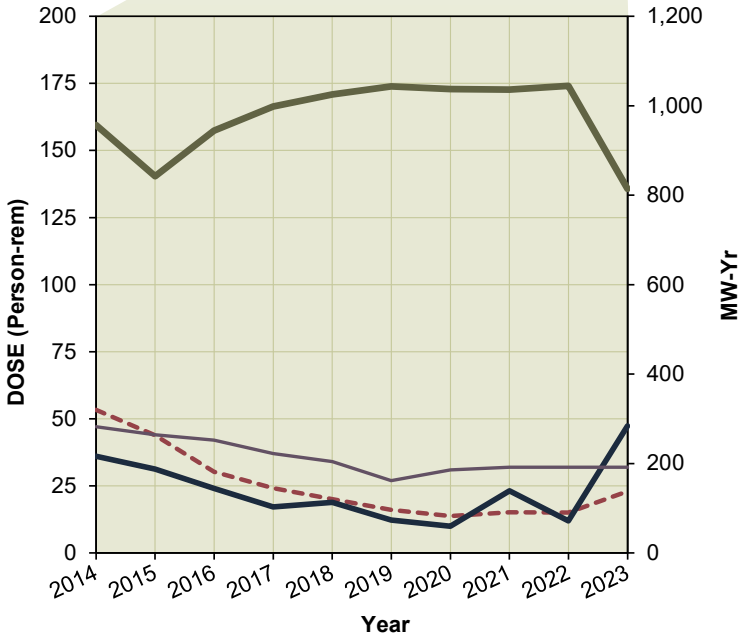
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	43.404	64.000	1,079.4
2015	39.690	23.737	1,142.9
2016	38.715	28.647	1,159.0
2017	32.041	43.740	1,102.0
2018	31.334	21.614	1,156.7
2019	34.199	37.243	1,145.3
2020	32.618	38.999	1,116.1
2021	37.232	35.455	1,138.5
2022	39.855	45.112	1,152.6
2023	42.630	47.320	1,105.6



PRAIRIE ISLAND 1, 2
Dose Performance Trends

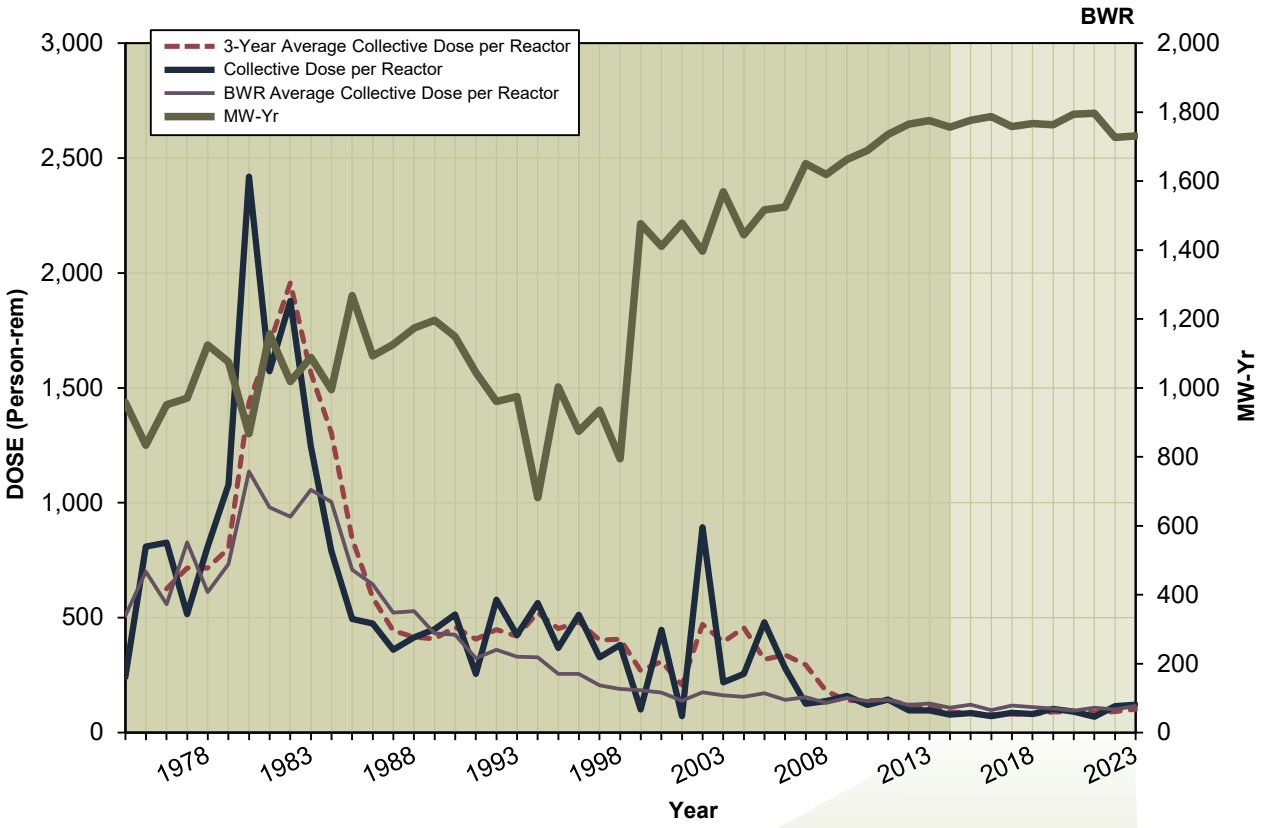


Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	53.336	36.000	957.0
2015	43.882	31.221	842.2
2016	30.230	24.039	944.5
2017	24.140	17.161	998.3
2018	20.022	18.866	1,025.5
2019	16.108	12.297	1,043.4
2020	13.724	10.009	1,037.0
2021	15.156	23.163	1,036.0
2022	15.058	12.001	1,044.6
2023	22.996	47.320	813.9

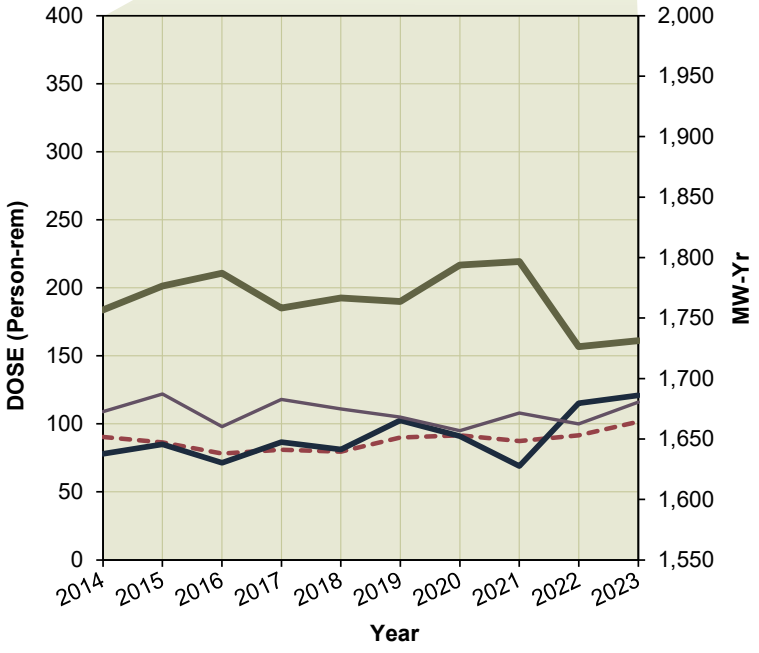


QUAD CITIES 1, 2

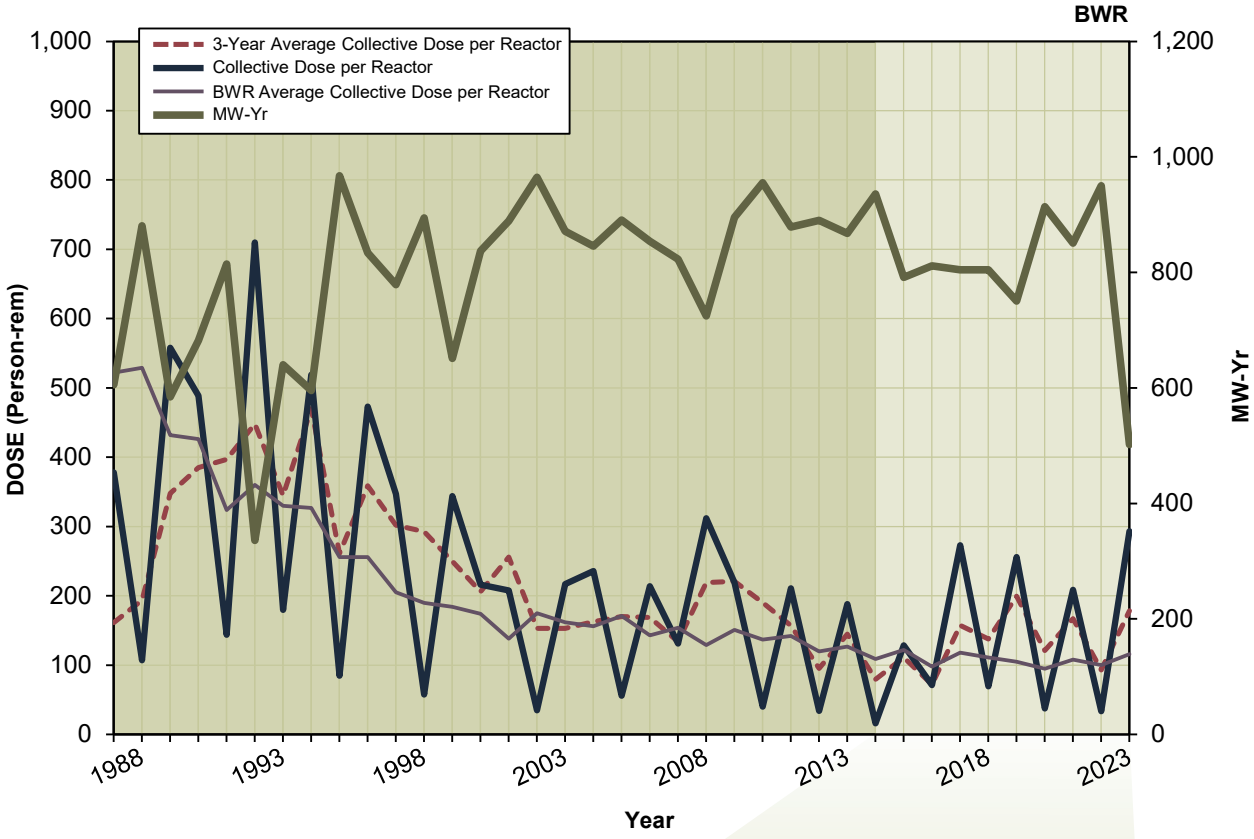
Dose Performance Trends



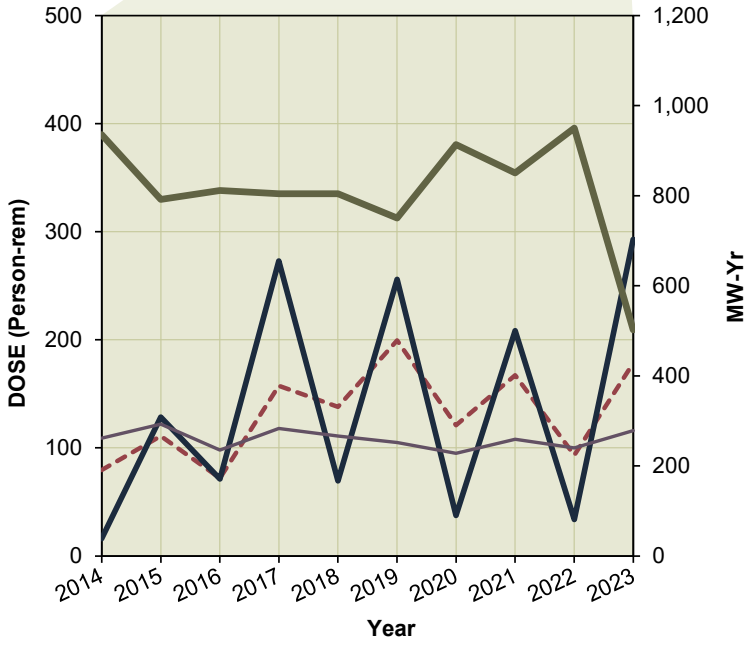
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	90.423	78.000	1,756.7
2015	86.392	85.062	1,776.5
2016	78.150	71.304	1,787.1
2017	80.983	86.584	1,758.2
2018	79.658	81.086	1,766.7
2019	90.049	102.479	1,763.7
2020	91.492	90.912	1,793.7
2021	87.430	68.901	1,796.8
2022	91.647	115.129	1,726.3
2023	101.665	120.960	1,731.2



RIVER BEND 1
Dose Performance Trends

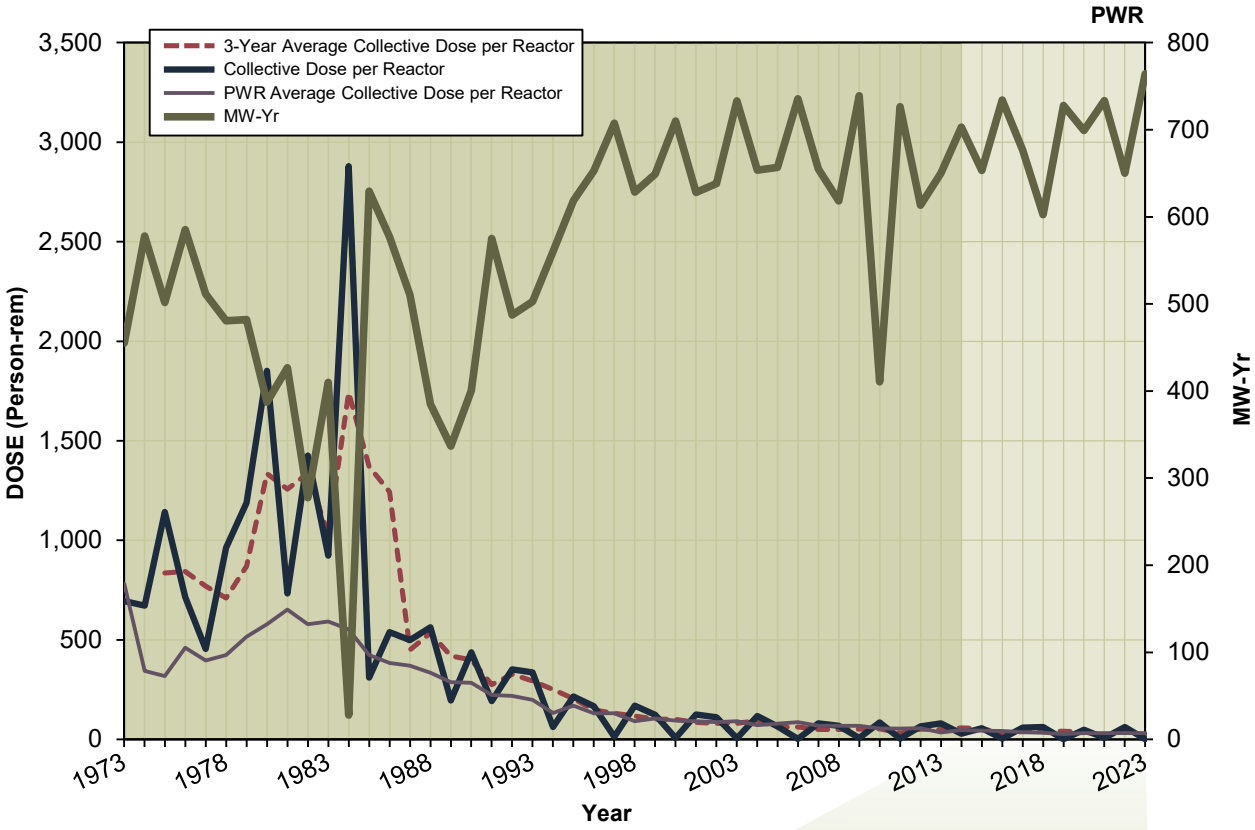


Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	79.549	16.000	935.8
2015	110.99	128.492	791.6
2016	71.924	71.142	811.5
2017	157.546	273.004	804.5
2018	137.909	69.580	804.3
2019	199.501	255.918	750.5
2020	120.973	37.420	913.6
2021	167.266	208.460	850.5
2022	93.181	33.664	950.0
2023	178.371	292.989	502.1

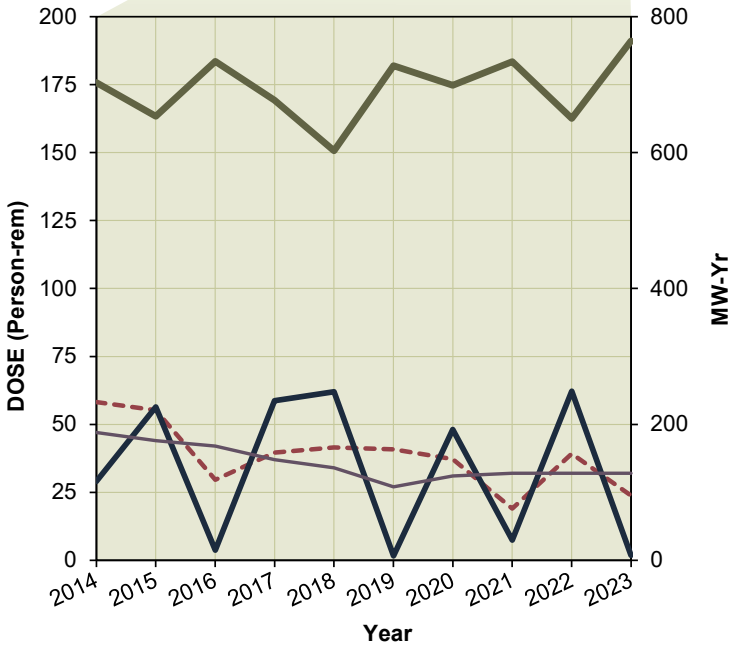


ROBINSON 2

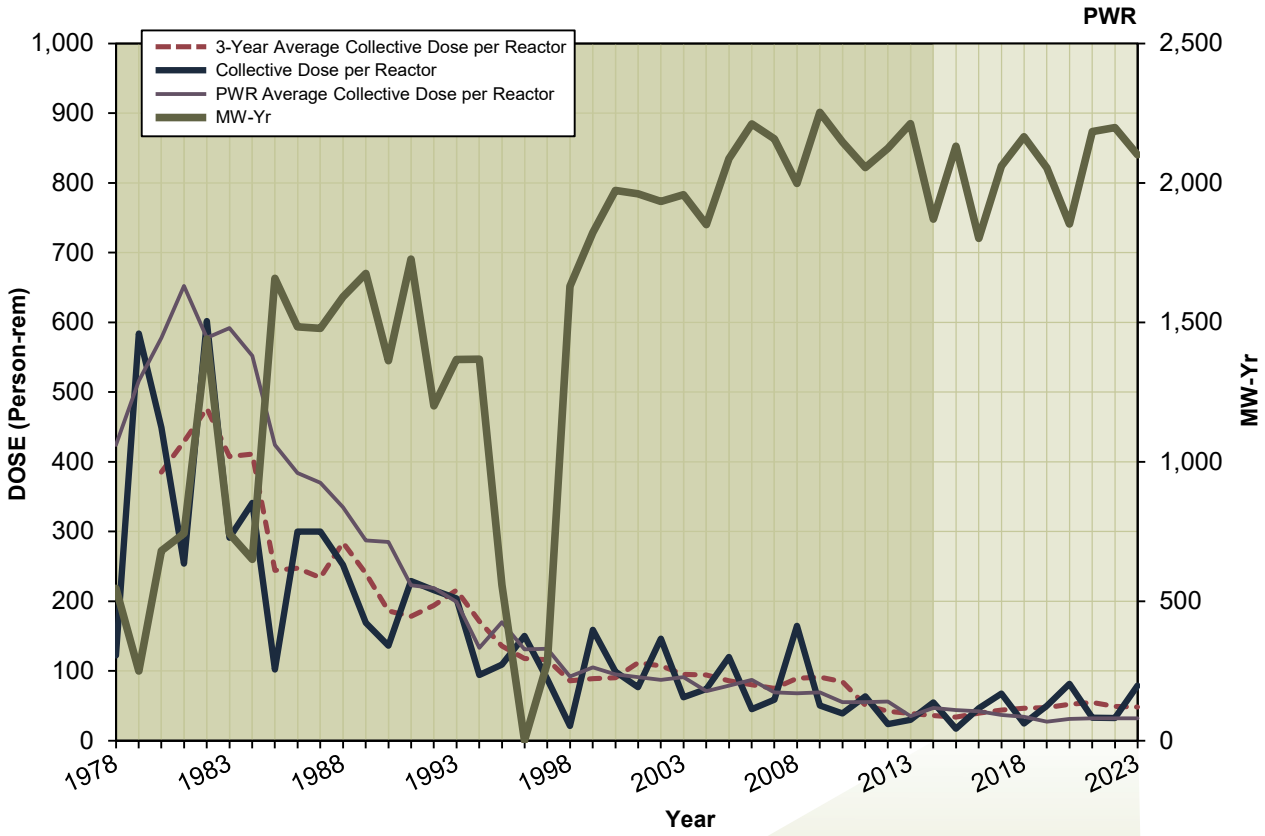
Dose Performance Trends



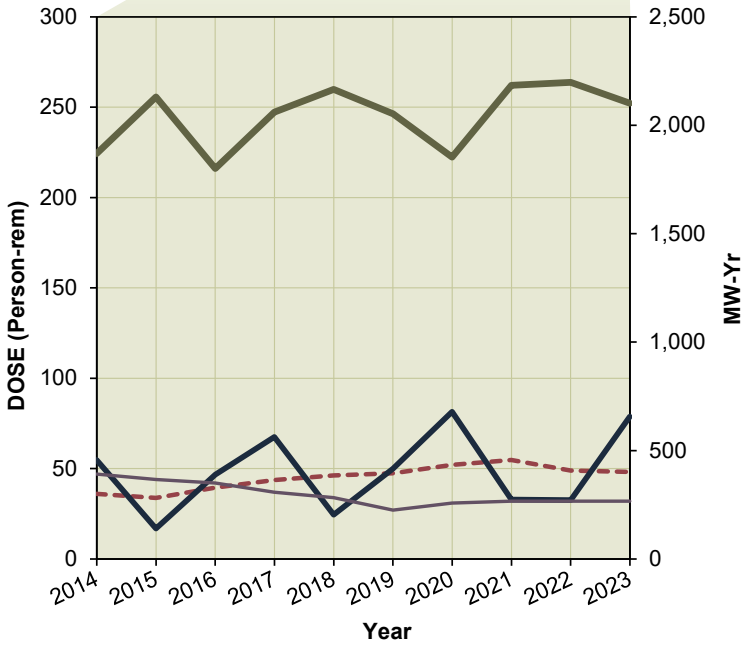
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	58.173	29.000	703.1
2015	55.211	56.373	653.4
2016	29.581	3.704	734.3
2017	39.605	58.739	676.9
2018	41.480	61.998	602.5
2019	40.802	1.668	727.9
2020	37.262	48.121	699.2
2021	19.077	7.443	733.6
2022	39.249	62.183	650.2
2023	23.812	1.809	764.2



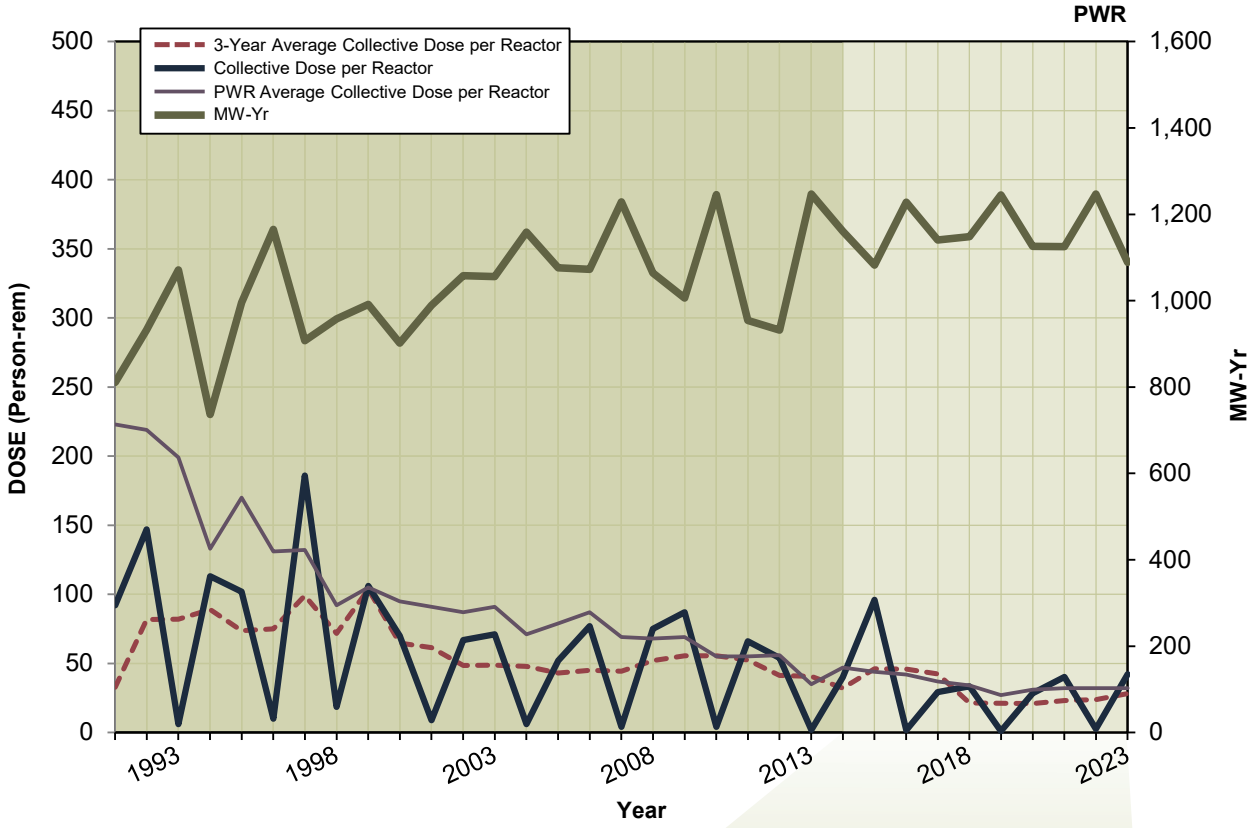
SALEM 1, 2
Dose Performance Trends



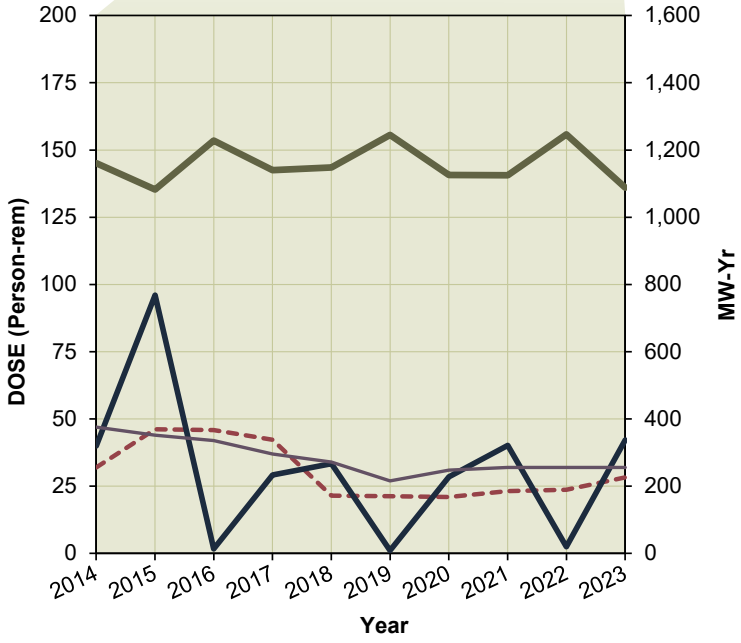
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	36.011	54.817	1,870.1
2015	33.812	16.905	2,131.3
2016	39.450	46.628	1,800.9
2017	43.710	67.599	2,060.5
2018	46.256	24.543	2,165.1
2019	47.399	50.055	2,053.6
2020	52.018	81.456	1,852.8
2021	54.807	32.911	2,184.0
2022	49.004	32.646	2,198.1
2023	48.112	78.780	2,101.5



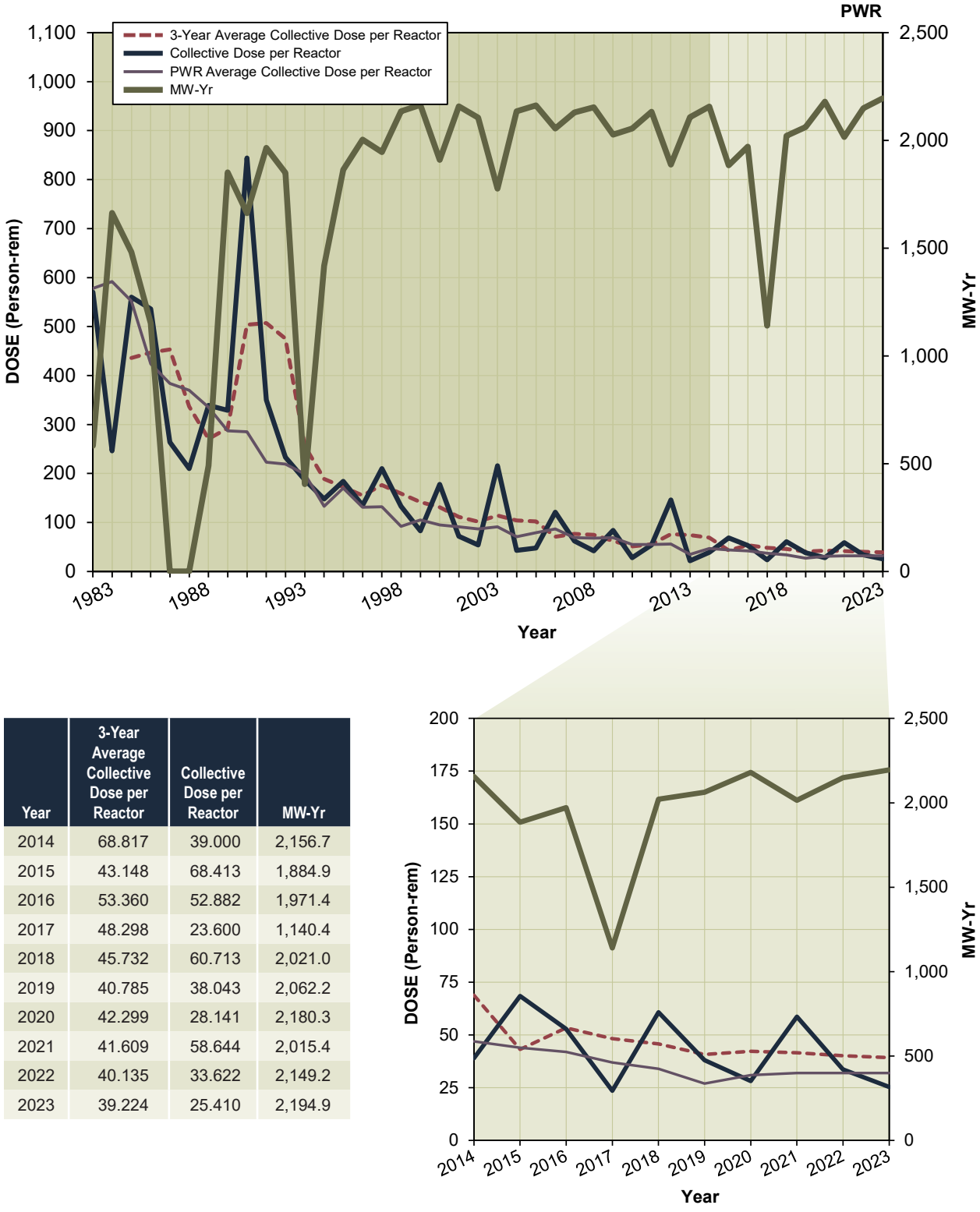
SEABROOK
Dose Performance Trends



Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	32.020	40.000	1,160.7
2015	46.159	96.053	1,082.6
2016	45.903	1.672	1,228.4
2017	42.305	29.191	1,140.4
2018	21.427	33.418	1,148.5
2019	21.231	1.084	1,245.0
2020	20.989	28.464	1,126.1
2021	23.223	40.122	1,125.1
2022	23.692	2.490	1,246.7
2023	28.243	42.180	1,088.4



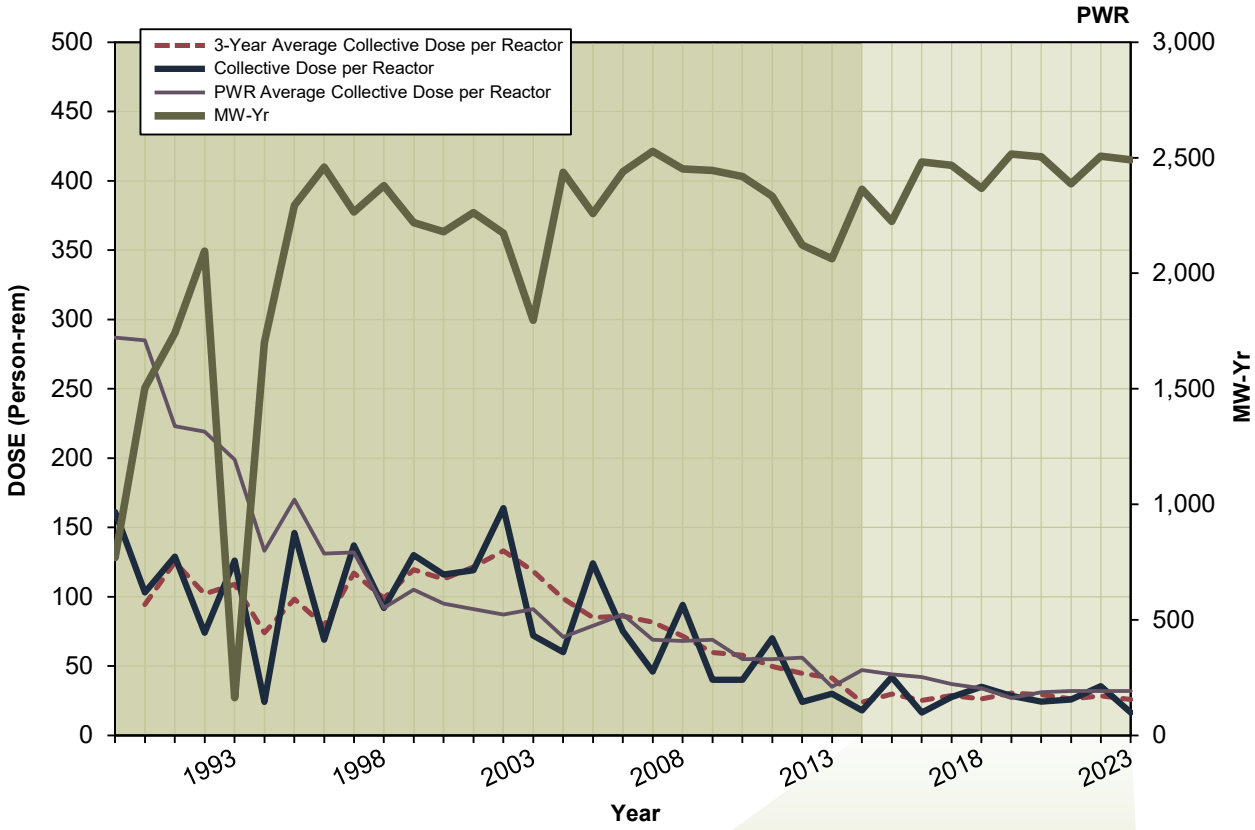
SEQUOYAH 1, 2
Dose Performance Trends



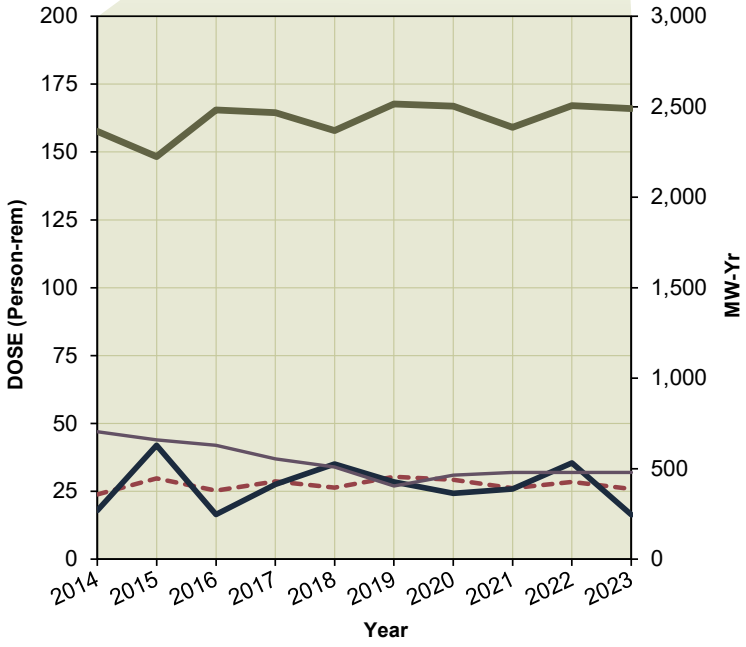
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	68.817	39.000	2,156.7
2015	43.148	68.413	1,884.9
2016	53.360	52.882	1,971.4
2017	48.298	23.600	1,140.4
2018	45.732	60.713	2,021.0
2019	40.785	38.043	2,062.2
2020	42.299	28.141	2,180.3
2021	41.609	58.644	2,015.4
2022	40.135	33.622	2,149.2
2023	39.224	25.410	2,194.9

SOUTH TEXAS 1, 2

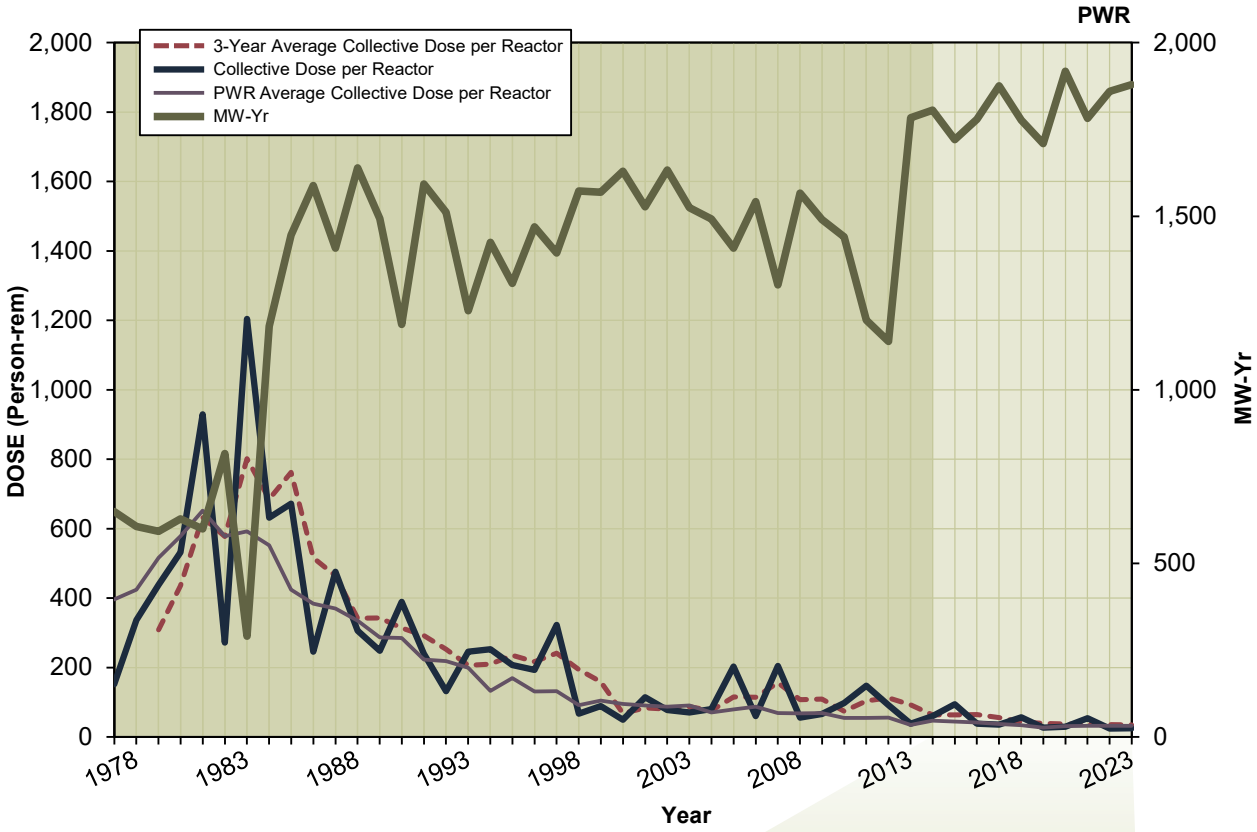
Dose Performance Trends



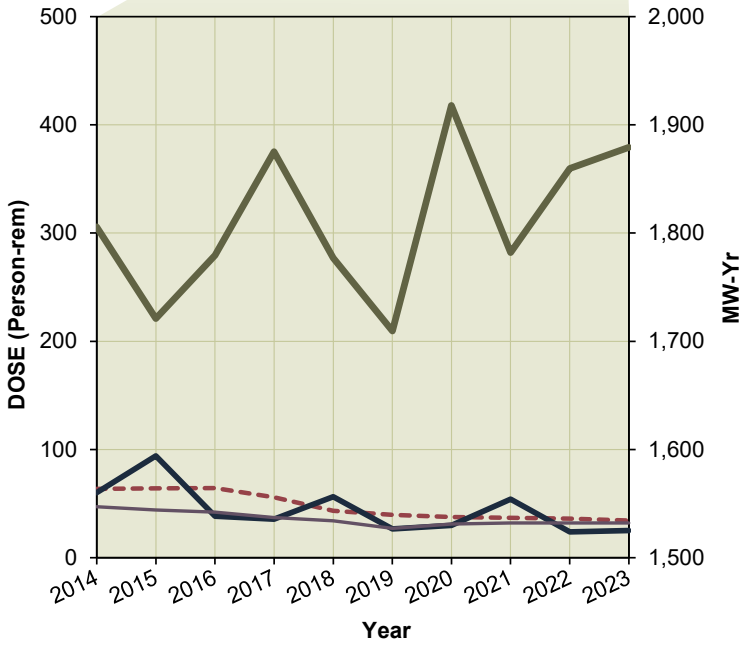
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	23.903	18.000	2,363.4
2015	29.718	41.997	2,224.5
2016	25.234	16.419	2,481.9
2017	28.643	27.513	2,467.1
2018	26.319	35.025	2,367.7
2019	30.327	28.444	2,515.3
2020	29.233	24.229	2,504.0
2021	26.172	25.843	2,386.5
2022	28.494	35.409	2,506.1
2023	25.865	16.340	2,490.4



ST. LUCIE 1, 2
Dose Performance Trends

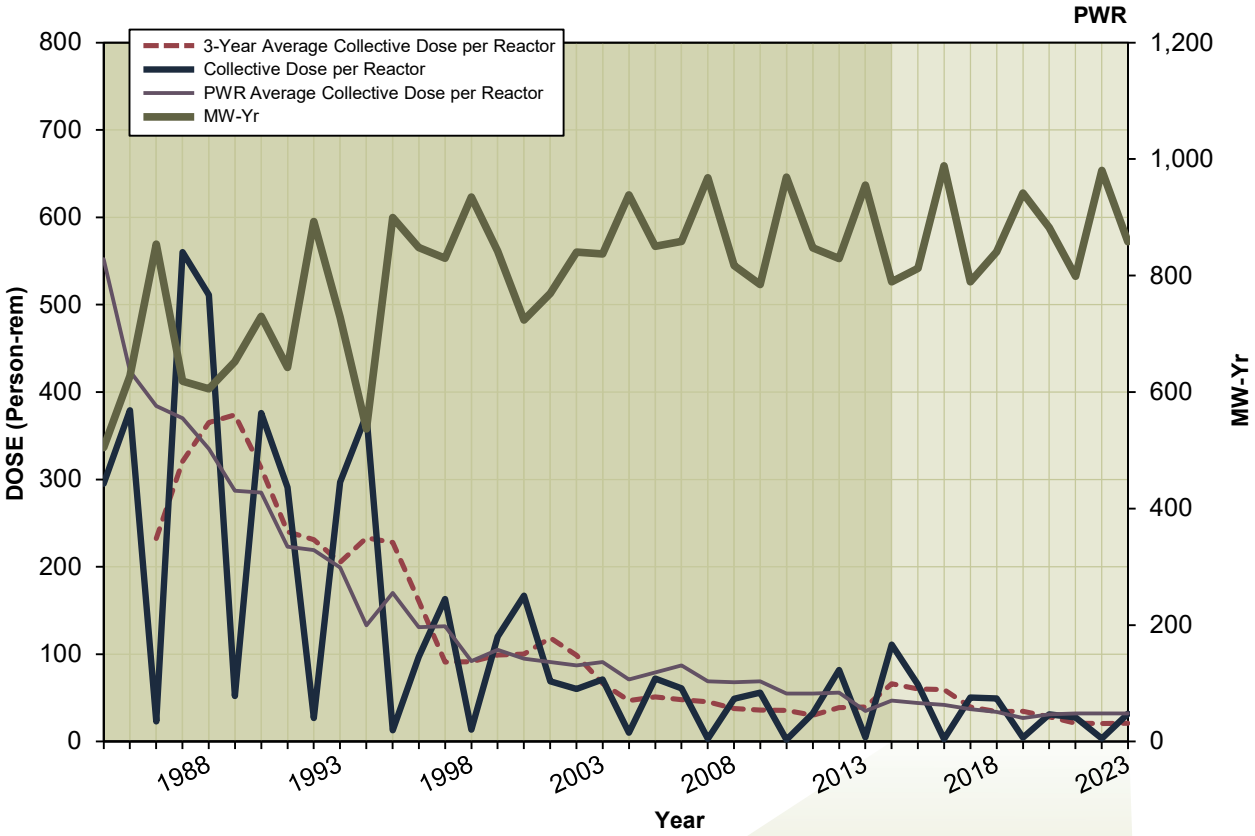


Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	63.574	60.000	1,805.7
2015	64.018	94.044	1,720.9
2016	64.301	38.314	1,779.5
2017	55.973	35.562	1,875.3
2018	43.445	56.460	1,777.1
2019	39.563	26.668	1,709.5
2020	37.677	29.904	1,917.9
2021	36.922	54.193	1,782.0
2022	36.014	23.946	1,859.6
2023	34.415	25.110	1,879.2

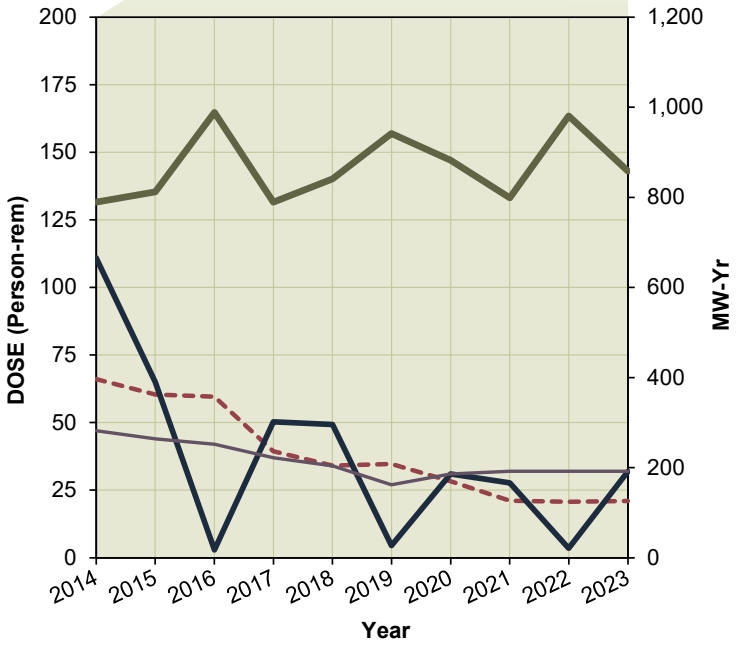


SUMMER 1

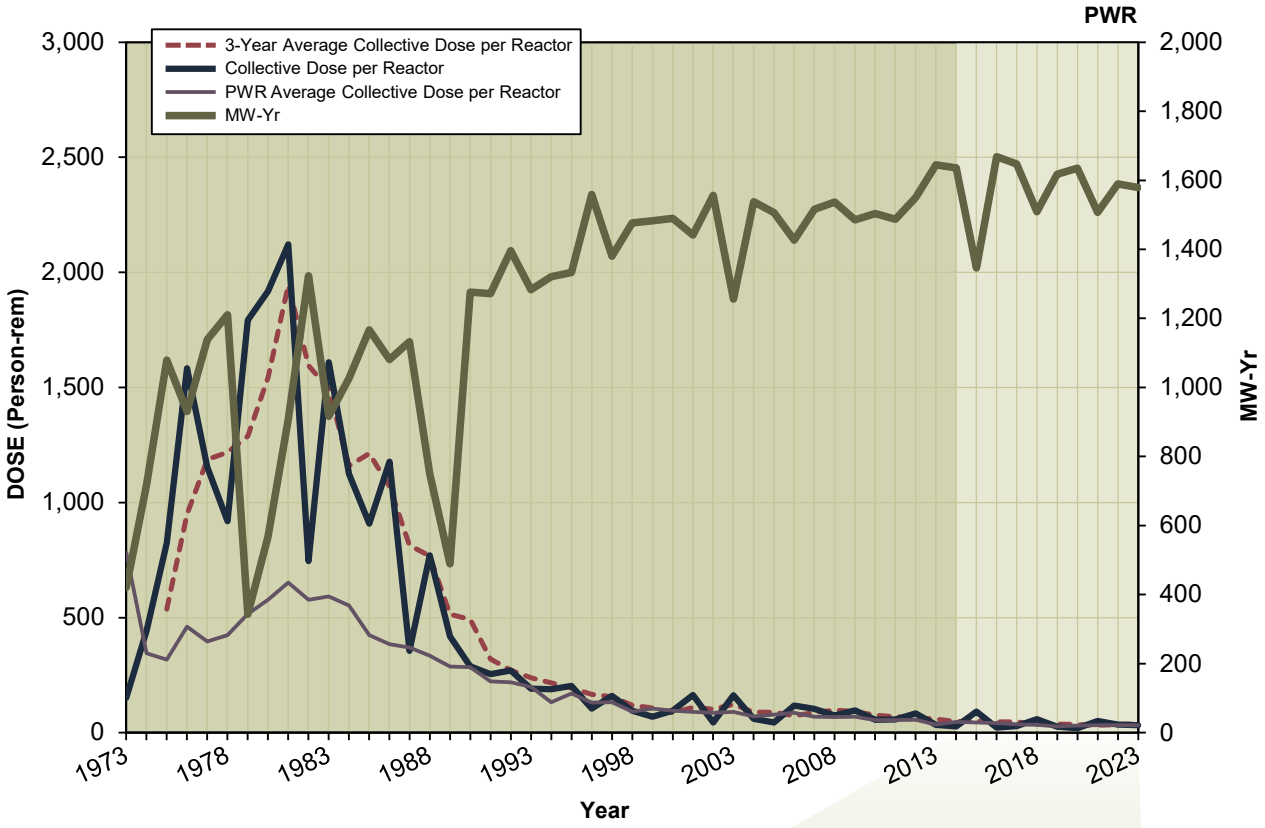
Dose Performance Trends



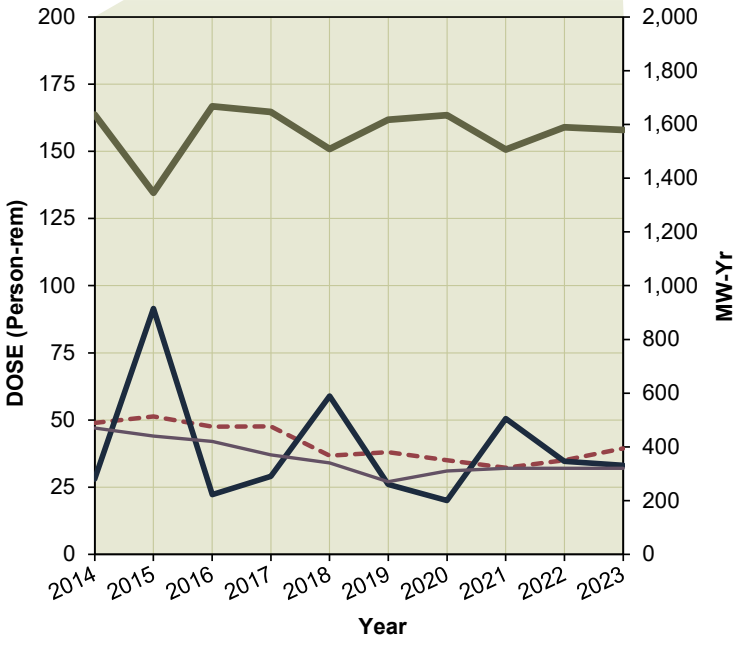
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	66.101	111.000	789.4
2015	60.333	64.958	812.3
2016	59.583	2.862	988.4
2017	39.376	50.308	789.2
2018	34.140	49.251	840.9
2019	34.705	4.557	941.6
2020	28.268	30.997	882.1
2021	21.084	27.699	798.8
2022	20.735	3.510	980.7
2023	21.038	31.904	858.1



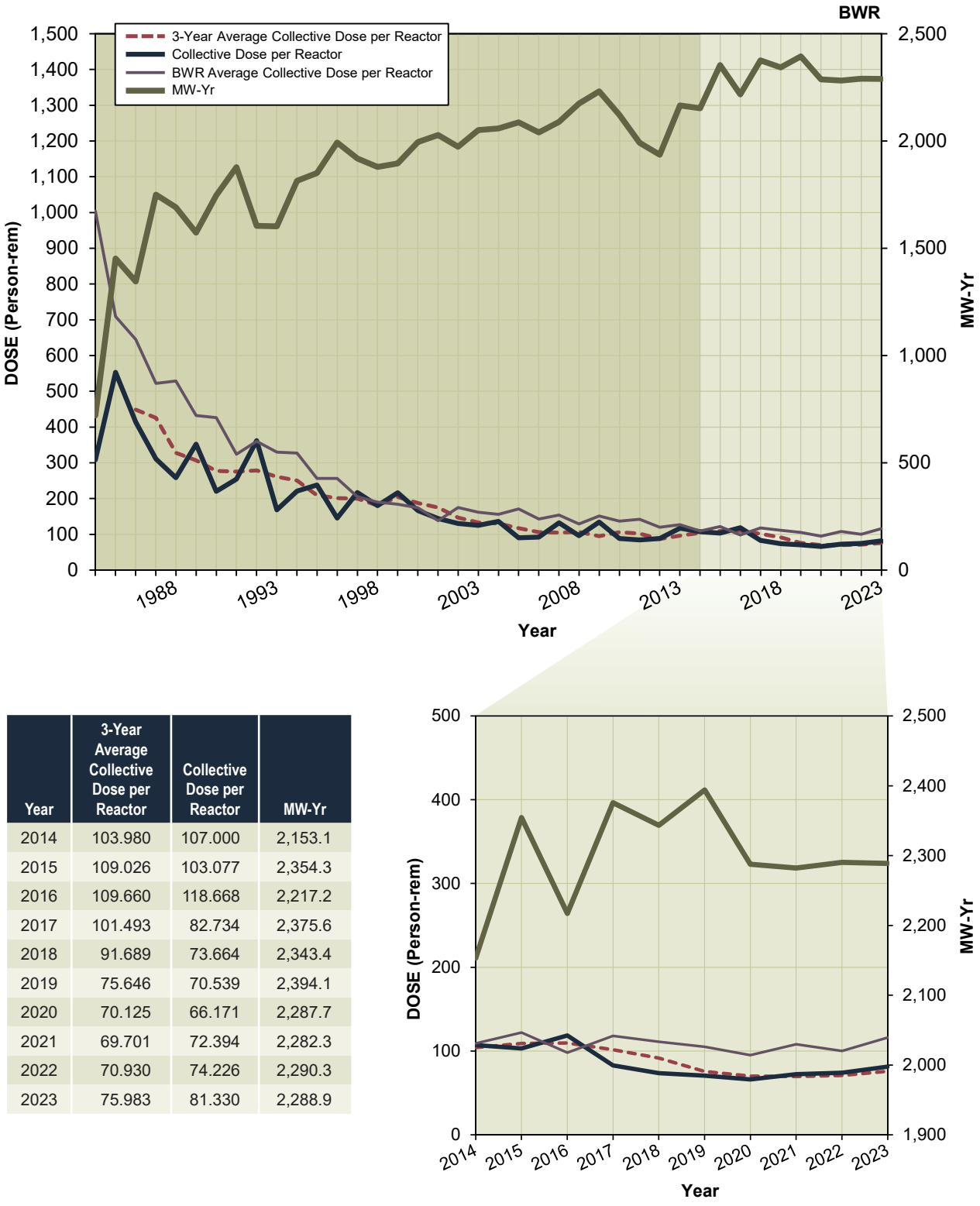
SURRY 1, 2
Dose Performance Trends



Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	48.962	28.000	1,636.1
2015	51.333	91.490	1,345.9
2016	47.484	22.216	1,667.9
2017	47.571	29.006	1,647.0
2018	36.714	58.919	1,509.0
2019	37.992	26.051	1,617.9
2020	35.014	20.072	1,634.7
2021	32.207	50.499	1,506.8
2022	35.056	34.597	1,589.8
2023	39.418	33.160	1,579.3

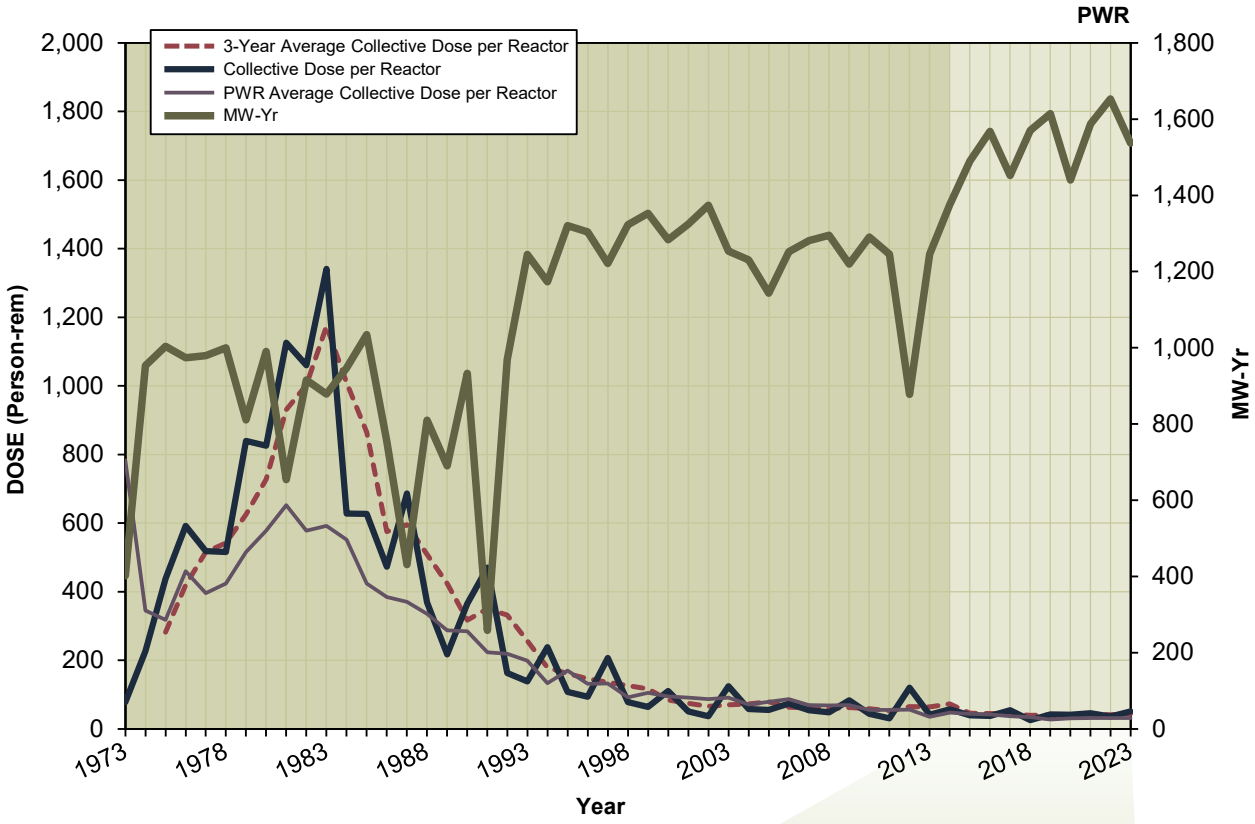


SUSQUEHANNA 1, 2
Dose Performance Trends

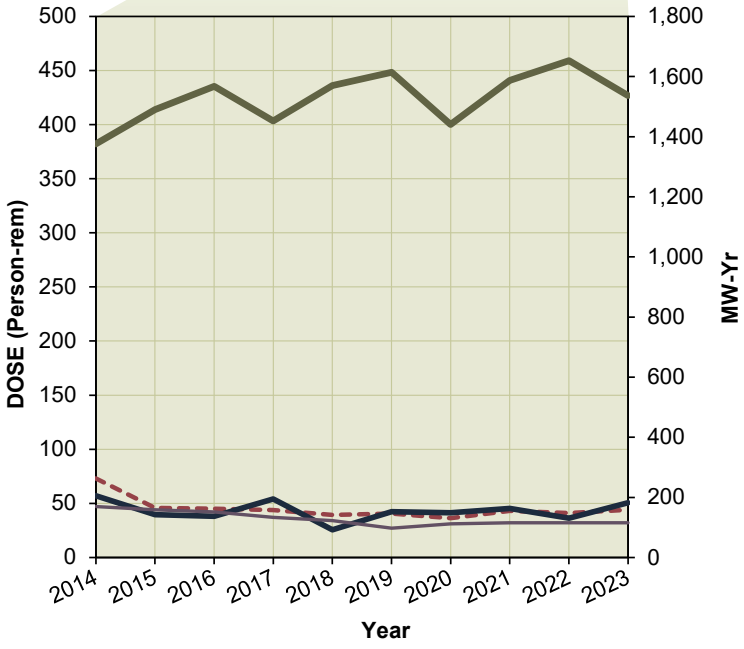


Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	103.980	107.000	2,153.1
2015	109.026	103.077	2,354.3
2016	109.660	118.668	2,217.2
2017	101.493	82.734	2,375.6
2018	91.689	73.664	2,343.4
2019	75.646	70.539	2,394.1
2020	70.125	66.171	2,287.7
2021	69.701	72.394	2,282.3
2022	70.930	74.226	2,290.3
2023	75.983	81.330	2,288.9

TURKEY POINT 3, 4
Dose Performance Trends

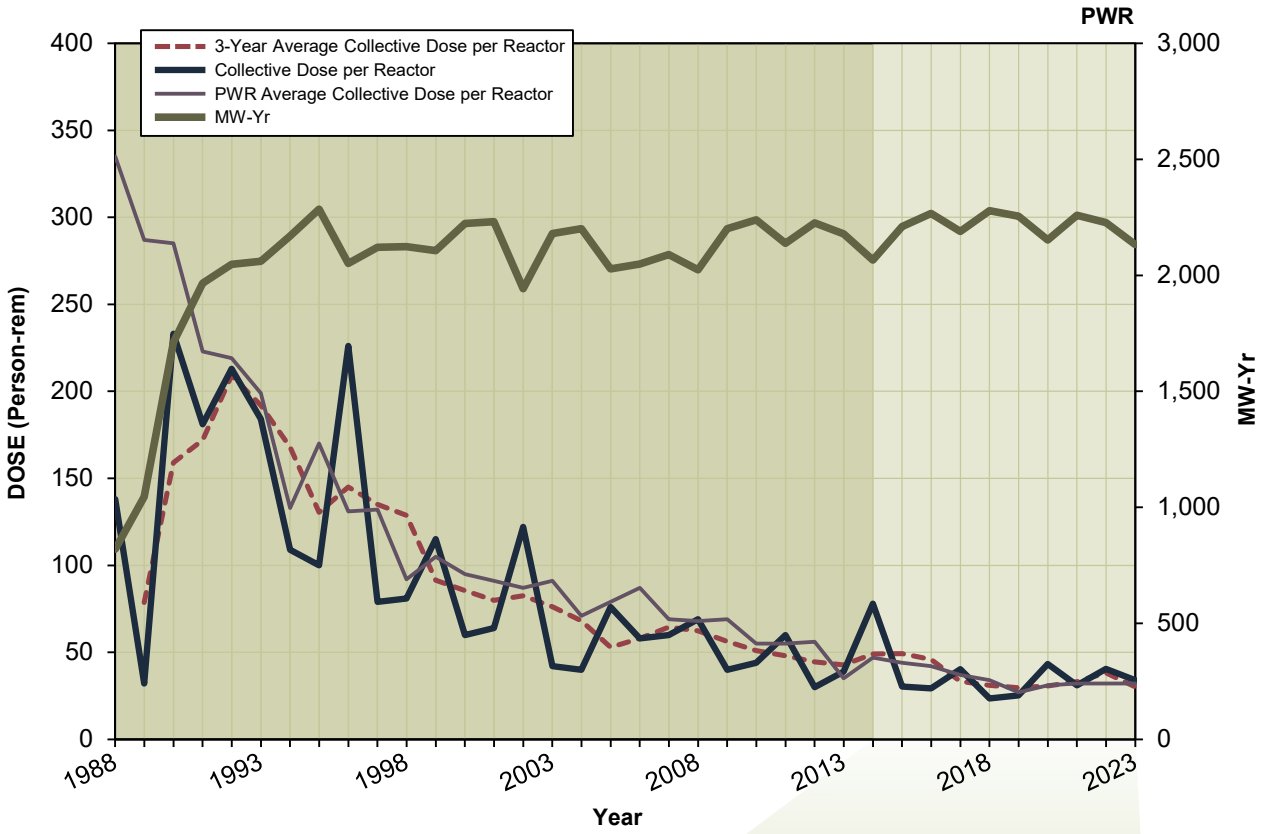


Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	72.949	57.000	1,375.7
2015	45.944	39.562	1,489.7
2016	44.953	38.135	1,567.7
2017	43.932	54.100	1,451.9
2018	39.260	25.544	1,570.2
2019	40.650	42.305	1,614.4
2020	36.395	41.336	1,440.5
2021	42.956	45.227	1,587.3
2022	40.994	36.420	1,652.8
2023	44.038	50.470	1,537.2

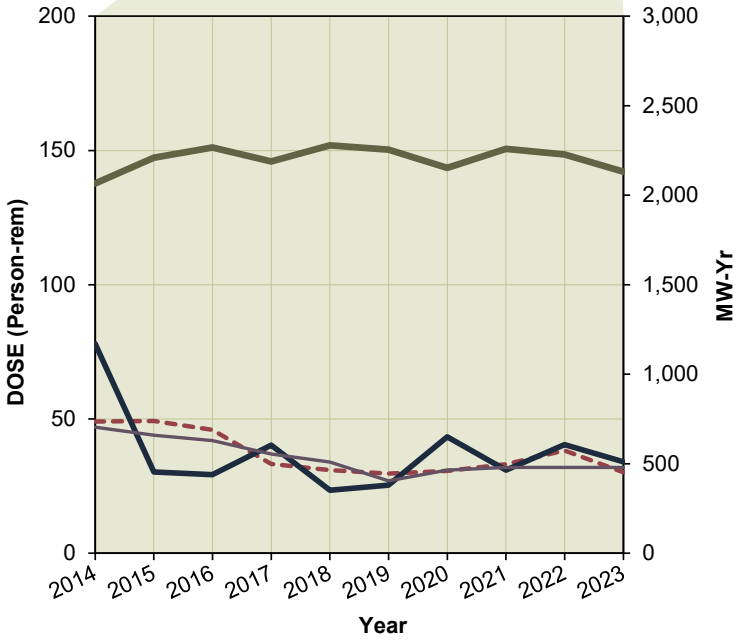


VOGTLE 1, 2*

Dose Performance Trends



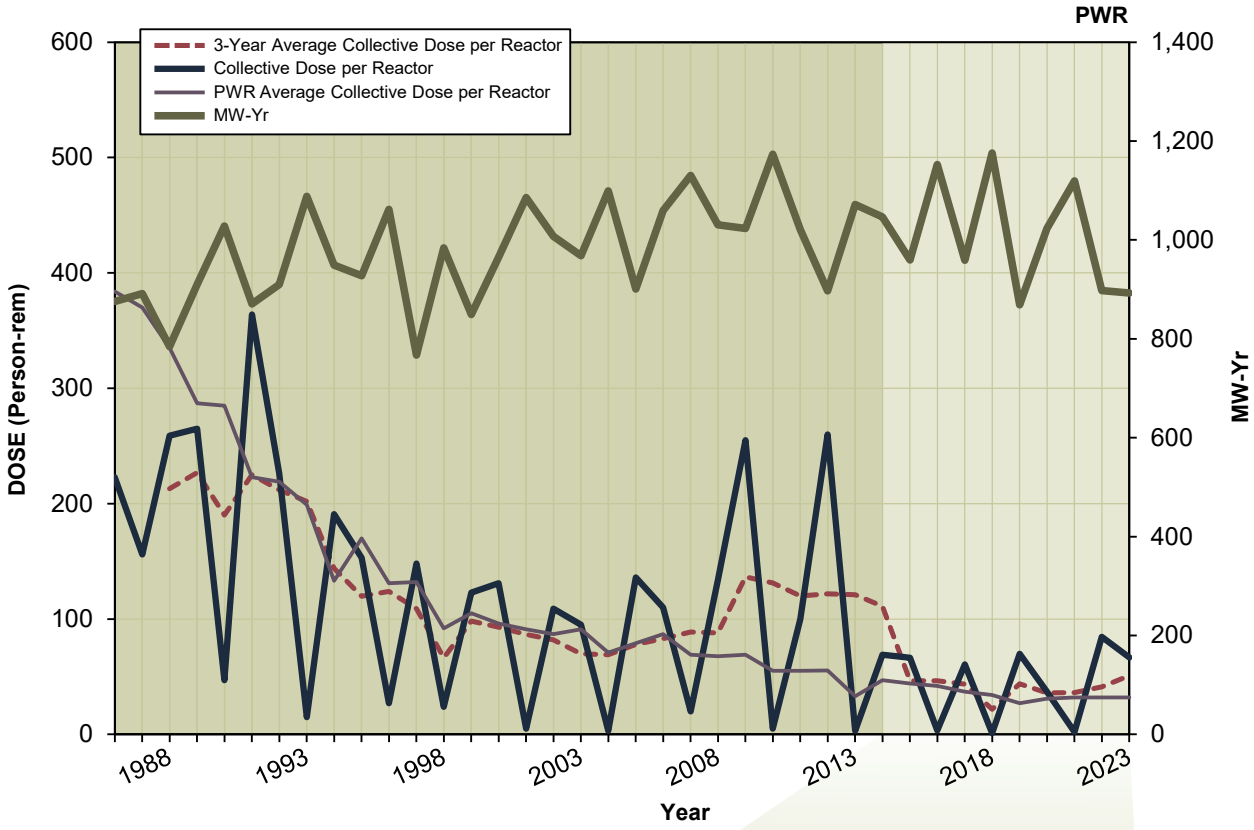
Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	49.060	78.000	2,065.8
2015	49.268	30.283	2,210.0
2016	45.964	29.236	2,267.1
2017	33.266	40.278	2,189.0
2018	30.981	23.428	2,278.4
2019	29.680	25.334	2,255.0
2020	30.695	43.323	2,152.7
2021	33.211	30.976	2,258.8
2022	38.249	40.447	2,227.8
2023	30.130	34.030	2,132.5



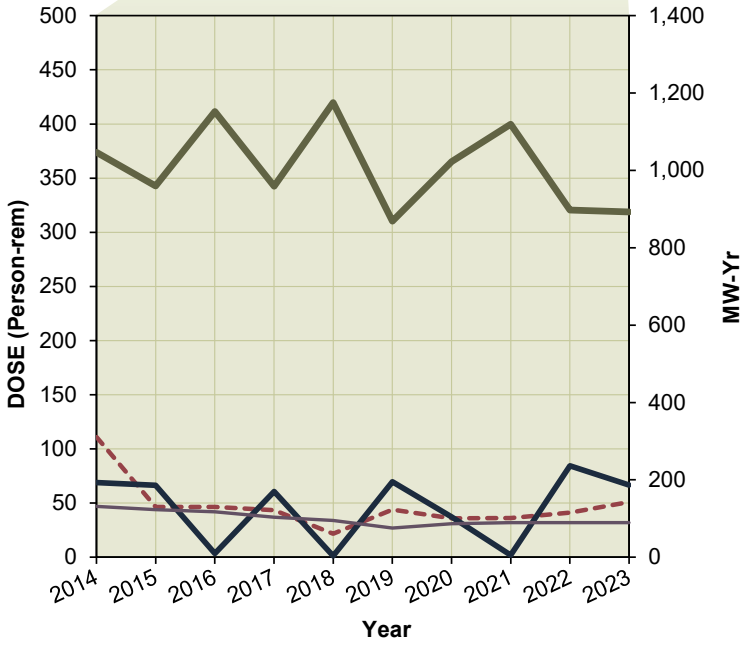
* Vogtle Unit 3 became operational in July 2023. It is not included in the count of operating reactors for 2023 because it did not complete a full year of operation, but the dose for Unit 3 is included in the total dose for Units 1 and 2.

WATERFORD 3

Dose Performance Trends

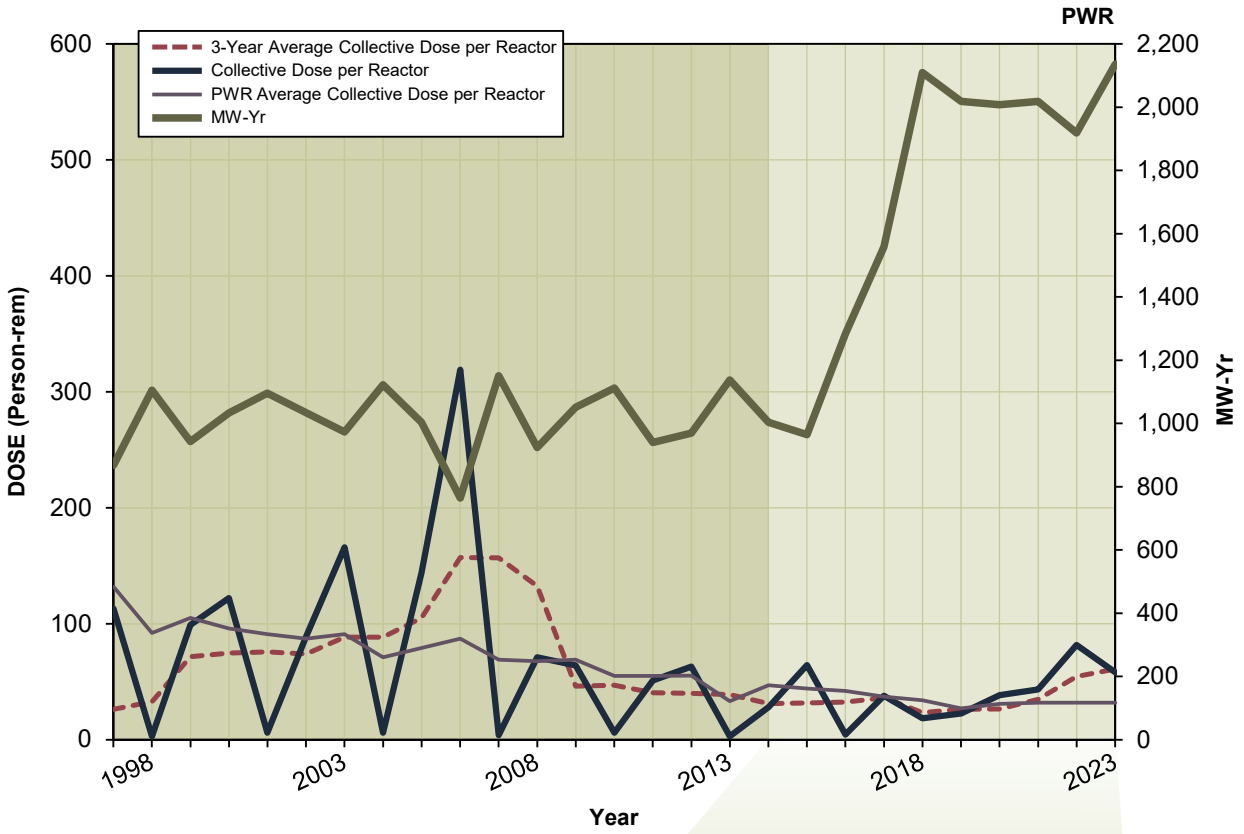


Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	110.931	69.000	1,046.4
2015	46.330	66.399	959.5
2016	46.418	3.392	1,152.5
2017	43.506	60.728	959.1
2018	21.750	1.130	1,175.6
2019	43.879	69.780	869.0
2020	36.000	37.090	1,023.0
2021	36.290	1.999	1,119.5
2022	41.204	84.524	897.6
2023	51.042	66.602	892.7

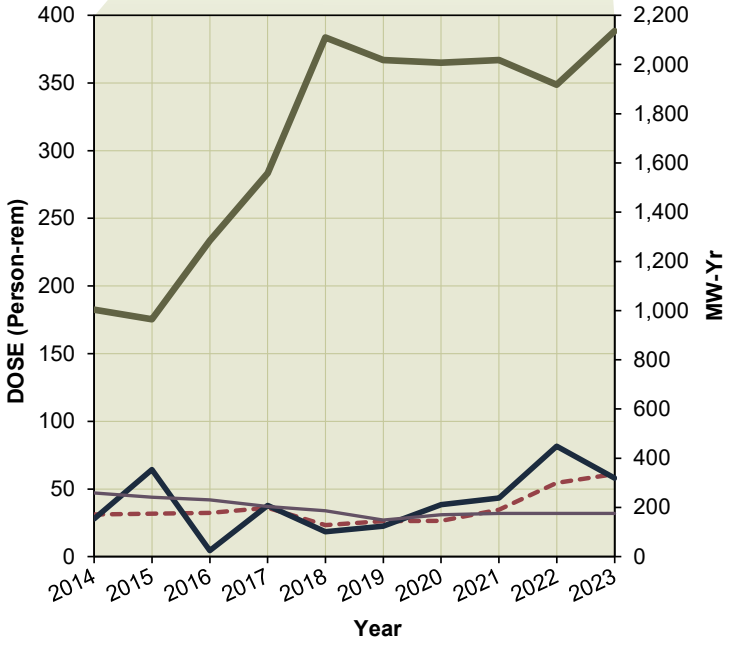


WATTS BAR 1, 2

Dose Performance Trends

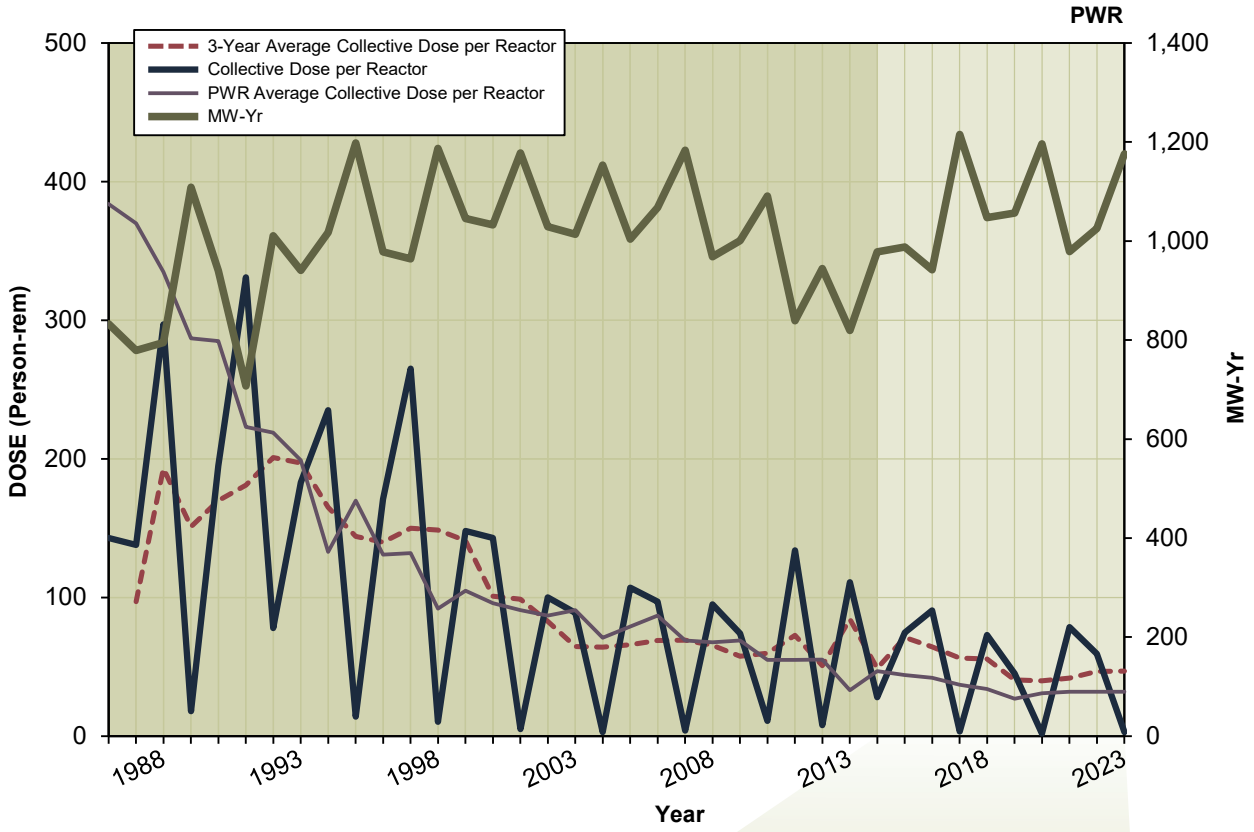


Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	31.221	28.000	1,003.4
2015	31.735	64.320	964.5
2016	32.359	4.489	1,284.1
2017	36.120	37.836	1,558.2
2018	23.416	18.460	2,110.1
2019	26.268	22.509	2,018.4
2020	26.460	38.410	2,007.9
2021	34.748	43.325	2,018.8
2022	54.472	81.681	1,918.2
2023	61.029	58.080	2,135.8

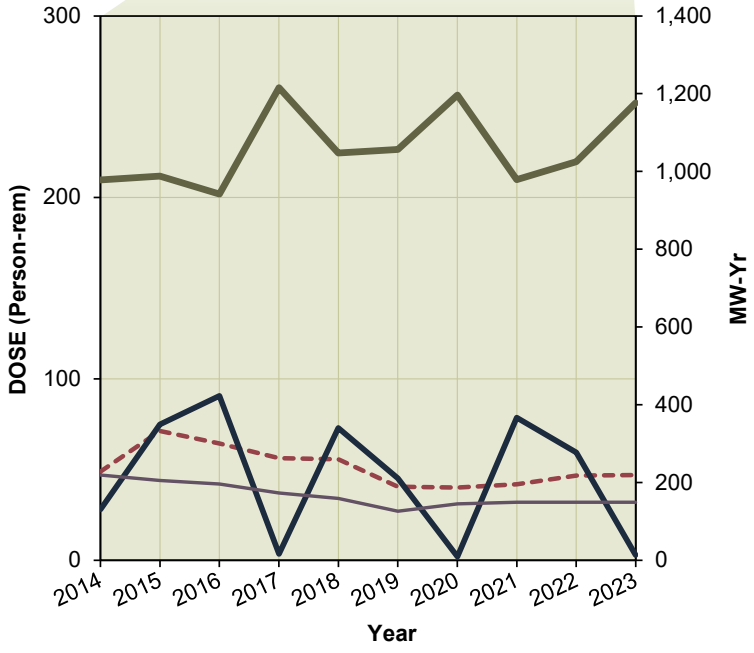


WOLF CREEK 1

Dose Performance Trends



Year	3-Year Average Collective Dose per Reactor	Collective Dose per Reactor	MW-Yr
2014	48.882	28.000	978.2
2015	71.187	74.804	987.9
2016	64.312	90.631	942.0
2017	56.291	3.437	1,215.5
2018	55.650	72.882	1,047.5
2019	40.501	45.183	1,056.6
2020	39.996	1.924	1,196.6
2021	41.919	78.650	978.9
2022	46.634	59.328	1,025.3
2023	46.954	2.884	1,176.0



APPENDIX E

PLANTS NO LONGER IN OPERATION

2023

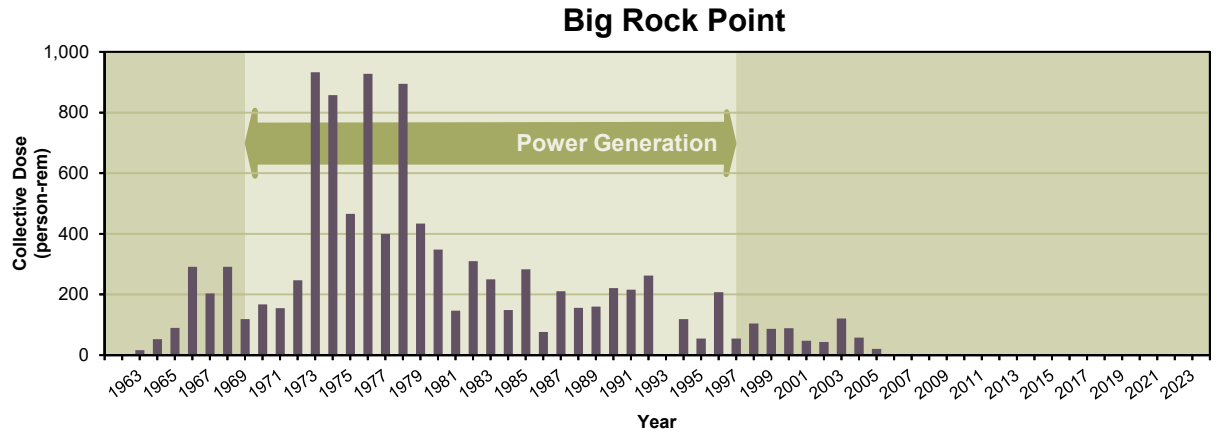
Information in this appendix was obtained from References 20, 22, and 23.

PLANTS NO LONGER IN OPERATION 2023

Big Rock Point

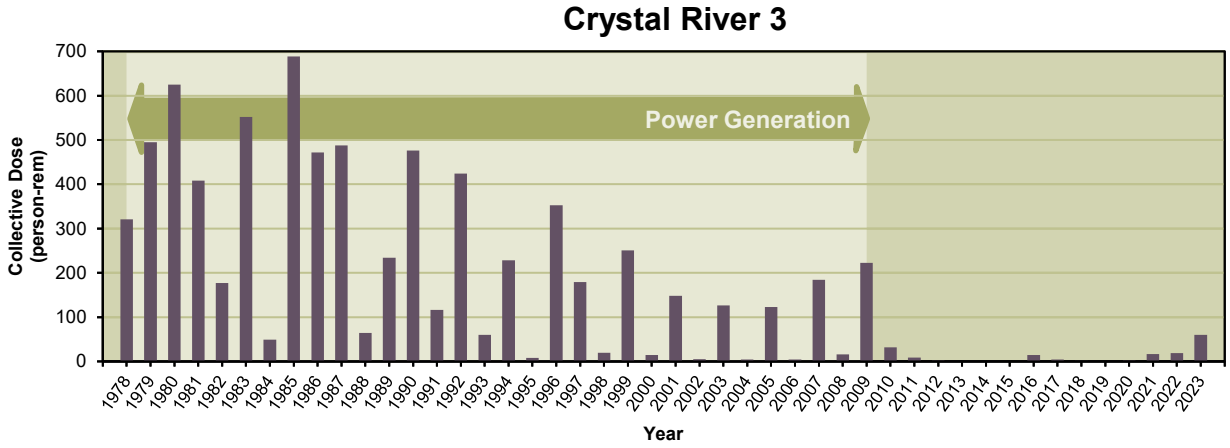
Big Rock Point (BRP) was a boiling-water reactor rated at 75 megawatts electric (MWe), designed by General Electric Company and owned by Consumers Energy Company. BRP was permanently shut down on August 29, 1997, and fuel was transferred to the spent fuel pool by September 20, 1997. The site completed decommissioning to a “green field” status. BRP will retain its license under Title 10 of the Code of Federal Regulations (10 CFR) Part 50, “Domestic Licensing of Production and Utilization Facilities,” until the fuel is removed from the independent spent fuel storage installation (ISFSI).

All fuel was transferred to the ISFSI by March 2003. After fuel is removed from the site to a U.S. Department of Energy (DOE) facility, the ISFSI will be decommissioned and the 10 CFR Part 50 license terminated.



Crystal River 3

Crystal River Nuclear Generating Plant (Crystal River), Unit 3, was a 2,609 megawatt-thermal (MWt), pressurized-water reactor that was licensed to operate from December 1976 to February 20, 2013. During a refueling outage that started on September 26, 2009, Crystal River Unit 3 replaced the steam generators (SGs), requiring a large hole to be made in the containment building structure. In the attempt to restore the containment structure following the SG replacement, damage to the containment structure was observed. The licensee attempted to repair the damage, but later decided to decommission the reactor.



The licensee submitted the original Crystal River Unit 3 postshutdown decommissioning activities report (PSDAR), including the site-specific cost estimate, on December 2, 2013, describing a safe storage (SAFSTOR) strategy for decommissioning the plant. The plant began construction of an ISFSI in 2016 and began loading fuel in summer 2017. Fuel transfer to the ISFSI was completed in January 2018.

The U.S. Nuclear Regulatory Commission (NRC) approved the transfer of the Crystal River Unit 3 license from Duke Energy Florida, LLC, to Accelerated Decommissioning Partners-CR3, LLC (ADP-CR3), on April 10, 2020, and issued the associated conforming amendments on October 1, 2020.

To support the license transfer, ADP-CR3 submitted a revised PSDAR to the NRC on June 26, 2019. On December 12, 2022, ADP-CR3 submitted a license amendment request (LAR) to add a license condition to include the requirements of a license termination plan (LTP) for ADP-CR3. The NRC staff accepted the LAR on July 25, 2023, and is currently conducting a technical review of the LAR.

The estimated date for closure is 2037.

Dresden Unit 1

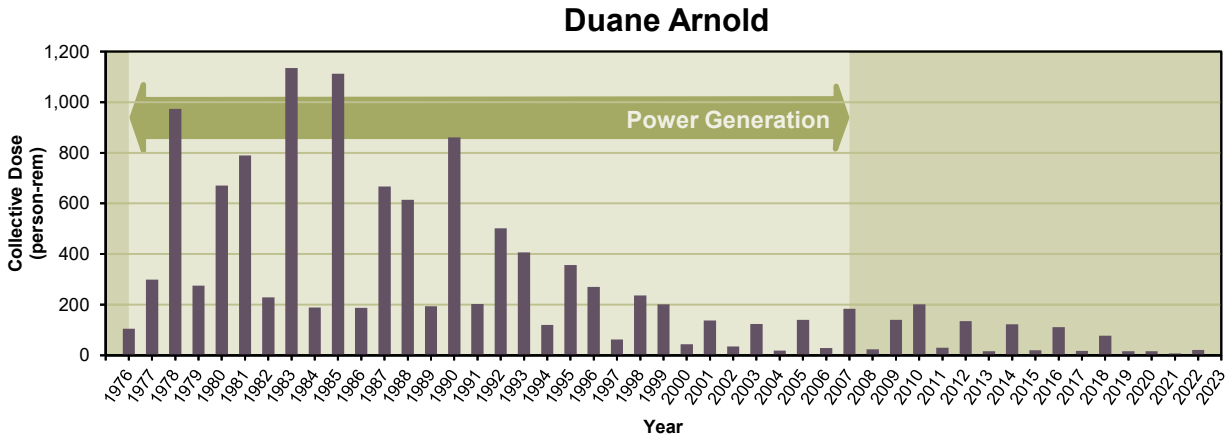
Dresden Generating Station, Unit 1, produced power commercially from August 1, 1960, to October 31, 1978, and is now designated a Nuclear Historic Landmark by the American Nuclear Society. Dresden Unit 1 was shut down on October 31, 1978, and is currently in SAFSTOR. The NRC approved the decommissioning plan (DP) in September 1993.

During the SAFSTOR period, through 2027, the Dresden Unit 1 facility will be subject to periodic inspection and monitoring. The licensee plans that the decontamination and dismantlement (DECON) of Dresden Unit 1 will take place from 2029 through 2031. A 4-year site restoration delay will follow the major DECON of Dresden Unit 1 to allow for the DECON of Units 2 and 3, with completion of these activities tentatively planned for 2035. Site restoration will be conducted in 2035 and 2036, concluding with a final site survey in late 2036. The licensee will monitor the Dresden ISFSI complex with site security and periodic inspections until final transfer of the spent fuel to the DOE.

Duane Arnold

The Duane Arnold Energy Center (DAEC) was a 1,912 MWt boiling-water reactor that began operation in February 1975 and is owned and operated by NextEra Energy Duane Arnold, LLC (NextEra). DAEC had stated its intention to permanently cease power operations in October 2020, but the reactor permanently shut down on August 10, 2020, when a derecho (a land-based hurricane) damaged non-safety-related portions of the plant, including the cooling towers.

By letter dated October 12, 2020, NextEra certified that all fuel had been removed from the reactor. NextEra submitted the DAEC PSDAR to the NRC on April 2, 2020. In the PSDAR, NextEra stated its intention to move all of the spent nuclear fuel into dry cask storage and put the plant into SAFSTOR, starting full decommissioning of the facility in 2075.



Fermi Unit 1

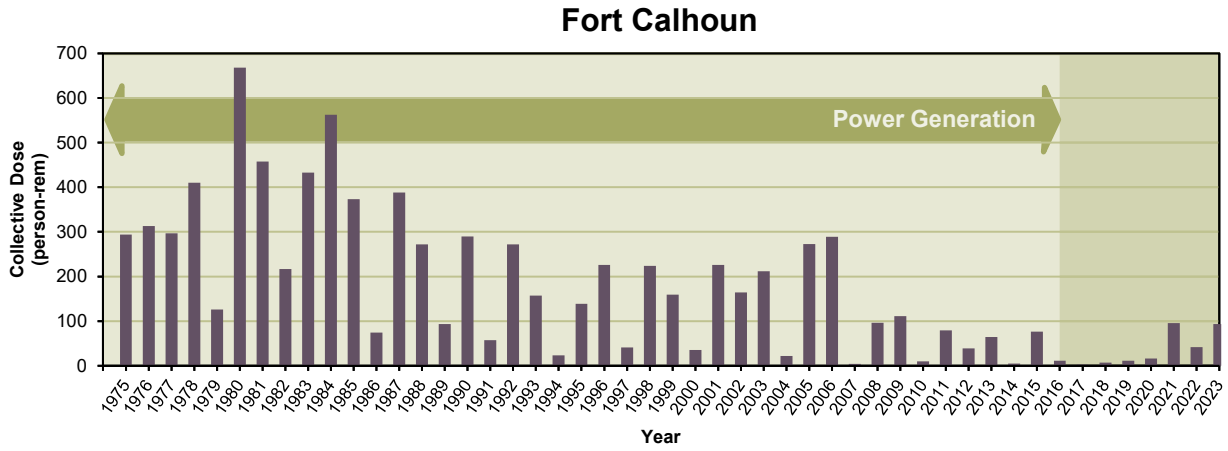
The Enrico Fermi Atomic Power Plant, Unit 1, was a fast breeder reactor power plant cooled by sodium and operated at essentially atmospheric pressure. The reactor plant was designed for a maximum capacity of 430 megawatts (MW); however, the maximum reactor power was 200 MW. The primary system was filled with sodium in December 1960, and criticality was achieved in August 1963. The reactor was tested at low power in the first few years of operation.

Power ascension testing above 1 MW began in December 1965, immediately following receipt of the high-power operating license. In October 1966, during power ascension, a zirconium plate at the bottom of the reactor vessel became loose and blocked sodium coolant flow to some fuel subassemblies. Two subassemblies started to melt. Radiation monitors alarmed, and the operators manually shut down the reactor. No abnormal releases to the environment occurred. Three years and nine months later, the cause had been determined, cleanup was completed, and fuel was replaced; Fermi Unit 1 was restarted. In 1972, the core was approaching the burnup limit. In November 1972, the Power Reactor Development Company decided to decommission Fermi Unit 1.

The fuel and blanket subassemblies were shipped off site in 1973. The nonradioactive secondary sodium system was drained, and the sodium was sent to Fike Chemical Company. The radioactive primary sodium was stored in storage tanks and in 55-gallon drums until the sodium was shipped off site in 1984. Decommissioning of the majority of the Fermi 1 plant was originally completed in December 1975. The licensee submitted a revised LTP in March 2010, and the NRC staff completed an expanded acceptance review of the revised LTP for Fermi Unit 1. The facility is in safe storage. There is no spent fuel onsite. Bulk sodium has been removed from the site, and the reactor vessel, primary system piping, and major components have been removed. The license for Fermi Unit 1 expires in 2032, and the estimated date for closure is 2032.

Fort Calhoun

Fort Calhoun Station was a 1,500 MWt, pressurized-water reactor that began operation in 1973 and is owned by the Omaha Public Power District (OPPD). The reactor was permanently shut down on October 24, 2016. By letter dated November 13, 2016, OPPD certified that it had removed all the fuel from the reactor.



In December 2019, OPPD formally changed its decommissioning strategy for Fort Calhuon from SAFSTOR to DECON with the submission of a revised PSDAR. Fuel transfer to the ISFSI was completed in May 2020, and the site has transitioned to ISFSI-only security plans, emergency plans, and technical specifications. Active decommissioning is ongoing, and release of the reactor operations area and the bulk of the site, except the ISFSI area, is now expected to occur in 2026. The revised PSDAR explains that the spent nuclear fuel that is stored on site will remain until 2058 when it is expected to be transferred to the DOE and removed from the site. Decommissioning of the ISFSI and restoration of the site is planned to be completed in 2059.

In June 2018, the licensee asked to release a nonimpacted part of its site from the 10 CFR Part 50 license for unrestricted use. The NRC approved the request in April 2019.

In August 2021, OPPD submitted its LTP.

GE Hitachi ESADA Vallecitos Experimental Superheat Reactor

On April 15, 1970, the NRC authorized the licensee, General Electric-Hitachi (GEH), to possess but not operate the reactor. The license was renewed on June 11, 1976, and remains in effect under the provisions of 10 CFR 50.51(b). The facility has been maintained in SAFSTOR condition. The facility is next to the Vallecitos Boiling-Water Reactor (VBWR), which is also in SAFSTOR. The licensee plans to maintain the facility in SAFSTOR until other ongoing nuclear and radioactive activities are also to be decommissioned to provide an integrated site decommissioning. In 2015, the licensee requested an exemption from the 60-year decommissioning schedule limit of 10 CFR 50.82(a)(3) so that the entire site could be decommissioned in an integrated fashion. The Commission disapproved the exemption request on August 6, 2021. GEH subsequently withdrew the exemption request by letter dated August 25, 2021. The licensee will begin active decommissioning of the ESADA Vallecitos Experimental Superheat Reactor and plans to terminate the license by 2030.

GE Hitachi Vallecitos Boiling-Water Reactor

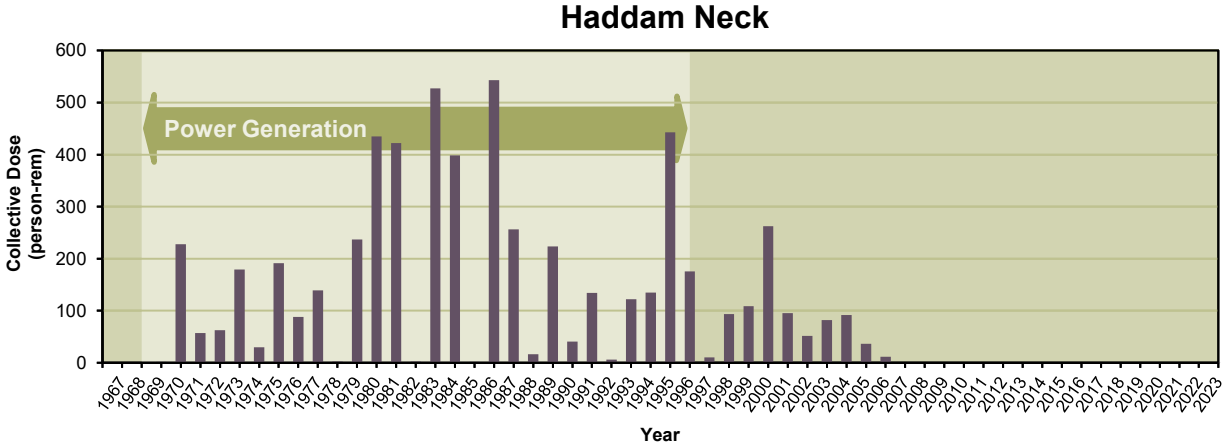
The VBWR was shut down in 1963, and the NRC issued a possession only license in 1965. The license was renewed in 1973 and has remained effective under the provisions of 10 CFR 50.51(b). The facility has been maintained in SAFSTOR condition with a limit of 60 years under 10 CFR 50.82(a)(3). The spent fuel has been removed from the site.

In 2015, GEH requested an exemption for the VBWR from the 60-year decommissioning schedule limit of 10 CFR 50.82(a)(3), which required license termination by 2025. The NRC disapproved the request on August 6, 2021. GEH subsequently withdrew the exemption request on August 25, 2021 and submitted a LTP on September 7, 2023, which is currently under NRC review.

Haddam Neck – Connecticut Yankee

Haddam Neck (Connecticut Yankee Nuclear Power Plant) was a 619 MWe (1,825 MWt) pressurized-water reactor that began commercial operation in December 1974 and ceased power operations in 1996. Decommissioning activities began in May 1998. SGs, reactor coolant pumps, the pressurizer, the reactor vessel, and shield wall blocks from the reactor building were disposed of off site, and demolition of the administration and turbine buildings began in spring 2004. As of March 30, 2005, all spent fuel and greater-than-Class-C waste had been transferred to the ISFSI, which is currently operational.

Decommissioning at Haddam Neck was completed in 2007, and the licensee will retain its license under 10 CFR Part 50 until the fuel is removed from the ISFSI.

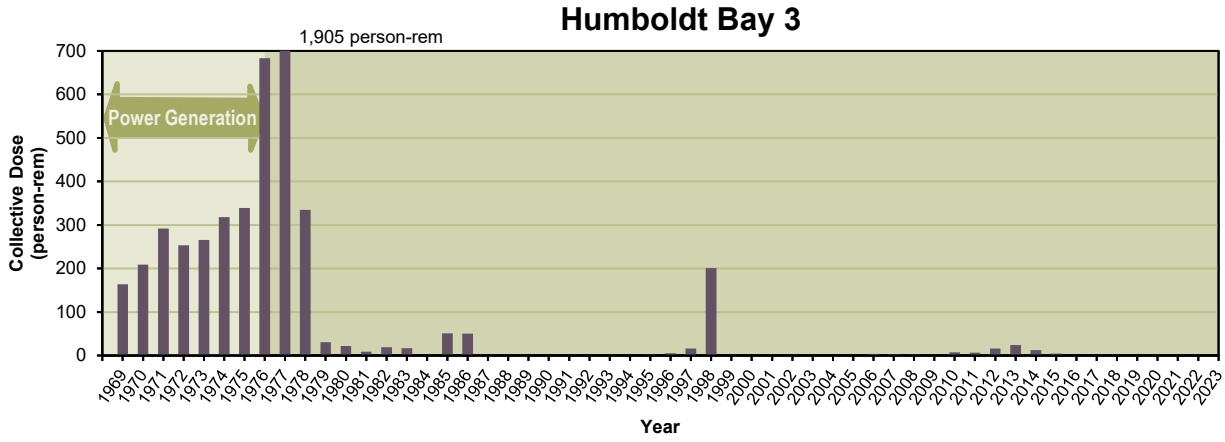


Humboldt Bay Unit 3

Humboldt Bay Power Plant, Unit 3, produced power commercially from August 1, 1963, to July 1976, when it was shut down for annual refueling and to conduct seismic modifications. In 1983, with the plant still shut down, Pacific Gas and Electric Company, the owner of the facility, determined that required seismic modifications and the requirements imposed as a result of the accident at Three Mile Island made continued operations no longer economically feasible and decided to decommission the plant. The NRC approved the licensee's DP in July 1988.

The licensee submitted a PSDAR in February 1998 and has begun incremental decommissioning activities. In December 2003, the licensee submitted an ISFSI application to the NRC. Humboldt Bay was to have unique dry cask storage because of the short length of its fuel assemblies. Moreover, the casks were to be stored below grade to accommodate regional seismicity issues, security concerns, and site boundary dose limits. The NRC issued the ISFSI license on November 18, 2005, and the licensee began constructing the ISFSI in 2007. Following fuel loading into the ISFSI in 2008, the licensee began constructing new combustion units in 2008 and 2009 to replace the old Humboldt Bay fossil Units 1 and 2. Decommissioning

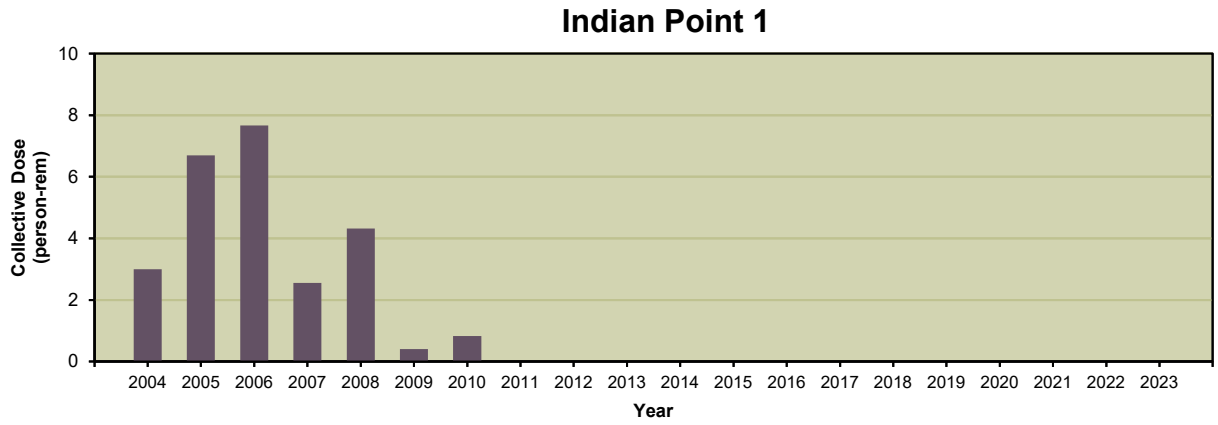
activities at the old fossil Units 1 and 2 were completed in 2013. During this period, decommissioning of Unit 3 began, and Humboldt Bay successfully completed removal of the reactor vessel internals in September 2013. The Humboldt Bay Unit 3 decommissioning status was DECON. The 10 CFR Part 50 license for Humboldt Bay was terminated on November 18, 2021. The ISFSI remains under a separate NRC license under 10 CFR Part 72, “Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater than Class C Waste.”



Indian Point Nuclear Generating Station Unit 1

Indian Point Nuclear Generating Station, Unit 1, produced power commercially from August 1962 to October 1974. Indian Point Unit 1 was shut down on October 31, 1974, because the emergency core cooling system did not meet regulatory requirements. Some decommissioning work associated with spent fuel storage was performed from 1974 through 1978. By January 1976, all spent fuel had been removed from the reactor vessel. The NRC issued the order approving SAFSTOR in January 1996. A PSDAR public meeting took place on January 20, 1999.

By letter dated November 21, 2019, Entergy Nuclear Operations, Inc. (ENOI) requested NRC approval of the direct transfer of Indian Point Energy Center (IPEC), as well as the general license for the IPEC ISFSI, from ENOI to Holtec Decommissioning International, LLC (HDI). On November 23, 2020, the NRC issued an order approving the transfer and draft conforming license amendments and concluded that Holtec and HDI are financially and technically qualified to own and decommission Indian Point and to manage spent fuel at IPEC.

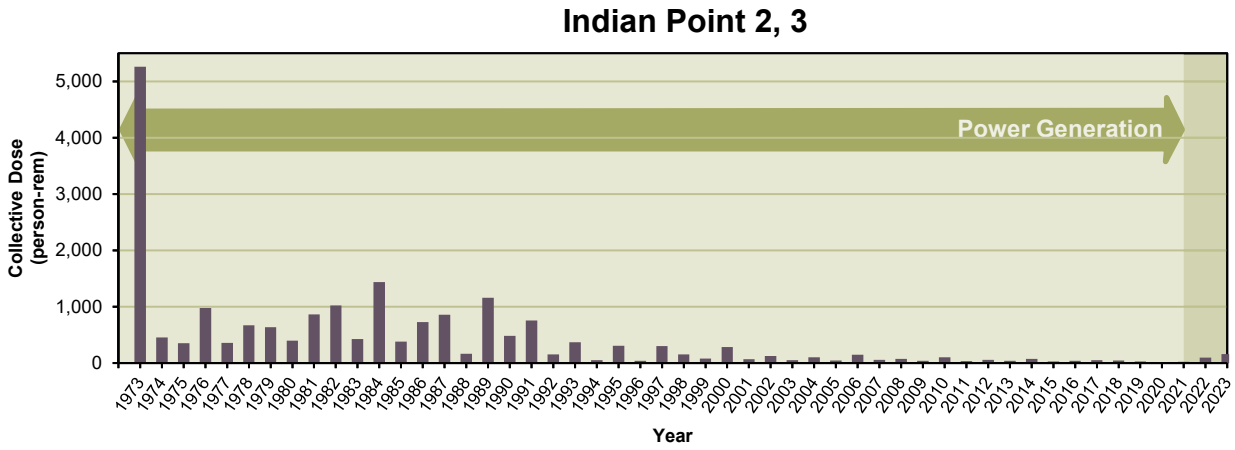


HDI projects that all decommissioning activities, except for decommissioning the ISFSI, will be completed by early 2032 and expects to complete transfer of spent fuel to the ISFSI by the end of 2023. License termination is estimated for 2062.

Indian Point Generating Station Units 2 and 3

Indian Point Unit 2 produced power commercially from August 1974 to April 2020. Power operations ceased at Indian Point Unit 2 on April 30, 2020, and the fuel was permanently removed from the reactor vessel and placed in the spent fuel pool on May 12, 2020. Indian Point Unit 3 produced power commercially from August 1976 to April 2021. Power operations ceased at Indian Point Unit 3 on April 30, 2021, and the fuel was permanently removed from the reactor vessel and placed in the spent fuel pool on May 11, 2021.

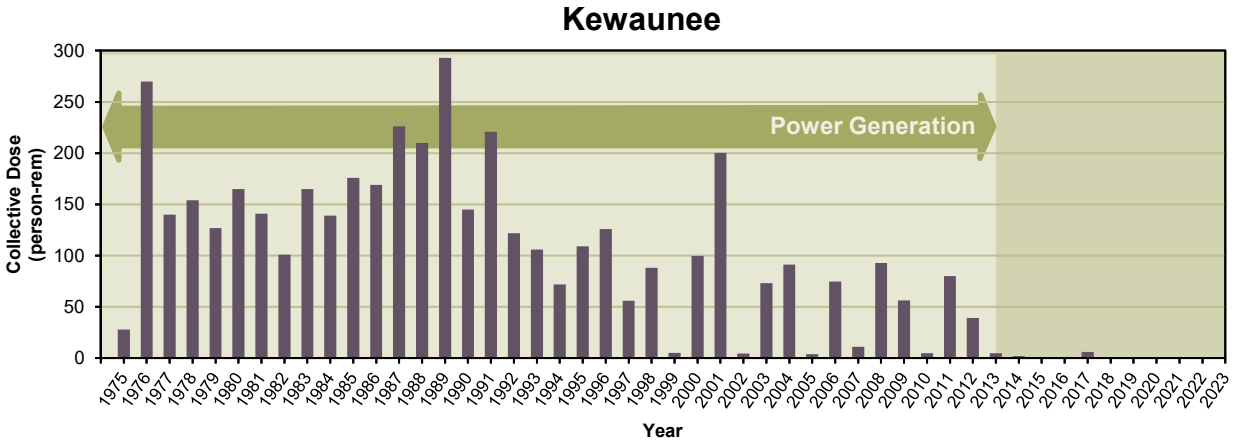
On November 21, 2019, Entergy and Holtec submitted a license transfer application requesting NRC approval to transfer the Indian Point facility operating licenses for Units 1, 2, and 3, as well as the general license for the ISFSI, to Holtec, as the licensed owner, and to HDI, as the licensed operator. On November 23, 2020, the NRC issued an order approving the transfer and draft conforming license amendments and concluded that Holtec and HDI are financially and technically qualified to own and decommission Indian Point and to manage spent fuel at IPEC. The license transfer was completed in May 2021. A PSDAR public meeting for IPEC was held on July 29, 2021 (in person) and on August 18, 2021 (virtual meeting). License termination is estimated for 2062.



Kewaunee

Kewaunee Power Station was a 1,772 MWt pressurized-water reactor that was licensed to operate from December 1973 to May 2013.

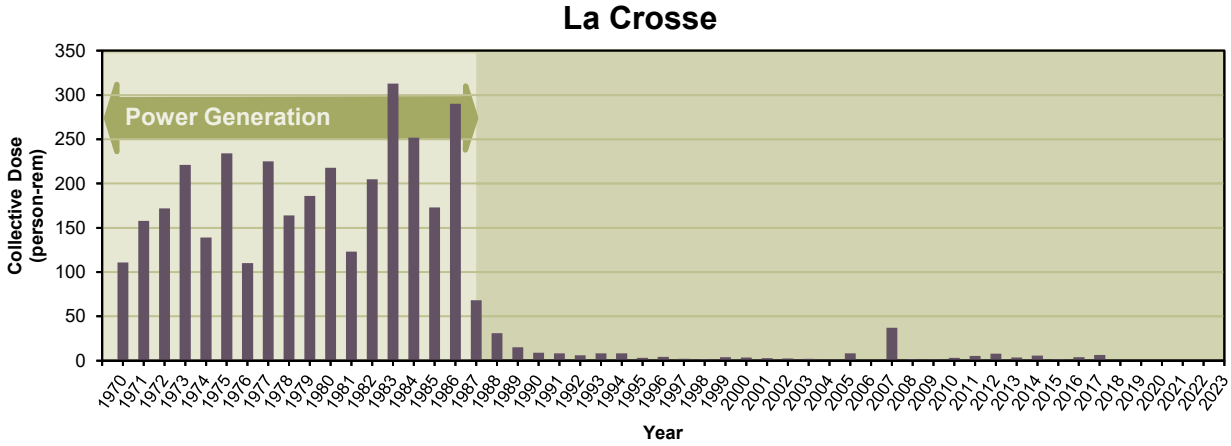
Dominion initially placed Kewaunee in the NRC's SAFSTOR status for deferred decommissioning. In 2021, however, the company agreed to have Utah-based EnergySolutions acquire the plant and its license for accelerated decommissioning. The NRC approved the transfer of the license to EnergySolutions' subsidiary Kewaunee Solutions, through an order in March 2022, and the sale was finalized on June 28, 2022. On June 28, 2022, Kewaunee was transitioned from SAFSTOR to the NRC's DECON status. Major decommissioning and dismantlement activities began in 2022 and are scheduled to end by 2055, including the decommissioning of the onsite ISFSI.



La Crosse

The La Crosse Boiling-Water Reactor (LACBWR) produced power commercially starting on November 1, 1969. The plant was one of a series of demonstration plants funded, in part, by the U.S. Atomic Energy Commission (AEC). The nuclear steam supply system and its auxiliaries were funded by the AEC, and the balance-of-plant equipment was funded by the Allis-Chalmers Company. The AEC later sold the plant to Dairyland Power Cooperative (DPC) and gave it a provisional operating license. LACBWR was shut down on April 30, 1987, and the NRC approved its DP on August 7, 1991.

Because the NRC approved DPC's DP before August 28, 1996 (the effective date of an NRC final rule concerning reactor decommissioning (61 FR 39278; July 29, 1996)), the DP is considered the PSDAR for LACBWR (see 10 CFR 50.82, "Termination of License"). The PSDAR public meeting took place on May 13, 1998, and subsequent updates to the LACBWR decommissioning report have combined the DP and PSDAR into the "LACBWR Decommissioning Plan and Post-Shut down Decommissioning Activities Report." DPC constructed an onsite ISFSI and completed the movement of all 333 spent nuclear fuel elements from the fuel element storage well to dry cask storage at the ISFSI by September 19, 2012.



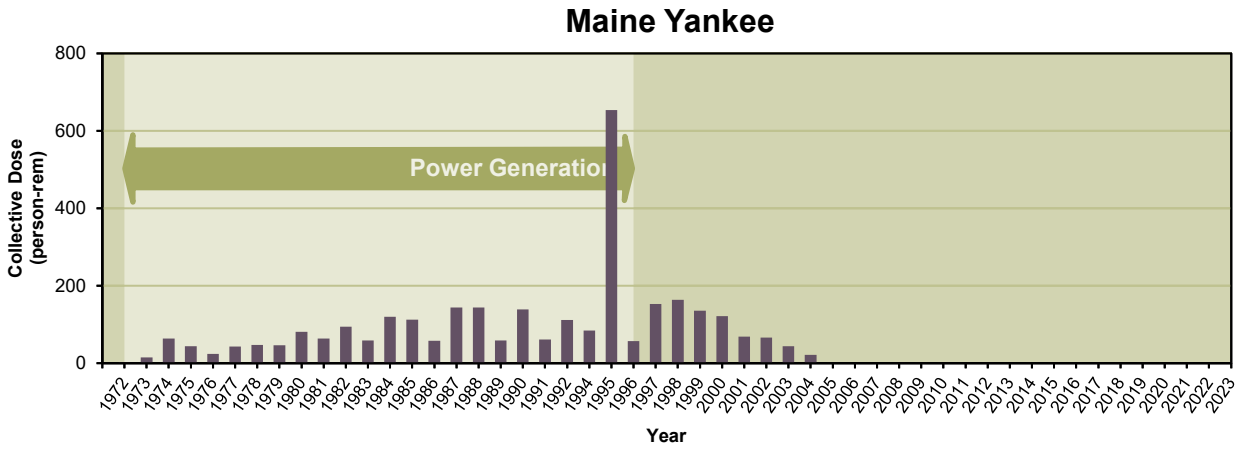
By order dated May 20, 2016, the NRC approved the direct transfer of Possession Only License No. DPR-45 for LACBWR from DPC to LaCrosse Solutions, LLC (LS), a wholly owned subsidiary of EnergySolutions, LLC. The order was published in the Federal Register on June 2, 2016 (81 FR 35383). The transfer assigns DPC's licensed possession, maintenance,

and decommissioning authorities for LACBWR to LS to expedite decommissioning at the LACBWR site. The LTP for LACBWR was submitted on June 27, 2016. The staff issued the LTP amendment, safety evaluation, and environmental assessment on May 21, 2019. On September 24, 2019, the NRC approved an order that allows the LACBWR license to be transferred back to DPC upon completion of decommissioning at the site and termination of the 10 CFR Part 50 license outside of the ISFSI. Final license termination activities at LACBWR have been completed and the 10 CFR Part 50 license outside of the ISFSI boundary was terminated in 2023 and the site released for unrestricted public use. The license transfer to DPC is expected to follow.

Maine Yankee

Maine Yankee Nuclear Power Plant was an 860 MWe pressurized-water reactor that started commercial power operations in June 1973. The Maine Yankee plant was shut down on December 6, 1996. Certification of permanent cessation of operations was submitted on August 7, 1997. The PSDAR was submitted on August 27, 1997, and the NRC approved the LTP on February 28, 2003.

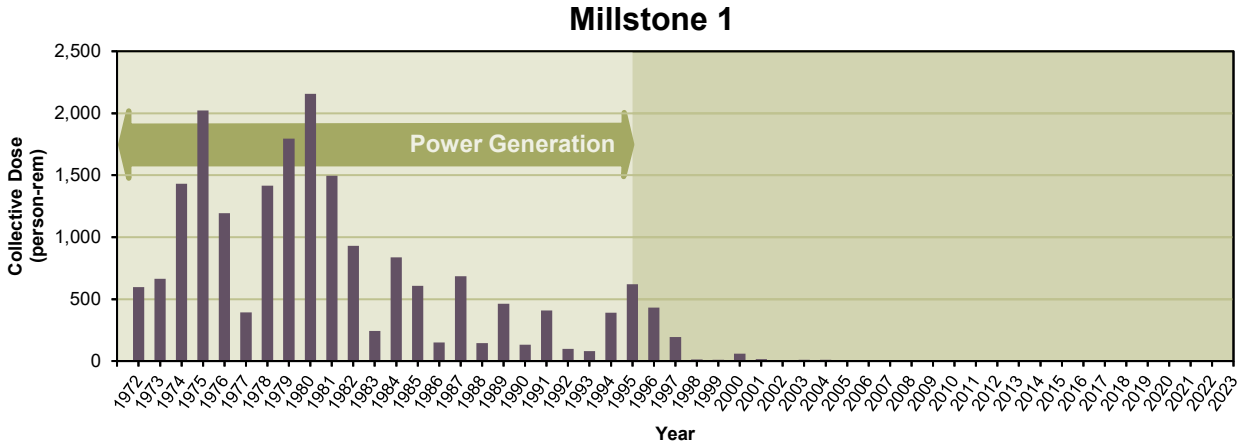
In 2003, the reactor pressure vessel was shipped to Barnwell, South Carolina by barge. Spent nuclear fuel and greater-than-Class-C waste were transferred to the onsite ISFSI between August 2002 and February 2004. Decommissioning was completed in June 2005, and Maine Yankee will retain its 10 CFR Part 50 license until the fuel is removed from the ISFSI.



Millstone Unit 1

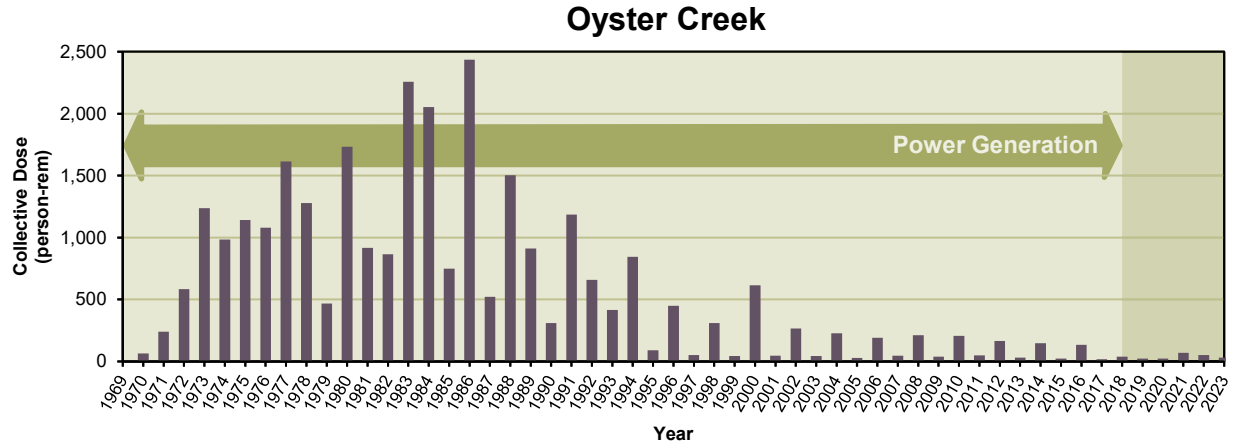
Millstone Power Station, Unit 1, produced power commercially from December 28, 1970, to November 4, 1995. Millstone Unit 1 was a single-cycle, boiling-water reactor with a reactor thermal output of 2,011 MW and a net electrical output of 652.1 MW. The unit was shut down on November 4, 1995. On July 21, 1998, pursuant to 10 CFR 50.82(a)(1)(i) and 10 CFR 50.82(a)(1)(ii), the licensee certified to the NRC that, as of July 17, 1998, Millstone Unit 1 had permanently ceased operations and that fuel had been permanently removed from the reactor vessel. The owner of the facility submitted its PSDAR to the NRC on June 14, 1999, which included a combination of DECON and SAFSTOR options. After a formal assessment of spent fuel storage options in 2007, the licensee concluded that it would keep the Millstone Unit 1 fuel in the spent fuel pool, in a SAFSTOR status, until 2048 rather than move the fuel to an ISFSI.

Safety-related structures, systems, and components and those important to safety remaining at Millstone Unit 1 are associated with the spent fuel pool island where the spent fuel is stored. Besides nonessential systems that support the balance-of-plant facilities, the remaining plant equipment has been deenergized, disabled, or removed from the unit and can no longer be used for power generation. Irradiated reactor vessel components have been removed. The reactor cavity and vessel have been drained, and a radiation shield has been installed to limit occupational radiation doses to workers. Currently, the licensee has estimated 2056 for completion of all decommissioning activities and the estimated closure date of this site.



Oyster Creek

Oyster Creek Nuclear Generation Station produced power commercially from December 1969, to September 17, 2018. Oyster Creek was a 1,930 MWt single-cycle, boiling-water reactor with a net electrical output of 619 MW. The unit was shut down on September 17, 2018. By letter dated September 25, 2018, Exelon Generation Company, prior owner of the facility, certified that all fuel had been removed from the reactor. In the PSDAR submitted to the NRC on May 21, 2018, Exelon stated its intention to move all of the spent nuclear fuel into dry cask storage by the end of 2024 and put the plant into SAFSTOR until it is ready to fully decommission the facility starting in 2075. License termination is scheduled to take place by 2078 and site restoration by 2080. The PSDAR meeting took place on July 17, 2018.



On August 31, 2018, Exelon and Holtec submitted a license transfer application requesting NRC approval to transfer the Oyster Creek renewed facility operating license and the general license for the Oyster Creek ISFSI to Oyster Creek Environmental Protection, LLC (OCEP), as the licensed owner, and to HDI, as the licensed operator. The NRC issued an order for the transfer to OCEP (as the licensed owner) and HDI (as the licensed operator) in June 2019, and the transfer was completed in July 2019. Partial site release (except for the ISFSI) is scheduled for 2025, and license termination would take place by 2035.

Palisades

Palisades Nuclear Plant (PNP) was a 2,565 MWt single unit pressurized water reactor that operated from March 1971 to its final shutdown on May 20, 2022. By letter dated June 13, 2022, Entergy Nuclear Palisades certified that all fuel had been removed from the reactor. On June 28, 2022, the operating license for PNP was transferred from Entergy to HDI for the purpose of decommissioning the plant.

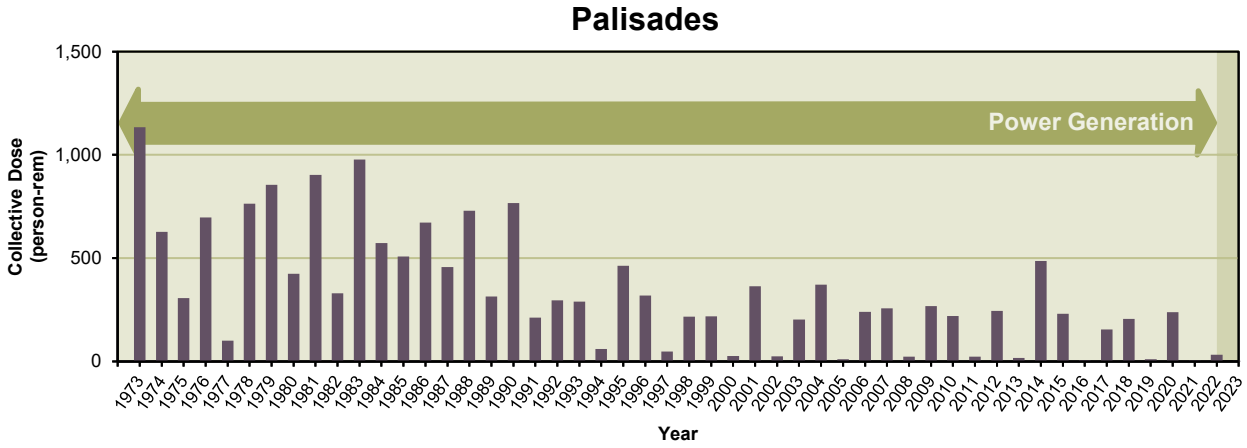
First of a Kind Effort to Restart a Shuttered Plant

PNP permanently ceased operations on May 20, 2022, after more than 40 years of commercial operation. In early 2023, Holtec, the licensee for PNP expressed an interest in returning the plant to an operational status.

This effort will involve Holtec explaining how it will (1) return plant components to a status that supports safe operation, (2) restore the licensing basis of the plant to an operational status, and (3) make any upgrades necessary to meet current NRC requirements.

The NRC staff will carefully review the regulatory and licensing documents for the plant, inspect new and restored components necessary to operate safely, and continue ongoing oversight to ensure sufficiency of all plant systems and programs.

To provide oversight of this effort, the NRC has established the Palisades Nuclear Plant Restart Panel, which will guide the staff plans to review, inspect, and confirm that PNP is ready to be returned to an operating facility. The restart panel will help coordinate licensing, inspection, and oversight activities across the agency to ensure that all aspects of the PNP restart project are meeting the NRC's safety, security, and environmental requirements.



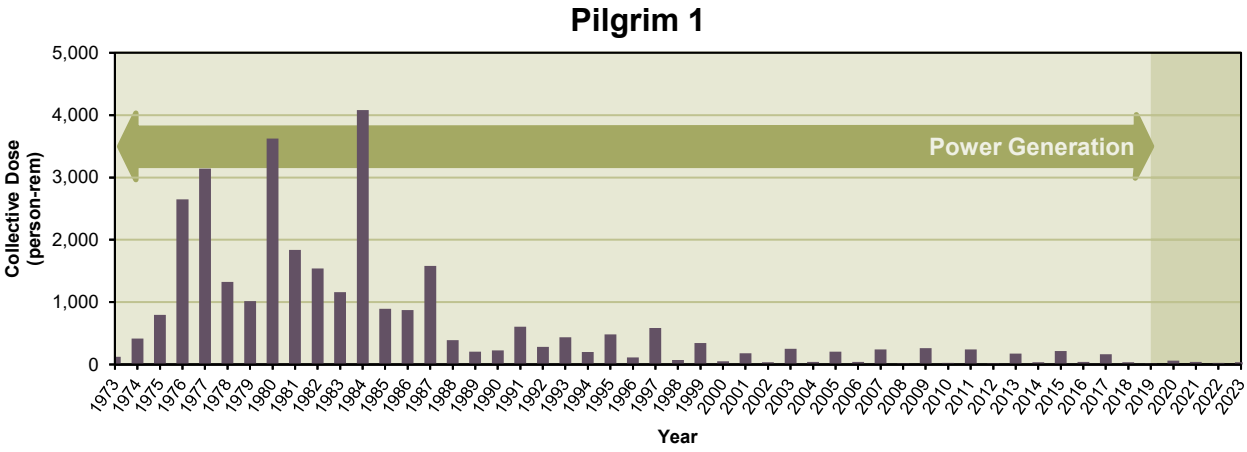
Peach Bottom 1

Peach Bottom Atomic Power Station, Unit 1, was a 200 MWt, high-temperature, gas cooled reactor that operated from June 1967 until its final shut down on October 31, 1974. All spent fuel has been removed from the site, and the spent fuel pool is drained and decontaminated. The reactor vessel, primary system piping, and SGs remain in place. The facility is currently in a SAFSTOR condition. Final decommissioning is not expected until 2034, when Units 2 and 3 are scheduled to shut down.

Pilgrim 1

Pilgrim Nuclear Power Station was a 670 MWe three-cycle, boiling-water reactor with a reactor thermal output of 2,028 MWt. The unit was shut down permanently by Entergy on May 31, 2019, after providing electricity safely to the region for more than 46 years.

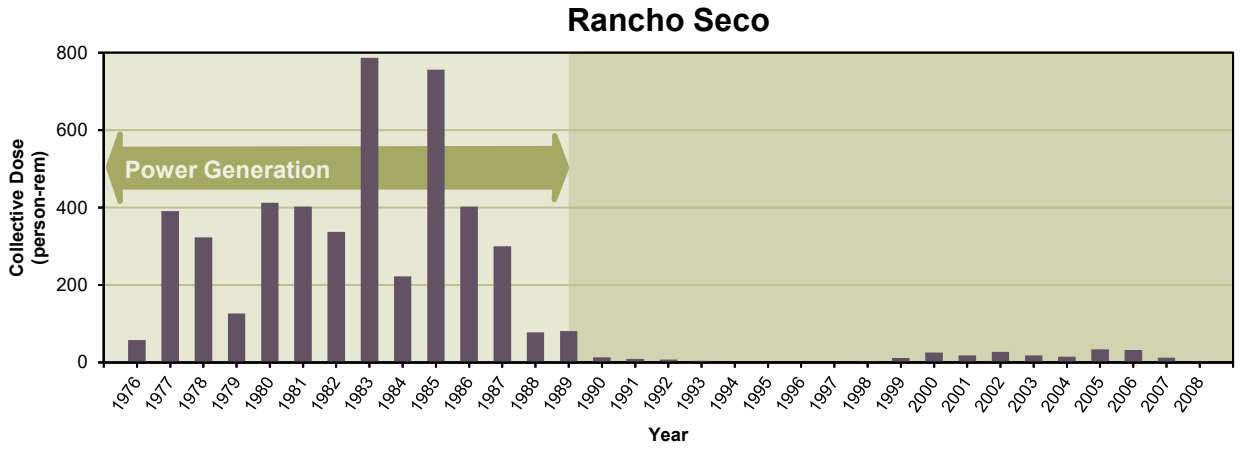
In August 2019, Pilgrim was purchased by Holtec International in a deal that allowed the site to enter immediate decommissioning. The deal enables decommissioning and site release for alternate uses decades sooner than previously anticipated. At the end of July 2020, HDI completed Phase I of its spent fuel transfer campaign. The licensee subsequently built a new ISFSI to hold all the Pilgrim spent fuel casks; ISFSI-II is currently in operation and all Pilgrim spent fuel and greater-than-Class C waste is stored there as of the end of 2021.



The NRC continues its oversight to ensure the reactor is being decommissioned safely and that spent fuel is safely and securely stored onsite. The NRC staff will periodically inspect operations at the site, including the ISFSI, to ensure that decommissioning activities are being conducted in accordance with all applicable regulations and commitments.

Rancho Seco

Rancho Seco Nuclear Generating Station was a 913 MW pressurized-water reactor owned by the Sacramento Municipal Utility District. Rancho Seco permanently shut down in June 1989, after approximately 15 years of operation. The licensee was granted a site specific 10 CFR Part 72 license for an onsite ISFSI on June 30, 2000. The owner completed transfer of all the spent nuclear fuel to the Rancho Seco ISFSI in August 2002. Rancho Seco completed



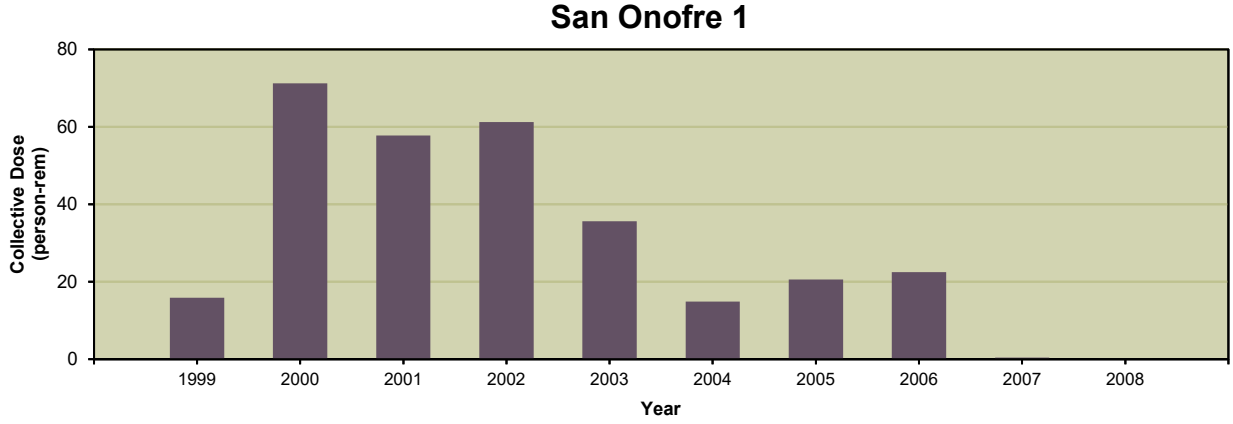
decommissioning of the former reactor site in 2009, and the site was released with the exception of a 6-acre ISFSI site and a class B and C waste storage building. This waste building was decommissioned in 2017, and the 10 CFR Part 50 license was terminated on August 31, 2018. The ISFSI is still in operation.

San Onofre Unit 1

San Onofre Nuclear Generating Station (SONGS), Unit 1, operated by Southern California Edison (SCE), produced power commercially from January 1, 1968, to November 30, 1992.

SONGS Unit 1 was a Westinghouse three-loop, pressurized-water reactor with a reactor thermal output of 1,347 MW.

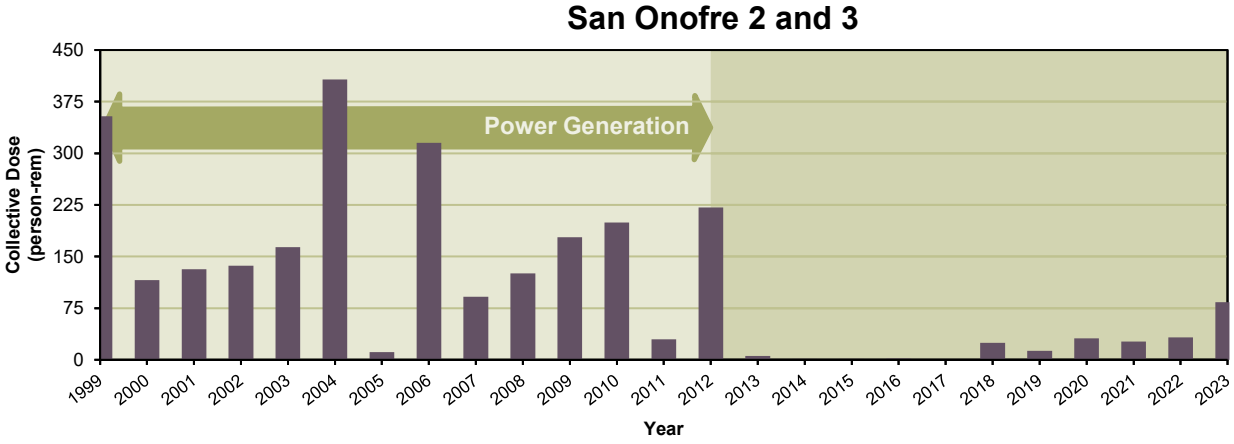
Defueling of SONGS Unit 1 was completed on March 6, 1993, and the NRC approved the permanently defueled technical specifications on December 28, 1993. On November 3, 1994, SCE submitted a proposed DP to place SONGS Unit 1 in SAFSTOR until the shutdown of SONGS Units 2 and 3. However, on December 15, 1998, SCE submitted the PSDAR for SONGS Unit 1 to begin decontamination in 2000. Unit 1 decommissioning is complete, except for subsurface foundations. The expanded ISFSI, to store Unit 2 and Unit 3 spent fuel, was built on top of the area where Unit 1 was located. The licensee transferred SONGS-1 spent fuel to an onsite generally licensed ISFSI. SONGS Unit 1 will not be completely decommissioned until after the ISFSI is decommissioned.



In February 2010, the NRC staff issued a license amendment to release offshore portions of the SONGS Unit 1 cooling intake and outlet pipes for unrestricted use. The fuel from Unit 1 was transferred to Phase 1 of the ISFSI. In 2015, the ISFSI was expanded onto the area previously occupied by SONGS Unit 1 to store all Unit 2 and Unit 3 spent fuel. SCE completed transferring all the nuclear fuel to dry storage in 2020. The Unit 1 reactor pressure vessel was transported by rail and then highway to the Energy Solutions disposal facility in Clive, Utah. The shipment left San Onofre on May 24, 2020 and arrived at the disposal facility on July 14, 2020.

San Onofre Units 2 and 3

SONGS Units 2 and 3, operated by SCE, are Combustion Engineering 1,127 MWe pressurized-water reactors, which were granted Facility Operating Licenses NPF 10 on February 16, 1982, and NPF-15 on November 15, 1982, respectively. SONGS Units 2 and 3 generated power commercially from 1984 to 2012. In June 2013, pursuant to 10 CFR 50.82(a)(1)(i), the licensee certified to the NRC that as of June 7, 2013, operations had ceased at SONGS Units 2 and 3. The licensee subsequently certified, pursuant to 10 CFR 50.82(a)(1)(ii), that all fuel had been removed from the reactor vessels of both units and committed to maintaining the units in a permanently defueled status. Therefore, pursuant to 10 CFR 50.82(a)(2), SCE's 10 CFR Part 50 licenses no longer authorize operation of SONGS or emplacement or retention of fuel into the reactor vessels. The licensee is still authorized to possess and store irradiated nuclear fuel. Irradiated fuel is currently being stored on site in dry casks at an ISFSI.



The PSDAR for SONGS Units 2 and 3, was submitted on September 23, 2014, and the associated public meeting took place on October 27, 2014, in Carlsbad, California. The NRC confirmed its review of the PSDAR and addressed public comments in a letter dated August 20, 2015. On May 7, 2020 (Agencywide Documents Access and Management System Accession No. ML20136A339), SCE provided updates to the PSDAR and irradiated fuel management plan for the SONGS Units 2 and 3 in accordance with 10 CFR 50.82(a)(7). In its letter, SCE indicated that, since the initial submittal of these plans in 2014, it has selected vendors to implement the decommissioning of SONGS Units 2 and 3, expanded the SONGS ISFSI installation, and made other decommissioning process decisions. As a result, SCE updated the PSDAR and irradiated fuel management plan for SONGS Units 2 and 3. On September 24, 2020 (ML20267A526), the NRC found the reviewed PSDAR acceptable. The licensee plans on submitting an LTP in 2025.

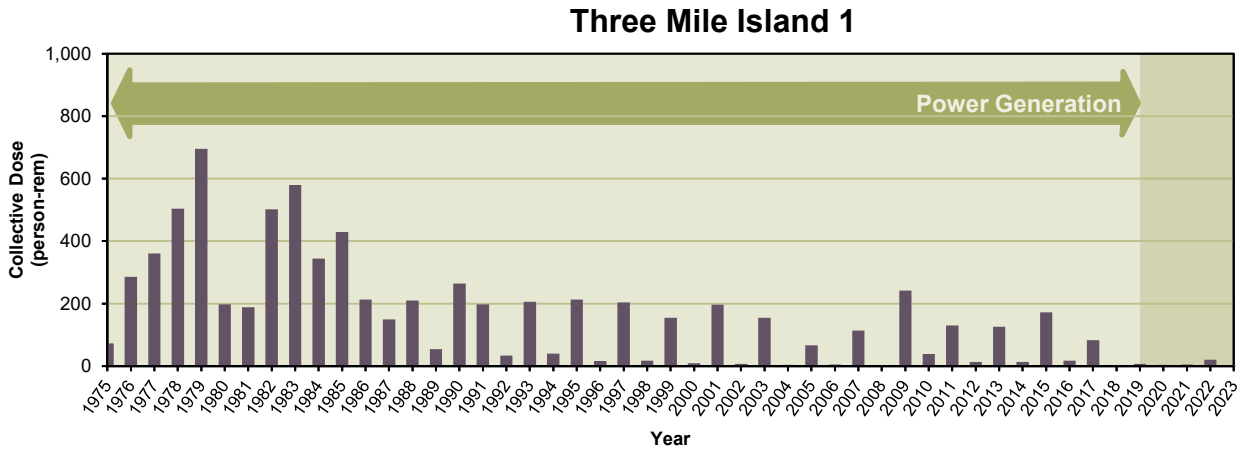
On July 17, 2015, the NRC approved the permanently defueled technical specifications for SONGS Units 2 and 3. It is estimated that all decommissioning activities for SONGS Units 2 and 3, except for the ISFSI, will be completed in 2031. The licensee will retain its 10 CFR Part 50 license for SONGS Units 2 and 3 until the fuel is removed from the ISFSI, the ISFSI is decommissioned, and the ISFSI license termination is approved.

Savannah, Nuclear Ship

The Nuclear Ship (NS) Savannah was removed from service in 1970, and the fuel was taken from the ship in October 1971. The American Nuclear Society has designated the ship a national historic landmark. The NS Savannah is berthed in Baltimore, Maryland. Major dismantlement and decommissioning began in fall 2022 with the removal of the ship's reactor pressure vessel. The licensee submitted a LTP on October 23, 2023. The NRC staff accepted the plan and a related LAR for formal review in a letter dated December 15, 2023.

Three Mile Island Unit 1

Three Mile Island Generating Station (TMI), Unit 1, was a 776 MWe three-loop pressurized-water reactor with a reactor thermal output of 2,568 MWt. TMI Unit 1 was sold to AmerGen (later Exelon) in 1999 and was permanently shut down on September 20, 2019, leaving a 45-year legacy of safe, reliable, carbon-free electricity generation and service to the community. By letter dated April 5, 2019 (ML19095A041), Exelon provided to the NRC the PSDAR for TMI Unit 1. The PSDAR discussed the use of SAFSTOR, thereby reflecting plans to complete decommissioning within a 60-year period after the permanent cessation of operations. In early 2022, by indirect transfer, the owner's name changed to Constellation Energy Company.

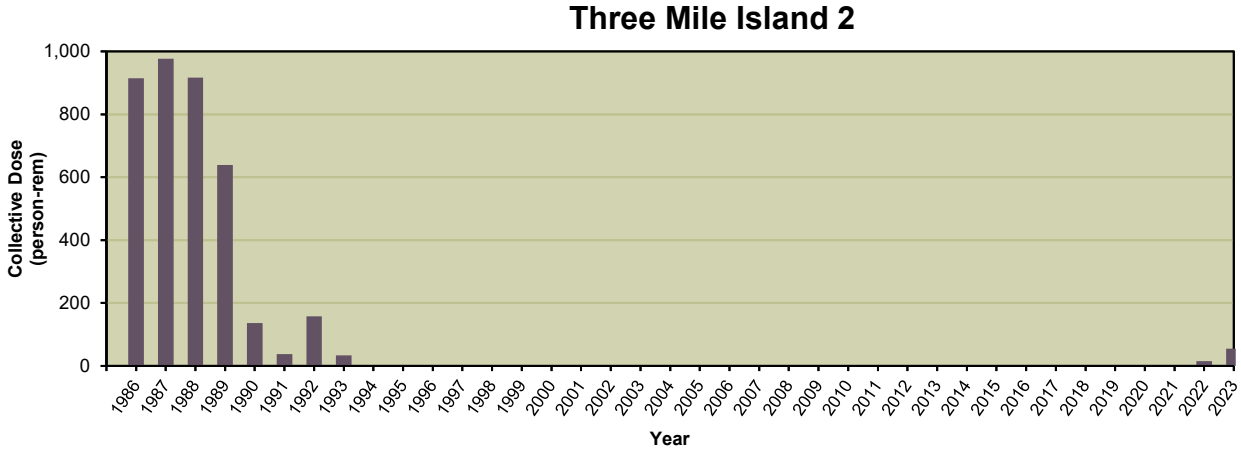


Three Mile Island Unit 2

TMI Unit 2, produced power commercially from December 30, 1978, to March 28, 1979. On March 28, 1979, the unit experienced an accident that resulted in severe damage to the reactor core. TMI Unit 2 has been in a nonoperating status since that time. The licensee conducted a substantial program to defuel the reactor vessel and decontaminate the facility. The plant defueling was completed in April 1990. All spent fuel has been removed except for some debris in the reactor coolant system. The removed fuel is currently in storage at Idaho National Laboratory, and the DOE has taken title and possession of the fuel.

TMI Unit 2 has been defueled and decontaminated to the extent that the plant is in a safe, inherently stable condition suitable for long-term management. This long-term management condition is termed “post-defueling monitored storage,” which was approved in 1993. The license for TMI Unit 2 was transferred to EnergySolutions (TMI-2 Solutions) on December 18, 2020. After taking the necessary engineering actions and upon receipt of NRC approval of the license amendment request to change the license from possession-only monitoring status and modification of the technical specifications, thereby allowing major decommissioning activities to proceed, TMI-2 Solutions intends to substantially complete decommissioning of TMI Unit 2 and release the site by 2037, except for a potential area set aside for storage of debris material on the ISFSI. The plant shares equipment with TMI Unit 1. These licensees share one TMI Station ISFSI. Also, there is one site emergency preparedness program and one site program under 10 CFR Part 37, “Physical Protection of Category 1 and Category 2 Quantities of Radioactive Material.” The licensees plan to decommission TMI Unit 2 independently of TMI Unit 1 but may coordinate some decommissioning activities. EnergySolutions indicates that an LTP for TMI Unit 2 will be developed and submitted to the NRC approximately 2 years before the anticipated license termination date.

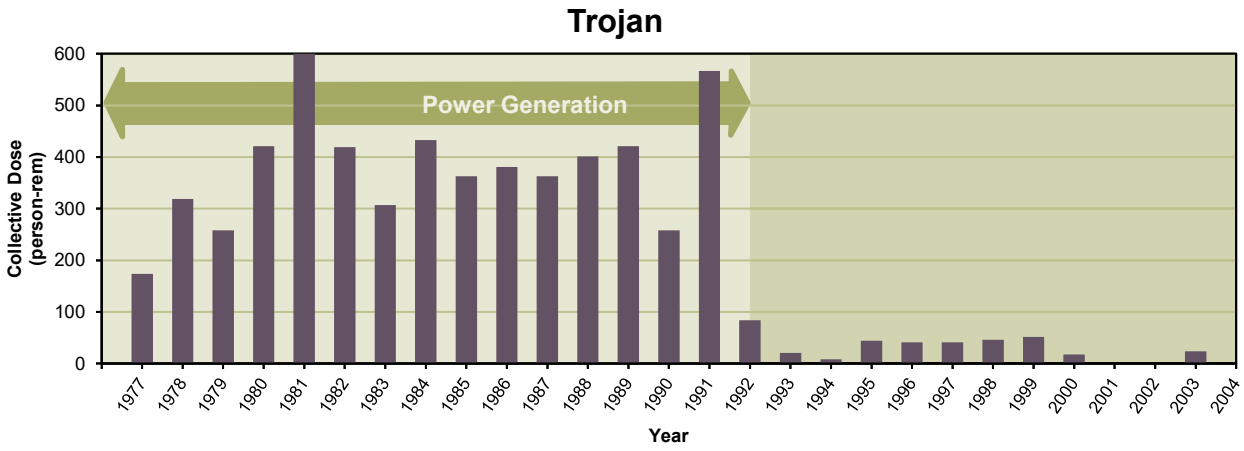
In February 2023, TMI-2 Solutions submitted an LAR requesting that the NRC review major decommissioning activities that would diminish the historic integrity of buildings previously deemed eligible for the National Register of Historic Places (NRHP) by the Pennsylvania State Historic Preservation Office. To fulfill its obligations under the National Environmental Policy Act, the NRC is evaluating the impact of Phase 2 activities, including demolition of structures, because the impacts on historic and cultural resources and NRHP-eligible structures have not been reviewed previously.



Trojan

The Trojan Nuclear Plant was shut down in November 1992, and the SGs and reactor vessel were shipped to the DOE Hanford site. The licensee was granted a site-specific 10 CFR Part 72 license for an onsite ISFSI in March 1999, which is still in operation. The licensee began spent fuel transfer to the ISFSI in December 2002 and finished fuel transfer in August 2003.

In December 2004, Trojan completed decommissioning activities. The NRC terminated Trojan’s 10 CFR Part 50 operating license on May 23, 2005.

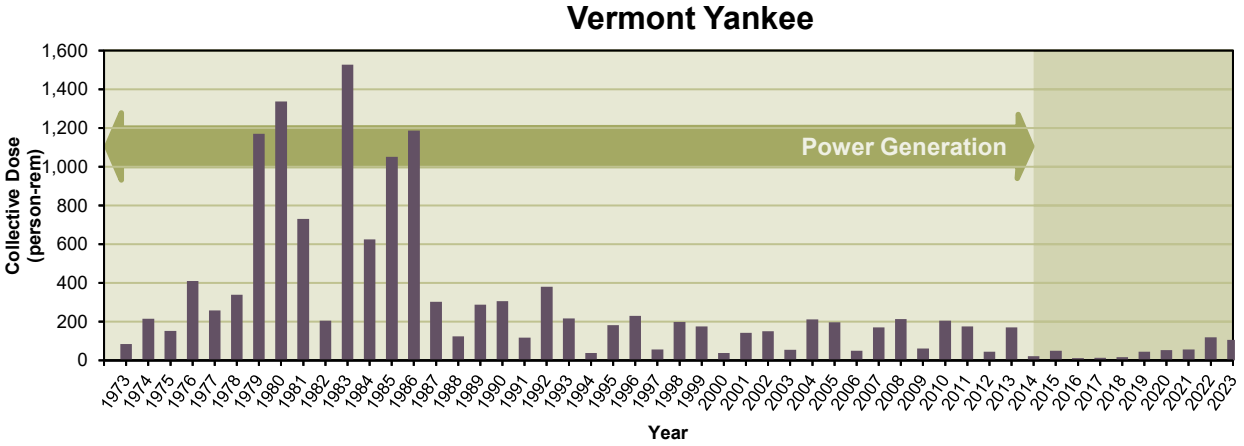


Vermont Yankee

Vermont Yankee Nuclear Power Station was a 1,912 MWt boiling-water reactor that began operation in 1972. The reactor was permanently shut down on December 29, 2014, and the fuel was removed from the reactor on January 12, 2015.

Entergy, which owns the facility, submitted the Vermont Yankee PSDAR to the NRC on December 19, 2014. In the report, Entergy stated its intention to keep the plant in SAFSTOR until it is ready to fully decommission the facility in 2073. Entergy completed movement of the spent nuclear fuel to dry cask storage in August 2018.

On February 9, 2017, Entergy and NorthStar Group Services, Inc. submitted a request to transfer the Vermont Yankee license from Entergy to NorthStar. On October 12, 2018, the NRC issued a first-of-a-kind order approving the permanent transfer of the Vermont Yankee operating license and associated spent fuel in onsite storage from Entergy to NorthStar for the purpose of decommissioning the reactor. With the completion of the transfer to NorthStar on January 11, 2019, the new estimated date for license termination is 2030.

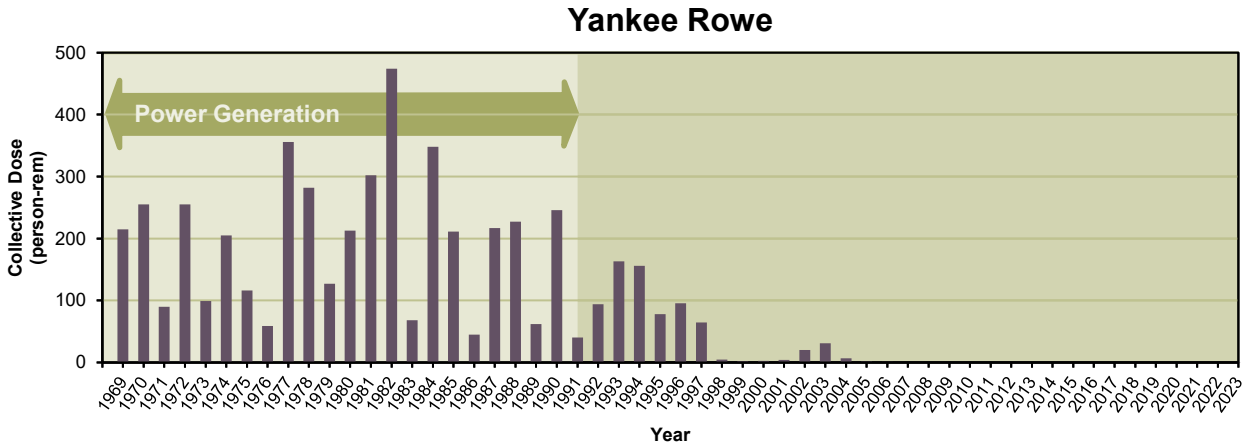


Yankee Rowe

Yankee Rowe Nuclear Power Station was permanently shut down on October 1, 1991, and the SGs were shipped to the Barnwell low-level radioactive waste disposal facility in South Carolina in November 1993. The reactor vessel was shipped to Barnwell in April 1997.

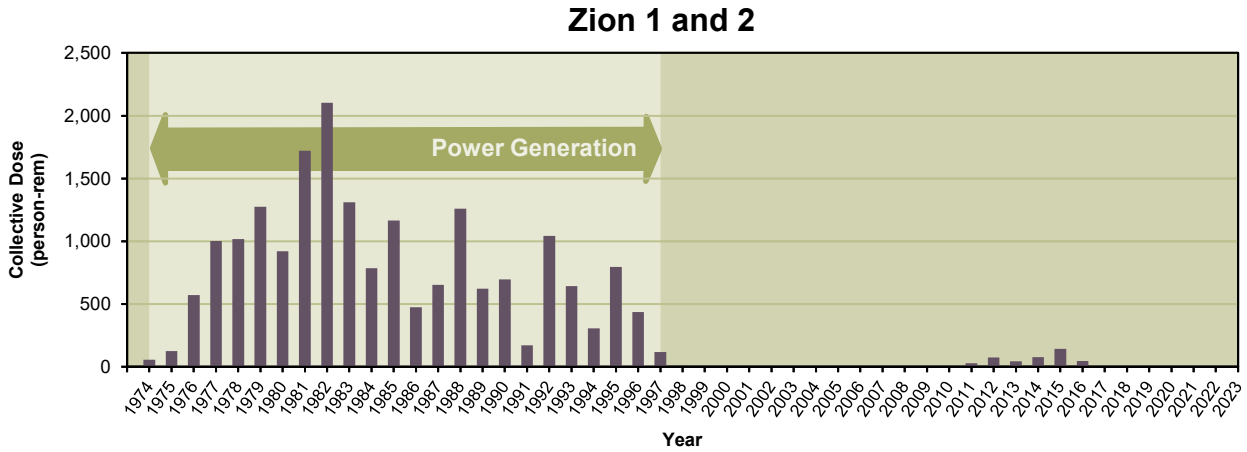
The owner completed construction of an onsite ISFSI, and all the fuel from the spent fuel pool was transferred to it.

Yankee Rowe completed decommissioning in 2007. The license for the site was reduced to the 2 acres surrounding the ISFSI, which is still in operation.



Zion Units 1 and 2

Zion Nuclear Power Station (ZNPS) received a construction permit in December 1968 to begin building two nuclear power reactors. Unit 1 produced power commercially from December 31, 1973, to February 21, 1997, and Unit 2 produced power commercially from September 17, 1974, to September 19, 1996. On April 27, 1997, all fuel from Unit 1 was removed, and on February 25, 1998, all fuel from Unit 2 was removed, and placed in the spent fuel pool. On January 14, 1998, the Unicom Corporation and Commonwealth Edison Company (ComEd) boards of directors, the joint owners of the facility, authorized the permanent cessation of operations at ZNPS for economic reasons. ComEd certified, in a letter dated February 13, 1998,



to the NRC that operations had ceased at ZNPS. On March 9, 1998, ComEd informed the NRC that all fuel had been removed from the ZNPS reactor vessels and committed to maintain them permanently defueled.

The NRC acknowledged the certification of permanent cessation of power operation and permanent removal of fuel from the reactor vessels in a letter dated May 4, 1998, and ZNPS was placed in SAFSTOR. The owner submitted the PSDAR, site-specific cost estimate, and fuel management plan on February 14, 2000, which noted that the SAFSTOR approach was the intended decommissioning method to be used for ZNPS. In 2010, the NRC staff finalized the transfer of the possession license for ZNPS Units 1 and 2 from Exelon Generating Company, LLC, to Zion Solutions, LLC, and the site entered active decommissioning. At ZNPS Units 1 and 2, all planned decommissioning activities have been completed. The NRC staff held a public meeting in April 2015 regarding the LTP for ZNPS Units 1 and 2, which was submitted in December 2014 and approved in September 2018. All the above-grade plant structures have been removed and on November 8, 2023, the NRC found that the site met the unrestricted release criteria for the remaining survey units outside the boundary of the on-site ISFSI. On November 16, 2023, the NRC issued the confirming amendments that identify Constellation Energy Generation as the licensee. The licensed area now consists of the ISFSI, the ISFSI support building, and the ISFSI warehouse, and it encompasses approximately 5 acres.

APPENDIX F

GLOSSARY

2023

References 1, 12, 13, 17, and 25 serve as the source of most of the definitions in this appendix. The remaining definitions were included to clarify terms used in this report.

GLOSSARY 2023

Agreement State: any State with which the Atomic Energy Commission or the U.S. Nuclear Regulatory Commission (NRC) has entered into an effective agreement under subsection 274b. of the Atomic Energy Act of 1954, including any amendments thereto. To simplify subsection 274b., an Agreement State is a U.S. State that has an agreement with the NRC authorizing the State to regulate certain uses of radioactive materials within the State. [Ref. 1]

As low as is reasonably achievable (ALARA): making every reasonable effort to maintain exposures to radiation as far below the dose limits in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 20, "Standards for Protection Against Radiation," as is practical, consistent with the purpose for which the licensed activity is undertaken, taking into account the state of technology, the economics of improvements in relation to the state of technology, the economics of improvements in relation to benefits to public health and safety, and other societal and socioeconomic considerations, and in relation to the use of nuclear energy and licensed materials in the public interest. [Ref. 1]

Average measurable dose: the dose obtained by dividing the collective dose by the number of individuals who received a measurable dose. This is the average most commonly used in this and other reports when examining trends and comparing doses received by workers, because it excludes those individuals receiving a less-than-measurable dose.

Boiling-water reactor (BWR): a reactor in which water is boiled using heat released from fission. The steam released by boiling then drives turbines and generators to produce electrical power. BWRs operate similarly to electrical plants using fossil fuel, except that the BWRs are heated by nuclear fission in the reactor core. [Ref. 25]

Byproduct material: as defined by NRC regulations, includes any radioactive material (except enriched uranium or plutonium) produced by a nuclear reactor. It also includes the tailings or wastes produced by the extraction or concentration of uranium or thorium or the fabrication of fuel for nuclear reactors. Additionally, it is any material that has been made radioactive through the use of a particle accelerator or any discrete source of radium-226 used for a commercial, medical, or research activity. [Ref. 25]

Breeder: a reactor that produces more nuclear fuel than it consumes. A fertile material, such as uranium-238, when bombarded by neutrons, is transformed into a fissile material, such as plutonium-239, which can be used as fuel. Fermi Unit 1 is an example of a fast breeder reactor. [Ref. 1]

Ceased operations: the date of plant shutdown notification to the NRC.

Ceased power generation: the date the plant stopped generating electricity.

Class (or lung class or inhalation class): a classification scheme for inhaled material according to its rate of clearance from the pulmonary region of the lung. Materials are classified as D, W, or Y, which applies to a range of clearance half-times: for Class D (Days) of less than 10 days, for Class W (Weeks) from 10 to 100 days, and for Class Y (Years) of greater than 100 days. [Ref. 25]

Collective dose: the sum of the individual doses received in a given period of time by a specified population from exposure to a specified source of radiation. [Ref. 1]

Committed dose equivalent ($H_{T,50}$): the dose equivalent to organs or tissues of reference that will be received from an intake of radioactive material by an individual during the 50-year period following the intake (CDE [$H_{T,50}$]). The NRC uses the acronym CDE for this term. [Ref. 1]

Committed effective dose equivalent ($H_{E,50}$): the sum of the products of the weighting factors applicable to each of the body organs or tissues that are irradiated and the committed dose equivalent to these organs or tissues (CEDE [$H_{E,50}$] = $\Sigma W_T H_{T.50}$). The NRC uses the acronym CEDE for this term. [Ref. 1]

Criticality: the normal operating condition of a reactor, in which nuclear fuel sustains a fission chain reaction. A reactor achieves criticality (and is said to be critical) when each fission event releases a sufficient number of neutrons to sustain an ongoing series of reactions. [Ref. 25]

DECON (immediate dismantlement): a phase of reactor decommissioning in which structures, systems, and components that contain radioactive contamination are removed from a site and safely disposed of at a commercially operated low-level waste disposal facility or decontaminated to a level that permits the site to be released for unrestricted use. [Ref. 25]

Deep-dose equivalent (H_d): applies to external whole-body exposure, and is the dose equivalent at a tissue depth of 1 centimeter (1,000 milligrams (mg)/square centimeter (cm^2)). The NRC uses the acronym DDE for this term. [Ref. 1]

Effective dose equivalent (H_E): the sum of the products of the dose equivalent to the organ or tissue (H_T) and the weighting factors (W_T) applicable to each of the body organs or tissues that are irradiated (EDE [H_E] = $\Sigma W_T H_T$). The NRC uses the acronym EDE for this term. [Ref. 1]

ENTOMB: a method of decommissioning, in which radioactive contaminants are encased in a structurally long-lived material, such as concrete. The entombed structure is maintained and surveillance is continued until the entombed radioactive waste decays to a level permitting termination of the license and unrestricted release of the property. [Ref. 25]

Exposure: being exposed to ionizing radiation or to radioactive material. [Ref. 1]

Independent spent fuel storage installation (ISFSI): a complex designed and constructed for the interim storage of spent nuclear fuel, solid reactor-related greater-than-Class-C (GTCC) waste, and other radioactive materials associated with spent fuel and reactor-related GTCC waste storage. An ISFSI that is located on the site of another facility licensed under 10 CFR Part 72, “Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater than Class C Waste,” or a facility licensed under 10 CFR Part 50, “Domestic Licensing of Production and Utilization Facilities,” that shares common utilities and services with that facility or is physically connected with that other facility may still be considered independent. [Ref. 13]

Lens dose equivalent (LDE): applies to the external exposure of the lens of the eye and is taken as the dose equivalent at a tissue depth of 0.3 centimeter (300 mg/cm2). [Ref. 1]

License: a license issued under the regulations in 10 CFR Parts 30 through 36, 39, 40, 50, 60, 61, 63, 70, or 72. [Ref. 1]

Licensee: a company, organization, institution, or other entity to which the NRC or an Agreement State has granted a general license or specific license to construct or operate a nuclear facility, or to receive, possess, use, transfer, or dispose of source material, byproduct material, or special nuclear material. [Ref. 25]

Licensed material: source material, special nuclear material, or byproduct material received, possessed, used, transferred, or disposed of under a general or specific license issued by the NRC or Agreement States and is not otherwise exempt from regulation. [Ref. 1]

Light-water reactor (LWR): a term used to describe reactors using ordinary water as a moderated coolant, including BWRs and pressurized-water reactors (PWRs), the most common types used in the United States. [Ref. 25]

Measurable dose: a dose greater than zero rem (not including doses reported as “not detectable”).

Megawatt-year: unit of electric energy, equal to the energy from a power of 1 million watts over a period of 1 year. [Ref. 25]

Mode of Intake: the manner of intake into the body: inhalation (H), absorption through the skin (B), oral ingestion (G), and injection (J). [Ref. 1]

Monitoring (radiation monitoring, radiation protection monitoring): the measurement of radiation levels, concentrations, surface area concentrations or quantities of radioactive material and the use of the results of these measurements to evaluate potential exposures and doses. [Ref. 25]

Monitoring year: interval during which the radiation exposure monitoring was performed.

Nonreactor licensees: NRC licensees that are not commercial nuclear power reactors. These licensees are industrial radiographers, fuel processors, fabricators, and reprocessors; manufacturers and distributors of byproduct material; ISFSIs; facilities for land disposal of low-level waste; and geologic repositories for high-level waste.

Number of individuals with measurable dose: the count of unique individuals who received a measurable dose during the monitoring year. In some instances, in this report, the number of individuals with a measurable dose may include individuals who are counted more than once, since they may be monitored at more than one licensee during the year. (See section 5 on the effect of transient individuals.) Tables that have been adjusted for transient workers are noted in the appropriate footnotes to the tables.

Occupational dose: the dose received by an individual in the course of employment in which the individual's assigned duties involve exposure to radiation or to radioactive material from licensed and unlicensed sources of radiation, whether in the possession of the licensee or other person. Occupational dose does not include doses received from background radiation, from any medical administration the individual has received, from exposure to individuals administered radioactive material and released under 10 CFR 35.75, "Release of individuals containing unsealed byproduct material or implants containing byproduct material," from voluntary participation in medical research programs; or as a member of the public. [Ref. 1]

Pressurized-water reactor (PWR): common nuclear power reactor design in which very pure water is heated to a very high temperature by fission, kept under high pressure (to prevent it from boiling), and converted to steam by a steam generator (rather than by boiling, as in a BWR). The resulting steam is used to drive turbines, which activate generators to produce electrical power The majority of reactors producing electric power in the United States are PWRs. [Ref. 25]

Radionuclide: a radioisotope that is an unstable isotope of an element that decays or disintegrates spontaneously, thereby emitting radiation. [Ref. 25]

REM: the special unit of any of the quantities expressed as dose equivalent. The dose equivalent in rem is equal to the absorbed dose in rads multiplied by the quality factor (1 rem = 0.01 sievert). [Ref. 1]

SAFSTOR (often considered "delayed DECON"): long-term storage condition for a permanently shutdown nuclear power plant. During SAFSTOR, radioactive contamination decreases substantially, making subsequent decontamination and demolition easier and reducing the amount of low-level waste requiring disposal. [Ref. 25]

Shallow-dose equivalent for both maximum extremity (SDE-ME) and whole body (SDE-WB): the external exposure of the skin of the whole body or the skin of an extremity taken as the dose equivalent at a tissue depth of 0.007 centimeter (7 mg/cm^2). [Ref. 25]

Sievert: International System of Units of any of the quantities expressed as dose equivalent. The dose equivalent in sieverts is equal to the absorbed dose in grays multiplied by the quality factor (1 Sv = 100 rem). [Ref. 1]

Special nuclear material: plutonium, uranium-233, uranium enriched in the isotope 233 or in the isotope 235, and any other material that the NRC, pursuant to the provisions of section 51 of the Atomic Energy Act of 1954, as amended, determines to be special nuclear material, or any material artificially enriched by any of the foregoing, but does not include source material. [Ref. 1]

Statistical comparisons: For statistical comparisons of averages, a two-sided one-sample t-test with a 0.05 significance level (i.e., 95 percent confidence) used to determine whether the difference between the two averages is significant. For values that are not averages, such as total collective dose, a 5-year average from the previous 5 years (not including the current year under

consideration) is calculated with a 95 percent confidence interval based on the normal distribution. If the value for the current year falls within the 5-year 95 percent confidence interval, then it is not significantly different, whereas, if the value falls outside (i.e., below the lower limit or above the upper limit), there is an indication of a statistically significant change.

Two-sided one-sample t-test formula:

$$t = \frac{\bar{X} - \mu}{\frac{s}{\sqrt{n}}}$$

Where:

t = calculated t-statistic
$\bar{X}$ = sample mean
μ = population mean
s = sample standard deviation
n = sample number

Example:

We wish to determine whether the average measurable dose for a type of nuclear reactor differs from the previous 5 years. The 5-year mean for the average measurable dose is 0.080. The population mean is the current year's average measurable dose, 0.060. The sample standard deviation is 0.01, and the sample number is 5. Using the formula above, the two-tailed probability value (as obtained from a Student's t-distribution table) given a t-value of 4.472 is 0.006, which is statistically significant at a 0.05 significance level.

$$t = \frac{0.080 - 0.060}{\frac{0.01}{2.236}} = 4.472$$

Total effective dose equivalent (TEDE): the sum of the effective dose equivalent (EDE) (for external exposures) and the committed effective dose equivalent (CEDE) (for internal exposures) (TEDE = EDE + CEDE). [Ref. 1]

Total organ dose equivalent (TODE): the sum of the deep dose equivalent (DDE) and the committed dose equivalent (CDE) to the organ receiving the highest dose as described in 10 CFR 20.2106(a)(6). [Ref. 12]

Transient individual: one who is monitored at more than one licensed site during the calendar year.

Unit availability factor: the unit available hours (the total clock hours in the reporting period during which the unit operated online or was capable of such operation) times 100 divided by the hours in the period. [Ref. 17]

Weighting factor (W_T): multipliers of the equivalent dose to an organ or tissue used for radiation protection purposes to account for different sensitivities of different organs and tissues to the induction of the stochastic effects of radiation. [Ref. 1]

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11. ABSTRACT (200 words or less)

This report summarizes the occupational exposure data that are maintained in the U.S. Nuclear Regulatory Commission (NRC) Radiation Exposure Information and Reporting System (REIRS) database. The bulk of the information contained in this report was compiled from the 2023 annual reports submitted by five of the seven categories of NRC licensees subject to the reporting requirements of Title 10 of the *Code of Federal Regulations* 20.2206, “Reports of individual monitoring.” (Because there are no geologic repositories for high-level waste currently licensed and no NRC-licensed low-level waste disposal facilities currently in operation, this report considers only five categories.) The annual reports submitted by these licensees consist of radiation exposure records for each monitored individual. These records are analyzed for trends and presented in this report in terms of collective dose and the distribution of dose across the monitored individuals. Annual reports for 2023 were received from a total of 169 NRC licensees. Collectively, the reports submitted by these licensees indicate that 135,562 individuals were monitored, 58,916 of whom received a measurable dose.

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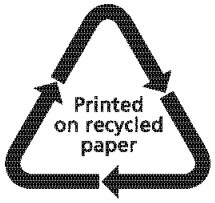

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