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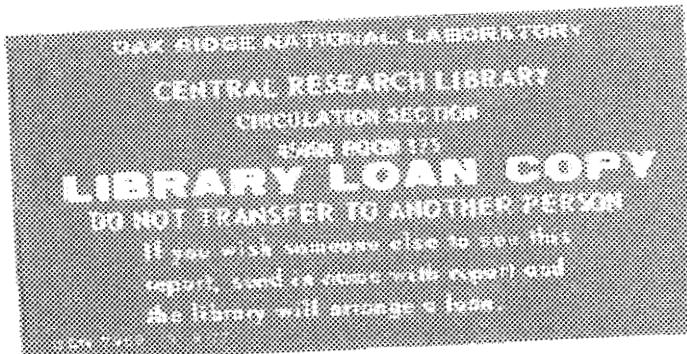
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Low-Level Radioactive Waste Source
Terms for the 1992 Integrated
Data Base

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DEPARTMENT OF ENERGY

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INTEGRATED DATA BASE**

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ABSTRACT

This technical manual presents updated generic source terms (i.e., unitized amounts and radionuclide compositions) which have been developed for use in the Integrated Data Base (IDB) Program of the U.S. Department of Energy (DOE). These source terms were used in the IDB annual report, *Integrated Data Base for 1992: Spent Fuel and Radioactive Waste Inventories, Projections, and Characteristics*, DOE/RW-0006, Rev. 8, October 1992. They are useful as a basis for projecting future amounts (volume and radioactivity) of low-level radioactive waste (LLW) shipped for disposal at commercial burial grounds or sent for storage at DOE solid-waste sites. Commercial fuel cycle LLW categories include boiling-water reactor, pressurized-water reactor, fuel fabrication, and uranium hexafluoride (UF_6) conversion. Commercial nonfuel cycle LLW includes institutional/industrial (I/I) waste. The LLW from DOE operations is categorized as uranium/thorium, fission product, induced activity, tritium, alpha, and "other." Fuel cycle commercial LLW source terms are normalized on the basis of net electrical output [MW(e)-year], except for UF_6 conversion, which is normalized on the basis of heavy metal requirement [metric tons of initial heavy metal (MTIHM)]. The nonfuel cycle commercial LLW source term is normalized on the basis of volume (cubic meters) and radioactivity (curies) for each subclass within the I/I category. The DOE LLW is normalized in a manner similar to that for commercial I/I waste. The revised source terms are based on the best available historical data through 1992.

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LIST OF ABBREVIATIONS, ACRONYMS, AND INITIALIZATIONS

BNL	Brookhaven National Laboratory
BWR	Boiling-water reactor
CFR	Code of Federal Regulations
DOA	U.S. Department of Agriculture
DAW	Dry active waste
D&D	Decontamination and decommissioning
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DVA	U.S. Department of Veterans Affairs
EIA	U.S. Energy Information Administration
EPA	U.S. Environmental Protection Agency
FF	Fuel fabrication
HAZWRAP	Hazardous Waste Remedial Actions Program
HLW	High-level radioactive waste
IDB	Integrated Data Base
I/I	Industrial and Institutional
INEL	Idaho National Engineering Laboratory
LLW	Low-level radioactive waste
LWR	Light water reactor
LWRSTDAT	<u>LWR Source Term DATA</u>
MIMS	Manifest Information Management System
MTIHM	Metric ton of initial heavy metal
NIH	National Institutes of Health
NLLWMP	National Low-Level Waste Management Program
NRC	U.S. Nuclear Regulatory Commission
ORIGEN	Oak Ridge Isotope Generation and Depletion Code
ORNL	Oak Ridge National Laboratory
PWR	Pressurized-water reactor
SNF	Spent nuclear fuel
SWIMS	Solid Waste Information Management System
TRU	Transuranic
WMIS	Waste Management Information System

1. INTRODUCTION

The directors of most successful businesses rely heavily upon accurate forecasts of long-term trends in their fields to chart the future directions of their firms. A practical means of predicting such trends involves an examination of data for products and services rendered in the past. In like manner, directors of nuclear waste management operations need reasonable estimates of the volume, radioactivity, type, and other characteristics of wastes expected in the future. Such estimates are needed to design and construct facilities for the safe and efficient treatment, storage, transport, and disposal of wastes that are expected to be generated. A method used frequently to make preliminary, unsophisticated estimates involves the use of multiplication factors derived from past experience. Within the nuclear industry, these factors are commonly called *source terms*.

Source terms can be used to predict the amounts and properties of radioactive waste expected from a given operation, or a series of operations. Source terms are usually expressed as the amount of waste (e.g., in cubic meters or curies) generated per unit of useful product, per unit of raw material processed, per unit of energy expended, or per unit of some other descriptive normalizing element. Source terms can be considered to be intensive properties (e.g., density, pressure, composition, etc.) as used in the sciences. Thus, if the total amount (an extensive property) is known or assumed for a given time interval, the characteristics of the waste expected to be generated over that interval can be estimated as the product of the appropriate intensive and extensive properties.

Generic source terms, which are used in the U.S. Department of Energy (DOE) Integrated Data Base (IDB) Program,¹ have been developed for low-level radioactive waste (LLW) from commercial fuel cycle and nonfuel cycle facilities as well as from DOE sites. These source terms have been derived based upon the best available historical data—which means data from the waste generator or shipper when possible.

As used in this manual, LLW has the same meaning as in The Low-Level Waste Policy Act (Pub. L. 95-573, Dec. 22, 1980). Namely, LLW is radioactive waste not classified as high-level radioactive waste (HLW), transuranic waste (TRU), spent nuclear fuel (SNF), or by-product material specified as uranium or thorium tailings and waste. Definitions for SNF and other wastes are given in the glossary of ref. 1.

Periodic revisions of the source terms used in the IDB have been necessary to account for changes largely caused by technological advances (mainly in the areas of waste compaction, decontamination, and incineration prior to disposal), regulatory constraints, and more detailed radionuclide analytical measurements. These updated source terms, which reflect current trends, are used to project the quantities and characteristics of LLW shipped within the United States to commercial disposal sites and DOE storage areas. This information is needed for administrative and technical planning purposes. Since 1987, when the previous version² of this manual was published, many new laws, regulations, and standards (local, state, and federal) dealing with radioactive wastes have been promulgated, and many earlier ones have been revised considerably. Consequently, waste management practices have changed in an effort to comply with recent and modified requirements (e.g., refs. 3 and 4). Minimization of waste generation and more effective waste treatment and handling procedures (e.g., selective ion exchange for liquid waste streams, incineration for combustible wastes, supercompaction for dry wastes, and melting for metals) have played key roles in meeting these requirements. The result has usually been a significant reduction in the volume of LLW received at the commercial disposal sites and the DOE storage areas. Furthermore, the increasing cost of waste disposal in recent years has been another strong incentive for decreasing the volumes of wastes generated, disposed of, and stored. The effects of waste volume reduction are evident from the data presented in Appendix A (Fig. A.1). This information was obtained from the semiannual operating reports of licensed nuclear reactors submitted to the U.S. Nuclear Regulatory Commission (NRC) for the period 1982 through 1992. Individual licensee reports are available in the NRC Public Document Room, Gelman Building, 2120 L Street, Washington, DC 20555, and in public document rooms located near each licensed facility.

This technical manual presents material that supports the LLW source terms used to make the projections given in Chapter 4, "Low-Level Waste," of previous IDB annual reports (i.e., *Integrated Data Base: Spent Fuel and Radioactive Waste Inventories, Projections, and Characteristics*, DOE/RW-0006 series through Rev. 8, hereafter referred to as the IDB). The 1992 IDB (Rev. 8)¹ presents waste inventories through 1991 and projections through the year 2030. Unless indicated to the contrary, calendar years are used throughout this manual. The fuel cycle projections given in the IDB are based on DOE Energy Information Administration (EIA) estimates of future nuclear power growth⁵ given in Table A.1 (Appendix A).

2. BACKGROUND

The IDB concept was first supported financially by DOE at Oak Ridge National Laboratory (ORNL) in 1979. The IDB encompasses all U.S. SNF and radioactive waste inventories and characteristics. Also included in the report are projections of the SNF and radioactive wastes expected each year until well into the next century. In the IDB, for purposes of comparison, commercial radioactive wastes are separated into two broad categories: fuel cycle and nonfuel cycle. For similar purposes, DOE radioactive wastes are presented separately in the IDB and are divided into five broad categories: uranium/thorium, fission product, induced activity, tritium, alpha, and "other."

Commercial fuel cycle wastes include those shipped to licensed disposal sites from commercial light-water reactor (LWR) nuclear power plants and from fuel cycle industries [e.g., fuel fabrication (FF) and uranium hexafluoride (UF_6) conversion] that support them and generate LLW. Except for UF_6 conversion, the basis for normalizing commercial fuel cycle LLW is the net electrical energy production of both types of LWR [i.e., boiling-water reactor (BWR) and pressurized-water reactor (PWR)] plants. The basis for normalizing UF_6 conversion is the heavy-metal requirement. Although future decontamination and decommissioning (D&D) activities at commercial and DOE facilities are expected to generate LLW, source terms for these LLWs are not developed in this manual because only limited historical data are available and the timing associated with future D&D activities is uncertain. However, these source terms are considered in a separate chapter of the IDB. Mill tailings, SNF, HLW and TRU wastes are not LLW and are treated in separate chapters of the IDB.¹

The nonfuel-cycle LLW includes various industrial wastes, institutional (e.g., hospital, clinic, university, laboratory, etc.) wastes, and non-DOE government [e.g., U.S. Department of Veterans Affairs (DVA), U.S. Environmental Protection Agency (EPA), National Institutes of Health (NIH), U.S. Department of Agriculture (DOA), U.S. Department of Defense (DOD), etc.] wastes. These non-DOE government wastes, which are estimated to account for less than 2.5% of the total volume of LLW shipped annually to commercial disposal sites, are similar to those shipped from other industries and institutions. Therefore, they are included with the industrial and institutional (I/I) wastes in the LLW source term development described in this report. Since September 1979, DOE LLW has been stored at DOE sites. Before this time, several DOE sites [e.g., Brookhaven National Laboratory (BNL) and the Mound Plant] shipped some LLW to commercial burial grounds.

3. RATIONALE USED FOR THE DEVELOPMENT AND PRESENTATION OF COMMERCIAL FUEL CYCLE LLW SOURCE TERMS

The reasoning behind the development of the commercial fuel cycle LLW source terms used in the IDB for 1992 is described in the following sections. The source terms are graphically presented after a brief discussion of their content.

3.1 RATIONALE FOR COMMERCIAL FUEL CYCLE LLW SOURCE TERMS

3.1.1 Rationale for LWR Source Terms

The LLW shipped to licensed disposal sites from operating LWR nuclear power plants^{1,2,6} and the corresponding net electrical energy produced by these plants^{2,7} together are the foundation of the BWR and PWR source terms developed in this manual. The slightly revised and updated version (1982–1992) of the ref. 2 data is given in Appendix A (Table A.6). It contains the volume, total radioactivity, and energy data (net electricity produced) on which the reactor source terms are based. The breakdown of total radioactivity into specific radionuclides (used in the source terms) is extensive and consequently is maintained in a separate spreadsheet (not included in this manual).

The source term values given are based on effluent-release semiannual reports submitted to the NRC by operating nuclear power plants. These values are consolidated into a collection of computer data bases/spreadsheets. This collection, called LWRSTDAT (LWR SOURCE TERM DATA), contains (a) the waste volume and complete radioactivity data as reported by the power plants in their semiannual reports and (b) the net electrical energy produced (as reported by the NRC and EIA). Also contained in this data collection are calculated summaries, some of which are presented in this manual (Tables A.2–A.6 and Figs A.1–A.5, Appendix A). It should be noted that 8 (of ~200) semiannual reports for 1992 were not available for inclusion in Table A.6 of Appendix A. It should also be recognized that reports included are subject to revision by the power plants. Revisions may be necessary because of typographical mistakes, failure to account for volume reduction of the waste after it has left the plant, revised analytical results, or operator error in making a measurement that was subsequently corrected. Thus, the values presented in Appendix A should be used with the realization that they are subject to revision.

As shown in Table 1, the LWR source term is comprised of two parts: routine LLW from day-to-day treatment of process streams and cleanup operations and nonroutine LLW from neutron irradiation of nonfuel reactor components.⁸ The nonroutine wastes require special case-by-case evaluation and treatment and are generated only sporadically. It should be kept in mind that throughout this technical manual, wastes are categorized in the earlier NRC system of "TYPES," not in the current NRC system of "CLASSES."

For each LWR type (i.e., BWR or PWR), annual normalized volumes for routine waste are calculated by dividing the annual volume (m³) of routine waste (Types A + B + D) reported shipped by the total net electrical energy [MW(e)-year] produced that year (Tables A.2 and A.4 in Appendix A). The normalized volumes shipped for burial from LWRs appear to have leveled out (Fig. A.1 in Appendix A), allowing the projection of normalized routine volumes to be confidently based on the previous year's value. Normalized nonroutine waste volumes, however, have no apparent trend (Fig. A.2, Appendix A). Therefore, all data included in LWRSTDAT (1959–1992) for the Type C waste are averaged to obtain an annual nonroutine LLW volume source term.

Table 1. Characterization of LWR LLW by type

Type	Characterization	Representative components
<i>Routine waste</i>		
A	Wet	Aqueous waste (e.g., evaporator bottoms, resins, sludges, etc.)
B	Dry, compressible	Compressible dry active waste (DAW) and equipment (e.g., cloth, paper, plastic, wood, etc.)
D	Other	Routine, noncompactible miscellaneous equipment and rubbish (e.g., oil, organic liquids, etc.)
<i>Nonroutine waste</i>		
C	Irradiated nonfuel core components	Nonroutine solids (e.g., control rods, curtains, fuel channels, support tubes, thermal shields, etc.)

The volumes used (routine and nonroutine) in the related source terms of the IDB are slightly different from those calculated from the LWRSTDAT data. This difference arises from difficulties (some previously mentioned) in obtaining volumes directly from the semiannual reports of power plants in a given year which always agree with those volumes in the shipping manifests received by the burial grounds that same year. The volumes presented in the IDBs are derived from shipping manifest information obtained from a data base, the Manifest Information Management System (MIMS)⁶, which is maintained by the National Low-Level Waste Management Program (NLLWMP). The fraction of waste (routine and nonroutine) calculated from LWRSTDAT is then applied to the total volume value obtained from the MIMS (with allowances made for I/I waste). This adjustment results in slightly different normalized volumes, but it is used to maintain consistency in reported numbers within the IDB—in particular, to ensure that when all the individual categories for commercial LLW volumes are summed, they agree with the shipping manifest total volume as reported in the MIMS data base. As pointed out with the data from LWR semiannual reports, the data from shipping manifests and MIMS are also not unchangeable (i.e., the numbers may be modified after the waste is buried). In this connection, see Appendix B. The slightly adjusted volume source terms used in the 1992 IDB are presented in Figs. C.1 and C.2 (Appendix C) for ease of comparison with the corresponding figures (before adjustment) in following sections.

Essentially all of the specific radionuclides reported shipped for disposal during 1978–1992 were incorporated into a spreadsheet by waste type. Because the sum of the activity of the specifically reported nuclides in each waste type is commonly less than the total activity of each waste type reported shipped, the unspecified activity was obtained by difference and subsequently treated as being ⁶⁰Co (to be conservative). When an activity was given for a specified volume, but without a nuclide breakdown, the given activity was distributed proportionally among the reported radionuclides for that waste type. For each type of LWR, the average activity (C_i) of each radionuclide was then normalized by dividing each radionuclide average activity by the average net electrical energy [MW(e)-year] produced during that time interval. These normalized averages were calculated for each waste type, based on LLW reported shipped during the period 1978–1992. It should be noted that for the radionuclides (mostly alpha- and beta-emitters) that were not reported before 10 CFR Pt. 61 was promulgated (January 26, 1983), only the reported data for the years 1984–1992 were averaged. The calculated percentages (based on the years 1978–1992 or 1984–1992, depending on the radionuclide

under consideration) were then applied to pre-1978 data to arrive at an "all time" average value [i.e., Ci/MW(e)-year (net)] for each radionuclide. This was done to compensate for the lack of complete and consistent reporting in the early days of commercial nuclear power. The routine LLW radioactivity source term for each radionuclide is obtained by summing the calculated "all time" average for the radionuclide in each of the three waste types (A, B, and D) that make up routine waste (Tables A.3 and A.5, Appendix A). A block diagram is presented in Appendix D that summarizes this method.

The normalized radioactivities calculated from the LWRSTDAT data base, when presented in the IDB, are treated in a manner similar to that of the volumes (i.e., fractions based on LWRSTDAT applied to the shipping manifest radioactivity data obtained from the MIMS). The slightly adjusted radioactivity source terms used in the 1992 IDB are presented in Figs. C.1 and C.2 (Appendix C) for ease of comparison with the corresponding figures in the following sections.

The nonroutine LLW volume source terms are simply the total volume of neutron-irradiated waste (Type C) reported shipped for disposal from BWR and PWR plants from 1959 through 1992, divided by the corresponding reported net electrical energy produced over the same time span. These data are presented in Tables A.2 and A.4 (Appendix A). No further treatment of Type C data was deemed necessary because no apparent trend was visible among the sporadic shipment data. The new radioactivity source terms for the nonroutine waste were calculated by applying precisely the same method used for developing the volume source terms. The pertinent nonroutine waste radionuclide data are also contained in the LWRSTDAT.

3.1.2 Rationale for FF and UF₆-Conversion Source Terms

With only minor changes, the FF and UF₆-conversion source terms are those as developed in ref. 9. The logic behind these changes follows.

The FF source term, presented in Sect. 3.2.2, was used for projecting the amounts of LLW shipped to disposal from FF facilities through the year 2030 in the 1992 IDB report. The flowsheet and radionuclide distribution are identical to those in ref. 9; however, the basis for normalizing LLW from a FF facility is changed from metric ton initial heavy metal (MTIHM) to MW(e)-year when the source term is used in the IDB. The assumptions made to allow this shift in the basis for normalization were (1) that the ratio between fuel demand and reactor output approaches a constant after several fuel reloadings and (2) that the ratio of the radionuclides in the input and waste streams at a FF facility is

not affected by the half-lives and daughter products of the nuclides. Both assumptions appear to be reasonable.

The conversion of yellowcake (U_3O_8) to UF_6 by the direct fluorination process remains the basis for the UF_6 LLW projection source term in the 1992 IDB. The process flowsheet presented in Sect. 3.2.3 is identical to the flowsheet⁹ used for UF_6 waste projections in earlier IDB reports. Although the waste stream designations and the total radioactivity found in the waste per MTIHM have not changed, the radionuclides shown in the waste streams have been slightly adjusted from ref. 9. In the source term, thorium has replaced protactinium (which was inadvertently shown in the original table) as an important element contributing to the long-term accumulation of radioactivity in the disposed LLW. The UF_6 -conversion source term was not shifted from MTIHM to MW(e)-year normalization because it does not meet the second assumption given previously for FF.

3.2 PRESENTATION OF COMMERCIAL FUEL CYCLE LLW SOURCE TERMS

The following paragraphs present the commercial fuel cycle source terms, which include LWRs, FF, and UF_6 conversion.

3.2.1 LWRs

This section gives the LWR (BWR and PWR) source terms developed using (a) the data given in Table A.6 (Appendix A) and other LWRSTDAT spreadsheets and (b) the reasoning described in Sect. 3.1.1. It also includes a discussion concerning the differences between the BWR and PWR source terms.

3.2.1.1 BWR

The annual normalized volume and radioactivity reported shipped each year to commercial disposal sites from BWRs for the period 1982–1992 are given in Tables A.2–A.3 and Figs. A.1–A.4 (Appendix A). The calculated total normalized volume of routine BWR waste shipped in 1992 amounts to $0.529 \text{ m}^3/[\text{MW}(\text{e})\text{-year}]$ of net energy produced (Table A.2, Appendix A). Inasmuch as the annual normalized volumes have leveled out, within reason, this value ($0.529 \text{ m}^3/[\text{MW}(\text{e})\text{-year}]$) is

taken as the volume *source term* for routine waste (Fig. 1). Nonroutine LLW volume reported shipped in 1992 was $0.0115 \text{ m}^3/\text{[MW(e)-year]}$. As stated previously, there is no apparent trend for nonroutine LLW volume. Therefore, the nonroutine volume *source term* of $0.0165 \text{ m}^3/\text{[MW(e)-year]}$ in Fig. 1 is an average value, based on the years 1959–1992.

The calculated total normalized radioactivities in 1992 for routine and nonroutine waste shipped from BWRs are $2.06 \text{ Ci}/\text{[MW(e)-year]}$ and $32.9 \text{ Ci}/\text{[MW(e)-year]}$, respectively. The *source term* values for 1992 BWR LLW are $2.654 \text{ Ci}/\text{[MW(e)-year]}$ for routine LLW, and for nonroutine LLW, $16.41 \text{ Ci}/\text{[MW(e)-year]}$ (Fig. 1). These *source term* values are derived by the rationale presented in Sect. 3.1.1.

The routine radioactivity source term presented in Fig. 1 contains 23 radionuclides which account for over 93% of the total radioactivity reported. The remaining percentage ("Other") is treated as ^{60}Co and included in the source term with ^{60}Co . The nonroutine radioactivity source term contains the same radionuclides as the routine source term, except for the ^{144}Ce – ^{144}Pr pair. The listed radionuclides make up over 97% of the reported curies, with the remainder, as before, added to the ^{60}Co total.

3.2.1.2 PWR

The annual volume and radioactivity (per unit of net energy produced) reported shipped during 1982–1992 are presented in Tables A.4–A.5 and Figs. A.1–A.4 (Appendix A). The calculated 1992 normalized volumes for routine and nonroutine waste shipped for disposal from PWR plants was 0.217 and $0.00748 \text{ m}^3/\text{[MW(e)-year]}$, respectively. The PWR normalized routine and nonroutine volume LLW *source terms* for 1992 were 0.217 and $0.00406 \text{ m}^3/\text{[MW(e)-year]}$, respectively (Sect. 3.1.1).

The total normalized radioactivity shipped for burial in 1992 for routine waste was calculated to be $0.669 \text{ Ci}/\text{[MW(e)-year]}$, and for nonroutine waste, the value was $1.61 \text{ Ci}/\text{[MW(e)-year]}$. Based on the reasoning presented in Sect. 3.1.1, the routine radioactivity *source term* was calculated to be $0.9354 \text{ Ci}/\text{[MW(e)-year]}$, with the nonroutine radioactivity *source term* being $2.125 \text{ Ci}/\text{[MW(e)-year]}$.

The PWR radionuclide source term for routine LLW (Fig. 2) contains the same 23 radionuclides as in the BWR routine source term. These 23 radionuclides account for almost 95% of the reported radioactivity in the routine waste. The nonroutine waste source term contains 21 of the 23 radionuclides and account for over 99% of the reported radioactivity.

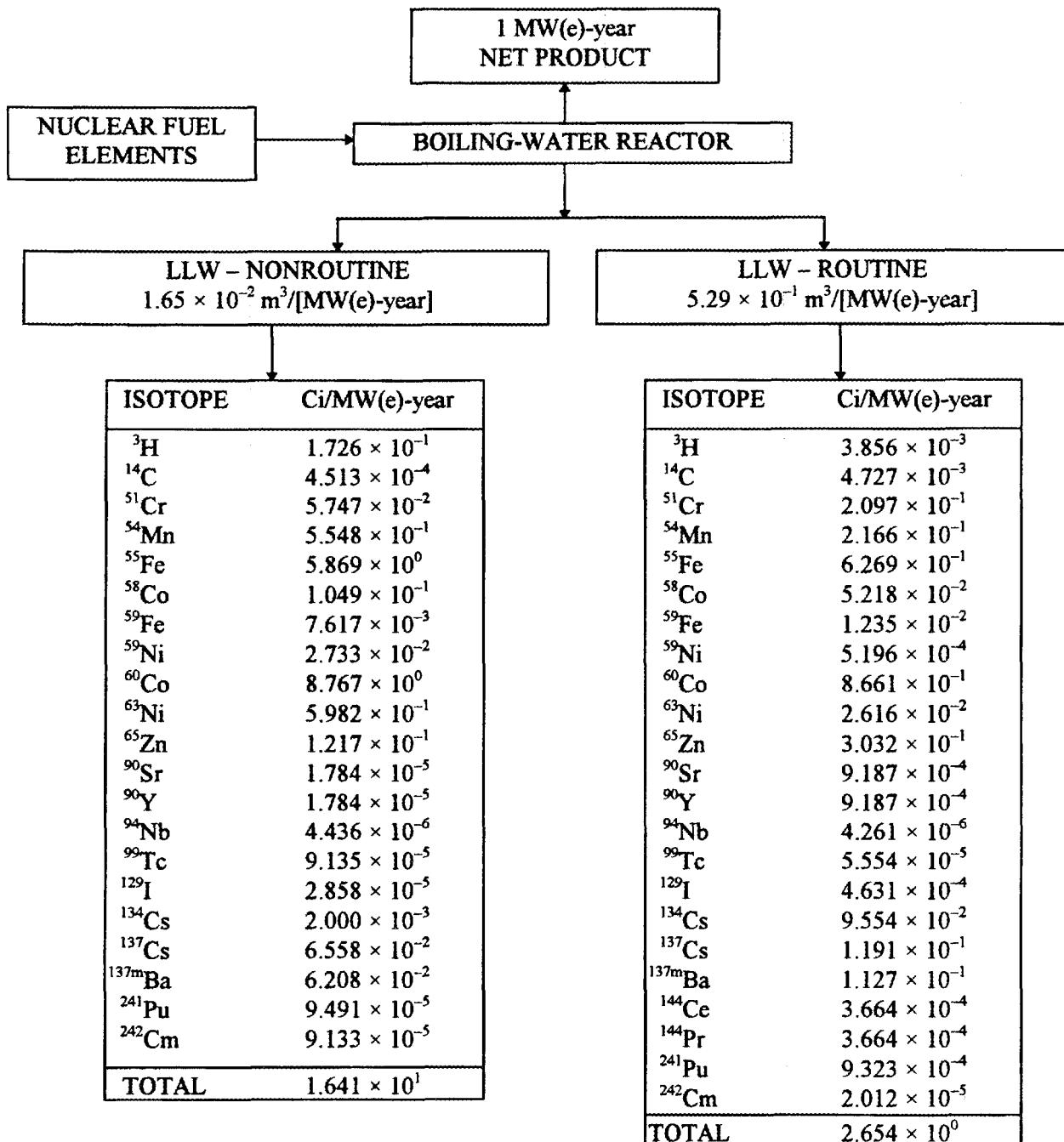


Fig. 1. BWR routine and nonroutine source terms.

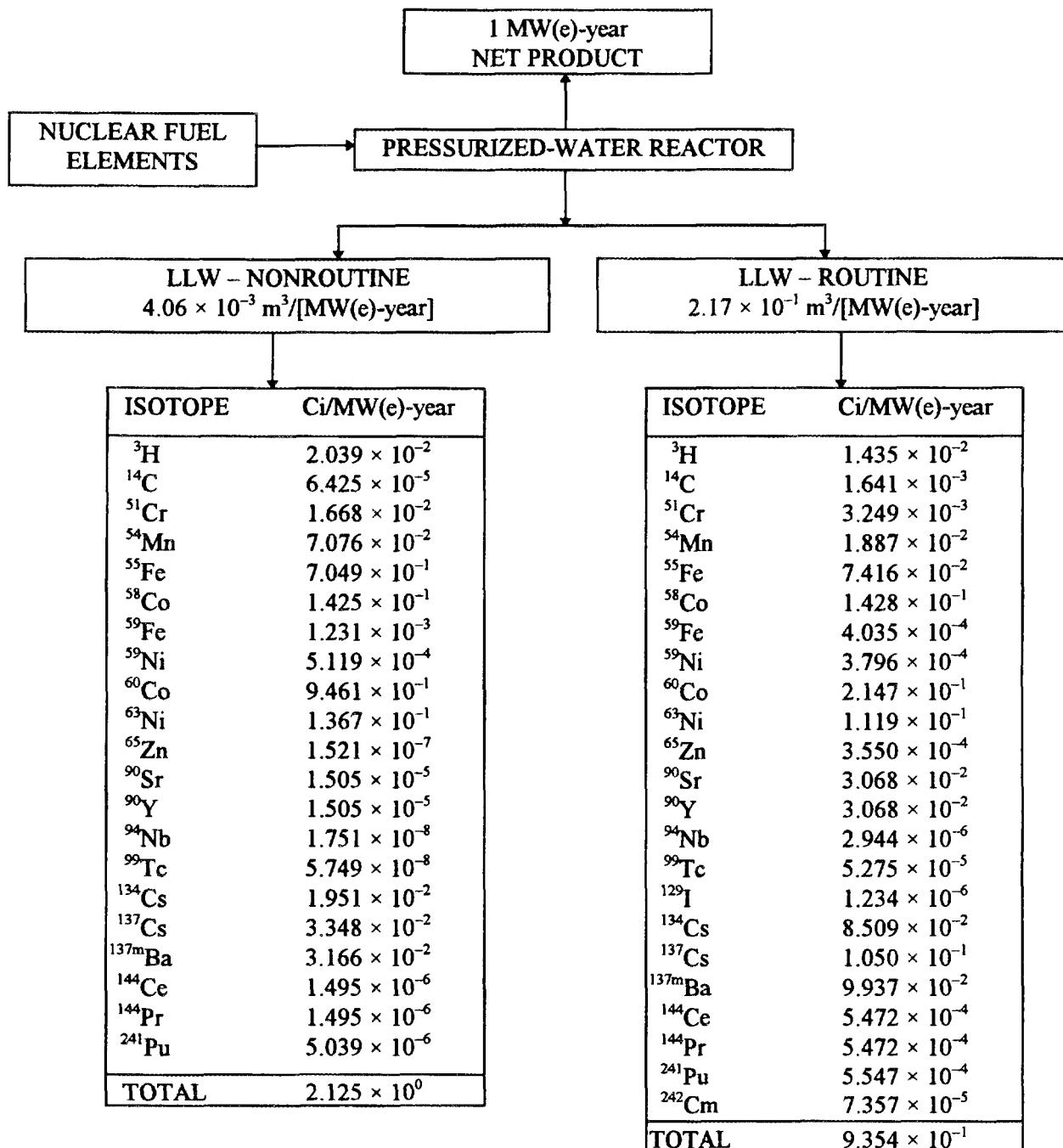


Fig. 2. PWR routine and nonroutine source terms.

3.2.1.3 Comparison of BWR and PWR Source Terms

The only significant differences between the BWR and PWR source terms lie in the relative quantities of waste shipped for disposal per MW(e)-year of energy produced. Historically, the PWRs have shipped, on the basis of both volume and radioactivity, less LLW per net MW(e)-year than the BWRs.² Only small differences are seen in the routine waste radionuclide populations of PWRs and BWRs, and PWRs have fewer radionuclides present in significant amounts in the nonroutine waste. (For a comparison, compare values in Figs. 1 and 2.)

Fundamental original design differences between BWR and PWR plants may have tended to limit waste volume reduction capabilities at some BWRs, while the PWRs have generally enjoyed more flexibility. This is true especially in liquid stream cleanup and liquid waste treatment systems where trade-offs occur among such choices as the use of evaporation, reverse osmosis, bead or powdered resins in ion exchange, and powdered resin precoat filters vs cartridge filters. The LLW arising from such sources, reported as Type A (wet), has achieved the greatest volume reduction in PWR waste. Vendor-supplied supercompaction of dry, compressible LLW (Type B) has been available since the mid-1980s, and has apparently benefited both BWRs and PWRs² (Fig. A.2 in Appendix A).

3.2.2 Fuel Fabrication

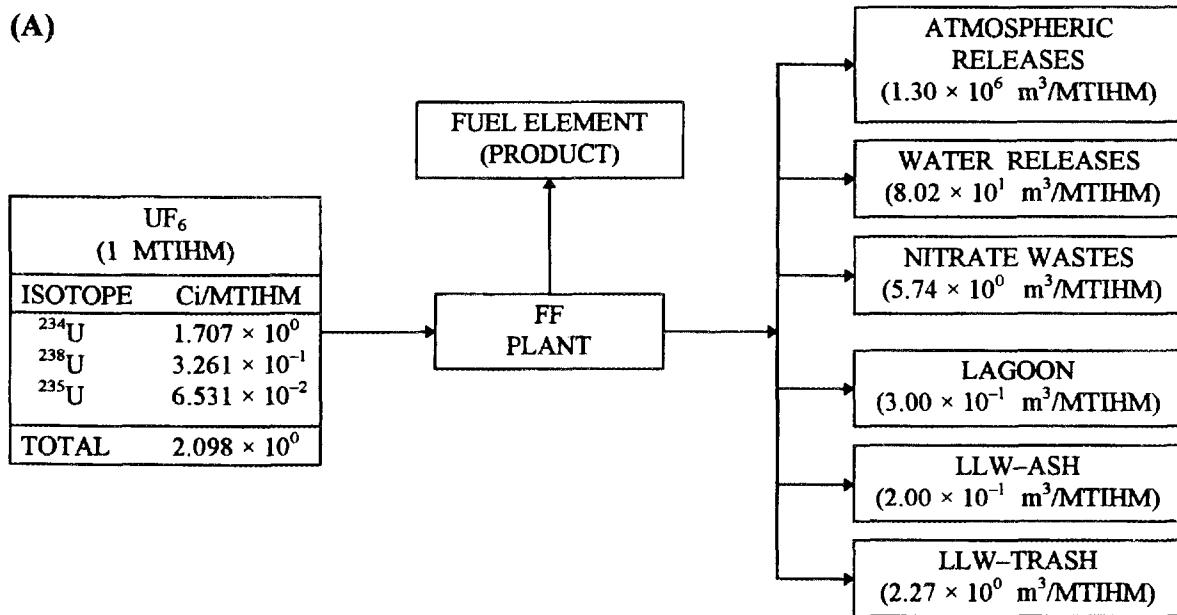
The FF source term from ref. 9 is shown in Fig. 3 (A). The source terms for LLW from a FF facility with the basis for normalization switched to MW(e)-year are given in Fig. 3 (B). This switch was made using the assumptions stated in Sect 3.1.2 for a FF facility and the MTIHM to [MW(e)-year] ratios for BWR (i.e., 0.0416) and PWR (i.e., 0.0310) plants, as given in ref. 10.

A cursory test of the validity of the FF source term was carried out with the data from ref. 11. This 1984 survey data, based on information supplied by nine fuel-fabrication LLW shippers, was normalized to MW(e)-year of energy produced and the result was compared to the values estimated with the FF source term. The survey value for volume is about one-third lower than that predicted, whereas the survey radioactivity value is about two-thirds higher than predicted.

3.2.3 UF₆ Conversion

The updated source term shows a large increase in the fraction of radon released to the atmosphere, 8.21×10^{-1} compared to only 3.22×10^{-5} in the previously used source term. Release in

(A)



Fractions of U from feed in waste and product streams from a FF plant

Waste streams							Product stream (fuel element)
Atmospheric releases	Lagoon	Water releases	Nitrate wastes	Ash	Trash		
1.6×10^{-6}	9.6×10^{-4}	4.9×10^{-4}	1.1×10^{-4}	1.0×10^{-6}	2.8×10^{-3}	9.956×10^{-1}	

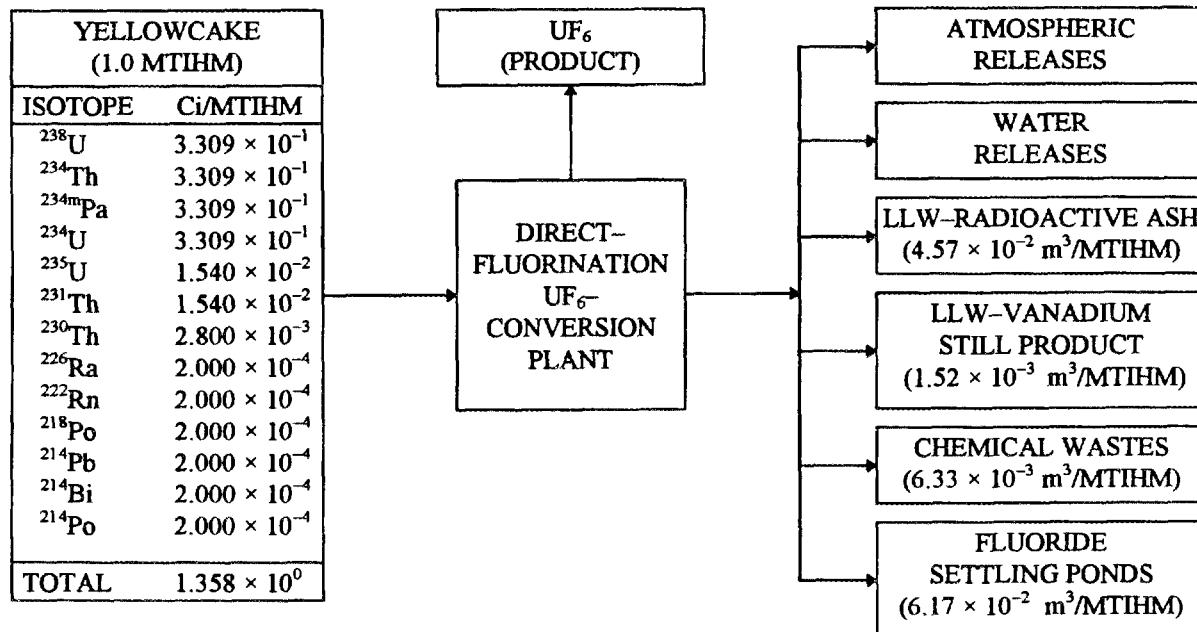
(B)

LLW sent to commercial burial from a FF plant

	Volume/energy {m ³ /[MW(e)-year]}		Radioactivity/energy {Ci/[MW(e)-year]}	
	BWR	PWR	BWR	PWR
Ash	8.32×10^{-3}	6.20×10^{-3}	8.73×10^{-8}	6.51×10^{-8}
Trash	9.44×10^{-2}	7.04×10^{-2}	2.44×10^{-4}	1.82×10^{-4}

Fig. 3. Fuel fabrication plant source term.

water accounted for roughly half the radon in the earlier source term: the other half was contained in the radioactive ash. In the updated source term, water release is essentially zero, and the fraction reported in the radioactive ash is 1.79×10^{-1} . Small amounts of radon are also reported in the vanadium still product and the fluoride settling pond in the new source term (Fig. 4), whereas formerly none appeared in these streams. The relative distribution of all other radionuclides among the waste streams have remained roughly the same—with the exception of the fluoride settling pond, where the fraction of total radioactivity decreased from 8.80×10^{-6} in the old source term to 3.8×10^{-6} in the revised version. These are trivial fractions because almost all of the radionuclides (other than the radon and traces of uranium) are concentrated in the radioactive ash, which is mostly calcium fluoride (CaF_2), and is the only waste shipped for commercial disposal thus far from a UF_6 -conversion plant.



Fractions of elements from yellowcake in waste and product streams
from a direct-fluorination UF_6 -conversion plant

Element	Waste streams						Product stream (UF_6)
	Atmospheric releases	Water releases	Radioactive ash	Vanadium still product	Chemical wastes	Fluoride settling ponds	
Uranium	2.50×10^{-5}	7.65×10^{-5}	3.51×10^{-5}	5.01×10^{-4}	1.00×10^{-6}	3.63×10^{-5}	9.9932×10^{-1}
Thorium	3.22×10^{-5}	7.27×10^{-6}	1.00×10^0	2.67×10^{-5}	1.00×10^{-6}	8.80×10^{-7}	0
Radium	3.36×10^{-5}	1.14×10^{-3}	9.99×10^{-1}	2.68×10^{-5}	1.00×10^{-6}	5.88×10^{-6}	0
Radon	8.21×10^{-1}	0	1.79×10^{-1}	4.84×10^{-6}	0	1.06×10^{-6}	0
Other	3.26×10^{-5}	7.25×10^{-6}	1.00×10^0	2.67×10^{-5}	1.00×10^{-6}	3.80×10^{-6}	0

Fig. 4. UF_6 -conversion (direct fluorination) plant source term.

4. RATIONALE USED FOR THE DEVELOPMENT AND PRESENTATION OF COMMERCIAL NONFUEL CYCLE LLW SOURCE TERMS

The nonfuel cycle LLW is comprised of industrial, institutional, and non-DOE government wastes that are not considered to be a component part of the nuclear fuel cycle. The separation of these wastes into a category different from the nuclear fuel cycle wastes was first sanctioned by the EPA Office of Radiation Programs in 1974.¹² Later, an NRC-sponsored study¹³ was undertaken to determine the sources, amounts, and characteristics of the nonfuel-cycle LLW. While this study focused largely on LLW generated by the academic community (i.e., large universities, colleges, medical schools, and teaching hospitals), it also sought information from other institutions such as private hospitals, clinics, and physicians licensed to use radionuclides. Much insight into the generation, treatment, and disposal of institutional LLW was gained by this study, but it also opened new areas for inquiry. Therefore, a follow-up study was undertaken¹⁴ to help clarify and expand the findings of the earlier work. In this second study more emphasis centered on waste characterization. As a result, three separate and distinct waste streams were defined as comprising the total institutional LLW from all sources. These waste streams were referred to as:

- Medical—primarily a low-volume waste stream containing mostly short-lived (less than 6 days) radionuclides administered to humans,
- Bioresearch—a relatively large volume waste stream containing longer-lived radionuclides [especially tritium (³H) and ¹⁴C] which are used to trace physiological processes in animals, and
- Nonbioresearch—a rather small-volume waste stream containing mostly long-lived radionuclides used in earth science studies.

The 1992 IDB has continued to recognize the above nomenclature in describing institutional LLW.

The industrial and non-DOE government LLWs are, for the most part, very similar to the institutional LLWs except that the industrial LLWs frequently contain greater radioactivity. This observation was generally confirmed in a study that was confined to describing all the LLW originating in the state of Massachusetts.¹⁵ The non-DOE government LLW is estimated to account for less than 2.5% of the total volume of LLW disposed of commercially each year. Therefore, it is included with

the I/I wastes. All the foregoing considerations were taken into account in the nonfuel-cycle (i.e., I/I) source terms presented in ref. 9 and are similarly incorporated, when appropriate, into the modified source terms described in this report.

Source terms for these wastes have been more difficult to develop because the reported information is seldom in a form that is amenable to direct incorporation into the IDB report format. The annual total LLW volume and radioactivity reported as received at the licensed disposal sites⁶ are, therefore, used as the basis for the nonfuel cycle or I/I LLW projection source terms. The historical I/I waste volumes and radioactivities are obtained by subtracting the reported volumes and radioactivities of BWR and PWR wastes (LWRSTDAT) and the calculated volumes and radioactivities of UF₆-conversion and FF wastes from the corresponding total volumes and radioactivities reported shipped to the disposal sites (obtained from the NLLWMP). The source term that was developed for the I/I LLW projections used in the 1992 IDB is shown in Table 2. The methodology and rationale used to determine the radionuclide distribution in the new source term is presented below.

4.1 INDUSTRIAL

The industrial LLWs are the least well defined of the commercially disposed radioactive wastes. Their sources are many and varied, as are the radionuclides they contain. The private companies that generate these wastes are usually reluctant to furnish explicit details regarding them for fear of exposing themselves to competitive disadvantage in the marketplace. The industrial sector that manufactures radiochemicals and radiopharmaceuticals is, however, the supplier of these materials to other industries and institutions. It is presumed that in the preparation of such "tagged" products that yields are often low, resulting in relatively large amounts of the radioactive agent appearing in the process waste. Also, pharmaceutical companies frequently have large-scale bioresearch programs which tend to generate significant volumes of LLW. The disposal site industrial waste data also include the small amounts of LLW attributed to the supporting nuclear fuel cycle industries [namely, fuel fabrication and UF₆ conversion (Sects. 3.2.2 and 3.2.3)].

The industrial LLW source term shown in Table 2 is based largely on the 1984 survey data presented in ref. 10. These estimates were made by using the reported 1984 disposal site LLW totals minus the 1984 fuel cycle LLW totals¹ to obtain the I/I LLW totals shipped in 1984. The sum of the survey I/I (medical, academic, and government) waste volumes and curies, respectively, provided the

Table 2. Composition (%) of I/I waste by category and total combined I/I^{a,b}

Radionuclide	Industrial ^c	Institutional ^e			Total (I/I) ^d
		Bioresearch	Medical	Nonbioresearch	
³ H	6.45E+01	5.29E+01	8.34E+00	8.82E+01	6.32E+01
¹⁴ C	3.82E-01	2.74E+01	6.11E+00	6.55E+00	4.45E+00
²² Na		1.65E-01			2.28E-02
³² P	6.34E+00	4.42E+00	7.37E+00		5.82E+00
³⁶ Cl		3.24E-02			4.47E-03
³⁵ S	5.52E+00	4.29E+00	8.74E-01		5.04E+00
⁴⁵ Ca	8.67E-04	2.24E-02			3.79E-03
⁴⁶ Sc			1.91E-02		2.57E-04
⁵¹ Cr	1.39E-01	2.78E-01	3.42E-01		1.55E-01
⁵⁴ Mn	8.05E-02			3.99E-02	6.65E-02
⁵⁵ Fe	2.34E-03	2.09E-03		6.58E-01	3.10E-02
⁵⁷ Co	4.58E-03		6.58E-01		1.25E-02
⁵⁸ Co	2.23E-03	2.32E-02			4.99E-03
⁵⁹ Fe	9.86E-04			1.55E-02	1.47E-03
⁶⁰ Co	3.37E+00			9.23E-01	2.75E+00
⁶³ Ni	9.75E-03			5.04E-02	1.01E-02
⁶⁵ Zn	1.20E-03	5.93E-02		1.40E-01	1.48E-02
⁶⁷ Ga			7.76E-02		1.04E-03
⁷⁵ Se	1.34E-02		2.42E-02		1.11E-02
⁸⁵ Kr	4.06E-02				3.27E-02
⁹⁰ Sr	3.31E-01				2.66E-01
⁹⁰ Y	3.31E-01				2.66E-01
⁹⁰ Mo			2.32E+00		3.11E-02
^{99m} Tc			7.02E-01		9.35E-03
¹⁰⁹ Cd	8.79E-02				7.07E-02
¹¹¹ In	6.48E-04		2.80E-02		8.97E-04
¹¹³ Sn			2.41E-02		3.24E-04
¹²³ I	5.06E-04		2.19E-02		7.02E-04
¹²⁵ I	1.70E+00	9.90E+00	7.06E+01		3.69E+00
¹³¹ I	1.47E-02	5.45E-01	5.65E-02		8.78E-02
¹³³ Ba	2.67E-02				2.15E-02
¹³³ Xe			3.83E-02		5.15E-04
¹³⁴ Cs	2.61E-02				2.10E-02
¹³⁷ Cs	6.01E+00	1.23E-02		1.25E+00	4.89E+00
^{137m} Ba	5.69E+00	1.16E-02		1.18E+00	4.63E+00
¹⁴⁷ Pm	1.02E-01				8.17E-02
¹⁵¹ Sr	6.17E-03				4.96E-03
¹⁵³ Gd			5.29E-03		7.11E-05
¹⁶⁹ Yb	8.64E-02				6.95E-02
¹⁷⁵ Hf	1.23E-02				9.92E-03
¹⁸² Ta	7.94E-01				6.39E-01
¹⁹² Ir	3.35E-01		2.00E+00		2.96E-01
²⁰¹ Tl			2.59E-01		3.48E-03
²¹⁰ Po	1.42E-01				1.15E-01
²²⁶ Ra			1.07E-01		1.44E-03
²³⁰ Th	7.49E-04				6.05E-03
²³² Th	1.67E+00				1.34E+00
²³⁵ U	1.36E-02				1.09E-02
²³⁸ U	2.17E+00			9.48E-01	1.81E+00
²⁴¹ Pu	1.81E-02				1.45E-02
Totals	1.00E+02	1.00E+02	1.00E+02	1.00E+02	1.000E+02

^aThis information is adapted from ref. 15.^bThe volumetric composition of I/I is considered to be as follows: 70.3% industrial, 21.9% bioresearch, 2.3% medical, and 5.5% nonbioresearch. The radioactivity of I/I waste is considered to be 80.5% industrial, 13.8% bioresearch, 1.3% medical, and 4.4% nonbioresearch.^cThe composition is presented as percent of total curies in each individual category of I/I waste.^dThe composition is presented as percent of the total in all I/I waste combined.

basis for calculating the magnitude of the total volume and total curie data that were "missing" from the survey. Once these missing totals were established by subtracting the survey sums from the corresponding I/I waste totals obtained from the data given in the IDB,¹ volume and curie values could be apportioned among the survey waste streams according to their reported totals. The missing LLW averaged 12.9 Ci/m³, which was assumed to be all tritium. This assumption was justified by a study of the Massachusetts LLW sent to disposal in 1979–1981, which found that 99.5% of the radioactivity shipped was from tritium.¹⁵ The more recent downward trends in the uses and disposal of tritium¹⁶ and the decreased volumes and radioactivity levels actually reported for the I/I LLW shipped in 1986 and 1987⁶ were also considered. For these reasons, the "missing" survey waste was not included in the development of the 1988 (and following years through 1992) projection source term.

The radionuclide composition tabulated for I/I LLW in the source term shown in Table 2 are derived from data reported in the 1984 survey for all nuclides present to the extent of 0.1 Ci or more. All the reported nuclides present in lesser amounts were distributed proportionally among the individually reported nuclides. Because tritium is the controlling radionuclide in the industrial waste source term, an apparent order of magnitude decrease in the tritium concentration indicates a significant change in bioresearch and manufacturing plant procedures. Such procedural changes (e.g., substitution of radionuclides with shorter half-lives for tritium in bioresearch and tritium recycle in pharmaceutical manufacture) were corroborated by a later study of medically related LLW conducted by the American College of Nuclear Physicians.¹⁶

4.2 INSTITUTIONAL

The greater detail provided by the 1984 survey,¹⁰ with respect to waste characterization, contributed to the existing knowledge used in the judgmental assignment of the individual radionuclides in the institutional LLW to the three categories previously identified (i.e., bioresearch, medical, and nonbioresearch). The validity of the nuclide assignments was generally supported by a later characterization of medically related radioactive waste.¹⁶

Tritium and ¹⁴C, which are physiologically active, relatively long-lived beta-emitters, are the radionuclides most used in bioresearch. Short-lived gamma-emitters are also used to a large extent in medical (as well as bioresearch) imaging procedures. The radionuclide most widely used for this purpose is ¹²⁵I, but such radionuclides as ³²P, ³⁵S, ⁵¹Cr, and ¹³¹I are also commonly used. The other

radionuclides contained in the nonbioresearch waste stream are mostly heavy metals and elements not usually used in medical applications (Table 2).

On a volume basis, the combined I/I waste stream composition is estimated to be as follows: 70.3% industrial, 21.9% bioresearch, 2.3% medical, and 5.5% nonbioresearch. In the combined I/I waste stream, the industrial waste represents about 80.5% of the total radioactivity, and the bioresearch, medical, and nonbioresearch streams represent 13.8%, 1.3%, and 4.4%, respectively. These values were derived from the information given in the 1984 survey.¹⁰ The observations of the study of medically related wastes¹⁶ indicated that minimization of the volume and radioactivity of I/I wastes shipped to commercial disposal has likely been accomplished. Greater effort in curbing waste generation and more efficient practices (e.g., development of better microanalysis methods) and procedures (e.g., the use of radionuclides with shorter half-lives instead of tritium in bioresearch) are generally in place. However, it should be noted that advances are continuously occurring. The handling and treatment of the waste in preparation for disposal have also evolved in recent years. The use of waste brokers who collect waste from several industries or institutions and process it by supercompaction (which would be too costly for a single facility) has also contributed to reducing the volume of I/I waste arriving at the commercial sites. Above all, changes in state and federal regulations have forced industries and institutions to eliminate or severely limit the "mixed" chemically hazardous and radioactive wastes (e.g., scintillation fluids) that are shipped to the licensed disposal sites.

5. RATIONALE USED FOR THE DEVELOPMENT AND PRESENTATION OF DOE/DEFENSE LLW SOURCE TERMS

The Solid Waste Information Management System (SWIMS) served as the depository of all available DOE LLW data from 1976 through 1989. This data base was maintained at the Idaho National Engineering Laboratory (INEL) by EG&G, Idaho. Since 1989, DOE LLW data have been maintained in the Waste Management Information System (WMIS) data base. The WMIS is operated under the Hazardous Waste Remedial Action Program (HAZWWRAP) at Oak Ridge National Laboratory. Both of these data bases contain the volume and radioactivity data on the wastes generated, stored, and buried at each DOE installation. The waste is categorized into six basic types:

- Uranium/thorium—those waste materials in which the principal hazard results from naturally occurring uranium and thorium isotopes (e.g., depleted uranium, natural uranium ore, and slightly enriched uranium.) The hazard from all other radioactive isotopes should be insignificant.
- Fission product—waste materials that are contaminated with beta-gamma-emitting radionuclides [e.g., ^{137}Cs and ^{90}Sr , including their respective daughters (i.e., $^{137\text{m}}\text{Ba}$ and ^{90}Y)], which originate as a result of fission processes.
- Induced activity—waste materials that are contaminated with beta-gamma-emitting radioisotopes which are generated through neutron activation. Of major concern is ^{60}Co .
- Tritium—waste materials in which the principal hazard results from tritium (^3H).
- Alpha—waste materials contaminated with alpha-emitting radionuclides not listed under uranium/thorium having low levels (<100 nCi/g) of TRU radionuclides.
- Other—not defined (includes unknowns or mixtures).

Each DOE installation generates waste types unique to its particular mission; however, not all DOE sites generate all of these waste types. The IDB makes use of the historical data reported for all LLW buried at DOE sites.

The DOE/defense LLW source terms have not been revised since they were developed according to the descriptions given in ref. 9. All contact- and remote-handled TRU wastes (i.e., those containing >10 nCi/g of long-lived alpha-emitting radionuclides, as defined¹⁷ prior to revision of the TRU waste definition¹⁸ and >100 nCi/g after the revision) were excluded from the LLW category. The

radionuclide composition of each type of DOE/defense LLW was then estimated as described in the following.

5.1 URANIUM/THORIUM

The mass of $^{232}\text{Th}/^{235}\text{U}/^{238}\text{U}$ reported buried at the West Valley, New York, disposal site through 1974¹⁹ served as the basis for the uranium/thorium source term. ORIGEN²⁰ was used to calculate the radioactivity of these radionuclides and their associated daughter products after 1 year of decay. The isotopic composition, expressed in percentage of curies (%Ci), was then computed for each of these radionuclides. Radionuclides contributing curies of less than 0.001% to the total activity were omitted. The derived composition for the uranium/thorium source term is shown in Table 3.

5.2 FISSION PRODUCT

These source term estimates are based on the reported fission product waste composition of the INEL Chemical Processing Plant waste reported to SWIMS for 1979.²¹ Appropriate daughter nuclides (e.g., ^{90}Y , ^{106}Rh , ^{137m}Ba , and ^{144}Pr) were added to complete the composition. The values assumed for the added nuclides are believed to be representative of those encountered in reactor operation, fuel reprocessing, fuel fabrication, and biomedical wastes. Possible inaccuracies resulting from the nonuniformity of the wastes arising from the operational diversity of the various DOE installations must be recognized. Furthermore, the reported curie contents of the "aged" INEL wastes gave no previous decay history. The meager information available for characterizing these fission product wastes necessitated the use of considerable engineering judgment. As more and better information becomes available and as operational changes are put into place, the fission product source term may require some revision. A summary of the curie percentages attributed to the fission product radionuclides of most importance in LLW disposal is given in Table 3. Nuclides contributing less than 0.1% of the total activity were not included.

5.3 INDUCED ACTIVITY

The projection source term for DOE/defense LLW containing induced activity was estimated on the basis of the solid wastes disposed of by INEL during 1979.²¹ Radionuclides contributing less than 0.05% of the total activity were not included. The substitution of different materials of construction could influence the species of induced activity generated. Also, the demands of waste

Table 3. Representative DOE LLW radionuclide composition by percent activity

Uranium/thorium		Fission product		Induced activity		Alpha, >100 nCi/g		Other	
Nuclide	Composition	Nuclide	Composition	Nuclide	Composition	Nuclide	Composition	Nuclide	Composition
²⁰⁸ Tl	0.0017	⁶⁰ Co	0.08	⁵¹ Cr	4.95	²³⁸ Pu	2.620	³ H	1.22
²¹² Pb	0.0045	⁹⁰ Sr	7.77	⁵⁴ Mn	38.10	²³⁹ Pu	0.200	¹⁴ C	0.06
²¹² Bi	0.0045	⁹⁰ Y	7.77	⁵⁸ Co	55.40	²⁴⁰ Pu	0.700	⁵⁴ Mn	6.76
²¹² Po	0.0029	⁹⁵ Zr	1.27	⁵⁹ Fe	0.49	²⁴¹ Pu	96.400	⁵⁸ Co	6.24
²¹⁶ Po	0.0045	⁹⁵ Nb	2.83	⁶⁰ Co	0.87	²⁴¹ Am	0.004	⁶⁰ Co	18.03
²²⁴ Ra	0.0045	⁹⁹ Tc	0.02	⁶⁵ Zn	0.19	²⁴² Cm	0.056	⁹⁰ Sr	8.48
²²⁸ Ra	0.0269	¹⁰⁶ Ru	6.39	Total	100.00	²⁴⁴ Cm	0.020	⁹⁰ Y	8.48
²²⁸ Ac	0.0269	¹⁰⁶ Rh	6.39			Total	100.000	⁹⁹ Tc	0.12
²²⁸ Th	0.0045	¹²⁵ Sb	2.93					¹³⁴ Cs	13.98
²³¹ Th	0.0259	^{125m} Te	0.73					¹³⁷ Cs	18.45
²³² Th	0.2730	¹³⁴ Cs	0.38					^{137m} Ba	17.45
²³⁴ Th	33.1970	¹³⁷ Cs	17.31					²³⁸ U	0.73
^{234m} Pa	33.1970	^{137m} Ba	16.38					Total	100.00
²³⁴ Pa	0.0034	¹⁴⁴ Ce	14.67						
²³⁵ U	0.0258	¹⁴⁴ Pr	14.67						
²³⁸ U	33.1970	¹⁴⁷ Pm	0.06						
Total	100.0000	¹⁵¹ Sm	0.11						
		¹⁵² Eu	0.09						
		¹⁵⁴ Eu	0.09						
		¹⁵⁵ Eu	0.06						
		Total	100.00						

classification may require a more thorough analyses of the activities in the waste, thus bringing about the possibility of finding some radionuclides not previously reported. This new finding, in turn, could necessitate a future update of this source term. Currently, however, this source term is thought to be an adequate description of the induced activity encountered in the LLW now being generated throughout the DOE complex (Table 3).

5.4 TRITIUM

The LLW categorized as "Tritium" is assumed to contain only tritium as the radioactive component. For this reason, it is not necessary to show this category in the DOE source term summary, which is presented in Table 3.

5.5 ALPHA

The so-called "Alpha" LLW arises from processing weapons-grade material and therefore contains only small amounts of beta and gamma radioactivity from plutonium decay. An estimate of the radionuclide composition of this waste was based on the actinide composition given for TRU waste at a representative fuel reprocessing plant.²² The ratios of plutonium and curium nuclides ($^{238}\text{Pu}/^{240}\text{Pu}$ and $^{242}\text{Cm}/^{244}\text{Cm}$) were assumed to be the same as in the SNF being reprocessed. Except for ^{239}Pu and ^{241}Pu , the other actinides tabulated in ref. 22 were taken to be ^{241}Am . A waste density of 0.6 g/cm³ was assumed.²³ This "Alpha" category was established when the definition of TRU waste was less than or equal to 10 nCi/g (i.e., before revision of DOE Order 5820.2 increased it to >100 nCi/g). The values shown in Table 3 for the radionuclide composition of "Alpha" LLW are, however, presented on a percentage basis that is still considered to be a valid description of this waste.

5.6 OTHER

The LLW represented by this category is not clearly defined and includes, for the most part, a mixture of fission-product and induced-activity wastes. Also present are traces of uranium/thorium and biologically active ^{14}C and tritium wastes. The estimated source term values shown in Table 3 are based on the composition of the wastes reported disposed of at the West Valley, New York, site from inception through 1972.¹⁹ Additionally, the ^3H , ^{14}C , and ^{99}Tc values were derived from early institutional waste studies.⁹

6. CONCLUSION

This manual presents the rationale for and the development of the source terms used for LLW in Chapter 4 of the 1992 IDB (Rev. 8) annual report.¹ In the 1993 IDB (Rev. 9),²⁴ the DOE/defense source terms were used as presented in Sect. 5 of this manual. However, the commercial source terms, as presented in Sect. 3 for fuel cycle waste and Sect. 4 for nonfuel cycle waste of this manual, were not used. Instead, the commercial waste is categorized by five general sectors that generate and ship LLW: academic, government, industrial, medical, and utility. These are used by the NLLWMP and match, to a close approximation, those used by the commercial burial grounds. Plans are to continue with this breakdown in future IDBs.

7. REFERENCES

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Appendix A

SUMMARY FIGURES AND TABLES OF LLW SHIPPED TO COMMERCIAL BURIAL GROUNDS

APPENDIX A

The information in this appendix is mainly intended to give a summary view of LLW shipped to burial during the period 1982–1992, but this appendix also presents other information mentioned in this manual which the reader may find useful. Figs. A.1–A.4 show normalized volume and radioactivity data for routine and nonroutine LLW shipped for burial. The figures show BWR and PWR values on the same graph to help make comparisons. Fig. A.5 shows the net electricity produced by the LWRs for the period 1970–1992. The chosen beginning year for this figure (1970) was largely arbitrary.

Table A.1 presents the DOE EIA “No New Orders” case for energy production mentioned in Sect. 1. Tables A.2–A.5 give the LWRSTDAT yearly values for the indicated quantity (volume or radioactivity) by waste type. The last two columns in each table contain the normalized quantities used to produce Figs. A.1–A.4. Some of the values in Tables A.4 and A.5 may not agree with those in Table A.6. These differences are explained by the LLW shipped for burial by Fort St. Vrain, a high-temperature gas-cooled commercial reactor shut down in 1989. In the interest of completeness, and since it (like PWRs) is categorized as a dual-cycle reactor, its buried LLW is included in Tables A.4 and A.5. Lastly, Table A.6 is presented, spanning the years 1982–1992. This table should be used only as a general information source, keeping in mind the aforementioned difficulties in obtaining consistent, or “correct”, values. Table A.6 is grouped by BWR or PWR designation. For BWRs a distinction is made between those plants with deep-bed (db) bead resin ion exchangers in their condensate polishing systems and those with powdered resin precoat filter-demineralizers (f/d) in their condensate polishing systems. Similar groupings are made for PWRs on the basis of their nuclear steam supply systems [i.e., manufacturers: Combustion Engineering, Inc. (CE), Babcock & Wilcox Company (B&W), and Westinghouse Electric Corp. (West)]. (See also Appendix B.)

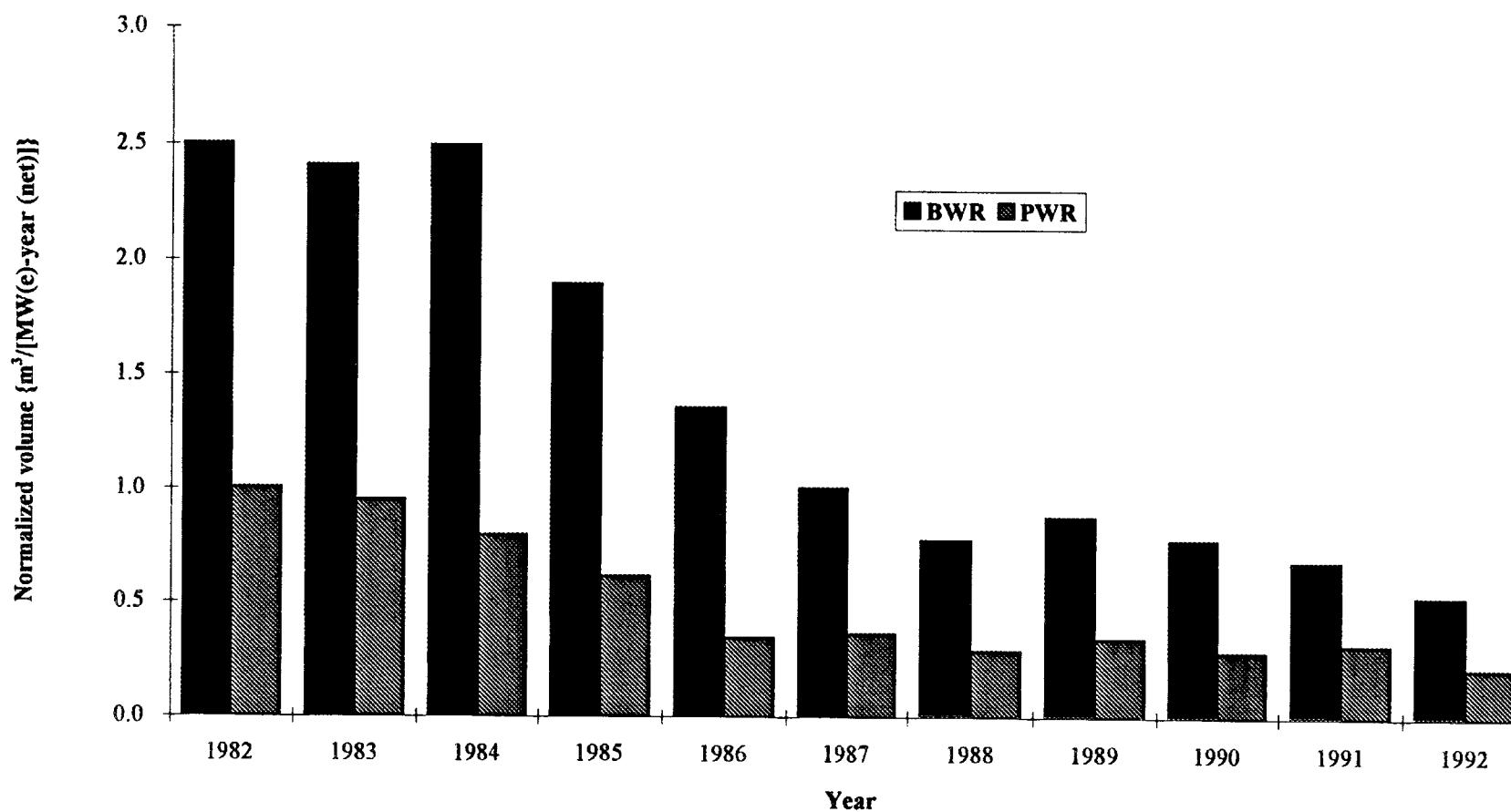


Fig. A.1. BWR and PWR normalized routine LLW volume shipped for burial, 1982-1992.

ORNL-DWG 94-14272

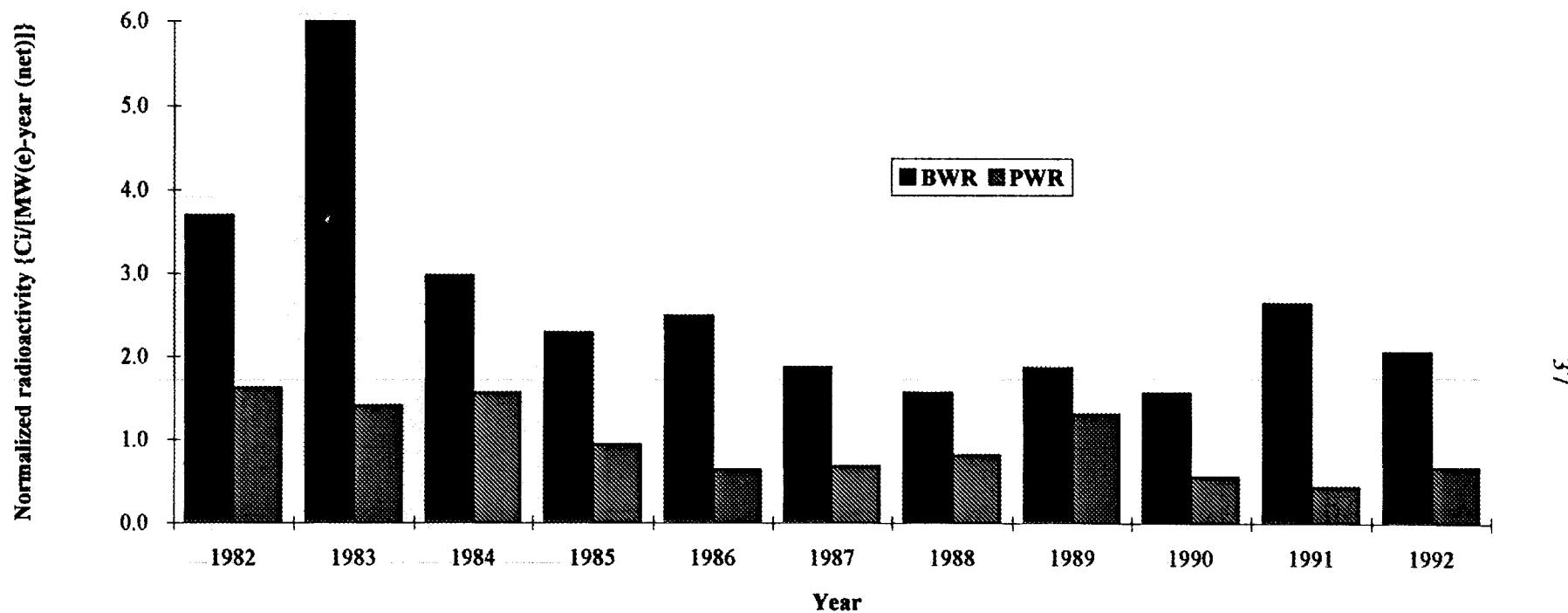


Fig. A.2. BWR and PWR normalized routine LLW radioactivity shipped for burial, 1982-1992.

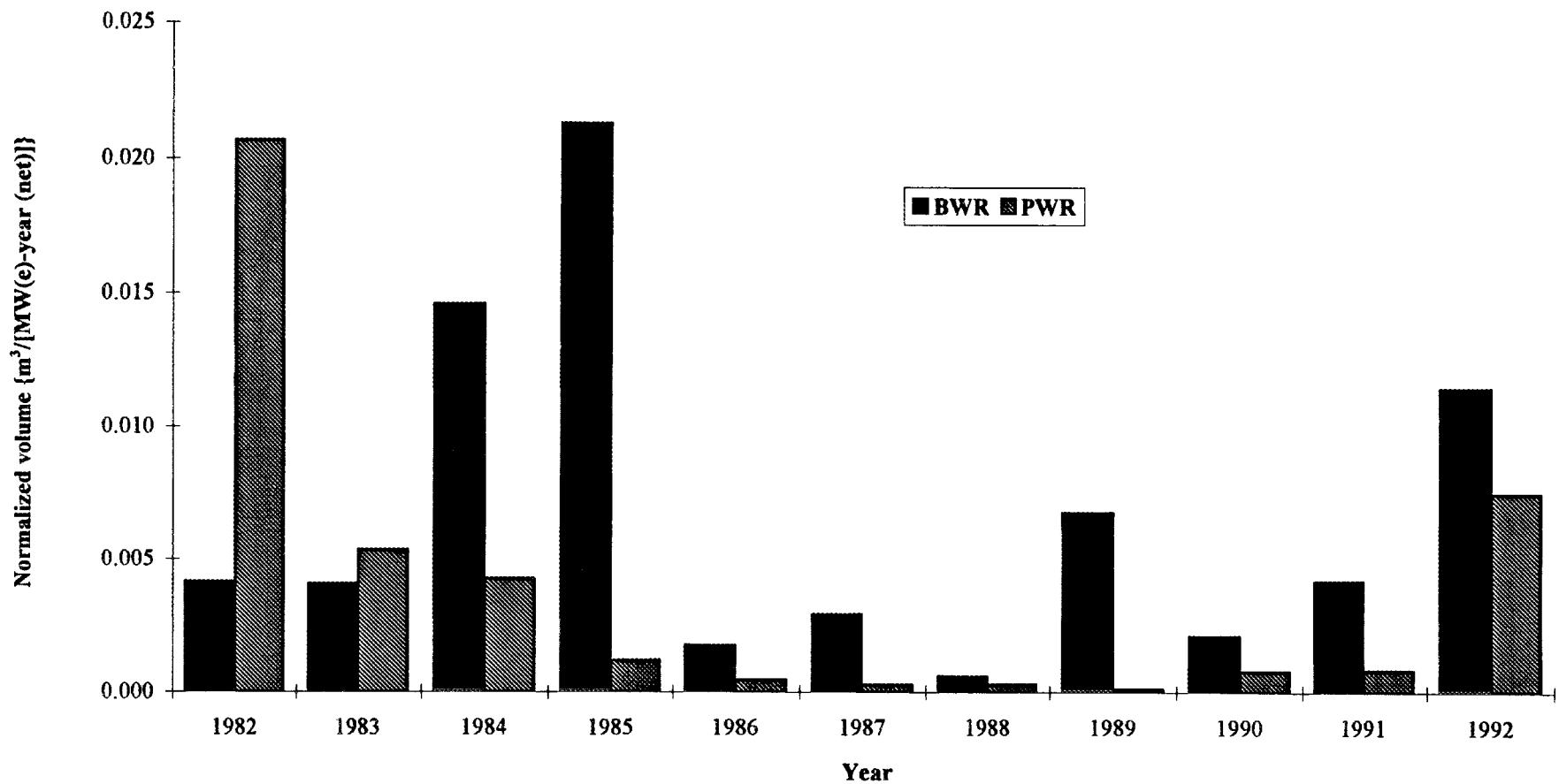


Fig. A.3. BWR and PWR normalized nonroutine LLW volume shipped for burial, 1982-1992.

ORNL-DWG 94-14274

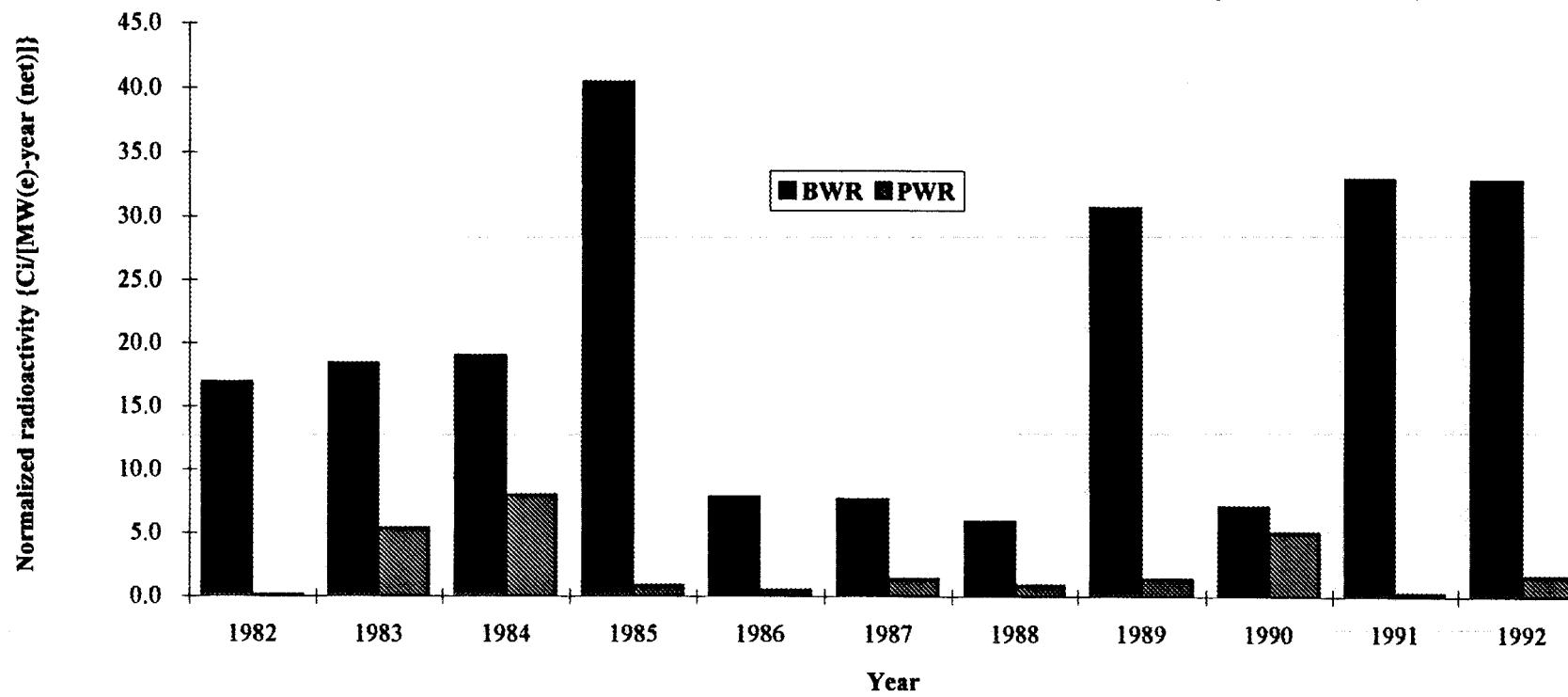


Fig. A.4. BWR and PWR normalized nonroutine LLW radioactivity shipped for burial, 1982-1992.

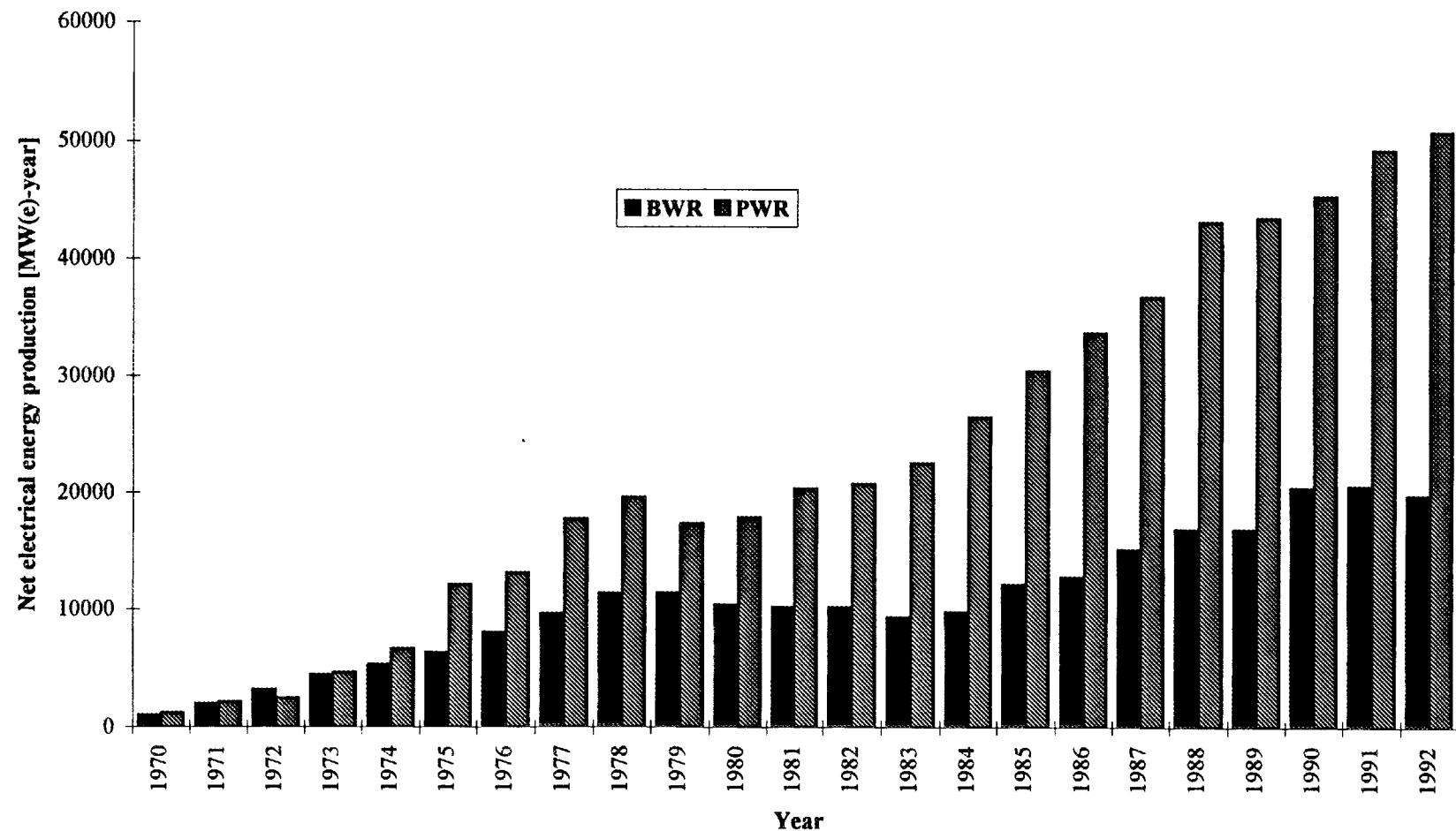


Fig. A.5. LWR net energy production, 1970-1992.

Table A.1. EIA "No New Orders" LWR energy production projections [MW(e)-year], 1993

End of calendar year	Reactor type			End of calendar year	Reactor type		
	BWR	PWR	BWR + PWR		BWR	PWR	BWR + PWR
1993	20,632	48,339	68,970	2012	16,489	45,036	61,525
1994	20,632	48,914	69,546	2013	15,247	42,134	57,380
1995	20,632	49,032	69,664	2014	13,523	36,663	50,186
1996	20,632	50,150	70,782	2015	11,849	34,365	46,214
1997	20,632	50,401	71,033	2016	11,649	32,547	44,197
1998	20,632	50,555	71,186	2017	11,010	30,031	41,040
1999	20,632	50,795	71,426	2018	10,707	28,438	39,146
2000	20,606	50,795	71,400	2019	10,438	27,550	37,989
2001	20,587	51,521	72,109	2020	10,438	26,609	37,048
2002	20,587	51,494	72,081	2021	10,438	24,134	34,572
2003	20,587	51,703	72,290	2022	9,969	22,880	32,849
2004	20,439	51,703	72,142	2023	6,866	21,321	28,187
2005	20,185	51,703	71,888	2024	5,816	17,905	23,720
2006	19,769	51,703	71,471	2025	4,592	14,625	19,217
2007	19,769	50,953	70,721	2026	2,584	10,508	13,092
2008	19,444	49,447	68,891	2027	854	7,844	8,698
2009	18,277	47,576	65,853	2028	854	5,305	6,159
2010	17,380	46,249	63,629	2029	500	4,437	4,937
2011	17,029	45,354	62,383	2030	0	3,715	3,715

Source: U.S. Department of Energy, Energy Information Administration. *World Nuclear Capacity and Fuel Cycle Requirements* 1993, DOE/EIA-0436 (93), Washington, D.C., November 1993.

Table A.2. BWR LLW volume shipped for burial in years 1982–1992 and the calculated volume per unit of energy produced for each year^a

End of calendar year	Net energy produced [MW(e)-year]	Waste type						Volume/net energy {m ³ /[MW(e)-year]}
		A (Wet)	B (Dry)	C (Nonroutine) ^b	D (Other)	A + B + D (Routine)	C (Nonroutine) ^b	
		Volume (m ³)						
1982	10,201	9,076	11,924	42.3	4,516	25,516	4.15×10^{-3}	2.50
1983	9,363	10,635	9,622	38.2	2,314	22,571	4.08×10^{-3}	2.41
1984	9,766	9,749	12,989	142.8	1,653	24,390	1.46×10^{-2}	2.50
1985	12,151	8,618	12,127	259.1	2,330	23,075	2.13×10^{-2}	1.90
1986	12,737	8,333	8,282	22.3	676	17,291	1.75×10^{-3}	1.36
1987	15,109	7,380	7,518	44.3	263	15,161	2.93×10^{-3}	1.00
1988	16,847	6,217	6,667	10.1	185	13,068	6.01×10^{-4}	0.78
1989	16,831	5,967	8,457	113.6	335	14,760	6.75×10^{-3}	0.88
1990	20,417	5,840	9,506	42.7	484	15,829	2.09×10^{-3}	0.78
1991	20,573	5,280	8,629	85.9	132	14,041	4.18×10^{-3}	0.68
1992	19,761	5,423	4,817	226.3	207	10,447	1.15×10^{-2}	0.53

^aThese values are based on the semiannual operating reports submitted by the nuclear power plants to the NRC and are compiled in a data base (Excel 5.0TM format) maintained by S. L. Loghry, Oak Ridge National Laboratory.

^bNonroutine, or Type C, wastes are those irradiated core components that are classified as LLW.

Table A.3. BWR LLW radioactivity shipped for burial in years 1982–1992 and the calculated radioactivity per unit of energy produced for each year^a

End of calendar year	Net energy produced [MW(e)-year]	Waste type						Radioactivity/net energy {Ci/[MW(e)-year]}
		A (Wet)	B (Dry)	C (Nonroutine) ^b	D (Other)	A + B + D (Routine)	C (Nonroutine) ^b	
		Radioactivity (Ci)						
1982	10,201	35,369	1,784	172,673	490.0	37,644	16.93	3.69
1983	9,363	54,741	1,337	172,530	52.8	56,130	18.43	5.99
1984	9,766	28,160	857	185,870	52.0	29,068	19.03	2.98
1985	12,151	26,864	592	491,998	307.4	27,763	40.49	2.28
1986	12,737	31,235	493	99,844	50.5	31,778	7.84	2.49
1987	15,109	27,648	653	115,899	8.5	28,310	7.67	1.87
1988	16,847	25,912	446	99,844	24.7	26,382	5.92	1.57
1989	16,831	30,566	766	517,048	36.7	31,369	30.72	1.86
1990	20,417	31,462	519	144,233	40.6	32,022	7.06	1.57
1991	20,573	53,820	449	678,699	178.3	54,447	32.99	2.65
1992	19,761	39,564	639	650,379	447.5	40,651	32.91	2.06

^aThese values are based on the semiannual operating reports submitted by the nuclear power plants to the NRC and are compiled in a data base (Excel 5.0™ format) maintained by S. L. Loghry, Oak Ridge National Laboratory.

^bNonroutine, or Type C, wastes are those irradiated core components that are classified as LLW.

Table A.4. PWR LLW volume shipped for burial in years 1982–1992 and the calculated volume per unit of energy produced for each year^a

End of calendar year	Net energy produced [MW(e)-year]	Waste type						Volume/net energy {m ³ /[MW(e)-year]}
		A (Wet)	B (Dry)	C (Nonroutine) ^b	D (Other)	A + B + D (Routine)	C (Nonroutine) ^b	
		Volume (m ³)				A + B + D (Routine)	C (Nonroutine) ^b	
1982	20,716	11,064	8,742	428.4	995	20,801	2.07×10^{-2}	1.00
1983	22,494	9,491	11,166	120.2	745	21,402	5.35×10^{-3}	0.95
1984	26,427	6,245	14,392	112.4	369	21,005	4.25×10^{-3}	0.80
1985	30,413	5,628	12,198	36.3	877	18,704	1.19×10^{-3}	0.62
1986	33,726	3,627	7,803	15.8	194	11,624	4.69×10^{-4}	0.35
1987	36,808	3,769	8,645	10.3	935	13,349	2.79×10^{-4}	0.36
1988	43,216	3,817	8,339	12.9	405	12,561	2.99×10^{-4}	0.29
1989	43,514	3,539	10,327	4.3	1,093	14,959	9.78×10^{-5}	0.34
1990	45,408	2,501	9,537	35.2	845	12,883	7.76×10^{-4}	0.28
1991	49,311	3,697	11,538	41.0	430	15,665	8.32×10^{-4}	0.32
1992	50,833	3,894	6,809	380.1	338	11,041	7.48×10^{-3}	0.22

^aThese values are based on the semiannual operating reports submitted by the nuclear power plants to the NRC and are compiled in a data base (Excel 5.0TM format) maintained by S. L. Loghry, Oak Ridge National Laboratory.

^bNonroutine, or Type C, wastes are those irradiated core components that are classified as LLW.

Table A.5. PWR LLW radioactivity shipped for burial in years 1982–1992 and the calculated radioactivity per unit of energy produced for each year^a

End of calendar year	Net energy produced [MW(e)-year]	Waste type						Radioactivity/net energy {Ci/[MW(e)-year]}
		A (Wet)	B (Dry)	C (Nonroutine) ^b	D (Other)	A + B + D (Routine)	C (Nonroutine) ^b	
		Radioactivity (Ci)						
1982	20,716	31,176	1,954	1,850	457.6	33,588	0.09	1.62
1983	22,494	30,431	817	119,856	439.7	31,688	5.33	1.41
1984	26,427	40,220	630	210,648	338.3	41,189	7.97	1.56
1985	30,413	26,489	1,665	25,772	391.2	28,545	0.85	0.94
1986	33,726	20,600	906	16,510	9.8	21,515	0.49	0.64
1987	36,808	24,133	710	50,178	127.3	24,971	1.36	0.68
1988	43,216	34,041	1,097	36,907	44.7	35,182	0.85	0.81
1989	43,514	55,901	592	60,595	339.1	56,832	1.39	1.31
1990	45,408	24,329	735	228,647	27.6	25,091	5.04	0.55
1991	49,311	20,510	801	12,648	22.7	21,334	0.26	0.43
1992	50,833	30,383	3,426	81,575	206.2	34,015	1.61	0.67

^aThese values are based on the semiannual operating reports submitted by the nuclear power plants to the NRC, and are compiled in a data base (Excel 5.0TM format) maintained by S. L. Loghry, Oak Ridge National Laboratory.

^bNonroutine, or Type C, wastes are those irradiated core components that are classified as LLW.

Table A.6. Reactor by reactor data base containing the reported net electrical energy produced and the volume and radioactivity of the LLW shipped to burial (1982–1992)

Reactor name	Net electricity produced [MW(e)-year]	Volume (m ³) for waste type				Activity (Ci) for waste type				Remarks		
		A (Wet)	B (Dry)	C (Core component)	D (Other)	A (Wet)	B (Dry)	C (Core component)	D (Other)			
<i>1992 BWR</i>												
[db <200 MW(e)]												
Big Rock Point	30.603	83.000	30.900	0.000	0.000	1553.000	8.170	0.000	0.000			
Dresden 1	0.000			(Reported with units 2 & 3)				(Reported with units 2 & 3)				
Humboldt Bay	0.000	0.000	38.600	0.000	0.000	0.000	0.064	0.000	0.000			
LaCrosse	0.000	0.000	3.720	0.000	0.000	0.000	0.436	0.000	0.000			
Subtotal	30.603	83.000	73.220	0.000	0.000	1553.000	8.670	0.000	0.000			
[db >200 MW(e)]												
Brunswick 1 & 2	351.467	192.800	211.600	8.480	0.000	1687.000	110.020	52622.800	0.000			
Dresden 2 & 3	825.562	514.000	1860.000	48.500	32.600	2290.000	39.760	30900.000	0.127			
FitzPatrick	0.000	104.770	147.700	0.000	0.000	1666.000	6.940	0.000	0.000			
Grand Gulf 1	932.439	245.000	54.800	0.000	30.200	2639.000	1.692	0.000	0.951			
Hope Creek 1	804.316	122.100	31.260	3.250	46.800	1887.000	6.042	19800.000	0.002			
LaSalle 1 & 2	1400.225	296.700	675.000	0.000	0.000	2385.000	9.000	0.000	0.000	No 2d-half data		
Millstone 1	411.931	143.900	129.180	4.800	0.000	809.000	3.387	22900.000	0.000			
Nine Mile Point 1 & 2	918.723	275.300	98.880	7.058	57.990	2119.918	17.194	81900.000	102.660			
Oyster Creek	516.992	275.500	39.230	22.830	19.310	897.900	6.560	23997.530	295.143			
Perry 1	816.014	175.700	111.770	0.000	0.000	2320.000	9.130	0.000	0.000			
Pilgrim	540.950	118.700	58.800	0.000	0.000	539.300	6.230	0.000	0.000			
Shoreham	0.000	0.000	0.000	77.090	0.000	0.000	0.000	675.900	0.000			
Susquehanna 1 & 2	1548.441	250.731	83.927	0.000	5.038	4331.333	67.888	0.000	25.670			
Subtotal	9067.061	2715.201	3502.147	172.008	191.938	23571.451	283.843	232796.230	424.553			
(f/d)												
Arnold	388.449	14.900	27.000	0.000	0.000	175.000	176.000	0.000	0.000	No 2d-half data		
Browns Ferry 1, 2 & 3	956.966	183.100	104.800	7.000	0.000	206.100	14.850	34100.000	0.000	No 2d-half data		
Clinton 1	560.046	79.900	30.300	0.000	0.000	2120.000	13.920	0.000	0.000			
Cooper	710.464	108.600	163.500	11.500	0.000	1370.000	5.600	99400.000	0.000			
Fermi 2	837.094	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000			
Hatch 1 & 2	1237.249	236.000	163.400	4.880	1.080	1526.000	11.160	36300.000	21.100			
Limerick 1 & 2	1679.015	211.000	38.300	5.080	2.860	652.000	5.310	93000.000	1.570			
Monticello	508.062	23.330	20.770	17.100	0.000	244.000	0.366	59100.000	0.000			

Table A.6. Reactor by reactor data base containing the reported net electrical energy produced and the volume and radioactivity of the LLW shipped to burial (1982–1992) (cont.)

Reactor name	Net electricity produced [MW(e)-year]	Volume (m ³) for waste type				Activity (Ci) for waste type				Remarks
		A (Wet)	B (Dry)	C (Core component)	D (Other)	A (Wet)	B (Dry)	C (Core component)	D (Other)	
<i>1992 BWR (cont.)</i>										
Peach Bottom 2 & 3	1478.773	345.210	148.810	1.626	4.211	2184.000	8.536	22300.000	0.000	
Quad Cities 1 & 2	916.240	927.010		3.890		3580.000		53383.000		No Breakdown by type
River Bend 1	315.159	218.300	210.500	0.000	0.000	682.000	7.380	0.000	0.000	
Vermont Yankee	426.032	72.600	68.170	3.250	0.000	506.000	51.510	20000.000	0.000	
WNP-2	<u>649.370</u>	<u>204.400</u>	<u>266.500</u>	<u>0.000</u>	<u>6.400</u>	<u>1194.400</u>	<u>51.825</u>	<u>0.000</u>	<u>0.235</u>	
Subtotal	10662.918	2624.350	1242.050	54.326	14.551	14439.500	346.457	417583.000	.22.905	
1992 BWR Total	19760.582	5422.551	4817.417	226.334	206.489	39563.951	638.970	650379.230	447.458	
<i>1992 PWR</i>										
(CE)										
ANO-1 (Unit 2)	627.459	51.300	123.700	0.000	0.000	2560.000	45.790	0.000	0.000	
Calvert Cliffs 1 & 2	1216.513	97.000	1320.000	1.040	0.000	581.010	3.363	5750.000	0.000	
Ft. Calhoun	287.536	32.860	31.600	0.000	0.000	439.400	1.567	0.000	0.000	
Maine Yankee	611.225	42.400	135.700	1.700	3.350	520.200	3.526	7540.000	0.120	
Millstone 2	308.588	68.900	722.146	0.204	0.000	1915.001	2700.744	1.862	0.000	
Palisades	550.370	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Palo Verde 1, 2 & 3	2921.367	207.400	200.100	0.000	17.200	1167.000	5.730	0.000	0.069	
San Onofre 2 & 3	1782.198	141.280	165.600	3.765	6.140	1427.000	15.436	152.168	102.000	
St. Lucie 1 & 2	1341.727	69.610	110.150	0.000	34.032	380.400	6.413	0.000	0.521	
Waterford 3	<u>866.169</u>	<u>54.310</u>	<u>186.200</u>	<u>1.620</u>	<u>0.000</u>	<u>922.180</u>	<u>4.340</u>	<u>3000.000</u>	<u>0.089</u>	
Subtotal	10513.153	765.060	2995.196	8.329	60.722	9912.191	2786.909	16444.030	102.799	
(B&W)										
ANO-1 (Unit 1)	664.539	(Reported with Unit 2)				(Reported with Unit 2)				
Crystal River	604.434	116.000	357.190	0.410	3.190	213.200	1.939	115.000	0.007	
Davis-Besse	872.955	33.600	3.500	0.000	0.000	40.600	0.360	0.000	0.000	
Oconee 1, 2 & 3	2015.402	140.732	120.300	0.000	0.000	1108.500	39.407	0.000	0.000	
Rancho Seco	0.000	29.700	57.000	0.000	0.000	2.930	0.747	0.000	0.000	
TMI-1	791.202	181.800	503.400	0.000	0.000	200.800	2.486	0.000	0.014	
TMI-2	<u>0.000</u>	<u>586.400</u>	<u>562.230</u>	<u>0.000</u>	<u>42.300</u>	<u>1033.730</u>	<u>239.430</u>	<u>0.000</u>	<u>1.970</u>	
Subtotal	4948.531	1088.232	1603.620	0.410	45.490	2599.760	284.369	115.000	1.991	
(West)										
Beaver Valley 1 & 2	1362.338	106.400	56.400	0.000	0.000	462.000	8.730	0.000	0.000	
Braidwood 1 & 2	1813.702	109.400	489.000	0.000	0.000	801.600	8.190	0.000	0.000	Reduced vol. not recorded

Table A.6. Reactor by reactor data base containing the reported net electrical energy produced and the volume and radioactivity of the LLW shipped to burial (1982–1992) (cont.)

Reactor name	Net electricity produced [MW(e)-year]	Volume (m ³) for waste type				Activity (Ci) for waste type				Remarks
		A (Wet)	B (Dry)	C (Core component)	D (Other)	A (Wet)	B (Dry)	C (Core component)	D (Other)	
<i>1992 PWR (cont.)</i>										
Byearon 1 & 2	1821.825	35.890	28.940	0.000	0.000	639.700	4.525	0.000	0.000	No 2d-half data
Callaway 1	922.197	37.740	48.090	0.000	2.640	1022.000	5.773	0.000	0.006	
Catawba 1 & 2	1860.018	172.250	35.050	0.000	0.000	926.734	61.844	0.000	0.000	
Comanche 1	791.928	41.990	84.730	0.000	0.000	232.000	1.915	0.000	0.003	
Cook 1 & 2	732.142	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Diablo Canyon 1 & 2	1904.883	22.580	96.200	0.000	0.000	984.000	11.070	0.000	0.000	
Farley 1 & 2	1261.304	85.200	40.000	0.000	0.000	586.300	1.630	0.000	0.000	
Ginna	396.472	21.010	33.620	0.000	0.000	583.000	1.332	0.000	0.000	
Haddam Neck	442.714	27.250	104.270	0.000	0.000	1233.700	8.812	0.000	0.000	
Harris	616.816	34.610	36.500	0.000	0.000	286.700	2.820	0.000	0.000	
Indian Pt. 2	897.255	46.935	116.820	0.000	0.000	594.100	13.219	0.000	0.000	
Indian Pt. 3	543.075	17.200	0.000	0.000	163.500	222.900	0.000	0.000	0.736	
Keweenaw	449.245	17.900	31.450	0.000	0.000	192.300	0.399	0.000	0.000	
McGuire 1 & 2	1627.405	83.620	66.700	0.000	14.410	1105.379	34.200	0.000	51.401	
Millstone 3	749.921	25.660	20.635	0.000	0.000	480.162	0.506	0.002	0.000	
No. Anna 1 & 2	1332.885	106.500	97.350	0.000	6.600	369.400	11.031	0.000	3.600	
Prairie Is. 1 & 2	765.764	10.380	27.830	0.000	0.773	27.100	0.723	0.000	0.082	
Pt. Beach 1 & 2	829.239	22.440	34.640	0.000	10.390	363.200	2.074	0.000	0.115	No 2d-half data
Robinson 2	463.046	10.830	17.200	0.000	0.000	396.900	2.530	0.000	0.000	No 1st Half data
Salem 1 & 2	1142.198	23.810	69.700	0.000	4.250	823.000	9.090	0.000	0.000	
San Onofre 1	333.492	32.460	51.900	0.140	9.090	613.087	11.914	15.900	42.700	No 2d-half data
Seabrook 1	897.633									
Sequoyah 1 & 2	1785.715	34.370	92.300	0.000	0.000	1310.500	36.600	0.000	0.000	
South Texas 1 & 2	2002.549	56.800	25.820	0.000	0.072	461.900	2.002	0.000	2.710	
Summer	856.201	84.800	28.800	0.000	0.000	263.500	4.157	0.000	0.000	
Surry 1 & 2	1329.029	105.800	104.300	0.000	0.000	395.800	13.900	0.000	0.000	
Trojan	521.628	364.000	3.150	0.000	0.000	227.000	3.183	0.000	0.000	No 2d-half data
Turkey Pt. 3&4	918.995	54.100	152.000	0.000	0.000	228.425	1.272	0.000	0.000	
Vogtle 1 & 2	1956.488	60.898	47.570	0.000	0.000	1042.900	26.530	0.000	0.000	
Wolf Creek 1	968.590	13.000	39.400	0.000	0.000	232.800	10.622	0.000	0.000	
Yankee Rowe	0.000	94.200	104.600	3.250	0.000	59.650	4.710	32300.000	0.000	
Zion 1 & 2	1074.711	80.590	11.650	0.000	19.670	704.000	41.200	0.000	0.052	No 2d-half data
Subtotal	35371.402	2040.613	2196.615	3.390	231.395	17871.736	346.504	32315.902	101.406	
1992 PWR Total	50833.086	3893.905	6795.431	12.129	337.607	30383.688	3417.782	48874.932	206.195	

Table A.6. Reactor by reactor data base containing the reported net electrical energy produced and the volume and radioactivity of the LLW shipped to burial (1982–1992) (cont.)

Reactor name	Net electricity produced [MW(e)-year]	Volume (m ³) for waste type				Activity (Ci) for waste type				Remarks
		A (Wet)	B (Dry)	C (Core component)	D (Other)	A (Wet)	B (Dry)	C (Core component)	D (Other)	
<i>1991 BWR</i>										
[db <200 MW(e)]										
Big Rock Point	55.990	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Dresden 1	0.000	(Reported with units 2 & 3)				(Reported with units 2 & 3)				
Humboldt Bay	0.000	0.000	64.800	0.000	0.000	0.000	0.142	0.000	0.000	
LaCrosse	0.000	0.000	5.460	0.000	0.000	0.000	0.323	0.000	0.000	
Subtotal	55.990	0.000	70.260	0.000	0.000	0.000	0.465	0.000	0.000	
[db >200 MW(e)]										
Brunswick 1 & 2	916.279	140.840	192.000	0.000	0.000	1175.900	56.000	0.000	0.000	
Dresden 2 & 3	631.304	237.000	2370.000	0.000	0.000	963.000	23.860	0.000	0.000	
FitzPatrick	385.210	76.334	1259.300	0.000	0.000	282.485	3.720	0.000	0.000	
Grand Gulf 1	1041.859	194.200	21.000	0.000	0.000	2666.000	16.360	0.000	0.000	
Hope Creek 1	843.525	144.900	49.800	3.250	47.700	4660.000	7.950	38400.000	0.001	
LaSalle 1 & 2	1772.471	234.050	664.100	0.000	0.000	5265.700	39.210	0.000	0.000	
Millstone 1	200.189	100.400	579.260	0.100	0.000	2240.000	5.730	0.624	0.000	
Nine Mile Point 1 & 2	1191.745	274.620	98.100	4.300	0.000	1818.500	3.843	99900.000	0.000	
Oyster Creek	336.477	323.500	89.100	20.600	15.600	1348.000	12.800	27.600	0.075	
Perry 1	1024.132	336.700	582.500	0.000	0.000	2672.000	8.570	0.000	0.000	
Pilgrim	390.662	163.100	186.400	0.000	0.000	698.000	8.039	0.000	0.000	
Shoreham	0.000	53.600	8.000	8.300	0.000	0.008	0.195	2.720	0.000	
Susquehanna 1 & 2	1808.919	366.076	85.130	21.630	0.000	18059.324	9.342	242700.000	0.000	
Subtotal	10542.772	2645.320	6184.690	58.180	63.300	41848.917	195.618	381030.944	0.076	
(f/d)										
Arnold	473.056	61.290	53.170	0.000	0.000	1106.000	16.090	0.000	0.000	
Browns Ferry 1, 2 & 3	429.972	110.900	144.600	4.850	0.000	157.200	26.930	33400.000	0.000	
Clinton 1	687.859	205.900	42.400	0.000	0.000	799.000	4.468	0.000	0.000	
Cooper	548.004	78.800	170.600	0.000	0.000	565.000	52.388	0.000	0.000	
Fermi 2	702.387	0.000	21.600	0.000	0.000	0.000	2.020	0.000	0.000	
Hatch 1 & 2	1097.771	328.000	402.000	9.170	15.380	1369.000	2.500	605.000	62.707	
Limerick 1 & 2	1743.040	475.000	37.000	0.000	6.140	404.000	5.463	0.000	111.000	
Monticello	410.104	97.700	118.300	0.000	0.000	1409.000	45.100	0.000	0.000	
Peach Bottom 2 & 3	1160.039	446.700	413.300	5.503	0.000	1891.700	19.390	83700.000	0.000	
Quad Cities 1 & 2	1008.361	407.700	347.200	0.000	0.000	1034.600	0.662	0.000	0.000	
River Bend 1	762.857	123.000	33.043	0.000	0.000	86.600	2.670	0.000	0.000	

Table A.6. Reactor by reactor data base containing the reported net electrical energy produced and the volume and radioactivity of the LLW shipped to burial (1982–1992) (cont.)

Reactor name	Net electricity produced [MW(e)-year]	Volume (m ³) for waste type				Activity (Ci) for waste type				Remarks
		A (Wet)	B (Dry)	C (Core component)	D (Other)	A (Wet)	B (Dry)	C (Core component)	D (Other)	
<i>1991 BWR (cont.)</i>										
Vermont Yankee	468.665	224.000	237.900	8.130	0.000	1505.000	63.200	180000.000	0.000	
WNP-2	482.531	145.300	156.200	0.000	0.000	1410.000	6.290	0.000	0.000	
Subtotal	9974.646	2704.290	2177.313	27.653	21.520	11737.100	247.171	297705.000	173.707	
1991 BWR Total	20573.407	5349.610	8432.263	85.833	84.820	53586.017	443.255	678735.944	173.783	
<i>1991 PWR</i>										
(CE)										
ANO-1 (Unit 2)	698.321	191.000	268.700	0.000	0.000	574.000	37.010	0.000	0.000	
Calvert Cliffs 1 & 2	1030.812	16.740	142.300	0.620	0.000	160.700	36.800	4320.000	0.000	
Ft. Calhoun	370.050	7.870	29.890	0.000	0.000	19.270	0.417	0.000	0.000	
Maine Yankee	714.621	24.300	120.400	0.000	2.400	338.300	6.720	0.000	0.976	
Millstone 2	450.003	12.200	3897.830	0.102	0.000	877.300	1.908	0.211	0.000	
Palisades	553.177	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Palo Verde 1, 2 & 3	2862.854	290.000	187.400	0.000	5.600	880.000	10.700	0.000	0.086	
San Onofre 2 & 3	1648.758	23.560	140.400	0.000	0.000	680.000	6.700	0.000	0.000	
St. Lucie 1 & 2	1487.265	83.790	91.250	0.000	7.101	818.000	7.374	0.000	0.207	
Waterford 3	829.226	23.120	269.010	0.000	0.000	781.300	2.143	0.000	0.000	
Subtotal	10645.086	672.580	5147.180	0.722	15.101	5128.870	109.772	4320.211	1.270	
(B&W)										
ANO-1 (Unit 1)	746.100	(Reported with Unit 2)			(Reported with Unit 2)					
Crystal River	622.539	147.600	553.000	0.000	15.100	224.800	13.100	0.000	0.700	
Davis-Besse	667.950	75.500	0.000	0.000	0.300	3.170	0.000	0.000	0.960	
Oconee 1, 2 & 3	2170.916	44.546	95.890	0.000	0.000	396.639	35.663	0.000	0.000	
Rancho Seco	0.000	16.510	22.750	0.052	0.365	226.200	17.650	1.670	0.001	
TMI-1	646.562	122.700	496.250	0.000	0.000	383.800	0.782	0.000	0.000	
TMI-2	0.000	73.000	315.000	0.000	0.000	209.700	11.010	0.000	0.000	
Subtotal	4854.068	479.856	1482.890	0.052	15.765	1444.309	78.205	1.670	1.661	
(West)										
Beaver Valley 1 & 2	1198.099	141.200	1093.000	0.000	0.000	1049.000	30.700	0.000	0.000	
Braidwood 1 & 2	1313.670	109.700	797.000	0.000	0.000	57.860	7.320	0.000	0.000	
Byearon 1 & 2	1720.273	176.889	104.470	0.000	0.000	332.300	45.460	0.000	0.000	
Callaway 1	1138.418	88.100	45.100	0.000	0.000	1488.000	23.576	0.000	0.000	

Table A.6. Reactor by reactor data base containing the reported net electrical energy produced and the volume and radioactivity of the LLW shipped to burial (1982–1992) (cont.)

Reactor name	Net electricity produced [MW(e)-year]	Volume (m ³) for waste type				Activity (Ci) for waste type				Remarks
		A (Wet)	B (Dry)	C (Core component)	D (Other)	A (Wet)	B (Dry)	C (Core component)	D (Other)	
<i>1991 PWR (cont.)</i>										
Catawba 1 & 2	1590.089	16.010	27.460	0.000	0.000	296.900	5.524	0.000	0.000	
Comanche 1	609.257	5.830	84.330	0.000	0.000	0.012	0.844	0.000	0.000	
Cook 1 & 2	1770.948	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Diablo Canyon 1 & 2	1718.533	61.600	127.200	0.000	0.000	1692.000	5.790	0.000	0.000	
Farley 1 & 2	1386.175	79.900	69.700	0.000	0.000	1027.500	4.980	0.000	0.000	
Ginna	396.584	25.900	24.070	0.000	0.000	2.303	0.889	0.000	0.000	
Haddam Neck	422.481	23.846	110.181	0.000	0.000	332.000	4.957	0.000	0.000	
Harris	675.507	35.650	38.400	0.000	0.000	164.470	29.340	0.000	0.000	
Indian Pt. 2	438.909	53.438	433.970	0.000	0.000	77.500	18.659	0.000	0.000	
Indian Pt. 3	832.851	17.900	79.770	0.000	31.800	16.357	2.427	0.000	1.230	
Keweenaw	419.230	18.450	43.400	0.000	50.412	475.600	4.603	0.000	4.513	
McGuire 1 & 2	1866.168	3.230	26.260	0.000	0.000	241.500	244.500	0.000	0.000	
Millstone 3	323.962	35.390	170.237	0.000	0.000	103.187	1.799	0.000	0.000	
No. Anna 1 & 2	1518.380	133.000	763.000	0.000	36.300	288.000	13.198	0.000	0.004	
Prairie Is. 1 & 2	965.558	1052.300	2573.000	0.000	271.588	180.000	8.197	0.000	1.506	
Pt. Beach 1 & 2	834.639	23.928	63.390	0.000	9.070	217.380	2.763	0.000	0.307	
Robinson 2	546.140	13.410	45.150	0.000	0.000	9.492	4.694	0.000	0.000	
Salem 1 & 2	1649.863	12.600	79.300	3.000	8.200	440.000	9.220	230.000	0.000	
San Onofre 1	230.907	0.000	90.400	0.000	2.500	0.000	4.430	0.000	1.320	
Seabrook 1	774.338	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Sequoyah 1 & 2	1892.168	65.000	161.400	0.000	3.410	1736.000	31.580	0.000	6.640	
South Texas 1 & 2	1649.455	51.060	48.820	0.000	0.000	95.100	2.993	0.000	0.000	
Summer	610.500	28.830	39.370	0.000	0.000	119.600	44.543	0.000	0.000	
Surry 1 & 2	1206.497	30.870	1295.000	0.000	0.000	775.000	43.060	0.000	0.000	
Trojan	167.165	72.590	71.230	0.000	0.000	34.300	5.361	0.000	0.000	
Turkey Pt. 3&4	229.640	5.520	75.190	0.000	33.580	1.270	1.608	0.000	8.695	
Vogtle 1 & 2	1870.062	33.700	34.950	0.000	0.000	586.000	10.127	0.000	0.000	
Wolf Creek 1	668.334	27.200	56.700	0.000	0.000	409.380	4.300	0.000	0.000	
Yankee Rowe	113.173	76.410	85.000	0.000	0.000	83.440	1.412	0.000	0.000	
Zion 1 & 2	1064.339	78.320	0.000	0.000	0.000	1925.000	0.000	0.000	0.000	
Subtotal	33812.312	2597.771	8756.448	3.000	446.860	14256.452	618.853	230.000	24.215	
1991 PWR Total	49311.465	3750.207	15386.518	3.774	477.726	20829.631	806.830	4551.881	27.146	

Table A.6. Reactor by reactor data base containing the reported net electrical energy produced and the volume and radioactivity of the LLW shipped to burial (1982–1992) (cont.)

Reactor name	Net electricity produced [MW(e)-year]	Volume (m ³) for waste type				Activity (Ci) for waste type				Remarks
		A (Wet)	B (Dry)	C (Core component)	D (Other)	A (Wet)	B (Dry)	C (Core component)	D (Other)	
<i>1990 BWR</i>										
[db <200 MW(e)]										
Big Rock Point	48.409	18.269	110.700	0.000	0.000	123.230	2.129	0.000	0.000	
Dresden 1	0.000		(Reported with units 2 & 3)				(Reported with units 2 & 3)			
Humboldt Bay	0.000	0.000	25.900	0.000	3.400	0.000	0.084	0.000	0.007	
LaCrosse	0.000	0.000	4.590	0.000	0.000	0.000	0.744	0.000	0.000	
Subtotal	48.409	18.269	141.190	0.000	3.400	123.230	2.956	0.000	0.007	
[db >200 MW(e)]										
Brunswick 1 & 2	954.956	174.800	314.500	0.000	0.000	1168.000	91.500	0.000	0.000	
Dresden 2 & 3	1051.613	246.000	1780.000	0.000	388.000	478.000	30.480	0.000	0.908	
FitzPatrick	524.974	125.600	157.200	0.000	0.000	2033.800	16.791	0.000	0.000	
Grand Gulf 1	846.695	127.900	34.100	0.000	0.000	1348.000	2.139	0.000	0.000	
Hope Creek 1	924.040	239.000	36.100	0.000	31.300	2288.000	6.200	0.000	1.578	
LaSalle 1 & 2	1690.756	189.600	714.100	0.000	0.000	2890.000	56.600	0.000	0.000	
Millstone 1	581.753	185.200	269.681	4.600	0.000	635.000	19.539	33400.000	0.000	
Nine Mile Point 1 & 2	611.486	513.300	63.980	0.000	9.080	1384.628	2.072	0.000	0.000	
Oyster Creek	491.146	248.800	66.000	2.200	5.700	914.000	11.710	195.000	10.090	
Perry 1	740.958	260.700	1095.800	0.000	0.000	1909.000	29.920	0.000	0.000	
Pilgrim	484.055	158.200	213.000	0.000	0.000	653.000	9.405	0.000	0.000	
Shoreham	0.000	35.800	11.800	2.800	0.000	0.006	0.092	0.819	0.000	
Susquehanna 1 & 2	1679.979	284.914	122.070	0.000	0.000	2950.270	8.192	0.000	0.000	
Subtotal	10582.412	2789.814	4878.331	9.600	434.080	18651.704	284.640	33595.819	12.576	
(fd)										
Arnold	343.551	66.790	264.170	3.250	0.000	1524.300	28.587	36300.000	0.000	
Browns Ferry 1, 2 & 3	0.000	97.000	156.900	0.000	14.400	16.760	14.610	0.000	15.600	
Clinton 1	407.539	205.600	65.900	0.000	0.000	543.000	0.853	0.000	0.000	
Cooper	583.091	81.800	178.200	0.000	0.000	171.910	11.300	0.000	0.000	
Fermi 2	808.789	286.000	939.000	3.250	0.000	1062.000	15.510	19800.000	0.000	
Hatch 1 & 2	1209.396	335.000	1014.000	18.490	17.200	2454.000	7.840	26047.000	9.990	
Limerick 1 & 2	1486.728	611.000	73.000	0.000	2.100	1231.000	6.700	0.000	2.350	
Monticello	514.023	59.300	34.700	0.000	0.000	1162.000	8.788	0.000	0.000	
Peach Bottom 2 & 3	1622.964	636.930	625.230	8.128	12.720	1696.230	35.739	28490.000	0.119	
Quad Cities 1 & 2	1104.809	362.800	846.400	0.000	0.000	1211.000	29.770	0.000	0.000	
River Bend 1	637.983	138.540	105.410	0.000	0.000	389.500	12.250	0.000	0.000	

Table A.6. Reactor by reactor data base containing the reported net electrical energy produced and the volume and radioactivity of the LLW shipped to burial (1982–1992) (cont.)

Reactor name	Net electricity produced [MW(e)-year]	Volume (m ³) for waste type				Activity (Ci) for waste type				Remarks
		A (Wet)	B (Dry)	C (Core component)	D (Other)	A (Wet)	B (Dry)	C (Core component)	D (Other)	
<i>1990 BWR (cont.)</i>										
Vermont Yankee	412.533	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
WNP-2	655.034	150.800	183.000	0.000	0.000	1226.000	59.700	0.000	0.000	
Subtotal	<u>9786.440</u>	<u>3031.560</u>	<u>4485.910</u>	<u>33.118</u>	<u>46.420</u>	<u>12687.700</u>	<u>231.647</u>	<u>110637.000</u>	<u>28.052</u>	
1990 BWR Total	20417.261	5839.643	9505.431	42.718	483.900	31462.634	519.243	144232.819	40.642	
<i>1990 PWR</i>										
(CE)										
ANO-1 (Unit 2)	816.743	11.300	157.700	0.000	0.000	0.013	14.240	0.000	0.000	
Calvert Cliffs 1 & 2	146.745	3.700	314.000	1.240	0.000	61.900	9.240	405.000	0.000	
Ft. Calhoun	273.776	8.940	113.040	0.000	0.000	4.728	2.753	0.000	0.000	
Maine Yankee	554.498	7.100	153.100	0.000	0.000	107.000	12.500	0.000	0.000	No data for 1st half
Millstone 2	605.115	39.200	477.226	0.000	0.000	6.044	4.373	0.000	0.000	
Palisades	340.104	43.648	241.110	0.000	0.000	66.674	20.674	0.000	0.000	
Palo Verde 1, 2 & 3	2349.725	565.000	195.200	0.000	5.650	232.000	8.320	0.000	0.000	
San Onofre 2 & 3	1698.891	1.360	115.000	0.000	0.000	26.600	4.850	0.000	0.000	
St. Lucie 1 & 2	1119.533	45.710	118.420	1.625	57.090	662.000	8.160	5210.000	6.240	
Waterford 3	981.546	15.450	167.690	0.000	7.430	308.200	0.997	0.000	0.009	
Subtotal	<u>8886.675</u>	<u>741.408</u>	<u>2052.486</u>	<u>2.865</u>	<u>70.170</u>	<u>1475.160</u>	<u>86.107</u>	<u>5615.000</u>	<u>6.250</u>	
(B&W)										
ANO-1 (Unit 1)	470.281	(Reported with Unit 2)			(Reported with Unit 2)					
Crystal River	472.611	58.400	836.000	0.416	27.100	78.030	26.800	110.000	5.400	
Davis-Besse	475.549	61.300	112.100	3.200	25.600	22.560	4.890	2230.000	1.045	
Oconee 1, 2 & 3	2298.202	123.610	315.340	0.000	0.000	1772.030	15.450	0.000	0.000	
Rancho Seco	0.000	15.000	5.890	0.000	10.271	369.000	0.126	0.000	0.006	
TMI-1	604.944	142.240	439.900	0.000	0.850	646.711	5.859	0.000	0.000	
TMI-2	0.000	15.940	328.800	0.000	0.000	7745.400	1.540	0.000	0.000	
Subtotal	<u>4321.587</u>	<u>416.490</u>	<u>2038.030</u>	<u>3.616</u>	<u>63.821</u>	<u>10633.731</u>	<u>54.665</u>	<u>2340.000</u>	<u>6.451</u>	
(West)										
Beaver Valley 1 & 2	1197.565	40.330	746.000	0.000	0.000	537.920	5.847	0.000	0.000	
Braidwood 1 & 2	1665.422	57.200	332.000	0.000	0.000	73.320	12.200	0.000	0.000	
Byearon 1 & 2	1477.119	113.370	129.900	0.000	0.000	475.420	23.820	0.000	0.000	
Callaway 1	912.393	53.000	481.000	0.000	0.000	312.400	12.400	0.000	0.000	
Catawba 1 & 2	1518.075	26.897	92.511	0.000	0.000	6.740	14.180	0.000	0.000	

Table A.6. Reactor by reactor data base containing the reported net electrical energy produced and the volume and radioactivity of the LLW shipped to burial (1982–1992) (cont.)

Reactor name	Net electricity produced [MW(e)-year]	Volume (m ³) for waste type				Activity (Ci) for waste type				Remarks
		A (Wet)	B (Dry)	C (Core component)	D (Other)	A (Wet)	B (Dry)	C (Core component)	D (Other)	
<i>1990 PWR (cont.)</i>										
Comanche 1	391.495	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Cook 1 & 2	1267.962	27.270	167.800	0.000	0.000	56.100	87.500	0.000	0.000	
Diablo Canyon 1 & 2	1856.481	22.900	59.500	0.000	0.000	289.600	1.746	0.000	0.000	
Farley 1 & 2	1387.098	70.050	80.850	0.000	0.000	283.992	4.780	0.000	0.000	
Ginna	392.449	104.000	107.600	0.000	0.000	226.600	6.560	0.000	0.000	
Haddam Neck	131.636	41.430	103.355	21.540	0.000	698.730	21.969	220000.000	0.000	
Harris	723.135	13.530	65.600	0.000	0.000	22.550	8.850	0.000	0.000	
Indian Pt. 2	591.965	58.890	200.800	0.413	0.000	1566.400	25.399	491.000	0.000	
Indian Pt. 3	574.010	35.120	33.670	0.000	597.400	1026.300	9.810	0.000	13.620	
Keweenaw	444.996	22.380	46.700	0.000	41.530	352.200	1.154	0.000	0.659	
McGuire 1 & 2	1277.113	136.460	123.230	0.000	0.000	951.540	26.806	0.000	0.000	
Millstone 3	937.513	0.000	65.878	0.000	0.000	0.000	4.183	0.000	0.000	
No. Anna 1 & 2	1506.980	89.500	689.000	0.000	7.020	710.000	14.140	0.000	0.000	
Prairie Is. 1 & 2	870.793	31.856	0.000	0.000	2.351	322.700	0.000	0.000	0.232	
Pt. Beach 1 & 2	835.623	44.350	85.880	0.000	0.000	38.570	2.745	0.000	0.000	
Robinson 2	377.965	8.250	61.690	0.000	0.000	7.740	6.701	0.000	0.000	
Salem 1 & 2	1296.471	12.600	76.600	0.000	0.000	143.000	1.780	0.000	0.000	
San Onofre 1	176.194	0.269	50.600	0.000	0.000	9.380	4.200	0.000	0.000	
Seabrook 1	465.513	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Sequoia 1 & 2	1597.375	40.500	218.100	0.000	0.000	63.890	33.840	0.000	0.000	
South Texas 1 & 2	1417.684	11.630	46.000	0.000	0.000	13.260	0.588	0.000	0.000	
Summer	697.461	29.100	82.800	0.000	0.000	207.300	15.125	0.000	0.000	
Surry 1 & 2	1210.354	34.300	655.000	0.000	13.000	1125.000	6.510	0.000	0.004	
Trojan	692.881	16.990	155.700	0.000	0.000	0.056	1.580	0.000	0.000	No data for 2nd half
Turkey Pt. 3&4	892.406	28.670	160.700	0.000	25.600	682.000	11.515	0.000	0.277	
Vogtle 1 & 2	1619.361	13.220	14.780	0.000	0.000	191.100	0.071	0.000	0.000	No data for 2nd half
Wolf Creek 1	898.299	11.600	71.500	0.000	0.000	26.998	4.704	0.000	0.000	
Yankee Rowe	94.273	42.500	133.000	6.800	0.000	2.740	5.730	161.000	0.000	
Zion 1 & 2	803.438	99.230	17.034	0.000	18.480	1796.300	215.210	0.000	0.001	
Subtotal	32199.500	1337.392	5356.778	28.753	705.381	12219.846	591.643	220652.000	14.793	
1990 PWR Total	45407.762	2495.290	9447.294	35.234	839.372	24328.737	732.415	228607.000	27.494	

Table A.6. Reactor by reactor data base containing the reported net electrical energy produced and the volume and radioactivity of the LLW shipped to burial (1982–1992) (cont.)

Reactor name	Net electricity produced [MW(e)-year]	Volume (m ³) for waste type				Activity (Ci) for waste type				Remarks
		A (Wet)	B (Dry)	C (Core component)	D (Other)	A (Wet)	B (Dry)	C (Core component)	D (Other)	
<i>1989 BWR</i>										
[db <200 MW(e)]										
Big Rock Point	47.396	36.134	37.380	0.000	0.000	369.000	2.580	0.000	0.000	
Dresden 1	0.000			(Reported with units 2 & 3)				(Reported with units 2 & 3)		
Humboldt Bay	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
LaCrosse	0.000	4.620	2.120	0.000	0.000	31.900	0.223	0.000	0.000	
Subtotal	47.396	40.754	39.500	0.000	0.000	400.900	2.803	0.000	0.000	
[db >200 MW(e)]										
Brunswick 1 & 2	954.426	185.100	272.400	14.100	0.000	3562.000	16.340	2000.000	0.000	
Dresden 2 & 3	1125.249	364.200	1221.000	14.200	0.000	2500.000	33.820	3.970	0.000	
FitzPatrick	702.184	60.800	84.000	1.600	0.000	1047.340	11.800	25200.000	0.000	No data for 1st half.
Grand Gulf 1	892.785	908.100	109.300	0.000	0.000	199.800	5.729	0.000	0.000	
Hope Creek 1	753.649	101.500	65.400	0.000	0.000	522.000	5.392	0.000	0.000	
LaSalle 1 & 2	1443.444	378.900	500.200	0.000	0.000	4320.000	40.655	0.000	0.000	
Millstone 1	529.509	163.900	568.620	4.400	0.000	1768.000	20.385	18119.700	0.000	
Nine Mile Point 1 & 2	486.882	341.692	256.900	0.000	197.319	722.370	5.243	0.000	11.606	
Oyster Creek	273.227	156.300	214.800	44.000	5.100	1178.000	19.320	232000.000	24.200	
Perry 1	607.978	138.900	829.100	0.000	0.000	895.000	22.510	0.000	0.000	
Pilgrim	194.816	125.000	76.600	0.000	0.000	275.100	0.611	0.000	0.000	
Shoreham	0.000	17.900	0.000	0.000	0.000	0.035	0.000	0.000	0.000	
Susquehanna 1 & 2	1510.359	226.700	199.900	0.000	3.313	1146.000	26.980	0.000	0.014	
Subtotal	9474.507	3170.992	4398.220	78.300	205.732	18135.645	208.785	277323.670	35.820	
(f/d)										
Arnold	358.097	56.300	88.430	1.630	0.000	977.700	50.183	15900.000	0.000	
Browns Ferry 1, 2 & 3	0.000	81.600	350.700	0.000	125.200	102.000	43.380	0.000	0.885	
Clinton 1	323.284	290.000	758.500	0.000	0.000	1889.000	2.201	0.000	0.000	
Cooper	545.969	124.400	168.000	0.000	0.000	306.000	0.409	0.000	0.000	
Fermi 2	592.414	283.000	82.900	0.000	0.000	701.000	0.049	0.000	0.000	
Hatch 1 & 2	1211.374	349.200	640.100	0.000	4.460	1903.000	5.642	0.000	0.026	
Limerick 1 & 2	715.941	427.040	166.200	0.637	0.000	2569.000	8.750	31400.000	0.000	
Monticello	301.958	29.200	185.000	2.230	0.000	455.000	6.808	59200.000	0.000	
Peach Bottom 2 & 3	462.244	365.500	494.300	1.634	0.028	866.000	23.400	844.000	0.000	
Quad Cities 1 & 2	1142.846	268.100	681.600	29.200	0.000	714.100	17.610	132400.000	0.000	
River Bend 1	545.860	322.000	194.100	0.000	0.000	836.000	4.570	0.000	0.000	
Vermont Yankee	411.451	4.840	0.000	0.000	0.000	2.150	0.000	0.000	0.000	

Table A.6. Reactor by reactor data base containing the reported net electrical energy produced and the volume and radioactivity of the LLW shipped to burial (1982–1992) (cont.)

Reactor name	Net electricity produced [MW(e)-year]	Volume (m ³) for waste type				Activity (Ci) for waste type				Remarks
		A (Wet)	B (Dry)	C (Core component)	D (Other)	A (Wet)	B (Dry)	C (Core component)	D (Other)	
<i>1989 BWR (cont.)</i>										
WNP-2	<u>697.905</u>	<u>153.900</u>	<u>209.700</u>	<u>0.000</u>	<u>0.000</u>	<u>708.000</u>	<u>391.690</u>	<u>0.000</u>	<u>0.000</u>	
Subtotal	<u>7309.342</u>	<u>2755.080</u>	<u>4019.530</u>	<u>35.331</u>	<u>129.688</u>	<u>12028.950</u>	<u>554.692</u>	<u>239744.000</u>	<u>0.911</u>	
1989 BWR Total	16831.245	5966.826	8457.250	113.631	335.420	30565.495	766.280	517067.670	36.731	
<i>1989 PWR</i>										
(CE)										
ANO-1 (Unit 2)	624.105	18.300	203.300	0.000	0.000	283.000	12.640	0.000	0.000	
Calvert Cliffs 1 & 2	310.198	15.920	145.200	0.000	0.000	402.900	5.560	0.000	0.000	
Ft. Calhoun	375.448	0.000	175.400	0.000	0.000	0.000	8.755	0.000	0.000	
Maine Yankee	791.890	23.300	171.800	0.000	0.000	230.820	5.500	0.000	0.000	
Millstone 2	557.551	24.200	299.880	0.000	0.000	550.716	4.705	0.000	0.000	
Palisades	411.768	47.860	170.400	0.413	0.114	104.700	11.140	4112.000	0.005	
Palo Verde 1, 2 & 3	895.542	501.000	373.000	0.000	0.000	655.000	19.190	0.000	0.000	
San Onofre 2 & 3	1604.152	73.700	65.400	0.000	19.680	2490.000	1.490	0.000	222.000	
St. Lucie 1 & 2	1413.586	50.520	225.830	0.000	41.440	166.400	1.718	0.000	0.643	
Waterford 3	<u>867.692</u>	<u>34.770</u>	<u>569.570</u>	<u>0.000</u>	<u>147.630</u>	<u>401.935</u>	<u>4.070</u>	<u>0.000</u>	<u>0.557</u>	
Subtotal	7851.932	789.570	2399.780	0.413	208.864	5285.470	74.768	4112.000	223.205	
(B&W)										
ANO-1 (Unit 1)	384.820	(Reported with Unit 2)			(Reported with Unit 2)					
Crystal River	334.245	66.500	280.700	0.000	0.000	2399.100	4.940	0.000	0.000	
Davis-Besse	836.372	65.800	52.100	0.000	0.000	206.100	1.719	0.000	0.000	
Oconee 1, 2 & 3	2086.479	173.181	212.550	1.084	37.983	1390.490	4.832	2.798	63.210	
Rancho Seco	163.054	209.640	34.830	0.000	0.000	282.780	44.373	0.000	0.000	
TMI-1	823.269	94.840	236.900	0.000	0.000	49.509	0.987	0.000	0.000	
TMI-2	<u>0.000</u>	<u>55.840</u>	<u>1121.400</u>	<u>0.000</u>	<u>0.000</u>	<u>13863.000</u>	<u>15.296</u>	<u>0.000</u>	<u>0.000</u>	
Subtotal	4628.241	665.801	1938.480	1.084	37.983	18190.979	72.147	2.798	63.210	
(West)										
Beaver Valley 1 & 2	956.077	43.000	795.000	0.000	0.000	1318.000	4.830	0.000	0.000	
Braidwood 1 & 2	1343.256	63.100	247.000	0.000	0.000	384.600	4.565	0.000	0.000	
Byearon 1 & 2	1711.936	89.920	41.370	0.000	0.000	894.100	0.880	0.000	0.000	
Callaway 1	951.888	106.100	161.300	0.000	136.600	595.000	4.940	0.000	0.000	
Catawba 1 & 2	1627.771	62.982	145.530	0.000	7.264	676.441	4.450	0.000	8.210	
Cook 1 & 2	1379.652	41.700	346.000	0.000	0.000	1155.000	15.670	0.000	0.000	

Table A.6. Reactor by reactor data base containing the reported net electrical energy produced and the volume and radioactivity of the LLW shipped to burial (1982–1992) (cont.)

Reactor name	Net electricity produced [MW(e)-year]	Volume (m ³) for waste type				Activity (Ci) for waste type				Remarks
		A (Wet)	B (Dry)	C (Core component)	D (Other)	A (Wet)	B (Dry)	C (Core component)	D (Other)	
<i>1989 PWR (cont.)</i>										
Diablo Canyon 1 & 2	1809.376	31.900	155.000	0.000	0.000	420.000	8.830	0.000	0.000	
Farley 1 & 2	1327.363	134.100	351.000	0.000	0.000	387.900	12.320	0.000	0.000	
Ginna	349.020	130.410	102.800	0.000	0.000	68.800	11.063	0.000	0.000	
Haddam Neck	337.269	27.250	125.730	0.000	0.000	635.030	20.100	0.000	0.000	
Harris	642.465	108.900	45.400	0.000	0.000	11.140	2.510	0.000	0.000	
Indian Pt. 2	507.178	31.340	446.500	0.000	0.000	333.910	26.200	0.000	0.000	
Indian Pt. 3	566.813	45.390	2.970	0.000	528.000	341.600	3.710	0.000	4.700	
Kewaunee	426.855	16.880	47.600	0.000	2.780	770.800	3.400	0.000	0.200	
McGuire 1 & 2	1735.540	172.900	247.630	0.000	15.080	600.252	13.820	0.000	18.150	
Millstone 3	807.336	37.600	152.510	0.000	0.000	735.876	3.503	0.000	0.000	
No. Anna 1 & 2	1163.567	172.600	499.000	0.000	5.090	1672.000	52.350	0.000	0.000	
Prairie Is. 1 & 2	944.498	37.090	77.310	0.000	1.552	65.190	37.370	0.000	0.044	
Pt. Beach 1 & 2	810.624	12.190	93.520	0.000	0.000	252.700	1.878	0.000	0.000	
Robinson 2	316.969	15.940	58.100	0.000	0.000	181.490	3.810	0.000	0.000	
Salem 1 & 2	1600.525	34.400	87.000	1.050	0.000	1140.000	7.470	55400.000	0.000	
San Onofre 1	133.060	43.190	43.700	0.000	2.690	1711.600	2.330	0.000	5.200	
Sequoyah 1 & 2	1779.979	107.000	335.000	0.000	22.710	2474.700	153.600	0.000	13.970	
South Texas 1 & 2	1139.605	23.300	27.000	0.000	0.000	7.070	0.169	0.000	0.000	
Summer	620.789	44.400	96.980	0.000	0.000	373.885	1.226	0.000	0.000	
Surry 1 & 2	463.622	51.800	482.000	0.000	3.700	1284.000	28.980	0.000	0.835	
Trojan	604.507	70.630	116.900	0.000	0.000	437.900	3.200	0.000	0.000	No data for 2nd half
Turkey Pt. 3&4	638.224	0.000	225.800	0.000	120.600	0.000	0.890	0.000	1.370	
Vogtle 1 & 2	1636.151	30.120	70.050	0.000	0.000	14.908	0.207	0.000	0.000	
Wolf Creek 1	1107.605	23.100	67.900	0.000	0.000	0.140	1.320	0.000	0.000	No data for 2nd half
Yankee Rowe	149.110	116.300	181.600	0.000	0.000	11.940	5.889	0.000	0.000	
Zion 1 & 2	1445.251	158.540	55.300	0.000	0.000	13469.000	3.689	0.000	0.000	
Subtotal	31033.881	2084.072	5930.500	1.050	846.066	32424.972	445.169	55400.000	52.679	
1989 PWR Total	43514.053	3539.443	10268.760	2.547	1092.913	55901.421	592.085	59514.798	339.094	
<i>1988 BWR</i>										
[db <200 MW(e)]										
Big Rock Point	43.630	17.850	71.650	0.827	0.000	145.000	0.840	651.000	0.000	
Dresden 1	0.000									
Humboldt Bay	0.000	0.000	35.400	0.000	4.500	0.000	0.092	0.000	0.007	EG&G data
LaCrosse	0.000	4.620	1.900	0.000	0.000	70.300	0.019	0.000	0.000	
Subtotal	43.630	22.470	108.950	0.827	4.500	215.300	0.952	651.000	0.007	

Table A.6. Reactor by reactor data base containing the reported net electrical energy produced and the volume and radioactivity of the LLW shipped to burial (1982–1992) (cont.)

Reactor name	Net electricity produced [MW(e)-year]	Volume (m ³) for waste type				Activity (Ci) for waste type				Remarks
		A (Wet)	B (Dry)	C (Core component)	D (Other)	A (Wet)	B (Dry)	C (Core component)	D (Other)	
<i>1988 BWR (cont.)</i>										
[B] > 200 MW(e)]										
Brunswick 1 & 2	955.567	316.240	315.000	0.000	58.400	3050.000	24.070	0.000	0.635	
Dresden 2 & 3	964.810	423.400	1921.600	4.660	0.000	1330.000	207.900	2.060	0.000	
FitzPatrick	497.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	No data
Grand Gulf 1	1093.130	346.000	152.700	0.000	0.000	709.000	6.370	0.000	0.000	
Hope Creek 1	796.914	250.900	28.500	0.000	11.900	3232.000	0.409	0.000	0.000	
LaSalle 1 & 2	1266.352	372.000	496.700	0.000	0.000	3351.100	20.840	0.000	0.000	
Millstone 1	631.499	188.200	125.500	3.900	0.000	1378.013	2.973	94043.000	0.000	
Nine Mile Point 1 & 2	403.807	447.000	136.600	0.000	0.000	687.580	6.718	0.000	0.000	
Oyster Creek	403.690	153.870	40.800	0.740	5.000	1603.510	35.570	4970.000	19.000	
Perry 1	829.349	215.600	279.700	0.000	0.000	554.000	4.860	0.000	0.000	
Pilgrim	0.000	101.810	170.000	0.000	0.000	216.630	2.090	0.000	0.000	
Shoreham	0.000	62.600	0.000	0.000	0.000	0.019	0.000	0.000	0.000	
Susquehanna 1 & 2	1630.919	628.529	600.470	0.000	103.030	2641.674	9.645	0.000	0.767	
Subtotal	9473.056	3506.149	4267.570	9.300	178.330	18753.525	321.445	99015.060	20.402	
(f/d)										
Arnold	360.849	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	No data
Browns Ferry 1, 2 & 3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	No data
Clinton 1	667.621	147.500	139.000	0.000	0.000	58.520	2.899	0.000	0.000	
Cooper	479.193	128.000	180.800	0.000	0.000	145.800	1.189	0.000	0.000	
Fermi 2	482.567	176.800	61.400	0.000	0.000	279.290	1.517	0.000	0.000	
Hatch 1 & 2	953.544	359.000	476.000	0.000	1.100	2015.000	4.213	0.000	4.200	
Limerick 1	761.359	413.000	364.320	0.000	0.000	786.320	9.170	0.000	0.000	
Monticello	521.741	52.100	95.700	0.000	0.000	278.400	14.350	0.000	0.000	
Peach Bottom 2 & 3	0.000	230.700	607.900	0.000	0.000	1111.000	76.870	0.000	0.000	
Quad Cities 1 & 2	1122.352	597.100	0.000	0.000	0.000	494.100	0.000	0.000	0.000	EG&G data
River Bend 1	826.943	263.000	42.600	0.000	0.000	349.000	0.996	0.000	0.000	
Vermont Yankee	469.294	75.200	98.200	0.000	0.000	417.000	7.650	0.000	0.000	
WNP-2	684.503	245.300	224.240	0.000	0.850	1009.000	4.290	0.000	0.076	
Subtotal	7329.967	2687.700	2290.160	0.000	1.950	6943.430	123.144	0.000	4.276	
1988 BWR Total	16846.654	6216.319	6666.680	10.127	184.780	25912.255	445.540	99666.060	24.685	

Table A.6. Reactor by reactor data base containing the reported net electrical energy produced and the volume and radioactivity of the LLW shipped to burial (1982–1992) (cont.)

Reactor name	Net electricity produced [MW(e)-year]	Volume (m ³) for waste type				Activity (Ci) for waste type				Remarks
		A (Wet)	B (Dry)	C (Core component)	D (Other)	A (Wet)	B (Dry)	C (Core component)	D (Other)	
<i>1988 PWR</i>										
(CE)										
ANO-1 (Unit 2)	564.491	58.210	138.530	0.000	0.000	816.300	5.639	0.000	0.000	
Calvert Cliffs 1 & 2	1338.580	20.860	222.000	0.000	0.000	1120.000	6.760	0.000	0.000	
Ft. Calhoun	299.728	3.250	45.490	0.000	0.000	15.150	2.312	0.000	0.000	
Maine Yankee	572.348	20.400	116.550	0.000	0.000	385.200	51.200	0.000	0.000	
Millstone 2	653.962	61.500	204.400	0.000	0.000	45.226	5.382	0.000	0.000	
Palisades	388.333	69.604	116.860	0.826	0.000	121.840	7.000	1247.000	0.000	
Palo Verde 1, 2 & 3	2616.985	496.337	282.000	0.000	0.000	761.130	15.555	0.000	0.000	
San Onofre 2 & 3	1726.506	69.900	187.300	0.000	3.124	2540.000	10.070	0.000	1.869	
St. Lucie 1 & 2	1557.911	43.790	358.600	3.250	61.160	953.500	26.789	11870.000	0.999	
Waterford 3	745.652	34.301	157.220	0.736	88.400	571.200	2.691	3850.000	3.166	
Subtotal	10464.494	878.152	1828.950	4.812	152.684	7329.546	133.398	16967.000	6.034	
(B&W)										
ANO-1 (Unit 1)	450.273	(Reported with Unit 2)				(Reported with Unit 2)				65
Crystal River	658.004	50.800	175.300	0.000	83.390	1063.000	11.520	0.000	10.055	
Davis-Besse	135.119	42.300	130.000	0.000	0.000	170.000	2.000	0.000	0.000	
Oconee 1, 2 & 3	2131.756	404.160	313.750	4.880	44.550	3015.410	26.770	11130.000	3.070	
Rancho Seco	326.764	242.000	103.980	0.000	4.880	7.100	55.415	0.000	0.000	
TMI-1	623.083	123.900	113.400	0.000	0.000	689.552	2.460	0.000	0.000	
TMI-2	0.000	174.290	744.200	0.000	0.000	6527.000	651.500	0.000	0.000	
Subtotal	4324.999	1037.450	1580.630	4.880	132.820	11472.062	749.665	11130.000	13.125	
(West)										
Beaver Valley 1 & 2	1315.034	51.000	181.000	0.000	0.000	422.700	4.960	0.000	0.000	
Braidwood 1 & 2	944.989	51.100	32.100	0.000	0.000	3.460	0.048	0.000	0.000	
Byearon 1 & 2	1443.185	155.620	71.730	0.000	0.000	506.900	2.111	0.000	0.000	
Callaway 1	1019.297	63.260	29.800	0.000	0.000	944.290	1.280	0.000	0.000	
Catawba 1 & 2	1574.813	85.000	162.360	0.000	6.730	675.810	29.620	0.000	16.850	
Cook 1 & 2	1116.935	26.400	219.400	0.000	0.000	555.000	3.130	0.000	0.000	
Diablo Canyon 1 & 2	1310.819	24.000	215.800	0.000	0.000	384.800	7.790	0.000	0.000	
Farley 1 & 2	1491.785	99.890	396.000	0.000	0.000	1455.800	15.990	0.000	0.000	
Ginna	402.020	91.260	75.800	0.000	0.000	347.000	32.800	0.000	0.000	EG&G data
Haddam Neck	377.343	30.030	90.180	0.000	0.000	328.000	8.267	0.000	0.000	
Harris	607.744	117.100	32.640	0.000	0.000	9.200	0.436	0.000	0.000	
Indian Pt. 2	689.324	25.290	215.250	0.000	0.000	445.210	21.332	0.000	0.000	

Table A.6. Reactor by reactor data base containing the reported net electrical energy produced and the volume and radioactivity of the LLW shipped to burial (1982–1992) (cont.)

Reactor name	Net electricity produced [MW(e)-year]	Volume (m ³) for waste type				Activity (Ci) for waste type				Remarks
		A (Wet)	B (Dry)	C (Core component)	D (Other)	A (Wet)	B (Dry)	C (Core component)	D (Other)	
<i>1988 PWR (cont.)</i>										
Indian Pt. 3	765.675	12.650	169.000	0.000	0.000	353.300	3.410	0.000	0.000	
Kewaunee	446.592	20.853	48.500	0.000	5.550	482.147	0.766	0.000	0.040	
McGuire 1 & 2	1761.604	260.900	221.530	0.000	28.470	390.085	16.200	0.000	2.697	
Millstone 3	875.510	78.900	93.900	0.000	0.000	530.778	2.842	0.000	0.000	
No. Anna 1 & 2	1686.205	109.590	108.160	0.000	2.970	768.020	2.651	0.000	0.058	
Prairie Is. 1 & 2	880.059	32.895	0.000	0.000	23.963	136.281	0.000	0.000	1.792	
Pt. Beach 1 & 2	861.240	27.200	137.200	0.000	30.160	654.200	2.801	0.000	3.770	
Robinson 2	362.608	22.740	61.500	0.000	0.000	370.900	3.442	0.000	0.000	
Salem 1 & 2	1524.736	110.900	248.000	0.000	0.000	367.400	12.900	0.000	0.000	
San Onofre 1	156.668	0.000	28.900	0.000	1.912	0.000	2.696	0.000	1.367	
Sequoyah 1 & 2	449.511	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
South Texas 1	432.557	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Summer	578.958	50.800	110.000	0.000	0.000	97.800	9.630	0.000	0.000	
Surry 1 & 2	713.658	46.500	426.000	0.000	0.000	178.500	15.860	0.000	0.000	
Trojan	723.108	76.500	35.170	0.000	0.000	426.500	2.457	0.000	0.000	
Turkey Pt. 3&4	772.682	33.660	53.900	0.000	19.900	572.000	0.461	0.000	0.254	⑤
Vogtle 1	774.667	20.800	26.400	0.000	0.000	25.300	0.172	0.000	0.000	
Wolf Creek 1	758.610	10.230	116.000	0.000	0.000	1270.000	1.660	0.000	0.000	
Yankee Rowe	127.411	20.400	98.100	3.250	0.000	43.850	1.149	8810.000	0.000	
Zion 1 & 2	1480.953	140.990	1222.400	0.000	0.000	2493.900	6.519	0.000	0.000	
Subtotal	28426.301	1896.458	4926.720	3.250	119.655	15239.131	213.380	8810.000	26.829	
1988 PWR Total	43215.794	3812.060	8336.300	12.942	405.159	34040.740	1096.443	36907.000	45.988	

<i>1987 BWR</i>									
[db <200 MW(e)]									
Big Rock Point	42.624	0.000	65.810	8.168	0.000	0.000	2.900	2294.000	0.000
Dresden 1	0.000	(Reported with units 2 & 3)				(Reported with units 2 & 3)			
Humboldt Bay	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LaCrosse	0.000	0.000	29.300	0.000	0.000	0.000	0.003	0.000	0.000
Subtotal	42.624	0.000	95.110	8.168	0.000	0.000	2.903	2294.000	0.000
[db >200 MW(e)]									
Brunswick 1 & 2	1111.195	344.140	481.000	7.160	11.300	5046.000	22.680	39704.740	0.172
Dresden 2 & 3	882.190	801.600	997.700	0.000	0.000	779.000	46.800	0.000	0.000
FitzPatrick	478.935	158.900	341.900	0.000	0.000	631.200	12.980	0.000	0.000

Table A.6. Reactor by reactor data base containing the reported net electrical energy produced and the volume and radioactivity of the LLW shipped to burial (1982–1992) (cont.)

Reactor name	Net electricity produced [MW(e)-year]	Volume (m ³) for waste type				Activity (Ci) for waste type				Remarks
		A (Wet)	B (Dry)	C (Core component)	D (Other)	A (Wet)	B (Dry)	C (Core component)	D (Other)	
<i>1987 BWR (cont.)</i>										
Grand Gulf 1	880.292	325.000	66.300	0.413	0.000	1608.000	2.550	41.700	0.000	
Hope Creek 1	827.139	386.900	34.200	0.000	0.000	360.200	2.430	0.000	0.000	
LaSalle 1 & 2	983.168	511.330	255.900	0.000	0.000	2288.500	6.701	0.000	0.000	
Millstone 1	499.430	157.500	200.320	0.000	0.000	503.100	243.141	0.000	0.000	
Nine Mile Point 1 & 2	565.550	410.090	96.500	0.000	0.660	229.900	0.395	0.000	0.003	
Oyster Creek	354.929	134.900	96.200	5.200	0.000	819.000	20.050	34000.000	0.000	
Perry 1	275.762	489.300	0.000	0.000	0.000	45.210	0.000	0.000	0.000	
Pilgrim	0.000	156.660	370.160	0.000	0.000	303.560	11.375	0.000	0.000	
Shorcham	0.000	62.600	0.000	0.000	0.000	0.096	0.000	0.000	0.000	
Susquehanna 1 & 2	<u>1683.931</u>	<u>554.238</u>	<u>307.000</u>	<u>0.000</u>	<u>59.330</u>	<u>2097.412</u>	<u>6.571</u>	<u>0.000</u>	<u>0.374</u>	
Subtotal	8542.522	4493.158	3247.180	12.773	71.290	14711.178	375.673	73746.440	0.549	
<i>(f/d)</i>										
Arnold	287.852	131.267	306.100	0.000	57.432	986.690	74.620	0.000	2.867	
Browns Ferry 1, 2 & 3	0.000	318.000	980.000	0.000	0.000	609.000	42.800	0.000	0.000	
Clinton 1	207.967	0.000	51.000	0.000	0.000	0.000	0.141	0.000	0.000	
Cooper	629.948	161.300	179.500	0.000	0.000	356.200	3.327	0.000	0.000	
Fermi 2	156.674	222.900	13.500	0.000	0.000	79.890	13.800	0.000	0.000	
Hatch 1 & 2	1235.713	324.000	446.900	3.630	3.260	1795.000	7.580	9.090	4.570	
Limerick 1	606.820	381.000	0.000	0.000	0.000	2150.000	0.000	0.000	0.000	
Monticello	403.075	67.500	148.100	0.000	2.895	552.200	13.510	0.000	0.118	
Peach Bottom 2 & 3	343.631	410.600	1016.000	0.000	118.390	3796.000	92.240	0.000	0.301	
Quad Cities 1 & 2	1073.965	317.300	583.700	19.116	0.000	902.100	5.443	28053.000	0.000	
River Bend 1	558.771	275.000	132.000	0.000	0.000	339.000	5.810	0.000	0.000	
Vermont Yankee	403.424	81.900	140.700	0.634	0.000	287.300	12.210	11800.000	0.000	
WNP-2	<u>615.786</u>	<u>196.000</u>	<u>178.370</u>	<u>0.000</u>	<u>0.850</u>	<u>1083.600</u>	<u>2.860</u>	<u>0.000</u>	<u>0.003</u>	
Subtotal	<u>6523.627</u>	<u>2886.767</u>	<u>4175.870</u>	<u>23.380</u>	<u>182.827</u>	<u>12936.980</u>	<u>274.341</u>	<u>39862.090</u>	<u>2.860</u>	
1987 BWR Total	15108.772	7379.925	7518.160	44.321	254.117	27648.158	652.916	115902.530	8.408	
<i>1987 PWR</i>										
<i>(CE)</i>										
ANO-1 (Unit 2)	753.592	170.200	352.400	0.000	0.000	1605.000	21.840	0.000	0.000	
Calvert Cliffs 1 & 2	1148.708	16.660	223.800	0.000	3.550	616.000	9.730	0.000	15.000	
Ft. Calhoun	349.831	47.510	78.560	0.000	0.000	535.800	11.386	0.000	0.000	
Maine Yankee	461.203	14.590	60.410	0.000	0.000	188.200	1.320	0.000	0.000	

Table A.6. Reactor by reactor data base containing the reported net electrical energy produced and the volume and radioactivity of the LLW shipped to burial (1982–1992) (cont.)

Reactor name	Net electricity produced [MW(e)-year]	Volume (m ³) for waste type				Activity (Ci) for waste type				Remarks
		A (Wet)	B (Dry)	C (Core component)	D (Other)	A (Wet)	B (Dry)	C (Core component)	D (Other)	
<i>1987 PWR (cont.)</i>										
Millstone 2	786.279	18.510	99.630	1.610	0.000	100.920	1.101	21200.000	0.000	
Palisades	294.516	36.280	147.050	0.000	39.160	96.910	8.600	0.000	0.390	
Palo Verde 1, 2 & 3	1535.286	458.410	4.810	0.000	0.000	974.310	1.330	0.000	0.000	
San Onofre 2 & 3	1598.717	16.080	223.900	0.000	5.312	253.000	17.120	0.000	0.444	
St. Lucie 1 & 2	1330.842	42.590	196.100	0.000	114.360	1040.900	10.750	0.000	0.686	
Waterford 3	<u>847.120</u>	<u>151.200</u>	<u>142.500</u>	<u>0.000</u>	<u>89.500</u>	<u>175.452</u>	<u>2.450</u>	<u>0.000</u>	<u>0.254</u>	
Subtotal	9106.094	972.030	1529.160	1.610	251.882	5586.492	85.627	21200.000	16.774	
 (B&W)										
ANO-1 (Unit 1)	543.401	(Reported with Unit 2)				(Reported with Unit 2)				
Crystal River	413.049	141.700	143.500	0.000	4.670	650.000	24.600	0.000	0.003	
Davis-Besse	581.267	6.600	78.200	0.000	0.000	2.530	0.674	0.000	0.000	
Oconee 1, 2 & 3	1864.216	183.810	547.100	0.000	123.070	1968.328	22.370	0.000	20.570	
Rancho Seco	0.000	0.000	158.900	0.000	0.000	0.000	3.510	0.000	0.000	
TMI-1	573.251	154.730	93.180	0.000	0.000	145.950	92.568	0.000	0.000	
TMI-2	<u>0.000</u>	<u>148.500</u>	<u>509.920</u>	<u>0.000</u>	<u>0.000</u>	<u>267.820</u>	<u>50.914</u>	<u>0.000</u>	<u>0.000</u>	
Subtotal	3975.183	635.340	1530.800	0.000	127.740	3034.628	194.636	0.000	20.573	
 (West)										
Beaver Valley 1 & 2	783.015	8.870	67.600	0.000	0.000	31.570	0.667	0.000	0.000	
Braidwood 1	165.284	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Byearon 1 & 2	1139.678	179.881	126.370	0.000	0.000	862.290	3.288	0.000	0.000	
Callaway 1	716.837	94.600	125.000	0.000	0.000	304.400	7.663	0.000	0.000	
Catawba 1 & 2	1545.441	72.210	192.780	0.000	7.530	275.000	3.840	0.000	0.001	
Cook 1 & 2	1147.654	122.900	340.000	0.000	0.000	2253.000	50.790	0.000	0.000	
Diablo Canyon 1 & 2	1597.125	22.260	143.100	0.000	0.000	119.250	1.730	0.000	0.000	
Farley 1 & 2	1294.489	51.500	481.500	0.000	0.000	321.490	12.030	0.000	0.000	
Ginna	432.697	104.700	59.900	0.000	0.000	212.000	4.440	0.000	0.000	
Haddam Neck	288.296	43.440	276.280	0.000	0.000	534.300	10.138	0.000	0.000	
Harris	449.266	105.000	0.000	0.000	0.000	2.610	0.000	0.000	0.000	
Indian Pt. 2	584.847	87.200	142.500	0.000	0.000	828.790	5.100	0.000	0.000	
Indian Pt. 3	553.341	36.970	0.000	2.160	277.800	255.000	0.000	74.800	3.170	
Kewaunee	457.292	43.220	38.000	0.000	11.100	452.770	4.550	0.000	0.438	
McGuire 1 & 2	1702.178	127.970	377.800	0.000	196.860	293.343	5.460	0.000	24.405	
Millstone 3	769.173	14.100	85.420	0.000	0.000	55.160	3.950	0.000	0.000	

Table A.6. Reactor by reactor data base containing the reported net electrical energy produced and the volume and radioactivity of the LLW shipped to burial (1982–1992) (cont.)

Reactor name	Net electricity produced [MW(e)-year]	Volume (m ³) for waste type				Activity (Ci) for waste type				Remarks
		A (Wet)	B (Dry)	C (Core component)	D (Other)	A (Wet)	B (Dry)	C (Core component)	D (Other)	
<i>1987 PWR (cont.)</i>										
No. Anna 1 & 2	1052.060	201.600	423.000	0.000	0.000	1605.000	30.020	0.000	0.000	
Prairie Is. 1 & 2	914.928	51.740	80.120	0.000	10.499	406.317	23.900	0.000	1.037	
Pt. Beach 1 & 2	818.304	37.710	117.550	0.000	0.000	1420.073	5.279	0.000	0.000	
Robinson 2	482.584	35.600	65.600	0.000	0.000	247.850	10.630	0.000	0.000	
Salem 1 & 2	1407.185	43.700	285.300	0.000	0.000	958.000	11.147	0.000	0.000	
San Onofre 1	277.061	4.020	29.980	0.000	6.940	25.700	22.500	0.000	2.072	
Sequoiah 1 & 2	0.000	68.760	352.000	0.000	0.000	847.600	130.300	0.000	0.000	
Summer	589.869	122.700	252.700	0.000	4.700	607.000	41.320	0.000	28.000	
Surry 1 & 2	1017.849	64.000	614.000	6.500	0.000	576.600	13.850	28800.000	0.000	
Trojan	495.981	143.920	186.790	0.000	0.000	397.700	11.688	0.000	0.000	
Turkey Pt. 3&4	397.663	69.500	220.830	0.000	16.900	906.000	1.474	0.000	24.802	
Vogtle 1	504.976	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Wolf Creek 1	738.213	77.400	46.400	0.000	3.750	6.541	1.050	0.000	3.930	
Yankee Rowe	129.606	25.100	161.000	0.000	0.000	4.793	4.040	0.000	0.000	
Zion 1 & 2	1273.713	101.320	290.930	0.000	19.300	701.800	8.881	0.000	2.115	
Subtotal	23723.603	2161.891	5582.450	8.660	555.379	15511.947	429.725	28874.800	89.969	
1987 PWR Total	36807.881	3769.261	8642.410	10.270	935.001	24133.067	709.988	50074.800	127.317	

<i>1986 BWR</i>									
[db <200 MW(e)]									
Big Rock Point	57.740	5.522	35.680	0.368	0.000	19.700	2.000	230.000	0.000
Dresden 1	0.000	(Reported with units 2 & 3)				(Reported with units 2 & 3)			
Humboldt Bay	0.000	143.300	452.000	0.000	3.610	329.310	19.080	0.000	1.297
LaCrosse	17.931	4.810	0.000	0.000	0.000	77.800	0.000	0.000	0.000
Subtotal	75.670	153.632	487.680	0.368	3.610	426.810	21.080	230.000	1.297
[db >200 MW(e)]									
Brunswick 1 & 2	1013.558	336.000	588.000	2.250	8.300	2025.000	32.800	7770.000	0.060
Dresden 2 & 3	696.391	1412.000	719.000	8.307	0.000	6800.000	17.720	30600.000	0.000
FitzPatrick	686.243	158.520	294.240	0.000	9.090	557.220	163.360	0.000	0.009
Grand Gulf 1	467.494	324.000	114.900	0.000	0.000	1356.000	4.373	0.000	0.000
Hope Creek 1	53.948	84.500	0.000	0.000	0.000	5.140	0.000	0.000	0.000
LaSalle 1 & 2	882.401	556.000	246.000	0.000	0.000	1190.000	5.430	0.000	0.000
Millstone 1	598.670	158.276	541.770	0.000	0.000	770.000	14.690	0.000	0.000
Nine Mile Point 1	358.987	190.700	440.000	2.550	91.920	708.370	2.013	6.840	10.119

Table A.6. Reactor by reactor data base containing the reported net electrical energy produced and the volume and radioactivity of the LLW shipped to burial (1982–1992) (cont.)

Reactor name	Net electricity produced [MW(e)-year]	Volume (m ³) for waste type			Activity (Ci) for waste type				Remarks
		A (Wet)	B (Dry)	C (Core component)	D (Other)	A (Wet)	B (Dry)	C (Core component)	
<i>1986 BWR (cont.)</i>									
Oyster Creek	148.469	142.500	449.000	0.000	0.000	768.300	27.260	0.000	0.000
Perry 1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pilgrim	117.218	239.269	362.212	0.000	0.000	434.997	2.951	0.000	0.000
Shoreham	0.000	44.700	0.000	0.000	0.000	0.147	0.000	0.000	0.000
Susquehanna 1 & 2	<u>1286.620</u>	<u>568.931</u>	<u>238.736</u>	<u>0.000</u>	<u>59.872</u>	<u>2506.561</u>	<u>15.200</u>	<u>0.000</u>	<u>7.385</u>
Subtotal	6309.999	4215.396	3993.858	13.107	169.182	17121.735	285.797	38376.840	17.573
(fd)									
Arnold	343.609	122.330	129.660	0.790	0.000	1576.640	26.000	19873.000	0.000
Browns Ferry 1, 2 & 3	0.000	297.500	726.000	0.000	288.000	1448.000	27.520	0.000	12.700
Cooper	462.256	192.300	256.000	0.963	0.000	483.000	5.970	94.300	0.000
Fermi 2	0.000	125.180	22.923	0.000	0.000	21.206	0.039	0.000	0.000
Hatch 1 & 2	828.667	421.500	841.200	0.000	101.800	856.000	22.520	0.000	3.420
Limerick 1	781.297	576.000	0.000	0.000	0.000	753.000	0.000	0.000	0.000
Monticello	385.050	96.200	194.100	3.260	0.000	1146.000	77.700	26900.000	0.000
Peach Bottom 2 & 3	1339.940	799.406	582.837	1.614	105.141	4487.116	5.058	14300.000	14.917
Quad Cities 1 & 2	1043.058	636.832	680.597	0.000	0.000	2132.452	3.910	0.000	0.000
River Bend 1	341.711	463.000	0.000	0.000	0.000	80.980	0.000	0.000	0.000
Vermont Yankee	234.819	52.000	255.400	2.240	0.000	195.800	16.600	69.400	0.000
WNP-2	<u>591.284</u>	<u>181.750</u>	<u>112.140</u>	<u>0.000</u>	<u>7.909</u>	<u>506.130</u>	<u>0.561</u>	<u>0.000</u>	<u>0.544</u>
Subtotal	<u>6351.693</u>	<u>3963.998</u>	<u>3800.857</u>	<u>8.867</u>	<u>502.850</u>	<u>13686.324</u>	<u>185.878</u>	<u>61236.700</u>	<u>31.581</u>
1986 BWR Total	12737.362	8333.026	8282.395	22.342	675.642	31234.868	492.755	99843.540	50.451
<i>1986 PWR</i>									
(CE)									
ANO-1 (Unit 2)	605.203	83.300	37.620	0.000	0.000	216.889	1.251	0.000	0.000
Calvert Cliffs 1 & 2	1464.454	17.630	194.500	0.000	0.000	445.300	5.940	0.000	0.000
Ft. Calhoun	411.312	72.530	43.570	0.000	0.000	21.378	6.826	0.000	0.000
Maine Yankee	712.042	77.070	118.550	0.000	0.000	133.930	30.483	0.000	0.000
Millstone 2	588.746	77.761	(Unit 1)	10.705	0.000	1436.700	(Unit 1)	4730.000	0.000
Palisades	95.967	33.557	205.300	0.000	0.329	240.400	24.880	0.000	0.020
Palo Verde 1 & 2	970.300	113.300	0.000	0.000	0.000	3.440	0.000	0.000	0.000
San Onofre 2 & 3	1496.976	9.400	265.300	0.000	9.550	167.000	13.190	0.000	4.755
St. Lucie 1 & 2	1505.657	69.000	379.000	0.000	11.700	2120.000	14.820	0.000	0.017
Waterford 3	<u>832.945</u>	<u>77.100</u>	<u>96.800</u>	<u>0.000</u>	<u>0.000</u>	<u>36.260</u>	<u>1.200</u>	<u>0.000</u>	<u>0.000</u>
Subtotal	8683.602	630.648	1340.640	10.705	21.579	4821.297	98.590	4730.000	4.792

Table A.6. Reactor by reactor data base containing the reported net electrical energy produced and the volume and radioactivity of the LLW shipped to burial (1982–1992) (cont.)

Reactor name	Net electricity produced [MW(e)-year]	Volume (m ³) for waste type				Activity (Ci) for waste type				Remarks
		A (Wet)	B (Dry)	C (Core component)	D (Other)	A (Wet)	B (Dry)	C (Core component)	D (Other)	
<i>1986 PWR (cont.)</i>										
(B&W)										
ANO-1 (Unit 1)	407.616		(Reported with Unit 2)				(Reported with Unit 2)			
Crystal River	302.671	190.600	173.600	0.000	0.000	1330.000	16.670	0.000	0.000	
Davis-Besse	0.398	3.320	136.650	0.000	0.000	1.181	1.010	0.000	0.000	
Oconee 1, 2 & 3	1899.403	165.470	539.600	0.000	54.600	821.530	27.040	0.000	2.873	
Rancho Seco	0.000	75.860	78.600	0.470	1.060	948.093	43.770	10.100	0.079	
TMI-1	549.654	134.700	77.960	0.000	0.000	7.304	0.394	0.000	0.000	EG&G data.
TMI-2	0.000	59.200	269.376	0.000	0.000	40.855	17.198	0.000	0.000	
Subtotal	3159.741	629.150	1275.786	0.470	55.660	3148.963	106.082	10.100	2.952	
(West)										
Beaver Valley 1	545.117	26.850	68.000	0.000	0.000	442.000	40.540	0.000	0.000	
Byearon 1	843.715	242.730	74.894	0.000	0.000	98.109	0.872	0.000	0.000	
Callaway 1	821.254	88.100	79.700	0.000	0.000	16.040	3.020	0.000	0.000	
Catawba 1 & 2	739.185	23.340	164.140	0.000	5.210	11.380	1.600	0.000	0.280	
Cook 1 & 2	1253.210	190.600	337.000	0.000	0.000	1516.000	69.171	0.000	0.000	
Diablo Canyon 1 & 2	1350.837	25.300	66.900	0.000	0.000	6.590	0.380	0.000	0.000	EG&G data.
Farley 1 & 2	1327.704	42.120	201.380	1.370	0.000	1226.600	1.971	570.000	0.000	EG&G data.
Ginna	411.849	34.150	78.000	0.000	0.000	116.700	22.000	0.000	0.000	
Haddam Neck	243.248	120.180	294.100	0.000	0.000	562.560	23.630	0.000	0.000	
Indian Pt. 2	434.702	88.600	416.200	0.000	0.000	243.953	4.646	0.000	0.000	EG&G data.
Indian Pt. 3	630.342	9.620	10.000	0.000	0.000	23.170	2.654	0.000	0.000	EG&G data.
Kewaunee	439.730	12.352	32.400		8.330	129.014	3.580		0.524	
McGuire 1 & 2	1297.575	172.120	474.200	0.000	11.670	644.216	5.350	0.000	0.001	
Millstone 3	668.693	5.470	0.000	0.000	0.000	0.517	0.000	0.000	0.000	No waste shipped Jan-June.
No. Anna 1 & 2	1406.889	230.000	285.400	0.000	14.200	548.000	248.600	0.000	0.001	EG&G data.
Prairie Is. 1 & 2	876.076	25.226	85.820	0.000	16.482	145.693	8.908	0.000	0.185	EG&G data.
Pt. Beach 1 & 2	819.943	19.626	88.304	0.000	0.000	1349.780	0.419	0.000	0.000	
Robinson 2	547.345	279.970	173.100	0.000	0.000	115.000	43.000	0.000	0.000	
Salem 1 & 2	1413.625	16.500	445.000	0.000	9.100	436.000	16.480	0.000	0.130	
San Onofre 1	99.725	4.020	240.700	0.000	5.940	370.000	11.560	0.000	0.431	
Sequoyah 1 & 2	0.000	95.800	328.000	3.260	0.000	1960.000	155.000	11200.000	0.000	EG&G data.
Summer	816.865	75.800	36.400	0.000	0.000	13.595	1.391	0.000	0.000	
Surry 1 & 2	1025.276	56.900	582.000	0.000	0.000	1140.000	16.100	0.000	0.000	
Trojan	808.833	112.780	135.530	0.000	0.000	617.059	7.614	0.000	0.000	
Turkey Pt. 3&4	711.221	65.420	257.900	0.000	0.000	84.644	4.098	0.000	0.000	

Table A.6. Reactor by reactor data base containing the reported net electrical energy produced and the volume and radioactivity of the LLW shipped to burial (1982–1992) (cont.)

Reactor name	Net electricity produced [MW(e)-year]	Volume (m ³) for waste type				Activity (Ci) for waste type				Remarks
		A (Wet)	B (Dry)	C (Core component)	D (Other)	A (Wet)	B (Dry)	C (Core component)	D (Other)	
<i>1986 PWR (cont.)</i>										
Wolf Creek 1	794.668	150.100	22.700	0.000	0.000	144.360	0.008	0.000	0.000	
Yankee Rowe	158.877	22.300	38.600	0.000	6.600	3.100	0.596	0.000	0.015	
Zion 1 & 2	1396.178	121.133	180.662	0.000	28.887	664.983	8.237	0.000	0.433	
Subtotal	<u>21882.683</u>	<u>2357.107</u>	<u>5197.030</u>	<u>4.630</u>	<u>106.419</u>	<u>12629.063</u>	<u>201.425</u>	<u>11770.000</u>	<u>2.000</u>	
1986 PWR Total	33726.026	3616.905	7813.456	15.805	183.658	20599.323	906.097	16510.100	9.744	
<i>1985 BWR</i>										
[db <200 MW(e)]										
Big Rock Point	37.238	10.900	41.300	0.000	0.000	108.700	5.410	0.000	0.000	
Dresden 1	0.000	(Reported with Units 2 & 3)				(Reported with Units 2 & 3)				
Humboldt Bay	0.000	208.800	588.700	0.000	33.950	226.800	16.865	0.000	0.368	
LaCrosse	36.837	14.440	48.600	0.000	0.000	231.000	3.270	0.000	0.000	
Subtotal	74.074	234.140	678.600	0.000	33.950	566.500	25.545	0.000	0.368	
[db >200 MW(e)]										
Brunswick 1 & 2	790.592	314.237	808.000	0.000	196.600	2437.000	51.411	0.000	12.776	
Dresden 2 & 3	853.018	1334.000	915.000	16.600	0.000	3060.000	31.690	63200.000	0.000	
FitzPatrick	475.305	230.650	502.330	0.000	43.900	591.670	187.280	0.000	0.168	
Grand Gulf 1	302.778	545.000	56.600	0.000	0.000	259.640	0.674	0.000	0.000	
LaSalle 1 & 2	940.029	900.000	310.000	0.000	0.000	480.000	6.600	0.000	0.000	
Millstone 1	523.426	181.400	979.000	6.230	0.000	1059.000	67.300	92490.000	0.000	
Nine Mile Point 1	562.666	295.790	249.600	1.630	15.000	978.570	3.634	5810.000	0.127	
Oyster Creek	427.337	162.600	299.000	0.000	0.000	622.000	7.750	0.000	0.000	
Pilgrim	564.792	253.940	1111.620	23.910	20.390	1003.077	4.985	73786.800	0.005	
Shoreham	0.000	22.400	0.000	0.000	0.000	0.004	0.000	0.000	0.000	
Susquehanna 1 & 2	<u>1393.911</u>	<u>731.691</u>	<u>64.780</u>	<u>0.000</u>	<u>36.580</u>	<u>2135.504</u>	<u>19.580</u>	<u>0.000</u>	<u>1.482</u>	
Subtotal	6833.853	4971.708	5295.930	48.370	312.470	12626.465	380.904	235286.800	14.558	
(f/d)										
Arnold	221.365	239.366	499.943	0.000	54.500	482.284	41.702	0.000	0.307	
Browns Ferry 1, 2 & 3	339.219	417.700	270.300	0.000	1613.260	2826.000	6.243	0.000	243.202	
Cooper	121.806	42.800	572.000	19.700	0.000	177.700	15.900	29600.000	0.000	
Fermi 2	0.000	109.000	1.500	0.000	0.000	3.360	0.035	0.000	0.000	
Hatch 1 & 2	1156.456	485.000	1366.000	3.710	186.700	1833.000	26.100	36470.000	3.808	
Limerick 1	129.663	306.000	0.000	0.000	0.000	20.600	0.000	0.000	0.000	

Table A.6. Reactor by reactor data base containing the reported net electrical energy produced and the volume and radioactivity of the LLW shipped to burial (1982–1992) (cont.)

Reactor name	Net electricity produced [MW(e)-year]	Volume (m ³) for waste type				Activity (Ci) for waste type				Remarks
		A (Wet)	B (Dry)	C (Core component)	D (Other)	A (Wet)	B (Dry)	C (Core component)	D (Other)	
<i>1985 BWR (cont.)</i>										
Monticello	489.047	181.300	356.000	6.510	0.000	1460.000	60.700	3350.000	0.000	
Peach Bottom 2 & 3	640.360	703.838	1906.344	11.872	108.539	3805.251	16.706	117475.060	44.987	
Quad Cities 1 & 2	1212.547	582.130	745.668	3.700	0.000	2513.134	8.678	52807.000	0.000	
River Bend 1	0.000	20.800	0.000	0.000	0.000	0.028	0.000	0.000	0.000	
Vermont Yankee	342.163	95.800	281.500	165.230	0.000	254.300	8.800	17008.920	0.000	
WNP-2	590.507	228.200	153.000	0.000	20.600	294.950	0.384	0.000	0.138	
Subtotal	<u>5243.133</u>	<u>3411.934</u>	<u>6152.255</u>	<u>210.722</u>	<u>1983.599</u>	<u>13670.607</u>	<u>185.248</u>	<u>236710.980</u>	<u>292.442</u>	
1985 BWR Total	12151.060	8617.782	12126.785	259.092	2330.019	26863.572	591.697	491997.780	307.368	
<i>1985 PWR</i>										
(CE)										
ANO-1 (Unit 2)	536.072	214.000	474.000	0.000	0.207	1331.000	416.000	0.000	0.001	
Calvert Cliffs 1 & 2	1137.096	87.300	297.000	1.470	3.570	242.000	10.560	14800.000	31.500	
Ft. Calhoun	349.789	183.940	158.930	0.000	0.000	131.129	93.193	0.000	0.000	
Maine Yankee	610.817	81.800	277.300	0.000	0.000	84.250	26.580	0.000	0.000	
Millstone 2	399.007									No data.
Palisades	604.814	120.051	296.714	0.000	107.392	193.040	18.640	0.000	7.290	
Palo Verde 1	128.639	84.200	0.000	0.000	0.000	68.000	0.000	0.000	0.000	
San Onofre 2 & 3	1010.801	35.030	403.425	1.490	120.510	1470.000	54.301	0.956	199.065	
St. Lucie 1 & 2	1366.081	79.300	420.000	0.000	45.300	1549.000	41.000	0.000	2.190	
Waterford 3	205.927	195.150	40.300	0.000	0.000	32.974	0.910	0.000	0.000	
Subtotal	6349.043	1080.771	2367.669	2.960	276.979	5101.393	661.184	14800.956	240.046	
(B&W)										
ANO-1 (Unit 1)	592.101	(Reported with Unit 2)				(Reported with Unit 2)				
Crystal River	326.668	225.900	269.000	0.370	2.340	1044.000	11.730	3540.000	0.008	
Davis-Besse	221.643	38.320	154.000	0.000	4.190	7.300	36.470	0.000	52.000	
Oconee 1, 2 & 3	1937.255	243.190	528.980	1.620	176.200	835.437	17.115	1202.800	4.160	
Rancho Seco	220.880	770.000	437.700	0.000	0.000	1363.000	481.040	0.000	0.000	
TMI-1	92.592	340.470	127.990	0.000	0.000	18.295	1.105	0.000	0.000	
TMI-2	0.000	28.800	332.210	0.000	0.000	2.170	4.079	0.000	0.000	
Subtotal	3391.139	1646.680	1849.880	1.990	182.730	3270.202	551.539	4742.800	56.168	
(West)										
Beaver Valley 1	673.222	50.200	106.200	0.000	0.000	93.600	3.492	0.000	0.000	

Table A.6. Reactor by reactor data base containing the reported net electrical energy produced and the volume and radioactivity of the LLW shipped to burial (1982–1992) (cont.)

Reactor name	Net electricity produced [MW(e)-year]	Volume (m ³) for waste type				Activity (Ci) for waste type				Remarks
		A (Wet)	B (Dry)	C (Core component)	D (Other)	A (Wet)	B (Dry)	C (Core component)	D (Other)	
<i>1985 PWR (cont.)</i>										
Byearn 1	115.548	139.620	38.150	0.000	0.000	11.854	2.053	0.000	0.000	
Callaway 1	917.838	116.700	22.300	0.000	0.000	5.846	0.443	0.000	0.000	
Catawba 1	392.484	0.000	36.470	0.000	0.000	0.000	0.069	0.000	0.000	
Cook 1 & 2	889.767	359.000	480.000	8.600	0.000	827.400	43.870	1130.000	0.000	
Diablo Canyon 1 & 2	597.106	8.600	19.500	0.000	2.970	40.200	3.660	0.000	0.096	
Farley 1 & 2	1293.519	71.070	393.700	0.000	17.200	799.770	18.220	0.000	0.002	
Ginna	412.993	116.000	107.000	0.000	0.000	111.000	8.100	0.000	0.000	
Haddam Neck	529.101	44.120	129.360	0.000	0.000	251.600	24.500	0.000	0.000	
Indian Pt. 2	760.328	153.465	522.160	14.270	0.000	554.185	22.360	0.010	0.000	
Indian Pt. 3	539.416	79.900	159.000	0.000	0.000	541.300	7.500	0.000	0.000	
Keweenaw	421.991	32.300	40.960	0.000	4.480	896.000	6.500	0.000	53.400	
McGuire 1 & 2	1411.432	154.078	453.347	0.000	50.920	192.295	3.878	0.000	0.779	
No. Anna 1 & 2	1438.800	261.000	341.000	0.000	48.000	225.000	61.700	0.000	3.130	
Prairie Is. 1 & 2	831.108	46.759	72.982	0.000	52.730	400.058	2.106	0.000	0.100	
Pt. Beach 1 & 2	793.664	92.211	189.068	0.000	0.000	1240.499	1.195	0.000	0.000	
Robinson 2	597.754	150.000	441.000	1.630	49.600	235.600	9.800	3100.000	8.420	
Salem 1 & 2	1599.877	50.700	390.400	0.000	14.400	2005.000	6.920	0.000	5.440	
San Onofre 1	280.374	0.000	136.300	0.000	44.000	0.000	5.050	0.000	0.995	
Sequoayah 1 & 2	1103.360	236.000	519.000	0.000	0.000	2510.000	115.400	0.000	0.000	
Summer	596.683	243.000	200.900	0.000	2.380	101.400	9.920	0.000	18.200	
Surry 1 & 2	1105.491	71.100	1881.000	0.000	72.600	1141.000	61.000	0.000	4.410	
Trojan	788.361	141.671	168.263	0.000	0.000	3502.194	12.757	0.000	0.000	
Turkey Pt. 3&4	979.957	70.200	537.600	0.000	0.230	1495.000	2.100	0.000	0.001	
Wolf Creek 1	335.626	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Yankee Rowe	134.801	48.840	151.600	0.000	0.000	261.827	6.452	0.000	0.000	
Zion 1 & 2	1132.573	164.410	443.599	6.810	57.774	675.000	12.977	1998.660	0.001	
Subtotal	20673.175	2900.944	7980.859	31.310	417.284	18117.628	452.022	6228.670	94.974	
1985 PWR Total	30413.356	5628.395	12198.408	36.260	876.993	26489.223	1664.745	25772.426	391.188	

1984 BWR

[db <200 MW(e)]									
Big Rock Point	47.630	0.000	36.700	0.000	0.000	0.000	2.132	0.000	0.000
Dresden 1	0.000		(Reported with Units 2 & 3)			(Reported with Units 2 & 3)			
Humboldt Bay	0.000	91.460	197.870	0.000	0.000	58.600	8.329	0.000	0.000
LaCrosse	36.345	4.810	34.410	0.000	0.000	184.000	0.059	0.000	0.000
Subtotal	83.975	96.270	268.980	0.000	0.000	242.600	10.520	0.000	0.000

Table A.6. Reactor by reactor data base containing the reported net electrical energy produced and the volume and radioactivity of the LLW shipped to burial (1982–1992) (cont.)

Reactor name	Net electricity produced [MW(e)-year]	Volume (m ³) for waste type				Activity (Ci) for waste type				Remarks
		A (Wet)	B (Dry)	C (Core component)	D (Other)	A (Wet)	B (Dry)	C (Core component)	D (Other)	
<i>1984 BWR (cont.)</i>										
[db >200 MW(e)]										
Brunswick 1 & 2	732.900	300.300	1018.000	0.000	52.500	3425.000	28.560	0.000	0.909	
Dresden 2 & 3	749.031	583.900	676.000	0.000	0.000	4324.600	35.500	0.000	0.000	
FitzPatrick	558.905	177.300	254.200	0.000	0.000	1235.000	21.530	0.000	0.000	
Grand Gulf 1	0.000	431.000	0.000	0.000	0.000	9.090	0.000	0.000	0.000	
LaSalle 1 & 2	752.718	526.830	312.700	0.000	0.000	175.930	4.493	0.000	0.000	
Millstone 1	493.144	253.600	686.000	0.000	0.000	1946.000	22.380	0.000	0.000	
Nine Mile Point	414.697	203.870	389.000	1.470	34.700	623.632	3.469	12800.000	0.044	
Oyster Creek	31.802	242.000	1146.000	4.460	0.000	919.000	30.560	43000.000	0.000	
Pilgrim	0.401	273.660	2843.270	0.000	0.000	1475.152	64.449	0.000	0.000	
Susquehanna 1	694.518	789.579	259.983	0.000	250.708	912.330	11.570	0.000	3.023	
Subtotal	4428.117	3782.039	7585.153	5.930	337.908	15045.734	222.511	55800.000	3.976	
(fd)										
Arnold	310.012	130.274	137.751	0.000	0.000	911.447	2.137	0.000	0.000	From DOE/LLW-50T.
Browns Ferry 1, 2 & 3	1389.844	916.543	1637.482	0.000	1118.607	5532.900	302.360	0.000	46.051	⑤
Cooper	395.842	141.500	295.300	0.000	0.000	472.600	18.601	0.000	0.000	From DOE/LLW-50T.
Hatch 1 & 2	624.360	524.380	1655.200	121.770	196.210	2246.430	260.630	69.790	2.000	
Monticello	30.016	110.400	1126.000	0.000	0.000	541.000	32.100	0.000	0.000	
Peach Bottom 2 & 3	1126.104	2250.061		11.339	0.000	1192.900	0.000	91000.000	0.000	No breakdown.
Quad-Cities 1 & 2	950.680	1344.663	0.000	3.731	0.000	1661.000	0.000	39000.000	0.000	No breakdown.
Vermont Yankee	380.542	131.700	216.600	0.000	0.000	278.000	7.110	0.000	0.000	
WNP-2	46.816	321.000	66.300	0.000	0.000	35.228	0.545	0.000	0.000	
Subtotal	5254.215	5870.521	5134.633	136.840	1314.817	12871.505	623.483	130069.790	48.051	
1984 BWR Total	9766.307	9748.830	12988.766	142.770	1652.725	28159.839	856.514	185869.790	52.027	
<i>1984 PWR</i>										
(CE)										
ANO-1 (Unit 2)	707.686	101.600	697.310	0.207	10.750	1400.158	61.581	0.053	0.300	
Calvert Cliffs 1 & 2	1330.145	32.200	491.700	4.440	0.000	798.000	21.820	36900.000	0.000	
Ft. Calhoun	266.679	133.440	259.360	0.000	0.000	39.959	31.758	0.000	0.000	
Maine Yankee	585.691	106.100	243.000	0.000	0.000	344.620	14.840	0.000	0.000	
Millstone 2	753.860	41.900	(Unit 1)	18.900	0.000	4253.000	(Unit 1)	106000.000	0.000	
Palisades	92.579	45.700	402.400	0.000	0.000	249.180	8.930	0.000	0.000	
San Onofre 2 & 3	1068.636		(Reported with Unit 1)				(Reported with Unit 1)			

Table A.6. Reactor by reactor data base containing the reported net electrical energy produced and the volume and radioactivity of the LLW shipped to burial (1982–1992) (cont.)

Reactor name	Net electricity produced [MW(e)-year]	Volume (m ³) for waste type				Activity (Ci) for waste type				Remarks
		A (Wet)	B (Dry)	C (Core component)	D (Other)	A (Wet)	B (Dry)	C (Core component)	D (Other)	
<i>1984 PWR (cont.)</i>										
St. Lucie 1 & 2	1117.146	46.500	1094.000	83.700	0.000	1234.000	70.800	62300.000	0.000	
Subtotal	5922.421	507.440	3187.770	107.247	10.750	8318.917	209.729	205200.053	0.300	
(B&W)										
ANO-1 (Unit 1)	525.226	(Reported with Unit 2)				(Reported with Unit 2)				
Crystal River	739.097	320.000	86.000	5.100	0.000	1145.900	2.281	770.077	0.000	
Davis-Besse	489.568	62.300	88.500	0.000	0.000	472.000	1.441	0.000	0.000	
Oconee 1, 2 & 3	2146.812	285.653	639.408	0.080	11.328	1472.536	23.000	4678.290	0.009	From DOE/LLW-50T.
Rancho Seco	429.791	257.000	168.000	0.000	0.000	37.900	8.090	0.000	0.000	
TMI-1	0.000	235.880	198.510	0.000	0.000	412.940	5.221	0.000	0.000	
TMI-2	0.000	67.903	192.140	0.000	0.000	6579.057	12.037	0.000	0.000	
Subtotal	4330.496	1228.736	1372.558	5.180	11.328	10120.333	52.070	5448.367	0.009	
(West)										
Beaver Valley 1	541.405	58.500	97.100	0.000	0.000	708.500	2.630	0.000	0.000	
Callaway 1	36.850									70
Cook 1 & 2	1473.319	270.000	224.000	0.000	0.000	666.000	3.080	0.000	0.000	
Diablo Canyon	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Farley 1 & 2	1374.273	33.950	528.300	0.000	0.000	267.500	30.960	0.000	0.000	
Ginna	360.116	121.400	130.400	0.000	0.000	312.000	11.250	0.000	0.000	
Haddam Neck	383.560	85.260	342.320	0.000	0.000	366.600	8.759	0.000	0.000	
Indian Pt. 2	329.309	303.000	870.000	0.000	0.000	3750.000	23.500	0.000	0.000	
Indian Pt. 3	689.219	35.500	117.600	0.000	0.000	406.620	4.900	0.000	0.000	
Kewaunee	434.634	25.320	29.650	0.000	8.220	1479.800	14.600	0.000	106.210	
McGuire 1 & 2	1480.356	58.153	293.317	0.000	62.532	1865.460	15.090	0.000	4.720	
No. Anna 1 & 2	969.883	214.000	652.000	0.000	33.700	875.300	77.600	0.000	0.222	
Prairie Is. 1 & 2	920.071	24.060	9.110	0.000	8.690	11.396	0.109	0.000	0.366	
Pt. Beach 1 & 2	755.371	712.388	0.000	0.000	0.000	1642.492	0.000	0.000	0.000	No breakdown.
Robinson 2	21.679	257.000	2780.000	0.000	16.900	140.200	24.540	0.000	30.100	
Salem 1 & 2	607.776	110.500	1383.000	0.000	24.100	599.500	22.600	0.000	0.710	
San Onofre 1	29.838	40.630	298.800	0.000	154.400	472.900	22.966	0.000	68.639	All units.
Sequoyah 1 & 2	1426.873	159.502	807.136	0.000	0.000	2400.000	29.800	0.000	0.000	
Summer	478.727	181.000	291.600	0.000	7.140	122.100	2.269	0.000	30.970	
Surry 1 & 2	974.617	585.300	352.000	0.000	7.860	1154.470	6.790	0.000	0.212	
Trojan	540.323	108.497	121.872	0.000	0.000	14.788	8.843	0.000	0.000	
Turkey Pt. 3&4	897.035	850.382	0.000	0.000	0.000	1910.296	0.000	0.000	0.000	No breakdown.

Table A.6. Reactor by reactor data base containing the reported net electrical energy produced and the volume and radioactivity of the LLW shipped to burial (1982–1992) (cont.)

Reactor name	Net electricity produced [MW(e)-year]	Volume (m ³) for waste type				Activity (Ci) for waste type				Remarks
		A (Wet)	B (Dry)	C (Core component)	D (Other)	A (Wet)	B (Dry)	C (Core component)	D (Other)	
<i>1984 PWR (cont.)</i>										
Yankee Rowe	117.062	50.520	107.000	0.000	0.000	119.900	32.430	0.000	0.000	
Zion 1 & 2	<u>1332.238</u>	<u>223.464</u>	<u>396.126</u>	<u>0.000</u>	<u>23.562</u>	<u>2495.153</u>	<u>25.566</u>	<u>0.000</u>	<u>95.836</u>	
Subtotal	<u>16174.535</u>	<u>4508.326</u>	<u>9831.331</u>	<u>0.000</u>	<u>347.104</u>	<u>21780.975</u>	<u>368.282</u>	<u>0.000</u>	<u>337.985</u>	
1984 PWR Total	26427.452	6244.502	14391.659	112.427	369.182	40220.225	630.081	210648.420	338.294	
<i>1983 BWR</i>										
[db <200 MW(e)]										
Big Rock Point	39.766	20.800	80.300	0.000	0.000	271.000	2.910	0.000	0.000	
Dresden 1	0.000									
Humboldt Bay	0.000	0.000	22.700	5.100	0.000	0.000	3.200	17500.000	0.000	
LaCrosse	<u>22.960</u>	<u>7.230</u>	<u>4.810</u>	<u>0.000</u>	<u>0.000</u>	<u>187.550</u>	<u>0.222</u>	<u>0.000</u>	<u>0.000</u>	
Subtotal	62.726	28.030	107.810	5.100	0.000	458.550	6.332	17500.000	0.000	
[db >200 MW(e)]										
Brunswick 1 & 2	607.392	981.000	2530.000	1.700	0.000	7130.000	197.100	1030.000	0.000	
Dresden 2 & 3	860.764	747.100	672.900	0.000	0.000	2872.000	42.230	0.000	0.000	
FitzPatrick	528.662	218.000	493.000	0.000	0.000	623.000	80.200	0.000	0.000	
LaSalle 1 & 2	0.000	535.600	146.600	0.000	0.000	28.500	1.638	0.000	0.000	
Millstone 1	610.787	148.550	544.440	0.000	0.000	655.640	25.685	0.000	0.000	
Nine Mile Point	319.656	144.400	567.000	9.730	0.000	449.800	7.840	53700.000	0.000	
Oyster Creek	23.403	268.000	733.000	0.000	0.000	406.000	154.600	0.000	0.000	
Pilgrim	537.520	191.010	474.030	0.000	0.000	1437.621	41.000	0.000	0.000	
Susquehanna 1	<u>403.419</u>	<u>1085.000</u>	<u>163.800</u>	<u>0.000</u>	<u>14.400</u>	<u>280.100</u>	<u>2.770</u>	<u>0.000</u>	<u>0.022</u>	
Subtotal	3891.604	4318.660	6324.770	11.430	14.400	13882.661	553.063	54730.000	0.022	
(f/d)										
Arnold	265.151	185.358	407.208	0.000	88.290	1418.033	18.037	0.000	4.871	
Browns Ferry 1, 2 & 3	<u>1591.995</u>	<u>828.380</u>	<u>775.710</u>	<u>0.000</u>	<u>2113.406</u>	<u>6151.240</u>	<u>698.250</u>	<u>0.000</u>	<u>47.485</u>	
Cooper	381.383	182.100	321.000	0.000	0.000	851.000	1.885	0.000	0.000	
Hatch 1 & 2	886.790	513.000	1254.000	0.000	98.100	2225.000	49.620	0.000	0.458	
Monticello	473.161	151.600	192.100	13.440	0.000	948.000	2.306	43300.000	0.000	
Peach Bottom 2 & 3	783.969	2681.959	0.000	0.000	0.000	22465.000	0.000	0.000	0.000	
Quad-Cities 1 & 2	<u>1018.442</u>	<u>1578.283</u>	<u>0.000</u>	<u>0.000</u>	<u>0.000</u>	<u>5847.176</u>	<u>0.000</u>	<u>0.000</u>	<u>0.000</u>	No breakdown.
Vermont Yankee	327.912	167.900	239.000	8.200	0.000	494.000	7.310	57000.000	0.000	

Table A.6. Reactor by reactor data base containing the reported net electrical energy produced and the volume and radioactivity of the LLW shipped to burial (1982–1992) (cont.)

Reactor name	Net electricity produced [MW(e)-year]	Volume (m ³) for waste type				Activity (Ci) for waste type				Remarks
		A (Wet)	B (Dry)	C (Core component)	D (Other)	A (Wet)	B (Dry)	C (Core component)	D (Other)	
<i>1983 BWR (cont.)</i>										
WNP-2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Subtotal	5728.802	6288.580	3189.018	21.640	2299.796	40399.449	777.408	100300.000	52.814	
1983 BWR Total	9683.132	10635.270	9621.598	38.170	2314.196	54740.660	1336.803	172530.000	52.836	
<i>1983 PWR</i>										
(CE)										
ANO-1 (Unit 2)	505.128	81.400	268.000	0.000	1.270	1069.000	33.400	0.000	5.040	
Calvert Cliffs 1 & 2	1332.849	28.500	477.000	0.000	0.000	106.000	1.353	0.000	0.000	
Ft. Calhoun	313.693	211.700	253.150	0.000	0.370	379.774	153.905	0.000	166.897	
Maine Yankee	654.142	142.500	194.900	0.000	0.000	91.310	12.100	0.000	0.000	
Millstone 2	279.944	44.820	(Unit 1)	0.000	0.000	257.721	(Unit 1)	0.000	0.000	
Palisades	430.066	147.700	427.000	0.330	0.000	252.000	9.000	25300.000	0.000	
San Onofre 2	316.637	(Reported with Unit 1)			(Reported with Unit 1)					
St. Lucie 1 & 2	395.582	23.050	411.000	79.900	106.000	438.000	27.230	93500.000	0.135	
Subtotal	4228.042	679.670	2031.050	80.230	107.640	2593.805	236.988	118800.000	172.072	
(B&W)										
ANO-1 (Unit 1)	367.394	(Reported with Unit 2)			(Reported with Unit 2)					
Crystal River	430.322	282.000	257.300	0.212	0.000	858.000	13.900	89.900	0.000	
Davis-Besse	557.068	25.360	88.100	0.000	0.000	630.900	5.882	0.000	0.000	
Oconee 1, 2 & 3	2043.004	1156.430	0.000	0.000	0.000	2842.981	0.000	0.000	0.000	
Rancho Seco	325.199	0.000	187.000	0.000	85.200	0.000	7.300	0.000	218.000	
TMI-1	0.000	206.645	391.227	0.000	7.255	635.806	24.048	0.000	24.284	
TMI-2	0.000	0.000	311.635	0.000	0.000	0.000	13.140	0.000	0.000	
Subtotal	3722.988	1670.435	1235.262	0.212	92.455	4967.687	64.270	89.900	242.284	
(West)										
Beaver Valley 1	533.513	79.100	139.700	0.000	0.000	472.400	2.338	0.000	0.000	
Cook 1 & 2	1403.196	311.000	357.000	0.000	0.000	1940.000	73.900	0.000	0.000	
Farley 1 & 2	1282.776	35.300	405.100	1.000	0.000	1001.200	43.320	5.100	0.000	
Ginna	346.815	262.910	67.000	0.000	0.000	506.700	14.480	0.000	0.000	
Haddam Neck	431.428	249.210	402.700	0.000	0.000	1510.210	13.683	0.000	0.000	
Indian Pt. 2	672.489	113.400	903.000	0.000	269.000	2092.000	31.000	0.000	0.003	
Indian Pt. 3	6.928	31.500	280.000	0.000	4.810	718.700	4.820	0.000	8.720	
Kewaunee	422.876	22.108	33.605	0.000	0.000	668.104	17.102	0.000	0.000	

Table A.6. Reactor by reactor data base containing the reported net electrical energy produced and the volume and radioactivity of the LLW shipped to burial (1982–1992) (cont.)

Reactor name	Net electricity produced [MW(e)-year]	Volume (m ³) for waste type				Activity (Ci) for waste type				Remarks
		A (Wet)	B (Dry)	C (Core component)	D (Other)	A (Wet)	B (Dry)	C (Core component)	D (Other)	
<i>1983 PWR (cont.)</i>										
McGuire 1 & 2	528.740	16.560	227.920	0.000	0.000	18.020	10.180	0.000	0.000	
No. Anna 1 & 2	1267.728	110.700	368.000	38.800	21.000	848.000	56.100	961.000	0.050	
Prairie Is. 1 & 2	867.565	71.210	167.270	0.000	0.000	187.800	4.392	0.000	0.000	
Pt. Beach 1 & 2	616.147	57.410	654.000	0.000	0.000	1001.000	118.300	0.000	0.000	
Robinson 2	381.876	297.000	798.000	0.000	0.000	14.680	31.430	0.000	0.000	
Salem 1 & 2	698.159	420.000	1633.000	0.000	19.300	291.000	7.440	0.000	0.100	
San Onofre 1	0.000	30.900	264.600	0.000	225.900	222.580	7.959	0.000	4.055	Units 1&2.
Sequoyah 1 & 2	1600.772	71.707	620.900	0.000	0.000	2269.850	45.759	0.000	0.000	
Summer	0.000	11.300	78.800	0.000	2.380	0.797	0.523	0.000	12.400	
Surry 1 & 2	867.375	3077.032	0.000	0.000	0.000	3563.710	0.000	0.000	0.000	
Trojan	465.582	118.100	109.600	0.000	0.000	1673.858	1.364	0.000	0.000	
Turkey Pt. 1 & 2	832.638	1212.400	0.000	0.000	0.000	926.334	0.000	0.000	0.000	
Yankee Rowe	153.221	51.790	58.590	0.000	2.760	1.401	3.519	0.000	0.030	
Zion 1 & 2	1163.375	590.423	330.605	0.000	0.000	2941.180	28.503	0.000	0.000	
Subtotal	14543.199	7241.060	7899.390	39.800	545.150	22869.524	516.112	966.100	25.358	
1983 PWR Total	22494.229	9591.165	11165.702	120.242	745.245	30431.016	817.370	119856.000	439.714	

<i>1982 BWR</i>									
[db <200 MW(e)]									
Big Rock Point	41.054	5.100	103.880	0.000	0.000	0.370	3.960	0.000	0.000
Dresden 1	0.000	(Reported with Units 2 & 3)				(Reported with Units 2 & 3)			
Humboldt Bay	0.000	0.000	77.100	0.000	0.000	0.000	1.340	0.000	0.000
LaCrosse	15.740	3.390	31.860	0.000	0.000	51.950	0.610	0.000	0.000
Subtotal	56.794	8.490	212.840	0.000	0.000	52.320	5.910	0.000	0.000
[db >200 MW(e)]									
Brunswick 1 & 2	550.325	721.000	2810.000	0.000	0.000	5210.000	285.600	0.000	0.000
Dresden 2 & 3	1027.940	377.200	518.600	2.620	0.000	2899.200	20.720	163470.000	0.000
FitzPatrick	565.783	268.200	1313.200	0.000	58.200	759.770	29.010	0.000	0.142
LaSalle 1 & 2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Millstone 1	465.238	181.900	795.000	0.000	0.000	1067.000	14.450	0.000	0.000
Nine Mile Point	129.450	159.000	415.300	1.700	0.000	1309.400	13.364	5750.000	0.000
Oyster Creek	229.648	370.000	609.000	17.000	0.000	4160.000	52.700	453.000	0.000
Pilgrim	374.975	196.306	2086.776	0.000	0.000	942.704	15.819	0.000	0.000
Susquehanna 1 & 2	0.000	40.000	5.100	0.000	0.000	0.062	0.003	0.000	0.000
Subtotal	3343.358	2313.606	8552.976	21.320	58.200	16348.136	431.666	169673.000	0.142

Table A.6. Reactor by reactor data base containing the reported net electrical energy produced and the volume and radioactivity of the LLW shipped to burial (1982–1992) (cont.)

Reactor name	Net electricity produced [MW(e)-year]	Volume (m ³) for waste type				Activity (Ci) for waste type				Remarks
		A (Wet)	B (Dry)	C (Core component)	D (Other)	A (Wet)	B (Dry)	C (Core component)	D (Other)	
<i>1982 BWR (cont.)</i>										
(f/d)										
Arnold	260.149	233.504	152.718	0.000	67.545	1267.826	5.131	0.000	1.310	
Browns Ferry 1, 2 & 3	1964.939	784.400	834.800	0.000	4290.700	4542.000	952.740	0.000	12.490	
Cooper	601.880	187.100	257.600	0.000	0.000	425.000	2.206	0.000	0.000	
Hatch 1 & 2	753.575	648.000	930.000	14.200	99.800	3537.000	21.920	0.041	476.088	
Monticello	276.160	82.900	660.000	6.800	0.000	526.000	360.500	3000.000	0.000	
Peach Bottom 2 & 3	1520.275	3234.210	0.000	0.000	0.000	4508.000	0.000	0.000	0.000	No breakdown.
Quad-Cities 1 & 2	947.274	1455.506	0.000	0.000	0.000	3957.901	0.000	0.000	0.000	No breakdown.
Vermont Yankee	476.187	128.000	323.300	0.000	0.000	205.100	4.320	0.000	0.000	
Subtotal	<u>6800.440</u>	<u>6753.620</u>	<u>3158.418</u>	<u>21.000</u>	<u>4458.045</u>	<u>18968.827</u>	<u>1346.817</u>	<u>3000.041</u>	<u>489.888</u>	
1982 BWR Total	10200.592	9075.716	11924.234	42.320	4516.245	35369.283	1784.393	172673.041	490.030	
<i>1982 PWR</i>										
(CE)										
ANO-1 (Unit 2)	434.336	248.000	195.000	402.000	64.000	3250.000	1150.000	1090.000	320.000	From DOE/LLW-27T.
Calvert Cliffs 1 & 2	1182.652	47.400	82.800	26.400	0.000	144.000	11.875	760.000	0.000	
Ft. Calhoun	397.235	183.060	158.710	0.000	0.000	27.627	7.789	0.000	0.000	
Maine Yankee	516.111	71.400	148.900	0.000	0.000	19.010	11.893	0.000	0.000	
Millstone 2	571.422	6.850	(Unit 1)	0.000	0.000	484.000	(Unit 1)	0.000	0.000	
Palisades	381.602	340.100	368.300	0.000	0.000	64.840	14.960	0.000	0.000	
St. Lucie 1	773.973	32.200	275.000	0.000	0.000	778.000	17.390	0.000	0.000	
Subtotal	4257.330	929.010	1228.710	428.400	64.000	4767.477	1213.907	1850.000	320.000	
(B&W)										
ANO-1 (Unit 1)	424.528	(Reported with Unit 2)			(Reported with Unit 2)					
Crystal River	560.755	339.000	323.300	0.000	0.000	620.000	7.540	0.000	0.000	
Davis-Besse	367.118	15.000	105.000	0.000	0.000	13.000	6.000	0.000	0.000	From DOE/LLW-27T.
Oconee 1, 2 & 3	1221.397	3062.592	0.000	0.000	0.000	10910.828	0.000	0.000	0.000	
Rancho Seco	384.042	166.000	49.100	0.000	24.500	465.000	0.914	0.000	0.019	
TMI-1 & 2	0.000	116.396	595.540	0.000	0.000	5.749	15.339	0.000	0.000	
Subtotal	2957.839	3698.988	1072.940	0.000	24.500	12014.577	29.793	0.000	0.019	

Table A.6. Reactor by reactor data base containing the reported net electrical energy produced and the volume and radioactivity of the LLW shipped to burial (1982–1992) (cont.)

Reactor name	Net electricity produced [MW(e)-year]	Volume (m ³) for waste type				Activity (Ci) for waste type				Remarks
		A (Wet)	B (Dry)	C (Core component)	D (Other)	A (Wet)	B (Dry)	C (Core component)	D (Other)	
<i>1982 PWR (cont.)</i>										
(West)										
Beaver Valley 1	306.658	82.200	212.200	0.000	0.000	379.900	3.590	0.000	0.000	
Cook 1 & 2	1408.678	338.600	374.400	0.000	0.000	771.700	72.560	0.000	0.000	
Farley 1 & 2	1199.159	28.927	317.000	0.000	0.000	28.230	74.600	0.000	0.000	
Ginna	274.696	154.844	334.540	0.000	0.000	193.630	8.830	0.000	0.000	
Haddam Neck	517.723	105.030	198.600	0.000	8.070	248.000	7.092	0.000	2.031	
Indian Pt. 2	507.347	184.000	990.000	0.000	0.000	6070.000	395.000	0.000	0.000	
Indian Pt. 3	163.819	41.700	337.000	0.000	0.000	52.990	8.380	0.000	0.000	
Kewaunee	436.328	27.740	21.070	0.000	18.449	270.600	1.400	0.000	0.677	
McGuire 1	490.790	7.900	88.200	0.000	0.000	2.800	4.159	0.000	0.000	
No. Anna 1 & 2	735.234	79.200	342.000	0.000	0.000	291.000	13.640	0.000	0.000	
Prairie Is. 1 & 2	887.078	9.060	90.010	0.000	0.000	320.800	43.040	0.000	0.000	
Pt. Beach 1 & 2	719.522	251.478	0.000	0.000	0.000	946.207	0.000	0.000	0.000	
Robinson 2	256.885	721.200	663.700	0.000	0.000	23.990	39.810	0.000	0.000	
Salem 1 & 2	1373.068	360.000	1549.000	0.000	0.000	308.000	11.110	0.000	0.000	
San Onofre 1	58.205	6.220	376.200	0.000	544.700	63.000	11.680	0.000	0.552	
Sequoyah 1 & 2	1007.902	55.590	0.000	0.000	302.740	113.651	0.000	0.000	114.214	
Summer	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Surry 1 & 2	1252.046	2178.419	0.000	0.000	0.000	993.600	0.000	0.000	0.000	
Trojan	547.803	122.910	164.240	0.000	0.000	18.202	3.542	0.000	0.000	
Turkey Pt. 3&4	868.216	1005.353	0.000	0.000	0.000	1131.841	0.000	0.000	0.000	
Yankee Rowe	100.634	40.598	136.506	0.000	32.341	1.061	7.013	0.000	20.058	
Zion 1 & 2	1124.053	635.364	245.868	0.000	0.000	2164.324	5.270	0.000	0.000	
Subtotal	14235.843	6436.333	6440.534	0.000	206.300	14393.526	710.716	0.000	137.532	
1982 PWR Total	21451.012	11064.331	8742.184	428.400	994.800	31175.580	1954.416	1850.000	457.551	

Appendix B

DISCUSSION OF DATA SOURCES AND USES

APPENDIX B

As stated previously, the sources for the data contained in this manual are the semiannual effluent reports submitted by the power plants to the U.S. Nuclear Regulatory Commission (NRC). Similar data can also be obtained from at least two other sources. One is an annual report, *Radioactive Materials Released from Nuclear Power Plants* (NUREG/CR-2907 BNL-NUREG-51581), prepared by Brookhaven National Laboratory for the NRC. The report contains detailed annual power plant release data (e.g., volume, radioactivity, and isotopic distribution) for liquids, solids, and airborne materials, as well as some summary information. Another source, part of the National Low-Level Waste Management Program, is the Manifest Information Management System (MIMS), which is maintained at the Idaho National Engineering Laboratory for DOE. The data base system contains information on radioactive waste taken from shipment manifests. In other words, the data base contains the volume and activity values, [after treatment (e.g., supercompaction, solidification, incineration, metal melting, etc.)] on the manifest that accompanies the waste to the commercial burial sites.

The possible variations among this report and the two aforementioned information sources can be the result of several factors. One of the most important factors is the difficulty in receiving accurate and timely information on waste that is sent to a vendor for treatment prior to disposal at a burial ground. Volume differences between "power plant to vendor" and "vendor to burial" can be quite large, considering the technologies of super compaction, solidification, and incineration, among others. Additional factors include overestimation/underestimation of waste characteristics and inconsistent reporting.

To illustrate the total effect that these mentioned difficulties can cause, the "modified" source terms used in the *Integrated Data Base: Spent Fuel and Radioactive Waste Inventories, Projections, and Characteristics*, DOE/RW-0006 (Rev. 8.), or IDB, are presented in Appendix C, Figs. C.1 and C.2, for comparison to Figs. 1 and 2. The "adjustment" made in order to maintain consistency in the IDB, has relatively little effect on the overall source terms. However, the reader should keep these differences, though slight, in mind.

The data presented herein are intended to primarily show overall trends (i.e., source terms) and isotopic compositions broken down according to assigned waste types. Depending on the usage of this data, other sources may need to be consulted.

Appendix C

LWR ADJUSTED SOURCE TERMS USED IN THE 1992 IDB ANNUAL REPORT

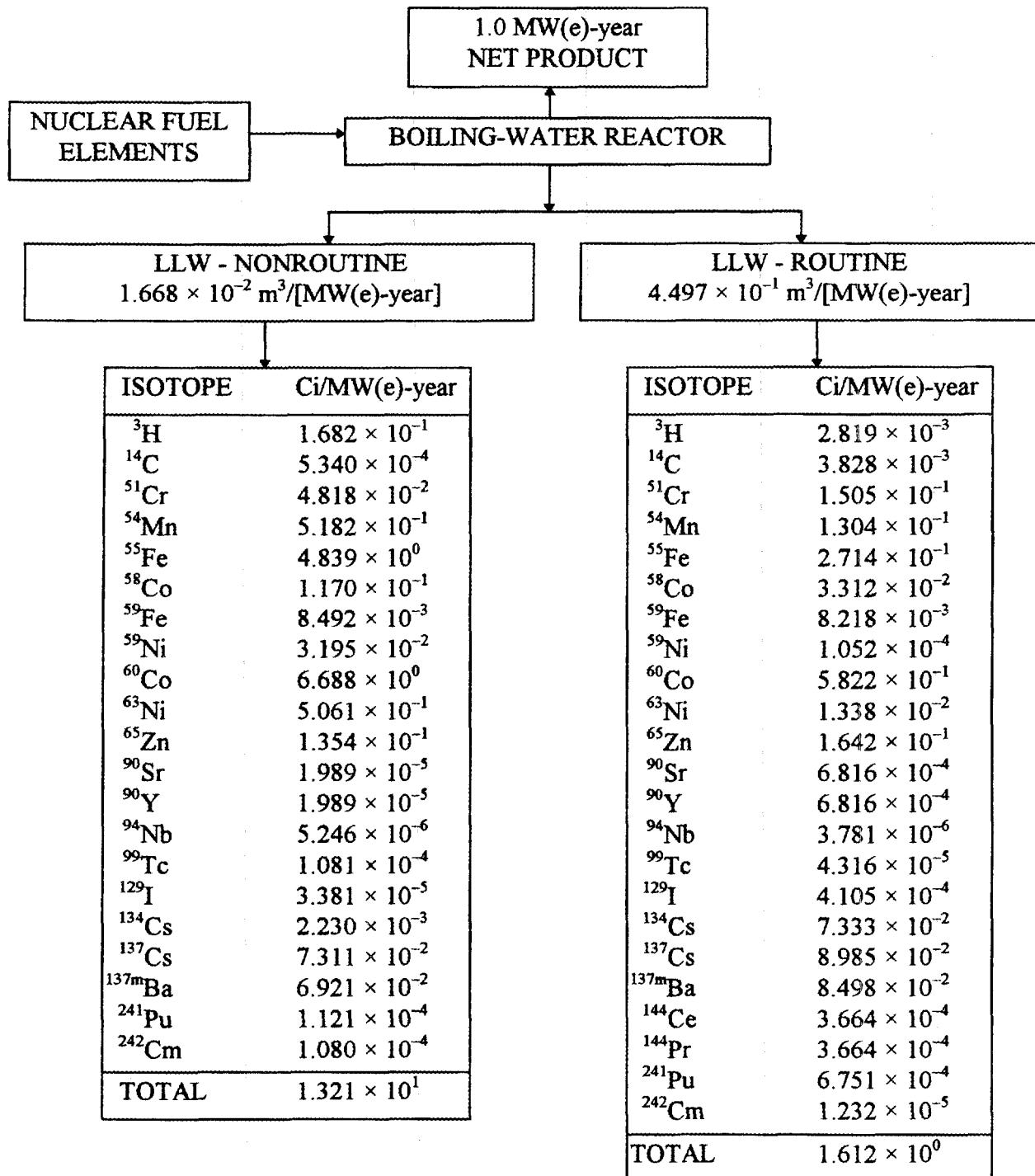


Fig. C.1. BWR adjusted routine and nonroutine source terms used in the 1992 IDB.

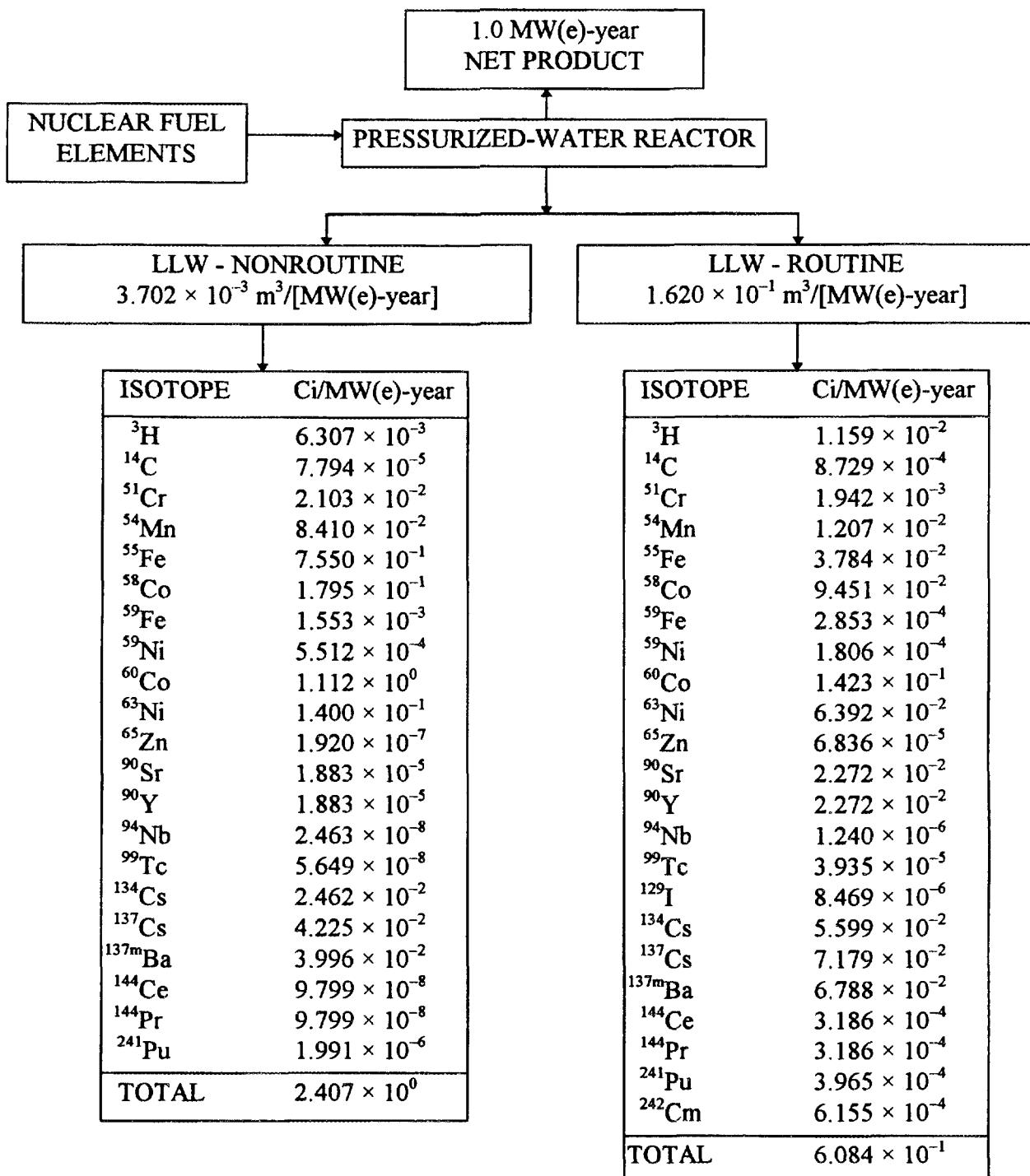
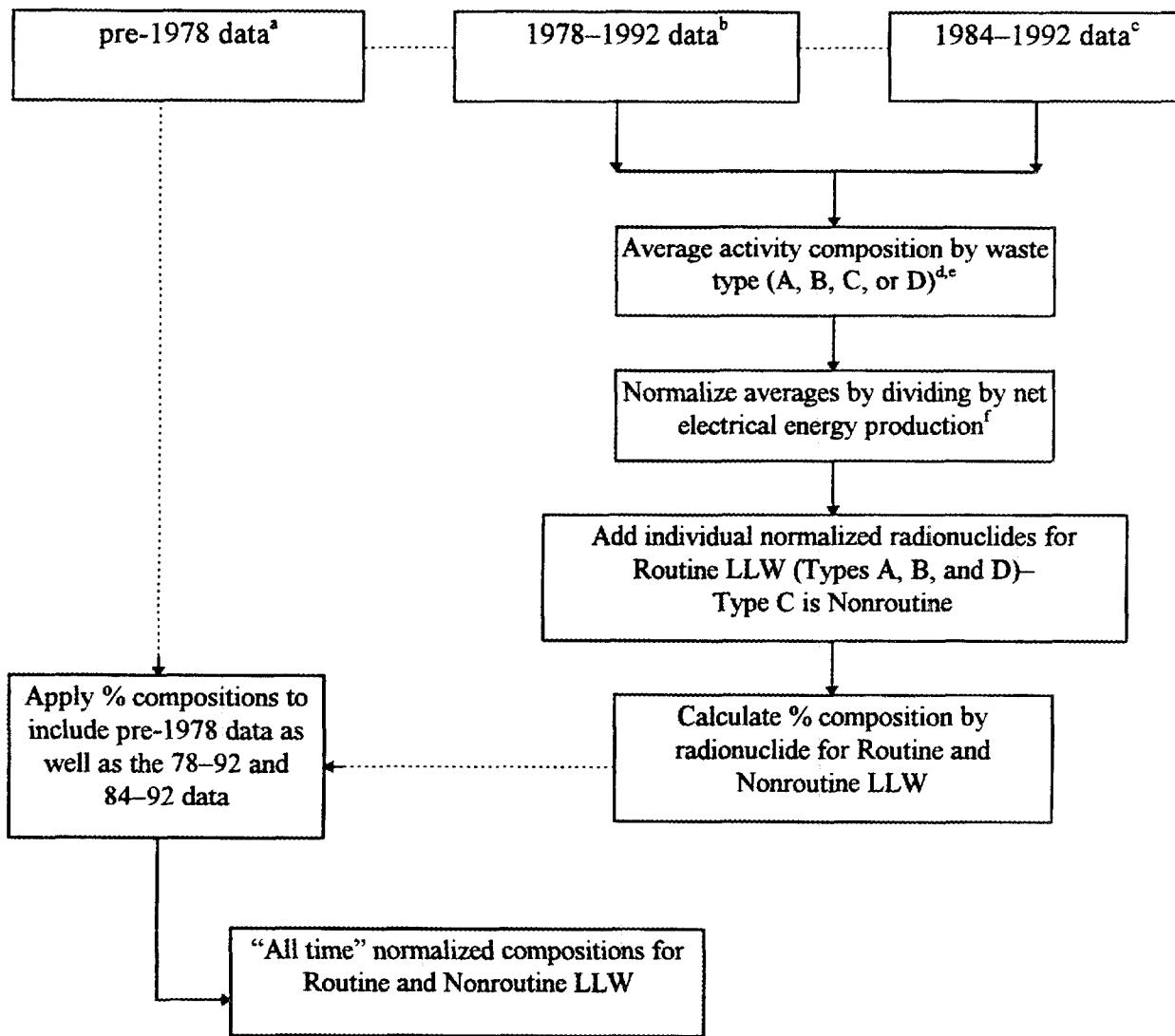


Fig. C.2. PWR adjusted routine and nonroutine source terms used in the 1992 IDB.

Appendix D

**BLOCK DIAGRAM FOR LWR LLW RADIOACTIVITY
SOURCE TERM RATIONALE**



^aIncomplete and inconsistent radionuclide breakdowns.

^bRadionuclide information includes ⁵¹Cr, ⁵⁴Mn, ⁵⁵Fe, ⁵⁸Co, ⁵⁹Fe, ⁶⁰Co, ⁶⁵Zn, ⁹⁰Sr, ⁹⁰Y, ¹³⁴Cs, ¹³⁷Cs, ^{137m}Ba, ¹⁴⁴Ce, and ¹⁴⁴Pr.

^cAdditional nuclide information includes ³H, ¹⁴C, ⁵⁹Ni, ⁶³Ni, ⁹⁴Nb, ⁹⁹Tc, ¹²⁹I, ²⁴¹Pu, and ²⁴²Cm.

^dUnspecified radioactivity treated as ⁶⁰Co.

^eWhen an activity was given for a specified volume, but without a nuclide breakdown, the given activity was distributed proportionally among the reported radionuclides for that waste type.

^fNet electrical production [MW(e)-year] for the period depending on the radionuclide under consideration.

Fig. D.1. Block diagram for LWR LLW radioactivity source term rationale.

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