NUREG/CR–2850
PNL–4221
Vol. 14

Dose Commitments Due to Radioactive Releases from Nuclear Power Plant Sites in 1992

Prepared by
R. L. Aaberg, D. A. Baker

Pacific Northwest Laboratory
Operated by
Battelle Memorial Institute

Prepared for
U.S. Nuclear Regulatory Commission

AVAILABILITY NOTICE

Availability of Reference Materials Cited in NRC Publications

Most documents cited in NRC publications will be available from one of the following sources:

1. The NRC Public Document Room, 2120 L Street, NW., Lower Level, Washington, DC 20555-0001

2. The Superintendent of Documents, U.S. Government Printing Office, P. O. Box 37082, Washington, DC 20402-9328

3. The National Technical Information Service, Springfield, VA 22161-0002

Although the listing that follows represents the majority of documents cited in NRC publications, it is not intended to be exhaustive.

Referenced documents available for inspection and copying for a fee from the NRC Public Document Room include NRC correspondence and internal NRC memoranda; NRC bulletins, circulars, information notices, inspection and investigation notices; licensee event reports, vendor reports and correspondence; Commission papers; and applicant and licensee documents and correspondence.

The following documents in the NUREG series are available for purchase from the Government Printing Office: formal NRC staff and contractor reports, NRC-sponsored conference proceedings, international agreement reports, grantee reports, and NRC booklets and brochures. Also available are regulatory guides, NRC regulations in the *Code of Federal Regulations*, and *Nuclear Regulatory Commission Issuances*.

Documents available from the National Technical Information Service include NUREG-series reports and technical reports prepared by other Federal agencies and reports prepared by the Atomic Energy Commission, forerunner agency to the Nuclear Regulatory Commission

Documents available from public and special technical libraries include all open literature items, such as books, journal articles, and transactions. *Federal Register* notices, Federal and State legislation, and congressional reports can usually be obtained from these libraries.

Documents such as theses, dissertations, foreign reports and translations, and non-NRC conference proceedings are available for purchase from the organization sponsoring the publication cited.

Single copies of NRC draft reports are available free, to the extent of supply, upon written request to the Office of Administration, Distribution and Mail Services Section, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

Copies of industry codes and standards used in a substantive manner in the NRC regulatory process are maintained at the NRC Library, Two White Flint North, 11545 Rockville Pike, Rockville, MD 20852-2738, for use by the public. Codes and standards are usually copyrighted and may be purchased from the originating organization or, if they are American National Standards, from the American National Standards Institute, 1430 Broadway, New York, NY 10018-3308.

DISCLAIMER NOTICE

ABSTRACT

Population and individual radiation dose commitments have been estimated from reported radionuclide releases from commercial power reactors operating during 1992. Fifty-year dose commitments for a 1-year exposure from both liquid and atmospheric releases were calculated for four population groups (infant, child, teenager, and adult) residing between 2 and 80 km from each of 72 reactor sites. This report tabulates the results of these calculations, showing the dose commitments for both water and airborne pathways for each age group and organ. Also included for each of the sites is an estimate of individual doses, which are compared with 10 CFR Part 50, Appendix I, design objectives.

The total collective dose commitments (from both liquid and airborne pathways) for each site ranged from a high of 3.7 person-rem to a low of 0.0015 person-rem for the sites with plants in operation and producing power during the year. The arithmetic mean was 0.66 person-rem. The total population dose for all sites was estimated at 47 person-rem for the 130-million people considered at risk.

The individual dose commitments estimated for all sites were below the 10 CFR 50, Appendix I, design objectives.

CONTENTS

TABLES

ACKNOWLEDGMENTS

The authors greatly appreciate the assistance provided by N.C. Batishko, N.C. Van Houten, and J.R. Weber. The authors also gratefully acknowledge the support provided by Stephen P. Klementowicz of the U.S. Nuclear Regulatory Commission.

1.0 INTRODUCTION

All commercial nuclear power reactors release small amounts of radioactive materials to the environment during normal operation. Because of these releases, concern was expressed about the magnitude of the collective dose received by the general population residing around these nuclear power plants. In response to this concern, the Pacific Northwest Laboratory (PNL)[a] contracted with the U.S. Nuclear Regulatory Commission (NRC) to undertake a series of studies to estimate radiation dose commitments produced by radionuclide releases from commercial light-water power reactors starting in 1975 (see previous reports in this series, p. ii). This document is a continuation of these studies and considers the doses from releases during 1992. In this study, as in previous studies, we estimated the collective (population) dose commitment[b] from both the liquid and gaseous releases to four age groups making up the population residing in the region of the site: infant (0 to 1 yr), child (1 to 11 yr), teenager (11 to 17 yr), and adult (17 yr and older).

In addition, individual doses were estimated for the sites and compared with the following 10 CFR Part 50, Appendix I, design objectives (AEC 1973):

Air	
Noble Gases	10 mrem for gamma and 20 for beta at site boundary
	5 mrem to total body at residence
Iodines and Particulate Material	15 mrem to organ from inhalation at residence and ingestion of garden products and pasture food products
Liquid	
3 mrem to total body	
10 mrem to organ	

The particular organs of reference in this study are listed in Table 1.1. The major pathways by which radionuclides travel from the reactor to the individual receptors are shown in Table 1.2. Other possible liquid pathways such as direct exposure from waterborne activities (swimming, boating, shoreline recreation [except for individual doses]) and internal exposure through ingestion of food produced using contaminated irrigation water (except for individual doses) were not included.

(a) Operated by Battelle Memorial Institute for the U.S. Department of Energy under Contract DE-AC06-76RLO 1830.

(b) As used in this report, dose commitment describes the total-body or specified organ dose equivalent in rem (1 rem = 0.01 sievert) received over 50 years from intake during the year in which radioactive materials were released into the environment from the power plants.

TABLE 1.1. Organs Considered in This Study

Organs Affected by Airborne Releases	Organs Affected by Waterborne Releases
Total body	Total body
Thyroid	Thyroid
Bone	Bone
Gastro-Intestinal (GI) tract	GI tract
Liver	Liver
Lung	

TABLE 1.2. Pathways Considered in This Study

Pathways for Airborne Releases	Pathways for Waterborne Releases
Air submersion	Ingestion of drinking water
Ground irradiation	Ingestion of fish and invertebrates
Inhalation	Shoreline exposure[a]
Ingestion of food crops and animal products	Irrigated food products[a]

(a) This pathway considered for the maximally exposed individual only, and is not included for population dose

The "source terms" used to estimate dose commitments produced from each site were the annual measured releases of radioactive materials as reported to the NRC by the plant licensees, subsequently published in an NRC public document (Tichler et al. 1995). In addition, annual dilution flows for liquid releases were taken from the above document.

The regional population for which we estimated collective dose commitments included those persons estimated to be living in a region between 2 and 80 km around the reactor sites during 1992. Population distributions were supplied by the NRC's Office of Nuclear Reactor Regulation. Atmospheric transport factors (annual average dilution and annual average deposition) were calculated for the region around each site using appropriate meteorological data supplied by the licensee. To calculate the doses, we used models approved by the NRC. We incorporated these models into three computer programs to expedite the dose calculations involved for each site.

Site-specific parameters other than releases, meteorology, and population were obtained from the licensee's Offsite Dose Calculation Manuals (ODCM) and environmental statements (both final [FES] and draft [DES]) for the various reactors when available (see Table 1.3). Such parameter values include the total population drinking contaminated water, river flow, fish and invertebrate harvest for the region, and mixing ratio for drinking water and

TABLE 1.3. Environmental Statements (ES) and Offsite Dose Calculation Manuals (ODCM) Consulted for Power Reactors Included in This Study

Site Number	Reactor Site	Docket Number	ES	ODCM	Remarks
1	Big Rock Point	50-155		Rev 7, Jul 91	ES not available
2	Browns Ferry	50-259, 50-260, 50-296	Jul 71	Rev 1, Jan 93	ES Published by TVA
3	Cooper	50-298	Feb 73 (Draft)	ODAM, Oct 91	
4	Dresden	50-237, 50-249	Nov 73	Rev 0.A, Apr 91	
5	Beaver Valley	50-334	Jul 73	Rev 2, Jun 89	
6	Humboldt Bay	50-133			Discontinued from this study
7	La Crosse	50-409	Jun 76 (Draft)	Rev 1, Mar 84	
8	Millstone Point	50-245, 50-336	Jun 73	RAB 4-3, 4-4, 4-5, Jun 90	Procedures
9	Monticello	50-263	Nov 72	Rev 0, Feb 94	
10	Nine Mile Point	50-220	Jan 74	Rev 10, Jun 90	
11	Oyster Creek	50-219	Dec 74	Rev 3, Sep 91	
12	Peach Bottom	50-277, 50-278	Apr 73	1990 Dose Assessment No. 6	
13	Pilgrim	50-293	May 72	Rev 5, Oct 91	
14	Quad Cities	50-254, 50-265	Sep 72	Rev 0.G, May 92	
15	Vermont Yankee	50-271	Jul 72	Rev 12, Sep 91	
16	St. Lucie	50-335	Jun 73	Rev 10, Jul 88	
17	Brunswick	50-324, 50-325	Jun 73 (Draft)	Rev 11, 92	
18	Duane Arnold	50-331	Mar 73	Rev 5, Dec 92 (ODAM)	
19	J. A. Fitzpatrick	50-333	Mar 73	Rev 7	
20	E. I. Hatch	50-321	Oct 72	Rev 7, Feb 92	
21	Arkansas One	50-313, 50-368	Feb 73, Sep 72	Rev 2, Jan 92	
22	Haddam Neck	50-213	Oct 73	RAB 4, Rev 4, Jun 90	Originally Connecticut Yankee
23	Fort Calhoun	50-285	Aug 72	CMP-6, May 91	
24	H. B. Robinson	50-261	Apr 74	Rev 7, Jul 91	
25	Indian Point	50-247	Sep 72	Rev 6, Jul 91	FES of Indian Point 2 used
26	Salem	50-272, 50-311	Apr 73	Rev 6, Mar 90	
27	Kewaunee	50-305	Dec 72	Rev 3, Jul 91	
28	Maine Yankee	50-309	Jul 72	Rev 2	Proposed change, May 91
29	Oconee	50-269, 50-270, 50-287	Mar 72	Rev 32, Jan 92	
30	Palisades	50-255	Jun 72	Rev 5, Aug 91	
31	Point Beach	50-266, 50-301	May 72	Rev 5, Jun 90	
32	Prairie Island	50-282, 50-306	May 73	Rev 12, Jun 91	
33	R. E. Ginna	50-244	Dec 73	Rev 2, Mar 89	
34	San Onofre	50-206	Oct 73	SO1, Rev 8, Jun 92; SO23, Rev 25, Feb 92	
35	Surry	50-281	Jun 72	Rev 2 (VPAP-2103)	FES of Surry 2 used
36	Three Mile Island	50-289	Dec 72	Rev 1, Dec 91	
37	Turkey Point	50-250, 50-251	Feb 72 (Draft)	Rev 3, Jun 91	
38	Yankee Rowe	50-29		Rev 8, Aug 92	ES not available
39	Zion	50-295, 50-304	Dec 72	Rev 0.K, Jan 93	
40	Calvert Cliffs	50-317	Apr 73	Rev 1, Jul 88	
41	Cook	50-315	Aug 73	Rev 5, Jan 92	
42	Trojan	50-344	Jan 73 (Draft)	Rev 4, Feb 88	
43	Rancho Seco	50-312	Mar 73	Rev 2	
44	Crystal River	50-302	May 73	Rev 15, May 90	
45	Davis-Besse	50-346	Mar 73	Rev 5.2, Dec 92	
46	J. M. Farley	50-348, 50-364	Jun 72	Rev 11, Dec 91	
47	North Anna	50-338, 50-339	Apr 73	Rev 2 (VPAP-2103)	
48	Sequoyah	50-327, 50-328	Feb 74	Rev 25, May 91	
49	McGuire	50-369, 50-370	Apr 76	Rev 33, Jan 92	
50	LaSalle	50-373, 50-374	Nov 78	Rev 0.A, Apr 91	
51	Summer	50-395	Jan 73	Rev 15, Feb 91	
52	Susquehanna	50-387, 50-388	Jun 73	Dec 89	
53	Grand Gulf	50-416, 50-417	Aug 73	Rev 11, Jun 88	
54	Callaway	50-483, 50-486	Mar 75	Rev 2, May 91	
55	Limerick	50-352, 50-353	Nov 73	Rev 10, Oct 91	
56	Diablo Canyon	50-275, 50-323	May 73	Rev 10, Mar 91	
57	WNP-2	50-397	Dec 72	Rev 0, Amend 11, Aug 92	
58	Palo Verde	50-528 thru 50-530	Sep 75	Rev 5, Oct 91	
59	Byron	50-454, 50-455	Jul 74	Rev 0.A, Apr 91	
60	Waterford	50-382	Mar 73	Rev 0, Aug 90	
61	Wolf Creek	50-482	Jun 82	Rev 9, Apr 92	
62	Catawba	50-413, 50-414	Dec 73	Rev 34, Jan 92	
63	Fermi	50-341	Jul 72	Rev 0.0, Draft	
64	Shoreham	50-322	Sep 72	Rev 18, Aug 91	Discontinued from this study
65	Hope Creek	50-354, 50-355	Feb 74	Rev 11, Mar 90	
66	Perry	50-440, 50-441	Apr 74	Rev 3, Feb 88	TCN 8, Feb 90; TCN 9, Feb 91
67	River Bend	50-458, 50-459	Sep 74	Rev 3, Feb 89	
68	Braidwood	50-456, 50-457	Mar 74	Rev 0.A, Apr 91	
69	Clinton	50-461, 50-462	Oct 74	Rev 8, Jul 91	
70	Harris	50-400 thru 50-403	Mar 74	Rev 3/1 (92)	
71	Vogtle	50-424, 50-425	Mar 74	Rev 8, 91	
72	South Texas Project	50-498, 50-499	Mar 72	Rev 6, Jan 94	
73	Seabrook	50-443, 50-444	Dec 74	Rev 13, Sep 93	
74	Comanche Peak	50-445, 50-446	Jun 74	Rev 7, Dec 91	

aquatic foods. In those cases in which site-specific data are not readily available and the particular pathway is not expected to result in a large dose, conservative assumptions have been used to estimate doses. The use of more realistic data should result in lower dose estimates in most cases.

The reactors included in this study, their type, licensed thermal power rating, and net electrical output for 1992, are listed in Table 1.4. Collective dose commitments derived in the study are also shown in this table. In addition, the percentages of the 10 CFR 50, Appendix I, design objectives are tabulated for each site on a per-unit basis. That is, the doses shown are from all site releases divided by the number of plants at the site, even though some plants, which were licensed early, need only meet the Appendix I design objectives on a site basis.

SITE-DEPENDENT PARAMETERS

In the Site Summaries section (Section 2.0), the location (including latitude and longitude) for each reactor site and the estimated 1992 population within 2 to 80 km around each site are given. In addition, the locations of major metropolitan centers within 80 km are listed along with their estimated 1992 populations. The populations of the metropolitan statistical areas (MSAs), consolidated metropolitan statistical areas (CMSAs), primary metropolitan statistical areas (PMSAs), and New England county metropolitan areas (NECMAs) are given where applicable. Distances and directions from the site for these areas are only approximate, since some of these areas are quite large and at times include the site. Next, the site-specific data pertinent to the airborne pathways are specified. The average production rates of vegetable crops and animal products are given for the area within an 80-km radius based upon the statewide average. This production has been reduced for sites on lakes and seacoasts to account for the presence of the body of water. An animal grazing factor is estimated for each site location. This factor accounts for the fraction of the year during which grazing animals such as milk cows and beef cattle graze on fresh pasture in the region around the site. After average production rates are given, the period of record and the percent data recovery of the meteorological data used in calculating diffusion factors are indicated.

MA - A core area containing a large population, with adjacent communities having a high degree of economic and social integration with that core.

MSA - A metropolitan area with at least one city or urbanized area with 50,000 or more inhabitants and a total metropolitan population of at least 100,000.

CMSA - An MSA with a population of one million or more and with separate component areas within the entire area which meet the MSA criteria .

PMSA - Component areas belonging to a CMSA.

NECMA - The county-based alternative metropolitan areas for MSAs and CMSAs of the six New England States.

TABLE 1.4. Population Total-Body Dose Commitments and Individual Dose Percentages of 10 CFR 50, Appendix I, Design Objectives, 1992

Site	Unit	Type(a)	Licensed Thermal Power (MW)	Electric Energy Generation (TW.hr)(b)	Population Dose Commitment (person-rem)			Individual Appendix I Percentages(d)					
								Liquid		Air			
					Liquid	Air(c)	Total	T Body	Organ	Gamma	Beta	T Body	Organ
Arkansas One	1	PWR	2568	5.83	0.22	0.16	0.38	26	11	0.36	0.49	0.36	0.11
	2	PWR	2815	5.50									
TOTAL			5383	11.33									
Beaver Valley	1	PWR	2660	6.30	0.048	1.0	1.0	5.8	7.00	<0.01	<0.01	0.01	0.12
	2	PWR	2660	5.64									
TOTAL			7980	11.94									
Big Rock Point(e)	1	BWR	240	0.27	1.3	0.020	1.3	1.8	0.88	0.43	0.06	0.20	0.06
Braidwood	1	PWR	3411	7.15	0.16	0.37	0.53	5.7	2.4	0.01	0.01	0.01	0.11
	2	PWR	3411	8.75									
TOTAL			6822	15.90									
Browns Ferry	1	BWR	3293	0.	1.1	0.63	1.7	1.2	0.55	0.34	0.08	0.38	0.32
	2	BWR	3293	8.39									
	3	BWR	3293	0.									
TOTAL			9879	8.39									
Brunswick	1	BWR	2436	1.82	<0.001	0.015	0.016	0.29	0.62	0.07	0.04	0.06	0.08
	2	BWR	2436	1.26									
TOTAL			4872	3.08									
Byron	1	PWR	3411	8.99	0.0051	0.0082	0.013	0.16	0.07	0.01	0.01	<0.01	0.01
	2	PWR	3411	6.98									
TOTAL			6822	15.97									
Callaway	1	PWR	3565	8.09	<0.001	0.035	0.035	0.56	0.20	0.06	0.10	0.05	0.08
Calvert Cliffs	1	PWR	2700	4.11	1.6	0.39	2.0	0.90	2.9	0.19	0.28	0.30	0.38
	2	PWR	2700	6.59									
TOTAL			5400	10.70									
Catawba	1	PWR	3411	7.03	0.62	0.76	1.4	5.4	3.3	5.8	1.3	6.7	0.36
	2	PWR	3411	9.27									
TOTAL			6822	16.30									
Clinton	1	BWR	2894	4.94	1.3	0.0022	1.3	22	60	<0.01	<0.01	<0.01	0.01
Comanche Peak	1	PWR	1161	6.95	2.1	0.070	2.2	11	4.3	0.15	0.13	0.17	0.01
Cook	1	PWR	3250	4.99	0.17	0.034	0.20	2.4	1.0	0.20	0.24	0.25	0.43
	2	PWR	3391	1.43									
TOTAL			6641	6.42									
Cooper	1	BWR	2381	6.23	0.0014	<0.001	0.0015	21	9.3	<0.01	<0.01	<0.01	<0.01
Crystal River	3	PWR	2452	5.30	3.2	0.015	3.2	11	6.2	0.04	0.06	0.01	0.01
Davis-Besse	1	PWR	2772	7.65	0.083	0.018	0.10	4.4	1.8	0.03	0.03	0.03	0.10
Diablo Canyon	1	PWR	3338	7.45	0.0020	0.013	0.015	0.14	0.20	<0.01	<0.01	<0.01	<0.01
	2	PWR	3411	9.25									
TOTAL			6749	16.70									

TABLE 1.4. (Contd)

Site	Unit	Type(a)	Licensed Thermal Power (MW)	Electric Energy Generation (TW.hr)(b)	Population Dose Commitment (person-rem)			Individual Appendix I Percentages(d)					
								Liquid		Air			
					Liquid	Air(c)	Total	T Body	Organ	Gamma	Beta	T Body	Organ
Dresden	1	BWR	700	0.	0	0.027	0.027	0.12	0.06	<0.01	<0.01	<0.01	<0.01
	2	BWR	2527	4.18									
	3	BWR	2527	3.06									
TOTAL			5754	7.24									
Duane Arnold	1	BWR	1658	3.43	0	0.010	0.010	0	0	<0.01	<0.01	<0.01	0.02
J.M. Farley	1	PWR	2652	6.65	0.014	0.034	0.048	0.60	1.00	0.01	0.01	0.02	0.01
	2	PWR	2652	5.41									
TOTAL			5304	11.06									
Fermi	2	BWR	3292	5.41	<0.001	0.052	0.052	<0.01	<0.01	0.10	0.05	0.12	0.20
J.A. Fitzpatrick	1	BWR	2436	0.	0.0018	0.0032	0.0050	0.01	0.01	0.06	0.04	0.03	0.01
Fort Calhoun	1	PWR	1500	2.54	0.13	0.017	0.15	4.5	2.3	0.04	0.05	0.02	0.02
R.E. Ginna	1	PWR	1520	3.48	0.44	0.13	0.57	31	13	0.01	0.01	0.01	0.29
Grand Gulf	1	BWR	3833	8.17	<0.001	0.017	0.017	13	14	0.92	0.67	0.16	15.00
Haddam Neck	1	PWR	1825	3.88	0.24	0.74	1.0	8.6	3.7	<0.01	<0.01	<0.01	0.06
Harris	1	PWR	2775	5.41	2.9	0.22	3.1	0.25	0.12	0.81	0.68	0.20	0.04
E. I. Hatch	1	BWR	2436	6.16	0.19	0.053	0.24	19	8.6	0.65	0.29	0.32	0.85
	2	BWR	2436	4.69									
TOTAL			4877	10.85									
Hope Creek	1	BWR	3293	7.05	0.34	0.042	0.38	4.4	3.1	0.19	0.10	<0.01	<0.01
Indian Point	1	PWR	615	7.88	0.032	2.9	2.9	0.17	0.07	1.7	2.34	0.23	0.93
	2	PWR	2758	4.76									
	3	PWR	2760	0.									
TOTAL			6133	12.64									
Kewaunee	1	PWR	1650	3.94	0.044	0.0035	0.047	0.06	0.49	<0.01	<0.01	<0.01	<0.01
LaCrosse(c)	1	BWR	165	0.	0.076	<0.001	0.076	16	7.5	0	0	0	<0.01
LaSalle	1	BWR	3323	6.45	0	0.012	0.012	<0.01	<0.01	0.01	<0.01	0.01	0.03
	2	BWR	3323	5.78									
TOTAL			6646	12.23									
Limerick	1	BWR	3293	6.23	0.61	0.19	0.80	0.12	0.05	0.04	0.04	0.07	0.13
	2	BWR	3293	8.49									
TOTAL			7586	14.72									
Maine Yankee	1	PWR	2630	5.36	0.0026	0.0089	0.012	0.04	0.18	0.05	0.09	0.10	0.24
McGuire	1	PWR	3411	7.49	2.6	0.23	2.8	1.2	1.0	1.6	1.17	0.65	0.18
	2	PWR	3411	6.78									
TOTAL			6822	14.27									

TABLE 1.4. (Contd)

Site	Unit	Type(a)	Licensed Thermal Power (MW)	Electric Energy Generation (TW.hr)(b)	Population Dose Commitment (person-rem)			Individual Appendix I Percentages(d)					
								Liquid		Air			
					Liquid	Air(c)	Total	T Body	Organ	Gamma	Beta	T Body	Organ
Millstone	1	BWR	2011	3.61	3.6	0.13	3.7	2.7	1.8	0.05	0.06	0.04	0.22
	2	PWR	2700	2.71									
	3	PWR	3411	6.57									
TOTAL			4571	12.89									
Monticello	1	BWR	1670	4.45	0	0.12	0.12	0	0	0.18	0.03	0.12	1.1
Nine Mile Point	1	BWR	1850	2.93	0.21	0.021	0.22	10	6.8	0.01	<0.01	<0.01	0.01
	2	BWR	3323	4.25									
TOTAL			5173	7.18									
North Anna	1	PWR	2893	5.36	0.16	0.13	0.29	13	5.3	0.23	0.23	0.13	0.34
	2	PWR	2893	6.32									
TOTAL			5786	11.68									
Oconee	1	PWR	2568	6.28	0.77	0.17	0.94	2.5	1.6	0.02	0.01	0.02	0.25
	2	PWR	2568	5.94									
	3	PWR	2568	5.45									
TOTAL			7704	17.67									
Oyster Creek	1	BWR	1930	4.53	0	0.056	0.056	0	0	0.05	<0.01	0.03	0.21
Palisades	1	PWR	2530	4.87	0.010	0.0049	0.015	0.04	0.02	0.02	0.03	0.02	0.06
Palo Verde	1	PWR	3800	7.12	0	0.65	0.65	0	0	0.22	0.31	0.03	0.14
	2	PWR	3800	10.10									
	3	PWR	3800	8.39									
TOTAL			11400	25.61									
Peach Bottom	2	BWR	3293	5.67	0.20	0.40	0.60	0.67	0.60	0.06	0.01	0.08	0.35
	3	BWR	3293	7.18									
TOTAL			6586	12.85									
Perry	1	BWR	3579	7.17	0.9	0.049	1.0	0.32	0.17	1.1	0.46	0.61	35
Pilgrim	1	BWR	1998	4.74	<0.001	0.13	0.13	0.40	0.51	1.4	0.77	0.59	1.66
Point Beach	1	PWR	1518	3.60	0.069	0.019	0.088	3.70	1.5	<0.01	<0.01	<0.01	0.17
	2	PWR	1518	3.67									
TOTAL			3036	7.27									
Prairie Island	1	PWR	1650	3.50	0.014	0.24	0.25	0.05	0.03	0.03	0.04	0.01	0.15
	2	PWR	1650	3.22									
TOTAL			3300	6.72									
Quad Cities	1	BWR	2511	4.17	0.031	0.032	0.063	0.11	0.05	<0.01	<0.01	<0.01	0.03
	2	BWR	2511	3.90									
TOTAL			5022	8.07									
Rancho Seco	1	PWR	2772	0.	0.0018	0.033	0.035	8.3	4.70	<0.01	<0.01	<0.01	0.07
River Bend	1	BWR	2894	2.76	0.0047	0.063	0.068	12.3	46	1.3	0.38	0.86	0.40
H.B. Robinson	2	PWR	2300	4.06	0.0086	0.0017	0.010	0.23	0.25	<0.01	<0.01	<0.01	<0.01

TABLE 1.4. (Contd)

Site	Unit	Type(a)	Licensed Thermal Power (MW)	Electric Energy Generation (TW.hr)(b)	Population Dose Commitment (person-rem)			Individual Appendix I Percentages(d)					
								Liquid		Air			
					Liquid	Air(c)	Total	T Body	Organ	Gamma	Beta	T. Body	Organ
St. Lucie	1	PWR	2560	7.14	<0.001	0.091	0.092	0.23	0.30	0.05	0.06	0.06	0.15
	2	PWR	2700	5.43									
TOTAL			5260	12.57									
Salem	1	PWR	3338	5.30	0.29	0.75	1.0	1.09	1.83	0.12	0.18	0.01	0.02
	2	PWR	3338	4.72									
TOTAL			6676	10.02									
San Onofre	1	PWR	1347	1.17	0.012	1.1	1.1	0.11	0.09	1.3	1.70	0.33	63
	2	PWR	3410	8.80									
	3	PWR	3390	6.83									
TOTAL			8147	16.80									
Seabrook	1	PWR	2000	7.87	0.0046	0.0011	0.0057	0.01	0.02	<0.01	<0.01	<0.01	<0.01
Sequoyah	1	PWR	2815	8.36	0.51	0.10	0.61	0.20	0.07	0.09	0.08	0.08	0.08
	2	PWR	2815	7.27									
TOTAL			5630	15.63									
South Texas	1	PWR	3800	7.27	0.0066	0.025	0.032	0.03	0.06	0.08	0.10	0.03	0.11
	2	PWR	3800	10.30									
TOTAL			7600	17.57									
Summer	1	PWR	2775	7.52	1.5	0.018	1.5	2.1	1.0	0.12	0.15	0.10	0.11
Surry	1	PWR	2441	5.22	0.022	0.10	0.12	0.01	<0.01	0.01	0.02	<0.01	0.02
	2	PWR	2441	6.43									
TOTAL			4882	11.65									
Susquehanna	1	BWR	3293	6.39	0.075	0.11	0.19	0.02	0.01	0.04	0.05	0.02	0.16
	2	BWR	3293	7.18									
TOTAL			6586	13.57									
Three Mile Island	1	PWR	2535	7.22	0.18	0.64	0.82	0.86	0.36	0.56	0.62	0.56	1.1
	2	PWR	2772	0.									
TOTAL			5307	7.22									
Trojan	1	PWR	3411	4.57	0.0016	0.062	0.064	0.19	0.13	0.64	0.54	0.33	0.26
Turkey Point	3	PWR	2200	3.42	0	0.0061	0.0061	0.03	0	<0.01	<0.01	<0.01	<0.01
	4	PWR	2200	4.64									
TOTAL			4400	8.06									
Vermont Yankee	1	BWR	1593	3.73	<0.001	0.13	0.13	<0.01	0.91	31	6.2	1.2	0.72
Vogtle	1	PWR	3411	9.38	0.0025	0.042	0.045	1.80	4.7	<0.01	<0.01	<0.01	0.02
	2	PWR	3411	7.77									
TOTAL			6822	17.15									
Waterford	3	PWR	3390	7.62	0.050	0.89	0.94	4.70	5.6	1.7	1.0	0.88	0.89
WNP-2		BWR	3323	5.69	<0.001	0.25	0.25	0.56	0.26	0.68	0.24	0.05	0.21
Wolf Creek	1	PWR	3411	8.49	0.77	0.0040	0.77	2.4	0.92	0.03	0.14	0.02	0.02
Yankee Rowe	1	PWR	600	0.	0.10	0.0035	0.10	1.9	5.6	0	0	0	<0.01

TABLE 1.4. (Contd)

Site	Unit	Type(a)	Licensed Thermal Power (MW)	Electric Energy Generation (TW.hr)(b)	Population Dose Commitment (person-rem)			Individual Appendix I Percentages(d)						
								Liquid		Air				
					Liquid	Air(c)	Total	T Body	Organ	Gamma	Beta	T Body	Organ
Zion	1	PWR	3250	4.11	2.8	0.65	3.5	0.11	0.12	0.73	0.33	0.05	0.28
	2	PWR	3250	5.37									
TOTAL			6500	9.48									
TOTAL FOR ALL SITES				615.57	32	15	47						
Arithmetic Mean				8.55	0.44	0.21	0.66	4.0%	4.4%	0.77	0.31	0.23	1.8
Geometric Mean				6.82	0.053	0.049	0.17	0.77%	0.67%	0.05	0.03	0.03	0.07

(a) BWR = boiling water reactor; PWR = pressurized water reactor
(b) 1 TW-hr = 3.6E15 joules.
(c) Does not include doses from nuclides not in reported releases, such as carbon-14.
(d) Percentages are calculated on a per-unit basis.
(e) Does not have charcoal delay beds in the gaseous effluent line from air ejector.

The location relative to the release of the maximal air concentrations for the site boundary (gamma and beta radiation), residence (total body), garden (leafy vegetables and produce), and pasture (milk and meat) are given. These locations have been taken from the licensee's ODCM and from personal communications with their representatives.

Various site-dependent factors associated with the waterborne pathways are presented. The average dilution flow through the plant discharge structure for the year 1992 specified by Tichler et al. (1995) is given. For river sites, the average annual river flow is tabulated. Next is shown the estimated 1992 population utilizing drinking water drawn from supplies containing diluted effluents from the site. Next is tabulated the mixing ratios and usages for the four liquid pathways: drinking water, fish, shellfish, and shoreline (individual only). Fish and invertebrate catch data are taken from the respective plant environmental statement or ODCM, when available (see Table 1.3). When site-specific fish and invertebrate catch data were not available for population dose estimates, the generic consumption rates were used for the particular site. Sites on salt water were assumed to contribute no dose from drinking water.

For individual dose estimates, generic maximum individual "Reg Guide" usages were used. The notation "RG" denotes consumption rates taken from Regulatory Guide 1.109 (NRC 1977). The mixing ratios specify further dilution of the plant dilution flow as given above to arrive at a typical concentration at the point of drinking-water withdrawal or fish and shellfish habitat. The mixing ratios are the reciprocal of the dilution factors as given in the licensee ODCM. Note that a mixing ratio of unity (1) would denote no further mixing of effluent in the receiving body. Note that for rivers and estuaries this is different than the notation of years previous to 1989 where unity denoted complete mixing. When the pathway was not applicable to the site, the word "None" is specified. The shoreline dose was calculated for each site, assuming one year of radionuclide buildup in the sediment, whether or not stipulated by the licensee. However, in no case was the estimated shoreline dose of any significance.

1.2 RESULTS

The population dose commitments are presented in the Site Summaries section (Section 2.0), which summarize site-specific parameters for that site. These tables include both waterborne and airborne pathway dose commitments for the several organs of reference for each age group investigated. They also include the dose to the whole population, which includes all age groups.

The results of the individual dose estimates are also listed. Doses and percentages of the design objectives from 10 CFR 50, Appendix I, are given for both waterborne and airborne releases. These individual dose commitments are given on a per-unit basis, whereas the population dose commitments listed above them are given on a per-site basis, as in previous years. Any variation from this stipulation is noted on the page for the site.

Population dose commitments estimated for both the waterborne pathways and airborne pathways varied widely over the sites studied. The total dose commitments (from both pathways) varied from a high of 3.7 to a low of 0.0015 person-rem for plants in operation and producing power during the year. The arithmetic mean for the total dose from liquid pathways (0.44 person-rem) and airborne pathways (0.21 person-rem) was 0.66 person-rem (see Table 1.4).

As in past years, most of the plants accounted for less than 1 person-rem to their surrounding population from plant releases of radionuclides into liquid effluent streams. Only two sites had waterborne releases that resulted in a population dose of greater than 3 person-rem: Millstone, with 3.6 person-rem primarily from zinc-65 in bay oysters; and Crystal River, with 3.2 person-rem, mostly from cesium isotopes in aquatic foods. Other sites for which liquid pathways contributed more than 2 person-rem are Harris, Zion, and McGuire, with 2.9, 2.8, and 2.6 person-rem, respectively, mostly from tritium in drinking water; and Comanche Peak, with 2.1 person-rem, mostly from cesium isotopes in aquatic foods.

The doses from radionuclide releases from plant vents and/or stacks into the atmosphere also accounted for less than 1 person-rem for most sites. Two sites had airborne releases resulting in greater than 1 person-rem: Indian Point with 2.9 and San Onofre with 1.1 person-rem. These airborne doses were primarily the result of xenon-133.

The total population dose commitments from all sites for 1992 were estimated to be 32 person-rem via waterborne pathways and 15 person-rem via airborne pathways for a total of 47 person-rem (see Table 1.4).

Individual dose commitments from both waterborne and airborne pathways were estimated for the sites. The doses are given for each site in the Site Summaries section (Section 2.0) of this report. Table 1.4 lists the percentages of the 10 CFR 50, Appendix I, design objectives for both waterborne and airborne pathways. The values represent percentages of the annual design objectives. For compliance purposes, each pathway would be compared on a quarterly basis as in 10 CFR 50, Appendix I. The percentages are on a per unit basis unless otherwise noted in the table. Individual dose commitments for all sites were below design objectives.

We should point out here, however, that the doses estimated in this study are extremely low compared to an average annual background dose of approximately 100 mrem (excluding radon and its decay products). We have compared dose commitments calculated in this study with annual background. However, this comparison is not quite exact, since these dose commitments are total-body doses received from the year's effluent release over 50 years of a person's lifetime. However, most of the dose commitment calculated here is delivered in the first year, so the comparison is reasonably valid.

For comparison purposes, the doses greater than 0.001 person-rem listed in the tables are given to two significant figures; however, the data and models used to calculate the doses limit their accuracy to, at most, one significant figure.

1.3 SITE COMPARISONS

Table 1.5 shows the population dose commitments for the past 18 years, along with the energy produced in that year. The last column shows the cost/benefit for commercial nuclear power in terawatt-hours as a ratio of population dose to generated power. Except for 1979 (the year of the TMI-2 accident), this ratio has been tending downward even though the population around many of the sites has been rising.

TABLE 1.5. Comparison of Annual Population Dose Commitments and Energy Output for the Past 18 Years

Year	Dose Commitments (person-rem) Liquid	Air	Total	Energy Output (TW-hr)	Cost/Benefit (person-rem TW-hr)
1975	76	1300	1300	170	7.6
1976	82	390	470	180	2.5
1977	160	540	700	250	2.8
1978	110	530	640	270	2.3
1979	220	1600	1800	250	7.2
1980	120	57	180	250	0.73
1981	87	63	150	280	0.54
1982	50	87	140	270	0.51
1983	95	76	170	280	0.60
1984	160	120	280	320	0.87
1985	91	110	200	370	0.54
1986	71	44	110	410	0.27
1987	56	22	78	450	0.17
1988	65	10	75	510	0.15
1989	68	16	84	535	0.16
1990	63	15	78	570	0.14
1991	70	17	88	613	0.14
1992	32	15	47	616	0.08

The reactor sites are compared in Table 1.6 as to the total population dose over the years of this study, 1975-1992. The sites were placed within six groupings by person-rem depending on resulting population dose summed over each of the years through 1992:

I	Greater than 100
II	30 - 100
III	10 - 30
IV	3 - 10
V	1 - 3
VI	Less than 1

Table 1.6 shows the sites within the groups, along with the reactor manufacturer, year of commercial operation commencement, and indicated population doses in person-rem. The manufacturer codes are as follows:

AC	Allis Chalmers
B	Babcox and Wilcox
CE	Combustion Engineering
GE	General Electric
W	Westinghouse

Table 1.7 shows the average population dose in person-rem for the last three years. The sites are listed in order of average dose with the high doses toward the top. Breaks in the table are indicated at every half-order of magnitude: 0.03, 0.1, 0.3, etc.

Table 1.8 shows the present contributions of all radionuclides contributing over 3% to the population dose from 1992 effluents. The contributors are shown for each site for both liquid (L) and air (A) pathways. Note that only a few nuclides of those reported by the licensees (Tichler et al. 1995) contribute much to the dose.

TABLE 1.6. Total-Body Population Doses from Nuclear Power Plant Effluents During Normal Operations,[a] 1975-1992

Site, Manufacturer	Year Commercial Operation	Total Person-Rem for Year																		
		1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	TOTAL
I. (>100 Person-rem)																				
Millstone, GE, CE, W	71,75,86	750	160	220	200	1.8	2.9	4.8	1.83	0.96	1.33	0.263	1.232	1.2022	0.2227	10	1.8	22.14	3.7	1384
Dresden, GE	60,70,71	360	120	180	170	15	13	10	6.2	2.2	1.1	0.96	0.21	0.14	0.11	0.25	0.11	0.044	0.027	879
Oyster Creek, GE	69	47	37	41	110	220	9.5	15	7.611	0.712	1.8	73	25	1.5013	2.2	2.6	0.28	0.074	0.056	594
Browns Ferry, GE	74,75,77	2.9	1.1	3.2	2.2	9.6	2.8	7.8	34.1	45	106	7.9	2.64	1.6013	1.2011	0.39	0.77	0.92	1.7	232
Nine Mile Point, GE	69,87	69	8.7	3.1	0.07	140	0.04	5.2	0.028	0.0456	0.029	0.018	0.0243	0.506	0.2144	0.035	0.023	0.15	0.22	227
Zion, W	73,74	6.1	17	22	23	14	11	1.7	2.62	8.1	33.69	7.19	6.04	6.086	7.24	0.76	3.5	3.2	3.5	177
McGuire, W	81,84	---	---	---	---	---	---	0.2	2.75	14.14	20.17	20.16	31.1	15.17	16.17	14	15	13.22	2.8	165
Oconee, B	73,74,74	9.2	20	38	12	5.8	10	13	9.9	5.59	4.66	6.9	5.93	3.97	3.84	3.8	2.8	0.91	0.94	157
Peach Bottom, GE	74,74	2.4	17	11	15	30	4.7	2.7	5.3	9.7	9.6	16	4.7	2.1	0.33	0.33	0.85	1.2	0.6	134
North Anna, W	78,80	---	---	---	0.48	4.9	3.1	4.2	5.24	28.3	44.18	27.088	1.675	1.72	0.036	1.3	0.13	0.21	0.29	123
Quad Cities, GE	73,73	25	11	4	7.3	6.5	42	16	1	0.99	0.57	5.7	0.8	0.08	0.06	0.094	0.12	0.12	0.063	121
II. (30 - 100 person-rem)																				
Pilgrim, GE	72	6.2	14	52	7.3	3.1	4.3	0.74	2.33	4.107	0.051	0.556	0.0186	0.0129	0.002	0.071	0.093	0.16	0.13	95
Cook, W	75,78	0.21	5	23	40	17	0.34	0.47	0.721	0.206	0.343	0.541	0.1695	0.617	0.2159	0.18	0.51	0.2	0.2	90
Indian Pt., B, W, W	62,74,76	3.8	9.1	13	8.4	5.9	4.9	8.6	5.5	4.59	3.2	2.77	3.2	6.2	0.43	0.51	1.6	0.67	2.9	85
Hatch, GE	75,79	---	0.03	35	0.087	0.13	0.34	2.2	2.842	5.84	8.04	3.386	2.75	4.96	6.435	0.36	0.32	0.27	0.24	73
LaCrosse, AC	69	7	12	9.4	5.9	4.1	2.1	4.9	6.95	1.75	1.06	1.05	0.81	0.82	0.4103	0.21	0.07	0.085	0.076	59
Big Rock Point, GE	63	4.6	7.7	2.6	2.6	9	10	3.6	1.16	0.57	4.48	3.26	1.97	0.74	0.85	1.6	0.77	0.21	1.3	57
Brunswick, GE	75,77	0.02	0.53	6.4	2.3	2.2	2	1.5	14.011	10	4.1002	0.1815	0.7121	0.6229	0.0397	0.041	0.038	0.031	0.016	45
Crystal River, B	77	---	---	0.02	0.29	0.65	0.32	19	0.031	4.8047	6.809	4.42	2.41	0.7158	0.201	0.47	0.72	0.039	3.2	44
Haddam Neck, W	68	0.54	3.7	2.4	5.6	3.6	7.5	0.55	0.203	1.03	1.49	0.606	0.54	0.9	0.537	4.8	1.1	3.442	1	40
Arkansas One, B	74,80	0.38	4.5	1.6	2.2	0.47	3.4	3.6	4.499	3.617	3.75	2.01	4.735	1.7085	1.034	0.33	0.15	0.32	0.38	39
Summer, W	82	---	---	---	---	---	---	---	0.0005	0.4437	0.547	0.5625	3.6002	4.111	13.007	5.9	4.1	2.2	1.5	36
Rancho Seco, B	75	0.05	0.01	0.06	0.15	0.32	15	1.8	1.68	2.91	9.73	0.252	0.024	0.0101	0.08	0.44	0.061	0.041	0.035	33
Surry, W	72,73	5.4	3.4	3.7	1.4	1	1.2	1.7	2.26	1.98	1.92	1.6	1.7	1.037	0.51	0.93	1.6	0.87	0.12	32
Kewaunee, W	74	8.5	5.1	1.9	0.59	1.8	3	1.6	1.703	0.7408	0.5512	1.2027	0.926	0.721	1.3022	1.3	1	0.1	0.047	32
III. (11 - 30 person-rem)																				
Davis-Besse, B	77	---	---	14	0.6	0.52	11	0.65	0.09	0.128	0.38	0.4961	0.0568	0.1378	0.0178	1	0.2	0.14	0.1	30
Calvert Cliffs, CE	75,77	0.5	0.74	1.9	2.6	3	1.7	0.72	2.15	0.92	0.7	0.82	0.81	2.66	1.74	2	0.99	4	2	30
Fitzpatrick, GE	75	0.09	1.4	0.56	0.37	0.24	2.8	6.7	6.93	2.83	0.9717	0.405	0.0995	0.153	0.157	0.1	0.05	0.076	0.005	24
Humboldt Bay, GE	63	18	5.8	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	24
San Onofre, W	68,83,84	0.28	1.4	0.78	1.8	0.52	3.1	1.8	0.513	0.71	3.8	1.96	0.566	1.435	0.503	0.63	0.57	0.51	1.1	22
Braidwood, W	87	---	---	---	---	---	---	---	---	---	---	---	---	0.0093	1.1061	8	7.1	2.5	0.53	19
Perry, GE	86	---	---	---	---	---	---	---	---	---	---	---	0.0012	0.0555	0.18	4.1	6.9	6.5	1	19
Three Mile Isl., B	74,78	0.57	1.4	2	2.2	0.29	2.2	0.24	0.277	0.0938	0.078	0.057	0.57	0.232	0.34	1.1	0.55	2.5	0.82	16
Harris, W	87	---	---	---	---	---	---	---	---	---	---	---	---	1.777	1.8	1.8	5.1	2.1	3.1	16
Robinson, W	71	9.3	0.28	0.47	0.45	0.19	0.2	1.3	0.0467	0.4355	0.2613	0.214	0.105	0.168	0.061	0.058	0.0086	0.014	0.01	14
Salem, W	77,81	---	---	0.12	0.37	2.3	0.28	0.85	0.58	2.41	0.52	0.565	0.72	1.17	0.94	0.77	1	0.65	1	14
Clinton, GE	87	---	---	---	---	---	---	---	---	---	---	---	---	0.83	4.0087	1.6	3.2	2.2	1.3	13
Turkey Point, W	72,73	0.22	0.28	0.4	9.1	0.17	0.08	0.07	0.3051	0.2583	0.1727	0.1381	0.2032	0.22	0.185	0.11	0.16	0.0022	0.0061	12
Sequoyah, W	80,82	---	---	---	---	---	0.22	0.67	1.25	1.55	1.81	1.06	0.197	0.159	0.279	1.5	1.8	1.3	0.61	12
St. Lucie, CE	76,83	---	0.03	0.65	1.1	0.76	0.51	0.62	0.87	0.592	1.4022	1.612	1.3027	0.5004	0.3602	0.74	0.12	0.21	0.092	11
IV. (3 - 10 person-rem)																				
Yankee Rowe, W	61	0.11	0.07	0.2	4.6	0.4	0.55	0.72	0.188	0.147	0.48	0.39	0.377	0.65	0.488	0.19	0.19	0.099	0.1	10
Hope Creek, GE	86	---	---	---	---	---	---	---	---	---	---	---	0.0593	4.5	1.09	1.7	2	0.44	0.38	10
Catawba, W	85	---	---	---	---	---	---	---	---	---	---	0.74	2.15	1.37	1.61	0.88	1.7	1.3	1.4	11
Wolf Creek, W	85	---	---	---	---	---	---	---	---	---	---	0.11	0.398	0.1448	0.191	0.79	0.85	5.545	0.77	8.8
Monticello, GE	71	5.2	0.25	0.2	0.2	0.18	0.16	0.14	0.19	0.1	0.049	0.14	0.096	0.17	0.18	0.21	0.2	0.15	0.12	7.9
Ft. Calhoun, CE	74	0.13	0.26	0.33	0.48	0.39	0.48	0.35	0.356	0.1887	1.917	0.244	0.216	0.2848	0.338	0.52	0.4	0.27	0.15	7.3
Farley, W	77,81	---	---	---	0.19	0.19	0.58	3.2	1.543	0.356	0.226	0.1389	0.091	0.079	0.065	0.17	0.064	0.071	0.048	7.0
Waterford, CE	85	---	---	---	---	---	---	---	---	---	---	0.4732	0.799	0.827	0.543	0.4	1.8	0.89	0.94	6.7
Limerick, GE	84	---	---	---	---	---	---	---	---	---	0.00016	0.078	0.209	0.94	0.25	2	1.7	0.63	0.8	6.6
Ginna, W	70	0.28	0.51	0.14	0.13	0.11	0.58	0.15	0.236	0.406	0.689	0.314	0.274	0.321	0.233	0.31	0.25	0.45	0.57	6.0
Beaver Valley, W	76,87	---	0.04	0.4	0.83	0.172	0.02	0.11	0.036	0.11	0.188	0.056	0.071	0.235	0.131	0.34	0.68	0.64	1	5.1
Prairie Island, W	73,74	0.12	1.4	0.59	0.46	0.1	0.06	0.04	0.067	0.047	0.059	0.0439	0.063	0.0341	0.0801	0.22	0.75	0.41	0.25	4.8
Palisades, CE	71	0.62	0.64	0.63	0.11	0.12	0.03	0.16	0.621	0.29	0.1214	0.305	0.1223	0.277	0.215	0.039	0.024	0.043	0.015	4.4
Point Beach, W	70,71	1.2	0.33	0.18	0.12	0.25	0.2	0.19	0.41	0.33	0.235	0.095	0.069	0.059	0.047	0.062	0.05	0.056	0.088	4.0
Comanche Peak, W	90	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.37	1	2.2	3.6
Palo Verde, CE	86,86,87	---	---	---	---	---	---	---	---	---	---	0.0033	0.13	0.16	0.2	0.49	0.55	0.94	0.65	3.1

TABLE 1.6. (Contd)

Site, Manufacturer	Year Commercial Operation	Total Person-Rem for Year																		
		1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	TOTAL
V. (1 - 3 person-rem)																				
Vermont Yankee, GE	72	0.08	0.11	0.37	0.24	0.46	0.06	0.6	0.056	0.11	0.096	0.1	0.12	0.016	0.059	0.069	0.16	0.16	0.13	3.0
Duane Arnold, GE	75	0.18	0.32	0.31	0.87	0.54	0.11	0.03	0.0076	0.045	0.032	0.024	0.062	0.068	0.064	0.005	0.0063	0.0039	0.01	2.7
Trojan, W	76	---	0.02	0.11	0.04	0.05	0.06	0.2	0.17	0.11	0.08	0.1	0.1	0.03	0.05	0.14	0.11	0.25	0.064	1.7
Cooper, GE	74	0.18	0.39	0.02	0.05	0.05	0.07	0.07	0.167	0.104	0.343	0.069	0.042	0.0112	0.0117	0.0085	0.0041	0.0016	0.0015	1.6
WNP-2, GE	84	---	---	---	---	---	---	---	---	---	0.0281	0.4732	0.0089	0.0162	0.0292	0.32	0.18	0.18	0.25	1.5
Susquehanna, GE	82,85	---	---	---	---	---	---	---	0.206	0.042	0.0469	0.106	0.081	0.052	0.034	0.18	0.29	0.18	0.19	1.4
LaSalle, GE	82,84	---	---	---	---	---	---	---	0.0017	0.0015	0.027	0.073	0.27	0.54	0.27	0.057	0.0022	0.0024	0.012	1.3
Byron, W	85,87	---	---	---	---	---	---	---	---	---	---	0.271	0.502	0.096	0.121	0.11	0.046	0.008	0.013	1.2
VI. (<1 person-rem)																				
Maine Yankee, W	72	0.1	0.06	0.01	0.03	0.04	0.03	0.01	0.0072	0.0052	0.0062	0.0113	0.0239	0.029	0.0076	0.0054	0.038	0.022	0.012	0.45
Fermi, GE	86	---	---	---	---	---	---	---	---	---	---	---	0.07	0.01	0.01	0.12	0.12	0.05	0.052	0.43
River Bend, GE	86	---	---	---	---	---	---	---	---	---	---	---	0.1704	0.0016	0.0017	0.0087	0.083	0.083	0.068	0.42
Vogtle, W	87	---	---	---	---	---	---	---	---	---	---	---	---	0.014	0.0209	0.18	0.05	0.056	0.045	0.37
South Texas, W	88	---	---	---	---	---	---	---	---	---	---	---	---	---	0.168	0.022	0.017	0.016	0.032	0.25
Callaway, W	84	---	---	---	---	---	---	---	---	---	0.0015	0.011	0.038	0.0231	0.0066	0.032	0.035	0.024	0.035	0.21
Diablo Canyon, W	84	---	---	---	---	---	---	---	---	---	3.8E-05	0.0106	0.037	0.0179	0.0213	0.011	0.015	0.01	0.015	0.14
Shoreham, GE	86	---	---	---	---	---	---	---	---	---	---	---	0.0069	0.034	0.0015	0.00024	---	---		0.043
Grand Gulf, GE	83	---	---	---	---	---	---	---	---	0.001	0.0019	0.0016	0.0007	0.0053	0.0011	0.0046	0.0055	0.0043	0.017	0.043
Seabrook, W	89	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2E-06	0.016	0.01	0.0057	0.032
TOTAL		1345	473	698	644	508	179	150	138	171	284	199	114	78	75	84	78	88	47	5351

(a) Only the doses from the TMI accident, 1979, are excluded.

TABLE 1.7. Average Population Doses for Last Three Years, person-rem

Site	1990	1991	1992	Average
McGuire, W	15	13	2.8	10
Millstone, GE, CE, W	1.8	22	3.7	9.2
Perry, GE	6.9	6.5	1	4.8
Harris, W	5.1	2.1	3.1	3.4
Zion, W	3.5	3.2	3.5	3.4
Braidwood, W	7.1	2.5	0.53	3.4
Summer, W	4.1	2.2	1.5	2.6
Wolf Creek, W	0.85	5.5	0.77	2.4
Clinton, GE	3.2	2.2	1.3	2.2
Calvert Cliffs, CE	0.99	4	2	2.3
Haddam Neck, W	1.1	3.4	1	1.8
Indian Pt., B, W, W	1.6	0.67	2.9	1.7
Oconee, B	2.8	0.91	0.94	1.5
Catawba, W	1.7	1.3	1.4	1.5
Crystal River, B	0.72	0.039	3.2	1.3
Three Mile Isl., B	0.55	2.5	0.82	1.3
Sequoyah, W	1.8	1.3	0.61	1.2
Waterford, CE	1.8	0.89	0.94	1.2
Comanche Peak, W	0.37	1	2.2	1.2
Browns Ferry, GE	0.77	0.92	1.7	1.1
Limerick, GE	1.7	0.63	0.8	1.0
Hope Creek, GE	2	0.44	0.38	0.94
Peach Bottom, GE	0.85	1.2	0.6	0.88
Salem, W	1	0.65	1	0.88
Surry, W	1.6	0.87	0.12	0.86
Beaver Valley, W	0.68	0.64	1	0.77
Big Rock Point, GE	0.77	0.21	1.3	0.76
San Onofre, W	0.57	0.51	1.1	0.73
Palo Verde, CE	0.55	0.94	0.65	0.71
Prairie Island, W	0.75	0.41	0.25	0.47
Ginna, W	0.25	0.45	0.57	0.42
Kewaunee, W	1	0.1	0.047	0.38
Cook, W	0.51	0.2	0.2	0.30
Arkansas One, B	0.15	0.32	0.38	0.28
Hatch, GE	0.32	0.27	0.24	0.28
Ft. Calhoun, CE	0.4	0.27	0.15	0.27
Susquehanna, GE	0.29	0.18	0.19	0.22
North Anna, W	0.13	0.21	0.29	0.21
WNP-2, GE	0.18	0.18	0.25	0.20
Monticello, GE	0.2	0.15	0.12	0.16
Vermont Yankee, GE	0.16	0.16	0.13	0.15
Davis-Besse, B	0.2	0.14	0.1	0.15
Trojan, W	0.11	0.25	0.064	0.14
St. Lucie, CE	0.12	0.21	0.092	0.14
Oyster Creek, GE	0.28	0.074	0.056	0.14
Nine Mile Point, GE	0.023	0.15	0.22	0.13
Yankee Rowe, W	0.19	0.099	0.1	0.13
Pilgrim, GE	0.093	0.16	0.13	0.13
Quad Cities, GE	0.12	0.12	0.063	0.10
River Bend, GE	0.083	0.083	0.068	0.078
LaCrosse, AC	0.07	0.085	0.076	0.077
Fermi, GE	0.12	0.05	0.052	0.074
Point Beach, W	0.05	0.056	0.088	0.065
Farley, W	0.064	0.071	0.048	0.061
Dresden, GE	0.11	0.044	0.027	0.060
Turkey Point, W	0.16	0.0022	0.0061	0.056
Vogtle, W	0.05	0.056	0.045	0.050
Rancho Seco, B	0.061	0.041	0.035	0.046
Fitzpatrick, GE	0.05	0.076	0.005	0.044
Callaway, W	0.035	0.024	0.035	0.031
Brunswick, GE	0.038	0.031	0.016	0.028
Palisades, CE	0.024	0.043	0.015	0.027
Maine Yankee, W	0.038	0.022	0.012	0.024
Byron, W	0.046	0.008	0.013	0.022
South Texas, W	0.017	0.016	0.032	0.022
Diablo Canyon, W	0.015	0.01	0.015	0.013
Robinson, W	0.0086	0.014	0.01	0.011
Seabrook, W	0.016	0.01	0.0057	0.011
Grand Gulf, GE	0.0055	0.0043	0.017	0.009
Duane Arnold, GE	0.0063	0.0039	0.01	0.007
LaSalle, GE	0.0022	0.0024	0.012	0.006
Cooper, GE	0.0041	0.0016	0.0015	0.002

TABLE 1.8. Percentage of Major Radionuclide contributions to Total Population Doses from Liquid (L) and Air (A) Pathways

Site	Path	Dose	Major Contributors (Percent) *																	
			H 3	C 14	Ar 41	Mn 54	Fe 55	Fe 59	Co 58	Co 60	Zn 65	Kr 85m	Kr 87	Kr 88 +D	Sr 90 +D	I 131 +D	Cs 134	Cs 137 +D	Xe 133	Xe 135	Xe 138+ D
ARKANSAS ONE	L	0.22															52	46			
	A	0.16	13						3										80	4	
BEAVER VALLEY	L	0.048	99																		
	A	1.0	95																3		
BIG ROCK POINT	L	1.3															3	95			
	A	0.020											16	54						15	10
BRAIDWOOD	L	0.16	17														40	37			
	A	0.37	94																6		
BROWNS FERRY	L	1.1															12	83			
	A	0.63										4	4	77					5	4	
BRUNSWICK	L	<0.001	3				14			77											
	A	0.015	8		13					5		4		37					9	21	
BYRON	L	0.0051	15				15										29	35			
	A	0.0082	11																84	4	
CALLAWAY	L	<0.001	50														25	25			
	A	0.035	70																27		
CALVERT CLIFFS	L	1.6	6						4	3							46	40			
	A	0.39																	93	3	
CATAWBA	L	0.62	3														42	52			
	A	0.76	48		36														13		
CLINTON	L	1.7	5			33			3	56											
	A	0.0022	95																		
COMANCHE PEAK	L	2.1															56	42			
	A	0.70	3											4					87	5	
COOK	L	0.17	33												4		33	30			
	A	0.034	52														7	7	25	4	
COOPER	L	0.0014								3							29	65			
	A	<0.001											12	62						16	6
CRYSTAL RIVER	L	3.2					4	8	14	10							34	27			
	A	0.015	27																65	7	

TABLE 1.8 (Contd)

Site	Path	Dose	Major Contributors (Percent) *																	
			H 3	C 14	Ar 41	Mn 54	Fe 55	Fe 59	Co 58	Co 60	Zn 65	Kr 85m	Kr 87	Kr 88 +D	Sr 90 +D	I 131 +D	Cs 134	Cs 137 +D	Xe 133	Xe 135	Xe 138+ D
DAVIS-BESSE	L	0.083	28														38	34			
	A	0.018	77															10	8	6	
DIABLO CANYON	L	0.0020	24			3	47	3	6	12								3			
	A	0.013	93							4											
DRESDEN	L	0																			
	A	0.027	24			4				61										7	
DUANE ARNOLD	L	0																			
	A	0.010	62							25										9	
FARLEY	L	0.014	22							3							11	62			
	A	0.034	57		10														23	9	
FERMI	L	<0.001	95							4											
	A	0.052	42		4									26					6	13	4
FITZPATRICK [a]	L	0.0018	48							5	17						12	16			
	A	0.0032	14							4	3	13	11	15					4	9	
FORT CALHOUN	L	0.13	80												3		6	6			
	A	0.017	41																55		
GINNA	L	0.44	15														52	30			
	A	0.13	30	41															20	8	
GRAND GULF	L	<0.001				8	3			3					57		17	7			
	A	0.017	37																43	17	
HADDAM NECK	L	0.24	7				73			7					3		4	5			
	A	0.74	97																		
HARRIS	L	2.9	86														4	7			
	A	0.22												4					85	8	
E. I. Hatch	L	0.19									4						27	67			
	A	0.053	47																7	41	
HOPE CREEK	L	0.34						6			92										
	A	0.042	65			3				4	3			15						7	
INDIAN POINT	L	0.032															56	42			
	A	2.9		12															80	5	

TABLE 1.8 (Contd)

Site	Path	Dose	Major Contributors (Percent) *																		
			H 3	C 14	Ar 41	Mn 54	Fe 55	Fe 59	Co 58	Co 60	Zn 65	Kr 85m	Kr 87	Kr 88 +D	Sr 90 +D	I 131 +D	Cs 134	Cs 137 +D	Xe 133	Xe 135	Xe 138+ D
KEWAUNEE	L	0.044	99																		
	A	0.0035	97																		
LACROSSE	L	0.076																99			
	A	<0.001	9												91						
LASALLE	L	0																			
	A	0.012	29							6		4	7	53							
LIMERICK	L	0.61	78												8		4	5			
	A	0.19																	59	40	
MAINE YANKEE	L	0.0026	7				48	6	9	14							4	11			
	A	0.0089	15							3								3	75		
MCGUIRE	L	2.6	97																		
	A	0.23	40		7														37	13	
MILLSTONE	L	3.6									94										
	A	0.13	61																26	9	
MONTICELLO	L	0																			
	A	0.12	64											4					7	18	
NINE MILE POINT[b]	L	0.21	20							7	55										
	A	0.021	50		4					13	9	6							10		
NORTH ANNA	L	0.16															28	70			
	A	0.13	50																46		
OCONEE	L	0.77															44	54			
	A	0.17	11											14					42	31	
OYSTER CREEK	L	0																			
	A	0.056	4									4	6	49					5	27	
PALISADES	L	0.010	45															53			
	A	0.0049	55																42		
PALO VERDE	L	0																			
	A	0.65	81																17		
PEACH BOTTOM	L	0.20																			
	A	0.40	9									3		18					24	42	

TABLE 1.8 (Contd)

Site	Path	Dose	Major Contributors (Percent) *																	
			H 3	C 14	Ar 41	Mn 54	Fe 55	Fe 59	Co 58	Co 60	Zn 65	Kr 85m	Kr 87	Kr 88 +D	Sr 90 +D	I 131 +D	Cs 134	Cs 137 +D	Xe 133	Xe 135	Xe 138+ D
PERRY	L	0.9	3								48						23	23			
	A	0.049												5		6			20	61	
PILGRIM	L	<0.001					20			58	5				6			10			
	A	0.13	21										3	20					3	48	
POINT BEACH	L	0.069	24														44	32			
	A	0.019	76														12	8			
PRAIRIE ISLAND	L	0.014	16				4		4	3							31	38			
	A	0.24	97																3		
QUAD CITIES	L	0.031	11															85			
	A	0.032	40							49								4			
RANCHO SECO	L	0.0018	3														10	87			
	A	0.033	100																		
RIVER BEND	L	0.0047				65				9	20										
	A	0.063										3	9	67						14	3
ROBINSON	L	0.0017	14							4								78			
	A	0.086	96																		
SAINT LUCIE	L	<0.001	5				37			4							33	18			
	A	0.091	33											9					45	17	
SALEM	L	0.29					8		38	12	3						22	14			
	A	0.75	68																32		
SAN ONOFRE	L	0.012	32				11										29	24			
	A	1.1	13																78	8	
SEABROOK	L	0.0046	28				65	4													
	A	0.0011	51		17	3			12	15											
SEQUOYAH	L	0.51	91														5	3			
	A	0.10	70																25	3	

TABLE 1.8 (Contd)

Site	Path	Dose	Major Contributors (Percent) *																	
			H 3	C 14	Ar 41	Mn 54	Fe 55	Fe 59	Co 58	Co 60	Zn 65	Kr 85m	Kr 87	Kr 88 +D	Sr 90 +D	I 131 +D	Cs 134	Cs 137 +D	Xe 133	Xe 135	Xe 138+ D
SOUTH TEXAS [c]	L	0.0066	35				26			10							4	16			
	A	0.025	64																33		
SUMMER	L	1.5	38														28	34			
	A	0.018																	83	16	
SURRY	L	0.022	32							16								50			
	A	0.10	97																		
SUSQUEHANNA	L	0.075	99																		
	A	0.11	88																8		
TMI	L	0.18	92														3	5			
	A	0.64	65																29	3	
TROJAN	L	0.0016	7												3		24	64			
	A	0.062	54		3														31	11	
TURKEY POINT	L	0																			
	A	0.0061																	84	14	
VERMONT YANKEE [d]	L	<0.001	3													89					
	A	0.13	26										7	22					9	14	18
VOGTLE	L	0.0025	79						3								5	8			
	A	0.042	95																4		
WATERFORD	L	0.050					34	37	14	8							3				
	A	0.89	77																11	11	
WNP-2	L	<0.001	41							6	8						17	26			
	A	0.25	81																3	15	
WOLF CREEK [e]	L	0.77															61	37			
	A	0.0040	66											3					15	13	
YANKEE ROWE	L	0.10	4	7													31	57			
	A	0.0035	100																		
ZION	L	21.0	81							3							8	7			
	A	0.65	80																16		

TABLE 1.8 (Contd)

* Contributions less than 3% are not included in table.

(a) ^{131m}Xe and ^{133m}Xe also contribute 10% and 14%, respectively, of the dose from the air pathway at Fitzpatrick.
(b) ^{89}Sr +D also contributes 16% to the dose from the liquid pathway, and 4% to the dose from the air pathway for Nine Mile Point.
(c) ^{124}Sb and ^{125}Sb+D also contribute 5% and 3%, respectively, of the dose from the liquid pathway at South Texas.
(d) ^{106}Ru+D also contributes 5% of the dose for the liquid pathway at Vermont Yankee.
(e) ^{85}Kr also contributes 3% of the dose from the air pathway at Wolf Creek.

2.0 SITE SUMMARIES, 1992

This section contains the values, for both airborne and waterborne pathways, for the site-specific parameters used in dose calculations, for calculated population dose commitments, and for individual dose commitments (expressed per unit and as a percentage of the 10 CFR 50, Appendix I, design objectives).

Site: **ARKANSAS ONE** POPE COUNTY, AR

Location: N 35.3100° W 93.2308°

Population Data

Total Population Within 2-to-80-km Region: 1.9E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
Russelville	20,000	10 km E
Conway	26,000	76 km ESE

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-89 TO 31-DEC-89 97% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 5.8E+06 kilogram Milk: 4.8E+07 liter Meat: 7.2E+07 kilogram

Regional Productivity Factor: 1.0 Animal Grazing Factor: 0.7

Site Boundary:	1,100 meter	N
Residence:	1,100 meter	N
Garden:	1,300 meter	SE
Pasture:	2,100 meter	NW

Site-Specific Data - Waterborne Pathways via ARKANSAS RIVER

Average Effluent Flow from Site: 4.4E+11 L/y
Average River Flow at Site: 3.2E+13 L/y (36,000 cfs)
Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	1.4E-02	None	1.0E+00	RG
Fish	1.4E-02	1.4E+00	1.0E+00	RG
Shellfish	---	None	---	None
Shoreline	---	---	1.0E+00	RG

Notes:

Average individual fish consumption rates as given in FES, 1972, used in lieu of catch data.
Site-specific bioaccumulation factors used for cesium.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

ARKANSAS ONE

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	9.7E-03	8.5E-03	5.3E-03	4.2E-02	5.1E-02
Teen	1.8E-02	1.8E-02	3.9E-03	2.6E-02	4.3E-02
Adult	1.9E-01	1.5E-01	2.5E-02	1.5E-01	2.6E-01
TOTAL	2.2E-01	1.8E-01	3.5E-02	2.2E-01	3.5E-01

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	2.3E-03	2.2E-03	2.6E-03	2.0E-03	2.3E-03	2.5E-03
Child	2.6E-02	2.6E-02	2.8E-02	2.3E-02	2.6E-02	3.0E-02
Teen	1.9E-02	1.9E-02	2.0E-02	1.6E-02	1.9E-02	2.3E-02
Adult	1.1E-01	1.2E-01	1.2E-01	9.9E-02	1.1E-01	1.3E-01
TOTAL	1.6E-01	1.6E-01	1.7E-01	1.4E-01	1.6E-01	1.9E-01

Production/Consumption factors:

Produce: 0.15 Milk: 1.9 Meat: 4.6

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	1.3E-01	
Fish/Shellfish	6.4E-01	
Shoreline Recreation	1.4E-03	
TOTAL	7.7E-01	26%

Ingestion Dose to Any Organ (INFANT THYROID)

Drinking Water	1.1E+00	
Fish/Shellfish	None	
TOTAL	1.1E+00	11%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	3.6E-02	<1%
Air Beta at SB (mrad)	9.8E-02	<1%
Total Body at Residence	1.8E-02	<1%

Iodine and Particulate Dose to Any Organ (INFANT THYROID)

Inhalation at Residence	1.0E-03	
Veg/Prod. from Garden	None	
Milk/Meat from Pasture	1.6E-02	
TOTAL	1.7E-02	<1%

Notes:

Site: **BEAVER VALLEY** SHIPPINGPORT, PA

Location: N 40.6219° W 80.4339°

Population Data

Total Population Within 2-to-80-km Region: 3.6E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Pittsburgh-Beaver Valley CMSA	2,200,000	42 km ESE
Youngstown-Warren MSA	490,000	56 km NNW
Stuebenville-Weirton MSA	140,000	33 km SSW
Wheeling MSA	160,000	66 km SSW
New Castle	28,000	43 km N

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 100% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 5.3E+07 kilogram Milk: 5.3E+08 liter Meat: 5.4E+07 kilogram

Regional Productivity Factor: 1.0 Animal Grazing Factor: 0.5

Site Boundary:	570 meter	NW
Residence:	610 meter	ENE
Garden:	920 meter	NE
Pasture:	1,600 meter	ESE

Site-Specific Data - Waterborne Pathways via OHIO RIVER

Average Effluent Flow from Site: 4.1E+09 L/y
Average River Flow at Site: 2.7E+13 L/y (30,000 cfs)
Drinking Water Population: 6,200

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	1.7E-03	RG	1.7E-03	RG
Fish	1.5E-04	4.1E+02	3.3E-01	RG
Shellfish	---	None	---	None
Shoreline	---	---	3.3E-01	RG

Notes:

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

BEAVER VALLEY

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	9.2E-04	9.2E-04	1.0E-03	2.5E-05	9.3E-04
Child	1.0E-02	1.0E-02	1.1E-02	3.3E-04	1.0E-02
Teen	3.9E-03	4.1E-03	4.1E-03	8.0E-05	3.9E-03
Adult	3.3E-02	3.5E-02	3.4E-02	5.0E-04	3.4E-02
TOTAL	4.8E-02	5.1E-02	5.0E-02	9.4E-04	4.9E-02

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	2.1E-02	2.1E-02	2.3E-02	6.7E-04	2.1E-02	2.1E-02
Child	2.1E-01	2.1E-01	2.3E-01	7.4E-03	2.1E-01	2.1E-01
Teen	1.2E-01	1.2E-01	1.3E-01	5.2E-03	1.2E-01	1.3E-01
Adult	6.0E-01	6.0E-01	6.2E-01	3.2E-02	6.0E-01	6.0E-01
TOTAL	9.6E-01	9.6E-01	1.0E+00	4.5E-02	9.6E-01	9.6E-01

Production/Consumption factors:

Produce: 0.075 Milk: 1.1 Meat: 0.19

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	7.4E-03	
Fish/Shellfish	1.6E-01	
Shoreline Recreation	1.9E-03	
TOTAL	1.7E-01	6%

Ingestion Dose to Any Organ (ADULT GI-LLI)

Drinking Water	7.8E-03	
Fish/Shellfish	6.9E-01	
TOTAL	7.0E-01	7%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	1.2E-04	<1%
Air Beta at SB (mrad)	2.1E-04	<1%
Total Body at Residence	5.8E-04	<1%

Iodine and Particulate Dose to Any Organ (CHILD THYROID)

Inhalation at Residence	2.1E-03	
Veg/Prod. from Garden	8.4E-03	
Milk/Meat from Pasture	7.0E-03	
TOTAL	1.8E-02	<1%

Notes:

Site: **BIG ROCK POINT** CHARLEVOIX CNTY, MI

Location: N 45.3592° W 85.1947°

Population Data

Total Population Within 2-to-80-km Region: 1.7E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
Traverse City	15,000	75 km SSW
Petoskey	6,100	18 km E

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 100% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 6.9E+07 kilogram Milk: 2.9E+08 liter Meat: 4.5E+07 kilogram

Regional Productivity Factor: 0.5 Animal Grazing Factor: 0.5

Site Boundary:	920 meter	E
Residence:	2,300 meter	E
Garden:	2,300 meter	E
Pasture:	4,000 meter	E

Site-Specific Data - Waterborne Pathways via LAKE MICHIGAN

Average Effluent Flow from Site: 6.5E+10 L/y

Drinking Water Population: 7,070

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	1.2E-03	RG	1.2E-03	RG
Fish	6.7E-02	5.0E+05	6.7E-02	RG
Shellfish	---	None	---	None
Shoreline	---	---	6.7E-02	RG

Notes:

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

BIG ROCK POINT

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	1.3E-06	7.7E-07	1.1E-07	4.8E-06	4.3E-06
Child	5.5E-02	1.2E-02	7.3E-06	3.5E-01	3.5E-01
Teen	1.0E-01	2.8E-02	6.0E-06	2.1E-01	2.9E-01
Adult	1.1E+00	2.5E-01	4.8E-05	1.2E+00	1.7E+00
TOTAL	1.3E+00	2.9E-01	6.1E-05	1.8E+00	2.3E+00

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	2.9E-04	2.9E-04	6.4E-04	2.9E-04	2.9E-04	3.0E-04
Child	3.3E-03	3.2E-03	6.8E-03	3.2E-03	3.3E-03	3.4E-03
Teen	2.4E-03	2.4E-03	3.7E-03	2.3E-03	2.4E-03	2.5E-03
Adult	1.4E-02	1.4E-02	1.9E-02	1.4E-02	1.4E-02	1.5E-02
TOTAL	2.0E-02	2.0E-02	3.0E-02	2.0E-02	2.0E-02	2.1E-02

Production/Consumption factors:

Produce: 1.0 Milk: 6.4 Meat: 1.6

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	3.0E-05	
Fish/Shellfish	5.5E-02	
Shoreline Recreation	1.0E-04	
TOTAL	5.5E-02	2%

Ingestion Dose to Any Organ (TEEN LIVER)

Drinking Water	3.1E-05	
Fish/Shellfish	8.8E-02	
TOTAL	8.8E-02	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	4.3E-02	<1%
Air Beta at SB (mrad)	1.3E-02	<1%
Total Body at Residence	9.9E-03	<1%

Iodine and Particulate Dose to Any Organ (INFANT THYROID)

Inhalation at Residence	1.3E-04	
Veg/Prod. from Garden	None	
Milk/Meat from Pasture	9.4E-03	
TOTAL	9.6E-03	<1%

Notes:

Site: **BRAIDWOOD** BRAIDWOOD, IL

Location: N 41.2683° W 88.2133°

Population Data

Total Population Within 2-to-80-km Region: 4.3E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Chicago PMSA	6,100,000	70 km NE
Gary-Hammond PMSA	600,000	70 km ENE
Kankakee MSA	96,000	32 km ESE
Aurora-Elgin PMSA	360,000	55 km N
Joliet PMSA	390,000	40 km NNE

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 100% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 1.1E+08 kilogram Milk: 1.8E+08 liter Meat: 1.9E+08 kilogram

Regional Productivity Factor: 0.9 Animal Grazing Factor: 0.5

Site Boundary:	520 meter	W
Residence:	480 meter	W
Garden:	480 meter	W
Pasture:	3,900 meter	E

Site-Specific Data - Waterborne Pathways via KANKAKEE RIVER

Average Effluent Flow from Site: 1.9E+10 L/y
Average River Flow at Site: 5.0E+12 L/y (5,630 cfs)
Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	None	4.3E-02	RG
Fish	3.7E-03	1.8E+00	3.7E-03	RG
Shellfish	---	None	---	None
Shoreline	---	---	3.7E-03	RG

Notes:

Ten percent of population are assumed to obtain fish from river.

Average individual fish consumption rate of 5 g/d as given in FES, 1974, used in lieu of catch data.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

BRAIDWOOD

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	1.0E-02	4.5E-02	3.4E-03	2.7E-02	3.6E-02
Teen	1.4E-02	9.0E-02	3.1E-03	1.6E-02	3.1E-02
Adult	1.4E-01	7.8E-01	2.4E-02	9.5E-02	1.9E-01
TOTAL	1.6E-01	9.1E-01	3.1E-02	1.4E-01	2.5E-01

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	3.4E-03	3.4E-03	3.5E-03	3.3E-04	3.4E-03	3.5E-03
Child	6.2E-02	6.2E-02	6.3E-02	3.7E-03	6.2E-02	6.3E-02
Teen	4.5E-02	4.5E-02	4.5E-02	2.7E-03	4.5E-02	4.5E-02
Adult	2.6E-01	2.6E-01	2.6E-01	1.6E-02	2.6E-01	2.6E-01
TOTAL	3.7E-01	3.7E-01	3.7E-01	2.3E-02	3.7E-01	3.7E-01

Production/Consumption factors:

Produce: 0.12 Milk: 0.28 Meat: 0.49

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	1.7E-01	
Fish/Shellfish	2.2E-03	
Shoreline Recreation	1.1E-05	
TOTAL	1.7E-01	6%

Ingestion Dose to Any Organ (CHILD GI-LLI)

Drinking Water	2.3E-01	
Fish/Shellfish	3.6E-03	
TOTAL	2.4E-01	2%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	9.8E-04	<1%
Air Beta at SB (mrad)	2.5E-03	<1%
Total Body at Residence	6.5E-04	<1%

Iodine and Particulate Dose to Any Organ (CHILD THYROID)

Inhalation at Residence	3.4E-03	
Veg/Prod. from Garden	1.2E-02	
Milk/Meat from Pasture	3.9E-04	
TOTAL	1.6E-02	<1%

Notes:

Site: **BROWNS FERRY** DECATUR, AL

Location: N 34.7042° W 87.1186°

Population Data

Total Population Within 2-to-80-km Region: 7.6E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
Huntsville MSA	240,000	49 km E
Florence MSA	110,000	52 km WNW
Decatur	49,000	16 km SE
Athens	17,000	17 km NE
Cullman	13,000	64 km SSE

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 100% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 1.7E+07 kilogram Milk: 5.7E+07 liter Meat: 8.6E+07 kilogram

Regional Productivity Factor: 1.0 Animal Grazing Factor: 0.7

Site Boundary:	1,700 meter	NNW
Residence:	1,000 meter	W
Garden:	1,800 meter	NNW
Pasture:	8,000 meter	N

Site-Specific Data - Waterborne Pathways via TENNESSEE RIVER AT WHEELER LAK

Average Effluent Flow from Site: 1.7E+11 L/y
Average River Flow at Site: 4.0E+13 L/y (45,000 cfs)
Drinking Water Population: 26,000

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	4.3E-03	RG	4.3E-03	RG
Fish	4.3E-03	2.2E+05	4.3E-03	RG
Shellfish	---	None	---	None
Shoreline	---	---	4.3E-03	RG

Notes:

Dilution only 30% of complete river mixing so discharge recirculation factor of 3.3 used to account for reduced river flow (ODCM, Rev 0, p.53).

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

BROWNS FERRY

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	4.4E-04	1.6E-04	3.6E-03	2.8E-03	1.5E-03
Child	5.4E-02	5.7E-03	2.7E-02	3.1E-01	2.9E-01
Teen	8.8E-02	9.0E-03	9.0E-03	1.8E-01	2.3E-01
Adult	9.4E-01	7.8E-02	6.2E-02	1.0E+00	1.4E+00
TOTAL	1.1E+00	9.3E-02	1.0E-01	1.5E+00	1.9E+00

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	8.9E-03	9.0E-03	1.8E-02	8.9E-03	9.1E-03	9.3E-03
Child	1.0E-01	1.0E-01	1.6E-01	1.0E-01	1.0E-01	1.0E-01
Teen	7.3E-02	7.4E-02	9.9E-02	7.2E-02	7.4E-02	7.9E-02
Adult	4.5E-01	4.5E-01	5.4E-01	4.4E-01	4.5E-01	4.6E-01
TOTAL	6.3E-01	6.3E-01	8.1E-01	6.2E-01	6.3E-01	6.6E-01

Production/Consumption factors:

Produce: 0.11 Milk: 0.58 Meat: 1.4

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	9.8E-04	
Fish/Shellfish	3.5E-02	
Shoreline Recreation	7.6E-06	
TOTAL	3.6E-02	1%

Ingestion Dose to Any Organ (TEEN LIVER)

Drinking Water	9.3E-04	
Fish/Shellfish	5.4E-02	
TOTAL	5.5E-02	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	3.4E-02	<1%
Air Beta at SB (mrad)	1.5E-02	<1%
Total Body at Residence	1.9E-02	<1%

Iodine and Particulate Dose to Any Organ (INFANT THYROID)

Inhalation at Residence	2.6E-02	
Veg/Prod. from Garden	1.6E-02	
Milk/Meat from Pasture	6.0E-03	
TOTAL	4.7E-02	<1%

Notes:

Site: **BRUNSWICK** BRUNSWICK CNTY, NC

Location: N 33.9583° W 78.0106°

Population Data

Total Population Within 2-to-80-km Region: 2.5E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
Wilmington MSA	120,000	32 km NNE
Whiteville	5,100	75 km WNW

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-91 TO 31-DEC-91 100% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 2.6E+07 kilogram Milk: 1.0E+08 liter Meat: 5.8E+07 kilogram

Regional Productivity Factor: 0.3 Animal Grazing Factor: 0.7

Site Boundary:	1,100 meter	SSE
Residence:	1,400 meter	SE
Garden:	2,600 meter	S
Pasture:	7,600 meter	S

Site-Specific Data - Waterborne Pathways via ATLANTIC OCEAN

Average Effluent Flow from Site: 1.0E+11 L/y

Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	None	---	None
Fish	1.0E-03	2.1E+05	1.0E+00	RG
Shellfish	2.0E-03	1.1E+05	1.0E+00	RG
Shoreline	---	---	1.0E+00	RG

Notes:

No milk cows reported to be within 5 miles so default cow pasture set at 5 miles.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

BRUNSWICK

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	1.0E-04	1.8E-04	2.0E-06	1.2E-04	1.0E-04
Teen	7.0E-05	3.6E-04	1.8E-06	6.5E-05	8.1E-05
Adult	4.2E-04	3.2E-03	1.4E-05	3.8E-04	4.9E-04
TOTAL	6.0E-04	3.7E-03	1.8E-05	5.7E-04	6.7E-04

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	2.3E-04	2.3E-04	1.5E-03	2.2E-04	2.3E-04	2.3E-04
Child	2.6E-03	2.6E-03	1.0E-02	2.3E-03	2.6E-03	2.7E-03
Teen	1.8E-03	1.8E-03	5.0E-03	1.7E-03	1.8E-03	2.1E-03
Adult	1.1E-02	1.1E-02	2.2E-02	1.0E-02	1.1E-02	1.2E-02
TOTAL	1.5E-02	1.5E-02	3.9E-02	1.4E-02	1.5E-02	1.7E-02

Production/Consumption factors:

Produce: 0.16 Milk: 0.94 Meat: 0.86

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	None	
Fish/Shellfish	8.3E-03	
Shoreline Recreation	4.4E-04	
TOTAL	8.8E-03	<1%

Ingestion Dose to Any Organ (ADULT GI-LLI)

Drinking Water	None	
Fish/Shellfish	6.2E-02	
TOTAL	6.2E-02	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	7.0E-03	<1%
Air Beta at SB (mrad)	7.1E-03	<1%
Total Body at Residence	2.9E-03	<1%

Iodine and Particulate Dose to Any Organ (INFANT THYROID)

Inhalation at Residence	3.6E-03	
Veg/Prod. from Garden	2.4E-03	
Milk/Meat from Pasture	5.7E-03	
TOTAL	1.2E-02	<1%

Notes:

Site: **BYRON** BYRON, IL

Location: N 42.1300° W 89.2550°

Population Data

Total Population Within 2-to-80-km Region: 9.5E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
Rockford MSA	280,000	27 km NE
Freeport	26,000	35 km NNW
Belvidere	16,000	40 km NE
Janesville-Beloit MSA	140,000	67 km N
De Kalb	35,000	48 km ESE
Elgin	77,000	80 km E

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 1-JAN-92 TO 31-DEC-92 98% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 1.1E+08 kilogram Milk: 1.8E+08 liter Meat: 1.9E+08 kilogram

Regional Productivity Factor: 0.9 Animal Grazing Factor: 0.5

Site Boundary:	800 meter	SSE
Residence:	1,000 meter	SSW
Garden:	4,300 meter	N
Pasture:	3,100 meter	W

Site-Specific Data - Waterborne Pathways via ROCK RIVER

Average Effluent Flow from Site: 2.0E+10 L/y
Average River Flow at Site: 4.2E+12 L/y (4,700 cfs)
Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	None	8.0E-04	RG
Fish	4.8E-03	2.1E+04	4.8E-03	RG
Shellfish	---	None	---	None
Shoreline	---	---	4.8E-03	RG

Notes:

No milk animals located within 5 miles so milk cows located at beef cattle pasture.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

BYRON

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	4.6E-04	4.1E-04	1.2E-04	1.8E-03	1.5E-03
Teen	4.7E-04	7.2E-04	9.9E-05	1.1E-03	1.2E-03
Adult	4.2E-03	6.0E-03	7.6E-04	6.3E-03	7.4E-03
TOTAL	5.1E-03	7.1E-03	9.7E-04	9.2E-03	1.0E-02

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.1E-04	1.1E-04	3.7E-04	1.0E-04	1.1E-04	1.2E-04
Child	1.3E-03	1.3E-03	3.4E-03	1.2E-03	1.3E-03	1.4E-03
Teen	9.6E-04	9.6E-04	1.7E-03	8.5E-04	9.6E-04	1.1E-03
Adult	5.7E-03	5.7E-03	8.5E-03	5.1E-03	5.7E-03	6.2E-03
TOTAL	8.2E-03	8.1E-03	1.4E-02	7.2E-03	8.2E-03	8.8E-03

Production/Consumption factors:

Produce: 0.55 Milk: 1.3 Meat: 2.2

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	2.4E-03	
Fish/Shellfish	2.5E-03	
Shoreline Recreation	1.6E-05	
TOTAL	4.9E-03	<1%

Ingestion Dose to Any Organ (CHILD LIVER)

Drinking Water	3.4E-03	
Fish/Shellfish	4.1E-03	
TOTAL	7.5E-03	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	6.0E-04	<1%
Air Beta at SB (mrad)	1.8E-03	<1%
Total Body at Residence	2.0E-04	<1%

Iodine and Particulate Dose to Any Organ (INFANT THYROID)

Inhalation at Residence	2.0E-05	
Veg/Prod. from Garden	None	
Milk/Meat from Pasture	1.0E-03	
TOTAL	1.1E-03	<1%

Notes:

Site: **CALLAWAY** FULTON, MO

Location: N 38.7618° W 91.7979°

Population Data

Total Population Within 2-to-80-km Region: 3.8E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
Columbia MSA	110,000	48 km WNW
Jefferson City	35,000	40 km WSW
Mexico	11,000	45 km NNW
Washington	11,500	69 km ESE
Fulton	10,000	19 km NW

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 94% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 3.3E+07 kilogram Milk: 1.5E+08 liter Meat: 1.9E+08 kilogram

Regional Productivity Factor: 0.9 Animal Grazing Factor: 0.6

Site Boundary:	2,200 meter	NNW
Residence:	2,900 meter	NNW
Garden:	2,900 meter	NW
Pasture:	2,200 meter	WSW

Site-Specific Data - Waterborne Pathways via MISSOURI RIVER

Average Effluent Flow from Site: 1.5E+09 L/y
Average River Flow at Site: 7.2E+13 L/y (80,500 cfs)
Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	None	---	None
Fish	2.1E-05	1.0E+03	1.1E-02	RG
Shellfish	---	None	---	None
Shoreline	---	---	1.1E-02	RG

Notes:

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

CALLAWAY

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	1.2E-07	1.2E-07	1.4E-07	1.5E-07	2.7E-07
Teen	1.4E-07	1.4E-07	1.2E-07	9.0E-08	2.3E-07
Adult	1.3E-06	1.2E-06	8.9E-07	5.2E-07	1.5E-06
TOTAL	1.6E-06	1.4E-06	1.2E-06	7.6E-07	2.0E-06

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	4.4E-04	4.4E-04	6.8E-04	1.5E-04	4.4E-04	4.5E-04
Child	6.7E-03	6.7E-03	8.3E-03	1.6E-03	6.7E-03	6.9E-03
Teen	4.3E-03	4.3E-03	4.9E-03	1.2E-03	4.3E-03	4.5E-03
Adult	2.4E-02	2.4E-02	2.6E-02	7.2E-03	2.4E-02	2.5E-02
TOTAL	3.5E-02	3.5E-02	4.0E-02	1.0E-02	3.5E-02	3.7E-02

Production/Consumption factors:

Produce: 0.4 Milk: 2.8 Meat: 5.7

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	None	
Fish/Shellfish	1.7E-02	
Shoreline Recreation	1.4E-05	
TOTAL	1.7E-02	<1%

Ingestion Dose to Any Organ (ADULT LIVER)

Drinking Water	None	
Fish/Shellfish	2.0E-02	
TOTAL	2.0E-02	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	6.0E-03	<1%
Air Beta at SB (mrad)	2.0E-02	<1%
Total Body at Residence	2.3E-03	<1%

Iodine and Particulate Dose to Any Organ (CHILD THYROID)

Inhalation at Residence	1.8E-03	
Veg/Prod. from Garden	5.8E-03	
Milk/Meat from Pasture	4.4E-03	
TOTAL	1.2E-02	<1%

Notes:

Site: **CALVERT CLIFFS** LUSBY, MD

Location: N 38.4347° W 76.4419°

Population Data

Total Population Within 2-to-80-km Region: 3.0E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Washington, DC-MD-VA MSA	3,900,000	73 km NW
Bowie	38,000	71 km NNW
Annapolis	33,000	61 km N
Salisbury	21,000	75 km E

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-91 TO 31-DEC-91 97% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 4.5E+07 kilogram Milk: 5.0E+08 liter Meat: 6.2E+07 kilogram

Regional Productivity Factor: 0.6 Animal Grazing Factor: 0.6

Site Boundary:	1,500 meter	WSW
Residence:	2,200 meter	SE
Garden:	2,700 meter	SSE
Pasture:	4,800 meter	SSW

Site-Specific Data - Waterborne Pathways via CHESAPEAKE BAY

Average Effluent Flow from Site: 1.5E+12 L/y

Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	None	---	None
Fish	6.2E-02	1.0E+07	1.0E+00	RG
Shellfish	6.2E-02	7.4E+06	1.0E+00	RG
Shoreline	---	---	1.0E+00	RG

Notes:

Population mixing ratios given in FES, 1973.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

CALVERT CLIFFS

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	9.1E-02	7.3E-01	8.7E-02	2.7E-01	3.3E-01
Teen	1.3E-01	1.5E+00	6.3E-02	1.6E-01	2.8E-01
Adult	1.3E+00	1.3E+01	4.3E-01	9.4E-01	1.7E+00
TOTAL	1.6E+00	1.5E+01	5.8E-01	1.4E+00	2.3E+00

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	5.7E-03	5.7E-03	5.5E-02	5.6E-03	5.8E-03	6.0E-03
Child	6.3E-02	6.3E-02	3.1E-01	6.1E-02	6.4E-02	6.8E-02
Teen	4.6E-02	4.6E-02	1.4E-01	4.4E-02	4.6E-02	5.3E-02
Adult	2.8E-01	2.7E-01	5.7E-01	2.7E-01	2.8E-01	3.0E-01
TOTAL	3.9E-01	3.9E-01	1.1E+00	3.8E-01	3.9E-01	4.2E-01

Production/Consumption factors:

Produce: 0.046 Milk: 0.76 Meat: 0.15

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	None	
Fish/Shellfish	2.7E-02	
Shoreline Recreation	3.6E-04	
TOTAL	2.7E-02	<1%

Ingestion Dose to Any Organ (ADULT GI-LLI)

Drinking Water	None	
Fish/Shellfish	2.9E-01	
TOTAL	2.9E-01	3%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	1.9E-02	<1%
Air Beta at SB (mrad)	5.6E-02	<1%
Total Body at Residence	1.5E-02	<1%

Iodine and Particulate Dose to Any Organ (INFANT THYROID)

Inhalation at Residence	3.5E-03	
Veg/Prod. from Garden	None	
Milk/Meat from Pasture	5.3E-02	
TOTAL	5.6E-02	<1%

Notes:

Site: **CATAWBA** CLOVER, SC

Location: N 34.9950° W 81.2450°

Population Data

Total Population Within 2-to-80-km Region: 1.7E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Charlotte-Gastonia MSA	1,100,000	29 km NE
Kannapolis	30,000	64 km NE
Rock Hill	42,000	11 km S
Spartanburg	44,000	80 km W

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 98% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 7.5E+06 kilogram Milk: 5.7E+07 liter Meat: 5.0E+07 kilogram

Regional Productivity Factor: 0.9 Animal Grazing Factor: 0.75

Site Boundary:	810 meter	NNE
Residence:	810 meter	NNE
Garden:	1,400 meter	S
Pasture:	3,700 meter	NNW

Site-Specific Data - Waterborne Pathways via CATAWBA RIVER

Average Effluent Flow from Site: 1.7E+11 L/y
Average River Flow at Site: 3.9E+12 L/y (4,400 cfs)
Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	None	2.6E-02	RG
Fish	4.3E-02	1.0E+06	1.0E+00	RG
Shellfish	---	None	---	None
Shoreline	---	---	1.0E+00	RG

Notes:

Discharge recirculation factor of 1.027 used for cesium (ODCM 1992, p.C-13).

No milk animals located within 5 miles so milk cows located at beef cattle pasture.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

CATAWBA

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	3.0E-02	5.6E-02	3.2E-03	1.3E-01	1.5E-01
Teen	5.1E-02	1.2E-01	2.7E-03	7.6E-02	1.2E-01
Adult	5.4E-01	1.0E+00	2.0E-02	4.4E-01	7.4E-01
TOTAL	6.2E-01	1.2E+00	2.6E-02	6.5E-01	1.0E+00

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	8.9E-03	8.9E-03	9.4E-03	5.7E-03	8.9E-03	9.1E-03
Child	1.2E-01	1.2E-01	1.2E-01	6.3E-02	1.2E-01	1.2E-01
Teen	9.1E-02	9.1E-02	9.3E-02	4.6E-02	9.1E-02	9.4E-02
Adult	5.4E-01	5.4E-01	5.5E-01	2.8E-01	5.4E-01	5.5E-01
TOTAL	7.6E-01	7.6E-01	7.8E-01	4.0E-01	7.6E-01	7.8E-01

Production/Consumption factors:

Produce: 0.021 Milk: 0.24 Meat: 0.34

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	4.8E-03	
Fish/Shellfish	1.6E-01	
Shoreline Recreation	5.3E-04	
TOTAL	1.6E-01	5%

Ingestion Dose to Any Organ (ADULT GI-LLI)

Drinking Water	5.4E-03	
Fish/Shellfish	3.3E-01	
TOTAL	3.3E-01	3%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	5.7E-01	6%
Air Beta at SB (mrad)	2.7E-01	1%
Total Body at Residence	3.3E-01	7%

Iodine and Particulate Dose to Any Organ (CHILD THYROID)

Inhalation at Residence	2.9E-02	
Veg/Prod. from Garden	2.3E-02	
Milk/Meat from Pasture	2.7E-03	
TOTAL	5.4E-02	<1%

Notes:

Site: **CLINTON** CLINTON, IL

Location: N 40.1517° W 88.9533°

Population Data

Total Population Within 2-to-80-km Region: 8.8E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
Decatur MSA	120,000	32 km S
Springfield MSA	190,000	72 km SW
Champaign-Urbana-Rantoul MSA	170,000	50 km E
Bloomington-Normal MSA	130,000	35 km NNW

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 97% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 1.1E+08 kilogram Milk: 1.8E+08 liter Meat: 1.9E+08 kilogram

Regional Productivity Factor: 0.9 Animal Grazing Factor: 0.5

Site Boundary:	980 meter	NNE
Residence:	1,500 meter	NNE
Garden:	1,500 meter	NNE
Pasture:	1,500 meter	N

Site-Specific Data - Waterborne Pathways via CLINTON LAKE

Average Effluent Flow from Site: 1.6E+08 L/y

Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	None	---	None
Fish	2.5E-01	1.8E+00	1.0E+00	RG
Shellfish	---	None	---	None
Shoreline	---	---	1.0E+00	RG

Notes:

Ten percent of population assumed to obtain fish from lake.
Average individual fish consumption rate of 5 g/d as given in FES, 1974, used in lieu of catch data.
Population file corrected from previous version; population estimate reduced from 2.7E+6 to 8.8E+5.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

CLINTON

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	2.1E-01	4.7E-01	6.7E-03	1.5E-02	3.2E-01
Teen	1.5E-01	1.1E+00	6.0E-03	8.6E-03	3.0E-01
Adult	9.0E-01	9.5E+00	4.8E-02	5.1E-02	1.9E+00
TOTAL	1.3E+00	1.1E+01	6.1E-02	7.4E-02	2.5E+00

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	3.4E-05	3.4E-05	7.0E-05	1.7E-06	3.4E-05	3.4E-05
Child	4.8E-04	4.9E-04	7.6E-04	2.8E-05	4.8E-04	4.9E-04
Teen	2.7E-04	2.7E-04	3.8E-04	1.4E-05	2.7E-04	2.8E-04
Adult	1.4E-03	1.4E-03	1.7E-03	7.5E-05	1.4E-03	1.4E-03
TOTAL	2.2E-03	2.2E-03	2.9E-03	1.2E-04	2.2E-03	2.2E-03

Production/Consumption factors:

Produce: 0.59 Milk: 1.4 Meat: 2.4

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	None	
Fish/Shellfish	5.6E-01	
Shoreline Recreation	1.0E-01	
TOTAL	6.7E-01	22%

Ingestion Dose to Any Organ (ADULT GI-LLI)

Drinking Water	None	
Fish/Shellfish	6.0E+00	
TOTAL	6.0E+00	60%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	4.7E-04	<1%
Air Beta at SB (mrad)	3.8E-04	<1%
Total Body at Residence	9.9E-05	<1%

Iodine and Particulate Dose to Any Organ (INFANT THYROID)

Inhalation at Residence	2.7E-05	
Veg/Prod. from Garden	None	
Milk/Meat from Pasture	1.1E-03	
TOTAL	1.1E-03	<1%

Notes:

Site: **COMANCHE PEAK** GLEN ROSE, TX

Location: N 32.2974° W 97.7850°

Population Data

Total Population Within 2-to-80-km Region: 1.2E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Fort Worth-Arlington PMSA	1,300,000	70 km NE
Hurst	34,000	80 km NE
Cleburne	22,000	37 km ENE
Weatherford	15,000	52 km N

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 91% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 2.3E+07 kilogram Milk: 4.3E+07 liter Meat: 1.1E+08 kilogram

Regional Productivity Factor: 0.9 Animal Grazing Factor: 0.75

Site Boundary:	1,500 meter	WSW
Residence:	1,600 meter	WSW
Garden:	1,800 meter	WSW
Pasture:	8,000 meter	WSW

Site-Specific Data - Waterborne Pathways via SQUAW CREEK RES.

Average Effluent Flow from Site: 4.2E+11 L/y

Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	None	1.0E+00	RG
Fish	1.0E+00	1.8E+00	1.0E+00	RG
Shellfish	---	None	---	None
Shoreline	---	---	1.0E+00	RG

Notes:

No milk animals reported to be within 5 miles so default cow pasture set at 5 miles.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

COMANCHE PEAK

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	9.3E-02	2.7E-02	2.1E-02	4.1E-01	4.9E-01
Teen	1.7E-01	5.2E-02	1.6E-02	2.5E-01	4.2E-01
Adult	1.9E+00	4.5E-01	1.1E-01	1.4E+00	2.5E+00
TOTAL	2.1E+00	5.3E-01	1.4E-01	2.1E+00	3.4E+00

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.0E-03	1.0E-03	1.4E-03	9.9E-04	1.0E-03	1.1E-03
Child	1.1E-02	1.1E-02	1.4E-02	1.1E-02	1.1E-02	1.2E-02
Teen	8.2E-03	8.2E-03	9.4E-03	8.0E-03	8.2E-03	9.3E-03
Adult	5.0E-02	5.0E-02	5.4E-02	4.9E-02	5.0E-02	5.3E-02
TOTAL	7.0E-02	7.0E-02	7.9E-02	6.9E-02	7.0E-02	7.6E-02

Production/Consumption factors:

Produce: 0.094 Milk: 0.26 Meat: 1.1

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	1.2E-01	
Fish/Shellfish	2.2E-01	
Shoreline Recreation	1.3E-04	
TOTAL	3.4E-01	11%

Ingestion Dose to Any Organ (CHILD LIVER)

Drinking Water	1.6E-01	
Fish/Shellfish	2.7E-01	
TOTAL	4.3E-01	4%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	1.5E-02	<1%
Air Beta at SB (mrad)	2.7E-02	<1%
Total Body at Residence	8.3E-03	<1%

Iodine and Particulate Dose to Any Organ (CHILD THYROID)

Inhalation at Residence	1.9E-04	
Veg/Prod. from Garden	1.0E-03	
Milk/Meat from Pasture	4.5E-04	
TOTAL	1.7E-03	<1%

Notes:

Site: **COOK** BENTON HARBOR, MI

Location: N 41.9761° W 86.5664°

Population Data

Total Population Within 2-to-80-km Region: 1.2E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Gary-Hammond PMSA	600,000	77 km SW
South Bend-Mishiwaka MSA	250,000	42 km SE
Elkhart-Goshen MSA	160,000	58 km SE
Michigan City	34,000	40 km SW

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 100% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 1.1E+08 kilogram Milk: 2.3E+08 liter Meat: 1.9E+08 kilogram

Regional Productivity Factor: 0.6 Animal Grazing Factor: 0.5

Site Boundary:	660 meter	N
Residence:	660 meter	N
Garden:	770 meter	SSW
Pasture:	3,600 meter	E

Site-Specific Data - Waterborne Pathways via LAKE MICHIGAN

Average Effluent Flow from Site: 1.8E+12 L/y

Drinking Water Population: 260,000

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	2.5E-02	RG	3.8E-01	RG
Fish	1.0E-02	1.5E+06	1.0E+00	RG
Shellfish	---	None	---	None
Shoreline	---	---	3.8E-01	RG

Notes:

Population-weighted mixing ratio used for population drinking water.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

COOK

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	1.4E-03	1.4E-03	2.2E-03	7.3E-04	1.7E-03
Child	2.1E-02	1.9E-02	2.0E-02	2.9E-02	4.0E-02
Teen	1.4E-02	1.3E-02	7.3E-03	1.5E-02	2.5E-02
Adult	1.4E-01	1.1E-01	5.9E-02	9.2E-02	1.7E-01
TOTAL	1.7E-01	1.4E-01	8.9E-02	1.4E-01	2.3E-01

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	4.4E-04	4.0E-04	9.0E-03	4.2E-04	7.3E-04	4.5E-04
Child	6.2E-03	5.7E-03	6.4E-02	4.4E-03	8.4E-03	6.1E-03
Teen	4.1E-03	3.7E-03	2.6E-02	2.2E-03	4.8E-03	4.0E-03
Adult	2.3E-02	2.1E-02	9.9E-02	1.1E-02	2.4E-02	2.2E-02
TOTAL	3.4E-02	3.1E-02	2.0E-01	1.8E-02	3.8E-02	3.2E-02

Production/Consumption factors:

Produce: 0.29 Milk: 0.89 Meat: 1.2

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	4.4E-03	
Fish/Shellfish	6.9E-02	
Shoreline Recreation	3.5E-05	
TOTAL	7.3E-02	2%

Ingestion Dose to Any Organ (TEEN LIVER)

Drinking Water	3.2E-03	
Fish/Shellfish	9.6E-02	
TOTAL	9.9E-02	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	2.0E-02	<1%
Air Beta at SB (mrad)	4.8E-02	<1%
Total Body at Residence	1.3E-02	<1%

Iodine and Particulate Dose to Any Organ (CHILD THYROID)

Inhalation at Residence	2.8E-02	
Veg/Prod. from Garden	2.3E-02	
Milk/Meat from Pasture	1.2E-02	
TOTAL	6.4E-02	<1%

Notes:

Site: **COOPER** NEMAHA COUNTY, NE

Location: N 40.3619° W 95.6411°

Population Data

Total Population Within 2-to-80-km Region: 1.7E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
Nebraska City	6,500	40 km NNW
Red Oak	6,300	80 km NNE
Plattsmouth	6,400	76 km NNW
Shenandoah	5,600	51 km NNE

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 98% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 9.7E+07 kilogram Milk: 7.2E+07 liter Meat: 2.0E+08 kilogram

Regional Productivity Factor: 1.0 Animal Grazing Factor: 0.6

Site Boundary:	1,100 meter	N
Residence:	1,400 meter	NW
Garden:	3,100 meter	NNW
Pasture:	17,000meter	S

Site-Specific Data - Waterborne Pathways via MISSOURI RIVER

Average Effluent Flow from Site: 6.1E+10 L/y
Average River Flow at Site: 2.8E+13 L/y (31,000 cfs)
Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	2.2E-03	None	2.0E-01	RG
Fish	2.2E-03	5.0E+03	1.0E-01	RG
Shellfish	---	None	---	None
Shoreline	---	---	2.0E-01	RG

Notes:

Population estimate assumes 1/2 fish caught below site.

Individual fish consumption only for 1/2 year: spring and summer months.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

COOPER

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	7.3E-05	4.3E-05	6.1E-08	3.2E-04	3.7E-04
Teen	1.2E-04	9.7E-05	4.7E-08	1.9E-04	3.1E-04
Adult	1.2E-03	8.8E-04	3.3E-07	1.1E-03	1.9E-03
TOTAL	1.4E-03	1.0E-03	4.3E-07	1.6E-03	2.6E-03

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	7.9E-07	7.8E-07	8.9E-06	8.0E-07	8.1E-07	8.1E-07
Child	8.8E-06	8.7E-06	8.4E-05	8.9E-06	8.9E-06	9.0E-06
Teen	6.4E-06	6.4E-06	3.5E-05	6.4E-06	6.4E-06	6.8E-06
Adult	3.9E-05	3.9E-05	1.4E-04	3.9E-05	3.9E-05	4.0E-05
TOTAL	5.5E-05	5.4E-05	2.7E-04	5.5E-05	5.5E-05	5.7E-05

Production/Consumption factors:

Produce: 2.9 Milk: 3.2 Meat: 14.0

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	5.1E-02	
Fish/Shellfish	5.7E-01	
Shoreline Recreation	8.2E-03	
TOTAL	6.3E-01	21%

Ingestion Dose to Any Organ (TEEN LIVER)

Drinking Water	5.2E-02	
Fish/Shellfish	8.8E-01	
TOTAL	9.3E-01	9%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	1.0E-04	<1%
Air Beta at SB (mrad)	6.3E-05	<1%
Total Body at Residence	3.4E-05	<1%

Iodine and Particulate Dose to Any Organ (CHILD THYROID)

Inhalation at Residence	1.2E-06	
Veg/Prod. from Garden	3.4E-05	
Milk/Meat from Pasture	1.8E-05	
TOTAL	5.3E-05	<1%

Notes:

Site: **CRYSTAL RIVER** CRYSTAL RIVER, FL

Location: N 28.3619° W 82.6989°

Population Data

Total Population Within 2-to-80-km Region: 5.1E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
Ocala	42,000	60 km ENE
Leesburg	15,000	80 km E
New Port Richey	14,000	79 km S

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-91 TO 31-DEC-91 97% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 2.8E+07 kilogram Milk: 1.1E+08 liter Meat: 7.2E+07 kilogram

Regional Productivity Factor: 0.5 Animal Grazing Factor: 1.0

Site Boundary:	1,300 meter	NE
Residence:	5,500 meter	ENE
Garden:	6,600 meter	E
Pasture:	6,900 meter	ENE

Site-Specific Data - Waterborne Pathways via GULF OF MEXICO

Average Effluent Flow from Site: 3.5E+10 L/y

Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	None	1.0E-02	RG
Fish	1.0E-01	3.2E+05	3.0E-01	RG
Shellfish	1.0E-01	1.8E+05	---	None
Shoreline	---	---	1.0E-02	RG

Notes:

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

CRYSTAL RIVER

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	3.2E-01	1.7E+00	2.1E-02	6.2E-01	6.8E-01
Teen	3.1E-01	3.6E+00	1.6E-02	3.6E-01	5.7E-01
Adult	2.5E+00	3.1E+01	1.1E-01	2.1E+00	3.4E+00
TOTAL	3.2E+00	3.7E+01	1.5E-01	3.1E+00	4.6E+00

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	2.1E-04	2.1E-04	7.0E-04	1.5E-04	2.1E-04	2.2E-04
Child	2.5E-03	2.5E-03	5.1E-03	1.7E-03	2.5E-03	2.7E-03
Teen	1.7E-03	1.7E-03	2.7E-03	1.2E-03	1.7E-03	1.9E-03
Adult	1.0E-02	1.0E-02	1.3E-02	7.4E-03	1.0E-02	1.1E-02
TOTAL	1.5E-02	1.5E-02	2.2E-02	1.0E-02	1.5E-02	1.6E-02

Production/Consumption factors:

Produce: 0.14 Milk: 0.85 Meat: 0.89

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	1.6E-02	
Fish/Shellfish	3.2E-01	
Shoreline Recreation	2.7E-04	
TOTAL	3.4E-01	11%

Ingestion Dose to Any Organ (ADULT GI-LLI)

Drinking Water	1.3E-02	
Fish/Shellfish	6.2E+00	
TOTAL	6.2E+00	62%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	3.6E-03	<1%
Air Beta at SB (mrad)	1.1E-02	<1%
Total Body at Residence	4.3E-04	<1%

Iodine and Particulate Dose to Any Organ (INFANT THYROID)

Inhalation at Residence	4.3E-05	
Veg/Prod. from Garden	None	
Milk/Meat from Pasture	1.9E-03	
TOTAL	2.0E-03	<1%

Notes:

Site: **DAVIS-BESSE** PORT CLINTON, OH

Location: N 41.5972° W 83.0864°

Population Data

Total Population Within 2-to-80-km Region: 1.8E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Toledo MSA	610,000	38 km WNW
Dearborn	89,000	80 km N
Taylor	71,000	71 km N
Lorain	71,000	77 km ESE
Lincoln Park	42,000	73 km N
Findlay	36,000	77 km SW

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 97% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 6.9E+07 kilogram Milk: 3.7E+08 liter Meat: 1.2E+08 kilogram

Regional Productivity Factor: 0.6 Animal Grazing Factor: 0.5

Site Boundary:	790 meter	NNE
Residence:	870 meter	NNE
Garden:	1,100 meter	W
Pasture:	4,300 meter	WSW

Site-Specific Data - Waterborne Pathways via LAKE ERIE

Average Effluent Flow from Site: 4.2E+10 L/y

Drinking Water Population: 450,000

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	1.6E-04	RG	1.8E-02	RG
Fish	1.8E-04	5.7E+06	1.0E-01	RG
Shellfish	---	None	---	None
Shoreline	---	---	1.0E-01	RG

Notes:

Population drinking-water mixing ratio estimated by averaging dilution factor derived from FES, 1973, suitably weighted by population.

Population fish mixing ratio and harvest taken from letter from Terry D. Murray, Toledo Edison

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

DAVIS-BESSE

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	5.0E-04	5.1E-04	5.1E-04	2.7E-05	5.3E-04
Child	8.1E-03	6.2E-03	5.8E-03	1.1E-02	1.9E-02
Teen	6.7E-03	3.0E-03	2.3E-03	6.7E-03	1.3E-02
Adult	6.8E-02	2.6E-02	1.9E-02	3.9E-02	8.5E-02
TOTAL	8.3E-02	3.5E-02	2.8E-02	5.7E-02	1.2E-01

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	2.7E-04	2.4E-04	8.0E-04	2.0E-04	4.4E-04	2.7E-04
Child	3.3E-03	3.1E-03	6.2E-03	1.8E-03	4.5E-03	3.4E-03
Teen	2.2E-03	2.0E-03	3.2E-03	7.0E-04	2.6E-03	2.1E-03
Adult	1.2E-02	1.1E-02	1.5E-02	2.8E-03	1.3E-02	1.1E-02
TOTAL	1.8E-02	1.6E-02	2.5E-02	5.5E-03	2.0E-02	1.7E-02

Production/Consumption factors:

Produce: 0.12 Milk: 0.93 Meat: 0.47

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	1.2E-02	
Fish/Shellfish	1.2E-01	
Shoreline Recreation	1.9E-04	
TOTAL	1.3E-01	4%

Ingestion Dose to Any Organ (TEEN LIVER)

Drinking Water	9.0E-03	
Fish/Shellfish	1.7E-01	
TOTAL	1.8E-01	2%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	2.6E-03	<1%
Air Beta at SB (mrad)	5.4E-03	<1%
Total Body at Residence	1.4E-03	<1%

Iodine and Particulate Dose to Any Organ (CHILD THYROID)

Inhalation at Residence	3.2E-03	
Veg/Prod. from Garden	1.1E-02	
Milk/Meat from Pasture	1.4E-03	
TOTAL	1.5E-02	<1%

Notes:

Site: **DIABLO CANYON** AVILA BEACH, CA

Location: N 35.2111° W120.8522°

Population Data

Total Population Within 2-to-80-km Region: 3.3E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
San Luis Obispo	42,000	19 km ENE
Atascudero	23,000	34 km NNE
Lompoc	38,000	74 km SSE
Morro Bay	9,700	18 km N

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 100% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 4.8E+07 kilogram Milk: 2.3E+08 liter Meat: 5.0E+07 kilogram

Regional Productivity Factor: 0.5 Animal Grazing Factor: 1.0

Site Boundary:	800 meter	NW
Residence:	5,300 meter	NNE
Garden:	6,600 meter	ESE
Pasture:	20,000meter	NNE

Site-Specific Data - Waterborne Pathways via PACIFIC OCEAN

Average Effluent Flow from Site: 5.6E+11 L/y

Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	None	---	None
Fish	1.0E-03	2.0E+06	2.0E-01	RG
Shellfish	---	None	2.0E-01	RG
Shoreline	---	---	2.0E-01	RG

Notes:

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

DIABLO CANYON

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	3.4E-04	3.9E-04	6.6E-05	1.3E-03	8.2E-04
Teen	2.2E-04	7.3E-04	5.6E-05	7.4E-04	6.4E-04
Adult	1.4E-03	6.1E-03	4.3E-04	4.3E-03	3.8E-03
TOTAL	2.0E-03	7.3E-03	5.5E-04	6.4E-03	5.2E-03

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.4E-04	1.4E-04	1.4E-04	1.1E-05	1.4E-04	1.4E-04
Child	2.3E-03	2.4E-03	2.3E-03	1.2E-04	2.3E-03	2.4E-03
Teen	1.5E-03	1.5E-03	1.5E-03	8.9E-05	1.5E-03	1.5E-03
Adult	8.5E-03	8.8E-03	8.5E-03	5.4E-04	8.5E-03	8.6E-03
TOTAL	1.3E-02	1.3E-02	1.2E-02	7.6E-04	1.2E-02	1.3E-02

Production/Consumption factors:

Produce: 0.37 Milk: 2.6 Meat: 0.93

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	None	
Fish/Shellfish	4.2E-03	
Shoreline Recreation	8.1E-05	
TOTAL	4.3E-03	<1%

Ingestion Dose to Any Organ (CHILD BONE)

Drinking Water	None	
Fish/Shellfish	2.0E-02	
TOTAL	2.0E-02	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	3.0E-04	<1%
Air Beta at SB (mrad)	1.4E-04	<1%
Total Body at Residence	2.2E-06	<1%

Iodine and Particulate Dose to Any Organ (CHILD GI-LLI)

Inhalation at Residence	5.9E-05	
Veg/Prod. from Garden	2.9E-04	
Milk/Meat from Pasture	1.3E-05	
TOTAL	3.6E-04	<1%

Notes:

Site: **DRESDEN** GRUNDY COUNTY, IL

Location: N 41.3897° W 88.2711°

Population Data

Total Population Within 2-to-80-km Region: 6.5E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Chicago PMSA	6,100,000	75 km NE
Gary-Hammond PMSA	600,000	80 km ENE
Kankakee MSA	96,000	45 km SE
Aurora-Elgin PMSA	360,000	41 km N
Joliet PMSA	390,000	22 km NE

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 100% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 1.1E+08 kilogram Milk: 1.8E+08 liter Meat: 1.9E+08 kilogram

Regional Productivity Factor: 1.0 Animal Grazing Factor: 0.5

Site Boundary:	1,000 meter	SE
Residence:	970 meter	ENE
Garden:	970 meter	ENE
Pasture:	8,000 meter	ENE

Site-Specific Data - Waterborne Pathways via ILLINOIS RIVER

Average Effluent Flow from Site: 1.2E+10 L/y
Average River Flow at Site: 1.2E+13 L/y (13,700 cfs)
Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	1.0E-03	None	7.8E-03	RG
Fish	1.0E-03	RG	1.0E-02	RG
Shellfish	---	None	---	None
Shoreline	---	---	1.0E-02	RG

Notes:
Water use by population negligible, due to past history of river used for disposal of Chicago sewage.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

DRESDEN

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	0.	0.	0.	0.	0.
Teen	0.	0.	0.	0.	0.
Adult	0.	0.	0.	0.	0.
TOTAL	0.	0.	0.	0.	0.

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	3.5E-04	3.5E-04	1.3E-03	3.1E-04	3.6E-04	6.4E-04
Child	4.6E-03	4.8E-03	1.3E-02	4.5E-03	4.9E-03	9.5E-03
Teen	3.2E-03	3.9E-03	6.7E-03	2.7E-03	3.4E-03	7.7E-03
Adult	1.9E-02	2.4E-02	3.3E-02	1.6E-02	2.0E-02	3.8E-02
TOTAL	2.7E-02	3.3E-02	5.3E-02	2.4E-02	2.9E-02	5.6E-02

Production/Consumption factors:

Produce: 0.089 Milk: 0.21 Meat: 0.36

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	1.3E-04	
Fish/Shellfish	3.6E-03	
Shoreline Recreation	3.4E-06	
TOTAL	3.7E-03	<1%

Ingestion Dose to Any Organ (TEEN LIVER)

Drinking Water	1.3E-04	
Fish/Shellfish	5.7E-03	
TOTAL	5.9E-03	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	3.0E-05	<1%
Air Beta at SB (mrad)	2.7E-06	<1%
Total Body at Residence	2.1E-05	<1%

Iodine and Particulate Dose to Any Organ (TEEN GI-LLI)

Inhalation at Residence	1.5E-05	
Veg/Prod. from Garden	5.8E-04	
Milk/Meat from Pasture	1.2E-04	
TOTAL	7.1E-04	<1%

Notes:

Site: **DUANE ARNOLD** CEDAR RAPIDS, IA

Location: N 42.1006° W 91.7772°

Population Data

Total Population Within 2-to-80-km Region: 5.8E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
Cedar Rapids MSA	170,000	17 km SE
Waterloo-Cedar Falls SMSA	150,000	66 km NW
Iowa City MSA	96,000	52 km SSE
Marion	20,000	16 km ESE

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 98% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 9.8E+07 kilogram Milk: 2.6E+08 liter Meat: 4.2E+08 kilogram

Regional Productivity Factor: 1.0 Animal Grazing Factor: 0.5

Site Boundary:	1,300 meter	NNW
Residence:	1,600 meter	NNW
Garden:	1,600 meter	NNW
Pasture:	2,700 meter	WNW

Site-Specific Data - Waterborne Pathways via CEDAR RIVER

Average Effluent Flow from Site: 0. L/y

Drinking Water Population: 170,000

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	RG	---	None
Fish	---	None	---	None
Shellfish	---	None	---	None
Shoreline	---	---	---	RG

Notes:

No waterborne pathways.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

DUANE ARNOLD

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	0.	0.	0.	0.	0.
Teen	0.	0.	0.	0.	0.
Adult	0.	0.	0.	0.	0.
TOTAL	0.	0.	0.	0.	0.

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.0E-04	1.0E-04	1.3E-04	4.9E-05	1.0E-04	1.2E-04
Child	1.8E-03	1.9E-03	2.0E-03	5.8E-04	1.8E-03	2.2E-03
Teen	1.1E-03	1.2E-03	1.2E-03	4.1E-04	1.1E-03	1.5E-03
Adult	6.5E-03	7.2E-03	6.8E-03	2.5E-03	6.5E-03	8.0E-03
TOTAL	9.6E-03	1.0E-02	1.0E-02	3.5E-03	9.6E-03	1.2E-02

Production/Consumption factors:

Produce: 0.87 Milk: 3.4 Meat: 8.9

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	None	
Fish/Shellfish	None	
Shoreline Recreation	None	
TOTAL	None	<1%

Ingestion Dose to Any Organ (TEEN LIVER)

Drinking Water	None	
Fish/Shellfish	None	
TOTAL	None	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	2.6E-04	<1%
Air Beta at SB (mrad)	3.3E-05	<1%
Total Body at Residence	1.3E-04	<1%

Iodine and Particulate Dose to Any Organ (CHILD GI-LLI)

Inhalation at Residence	4.2E-04	
Veg/Prod. from Garden	1.9E-03	
Milk/Meat from Pasture	4.5E-04	
TOTAL	2.7E-03	<1%

Notes:

Site: **J. M. FARLEY** DOTHAN, AL

Location: N 31.2228° W 85.1126°

Population Data

Total Population Within 2-to-80-km Region: 3.8E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
Dothan MSA	130,000	27 km W
Enterprise	20,000	71 km W
Ozark	13,000	56 km WNW
Eufaula	13,000	75 km N
Bainbridge	11,000	62 km SE

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 87% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 1.7E+07 kilogram Milk: 5.7E+07 liter Meat: 8.6E+07 kilogram

Regional Productivity Factor: 0.95 Animal Grazing Factor: 0.8

Site Boundary:	1,600 meter	SSE
Residence:	1,900 meter	SW
Garden:	1,900 meter	SW
Pasture:	9,600 meter	SSE

Site-Specific Data - Waterborne Pathways via CHATTAHOOCHEE RIVER

Average Effluent Flow from Site: 1.2E+11 L/y
Average River Flow at Site: 1.1E+13 L/y (12,000 cfs)
Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Waters	---	None	---	None
Fish	1.1E-02	2.3E+05	2.0E-01	RG
Shellfish	---	None	---	None
Shoreline	---	---	2.0E-01	RG

Notes:

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

J. M. FARLEY

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	9.3E-04	4.8E-03	3.8E-04	2.8E-03	3.2E-03
Teen	1.3E-03	9.6E-03	3.4E-04	1.7E-03	2.7E-03
Adult	1.2E-02	8.3E-02	2.7E-03	9.6E-03	1.7E-02
TOTAL	1.4E-02	9.8E-02	3.5E-03	1.4E-02	2.3E-02

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	5.5E-04	5.5E-04	6.2E-04	1.9E-04	5.5E-04	5.6E-04
Child	6.4E-03	6.4E-03	6.8E-03	2.2E-03	6.4E-03	6.6E-03
Teen	4.1E-03	4.1E-03	4.3E-03	1.6E-03	4.1E-03	4.3E-03
Adult	2.3E-02	2.3E-02	2.3E-02	9.6E-03	2.3E-02	2.3E-02
TOTAL	3.4E-02	3.4E-02	3.5E-02	1.4E-02	3.4E-02	3.5E-02

Production/Consumption factors:

Produce: 0.22 Milk: 1.1 Meat: 2.7

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	5.5E-03	
Fish/Shellfish	1.2E-02	
Shoreline Recreation	9.3E-05	
TOTAL	1.8E-02	<1%

Ingestion Dose to Any Organ (ADULT GI-LLI)

Irrigated Foods	5.6E-03	
Fish/Shellfish	9.4E-02	
TOTAL	1.0E-01	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	1.3E-03	<1%
Air Beta at SB (mrad)	1.5E-03	<1%
Total Body at Residence	9.9E-04	<1%

Iodine and Particulate Dose to Any Organ (CHILD THYROID)

Inhalation at Residence	2.5E-04	
Veg/Prod. from Garden	9.3E-04	
Milk/Meat from Pasture	2.1E-04	
TOTAL	1.4E-03	<1%

Notes:

Irrigated leafy vegetable pathway not significant compared to fish for individual doses.

Site: **FERMI** LAGOONA BEACH, MI

Location: N 41.9781° W 83.2594°

Population Data

Total Population Within 2-to-80-km Region: 5.0E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Detroit PMSA	4,400,000	24-80 km
Toledo MSA	610,000	40 km SW
Ann Arbor PMSA	280,000	48 km NW
Sandusky	30,000	72 km SE
Monroe	23,000	13 km WSW

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 100% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 6.8E+07 kilogram Milk: 2.9E+08 liter Meat: 4.5E+07 kilogram

Regional Productivity Factor: 0.6 Animal Grazing Factor: 0.5

Site Boundary:	920 meter	NW
Residence:	1,100 meter	WNW
Garden:	1,800 meter	NNE
Pasture:	3,000 meter	N

Site-Specific Data - Waterborne Pathways via LAKE ERIE

Average Effluent Flow from Site: 2.0E+10 L/y

Drinking Water Population: 525,000

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	5.6E-04	RG	1.3E-02	RG
Fish	1.0E-03	8.9E+06	2.0E-01	RG
Shellfish	---	None	---	None
Shoreline	---	---	2.0E-01	RG

Notes:

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

FERMI

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	4.1E-06	4.1E-06	4.1E-06	0.	4.1E-06
Child	5.0E-05	5.3E-05	4.7E-05	0.	5.0E-05
Teen	2.0E-05	2.9E-05	1.9E-05	0.	2.1E-05
Adult	1.7E-04	2.5E-04	1.6E-04	0.	1.7E-04
TOTAL	2.4E-04	3.4E-04	2.3E-04	0.	2.5E-04

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	6.6E-04	7.0E-04	5.8E-03	4.5E-04	6.7E-04	6.9E-04
Child	8.5E-03	9.1E-03	4.4E-02	5.2E-03	8.6E-03	8.8E-03
Teen	6.2E-03	6.4E-03	2.2E-02	3.6E-03	6.2E-03	6.6E-03
Adult	3.7E-02	3.7E-02	9.7E-02	2.2E-02	3.7E-02	3.8E-02
TOTAL	5.2E-02	5.3E-02	1.7E-01	3.1E-02	5.2E-02	5.4E-02

Production/Consumption factors:

Produce: 0.042 Milk: 0.26 Meat: 0.066

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	1.8E-05	
Fish/Shellfish	1.2E-05	
Shoreline Recreation	1.0E-06	
TOTAL	3.1E-05	<1%

Ingestion Dose to Any Organ (ADULT GI-LLI)

Drinking Water	1.9E-05	
Fish/Shellfish	5.4E-05	
TOTAL	7.3E-05	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	9.9E-03	<1%
Air Beta at SB (mrad)	9.8E-03	<1%
Total Body at Residence	5.8E-03	<1%

Iodine and Particulate Dose to Any Organ (INFANT THYROID)

Inhalation at Residence	1.8E-03	
Veg/Prod. from Garden	None	
Milk/Meat from Pasture	2.9E-02	
TOTAL	3.1E-02	<1%

Notes:

Site: **J. A. FITZPATRICK** OSWEGO, NY

Location: N 43.5239° W 76.3983°

Population Data

Total Population Within 2-to-80-km Region: 8.7E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
Syracuse MSA	660,000	56 km SSE
Rome	44,000	80 km ESE
Auburn	31,000	66 km SSW
Watertown	29,000	64 km NE
Kingston	23,000	79 km N

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 98% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 7.6E+07 kilogram Milk: 7.0E+08 liter Meat: 3.3E+07 kilogram

Regional Productivity Factor: 0.7 Animal Grazing Factor: 0.5

Site Boundary:	950 meter	E
Residence:	1,400 meter	E
Garden:	1,400 meter	E
Pasture:	3,500 meter	SE

Site-Specific Data - Waterborne Pathways via LAKE ONTARIO

Average Effluent Flow from Site: 2.0E+11 L/y

Drinking Water Population: 530,000

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	3.0E-03	RG	6.1E-03	RG
Fish	5.0E-03	7.3E+05	8.3E-02	RG
Shellfish	---	None	---	None
Shoreline	---	---	5.6E-02	RG

Notes:

Population consumption of drinking water derived from Nine Mile Point FES, 1974.
Dilution factors for population derived from FES, 1973.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

J. A. FITZPATRICK

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	2.1E-05	2.1E-05	1.7E-05	2.6E-06	2.2E-05
Child	3.1E-04	2.8E-04	1.9E-04	1.5E-04	4.2E-04
Teen	1.6E-04	1.8E-04	7.5E-05	8.4E-05	2.5E-04
Adult	1.3E-03	1.6E-03	6.4E-04	5.1E-04	1.7E-03
TOTAL	1.8E-03	2.1E-03	9.2E-04	7.5E-04	2.4E-03

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	4.9E-05	5.2E-05	1.4E-04	4.1E-05	5.5E-05	4.9E-05
Child	5.8E-04	5.5E-04	1.1E-03	4.5E-04	6.1E-04	5.8E-04
Teen	3.8E-04	3.8E-04	5.9E-04	3.1E-04	4.0E-04	4.1E-04
Adult	2.2E-03	2.2E-03	2.8E-03	1.9E-03	2.2E-03	2.3E-03
TOTAL	3.2E-03	3.2E-03	4.7E-03	2.7E-03	3.3E-03	3.3E-03

Production/Consumption factors:

Produce: 0.32 Milk: 4.3 Meat: 0.33

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	7.6E-06	
Fish/Shellfish	3.4E-04	
Shoreline Recreation	2.2E-06	
TOTAL	3.5E-04	<1%

Ingestion Dose to Any Organ (TEEN LIVER)

Drinking Water	5.7E-06	
Fish/Shellfish	5.8E-04	
TOTAL	5.8E-04	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	5.8E-03	<1%
Air Beta at SB (mrad)	7.4E-03	<1%
Total Body at Residence	1.4E-03	<1%

Iodine and Particulate Dose to Any Organ (CHILD BONE)

Inhalation at Residence	3.7E-05	
Veg/Prod. from Garden	5.5E-04	
Milk/Meat from Pasture	3.8E-04	
TOTAL	9.7E-04	<1%

Notes:

Site: **FORT CALHOUN** WASHINGTON CNTY, NE

Location: N 41.5208° W 96.0767°

Population Data

Total Population Within 2-to-80-km Region: 7.6E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
Omaha MSA	620,000	32 km SSE
Council Bluffs	54,000	34 km SE
Freemont	24,000	36 km WSW
Bellevue	31,000	44 km SSE

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 100% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 9.7E+07 kilogram Milk: 7.2E+07 liter Meat: 2.0E+08 kilogram

Regional Productivity Factor: 1.0 Animal Grazing Factor: 0.5

Site Boundary:	910 meter	S
Residence:	1,400 meter	S
Garden:	1,400 meter	S
Pasture:	4,400 meter	S

Site-Specific Data - Waterborne Pathways via MISSOURI RIVER

Average Effluent Flow from Site: 5.4E+11 L/y
Average River Flow at Site: 2.4E+13 L/y (27,000 cfs)
Drinking Water Population: 570,000

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	2.3E-02	RG	3.2E-02	RG
Fish	2.3E-02	1.0E+04	1.0E+00	RG
Shellfish	---	None	---	None
Shoreline	---	---	1.0E+00	RG

Notes:

Population exposed to drinking water assumed to be Omaha SMSA.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

FORT CALHOUN

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	2.2E-03	2.3E-03	1.7E-02	1.2E-03	2.8E-03
Child	2.6E-02	2.8E-02	1.3E-01	1.4E-02	3.0E-02
Teen	1.0E-02	1.4E-02	4.1E-02	4.1E-03	1.1E-02
Adult	8.8E-02	1.2E-01	3.0E-01	2.8E-02	9.0E-02
TOTAL	1.3E-01	1.7E-01	4.9E-01	4.7E-02	1.3E-01

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	2.0E-04	2.0E-04	3.9E-04	1.4E-04	2.0E-04	2.1E-04
Child	3.0E-03	3.0E-03	4.8E-03	1.6E-03	3.0E-03	3.1E-03
Teen	2.0E-03	2.0E-03	2.7E-03	1.1E-03	2.0E-03	2.1E-03
Adult	1.1E-02	1.1E-02	1.4E-02	6.8E-03	1.1E-02	1.2E-02
TOTAL	1.7E-02	1.6E-02	2.2E-02	9.6E-03	1.7E-02	1.7E-02

Production/Consumption factors:

Produce: 0.65 Milk: 0.72 Meat: 3.2

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	6.0E-04	
Fish/Shellfish	1.3E-01	
Shoreline Recreation	1.1E-04	
TOTAL	1.3E-01	4%

Ingestion Dose to Any Organ (ADULT GI-LLI)

Drinking Water	8.2E-04	
Fish/Shellfish	2.3E-01	
TOTAL	2.3E-01	2%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	4.2E-03	<1%
Air Beta at SB (mrad)	1.1E-02	<1%
Total Body at Residence	1.2E-03	<1%

Iodine and Particulate Dose to Any Organ (CHILD THYROID)

Inhalation at Residence	3.7E-04	
Veg/Prod. from Garden	1.5E-03	
Milk/Meat from Pasture	5.3E-04	
TOTAL	2.4E-03	<1%

Notes:

Site: **R. E. GINNA** ONTARIO, NY

Location: N 43.2778° W 77.3089°

Population Data

Total Population Within 2-to-80-km Region: 1.2E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Rochester MSA	1,000,000	27 km WSW
Auburn	31,000	71 km ESE
Oswego	19,000	67 km ENE
Batavia	16,000	78 km WSW
Geneva	14,000	52 km SSE

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 98% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 7.6E+07 kilogram Milk: 7.0E+08 liter Meat: 3.3E+07 kilogram

Regional Productivity Factor: 0.6 Animal Grazing Factor: 0.5

Site Boundary:	450 meter	S
Residence:	450 meter	S
Garden:	450 meter	S
Pasture:	5,000 meter	SW

Site-Specific Data - Waterborne Pathways via LAKE ONTARIO

Average Effluent Flow from Site: 6.0E+11 L/y

Drinking Water Population: 560,000

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	1.0E-02	RG	5.0E-02	RG
Fish	1.0E-02	7.3E+05	1.0E+00	RG
Shellfish	---	None	---	None
Shoreline	---	---	1.0E+00	RG

Notes:

Dilution factors for population derived from FES, 1973.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

R. E. GINNA

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	1.9E-03	1.6E-03	2.5E-02	2.6E-03	3.8E-03
Child	3.6E-02	1.9E-02	1.8E-01	8.6E-02	1.1E-01
Teen	3.5E-02	8.3E-03	5.7E-02	4.2E-02	7.4E-02
Adult	3.7E-01	7.0E-02	4.1E-01	2.6E-01	4.6E-01
TOTAL	4.4E-01	9.9E-02	6.7E-01	3.9E-01	6.5E-01

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	4.6E-03	4.6E-03	5.6E-03	1.8E-02	4.6E-03	4.6E-03
Child	4.1E-02	4.1E-02	4.7E-02	1.6E-01	4.1E-02	4.1E-02
Teen	1.6E-02	1.6E-02	1.9E-02	4.9E-02	1.6E-02	1.7E-02
Adult	6.9E-02	6.9E-02	7.8E-02	1.6E-01	6.9E-02	7.1E-02
TOTAL	1.3E-01	1.3E-01	1.5E-01	3.9E-01	1.3E-01	1.3E-01

Production/Consumption factors:

Produce: 0.19 Milk: 2.6 Meat: 0.2

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	2.3E-03	
Fish/Shellfish	9.3E-01	
Shoreline Recreation	1.6E-04	
TOTAL	9.4E-01	31%

Ingestion Dose to Any Organ (TEEN LIVER)

Drinking Water	2.0E-03	
Fish/Shellfish	1.3E+00	
TOTAL	1.3E+00	13%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	1.1E-03	<1%
Air Beta at SB (mrad)	2.2E-03	<1%
Total Body at Residence	7.1E-04	<1%

Iodine and Particulate Dose to Any Organ (CHILD BONE)

Inhalation at Residence	3.6E-04	
Veg/Prod. from Garden	3.5E-02	
Milk/Meat from Pasture	8.0E-03	
TOTAL	4.3E-02	<1%

Notes:

Site: **GRAND GULF** PORT GIBSON, MS

Location: N 32.0270° W 91.2530°

Population Data

Total Population Within 2-to-80-km Region: 3.3E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
Vicksburg	21,000	40 km NNE
Tallulah	9,000	45 km NNW
Natches	19,000	60 km SSW
Brookhaven	10,000	76 km SSE

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 86% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 4.4E+06 kilogram Milk: 7.1E+07 liter Meat: 9.9E+07 kilogram

Regional Productivity Factor: 0.9 Animal Grazing Factor: 0.8

Site Boundary:	700 meter	SSE
Residence:	1,000 meter	E
Garden:	600 meter	S
Pasture:	600 meter	S

Site-Specific Data - Waterborne Pathways via MISSISSIPPI RIVER

Average Effluent Flow from Site: 2.2E+09 L/y
Average River Flow at Site: 3.8E+14 L/y (430,000 cfs)
Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	5.7E-06	None	---	None
Fish	5.7E-06	7.0E+05	5.0E-01	RG
Shellfish	5.7E-06	7.0E+03	---	None
Shoreline	---	---	5.0E-01	RG

Notes:

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

GRAND GULF

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	2.1E-05	1.4E-05	8.9E-06	9.1E-05	2.3E-05
Teen	1.8E-05	2.9E-05	6.5E-06	6.6E-05	2.0E-05
Adult	1.4E-04	2.6E-04	4.3E-05	4.5E-04	1.2E-04
TOTAL	1.7E-04	3.0E-04	5.9E-05	6.0E-04	1.7E-04

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	2.5E-04	2.4E-04	4.8E-03	1.6E-04	2.5E-04	2.5E-04
Child	2.9E-03	2.8E-03	2.8E-02	1.7E-03	2.9E-03	3.0E-03
Teen	2.0E-03	2.0E-03	1.2E-02	1.2E-03	2.0E-03	2.1E-03
Adult	1.1E-02	1.1E-02	4.8E-02	7.2E-03	1.2E-02	1.2E-02
TOTAL	1.7E-02	1.7E-02	9.4E-02	1.0E-02	1.7E-02	1.7E-02

Production/Consumption factors:

Produce: 0.061 Milk: 1.5 Meat: 3.3

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	None	
Fish/Shellfish	3.9E-01	
Shoreline Recreation	2.9E-03	
TOTAL	4.0E-01	13%

Ingestion Dose to Any Organ (ADULT BONE)

Drinking Water	None	
Fish/Shellfish	1.4E+00	
TOTAL	1.4E+00	14%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	9.2E-02	<1%
Air Beta at SB (mrad)	1.3E-01	<1%
Total Body at Residence	8.0E-03	<1%

Iodine and Particulate Dose to Any Organ (INFANT THYROID)

Inhalation at Residence	8.5E-03	
Veg/Prod. from Garden	None	
Milk/Meat from Pasture	2.2E+00	
TOTAL	2.2E+00	15%

Notes:

Site: **HADDAM NECK** HADDAM NECK, CT

Location: N 41.4819° W 72.4992°

Population Data

Total Population Within 2-to-80-km Region: 3.6E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Hartfd-New Brit.-Middletn-Bristol NECMA	1,100,000	35 km NNW
Springfield NECMA	600,000	70 km N
New Haven-Waterbury-Meriden NECMA	800,000	40 km WSW
Bridgeport-Stamford-Norwalk-Danbury NECMA	830,000	66 km WSW
New London-Norwich NECMA	250,000	35 km ESE

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 92% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 3.2E+07 kilogram Milk: 4.4E+08 liter Meat: 2.0E+07 kilogram

Regional Productivity Factor: 0.7 Animal Grazing Factor: 0.6

Site Boundary:	480 meter	NNW
Residence:	750 meter	NW
Garden:	810 meter	NW
Pasture:	7,200 meter	N

Site-Specific Data - Waterborne Pathways via CONN. R. TO LONG ISL. SOUND

Average Effluent Flow from Site: 6.8E+11 L/y

Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	1.0E+00	None	---	None
Fish	1.8E-02	1.2E+06	1.0E+00	RG
Shellfish	---	None	---	None
Shoreline	---	---	1.0E+00	RG

Notes:

Population fish harvest is from river (fresh); shellfish harvest is from sound (salt).
Individual fish catch is from canal (fresh) (RAB 4-3 1990).

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

HADDAM NECK

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	1.0E-02	7.2E-04	2.9E-04	5.4E-02	5.9E-02
Teen	2.0E-02	1.1E-03	2.6E-04	3.3E-02	5.0E-02
Adult	2.1E-01	9.0E-03	2.1E-03	1.9E-01	3.0E-01
TOTAL	2.4E-01	1.1E-02	2.6E-03	2.8E-01	4.0E-01

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.4E-02	1.3E-02	1.3E-02	2.1E-03	1.6E-02	1.4E-02
Child	1.5E-01	1.5E-01	1.5E-01	1.6E-02	1.6E-01	1.5E-01
Teen	9.5E-02	9.2E-02	9.2E-02	5.2E-03	9.9E-02	9.3E-02
Adult	4.8E-01	4.7E-01	4.7E-01	1.5E-02	4.9E-01	4.7E-01
TOTAL	7.4E-01	7.2E-01	7.2E-01	3.8E-02	7.6E-01	7.2E-01

Production/Consumption factors:

Produce: 0.032 Milk: 0.65 Meat: 0.05

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	None	
Fish/Shellfish	2.6E-01	
Shoreline Recreation	2.5E-05	
TOTAL	2.6E-01	9%

Ingestion Dose to Any Organ (TEEN LIVER)

Drinking Water	None	
Fish/Shellfish	3.7E-01	
TOTAL	3.7E-01	4%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	9.0E-06	<1%
Air Beta at SB (mrad)	1.5E-05	<1%
Total Body at Residence	9.2E-06	<1%

Iodine and Particulate Dose to Any Organ (CHILD LIVER)

Inhalation at Residence	7.6E-04
Veg/Prod. from Garden	6.3E-03
Milk/Meat from Pasture	2.6E-03
TOTAL	9.6E-03 <1%

Notes:

Site: **HARRIS** NEWHILL, NC

Location: N 35.6 ° W 79.0 °

Population Data

Total Population Within 2-to-80-km Region: 1.5E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Raleigh-Durham MSA	740,000	32 km NE
Fayetteville MSA	270,000	60 km SSE
Burlington MSA	108,000	64 km NW
Chapel Hill	39,000	32 km NNW
Sanford	14,000	22 km SW

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 99% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 2.6E+07 kilogram Milk: 1.0E+08 liter Meat: 5.8E+07 kilogram

Regional Productivity Factor: 0.9 Animal Grazing Factor: 0.72

Site Boundary:	2,100 meter	SSW
Residence:	2,400 meter	NNW
Garden:	2,700 meter	NNE
Pasture:	3,500 meter	N

Site-Specific Data - Waterborne Pathways via CAPE FEAR RIVER

Average Effluent Flow from Site: 2.6E+10 L/y
Average River Flow at Site: 2.9E+12 L/y (3,200 cfs)
Drinking Water Population: 167,000

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	9.2E-03	RG	1.2E-03	RG
Fish	1.0E+00	2.4E+00	1.6E-02	RG
Shellfish	---	None	---	None
Shoreline	---	---	1.6E-02	RG

Notes:

Average individual fish consumption rate of 2.4 kg/y as given in FES, 1974 used in lieu of catch data.
One percent of population assumed to obtain fish from undiluted effluent.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

HARRIS

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	4.7E-02	4.7E-02	7.4E-02	4.0E-04	4.7E-02
Child	5.5E-01	5.7E-01	7.7E-01	7.3E-02	6.1E-01
Teen	2.4E-01	2.9E-01	3.0E-01	4.2E-02	2.7E-01
Adult	2.1E+00	2.5E+00	2.4E+00	2.4E-01	2.2E+00
TOTAL	2.9E+00	3.4E+00	3.6E+00	3.6E-01	3.1E+00

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	3.1E-03	3.1E-03	3.9E-03	3.1E-03	3.2E-03	3.4E-03
Child	3.5E-02	3.5E-02	4.0E-02	3.5E-02	3.5E-02	3.8E-02
Teen	2.6E-02	2.6E-02	2.8E-02	2.6E-02	2.6E-02	3.0E-02
Adult	1.6E-01	1.6E-01	1.6E-01	1.5E-01	1.6E-01	1.7E-01
TOTAL	2.2E-01	2.2E-01	2.4E-01	2.2E-01	2.2E-01	2.4E-01

Production/Consumption factors:

Produce: 0.081 Milk: 0.48 Meat: 0.44

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	3.2E-03	
Fish/Shellfish	4.2E-03	
Shoreline Recreation	3.6E-05	
TOTAL	7.4E-03	<1%

Ingestion Dose to Any Organ (ADULT GI-LLI)

Drinking Water	3.3E-03	
Fish/Shellfish	8.6E-03	
TOTAL	1.2E-02	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	8.0E-02	<1%
Air Beta at SB (mrad)	1.4E-01	<1%
Total Body at Residence	1.0E-02	<1%

Iodine and Particulate Dose to Any Organ (INFANT THYROID)

Inhalation at Residence	1.7E-04	
Veg/Prod. from Garden	None	
Milk/Meat from Pasture	6.1E-03	
TOTAL	6.2E-03	<1%

Notes:

Site: **E. I. HATCH** BAXLEY, GA

Location: N 31.9342° W 82.3444°

Population Data

Total Population Within 2-to-80-km Region: 3.7E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
Waycross	16,000	80 km S
Statesboro	16,000	78 km NE
Hinesville	22,000	171 km SW
Douglas	10,000	67 km SW
Vidalia	11,000	32 km N

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 98% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 8.8E+06 kilogram Milk: 7.0E+07 liter Meat: 8.1E+07 kilogram

Regional Productivity Factor: 1.0 Animal Grazing Factor: 0.8

Site Boundary:	1,600 meter	ENE
Residence:	1,800 meter	SW
Garden:	1,900 meter	WSW
Pasture:	1,800 meter	NNW

Site-Specific Data - Waterborne Pathways via ALTAMAHA RIVER

Average Effluent Flow from Site: 6.7E+09 L/y
Average River Flow at Site: 1.2E+13 L/y (13,000 cfs)
Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	5.7E-04	None	---	None
Fish	5.7E-04	6.3E+05	1.0E-01	RG
Shellfish	---	None	---	None
Shoreline	---	---	1.0E-01	RG

Notes:

Commercial catch plus 3 pounds of game fish per year taken from river by average person according to FES, 1972.

Site-specific bioaccumulation factors used for cesium and zinc (ODCM 1984, p.1.2-4).

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

E. I. HATCH

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	9.5E-03	1.2E-03	2.9E-03	4.6E-02	4.8E-02
Teen	1.6E-02	2.5E-03	2.1E-03	2.8E-02	4.0E-02
Adult	1.7E-01	2.2E-02	1.4E-02	1.6E-01	2.4E-01
TOTAL	1.9E-01	2.6E-02	1.9E-02	2.4E-01	3.3E-01

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	7.7E-04	7.8E-04	1.2E-02	4.4E-04	8.2E-04	7.5E-04
Child	9.4E-03	9.2E-03	7.0E-02	4.7E-03	9.7E-03	9.4E-03
Teen	6.3E-03	6.3E-03	3.0E-02	3.2E-03	6.5E-03	6.5E-03
Adult	3.6E-02	3.6E-02	1.1E-01	1.9E-02	3.6E-02	3.7E-02
TOTAL	5.3E-02	5.3E-02	2.2E-01	2.8E-02	5.4E-02	5.4E-02

Production/Consumption factors:

Produce: 0.12 Milk: 1.4 Meat: 2.7

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	None	
Fish/Shellfish	5.8E-01	
Shoreline Recreation	5.8E-04	
TOTAL	5.8E-01	19%

Ingestion Dose to Any Organ (TEEN LIVER)

Drinking Water	None	
Fish/Shellfish	8.6E-01	
TOTAL	8.6E-01	9%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	6.5E-02	<1%
Air Beta at SB (mrad)	5.9E-02	<1%
Total Body at Residence	1.6E-02	<1%

Iodine and Particulate Dose to Any Organ (INFANT THYROID)

Inhalation at Residence	5.1E-03	
Veg/Prod. from Garden	None	
Milk/Meat from Pasture	1.2E-01	
TOTAL	1.3E-01	<1%

Notes:

Site: **HOPE CREEK** SALEM COUNTY, NJ

Location: N 39.5733° W 75.4667°

Population Data

Total Population Within 2-to-80-km Region: 4.9E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Philadelphia PMSA	4,900,000	64 km NNE
Wilmington PMSA	580,000	30 km N
Vineland-Millville-Bridgeton PMSA	140,000	38 km E

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 99% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 7.4E+07 kilogram Milk: 2.7E+08 liter Meat: 2.4E+07 kilogram

Regional Productivity Factor: 0.8 Animal Grazing Factor: 0.6

Site Boundary:	200 meter	SW
Residence:	6,900 meter	NNE
Garden:	6,900 meter	NNE
Pasture:	7,800 meter	W

Site-Specific Data - Waterborne Pathways via DELAWARE RIVER AND BAY

Average Effluent Flow from Site: 5.6E+10 L/y
Average River Flow at Site: 1.5E+13 L/y (16,500 cfs)
Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	None	---	None
Fish	3.8E-03	3.6E+05	5.0E-02	RG
Shellfish	3.8E-03	1.6E+05	5.0E-02	RG
Shoreline	---	---	5.0E-02	RG

Notes:

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

HOPE CREEK

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	5.9E-02	2.7E-02	5.0E-05	4.2E-02	9.8E-02
Teen	4.0E-02	5.7E-02	4.5E-05	2.9E-02	8.9E-02
Adult	2.4E-01	5.1E-01	3.5E-04	1.9E-01	5.5E-01
TOTAL	3.4E-01	6.0E-01	4.5E-04	2.6E-01	7.4E-01

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	5.7E-04	6.1E-04	5.2E-04	2.3E-04	6.2E-04	5.6E-04
Child	7.5E-03	7.2E-03	7.1E-03	2.4E-03	7.8E-03	7.6E-03
Teen	5.1E-03	5.2E-03	5.0E-03	1.7E-03	5.3E-03	5.5E-03
Adult	2.9E-02	2.9E-02	2.8E-02	1.0E-02	2.9E-02	3.0E-02
TOTAL	4.2E-02	4.2E-02	4.1E-02	1.4E-02	4.3E-02	4.4E-02

Production/Consumption factors:

Produce: 0.061 Milk: 0.33 Meat: 0.049

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	None	
Fish/Shellfish	1.3E-01	
Shoreline Recreation	4.3E-05	
TOTAL	1.3E-01	4%

Ingestion Dose to Any Organ (ADULT GI-LLI)

Drinking Water	None	
Fish/Shellfish	3.1E-01	
TOTAL	3.1E-01	3%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	1.9E-02	<1%
Air Beta at SB (mrad)	2.0E-02	<1%
Total Body at Residence	1.5E-04	<1%

Iodine and Particulate Dose to Any Organ (CHILD LIVER)

Inhalation at Residence	4.9E-05	
Veg/Prod. from Garden	1.9E-04	
Milk/Meat from Pasture	8.9E-05	
TOTAL	3.3E-04	<1%

Notes:

Site: **INDIAN POINT** BUCHANAN, NY

Location: N 41.2714° W 73.9525°

Population Data

Total Population Within 2-to-80-km Region: 1.6E+07

Major Metropolitan Centers Within Region:

Center	Population	Location
New York PMSA	8,500,000	57 km S
Newark PMSA	1,800,000	62 km S
Nassau-Suffok PMSA	2,600,000	70 km SSE
Jersey City PMSA	550,000	61 km S
Bergen-Passaic PMSA	1,300,000	44 km SSW

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 100% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 7.6E+07 kilogram Milk: 7.0E+08 liter Meat: 3.3E+07 kilogram

Regional Productivity Factor: 0.8 Animal Grazing Factor: 0.5

Site Boundary:	380 meter	SSW
Residence:	1,500 meter	SSW
Garden:	1,300 meter	S
Pasture:	8,000 meter	SW

Site-Specific Data - Waterborne Pathways via HUDSON RIVER

Average Effluent Flow from Site: 2.3E+12 L/y
Average River Flow at Site: 1.8E+13 L/y (20,000 cfs)
Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	1.3E-01	None	---	None
Fish	1.3E-01	RG	2.0E-01	RG
Shellfish	---	None	2.0E-01	RG
Shoreline	---	---	2.0E-01	RG

Notes:

Average individual fish consumption rates as given in Table A-1 used in lieu of catch data.
One percent of population assumed to obtain 10% of fish from river according to FES, 1972.
Site-specific bioaccumulation factors used for cesium, silver, and niobium (ODCM 1991, p.2-11).

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

INDIAN POINT

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	1.4E-03	1.7E-04	3.6E-03	6.5E-03	7.4E-03
Teen	2.6E-03	2.7E-04	2.6E-03	3.9E-03	6.3E-03
Adult	2.8E-02	2.2E-03	1.7E-02	2.3E-02	3.8E-02
TOTAL	3.2E-02	2.6E-03	2.4E-02	3.3E-02	5.2E-02

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	6.9E-02	6.9E-02	1.2E-01	2.0E-01	6.9E-02	7.1E-02
Child	6.1E-01	6.1E-01	9.1E-01	1.6E+00	6.1E-01	6.4E-01
Teen	3.5E-01	3.5E-01	4.9E-01	6.5E-01	3.5E-01	3.9E-01
Adult	1.9E+00	1.9E+00	2.5E+00	2.7E+00	1.9E+00	2.1E+00
TOTAL	2.9E+00	2.9E+00	4.0E+00	5.1E+00	2.9E+00	3.1E+00

Production/Consumption factors:

Produce: 0.02 Milk: 0.27 Meat: 0.021

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	None	
Fish/Shellfish	5.0E-03	
Shoreline Recreation	5.9E-06	
TOTAL	5.0E-03	<1%

Ingestion Dose to Any Organ (TEEN LIVER)

Drinking Water	None	
Fish/Shellfish	7.1E-03	
TOTAL	7.1E-03	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	1.7E-01	2%
Air Beta at SB (mrad)	4.7E-01	2%
Total Body at Residence	1.1E-02	<1%

Iodine and Particulate Dose to Any Organ (CHILD BONE)

Inhalation at Residence	3.0E-03	
Veg/Prod. from Garden	1.0E-01	
Milk/Meat from Pasture	3.6E-02	
TOTAL	1.4E-01	<1%

Notes:

No milk cows reported to be within 5 miles so default cow pasture set at 5 miles.

Site: **KEWAUNEE** CARLTON, WI

Location: N 44.3431° W 87.5361°

Population Data

Total Population Within 2-to-80-km Region: 6.5E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
Greenbay MSA	190,000	44 km NW
Appleton-Oshkosh-Neenah MSA	320,000	72 km W
Sheboygan MSA	100,000	65 km SSW
Manitowoc	33,000	29 km SSW

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 97% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 7.2E+07 kilogram Milk: 1.2E+09 liter Meat: 1.0E+08 kilogram

Regional Productivity Factor: 0.5 Animal Grazing Factor: 0.5

Site Boundary:	1,300 meter	N
Residence:	1,600 meter	W
Garden:	1,600 meter	W
Pasture:	1,600 meter	W

Site-Specific Data - Waterborne Pathways via LAKE MICHIGAN

Average Effluent Flow from Site: 6.1E+11 L/y

Drinking Water Population: 260,000

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	8.2E-03	RG	1.9E-02	RG
Fish	1.0E-02	1.1E+00	1.0E+00	RG
Shellfish	---	None	---	None
Shoreline	---	---	1.0E+00	RG

Notes:

Population-weighted mixing ratio used for population drinking water.
Average individual fish consumption rates as given in FES, used in lieu of catch data.
Population fish mixing ratio reduced 1/10 that of FES, 1972, to account for lake mixing.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

KEWAUNEE

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	8.2E-04	8.2E-04	8.1E-04	4.6E-06	8.1E-04
Child	9.2E-03	9.9E-03	9.1E-03	8.2E-05	9.1E-03
Teen	3.5E-03	5.0E-03	3.5E-03	3.2E-05	3.5E-03
Adult	3.0E-02	4.3E-02	3.0E-02	2.3E-04	3.0E-02
TOTAL	4.4E-02	5.9E-02	4.3E-02	3.5E-04	4.3E-02

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	4.8E-05	4.8E-05	4.8E-05	1.2E-06	4.8E-05	4.8E-05
Child	7.4E-04	7.4E-04	7.4E-04	1.3E-05	7.4E-04	7.4E-04
Teen	4.3E-04	4.3E-04	4.3E-04	9.5E-06	4.3E-04	4.3E-04
Adult	2.3E-03	2.3E-03	2.3E-03	5.8E-05	2.3E-03	2.3E-03
TOTAL	3.5E-03	3.5E-03	3.5E-03	8.1E-05	3.5E-03	3.5E-03

Production/Consumption factors:

Produce: 0.28 Milk: 6.9 Meat: 0.98

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	6.9E-04	
Fish/Shellfish	1.2E-03	
Shoreline Recreation	3.7E-05	
TOTAL	1.9E-03	<1%

Ingestion Dose to Any Organ (ADULT GI-LLI)

Drinking Water	7.2E-04	
Fish/Shellfish	4.8E-02	
TOTAL	4.9E-02	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	1.7E-04	<1%
Air Beta at SB (mrad)	7.6E-05	<1%
Total Body at Residence	1.9E-05	<1%

Iodine and Particulate Dose to Any Organ (CHILD THYROID)

Inhalation at Residence	6.3E-05	
Veg/Prod. from Garden	2.2E-04	
Milk/Meat from Pasture	1.0E-04	
TOTAL	3.9E-04	<1%

Notes:

Site: **LACROSSE** GENOA, WI

Location: N 43.5583° W 91.2306°

Population Data

Total Population Within 2-to-80-km Region: 3.6E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
La Crosse MSA	98,000	27 km N
Winona	25,000	64 km WNW

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 100% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 7.2E+07 kilogram Milk: 1.2E+09 liter Meat: 1.0E+08 kilogram

Regional Productivity Factor: 1.0 Animal Grazing Factor: 0.5

Site Boundary:	340 meter	ENE
Residence:	600 meter	ENE
Garden:	600 meter	ENE
Pasture:	1,000 meter	ENE

Site-Specific Data - Waterborne Pathways via MISSISSIPPI RIVER

Average Effluent Flow from Site: 4.0E+09 L/y
Average River Flow at Site: 2.5E+13 L/y (28,000 cfs)
Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	None	---	None
Fish	1.6E-04	RG	4.9E-02	RG
Shellfish	---	None	---	None
Shoreline	---	---	4.9E-02	RG

Notes:
Fifty percent of population assumed to obtain fish from river at average consumption rates.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

LACROSSE

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	3.2E-03	2.4E-04	8.5E-08	2.2E-02	2.1E-02
Teen	6.0E-03	4.9E-04	7.7E-08	1.3E-02	1.7E-02
Adult	6.6E-02	4.1E-03	6.1E-07	7.5E-02	1.0E-01
TOTAL	7.6E-02	4.8E-03	7.8E-07	1.1E-01	1.4E-01

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.0E-06	3.3E-07	2.9E-07	3.8E-06	3.4E-07	6.7E-07
Child	1.3E-04	1.3E-05	6.6E-06	5.0E-04	7.2E-06	1.2E-05
Teen	5.5E-05	9.9E-06	4.0E-06	2.3E-04	4.3E-06	8.5E-06
Adult	2.5E-04	4.9E-05	2.2E-05	1.0E-03	2.3E-05	3.8E-05
TOTAL	4.3E-04	7.2E-05	3.3E-05	1.8E-03	3.5E-05	5.9E-05

Production/Consumption factors:

Produce: 1.0 Milk: 25.0 Meat: 3.5

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	None	
Fish/Shellfish	4.7E-01	
Shoreline Recreation	3.7E-04	
TOTAL	4.8E-01	16%

Ingestion Dose to Any Organ (TEEN LIVER)

Drinking Water	None	
Fish/Shellfish	7.5E-01	
TOTAL	7.5E-01	7%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	None	<1%
Air Beta at SB (mrad)	None	<1%
Total Body at Residence	None	<1%

Iodine and Particulate Dose to Any Organ (CHILD BONE)

Inhalation at Residence	5.1E-08	
Veg/Prod. from Garden	1.2E-04	
Milk/Meat from Pasture	1.0E-05	
TOTAL	1.3E-04	<1%

Notes:

Site: **LASALLE** SENECA, IL

Location: N 41.2439° W 88.6708°

Population Data

Total Population Within 2-to-80-km Region: 1.1E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Joliet PMSA	390,000	59 km NNE
Aurora-Elgin PMSA	360,000	65 km NNE
Kankakee MSA	96,000	69 km ESE
Dekalb	35,000	77 km N
Naperville	85,000	73 km NE

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 100% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 1.1E+08 kilogram Milk: 1.8E+08 liter Meat: 1.9E+08 kilogram

Regional Productivity Factor: 0.9 Animal Grazing Factor: 0.5

Site Boundary:	840 meter	ESE
Residence:	1,100 meter	SW
Garden:	1,100 meter	SW
Pasture:	1,600 meter	WNW

Site-Specific Data - Waterborne Pathways via ILLINOIS RIVER

Average Effluent Flow from Site: 1.9E+06 L/y
Average River Flow at Site: 1.2E+13 L/y (13,700 cfs)
Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	1.6E-07	None	---	None
Fish	1.6E-07	RG	---	None
Shellfish	---	None	---	None
Shoreline	---	---	---	RG

Notes:

Water use by population negligible, due to past history of river used for disposal of Chicago sewage.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

LASALLE

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	0.	0.	0.	0.	0.
Teen	0.	0.	0.	0.	0.
Adult	0.	0.	0.	0.	0.
TOTAL	0.	0.	0.	0.	0.

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.7E-04	1.7E-04	1.3E-03	1.2E-04	1.7E-04	1.7E-04
Child	2.2E-03	2.2E-03	1.1E-02	1.4E-03	2.2E-03	2.2E-03
Teen	1.5E-03	1.5E-03	5.1E-03	1.0E-03	1.5E-03	1.6E-03
Adult	8.6E-03	9.0E-03	2.2E-02	6.0E-03	8.6E-03	8.9E-03
TOTAL	1.2E-02	1.3E-02	4.0E-02	8.5E-03	1.2E-02	1.3E-02

Production/Consumption factors:

Produce: 0.49 Milk: 1.1 Meat: 2.0

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	1.6E-07
Fish/Shellfish	7.6E-06
Shoreline Recreation	9.3E-09
TOTAL	7.7E-06 <1%

Ingestion Dose to Any Organ (TEEN LIVER)

Drinking Water	1.9E-07
Fish/Shellfish	1.1E-05
TOTAL	1.1E-05 <1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	1.1E-03 <1%
Air Beta at SB (mrad)	1.7E-05 <1%
Total Body at Residence	5.1E-04 <1%

Iodine and Particulate Dose to Any Organ (INFANT THYROID)

Inhalation at Residence	6.2E-05
Veg/Prod. from Garden	None
Milk/Meat from Pasture	5.0E-03
TOTAL	5.1E-03 <1%

Notes:

Site: **LIMERICK** POTTSTOWN, PA

Location: N 40.2242° W 75.5875°

Population Data

Total Population Within 2-to-80-km Region: 6.8E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Philadelphia PMSA	4,900,000	40 km ESE
Allentown-Bethlehem-Easton PMSA	690,000	42 km ENE
Reading MSA	340,000	34 km WNW
Lancaster MSA	420,000	68 km WSW
Wilmington PMSA	580,000	56 km S
Trenton PMSA	330,000	71 km E

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 98% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 5.3E+07 kilogram Milk: 5.3E+08 liter Meat: 5.4E+07 kilogram

Regional Productivity Factor: 0.9 Animal Grazing Factor: 0.6

Site Boundary:	790 meter	NE
Residence:	970 meter	ESE
Garden:	970 meter	ESE
Pasture:	1,800 meter	ESE

Site-Specific Data - Waterborne Pathways via SCHUYLKILL RIVER

Average Effluent Flow from Site: 1.3E+10 L/y
Average River Flow at Site: 2.7E+12 L/y (3,010 cfs)
Drinking Water Population: 3,000,000

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	4.8E-03	RG	4.8E-03	RG
Fish	---	None	1.3E-02	RG
Shellfish	---	None	---	None
Shoreline	---	---	1.3E-02	RG

Notes:

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

LIMERICK

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	1.1E-02	1.0E-02	8.9E-03	1.4E-02	1.3E-02
Child	1.3E-01	1.2E-01	9.9E-02	1.5E-01	1.3E-01
Teen	4.9E-02	5.3E-02	3.8E-02	4.2E-02	5.1E-02
Adult	4.2E-01	4.7E-01	3.2E-01	2.9E-01	4.1E-01
TOTAL	6.1E-01	6.5E-01	4.7E-01	4.9E-01	6.1E-01

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	2.7E-03	2.7E-03	6.0E-03	2.7E-03	2.7E-03	2.9E-03
Child	3.0E-02	3.0E-02	4.9E-02	3.0E-02	3.0E-02	3.2E-02
Teen	2.2E-02	2.2E-02	3.0E-02	2.2E-02	2.2E-02	2.5E-02
Adult	1.3E-01	1.3E-01	1.6E-01	1.3E-01	1.3E-01	1.4E-01
TOTAL	1.9E-01	1.9E-01	2.5E-01	1.9E-01	1.9E-01	2.0E-01

Production/Consumption factors:

Produce: 0.036 Milk: 0.53 Meat: 0.089

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	1.9E-04	
Fish/Shellfish	3.3E-03	
Shoreline Recreation	4.5E-06	
TOTAL	3.5E-03	<1%

Ingestion Dose to Any Organ (TEEN LIVER)

Drinking Water	1.4E-04	
Fish/Shellfish	5.3E-03	
TOTAL	5.4E-03	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	4.0E-03	<1%
Air Beta at SB (mrad)	7.8E-03	<1%
Total Body at Residence	3.3E-03	<1%

Iodine and Particulate Dose to Any Organ (INFANT THYROID)

Inhalation at Residence	3.4E-04	
Veg/Prod. from Garden	None	
Milk/Meat from Pasture	1.9E-02	
TOTAL	2.0E-02	<1%

Notes:

Site: **MAINE YANKEE** LINCOLN COUNTY, ME

Location: N 43.9506° W 69.6961°

Population Data

Total Population Within 2-to-80-km Region: 6.5E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
Portland NECMA	240,000	56 km WSW
Lewiston-Auburn NECMA	110,000	45 km WNW
Augusta	21,000	41 km N
Biddeford	21,000	80 km SW
Waterville	17,000	67 km N

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 74% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 2.4E+08 kilogram Milk: 6.6E+07 liter Meat: 4.3E+06 kilogram

Regional Productivity Factor: 0.6 Animal Grazing Factor: 0.5

Site Boundary:	670 meter	ESE
Residence:	700 meter	SE
Garden:	900 meter	SSE
Pasture:	5,500 meter	NE

Site-Specific Data - Waterborne Pathways via ATLANTIC OCEAN

Average Effluent Flow from Site: 6.8E+11 L/y

Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	None	---	None
Fish	1.0E-03	RG	1.0E-01	RG
Shellfish	2.0E-03	RG	1.0E-01	RG
Shoreline	---	---	4.0E-02	RG

Notes:

Average individual fish consumption rates as given in Table A-1 used in lieu of catch data.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

MAINE YANKEE

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	4.5E-04	1.5E-03	1.3E-04	1.8E-03	1.1E-03
Teen	2.9E-04	3.2E-03	9.3E-05	1.0E-03	8.4E-04
Adult	1.9E-03	2.8E-02	6.3E-04	6.0E-03	4.9E-03
TOTAL	2.6E-03	3.3E-02	8.5E-04	8.8E-03	6.8E-03

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.2E-04	1.2E-04	1.2E-03	1.3E-04	1.4E-04	1.3E-04
Child	1.6E-03	1.5E-03	1.7E-02	1.9E-03	1.7E-03	1.7E-03
Teen	1.1E-03	1.1E-03	7.0E-03	1.1E-03	1.1E-03	1.2E-03
Adult	6.2E-03	6.2E-03	2.8E-02	5.8E-03	6.2E-03	6.6E-03
TOTAL	8.9E-03	8.9E-03	5.3E-02	8.9E-03	9.2E-03	9.6E-03

Production/Consumption factors:

Produce: 1.1 Milk: 0.46 Meat: 0.05

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	None	
Fish/Shellfish	1.1E-03	
Shoreline Recreation	9.5E-06	
TOTAL	1.1E-03	<1%

Ingestion Dose to Any Organ (ADULT GI-LLI)

Drinking Water	None	
Fish/Shellfish	1.8E-02	
TOTAL	1.8E-02	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	5.5E-03	<1%
Air Beta at SB (mrad)	1.7E-02	<1%
Total Body at Residence	5.2E-03	<1%

Iodine and Particulate Dose to Any Organ (CHILD THYROID)

Inhalation at Residence	4.3E-03	
Veg/Prod. from Garden	2.6E-02	
Milk/Meat from Pasture	5.5E-03	
TOTAL	3.6E-02	<1%

Notes:

Site: **McGUIRE** CORNELIUS, NC

Location: N 35.4322° W 80.9483°

Population Data

Total Population Within 2-to-80-km Region: 1.9E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Charlotte-Gastonia-Rock Hill MSA	1,200,000	25 km S
Kannapolis	30,000	30 km E
Salisbury	23,000	51 km ENE
Hickory	28,000	49 km NW

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 93% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 2.6E+07 kilogram Milk: 1.0E+08 liter Meat: 5.8E+07 kilogram

Regional Productivity Factor: 0.9 Animal Grazing Factor: 0.7

Site Boundary:	810 meter	NNE
Residence:	810 meter	ENE
Garden:	1,400 meter	SE
Pasture:	2,100 meter	ESE

Site-Specific Data - Waterborne Pathways via LAKE NORMAN ON CATAWBA RIVER

Average Effluent Flow from Site: 3.5E+12 L/y
Average River Flow at Site: 2.3E+12 L/y (2,604 cfs)
Drinking Water Population: 630,000

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	3.3E-01	RG	2.4E+00	RG
Fish	1.8E+00	1.3E+05	2.4E+00	RG
Shellfish	---	None	---	None
Shoreline	---	---	2.4E+00	RG

Notes:

Edible harvest of fish from downstream reservoirs derived from creel surveys obtained from James T. Thornton, Duke Power Company.

Mixing ratios greater than 1 account for low river flow in comparison to plant discharge; revised for population.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

McGUIRE

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	4.6E-02	4.7E-02	6.4E-02	1.3E-03	4.7E-02
Child	5.2E-01	5.6E-01	6.4E-01	3.8E-02	5.5E-01
Teen	2.1E-01	2.8E-01	2.4E-01	1.8E-02	2.2E-01
Adult	1.8E+00	2.4E+00	1.9E+00	1.0E-01	1.8E+00
TOTAL	2.6E+00	3.3E+00	2.9E+00	1.6E-01	2.6E+00

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	2.9E-03	2.9E-03	5.5E-03	2.0E-03	2.9E-03	3.1E-03
Child	3.7E-02	3.7E-02	5.4E-02	2.2E-02	3.8E-02	3.9E-02
Teen	2.7E-02	2.7E-02	3.4E-02	1.6E-02	2.7E-02	2.9E-02
Adult	1.6E-01	1.6E-01	1.9E-01	9.6E-02	1.6E-01	1.7E-01
TOTAL	2.3E-01	2.3E-01	2.8E-01	1.4E-01	2.3E-01	2.4E-01

Production/Consumption factors:

Produce: 0.063 Milk: 0.38 Meat: 0.35

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	2.3E-02	
Fish/Shellfish	1.3E-02	
Shoreline Recreation	6.7E-05	
TOTAL	3.7E-02	1%

Ingestion Dose to Any Organ (ADULT GI-LLI)

Drinking Water	2.6E-02	
Fish/Shellfish	7.6E-02	
TOTAL	1.0E-01	1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	1.6E-01	2%
Air Beta at SB (mrad)	2.3E-01	1%
Total Body at Residence	3.3E-02	<1%

Iodine and Particulate Dose to Any Organ (INFANT THYROID)

Inhalation at Residence	5.3E-03	
Veg/Prod. from Garden	None	
Milk/Meat from Pasture	2.2E-02	
TOTAL	2.7E-02	<1%

Notes:

mixing ratio for drinking water population based on letter from T.C. McMeekin, Duke Power, to US NRC 8/0

Site: **MILLSTONE** WATERFORD, CT

Location: N 41.3086° W 72.1681°

Population Data

Total Population Within 2-to-80-km Region: 2.7E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Hartfd-New Brit.-Middletn-Bristol NECMA	1,100,000	67 km NW
New Haven-Waterbury-Meriden NECMA	800,000	64 km W
New London-Norwich NECMA	250,000	8 km NNE
Providence-Pawtucket-Woonsocket NECMA	920,000	78 km NE

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-9 TO 31-DEC-9 95% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 3.2E+07 kilogram Milk: 4.4E+08 liter Meat: 2.0E+07 kilogram

Regional Productivity Factor: 0.6 Animal Grazing Factor: 0.6

Site Boundary:	570 meter	NNE
Residence:	1,800 meter	ESE
Garden:	2,100 meter	ESE
Pasture:	3,200 meter	ENE

Site-Specific Data - Waterborne Pathways via NIANTIC BAY

Average Effluent Flow from Site: 2.9E+12 L/y

Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	None	---	None
Fish	2.5E-02	1.2E+06	3.3E-01	RG
Shellfish	2.5E-02	8.9E+05	3.3E-01	RG
Shoreline	---	---	1.4E-01	RG

Notes:

Site-specific bioaccumulation factors for oysters used for silver and zinc.

Discharge recirculation factor of 1.025 used for all nuclides (RAB 4-3 1990, p.4).

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

MILLSTONE

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	6.2E-01	2.3E-01	6.5E-03	4.5E-01	1.0E+00
Teen	4.3E-01	4.9E-01	4.6E-03	3.0E-01	9.2E-01
Adult	2.6E+00	4.5E+00	3.0E-02	2.0E+00	5.7E+00
TOTAL	3.6E+00	5.2E+00	4.1E-02	2.7E+00	7.6E+00

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	2.3E-03	2.3E-03	2.0E-02	7.9E-04	2.5E-03	2.5E-03
Child	2.6E-02	2.5E-02	1.1E-01	8.6E-03	2.6E-02	2.7E-02
Teen	1.7E-02	1.7E-02	5.0E-02	6.0E-03	1.7E-02	1.8E-02
Adult	9.0E-02	9.0E-02	2.0E-01	3.6E-02	9.0E-02	9.2E-02
TOTAL	1.3E-01	1.3E-01	3.8E-01	5.0E-02	1.3E-01	1.4E-01

Production/Consumption factors:

Produce: 0.037 Milk: 0.75 Meat: 0.057

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	None	
Fish/Shellfish	8.2E-02	
Shoreline Recreation	7.9E-05	
TOTAL	8.2E-02	3%

Ingestion Dose to Any Organ (ADULT LIVER)

Drinking Water	None	
Fish/Shellfish	1.8E-01	
TOTAL	1.8E-01	2%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	4.8E-03	<1%
Air Beta at SB (mrad)	1.1E-02	<1%
Total Body at Residence	1.8E-03	<1%

Iodine and Particulate Dose to Any Organ (INFANT THYROID)

Inhalation at Residence	1.9E-03	
Veg/Prod. from Garden	None	
Milk/Meat from Pasture	3.1E-02	
TOTAL	3.3E-02	<1%

Notes:

Site: **MONTICELLO** MONTICELLO, MN

Location: N 45.3333° W 93.8483°

Population Data

Total Population Within 2-to-80-km Region: 2.4E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Minneapolis-St. Paul MSA	2,500,000	60 km SE
St. Cloud MSA	190,000	36 km NW
Bloomington	66,000	72 km SE
Edina	46,000	63 km SE
Richfield	36,000	67 km SE

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-91 TO 31-DEC-91 90% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 1.2E+08 kilogram Milk: 4.0E+08 liter Meat: 1.1E+08 kilogram

Regional Productivity Factor: 1.0 Animal Grazing Factor: 0.5

Site Boundary:	950 meter	ESE
Residence:	970 meter	SW
Garden:	1,100 meter	SSW
Pasture:	4,000 meter	ESE

Site-Specific Data - Waterborne Pathways --- None

Average Effluent Flow from Site: --- L/y

Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	None	---	None
Fish	---	None	---	None
Shellfish	---	None	---	None
Shoreline	---	---	---	None

Notes:

No waterborne pathways.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

MONTICELLO

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant					
Child					
Teen		(No Liquid Releases)			
Adult					
TOTAL					

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.7E-03	1.7E-03	5.0E-02	7.6E-04	1.9E-03	1.6E-03
Child	2.3E-02	2.3E-02	3.5E-01	8.7E-03	2.3E-02	2.3E-02
Teen	1.4E-02	1.4E-02	1.5E-01	5.3E-03	1.4E-02	1.5E-02
Adult	7.8E-02	7.8E-02	5.7E-01	2.9E-02	8.0E-02	7.9E-02
TOTAL	1.2E-01	1.2E-01	1.1E+00	4.4E-02	1.2E-01	1.2E-01

Production/Consumption factors:

Produce: 0.27 Milk: 1.3 Meat: 0.56

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	None	
Fish/Shellfish	None	
Shoreline Recreation	None	
TOTAL	None	

Ingestion Dose to Any Organ (ADULT LIVER)

Drinking Water	None	
Fish/Shellfish	None	
TOTAL	None	

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	1.8E-02	<1%
Air Beta at SB (mrad)	6.3E-03	<1%
Total Body at Residence	6.2E-03	<1%

Iodine and Particulate Dose to Any Organ (INFANT THYROID)

Inhalation at Residence	7.8E-03	
Veg/Prod. from Garden	None	
Milk/Meat from Pasture	1.6E-01	
TOTAL	1.7E-01	1%

Notes:

Site: **NINE MILE POINT** OSWEGO, NY

Location: N 43.5222° W 76.4100°

Population Data

Total Population Within 2-to-80-km Region: 8.7E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
Syracuse MSA	660,000	56 km SSE
Auburn	31,000	67 km NE
Watertown	29,000	64 km NE
Oswego	19,000	11 km SW

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 98% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 7.6E+07 kilogram Milk: 7.0E+08 liter Meat: 3.3E+07 kilogram

Regional Productivity Factor: 0.7 Animal Grazing Factor: 0.5

Site Boundary:	640 meter	ENE
Residence:	1,400 meter	SW
Garden:	1,900 meter	WSW
Pasture:	8,900 meter	ESE

Site-Specific Data - Waterborne Pathways via LAKE ONTARIO

Average Effluent Flow from Site: 4.9E+10 L/y

Drinking Water Population: 550,000

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	1.0E-02	RG	2.5E-02	RG
Fish	3.3E-03	7.3E+05	1.0E+00	RG
Shellfish	---	None	---	None
Shoreline	---	---	8.3E-02	RG

Notes:

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

NINE MILE POINT

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	2.7E-03	3.0E-03	7.7E-04	6.3E-03	3.1E-03
Child	4.8E-02	2.8E-02	8.7E-03	8.2E-02	5.3E-02
Teen	2.1E-02	2.7E-02	3.3E-03	2.8E-02	3.3E-02
Adult	1.4E-01	2.5E-01	2.8E-02	2.0E-01	2.2E-01
TOTAL	2.1E-01	3.1E-01	4.1E-02	3.2E-01	3.1E-01

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.8E-04	2.1E-04	1.4E-03	1.1E-04	2.3E-04	1.5E-04
Child	2.5E-03	2.1E-03	9.7E-03	2.0E-03	2.6E-03	2.1E-03
Teen	1.4E-03	1.4E-03	4.1E-03	9.9E-04	1.5E-03	1.4E-03
Adult	7.3E-03	7.7E-03	1.6E-02	4.9E-03	7.7E-03	7.2E-03
TOTAL	1.2E-02	1.2E-02	3.1E-02	8.0E-03	1.2E-02	1.1E-02

Production/Consumption factors:

Produce: 0.32 Milk: 4.3 Meat: 0.33

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	5.1E-04	
Fish/Shellfish	3.1E-01	
Shoreline Recreation	1.1E-04	
TOTAL	3.2E-01	11%

Ingestion Dose to Any Organ (ADULT LIVER)

Drinking Water	5.3E-04	
Fish/Shellfish	6.9E-01	
TOTAL	6.9E-01	7%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	6.8E-04	<1%
Air Beta at SB (mrad)	1.7E-04	<1%
Total Body at Residence	1.4E-04	<1%

Iodine and Particulate Dose to Any Organ (INFANT THYROID)

Inhalation at Residence	3.2E-05	
Veg/Prod. from Garden	None	
Milk/Meat from Pasture	1.7E-03	
TOTAL	1.7E-03	<1%

Notes:

Site: **NORTH ANNA** LOUISA COUNTY, VA

Location: N 38.0608° W 77.7906°

Population Data

Total Population Within 2-to-80-km Region: 1.2E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Richmond-Petersburg MSA	870,000	66 km SSE
Charlottesville MSA	130,000	63 km W
Fredericksburg	19,000	40 km NE
Culpeper	8,600	54 km NNW
Ashland	5,900	41 km SE

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 100% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 3.5E+07 kilogram Milk: 1.5E+08 liter Meat: 7.4E+07 kilogram

Regional Productivity Factor: 0.9 Animal Grazing Factor: 0.7

Site Boundary:	1,400 meter	SE
Residence:	2,200 meter	SE
Garden:	1,500 meter	SSE
Pasture:	9,000 meter	SSW

Site-Specific Data - Waterborne Pathways via LAKE ANNA

Average Effluent Flow from Site: 2.5E+12 L/y

Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	None	6.8E-01	RG
Fish	1.0E-03	7.3E+00	1.0E+00	RG
Shellfish	---	None	---	None
Shoreline	---	---	1.0E+00	RG

Notes:

Average individual fish consumption rate as given in FES, 1973, used in lieu of catch data.
Discharge recirculation factor of 16 used for Cs-137 and 10 for Cs-134 (ODCM Rev 2, p.53)

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

NORTH ANNA

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	7.1E-03	2.7E-03	8.7E-04	3.8E-02	4.1E-02
Teen	1.3E-02	5.1E-03	7.0E-04	2.3E-02	3.4E-02
Adult	1.4E-01	4.4E-02	5.2E-03	1.3E-01	2.0E-01
TOTAL	1.6E-01	5.2E-02	6.7E-03	1.9E-01	2.8E-01

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.9E-03	1.9E-03	2.3E-02	9.8E-04	1.9E-03	2.0E-03
Child	2.4E-02	2.4E-02	1.4E-01	1.1E-02	2.4E-02	2.4E-02
Teen	1.6E-02	1.6E-02	6.7E-02	7.6E-03	1.6E-02	1.7E-02
Adult	9.1E-02	9.1E-02	2.7E-01	4.5E-02	9.1E-02	9.4E-02
TOTAL	1.3E-01	1.3E-01	5.0E-01	6.4E-02	1.3E-01	1.4E-01

Production/Consumption factors:

Produce: 0.13 Milk: 0.85 Meat: 0.68

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	1.5E-01	
Fish/Shellfish	2.5E-01	
Shoreline Recreation	4.5E-04	
TOTAL	4.0E-01	13%

Ingestion Dose to Any Organ (CHILD LIVER)

Drinking Water	2.0E-01	
Fish/Shellfish	3.3E-01	
TOTAL	5.3E-01	5%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	2.3E-02	<1%
Air Beta at SB (mrad)	4.7E-02	<1%
Total Body at Residence	6.6E-03	<1%

Iodine and Particulate Dose to Any Organ (CHILD LUNG)

Inhalation at Residence	1.1E-02	
Veg/Prod. from Garden	3.4E-02	
Milk/Meat from Pasture	6.7E-03	
TOTAL	5.2E-02	<1%

Notes:

Site: **OCONEE** OCONEE COUNTY, SC

Location: N 34.7917° W 82.8986°

Population Data

Total Population Within 2-to-80-km Region: 1.0E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Greenville-Spartenburg MSA	640,000	46 km E
Anderson	26,000	39 km SE
Easley	15,000	27 km E
Greer	10,000	64 km ENE

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 97% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 7.5E+06 kilogram Milk: 5.7E+07 liter Meat: 5.0E+07 kilogram

Regional Productivity Factor: 1.0 Animal Grazing Factor: 0.7

Site Boundary:	5,600 meter	S
Residence:	5,600 meter	S
Garden:	1,600 meter	S
Pasture:	4,000 meter	NNE

Site-Specific Data - Waterborne Pathways via HARTWELL RESERVOIR ON KEOWEE R

Average Effluent Flow from Site: 1.2E+12 L/y
Average River Flow at Site: 9.8E+11 L/y (1,100 cfs)
Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	RG	---	None
Fish	1.3E+00	RG	1.0E+00	RG
Shellfish	---	None	---	None
Shoreline	---	---	1.0E+00	RG

Notes:

Average individual fish consumption rates as given in Table A-1 used in lieu of catch data. Ten percent of population assumed to obtain 10% of fish harvested from Hartwell Reservoir according to FES, 1972.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

OCONEE

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	3.3E-02	7.2E-02	5.9E-03	1.6E-01	1.8E-01
Teen	6.2E-02	1.5E-01	4.4E-03	9.8E-02	1.6E-01
Adult	6.7E-01	1.3E+00	3.0E-02	5.7E-01	9.3E-01
TOTAL	7.7E-01	1.5E+00	4.0E-02	8.3E-01	1.3E+00

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	2.4E-03	2.4E-03	8.3E-03	2.2E-03	2.4E-03	2.5E-03
Child	2.8E-02	2.8E-02	6.2E-02	2.5E-02	2.8E-02	2.9E-02
Teen	2.0E-02	2.0E-02	3.5E-02	1.8E-02	2.0E-02	2.2E-02
Adult	1.2E-01	1.2E-01	1.7E-01	1.1E-01	1.2E-01	1.3E-01
TOTAL	1.7E-01	1.7E-01	2.8E-01	1.5E-01	1.7E-01	1.8E-01

Production/Consumption factors:

Produce: 0.037 Milk: 0.43 Meat: 0.61

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	None	
Fish/Shellfish	7.4E-02	
Shoreline Recreation	1.5E-04	
TOTAL	7.4E-02	2%

Ingestion Dose to Any Organ (ADULT GI-LLI)

Drinking Water	None	
Fish/Shellfish	1.6E-01	
TOTAL	1.6E-01	2%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	1.7E-03	<1%
Air Beta at SB (mrad)	2.8E-03	<1%
Total Body at Residence	9.8E-04	<1%

Iodine and Particulate Dose to Any Organ (INFANT THYROID)

Inhalation at Residence	1.7E-04	
Veg/Prod. from Garden	None	
Milk/Meat from Pasture	3.7E-02	
TOTAL	3.7E-02	<1%

Notes:

Site: **OYSTER CREEK** OYSTER CREEK, NJ

Location: N 38.8142° W 74.2064°

Population Data

Total Population Within 2-to-80-km Region: 3.7E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
New Brunswick-Sayreville PMSA	630,000	77 km N
Long Branch-Asbury Park PMSA	510,000	57 km NNE
Trenton PMSA	320,000	66 km SSW
Atlantic City MSA	320,000	55 km SSW
Camden	87,000	79 km W

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 100% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 7.4E+07 kilogram Milk: 2.7E+08 liter Meat: 2.4E+07 kilogram

Regional Productivity Factor: 0.5 Animal Grazing Factor: 0.6

Site Boundary:	510 meter	E
Residence:	970 meter	NNE
Garden:	510 meter	SE
Pasture:	8,000 meter	N

Site-Specific Data - Waterborne Pathways via BARNEGAT BAY

Average Effluent Flow from Site: 0. L/y

Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	None	---	None
Fish	---	None	---	None
Shellfish	---	None	---	None
Shoreline	---	---	---	RG

Notes:

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

OYSTER CREEK

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant					
Child					
Teen		(No Liquid Releases)			
Adult					
TOTAL					

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	8.3E-04	8.0E-04	2.6E-02	8.9E-04	8.7E-04	8.6E-04
Child	9.3E-03	9.1E-03	1.6E-01	1.0E-02	9.4E-03	1.0E-02
Teen	6.7E-03	6.8E-03	6.7E-02	6.8E-03	6.8E-03	7.6E-03
Adult	4.0E-02	4.0E-02	2.5E-01	3.9E-02	4.0E-02	4.3E-02
TOTAL	5.6E-02	5.8E-02	5.0E-01	5.8E-02	5.7E-02	6.1E-02

Production/Consumption factors:

Produce: 0.051 Milk: 0.28 Meat: 0.041

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	None	
Fish/Shellfish	None	
Shoreline Recreation	None	
TOTAL	None	<1%

Ingestion Dose to Any Organ (ADULT GI-LLI)

Drinking Water	None	
Fish/Shellfish	None	
TOTAL	None	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	5.1E-03	<1%
Air Beta at SB (mrad)	3.4E-04	<1%
Total Body at Residence	1.6E-03	<1%

Iodine and Particulate Dose to Any Organ (CHILD THYROID)

Inhalation at Residence	3.2E-04	
Veg/Prod. from Garden	2.2E-02	
Milk/Meat from Pasture	8.8E-03	
TOTAL	3.1E-02	<1%

Notes:

No milk cows animals reported to be within 5 miles so default cow pasture set at 5 miles.

Site: **PALISADES** COVERT TOWNSHIP, MI

Location: N 42.3222° W 86.3153°

Population Data

Total Population Within 2-to-80-km Region: 1.1E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Kalamazoo MSA	220,000	61 km E
Elkhart-Goshen MSA	160,000	76 km SSE
Holland	31,000	53 km NNE
Benton Harbor MSA	160,000	25 km SSW

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 100% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 6.8E+07 kilogram Milk: 2.9E+08 liter Meat: 4.5E+07 kilogram

Regional Productivity Factor: 0.6 Animal Grazing Factor: 0.5

Site Boundary:	770 meter	SSE
Residence:	810 meter	S
Garden:	810 meter	S
Pasture:	5,000 meter	ESE

Site-Specific Data - Waterborne Pathways via LAKE MICHIGAN

Average Effluent Flow from Site: 1.2E+11 L/y

Drinking Water Population: 51,000

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	3.5E-03	RG	1.0E-03	RG
Fish	1.0E-03	7.3E+00	6.7E-02	RG
Shellfish	---	None	---	None
Shoreline	---	---	6.7E-02	RG

Notes:

Population-weighted mixing ratio used for population drinking water.

Average individual fish consumption rate of 20 g/d as given in FES, 1974, used in lieu of catch data.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

PALISADES

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	9.1E-05	9.1E-05	9.1E-05	1.7E-06	9.3E-05
Child	1.3E-03	1.1E-03	1.1E-03	1.5E-03	2.5E-03
Teen	8.5E-04	4.6E-04	4.3E-04	8.7E-04	1.6E-03
Adult	8.2E-03	3.9E-03	3.7E-03	5.0E-03	1.1E-02
TOTAL	1.0E-02	5.5E-03	5.2E-03	7.4E-03	1.5E-02

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	7.6E-05	7.4E-05	9.3E-04	3.3E-05	7.8E-05	7.7E-05
Child	9.4E-04	9.3E-04	5.9E-03	3.9E-04	9.4E-04	9.6E-04
Teen	6.0E-04	5.9E-04	2.5E-03	2.6E-04	6.0E-04	6.3E-04
Adult	3.3E-03	3.2E-03	9.2E-03	1.5E-03	3.3E-03	3.4E-03
TOTAL	4.9E-03	4.8E-03	1.9E-02	2.2E-03	4.9E-03	5.0E-03

Production/Consumption factors:

Produce: 0.19 Milk: 1.2 Meat: 0.31

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	5.1E-05	
Fish/Shellfish	1.3E-03	
Shoreline Recreation	8.9E-07	
TOTAL	1.3E-03	<1%

Ingestion Dose to Any Organ (TEEN LIVER)

Drinking Water	3.6E-05	
Fish/Shellfish	1.9E-03	
TOTAL	2.0E-03	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	1.9E-03	<1%
Air Beta at SB (mrad)	6.0E-03	<1%
Total Body at Residence	7.7E-04	<1%

Iodine and Particulate Dose to Any Organ (CHILD THYROID)

Inhalation at Residence	9.4E-04	
Veg/Prod. from Garden	6.9E-03	
Milk/Meat from Pasture	1.6E-03	
TOTAL	9.4E-03	<1%

Notes:

Site: **PALO VERDE** WINTERSBURG, AZ

Location: N 33.4200° W112.8683°

Population Data

Total Population Within 2-to-80-km Region: 1.3E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Phoenix MSA	2,100,000	64 km E
Avondale	16,200	49 km E

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 100% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 1.2E+07 kilogram Milk: 2.3E+07 liter Meat: 2.1E+07 kilogram

Regional Productivity Factor: 0.9 Animal Grazing Factor: 0.1

Site Boundary:	2,400 meter	S
Residence:	7,500 meter	SSW
Garden:	4,300 meter	ENE
Pasture:	8,000 meter	ENE

Site-Specific Data - Waterborne Pathways via NONE

Average Effluent Flow from Site: 0. L/y

Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	None	---	None
Fish	---	None	---	None
Shellfish	---	None	---	None
Shoreline	---	---	---	RG

Notes:

Milk cows fed from dry lot 90% of time according to FES, 1975.

No waterborne pathways.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

PALO VERDE

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant					
Child					
Teen		(No Liquid Releases)			
Adult					
TOTAL					

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	6.5E-03	6.5E-03	7.6E-03	1.7E-03	6.5E-03	6.6E-03
Child	1.1E-01	1.1E-01	1.2E-01	1.9E-02	1.1E-01	1.1E-01
Teen	7.7E-02	7.8E-02	8.5E-02	1.4E-02	7.7E-02	8.0E-02
Adult	4.6E-01	4.6E-01	4.9E-01	8.5E-02	4.6E-01	4.6E-01
TOTAL	6.5E-01	6.5E-01	7.1E-01	1.2E-01	6.5E-01	6.6E-01

Production/Consumption factors:

Produce: 0.04 Milk: 0.12 Meat: 0.18

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	None	
Fish/Shellfish	None	
Shoreline Recreation	None	
TOTAL	None	<1%

Ingestion Dose to Any Organ (TEEN LIVER)

Drinking Water	None	
Fish/Shellfish	None	
TOTAL	None	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	2.2E-02	<1%
Air Beta at SB (mrad)	6.2E-02	<1%
Total Body at Residence	1.5E-03	<1%

Iodine and Particulate Dose to Any Organ (CHILD THYROID)

Inhalation at Residence	3.3E-03	
Veg/Prod. from Garden	1.4E-02	
Milk/Meat from Pasture	3.0E-03	
TOTAL	2.1E-02	<1%

Notes:

Site: **PEACH BOTTOM** YORK COUNTY, PA

Location: N 39.7589° W 76.2692°

Population Data

Total Population Within 2-to-80-km Region: 4.3E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Baltimore MSA	2,400,000	60 km SSW
Harrisburg-Lebanon-Carlisle MSA	590,000	77 km NNW
Wilmington MSA	580,000	62 km E
Lancaster MSA	420,000	31 km N
York MSA	420,000	45 km NW

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 90% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 5.3E+07 kilogram Milk: 5.3E+08 liter Meat: 5.4E+07 kilogram

Regional Productivity Factor: 0.95 Animal Grazing Factor: 0.6

Site Boundary:	1,100 meter	SSE
Residence:	1,100 meter	SSE
Garden:	1,100 meter	SSE
Pasture:	2,100 meter	SSW

Site-Specific Data - Waterborne Pathways via SUSQUEHANNA RIVER

Average Effluent Flow from Site: 8.5E+10 L/y
Average River Flow at Site: 3.2E+13 L/y (36,000 cfs)
Drinking Water Population: 2,200,000

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	2.6E-03	RG	1.1E-01	RG
Fish	2.6E-03	RG	5.6E-01	RG
Shellfish	---	None	---	None
Shoreline	---	---	1.8E-01	RG

Notes:

Average individual fish consumption rates as given in Table A-1 used in lieu of catch data.
Ten percent of population assumed to obtain 10% of fish from downstream waters according to FES, 1973.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

PEACH BOTTOM

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	3.3E-03	1.1E-03	9.7E-04	9.3E-03	9.9E-04
Child	4.7E-02	1.3E-02	1.1E-02	1.4E-01	1.1E-02
Teen	1.7E-02	5.8E-03	4.0E-03	5.1E-02	4.2E-03
Adult	1.3E-01	4.9E-02	3.4E-02	4.0E-01	3.5E-02
TOTAL	2.0E-01	6.9E-02	5.0E-02	6.0E-01	5.2E-02

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	5.9E-03	5.9E-03	6.9E-02	5.5E-03	6.1E-03	6.1E-03
Child	6.7E-02	6.5E-02	3.9E-01	6.0E-02	6.7E-02	6.9E-02
Teen	4.8E-02	4.7E-02	1.7E-01	4.3E-02	4.8E-02	5.1E-02
Adult	2.8E-01	2.8E-01	6.7E-01	2.6E-01	2.8E-01	2.9E-01
TOTAL	4.0E-01	4.0E-01	1.3E+00	3.6E-01	4.0E-01	4.2E-01

Production/Consumption factors:

Produce: 0.06 Milk: 0.88 Meat: 0.15

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	3.4E-03	
Fish/Shellfish	1.7E-02	
Shoreline Recreation	3.8E-06	
TOTAL	2.0E-02	<1%

Ingestion Dose to Any Organ (ADULT BONE)

Drinking Water	1.0E-02	
Fish/Shellfish	5.0E-02	
TOTAL	6.0E-02	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	6.2E-03	<1%
Air Beta at SB (mrad)	1.0E-03	<1%
Total Body at Residence	4.2E-03	<1%

Iodine and Particulate Dose to Any Organ (INFANT THYROID)

Inhalation at Residence	1.3E-03	
Veg/Prod. from Garden	None	
Milk/Meat from Pasture	5.2E-02	
TOTAL	5.3E-02	<1%

Notes:

Site: **PERRY** NORTH PERRY, OH

Location: N 41.8008° W 81.1433°

Population Data

Total Population Within 2-to-80-km Region: 2.4E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Cleveland PMSA	1,800,000	53 km SW
Akron PMSA	660,000	80 km SSW
Warren	51,000	70 km SE
Ashtabula	22,000	35 km NE
Painesville	16,000	11 km SW

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 99% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 6.9E+07 kilogram Milk: 3.7E+06 liter Meat: 1.2E+08 kilogram

Regional Productivity Factor: 0.45 Animal Grazing Factor: 0.5

Site Boundary:	640 meter	NE
Residence:	1,100 meter	WSW
Garden:	1,100 meter	WSW
Pasture:	1,800 meter	ESE

Site-Specific Data - Waterborne Pathways via LAKE ERIE

Average Effluent Flow from Site: 6.0E+10 L/y

Drinking Water Population: 1,700,000

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	3.2E-03	RG	3.1E-02	RG
Fish	1.3E-02	RG	9.2E-02	RG
Shellfish	---	None	---	None
Shoreline	---	---	6.9E-02	RG

Notes:

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

PERRY

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	8.5E-04	9.2E-04	2.8E-03	9.8E-04	9.7E-04
Child	1.1E-01	4.3E-02	2.9E-02	1.5E-01	2.4E-01
Teen	9.7E-02	7.8E-02	1.2E-02	9.3E-02	2.1E-01
Adult	7.4E-01	7.1E-01	8.7E-02	5.7E-01	1.3E+00
TOTAL	9.5E-01	8.3E-01	1.3E-01	8.2E-01	1.8E+00

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	6.9E-04	6.8E-04	1.9E-02	7.2E-04	7.3E-04	7.0E-04
Child	8.1E-03	7.6E-03	3.7E-01	8.8E-03	8.6E-03	7.8E-03
Teen	5.8E-03	5.6E-03	1.9E-01	6.0E-03	6.1E-03	5.9E-03
Adult	3.4E-02	3.4E-02	9.2E-01	3.5E-02	3.6E-02	3.5E-02
TOTAL	4.9E-02	4.8E-02	1.5E+00	5.1E-02	5.1E-02	4.9E-02

Production/Consumption factors:

Produce: 0.066 Milk: 0.005 Meat: 0.27

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	4.6E-04	
Fish/Shellfish	9.1E-03	
Shoreline Recreation	3.4E-05	
TOTAL	9.6E-03	<1%

Ingestion Dose to Any Organ (ADULT LIVER)

Drinking Water	4.9E-04	
Fish/Shellfish	1.6E-02	
TOTAL	1.7E-02	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	1.1E-01	1%
Air Beta at SB (mrad)	9.1E-02	<1%
Total Body at Residence	3.1E-02	<1%

Iodine and Particulate Dose to Any Organ (INFANT THYROID)

Inhalation at Residence	2.5E-01	
Veg/Prod. from Garden	None	
Milk/Meat from Pasture	5.0E+00	
TOTAL	5.3E+00	35%

Notes:

Site: **PILGRIM** PLYMOUTH, MA

Location: N 41.9444° W 70.5794°

Population Data

Total Population Within 2-to-80-km Region: 4.5E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Bos-Lawrence-Salem-Lowell-Brcktn NECMA	3,800,000	61 km NW
Providence-Pawtucket-Woonsocket NECMA	920,000	70 km W
New Bedford-Fall River-Attleboro NECMA	510,000	45 km SSW

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 91% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 2.0E+07 kilogram Milk: 2.6E+08 liter Meat: 1.6E+07 kilogram

Regional Productivity Factor: 0.3 Animal Grazing Factor: 0.6

Site Boundary:	360 meter	ESE
Residence:	800 meter	ESE
Garden:	820 meter	SE
Pasture:	4,000 meter	WSW

Site-Specific Data - Waterborne Pathways via CAPE COD BAY

Average Effluent Flow from Site: 2.6E+09 L/y

Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	None	---	None
Fish	1.0E-03	2.6E+04	2.0E-01	RG
Shellfish	2.0E-03	3.1E+04	2.0E-01	RG
Shoreline	---	---	1.0E+00	RG

Notes:

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

PILGRIM

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	7.1E-05	9.8E-05	2.1E-06	1.5E-04	9.3E-05
Teen	4.8E-05	2.0E-04	1.5E-06	8.4E-05	7.2E-05
Adult	3.0E-04	1.7E-03	9.7E-06	5.1E-04	4.3E-04
TOTAL	4.2E-04	2.0E-03	1.3E-05	7.4E-04	5.9E-04

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.9E-03	1.9E-03	2.4E-02	1.7E-03	1.9E-03	2.0E-03
Child	2.2E-02	2.2E-02	1.6E-01	1.9E-02	2.2E-02	2.3E-02
Teen	1.6E-02	1.6E-02	8.2E-02	1.3E-02	1.6E-02	1.7E-02
Adult	9.3E-02	9.4E-02	3.5E-01	7.6E-02	9.3E-02	9.9E-02
TOTAL	1.3E-01	1.3E-01	6.2E-01	1.1E-01	1.3E-01	1.4E-01

Production/Consumption factors:

Produce: 0.007 Milk: 0.13 Meat: 0.014

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	None	
Fish/Shellfish	1.0E-02	
Shoreline Recreation	1.9E-03	
TOTAL	1.2E-02	<1%

Ingestion Dose to Any Organ (ADULT GI-LLI)

Drinking Water	None	
Fish/Shellfish	5.1E-02	
TOTAL	5.1E-02	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	1.5E-01	2%
Air Beta at SB (mrad)	1.5E-01	<1%
Total Body at Residence	3.3E-02	<1%

Iodine and Particulate Dose to Any Organ (INFANT THYROID)

Inhalation at Residence	4.6E-02	
Veg/Prod. from Garden	1.1E-01	
Milk/Meat from Pasture	9.6E-02	
TOTAL	2.5E-01	2%

Notes:

Site: **POINT BEACH** MANITOWOC CNTY, WI

Location: N 44.2808° W 87.5361°

Population Data

Total Population Within 2-to-80-km Region: 6.5E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
Greenbay	96,000	47 km NW
Appleton-Oshkosh-Neenah MSA	320,000	72 km W
Sheboygan	50,000	60 km SSW
Manitowoc	33,000	24 km SSW

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 100% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 7.2E+07 kilogram Milk: 1.2E+09 liter Meat: 1.0E+08 kilogram

Regional Productivity Factor: 0.5 Animal Grazing Factor: 0.5

Site Boundary:	1,300 meter	S
Residence:	1,300 meter	WNW
Garden:	1,300 meter	WNW
Pasture:	1,300 meter	S

Site-Specific Data - Waterborne Pathways via LAKE MICHIGAN

Average Effluent Flow from Site: 6.1E+11 L/y

Drinking Water Population: 260,000

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	2.6E-03	RG	1.0E-02	RG
Fish	1.3E-02	6.7E+04	2.0E-01	RG
Shellfish	---	None	---	None
Shoreline	---	---	2.0E-01	RG

Notes:

Population-weighted mixing ratio used for population drinking water.

Edible fish harvest for population includes both commercial and sport.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

POINT BEACH

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	4.0E-04	3.8E-04	1.3E-03	2.5E-04	6.9E-04
Child	6.6E-03	4.3E-03	1.0E-02	1.1E-02	1.7E-02
Teen	5.6E-03	1.8E-03	3.4E-03	5.7E-03	1.1E-02
Adult	5.7E-02	1.5E-02	2.6E-02	3.4E-02	7.2E-02
TOTAL	6.9E-02	2.2E-02	4.1E-02	5.1E-02	1.0E-01

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	2.3E-04	2.1E-04	8.3E-04	2.1E-04	4.8E-04	2.4E-04
Child	3.6E-03	3.2E-03	7.2E-03	2.0E-03	5.4E-03	3.4E-03
Teen	2.3E-03	1.9E-03	3.5E-03	7.1E-04	2.9E-03	2.1E-03
Adult	1.3E-02	1.1E-02	1.6E-02	2.6E-03	1.4E-02	1.1E-02
TOTAL	1.9E-02	1.6E-02	2.7E-02	5.5E-03	2.2E-02	1.7E-02

Production/Consumption factors:

Produce: 0.28 Milk: 6.8 Meat: 0.98

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	3.6E-04	
Fish/Shellfish	1.1E-01	
Shoreline Recreation	2.2E-05	
TOTAL	1.1E-01	4%

Ingestion Dose to Any Organ (TEEN LIVER)

Drinking Water	3.1E-04	
Fish/Shellfish	1.5E-01	
TOTAL	1.5E-01	2%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	2.2E-04	<1%
Air Beta at SB (mrad)	3.4E-04	<1%
Total Body at Residence	4.8E-05	<1%

Iodine and Particulate Dose to Any Organ (INFANT THYROID)

Inhalation at Residence	1.8E-04	
Veg/Prod. from Garden	None	
Milk/Meat from Pasture	2.6E-02	
TOTAL	2.6E-02	<1%

Notes:

Site: **PRAIRIE ISLAND** RED WING, MN

Location: N 44.6219° W 92.6331°

Population Data

Total Population Within 2-to-80-km Region: 2.4E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Minneapolis-St. Paul MSA	2,200,000	63 km NW
Rochester MSA	98,000	68 km SSE
Owatonna	19,000	77 km SW
Faribault	16,000	63 km SW
Red Wing	14,000	10 km SE

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-91 TO 31-DEC-91 100% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 1.2E+08 kilogram Milk: 4.0E+08 liter Meat: 1.1E+08 kilogram

Regional Productivity Factor: 1.0 Animal Grazing Factor: 0.5

Site Boundary:	580 meter	WNW
Residence:	970 meter	WNW
Garden:	970 meter	SSE
Pasture:	3,700 meter	S

Site-Specific Data - Waterborne Pathways via MISSISSIPPI RIVER

Average Effluent Flow from Site: 6.0E+11 L/y
Average River Flow at Site: 1.3E+13 L/y (15,000 cfs)
Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	4.5E-02	None	---	None
Fish	4.5E-02	6.8E+05	3.0E-01	RG
Shellfish	---	None	---	None
Shoreline	---	---	3.0E-01	RG

Notes:

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

PRAIRIE ISLAND

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	1.1E-03	1.6E-03	7.1E-04	3.0E-03	3.2E-03
Teen	1.2E-03	2.9E-03	5.6E-04	1.7E-03	2.7E-03
Adult	1.1E-02	2.5E-02	4.0E-03	1.0E-02	1.6E-02
TOTAL	1.4E-02	3.0E-02	5.3E-03	1.5E-02	2.2E-02

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	3.3E-03	3.3E-03	3.8E-03	1.1E-04	3.3E-03	3.3E-03
Child	4.8E-02	4.8E-02	5.2E-02	1.3E-03	4.9E-02	4.9E-02
Teen	3.0E-02	3.0E-02	3.1E-02	8.9E-04	3.0E-02	3.0E-02
Adult	1.6E-01	1.6E-01	1.6E-01	5.2E-03	1.6E-01	1.6E-01
TOTAL	2.4E-01	2.4E-01	2.5E-01	7.5E-03	2.4E-01	2.4E-01

Production/Consumption factors:

Produce: 0.26 Milk: 1.3 Meat: 0.55

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	None	
Fish/Shellfish	1.4E-03	
Shoreline Recreation	2.9E-05	
TOTAL	1.4E-03	<1%

Ingestion Dose to Any Organ (ADULT GI-LLI)

Drinking Water	None	
Fish/Shellfish	3.4E-03	
TOTAL	3.4E-03	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	2.8E-03	<1%
Air Beta at SB (mrad)	8.8E-03	<1%
Total Body at Residence	7.1E-04	<1%

Iodine and Particulate Dose to Any Organ (CHILD THYROID)

Inhalation at Residence	7.0E-03	
Veg/Prod. from Garden	1.4E-02	
Milk/Meat from Pasture	7.3E-04	
TOTAL	2.2E-02	<1%

Notes:

Site: **QUAD CITIES** ROCK ISLAND, IL

Location: N 41.7261° W 90.3100°

Population Data

Total Population Within 2-to-80-km Region: 7.3E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
Davenport-Rock Island-Moline MSA	350,000	30 km SW
Muscatine	23,000	70 km WSW
Sterling	15,000	52 km E
Dixon	15,000	70 km E
Kewanee	13,000	62 km SSE

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 100% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 1.1E+08 kilogram Milk: 1.8E+08 liter Meat: 1.9E+08 kilogram

Regional Productivity Factor: 1.0 Animal Grazing Factor: 0.5

Site Boundary:	710 meter	W
Residence:	970 meter	N
Garden:	970 meter	N
Pasture:	2,400 meter	S

Site-Specific Data - Waterborne Pathways via MISSISSIPPI RIVER

Average Effluent Flow from Site: 1.3E+12 L/y
Average River Flow at Site: 4.2E+13 L/y (47,000 cfs)
Drinking Water Population: 350,000

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	3.1E-02	RG	3.1E-02	RG
Fish	3.1E-02	2.1E+06	3.8E-01	RG
Shellfish	---	None	---	None
Shoreline	---	---	3.8E-01	RG

Notes:

Total population of Davenport-Rock Island-Moline MSA assumed to drink river water.
Fifty percent of fish harvest caught in downstream waters.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

QUAD CITIES

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	1.0E-04	9.2E-05	8.0E-05	1.4E-04	1.8E-04
Child	2.3E-03	1.2E-03	9.0E-04	8.6E-03	8.5E-03
Teen	2.5E-03	8.1E-04	3.5E-04	4.6E-03	6.2E-03
Adult	2.6E-02	7.1E-03	3.0E-03	2.7E-02	3.8E-02
TOTAL	3.1E-02	9.3E-03	4.3E-03	4.0E-02	5.3E-02

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	3.8E-04	3.8E-04	8.8E-04	3.1E-04	4.5E-04	5.1E-04
Child	6.2E-03	6.5E-03	1.0E-02	4.5E-03	6.6E-03	8.0E-03
Teen	4.0E-03	4.8E-03	5.4E-03	2.5E-03	4.1E-03	5.8E-03
Adult	2.3E-02	2.8E-02	2.6E-02	1.3E-02	2.3E-02	3.0E-02
TOTAL	3.2E-02	4.0E-02	4.3E-02	2.1E-02	3.3E-02	4.5E-02

Production/Consumption factors:

Produce: 0.79 Milk: 1.8 Meat: 3.2

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	1.8E-05	
Fish/Shellfish	3.2E-03	
Shoreline Recreation	2.7E-06	
TOTAL	3.2E-03	<1%

Ingestion Dose to Any Organ (TEEN LIVER)

Drinking Water	1.5E-05	
Fish/Shellfish	5.0E-03	
TOTAL	5.0E-03	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	4.3E-04	<1%
Air Beta at SB (mrad)	3.0E-05	<1%
Total Body at Residence	2.4E-04	<1%

Iodine and Particulate Dose to Any Organ (TEEN GI-LLI)

Inhalation at Residence	1.1E-04	
Veg/Prod. from Garden	2.1E-03	
Milk/Meat from Pasture	2.1E-03	
TOTAL	4.3E-03	<1%

Notes:

Site: **RANCHO SECO** SACRAMENTO CNTY, CA

Location: N 38.3444° W121.1200°

Population Data

Total Population Within 2-to-80-km Region: 1.8E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Sacramento MSA	1,500,000	42 km NW
Stockton MSA	480,000	45 km SSW
Modesto MSA	370,000	79 km S
Antioch	62,000	71 km WSW
Davis	46,000	58 km WNW

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-90 TO 31-DEC-90 93% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 4.8E+07 kilogram Milk: 2.3E+08 liter Meat: 5.0E+07 kilogram

Regional Productivity Factor: 1.0 Animal Grazing Factor: 0.9

Site Boundary:	640 meter	N
Residence:	1,300 meter	ENE
Garden:	800 meter	N
Pasture:	970 meter	WSW

Site-Specific Data - Waterborne Pathways via COSUMNES AND MOKELUMNE RIVERS

Average Effluent Flow from Site: 1.8E+10 L/y

Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Irrigated Foods	---	None	1.0E+00	RG
Fish	4.8E-03	7.3E+00	1.0E+00	RG
Shellfish	---	None	1.0E+00	RG
Shoreline	---	---	1.0E+00	RG

Notes:

One percent of population assumed to obtain fish from river.
Average individual fish consumption rate of 7.3 kg/y as given in FES, 1973 used in lieu of catch data.
Irrigated food products pathway used in lieu of drinking water for individual.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

RANCHO SECO

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	8.0E-05	1.0E-05	7.2E-06	4.8E-04	4.8E-04
Teen	1.5E-04	1.2E-05	6.5E-06	2.9E-04	4.0E-04
Adult	1.6E-03	9.7E-05	5.1E-05	1.6E-03	2.4E-03
TOTAL	1.8E-03	1.2E-04	6.5E-05	2.4E-03	3.3E-03

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	4.7E-04	4.7E-04	4.7E-04	7.4E-09	4.7E-04	4.7E-04
Child	6.4E-03	6.4E-03	6.4E-03	8.3E-08	6.4E-03	6.4E-03
Teen	4.1E-03	4.1E-03	4.1E-03	6.0E-08	4.1E-03	4.1E-03
Adult	2.2E-02	2.2E-02	2.2E-02	3.7E-07	2.2E-02	2.2E-02
TOTAL	3.3E-02	3.3E-02	3.3E-02	5.2E-07	3.3E-02	3.3E-02

Production/Consumption factors:

Produce: 0.14 Milk: 1.0 Meat: 0.35

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Irrigated Foods	1.6E-01	
Fish/Shellfish	9.1E-02	
Shoreline Recreation	3.9E-06	
TOTAL	2.5E-01	8%

Ingestion Dose to Any Organ (CHILD LIVER)

Irrigated Foods	3.4E-01	
Fish/Shellfish	1.3E-01	
TOTAL	4.7E-01	5%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	1.5E-07	<1%
Air Beta at SB (mrad)	1.7E-05	<1%
Total Body at Residence	4.5E-08	<1%

Iodine and Particulate Dose to Any Organ (CHILD LUNG)

Inhalation at Residence	1.2E-03	
Veg/Prod. from Garden	6.4E-03	
Milk/Meat from Pasture	3.0E-03	
TOTAL	1.1E-02	<1%

Notes:

Site: **RIVER BEND** ST. FRANCISVILLE, L

Location: N 30.7572° W 91.3317°

Population Data

Total Population Within 2-to-80-km Region: 7.4E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
Baton Rouge MSA	530,000	38 km SSE
Denham Springs	8,400	39 km SE

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 97% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 1.8E+06 kilogram Milk: 7.8E+07 liter Meat: 6.1E+07 kilogram

Regional Productivity Factor: 0.9 Animal Grazing Factor: 0.75

Site Boundary:	990 meter	WNW
Residence:	1,300 meter	NW
Garden:	1,300 meter	NW
Pasture:	7,000 meter	NNW

Site-Specific Data - Waterborne Pathways via MISSISSIPPI RIVER

Average Effluent Flow from Site: 4.1E+09 L/y
Average River Flow at Site: 3.7E+14 L/y (419,000 cfs)
Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	None	---	None
Fish	1.1E-05	4.6E+00	1.3E-02	RG
Shellfish	1.1E-05	4.6E+00	1.3E-02	RG
Shoreline	---	---	1.3E-02	RG

Notes:
Average individual fish and shellfish consumption rates as given in FES used in lieu of catch data.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

RIVER BEND

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	7.9E-04	1.9E-03	5.6E-06	2.7E-04	2.3E-03
Teen	5.5E-04	4.3E-03	4.1E-06	1.8E-04	2.1E-03
Adult	3.3E-03	4.0E-02	2.7E-05	1.1E-03	1.3E-02
TOTAL	4.7E-03	4.6E-02	3.7E-05	1.6E-03	1.8E-02

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	9.3E-04	9.2E-04	7.3E-03	9.3E-04	9.4E-04	9.4E-04
Child	1.0E-02	1.0E-02	4.5E-02	1.0E-02	1.0E-02	1.1E-02
Teen	7.5E-03	7.5E-03	2.1E-02	7.4E-03	7.5E-03	7.9E-03
Adult	4.5E-02	4.5E-02	9.2E-02	4.5E-02	4.5E-02	4.7E-02
TOTAL	6.3E-02	6.3E-02	1.7E-01	6.3E-02	6.4E-02	6.7E-02

Production/Consumption factors:

Produce: 0.011 Milk: 0.73 Meat: 0.93

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	8.6E-07	
Fish/Shellfish	3.7E-01	
Shoreline Recreation	3.2E-03	
TOTAL	3.7E-01	12%

Ingestion Dose to Any Organ (ADULT GI-LLI)

Drinking Water	4.7E-06	
Fish/Shellfish	4.6E+00	
TOTAL	4.6E+00	46%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	1.3E-01	1%
Air Beta at SB (mrad)	7.6E-02	<1%
Total Body at Residence	4.3E-02	<1%

Iodine and Particulate Dose to Any Organ (CHILD THYROID)

Inhalation at Residence	8.3E-03	
Veg/Prod. from Garden	4.2E-02	
Milk/Meat from Pasture	9.9E-03	
TOTAL	6.0E-02	<1%

Notes:

Site: **H. B. ROBINSON** HARTSVILLE, SC

Location: N 34.4858° W 80.1586°

Population Data

Total Population Within 2-to-80-km Region: 7.6E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
Florence MSA	110,000	42 km ESE
Sumter	42,000	56 km SSW
Monroe	16,000	74 km NNW
Lancaster	8,900	66 km WNW

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 100% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 7.5E+06 kilogram Milk: 5.7E+07 liter Meat: 5.0E+07 kilogram

Regional Productivity Factor: 1.0 Animal Grazing Factor: 0.8

Site Boundary:	420 meter	SSE
Residence:	480 meter	SE
Garden:	480 meter	S
Pasture:	2,900 meter	NNE

Site-Specific Data - Waterborne Pathways via LAKE ROBINSON

Average Effluent Flow from Site: 8.3E+11 L/y

Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	None	---	None
Fish	2.0E-01	1.8E+00	1.0E+00	RG
Shellfish	---	None	---	None
Shoreline	---	---	1.0E+00	RG

Notes:

Average individual fish consumption rates as given in FES, 1975, used in lieu of catch data. Ten percent of population obtain fish taken from downstream waters diluted by a factor of 0.2 according to FES, 1974.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

H. B. ROBINSON

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	5.3E-04	1.5E-03	1.4E-04	2.0E-03	2.1E-03
Teen	7.4E-04	2.9E-03	1.3E-04	1.2E-03	1.7E-03
Adult	7.3E-03	2.5E-02	1.0E-03	6.7E-03	1.0E-02
TOTAL	8.6E-03	2.9E-02	1.3E-03	9.9E-03	1.4E-02

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	2.0E-05	2.0E-05	2.0E-05	9.9E-07	2.0E-05	2.1E-05
Child	3.0E-04	3.0E-04	3.0E-04	1.1E-05	3.0E-04	3.1E-04
Teen	2.0E-04	2.1E-04	2.1E-04	7.9E-06	2.0E-04	2.2E-04
Adult	1.2E-03	1.2E-03	1.2E-03	4.8E-05	1.2E-03	1.3E-03
TOTAL	1.7E-03	1.7E-03	1.7E-03	6.7E-05	1.7E-03	1.8E-03

Production/Consumption factors:

Produce: 0.05 Milk: 0.58 Meat: 0.82

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	None	
Fish/Shellfish	6.8E-03	
Shoreline Recreation	1.2E-04	
TOTAL	6.9E-03	<1%

Ingestion Dose to Any Organ (ADULT GI-LLI)

Drinking Water	None	
Fish/Shellfish	2.5E-02	
TOTAL	2.5E-02	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	3.5E-06	<1%
Air Beta at SB (mrad)	1.8E-05	<1%
Total Body at Residence	1.3E-06	<1%

Iodine and Particulate Dose to Any Organ (CHILD GI-LLI)

Inhalation at Residence	3.1E-06	
Veg/Prod. from Garden	7.9E-05	
Milk/Meat from Pasture	2.9E-05	
TOTAL	1.1E-04	<1%

Notes:

Site: **SAINT LUCIE** FORT PIERCE, FL

Location: N 27.3486° W 80.2464°

Population Data

Total Population Within 2-to-80-km Region: 7.8E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
West Palm Beach	68,000	73 km SSE
Ft. Pierce MSA	250,000	14 km NW
Riviera Beach	28,000	65 km SSE
Vero Beach	34,000	36 km NNW
Palm Beach	10,000	72 km SSE

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 100% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 2.8E+07 kilogram Milk: 1.1E+08 liter Meat: 7.2E+07 kilogram

Regional Productivity Factor: 0.5 Animal Grazing Factor: 1.0

Site Boundary:	1,600 meter	N
Residence:	1,600 meter	N
Garden:	1,600 meter	N
Pasture:	6,800 meter	W

Site-Specific Data - Waterborne Pathways via ATLANTIC OCEAN

Average Effluent Flow from Site: 3.7E+12 L/y

Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	None	---	None
Fish	5.0E-03	2.6E+05	1.0E+00	RG
Shellfish	5.0E-03	2.7E+04	1.0E+00	RG
Shoreline	---	---	1.0E+00	RG

Notes:

Population mixing ratios taken from FES, 1973.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

SAINT LUCIE

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	8.8E-05	1.5E-04	1.9E-05	4.3E-04	2.8E-04
Teen	6.9E-05	2.9E-04	1.4E-05	2.4E-04	2.2E-04
Adult	5.3E-04	2.4E-03	9.8E-05	1.4E-03	1.3E-03
TOTAL	6.9E-04	2.8E-03	1.3E-04	2.1E-03	1.8E-03

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.2E-03	1.2E-03	7.0E-03	8.8E-04	1.2E-03	1.2E-03
Child	1.5E-02	1.5E-02	4.9E-02	9.8E-03	1.5E-02	1.6E-02
Teen	1.1E-02	1.1E-02	2.5E-02	7.1E-03	1.1E-02	1.2E-02
Adult	6.4E-02	6.4E-02	1.2E-01	4.3E-02	6.4E-02	6.7E-02
TOTAL	9.1E-02	9.1E-02	2.0E-01	6.1E-02	9.1E-02	9.6E-02

Production/Consumption factors:

Produce: 0.092 Milk: 0.55 Meat: 0.58

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	None	
Fish/Shellfish	6.6E-03	
Shoreline Recreation	6.8E-05	
TOTAL	6.7E-03	<1%

Ingestion Dose to Any Organ (ADULT GI-LLI)

Drinking Water	None	
Fish/Shellfish	3.0E-02	
TOTAL	3.0E-02	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	5.4E-03	<1%
Air Beta at SB (mrad)	1.1E-02	<1%
Total Body at Residence	3.0E-03	<1%

Iodine and Particulate Dose to Any Organ (INFANT THYROID)

Inhalation at Residence	2.0E-03	
Veg/Prod. from Garden	None	
Milk/Meat from Pasture	2.1E-02	
TOTAL	2.3E-02	<1%

Notes:

Site: **SALEM** SALEM, NJ

Location: N 39.4628° W 75.5358°

Population Data

Total Population Within 2-to-80-km Region: 4.9E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Philadelphia PMSA	4,900,000	63 km NNE
Wilmington PMSA	580,000	32 km NNW
Vineland-Millville-Bridgeton PMSA	140,000	48 km E

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 99% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 7.4E+07 kilogram Milk: 2.7E+08 liter Meat: 2.4E+07 kilogram

Regional Productivity Factor: 0.9 Animal Grazing Factor: 0.6

Site Boundary:	1,300 meter	N
Residence:	7,900 meter	W
Garden:	7,900 meter	W
Pasture:	7,900 meter	W

Site-Specific Data - Waterborne Pathways via DELAWARE RIVER ESTUARY

Average Effluent Flow from Site: 2.6E+12 L/y
Average River Flow at Site: 1.5E+13 L/y (16,500 cfs)
Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	1.8E-01	None	---	None
Fish	1.8E-01	3.6E+05	1.0E+00	RG
Shellfish	1.8E-01	1.6E+05	1.0E+00	RG
Shoreline	---	---	1.0E+00	RG

Notes:

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

SALEM

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	4.0E-02	6.9E-02	1.1E-02	5.4E-02	5.4E-02
Teen	3.1E-02	1.4E-01	8.1E-03	3.1E-02	4.5E-02
Adult	2.2E-01	1.3E+00	5.3E-02	1.8E-01	2.7E-01
TOTAL	2.9E-01	1.5E+00	7.3E-02	2.7E-01	3.7E-01

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	9.6E-03	9.6E-03	1.1E-02	3.4E-03	9.6E-03	9.8E-03
Child	1.3E-01	1.3E-01	1.4E-01	3.8E-02	1.3E-01	1.3E-01
Teen	9.2E-02	9.2E-02	9.4E-02	2.8E-02	9.2E-02	9.6E-02
Adult	5.2E-01	5.2E-01	5.3E-01	1.7E-01	5.2E-01	5.4E-01
TOTAL	7.5E-01	7.5E-01	7.7E-01	2.4E-01	7.5E-01	7.8E-01

Production/Consumption factors:

Produce: 0.069 Milk: 0.37 Meat: 0.055

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	None	
Fish/Shellfish	3.2E-02	
Shoreline Recreation	2.9E-04	
TOTAL	3.3E-02	1%

Ingestion Dose to Any Organ (ADULT GI-LLI)

Drinking Water	None	
Fish/Shellfish	1.8E-01	
TOTAL	1.8E-01	2%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	1.2E-02	<1%
Air Beta at SB (mrad)	3.5E-02	<1%
Total Body at Residence	4.6E-04	<1%

Iodine and Particulate Dose to Any Organ (CHILD THYROID)

Inhalation at Residence	4.0E-04	
Veg/Prod. from Garden	1.4E-03	
Milk/Meat from Pasture	7.4E-04	
TOTAL	2.5E-03	<1%

Notes:

Site: **SAN ONOFRE** CAMP PENDLETON, CA

Location: N 33.3703° W117.5569°

Population Data

Total Population Within 2-to-80-km Region: 6.0E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
San Diego PMSA	2,500,000	68 km SSE
Anaheim-Santa Ana PMSA	2,400,000	62 km NW
Long Beach	430,000	75 km NW
Huntington Beach	180,000	61 km N
Riverside	230,000	68 km N
Pomona	130,000	79 km NNW

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 100% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 4.8E+07 kilogram Milk: 2.3E+08 liter Meat: 5.0E+07 kilogram

Regional Productivity Factor: 0.6 Animal Grazing Factor: 1.0

Site Boundary:	320 meter	WNW
Residence:	1,500 meter	NW
Garden:	3,100 meter	NW
Pasture:	320 meter	N

Site-Specific Data - Waterborne Pathways via PACIFIC OCEAN

Average Effluent Flow from Site: 3.3E+12 L/y

Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	None	---	None
Fish	1.0E+00	2.9E+04	1.0E+00	RG
Shellfish	1.0E+00	2.9E+03	1.0E+00	RG
Shoreline	---	---	1.0E+00	RG

Notes:

Seafood for population caught in undiluted effluent according to FES, 1973.

No milk animals reported to be within 5 miles so default cow pasture set at 5 miles.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

SAN ONOFRE

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	1.1E-03	1.7E-03	2.8E-03	3.2E-03	2.9E-03
Teen	1.1E-03	3.0E-03	2.0E-03	1.8E-03	2.4E-03
Adult	9.5E-03	2.6E-02	1.4E-02	1.1E-02	1.5E-02
TOTAL	1.2E-02	3.1E-02	1.9E-02	1.6E-02	2.0E-02

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.5E-02	1.5E-02	1.1E-01	1.4E-02	1.5E-02	1.6E-02
Child	1.7E-01	1.7E-01	6.9E-01	1.5E-01	1.8E-01	1.9E-01
Teen	1.3E-01	1.3E-01	3.4E-01	1.1E-01	1.3E-01	1.4E-01
Adult	7.6E-01	7.5E-01	1.5E+00	6.6E-01	7.6E-01	8.1E-01
TOTAL	1.1E+00	1.1E+00	2.6E+00	9.4E-01	1.1E+00	1.2E+00

Production/Consumption factors:

Produce: 0.025 Milk: 0.18 Meat: 0.062

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	None	
Fish/Shellfish	3.2E-03	
Shoreline Recreation	2.7E-05	
TOTAL	3.3E-03	<1%

Ingestion Dose to Any Organ (ADULT GI-LLI)

Drinking Water	None	
Fish/Shellfish	9.2E-03	
TOTAL	9.2E-03	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	1.3E-01	1%
Air Beta at SB (mrad)	3.4E-01	2%
Total Body at Residence	1.7E-02	<1%

Iodine and Particulate Dose to Any Organ (INFANT THYROID)

Inhalation at Residence	7.4E-03	
Veg/Prod. from Garden	None	
Milk/Meat from Pasture	9.5E+00	
TOTAL	9.5E+00	63%

Notes:

Site: **SEABROOK** SEABROOK, NH

Location: N 42.8983° W 70.8483°

Population Data

Total Population Within 2-to-80-km Region: 4.3E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Boston-Lawrence-Salem-Lowell-Brockton NECMA	3,800,000	64 km SSW
Portsmouth-Dover-Rochester NECMA	350,000	22 km NNE
Manchester-Nashua NECMA	340,000	51 km W
Concord	36,000	66 km WNW

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 99% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 2.7E+06 kilogram Milk: 1.3E+08 liter Meat: 7.9E+06 kilogram

Regional Productivity Factor: 0.4 Animal Grazing Factor: 0.5

Site Boundary:	910 meter	SW
Residence:	970 meter	SW
Garden:	970 meter	SW
Pasture:	5,200 meter	SW

Site-Specific Data - Waterborne Pathways via ATLANTIC OCEAN

Average Effluent Flow from Site: 7.3E+11 L/y

Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	None	---	None
Fish	2.9E-01	5.7E+04	2.5E-02	RG
Shellfish	---	None	2.5E-02	RG
Shoreline	---	---	2.5E-02	RG

Notes:

Population mixing ratio taken from FES, 1974.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

SEABROOK

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	8.3E-04	6.5E-04	1.5E-04	4.0E-03	2.3E-03
Teen	5.2E-04	1.1E-03	1.3E-04	2.3E-03	1.8E-03
Adult	3.2E-03	8.5E-03	1.0E-03	1.3E-02	1.0E-02
TOTAL	4.6E-03	1.0E-02	1.3E-03	2.0E-02	1.5E-02

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.3E-05	1.3E-05	1.4E-05	7.8E-06	1.3E-05	1.6E-05
Child	1.8E-04	1.8E-04	1.8E-04	8.7E-05	1.8E-04	2.2E-04
Teen	1.3E-04	1.4E-04	1.4E-04	6.4E-05	1.3E-04	1.7E-04
Adult	7.9E-04	8.1E-04	8.0E-04	3.9E-04	7.9E-04	9.6E-04
TOTAL	1.1E-03	1.1E-03	1.1E-03	5.4E-04	1.1E-03	1.4E-03

Production/Consumption factors:

Produce: 0.001 Milk: 0.091 Meat: 0.009

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	None	
Fish/Shellfish	2.8E-04	
Shoreline Recreation	6.3E-07	
TOTAL	2.8E-04	<1%

Ingestion Dose to Any Organ (CHILD BONE)

Drinking Water	None	
Fish/Shellfish	1.9E-03	
TOTAL	1.9E-03	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	2.2E-05	<1%
Air Beta at SB (mrad)	9.6E-06	<1%
Total Body at Residence	1.4E-05	<1%

Iodine and Particulate Dose to Any Organ (TEEN GI-LLI)

Inhalation at Residence	8.5E-06	
Veg/Prod. from Garden	6.4E-05	
Milk/Meat from Pasture	3.2E-06	
TOTAL	7.6E-05	<1%

Notes:

Site: **SEQUOYAH** HAMILTON COUNTY, TN

Location: N 35.2233° W 85.0878°

Population Data

Total Population Within 2-to-80-km Region: 9.0E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
Chattanooga MSA	430,000	28 km SW
Cleveland	30,000	21 km SE
East Ridge	21,000	27 km SSW
Dalton	22,000	50 km S
Athens	12,000	53 km ENE

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 100% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 1.1E+07 kilogram Milk: 1.6E+08 liter Meat: 1.2E+08 kilogram

Regional Productivity Factor: 0.25 Animal Grazing Factor: 0.7

Site Boundary:	950 meter	N
Residence:	2,000 meter	SSW
Garden:	2,700 meter	SSW
Pasture:	2,100 meter	NW

Site-Specific Data - Waterborne Pathways via TENNESSEE RIVER

Average Effluent Flow from Site: 5.0E+09 L/y
Average River Flow at Site: 3.1E+13 L/y (35,000 cfs)
Drinking Water Population: 235,000

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	1.6E-04	RG	2.0E-04	RG
Fish	1.6E-04	3.8E+04	2.0E-04	RG
Shellfish	---	None	---	None
Shoreline	---	---	2.0E-04	RG

Notes:

Population fish catch data taken from FES, 1974.

Site-specific bioaccumulation factors used for cesium, antimony, and strontium (ODCM 1991, p.130).

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

SEQUOYAH

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	9.2E-03	9.2E-03	1.0E-02	8.6E-04	9.9E-03
Child	1.0E-01	1.1E-01	1.1E-01	1.2E-02	1.1E-01
Teen	4.1E-02	4.5E-02	4.0E-02	4.2E-03	4.4E-02
Adult	3.6E-01	3.9E-01	3.4E-01	2.6E-02	3.6E-01
TOTAL	5.1E-01	5.5E-01	5.0E-01	4.4E-02	5.3E-01

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.1E-03	1.1E-03	1.1E-03	4.3E-04	1.1E-03	1.1E-03
Child	1.6E-02	1.6E-02	1.6E-02	4.8E-03	1.6E-02	1.6E-02
Teen	1.2E-02	1.2E-02	1.2E-02	3.5E-03	1.2E-02	1.2E-02
Adult	7.1E-02	7.1E-02	7.1E-02	2.1E-02	7.1E-02	7.3E-02
TOTAL	1.0E-01	1.0E-01	1.0E-01	3.0E-02	1.0E-01	1.0E-01

Production/Consumption factors:

Produce: 0.016 Milk: 0.35 Meat: 0.41

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	1.9E-03	
Fish/Shellfish	4.1E-03	
Shoreline Recreation	4.1E-06	
TOTAL	6.0E-03	<1%

Ingestion Dose to Any Organ (CHILD LIVER)

Drinking Water	2.6E-03	
Fish/Shellfish	4.8E-03	
TOTAL	7.4E-03	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	8.9E-03	<1%
Air Beta at SB (mrad)	1.6E-02	<1%
Total Body at Residence	4.1E-03	<1%

Iodine and Particulate Dose to Any Organ (CHILD LUNG)

Inhalation at Residence	3.3E-03	
Veg/Prod. from Garden	7.4E-03	
Milk/Meat from Pasture	6.6E-04	
TOTAL	1.1E-02	<1%

Notes:

Discharge recirculation factor 1.7 used to account for reduced river flow (ODCM 1991, p. 58).

Site: **SOUTH TEXAS** PALACIOS, TX

Location: N 28.7000° W 96.2133°

Population Data

Total Population Within 2-to-80-km Region: 2.9E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
Bay City	18,000	19 km NNE
Lake Jackson	23,000	67 km ENE
Freeport	11,000	72 km ENE
Angleton	17,000	74 km NE

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 100% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 2.3E+07 kilogram Milk: 4.3E+07 liter Meat: 1.1E+08 kilogram

Regional Productivity Factor: 0.4 Animal Grazing Factor: 0.9

Site Boundary:	1,500 meter	NNW
Residence:	4,000 meter	WSW
Garden:	4,000 meter	WSW
Pasture:	4,000 meter	WSW

Site-Specific Data - Waterborne Pathways via COLORADO RIVER

Average Effluent Flow from Site: 5.4E+11 L/y
Average River Flow at Site: 5.4E+11 L/y (600 cfs)
Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	None	---	None
Fish	1.0E+00 (Riv)	1.1E+05	3.3E+01	RG
Shellfish	6.1E-03 (Bay)	8.9E+06	3.3E+01	RG
Shoreline	---	---	3.3E+01	RG

Notes:

Nuclide-dependent recirculation factors taken from ODCM, Rev. 6.

Population mixing ratios and average consumption rates for seafood harvested from river and bay taken from ODCM, Rev. 6.

Individual liquid doses derived from fish caught in Little Robins area (LRA) with mixing ratio at 33 times river flow.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

SOUTH TEXAS

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	1.0E-03	2.5E-03	2.5E-04	3.5E-03	2.1E-03
Teen	7.7E-04	4.7E-03	2.3E-04	2.0E-03	1.7E-03
Adult	5.4E-03	3.9E-02	1.8E-03	1.1E-02	1.0E-02
TOTAL	7.2E-03	4.6E-02	2.3E-03	1.7E-02	1.4E-02

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	2.9E-04	2.9E-04	8.7E-04	1.3E-04	2.9E-04	3.0E-04
Child	4.4E-03	4.4E-03	8.0E-03	1.4E-03	4.4E-03	4.5E-03
Teen	2.9E-03	2.9E-03	4.3E-03	1.0E-03	2.9E-03	3.1E-03
Adult	1.7E-02	1.7E-02	2.2E-02	6.2E-03	1.7E-02	1.8E-02
TOTAL	2.5E-02	2.5E-02	3.5E-02	8.8E-03	2.5E-02	2.6E-02

Production/Consumption factors:

Produce: 0.17 Milk: 0.46 Meat: 1.9

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	None	
Fish/Shellfish	4.8E-03	
Shoreline Recreation	6.2E-04	
TOTAL	5.4E-03	<1%

Ingestion Dose to Any Organ (ADULT GI-LLI)

Drinking Water	None	
Fish/Shellfish	1.4E-02	
TOTAL	1.4E-02	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	7.9E-03	<1%
Air Beta at SB (mrad)	2.1E-02	<1%
Total Body at Residence	1.5E-03	<1%

Iodine and Particulate Dose to Any Organ (INFANT THYROID)

Inhalation at Residence	7.1E-04	
Veg/Prod. from Garden	None	
Milk/Meat from Pasture	1.6E-02	
TOTAL	1.7E-02	<1%

Notes:

No milk animals reported to be within 5 miles so milk cows located at beef cattle pasture.

Site: **SUMMER** JENKINSVILLE, SC

Location: N 34.2958° W 81.3203°

Population Data

Total Population Within 2-to-80-km Region: 9.4E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
Columbia MSA	450,000	42 km SE
Rock Hill	42,000	75 km NNE
Greenwood	21,000	78 km W
Union	9,800	54 km NNW
Laurens	9,700	68 km WNW

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 94% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 7.5E+06 kilogram Milk: 5.7E+07 liter Meat: 5.0E+07 kilogram

Regional Productivity Factor: 0.9 Animal Grazing Factor: 0.7

Site Boundary:	1,600 meter	ENE
Residence:	1,800 meter	E
Garden:	1,800 meter	E
Pasture:	1,600 meter	ENE

Site-Specific Data - Waterborne Pathways via PARR RESERVOIR AND BROAD RIVER

Average Effluent Flow from Site: 1.5E+12 L/y
Average River Flow at Site: 5.4E+12 L/y (6,000 cfs)
Drinking Water Population: 120,000

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	2.9E-01	RG	1.0E+00	RG
Fish	2.9E-01	2.2E+00	1.0E+00	RG
Shellfish	---	None	---	None
Shoreline	---	---	1.0E+00	RG

Notes:
Average individual fish consumption rate of 2.2 kg/y as given in FES, 1973, used in lieu of catch data.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

SUMMER

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	1.2E-02	1.2E-02	3.1E-02	5.0E-04	1.2E-02
Child	1.7E-01	1.6E-01	2.9E-01	1.8E-01	3.4E-01
Teen	1.2E-01	9.7E-02	1.1E-01	1.1E-01	2.3E-01
Adult	1.2E+00	8.3E-01	8.4E-01	6.3E-01	1.5E+00
TOTAL	1.5E+00	1.1E+00	1.3E+00	9.2E-01	2.1E+00

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	2.6E-04	2.6E-04	4.0E-04	2.6E-04	2.6E-04	2.8E-04
Child	2.9E-03	2.9E-03	3.7E-03	2.9E-03	2.9E-03	3.2E-03
Teen	2.2E-03	2.2E-03	2.5E-03	2.1E-03	2.2E-03	2.5E-03
Adult	1.3E-02	1.3E-02	1.4E-02	1.3E-02	1.3E-02	1.4E-02
TOTAL	1.8E-02	1.8E-02	2.1E-02	1.8E-02	1.8E-02	2.0E-02

Production/Consumption factors:

Produce: 0.037 Milk: 0.42 Meat: 0.6

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body		
Drinking Water	3.1E-02	
Fish/Shellfish	3.2E-02	
Shoreline Recreation	4.2E-05	
TOTAL	6.3E-02	2%

Ingestion Dose to Any Organ (INFANT THYROID)		
Drinking Water	1.0E-01	
Fish/Shellfish	None	
TOTAL	1.0E-01	1%

Airborne

Direct Dose from Noble Gases to Air and Total Body		
Air Gamma at SB (mrad)	1.2E-02	<1%
Air Beta at SB (mrad)	3.0E-02	<1%
Total Body at Residence	5.1E-03	<1%

Iodine and Particulate Dose to Any Organ (INFANT THYROID)		
Inhalation at Residence	1.8E-04	
Veg/Prod. from Garden	None	
Milk/Meat from Pasture	1.6E-02	
TOTAL	1.6E-02	<1%

Notes:

Site: **SURRY** SURRY COUNTY, VA

Location: N 37.1656° W 76.6983°

Population Data

Total Population Within 2-to-80-km Region: 2.0E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Norfolk-Virginia Beach-Newport News MSA	1,400,000	50 km SE
Richmond-Petersburg MSA	870,000	77 km WNW
Williamsburg	12,000	12 km N

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 100% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 3.5E+07 kilogram Milk: 1.5E+08 liter Meat: 7.4E+07 kilogram

Regional Productivity Factor: 0.8 Animal Grazing Factor: 0.7

Site Boundary:	500 meter	N
Residence:	2,900 meter	S
Garden:	3,000 meter	SSW
Pasture:	5,900 meter	NNW

Site-Specific Data - Waterborne Pathways via JAMES RIVER ESTUARY

Average Effluent Flow from Site: 2.4E+12 L/y
Average River Flow at Site: 2.2E+13 L/y (25,000 cfs)
Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	None	---	None
Fish	1.1E-01	6.0E+05	2.0E-01	RG
Shellfish	1.1E-01	1.1E+06	2.0E-01	RG
Shoreline	---	---	2.0E-01	RG

Notes:
Flow includes river and saline "mixing flow" of estuary as given in FES, 1972.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

SURRY

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	2.0E-03	2.2E-03	8.5E-04	3.1E-03	4.1E-03
Teen	2.1E-03	3.5E-03	7.5E-04	1.8E-03	3.4E-03
Adult	1.8E-02	3.1E-02	6.0E-03	1.0E-02	2.2E-02
TOTAL	2.2E-02	3.6E-02	7.6E-03	1.5E-02	2.9E-02

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.1E-03	1.1E-03	2.0E-03	7.0E-05	1.2E-03	1.2E-03
Child	1.7E-02	1.7E-02	2.3E-02	7.2E-04	1.8E-02	1.8E-02
Teen	1.2E-02	1.2E-02	1.5E-02	4.2E-04	1.2E-02	1.2E-02
Adult	6.8E-02	6.8E-02	7.9E-02	2.2E-03	6.8E-02	6.8E-02
TOTAL	9.9E-02	9.9E-02	1.2E-01	3.5E-03	1.0E-01	1.0E-01

Production/Consumption factors:

Produce: 0.072 Milk: 0.46 Meat: 0.37

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	None
Fish/Shellfish	3.1E-04
Shoreline Recreation	1.3E-06
TOTAL	3.2E-04 <1%

Ingestion Dose to Any Organ (ADULT LIVER)

Drinking Water	None
Fish/Shellfish	4.0E-04
TOTAL	4.0E-04 <1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	1.4E-03 <1%
Air Beta at SB (mrad)	3.2E-03 <1%
Total Body at Residence	4.8E-05 <1%

Iodine and Particulate Dose to Any Organ (TEEN LUNG)

Inhalation at Residence	9.6E-04
Veg/Prod. from Garden	1.6E-03
Milk/Meat from Pasture	7.3E-04
TOTAL	3.2E-03 <1%

Notes:

Site: **SUSQUEHANNA** BERWICK, PA

Location: N 41.1000° W 76.1500°

Population Data

Total Population Within 2-to-80-km Region: 1.5E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Williamsport MSA	120,000	73 km WNW
Allentown-Bethlehem MSA	690,000	79 km SE
Scranton-Wilkes-Barre MSA	730,000	35 km NE
Hazleton	25,000	21 km SE

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 98% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 5.3E+07 kilogram Milk: 5.3E+08 liter Meat: 5.4E+07 kilogram

Regional Productivity Factor: 0.9 Animal Grazing Factor: 0.6

Site Boundary:	1,100 meter	WSW
Residence:	1,900 meter	WSW
Garden:	1,900 meter	WSW
Pasture:	2,700 meter	WSW

Site-Specific Data - Waterborne Pathways via SUSQUEHANNA RIVER

Average Effluent Flow from Site: 1.4E+10 L/y
Average River Flow at Site: 1.2E+13 L/y (13,300 cfs)
Drinking Water Population: 100,000

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	3.3E-03	RG	3.1E-03	RG
Fish	3.3E-03	4.3E+04	3.1E-03	RG
Shellfish	---	None	---	None
Shoreline	---	---	3.1E-03	RG

Notes:

Mixing ratios and population fish harvest data taken from letter from Bruce Carson, PP&L Company, January 28, 1992.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

SUSQUEHANNA

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	1.4E-03	1.4E-03	1.4E-03	1.9E-05	1.4E-03
Child	1.6E-02	1.6E-02	1.6E-02	2.8E-04	1.6E-02
Teen	6.1E-03	6.4E-03	6.0E-03	8.4E-05	6.2E-03
Adult	5.2E-02	5.5E-02	5.1E-02	5.3E-04	5.3E-02
TOTAL	7.5E-02	7.9E-02	7.4E-02	9.2E-04	7.6E-02

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.5E-03	1.6E-03	1.5E-03	2.0E-04	1.6E-03	1.6E-03
Child	2.1E-02	2.1E-02	2.1E-02	2.2E-03	2.1E-02	2.2E-02
Teen	1.4E-02	1.4E-02	1.4E-02	1.5E-03	1.4E-02	1.5E-02
Adult	7.6E-02	7.7E-02	7.6E-02	9.1E-03	7.6E-02	8.0E-02
TOTAL	1.1E-01	1.1E-01	1.1E-01	1.3E-02	1.1E-01	1.2E-01

Production/Consumption factors:

Produce: 0.16 Milk: 2.4 Meat: 0.41

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	6.7E-04	
Fish/Shellfish	6.7E-05	
Shoreline Recreation	1.0E-06	
TOTAL	7.4E-04	<1%

Ingestion Dose to Any Organ (CHILD LIVER)

Drinking Water	9.1E-04	
Fish/Shellfish	1.2E-04	
TOTAL	1.0E-03	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	3.6E-03	<1%
Air Beta at SB (mrad)	1.1E-02	<1%
Total Body at Residence	8.7E-04	<1%

Iodine and Particulate Dose to Any Organ (CHILD LIVER)

Inhalation at Residence	4.3E-03	
Veg/Prod. from Garden	1.6E-02	
Milk/Meat from Pasture	4.6E-03	
TOTAL	2.5E-02	<1%

Notes:

Site: **THREE MILE ISLAND** THREE MILE ISLAND,

Location: N 40.1531° W 76.7250°

Population Data

Total Population Within 2-to-80-km Region: 2.1E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Harrisburg-Lebanon-Carlisle MSA	590,000	18 km NW
Reading MSA	340,000	71 km ENE
Lancaster MSA	420,000	38 km ESE
York MSA	420,000	21 km S

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 100% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 5.3E+07 kilogram Milk: 5.3E+08 liter Meat: 5.4E+07 kilogram

Regional Productivity Factor: 1.0 Animal Grazing Factor: 0.5

Site Boundary:	600 meter	SE
Residence:	700 meter	E
Garden:	720 meter	E
Pasture:	1,800 meter	E

Site-Specific Data - Waterborne Pathways via SUSQUEHANNA RIVER

Average Effluent Flow from Site: 9.6E+10 L/y
Average River Flow at Site: 3.0E+13 L/y (34,000 cfs)
Drinking Water Population: 230,000

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	3.2E-03	RG	3.2E-03	RG
Fish	3.2E-03	RG	2.0E-01	RG
Shellfish	---	None	---	None
Shoreline	---	---	2.0E-01	RG

Notes:

No fish harvest data given in FES, 1972 so generic consumption rates used (Table A-1).
Ten percent of population obtain 25% of their fish from river according to FES, 1972.
Nearest full-time real resident is at 700 m east of site.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

THREE MILE ISLAND

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	3.3E-03	3.2E-03	3.8E-03	9.8E-05	3.3E-03
Child	3.7E-02	3.6E-02	4.0E-02	3.6E-03	4.0E-02
Teen	1.5E-02	1.4E-02	1.5E-02	1.8E-03	1.6E-02
Adult	1.3E-01	1.2E-01	1.3E-01	1.1E-02	1.3E-01
TOTAL	1.8E-01	1.7E-01	1.9E-01	1.6E-02	1.9E-01

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	8.7E-03	8.7E-03	2.2E-02	3.1E-03	8.7E-03	8.9E-03
Child	1.1E-01	1.1E-01	2.0E-01	3.5E-02	1.1E-01	1.2E-01
Teen	7.8E-02	7.8E-02	1.2E-01	2.5E-02	7.8E-02	8.2E-02
Adult	4.4E-01	4.4E-01	6.0E-01	1.5E-01	4.4E-01	4.5E-01
TOTAL	6.4E-01	6.4E-01	9.5E-01	2.2E-01	6.4E-01	6.6E-01

Production/Consumption factors:

Produce: 0.13 Milk: 1.9 Meat: 0.32

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	7.1E-04	
Fish/Shellfish	2.5E-02	
Shoreline Recreation	4.9E-06	
TOTAL	2.6E-02	<1%

Ingestion Dose to Any Organ (TEEN LIVER)

Drinking Water	5.1E-04	
Fish/Shellfish	3.5E-02	
TOTAL	3.6E-02	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	5.6E-02	<1%
Air Beta at SB (mrad)	1.2E-01	<1%
Total Body at Residence	2.8E-02	<1%

Iodine and Particulate Dose to Any Organ (CHILD THYROID)

Inhalation at Residence	3.3E-02	
Veg/Prod. from Garden	9.1E-02	
Milk/Meat from Pasture	4.1E-02	
TOTAL	1.6E-01	1%

Notes:

Site: **TROJAN** PRESCOTT, OR

Location: N 46.0408° W122.8844°

Population Data

Total Population Within 2-to-80-km Region: 1.6E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Portland-Vancouver MSA	1,500,000	60 km SSE
Longview	31,000	12 km NNW
Astoria	10,000	72 km WNW
Forest Grove	14,000	58 km SSW
Centralia	12,000	75 km N

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 98% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 6.4E+07 kilogram Milk: 3.7E+07 liter Meat: 2.6E+07 kilogram

Regional Productivity Factor: 0.9 Animal Grazing Factor: 0.75

Site Boundary:	660 meter	N
Residence:	1,000 meter	NNW
Garden:	1,000 meter	NNW
Pasture:	1,600 meter	SSW

Site-Specific Data - Waterborne Pathways via COLUMBIA RIVER

Average Effluent Flow from Site: 6.4E+10 L/y
Average River Flow at Site: 2.1E+14 L/y (230,000 cfs)
Drinking Water Population: 0,530

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	3.1E-04	RG	3.0E-04	RG
Fish	3.1E-04	1.0E+06	5.2E-02	RG
Shellfish	---	None	---	None
Shoreline	---	---	5.2E-02	RG

Notes:

Drinking water population assumed 1/4 of Rainier population, since residents only there part of year.
No milk animals located within 5 miles so milk cows located at beef cattle pasture.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

TROJAN

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	4.4E-07	4.5E-07	4.7E-07	1.1E-07	4.4E-07
Child	8.6E-05	1.7E-04	2.2E-05	4.1E-04	3.7E-04
Teen	1.3E-04	3.2E-04	1.6E-05	2.5E-04	3.1E-04
Adult	1.3E-03	2.8E-03	1.2E-04	1.5E-03	1.8E-03
TOTAL	1.6E-03	3.3E-03	1.6E-04	2.1E-03	2.5E-03

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	7.2E-04	7.2E-04	8.6E-04	4.1E-04	7.2E-04	7.4E-04
Child	1.0E-02	1.0E-02	1.2E-02	4.6E-03	1.0E-02	1.1E-02
Teen	7.5E-03	7.5E-03	8.0E-03	3.4E-03	7.5E-03	7.9E-03
Adult	4.4E-02	4.4E-02	4.6E-02	2.0E-02	4.4E-02	4.5E-02
TOTAL	6.2E-02	6.2E-02	6.7E-02	2.9E-02	6.2E-02	6.5E-02

Production/Consumption factors:

Produce: 0.19 Milk: 0.16 Meat: 0.18

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	7.5E-05	
Fish/Shellfish	5.6E-03	
Shoreline Recreation	2.0E-05	
TOTAL	5.7E-03	<1%

Ingestion Dose to Any Organ (ADULT GI-LLI)

Drinking Water	8.6E-05	
Fish/Shellfish	1.3E-02	
TOTAL	1.3E-02	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	6.4E-02	<1%
Air Beta at SB (mrad)	1.1E-01	<1%
Total Body at Residence	1.6E-02	<1%

Iodine and Particulate Dose to Any Organ (CHILD THYROID)

Inhalation at Residence	7.1E-03	
Veg/Prod. from Garden	2.6E-02	
Milk/Meat from Pasture	6.6E-03	
TOTAL	4.0E-02	<1%

Notes:

Site: **TURKEY POINT** DADE COUNTY, FL

Location: N 25.4350° W 80.3314°

Population Data

Total Population Within 2-to-80-km Region: 3.2E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Miami-Hialeah PMSA	1,900,000	41 km NNE
Fort Lauderdale-Hollywood-Pompano Beach PMSA	1,300,000	79 km NNE
Homestead	29,000	16 km W
Key Largo	11,000	42 km S

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 100% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 2.8E+07 kilogram Milk: 1.1E+08 liter Meat: 7.2E+07 kilogram

Regional Productivity Factor: 0.4 Animal Grazing Factor: 1.0

Site Boundary:	2,000 meter	SSE
Residence:	3,400 meter	N
Garden:	3,400 meter	N
Pasture:	7,200 meter	W

Site-Specific Data - Waterborne Pathways via BISCAYNE BAY

Average Effluent Flow from Site: 1.9E+11 L/y

Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	None	---	None
Fish	1.0E-03	None	---	None
Shellfish	2.0E-03	None	---	None
Shoreline	---	---	1.0E+00	RG

Notes:

Closed cycle cooling so no waterborne population or individual exposures except individual shoreline pathway.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

TURKEY POINT

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	0.	0.	0.	0.	0.
Teen	0.	0.	0.	0.	0.
Adult	0.	0.	0.	0.	0.
TOTAL	0.	0.	0.	0.	0.

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	8.7E-05	8.7E-05	2.0E-04	8.8E-05	8.8E-05	9.3E-05
Child	9.7E-04	9.7E-04	1.6E-03	9.7E-04	9.7E-04	1.1E-03
Teen	7.1E-04	7.1E-04	9.9E-04	7.1E-04	7.1E-04	8.1E-04
Adult	4.3E-03	4.3E-03	5.3E-03	4.3E-03	4.3E-03	4.6E-03
TOTAL	6.1E-03	6.1E-03	8.1E-03	6.1E-03	6.1E-03	6.6E-03

Production/Consumption factors:

Produce: 0.018 Milk: 0.11 Meat: 0.11

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	None	
Fish/Shellfish	None	
Shoreline Recreation	7.7E-04	
TOTAL	7.7E-04	<1%

Ingestion Dose to Any Organ ( )

Drinking Water	None	
Fish/Shellfish	None	
TOTAL	None	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	2.1E-04	<1%
Air Beta at SB (mrad)	5.8E-04	<1%
Total Body at Residence	2.3E-05	<1%

Iodine and Particulate Dose to Any Organ (INFANT THYROID)

Inhalation at Residence	2.4E-06	
Veg/Prod. from Garden	None	
Milk/Meat from Pasture	6.7E-04	
TOTAL	6.7E-04	<1%

Notes:

Site: **VERMONT YANKEE** VERNON, VT

Location: N 42.7803° W 72.5158°

Population Data

Total Population Within 2-to-80-km Region: 1.5E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Springfield NECMA	600,000	70 km S
Worcester-Fitchburg-Leominster NECMA	710,000	80 km SE
Pittsfield NECMA	140,000	71 km SW
Keene	22,000	26 km NE
Brattleboro	12,000	10 km NNW

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 97% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 4.4E+06 kilogram Milk: 7.3E+08 liter Meat: 2.7E+07 kilogram

Regional Productivity Factor: 1.0 Animal Grazing Factor: 0.4

Site Boundary:	400 meter	S
Residence:	2,100 meter	NNW
Garden:	2,100 meter	NNW
Pasture:	4,700 meter	NW

Site-Specific Data - Waterborne Pathways via CONNECTICUT RIVER AT VERNON PO

Average Effluent Flow from Site: 7.0E+06 L/y
Average River Flow at Site: 8.9E+12 L/y (10,000 cfs)
Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	7.8E-07	None	3.6E-02	RG
Fish	7.8E-07	RG	3.6E-02	RG
Shellfish	---	None	---	None
Shoreline	---	---	3.6E-02	RG

Notes:

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

VERMONT YANKEE

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	9.3E-09	8.9E-08	4.7E-06	2.3E-08	1.5E-08
Teen	7.0E-09	1.6E-07	3.4E-06	1.4E-08	1.2E-08
Adult	4.4E-08	1.2E-06	2.2E-05	7.9E-08	7.0E-08
TOTAL	6.0E-08	1.4E-06	3.1E-05	1.2E-07	9.7E-08

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	2.0E-03	1.9E-03	3.9E-02	1.6E-03	2.0E-03	2.0E-03
Child	2.2E-02	2.2E-02	2.4E-01	1.7E-02	2.2E-02	2.3E-02
Teen	1.5E-02	1.5E-02	1.1E-01	1.2E-02	1.5E-02	1.7E-02
Adult	8.6E-02	8.8E-02	4.3E-01	6.7E-02	8.7E-02	9.3E-02
TOTAL	1.3E-01	1.3E-01	8.3E-01	9.8E-02	1.3E-01	1.3E-01

Production/Consumption factors:

Produce: 0.015 Milk: 3.7 Meat: 0.23

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	7.0E-05	
Fish/Shellfish	2.3E-05	
Shoreline Recreation	7.3E-07	
TOTAL	9.3E-05	<1%

Ingestion Dose to Any Organ (INFANT THYROID)

Drinking Water	9.1E-02	
Fish/Shellfish	None	
TOTAL	9.1E-02	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	3.1E+00	31%
Air Beta at SB (mrad)	1.2E+00	6%
Total Body at Residence	5.8E-02	1%

Iodine and Particulate Dose to Any Organ (INFANT THYROID)

Inhalation at Residence	1.8E-02	
Veg/Prod. from Garden	3.2E-02	
Milk/Meat from Pasture	5.7E-02	
TOTAL	1.1E-01	<1%

Notes:

No waterborne pathways

Site: **VOGTLE** WAYNESBORO, GA

Location: N 33.1419° W 81.7647°

Population Data

Total Population Within 2-to-80-km Region: 6.6E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
Augusta MSA	400,000	40 km NNW
Fort Gordon	9,100	48 km NW
Aiken	20,000	45 km N
Statesboro	16,000	76 km S

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 98% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 8.8E+06 kilogram Milk: 7.0E+07 liter Meat: 8.1E+07 kilogram

Regional Productivity Factor: 0.8 Animal Grazing Factor: 0.75

Site Boundary:	1,100 meter	NE
Residence:	1,900 meter	WSW
Garden:	5,000 meter	WSW
Pasture:	16,000meter	SE

Site-Specific Data - Waterborne Pathways via SAVANNA RIVER

Average Effluent Flow from Site: 3.2E+09 L/y
Average River Flow at Site: 9.1E+12 L/y (10,150 cfs)
Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	None	4.0E-04	RG
Fish	3.6E-04	1.8E+00	8.3E-02	RG
Shellfish	---	None	---	None
Shoreline	---	---	8.3E-02	RG

Notes:

Ten percent of population assumed to obtain fish from river.

Average individual fish consumption rate of 5 g/d as given in FES, 1974, used in lieu of catch data.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

VOGTLE

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	2.7E-04	1.1E-03	2.3E-04	1.2E-04	3.5E-04
Teen	2.4E-04	2.0E-03	2.1E-04	7.3E-05	3.0E-04
Adult	2.0E-03	1.8E-02	1.6E-03	4.2E-04	2.2E-03
TOTAL	2.5E-03	2.1E-02	2.1E-03	6.2E-04	2.9E-03

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	5.1E-04	5.1E-04	9.7E-04	2.9E-05	5.1E-04	5.2E-04
Child	7.5E-03	7.5E-03	1.0E-02	3.2E-04	7.5E-03	7.5E-03
Teen	5.0E-03	5.0E-03	6.0E-03	2.3E-04	5.0E-03	5.1E-03
Adult	2.9E-02	2.9E-02	3.3E-02	1.4E-03	2.9E-02	2.9E-02
TOTAL	4.2E-02	4.2E-02	4.9E-02	2.0E-03	4.2E-02	4.3E-02

Production/Consumption factors:

Produce: 0.055 Milk: 0.65 Meat: 1.2

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	6.3E-03	
Fish/Shellfish	4.8E-02	
Shoreline Recreation	3.4E-04	
TOTAL	5.4E-02	2%

Ingestion Dose to Any Organ (ADULT GI-LLI)

Drinking Water	6.3E-03	
Fish/Shellfish	4.7E-01	
TOTAL	4.7E-01	5%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	4.7E-04	<1%
Air Beta at SB (mrad)	7.3E-04	<1%
Total Body at Residence	1.7E-04	<1%

Iodine and Particulate Dose to Any Organ (CHILD THYROID)

Inhalation at Residence	8.1E-04	
Veg/Prod. from Garden	1.3E-03	
Milk/Meat from Pasture	1.6E-04	
TOTAL	2.3E-03	<1%

Notes:

Site: **WATERFORD** TAFT, LA

Location: N 29.9953° W 90.4728°

Population Data

Total Population Within 2-to-80-km Region: 1.8E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
New Orleans MSA	1,200,000	32 km E
Metairie	150,000	26 km E
Kenner	72,000	16 km E
Marrero	37,000	32 km ESE
Houma	30,000	51 km SSW

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 99% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 1.8E+06 kilogram Milk: 7.8E+07 liter Meat: 6.1E+07 kilogram

Regional Productivity Factor: 0.6 Animal Grazing Factor: 1.0

Site Boundary:	970 meter	NNE
Residence:	1,400 meter	N
Garden:	1,400 meter	N
Pasture:	7,900 meter	NW

Site-Specific Data - Waterborne Pathways via MISSISSIPPI RIVER AND GULF

Average Effluent Flow from Site: 1.2E+12 L/y
Average River Flow at Site: 4.4E+14 L/y (493,000 cfs)
Drinking Water Population: 1,000,000

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	2.8E-03	RG	4.5E-03	RG
Fish	2.8E-03	4.5E+03	1.0E+00	RG
Shellfish	---	None	---	None
Shoreline	---	---	1.0E+00	RG

Notes:

Complete river mixing ratio used for both river and gulf seafood harvests.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

WATERFORD

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	9.2E-04	9.4E-04	8.7E-03	1.7E-04	1.1E-03
Child	1.0E-02	1.1E-02	6.5E-02	1.8E-03	1.2E-02
Teen	4.1E-03	5.0E-03	2.0E-02	4.5E-04	4.4E-03
Adult	3.5E-02	4.3E-02	1.5E-01	2.8E-03	3.6E-02
TOTAL	5.0E-02	6.0E-02	2.4E-01	5.2E-03	5.3E-02

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	9.0E-03	9.0E-03	9.0E-03	3.0E-03	9.0E-03	9.2E-03
Child	1.4E-01	1.4E-01	1.4E-01	3.4E-02	1.4E-01	1.4E-01
Teen	1.1E-01	1.1E-01	1.1E-01	2.5E-02	1.1E-01	1.1E-01
Adult	6.4E-01	6.4E-01	6.4E-01	1.5E-01	6.4E-01	6.5E-01
TOTAL	8.9E-01	8.9E-01	8.9E-01	2.1E-01	8.9E-01	9.0E-01

Production/Consumption factors:

Produce: 0.003 Milk: 0.2 Meat: 0.26

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	1.6E-04	
Fish/Shellfish	1.4E-01	
Shoreline Recreation	1.4E-04	
TOTAL	1.4E-01	5%

Ingestion Dose to Any Organ (ADULT GI-LLI)

Drinking Water	1.9E-04	
Fish/Shellfish	5.6E-01	
TOTAL	5.6E-01	6%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	1.7E-01	2%
Air Beta at SB (mrad)	2.1E-01	1%
Total Body at Residence	4.4E-02	<1%

Iodine and Particulate Dose to Any Organ (CHILD LUNG)

Inhalation at Residence	3.0E-02	
Veg/Prod. from Garden	1.0E-01	
Milk/Meat from Pasture	1.4E-03	
TOTAL	1.3E-01	<1%

Notes:

Site: **WNP-2** RICHLAND, WA

Location: N 46.2833° W119.2916°

Population Data

Total Population Within 2-to-80-km Region: 3.0E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
Richland-Kennewick-Pasco MSA	150,000	20 km SSE
Moses Lake	11,000	73 km N

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 100% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 2.1E+08 kilogram Milk: 1.2E+08 liter Meat: 3.2E+07 kilogram

Regional Productivity Factor: 0.8 Animal Grazing Factor: 0.7

Site Boundary:	1,900 meter	ESE
Residence:	6,800 meter	ESE
Garden:	6,800 meter	ESE
Pasture:	10,000meter	SE

Site-Specific Data - Waterborne Pathways via COLUMBIA RIVER

Average Effluent Flow from Site: 3.6E+09 L/y
Average River Flow at Site: 1.0E+14 L/y (115,000 cfs)
Drinking Water Population: 67,000

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	2.0E-05	RG	---	None
Irrigated Foods	---	None	2.0E-05	RG
Fish	3.5E-05	7.5E+03	2.0E-03	RG
Shellfish	---	None	---	None
Shoreline	---	---	5.0E-04	RG

Notes:
Desert sigmas used to estimate air dilution for both population and individual doses.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

WNP-2

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	5.8E-06	5.7E-06	6.6E-06	5.3E-06	1.1E-05
Child	7.5E-05	6.6E-05	6.2E-05	8.0E-05	1.3E-04
Teen	3.7E-05	4.0E-05	2.2E-05	2.8E-05	6.0E-05
Adult	3.3E-04	3.6E-04	1.8E-04	1.8E-04	4.1E-04
TOTAL	4.5E-04	4.7E-04	2.7E-04	2.9E-04	6.1E-04

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	2.4E-03	2.4E-03	8.3E-03	7.3E-04	2.4E-03	2.8E-03
Child	4.8E-02	4.9E-02	1.1E-01	1.3E-02	4.8E-02	5.3E-02
Teen	3.0E-02	3.1E-02	6.2E-02	7.1E-03	3.0E-02	3.4E-02
Adult	1.6E-01	1.8E-01	3.0E-01	3.8E-02	1.6E-01	1.8E-01
TOTAL	2.5E-01	2.5E-01	4.8E-01	5.8E-02	2.5E-01	2.7E-01

Production/Consumption factors:

Produce: 2.9 Milk: 2.5 Meat: 1.0

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water & IFP.	4.6E-05	
Fish/Shellfish	1.7E-02	
Shoreline Recreation	5.2E-06	
TOTAL	1.7E-02	<1%

Ingestion Dose to Any Organ (TEEN LIVER)

Drinking Water & IFP	8.6E-05	
Fish/Shellfish	2.6E-02	
TOTAL	2.6E-02	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	6.8E-02	<1%
Air Beta at SB (mrad)	4.8E-02	<1%
Total Body at Residence	2.4E-03	<1%

Iodine and Particulate Dose to Any Organ (INFANT THYROID)

Inhalation at Residence	9.9E-03	
Veg/Prod. from Garden	8.8E-03	
Milk/Meat from Pasture	1.3E-02	
TOTAL	3.2E-02	<1%

Notes:

Irrigated food products (IFP) pathway not significant compared to fish for individual doses.

Site: **WOLF CREEK** BURLINGTON, KS

Location: N 39.0267° W 84.7233°

Population Data

Total Population Within 2-to-80-km Region: 1.9E+05

Major Metropolitan Centers Within Region:

Center	Population	Location
Chanute	9,500	62 km SSE
Emporia	26,000	42 km WNW
Ottawa	11,000	58 km NW

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 93% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 2.4E+08 kilogram Milk: 6.5E+07 liter Meat: 1.6E+08 kilogram

Regional Productivity Factor: 0.95 Animal Grazing Factor: 0.5

Site Boundary:	1,200 meter	N
Residence:	2,300 meter	N
Garden:	2,300 meter	N
Pasture:	2,300 meter	N

Site-Specific Data - Waterborne Pathways via NEOSHO RIVER

Average Effluent Flow from Site: 1.3E+12 L/y
Average River Flow at Site: 1.2E+12 L/y (1,335 cfs)
Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	---	None	1.0E+00	RG
Fish	1.7E-02	1.8E+00	1.0E+00	RG
Shellfish	---	None	---	None
Shoreline	---	---	1.0E+00	RG

Notes:

Average individual fish consumption rate of 5 g/d as given in FES, 1982, used in lieu of catch data.
No milk animals located within 5 miles so milk cows located at beef cattle pasture.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

WOLF CREEK

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	3.4E-02	2.0E-02	1.6E-03	1.4E-01	1.7E-01
Teen	6.3E-02	4.0E-02	1.4E-03	8.6E-02	1.5E-01
Adult	6.7E-01	3.4E-01	1.1E-02	5.0E-01	9.0E-01
TOTAL	7.7E-01	4.0E-01	1.4E-02	7.3E-01	1.2E+00

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	4.3E-05	4.3E-05	4.6E-05	1.9E-05	4.3E-05	4.6E-05
Child	7.9E-04	7.9E-04	8.2E-04	2.1E-04	7.9E-04	8.4E-04
Teen	4.8E-04	4.8E-04	5.0E-04	1.5E-04	4.8E-04	5.5E-04
Adult	2.7E-03	2.7E-03	2.7E-03	9.2E-04	2.7E-03	2.9E-03
TOTAL	4.0E-03	4.0E-03	4.1E-03	1.3E-03	4.0E-03	4.3E-03

Production/Consumption factors:

Produce: 6.2 Milk: 2.5 Meat: 10.0

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	2.8E-02	
Fish/Shellfish	4.5E-02	
Shoreline Recreation	6.5E-05	
TOTAL	7.3E-02	2%

Ingestion Dose to Any Organ (CHILD LIVER)

Drinking Water	3.9E-02	
Fish/Shellfish	5.4E-02	
TOTAL	9.3E-02	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	3.3E-03	<1%
Air Beta at SB (mrad)	2.7E-02	<1%
Total Body at Residence	8.5E-04	<1%

Iodine and Particulate Dose to Any Organ (CHILD THYROID)

Inhalation at Residence	4.1E-04	
Veg/Prod. from Garden	1.5E-03	
Milk/Meat from Pasture	9.4E-04	
TOTAL	2.8E-03	<1%

Notes:

Site: **YANKEE ROWE** ROWE, MA

Location: N 42.7281° W 72.9289°

Population Data

Total Population Within 2-to-80-km Region: 1.7E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Springfield NECMA	600,000	74 km SSE
Albany-Schenectady-Troy MSA	870,000	68 km W
Pittsfield NECMA	140,000	41 km W
Amherst	35,000	51 km SE

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-92 TO 31-DEC-92 98% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 2.0E+07 kilogram Milk: 2.6E+08 liter Meat: 1.6E+07 kilogram

Regional Productivity Factor: 1.0 Animal Grazing Factor: 0.5

Site Boundary:	800 meter	S
Residence:	1,300 meter	SW
Garden:	1,300 meter	SW
Pasture:	3,200 meter	SE

Site-Specific Data - Waterborne Pathways via DEERFIELD RIVER

Average Effluent Flow from Site: 4.3E+09 L/y
Average River Flow at Site: 3.3E+11 L/y (370 cfs)
Drinking Water Population: None

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Irrigated Foods	---	None	1.3E-02	RG
Fish	1.3E-02	RG	1.3E-02	RG
Shellfish	---	None	---	None
Shoreline	---	---	1.3E-02	RG

Notes:

Ten percent of population obtain 25% of their fish from river.

Irrigated food products pathway used in lieu of drinking water for individual.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

YANKEE ROWE

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.	0.	0.	0.	0.
Child	6.2E-03	2.7E-03	2.5E-03	3.0E-02	2.5E-02
Teen	8.8E-03	2.0E-03	1.6E-03	1.8E-02	2.0E-02
Adult	8.8E-02	1.3E-02	1.0E-02	1.0E-01	1.2E-01
TOTAL	1.0E-01	1.8E-02	1.4E-02	1.5E-01	1.7E-01

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	9.0E-05	9.0E-05	9.0E-05	1.2E-07	9.0E-05	9.0E-05
Child	8.4E-04	8.4E-04	8.4E-04	1.0E-06	8.4E-04	8.5E-04
Teen	4.6E-04	4.6E-04	4.6E-04	5.3E-07	4.6E-04	4.6E-04
Adult	2.1E-03	2.1E-03	2.1E-03	2.7E-06	2.1E-03	2.1E-03
TOTAL	3.5E-03	3.5E-03	3.5E-03	4.4E-06	3.5E-03	3.5E-03

Production/Consumption factors:

Produce: 0.061 Milk: 1.2 Meat: 0.12

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Irrigated Foods	4.9E-02	
Fish/Shellfish	9.0E-03	
Shoreline Recreation	2.5E-06	
TOTAL	5.8E-02	2%

Ingestion Dose to Any Organ (CHILD BONE)

Irrigated Foods	5.5E-01	
Fish/Shellfish	1.4E-02	
TOTAL	5.6E-01	6%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	None	<1%
Air Beta at SB (mrad)	None	<1%
Total Body at Residence	None	<1%

Iodine and Particulate Dose to Any Organ (CHILD LUNG)

Inhalation at Residence	2.5E-05	
Veg/Prod. from Garden	8.9E-05	
Milk/Meat from Pasture	3.2E-05	
TOTAL	1.5E-04	<1%

Notes:

Site: **ZION** ZION, IL

Location: N 42.4456° W 87.8022°

Population Data

Total Population Within 2-to-80-km Region: 7.3E+06

Major Metropolitan Centers Within Region:

Center	Population	Location
Chicago PMSA	6,100,000	66 km S
Milwaukee-Racine MSA	1,600,000	65 km N
Kenosha	130,000	14 km N
Waukesha	57,000	71 km NNW

Site-Specific Data - Airborne Pathways

Meteorology Period of Record: 01-JAN-91 TO 31-DEC-91 97% Data recovery

Average Annual State Production of food products in 80-km radius circle:

Veg: 1.1E+08 kilogram Milk: 1.8E+08 liter Meat: 1.9E+08 kilogram

Regional Productivity Factor: 0.5 Animal Grazing Factor: 0.5

Site Boundary:	470 meter	N
Residence:	1,500 meter	W
Garden:	1,500 meter	W
Pasture:	8,000 meter	W

Site-Specific Data - Waterborne Pathways via LAKE MICHIGAN

Average Effluent Flow from Site: 1.1E+12 L/y
Average River Flow at Site: 3.6E+14 L/y (400,000 cfs)
Drinking Water Population: 6,800,000

	Population		Individual	
	Mixing Ratio	Usage or Harvest (kg/y)	Mixing Ratio	Usage (kg/y)
Drinking Water	1.7E-02	RG	1.7E-02	RG
Fish	3.1E-03	5.0E+06	3.1E-03	RG
Shellfish	---	None	---	None
Shoreline	---	---	3.1E-03	RG

Notes:

Fish mixing ratio derived using hypothetical river model (flow of 4E5 cfs) from ODCM, 1989.
No milk cows reported to be within 5 miles so default cow pasture set at 5 miles.

POPULATION AND INDIVIDUAL DOSE-COMMITMENT ESTIMATES FOR

ZION

Population Dose Commitments (person-rem)

Waterborne

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	4.6E-02	4.9E-02	1.6E-01	1.5E-02	5.9E-02
Child	5.3E-01	6.1E-01	1.3E+00	2.1E-01	6.7E-01
Teen	2.3E-01	3.2E-01	4.3E-01	6.9E-02	2.8E-01
Adult	2.0E+00	2.8E+00	3.3E+00	4.2E-01	2.1E+00
TOTAL	2.8E+00	3.8E+00	5.2E+00	7.1E-01	3.1E+00

Airborne

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	6.3E-03	6.2E-03	4.6E-02	1.9E-03	6.4E-03	6.4E-03
Child	1.0E-01	1.0E-01	4.5E-01	2.1E-02	1.1E-01	1.1E-01
Teen	7.8E-02	7.8E-02	2.5E-01	1.5E-02	7.9E-02	8.3E-02
Adult	4.7E-01	4.7E-01	1.2E+00	9.3E-02	4.7E-01	4.9E-01
TOTAL	6.5E-01	6.5E-01	1.9E+00	1.3E-01	6.6E-01	6.8E-01

Production/Consumption factors:

Produce: 0.04 Milk: 0.092 Meat: 0.16

Individual Dose Commitments (mrem) on a per-unit basis and Percentage of Appendix I Design Objectives

Waterborne

Ingestion and Direct Dose from All Nuclides to Total Body

Drinking Water	3.6E-04	
Fish/Shellfish	5.2E-04	
Shoreline Recreation	1.2E-06	
TOTAL	8.8E-04	<1%

Ingestion Dose to Any Organ (INFANT THYROID)

Drinking Water	1.6E-03	
Fish/Shellfish	None	
TOTAL	1.6E-03	<1%

Airborne

Direct Dose from Noble Gases to Air and Total Body

Air Gamma at SB (mrad)	7.3E-02	<1%
Air Beta at SB (mrad)	6.6E-02	<1%
Total Body at Residence	2.3E-03	<1%

Iodine and Particulate Dose to Any Organ (CHILD THYROID)

Inhalation at Residence	3.2E-03	
Veg/Prod. from Garden	3.1E-02	
Milk/Meat from Pasture	8.1E-03	
TOTAL	4.2E-02	<1%

Notes:

3.0 REFERENCES

Tichler, J., K. Doty, and J. Congemi. 1995. Radioactive Materials Released from Nuclear Power Plants, Annual Report 1991. NUREG/CR-2907, BNL-NUREG-51581, Vol. 13, U.S. Nuclear Regulatory Commission, Washington, D.C.

U.S. Atomic Energy Commission (AEC). 1973. Final Environmental Statement Concerning Proposed Rule-Making Action: Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion "As Low As Practicable" for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents. 1973. WASH-1258, Vol. 1, Directorate of Regulatory Standards, U.S. Atomic Energy Commission, Washington, D.C.

U.S. Bureau of the Census. 1991. State and Metropolitan Area Data Book, 1991. U.S. Government Printing Office, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1977. Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I, Revision 1. Regulatory Guide 1.109, Washington, D.C.

APPENDIX

A.1 MODELS AND GENERIC PARAMETERS

The calculational models used were primarily those given in the Nuclear Regulatory Commission's Regulatory Guide 1.109, Rev. 1 (NRC 1977a). Computer programs were written to use these models to generate population dose commitments for four age groups. The percentages of the population comprising the four age groups were 1.44%, infant (0 to 1 yr); 16.0%, child (1 to 11 yr); 11.7%, teenager (11 to 17 yr); and 70.9%, adult (17 yr and older) (U. S. Bureau of the Census 1975). Where possible, the site-dependent parameters were taken from the environmental statements (ES) and offsite dose calculation manuals (ODCM) issued for each reactor (see Table 1.3). The generic parameters used for this study such as consumption rates, occupancy factors, and holdup times, are given in Tables A.1, A.2, and A.3 below. It should be noted that generic consumption rates for aquatic foods and inhalation rates are taken from Regulatory Guide 1.109 (NRC 1977a); bioaccumulation factors and terrestrial food transfer factors were taken from the same source. Dose commitment factors for the four age groups were taken from Hoenes and Soldat (1977). Noble-gas dose factors were taken from NRC (1977a).

TABLE A.1. Generic Consumption Rates and Occupancy Factors Used for the Average Member of the Population[a]

Pathway	Infant	Child	Teenager	Adult
Fruits, vegetables and grain (kg/yr)	0	200	240	190
Milk (L/yr)	170	170	200	110
Meat and poultry (kg/yr)	0	37	59	95
Fish (kg/yr)[b]	0	2.2	5.2	6.9
Invertebrates (kg/yr)	0	0.33	0.75	1.0
Drinking water (L/yr)	170 [c]	260	260	370
Inhalation (m^3/yr)	1400 [d]	3700	8000	8000
Air submersion and ground irradiation occupancy factor	0.5	0.5	0.5	0.5

(a) Regulatory Guide 1.109 (NRC 1977a).
(b) Both fresh and salt water.
(c) Assumed to be equal to milk consumption.
(d) Same as for maximally exposed individual.

TABLE A.2. Generic Consumption Rates and Occupancy Factors Used for the Maximally Exposed Individual[a]

Pathway	Infant	Child	Teenager	Adult
Fruits, vegetables, and grain (kg/yr)	0	520	630	520
Leafy vegetables	26	42	64	
Milk (L/yr)	330	330	400	310
Meat and poultry (kg/yr)	0	41	65	110
Fish (kg/yr)[b]	0	6.9	16	21
Invertebrates (kg/yr)	0	1.7	3.8	5
Drinking water (L/yr)	330	510	510	730
Shoreline recreation (hr/yr)	0	14	67	12
Inhalation (m^3/yr)	1400	3700	8000	8000
Air submersion and ground irradiation occupancy factor	0.5	0.5	0.5	0.5

(a) Regulatory Guide 1.109 (NRC 1977a).
(b) Both fresh and salt water.

TABLE A.3. Holdup Times Between Harvest and Consumption of Foods[a]

Food	Holdup Time (days) Population	Individual
Leafy vegetables	-	1
Fruits, grains and vegetables	14	60
Milk[b]	4	2
Meat[b]	20	20
Aquatic foods (fish and invertebrates)	7	1
Drinking Water	1	0.5

(a) Regulatory Guide 1.109 (NRC 1977a).
(b) Value given is time after milking or slaughter. For the portion of the time animals were fed stored feed, an additional 90 days was added to the holdup time.

A.2 SOURCE TERMS

The doses were estimated using the measured releases as reported by the site licensees for 1992 (Tichler et al. 1995).[a] These releases include all radionuclides specified by the NRC to be measured and reported by the operators of all commercial nuclear power plants. Radionuclides given as a combination of parent-daughter isotopes, such as Y/Sr-90, Zr/Nb-95, Ba/La-140, I/Xe-133, and Pr/Ce-144, were divided evenly between the parent and daughter.

The radionuclides used in this study, along with their decay constants, are given in Table A.4. Note that the "+D" after some of the nuclides indicates that the decay energy of the daughter is included with the parent. Thus, whenever a parent nuclide release is specified, the result of the dose calculation is as though an additional equilibrium amount of the daughter nuclide is specified. The daughter nuclide itself is included separately if it can be released independently of the parent and/or if it has a relatively long half-life.

For airborne releases, three types of release were used as specified by the licensee or determined from information from the licensee: ground, elevated, and mixed mode. The definitions of these release types are found in Regulatory Guide 1.111 (NRC 1977b). For releases above the adjacent building height by a factor of 2 or more, an elevated release was used at the stack height. For releases below the building height, a release height of zero was used. All other releases were assumed to be a mixed mode release.

A.3 METEOROLOGY AND AIRBORNE DOSES

Meteorological (joint frequency) data for 1992 were generated from information submitted by the licensees for ground, elevated, and mixed-mode releases for a site. In some cases, more than one joint frequency distribution was used depending on the height of release and availability. When 1992 data were not available for a site, the previous year's joint frequency data were used.

For population doses, atmospheric transport factors were calculated for 16 compass points and for 10 radii from 2 to 80 km (see Table A.5) using the NRC computer program XOQDOQ (Sagendorf et al. 1982). For individual 10 CFR 50, Appendix I doses, semi-infinite plume transport factors were estimated at locations of site boundary, closest residence, closest garden, and closest pasture. Here "closest" is the location of maximum dose as stipulated by the licensee. Ingestion doses from leafy vegetables and other vegetables were calculated for the garden location; ingestion doses from milk (cow or goat) and meat were calculated for the pasture location. If no milk pathway was designated by the licensee, a default pasture location 5 miles from the site was used.

(a) Very short-lived isotopes (such as Kr-90, -91, -93, -94, Xe-139, -140, -141, -143, and Rb-88M), those not likely to be produced, and those that were daughters whose decay energies were accounted for in the dose factor for the parent were not included in the dose.

TABLE A.4. Radionuclides Considered in This Study

No.	Nuclide	Decay Constant (1/sec)	No.	Nuclide	Decay Constant (1/sec)
1	H-3	1.78E-09	43	Nb-97	1.57E-04
2	Be-10	1.37E-14	44	Mo-99+D	2.92E-06
3	C-14[a]	3.83E-12	45	Tc-99M	3.19E-05
4	N-13	1.16E-03	46	Ru-103+D	2.02E-07
5	F-18	1.05E-04	47	Ru-106+D	2.17E-08
6	Na-22	8.44E-09	48	Ag-110M+D	3.19E-08
7	Na-24	1.28E-05	49	Cd-115M	1.80E-07
8	Ar-41	1.05E-04	50	Cd-115	3.60E-06
9	Sc-46	9.58E-08	51	Sn-125+D	8.31E-07
10	Cr-51	2.89E-07	52	Sb-124	1.33E-07
11	Mn-54	2.57E-08	53	Sb-125+D	8.06E-09
12	Mn-56	7.47E-05	54	Te-132+D	2.47E-06
13	Fe-55	8.14E-09	55	Te-133M+D	2.09E-04
14	Fe-59	1.80E-07	56	I-131+D	9.97E-07
15	Co-57	2.97E-08	57	I-132	8.42E-05
16	Co-58	1.12E-07	58	I-133+D	9.25E-06
17	Co-60	4.17E-09	59	I-134	2.20E-04
18	Ni-57	5.35E-06	60	I-135+D	2.92E-05
19	Ni-63	2.20E-10	61	Xe-131M	6.69E-07
20	Ni-65	7.64E-05	62	Xe-133M	3.61E-06
21	Cu-64	1.52E-05	63	Xe-133	1.52E-06
22	Zn-65	3.31E-08	64	Xe-135M	7.56E-04
23	Zn-69M+D	1.39E-05	65	Xe-135	2.10E-05
24	As-76	7.32E-06	66	Xe-137	3.01E-03
25	Br-82	5.44E-06	67	Xe-138+D	8.14E-04
26	Kr-83M	1.04E-04	68	Cs-134	1.07E-08
27	Kr-85M	4.31E-05	69	Cs-136	6.17E-07
28	Kr-85	2.05E-09	70	Cs-137+D	7.31E-10
29	Kr-87	1.52E-04	71	Cs-138	3.58E-04
30	Kr-88+D	6.89E-05	72	Cs-139+D	1.24E-03
31	Kr-89	3.64E-03	73	Ba-139	1.39E-04
32	Rb-88	6.53E-04	74	Ba-140+D	6.28E-07
33	Rb-89+D	7.61E-04	75	La-140	4.78E-06
34	Sr-89+D	1.59E-07	76	La-141	4.97E-05
35	Sr-90+D	7.58E-10	77	Ce-141	2.47E-07
36	Sr-91+D	2.03E-05	78	Ce-144+D	2.83E-08
37	Sr-92+D	7.11E-05	79	Eu-152	1.69E-09
38	Y-90	3.01E-06	80	Eu-154	2.55E-09
39	Y-91M+D	2.32E-04	81	W-187	8.06E-06
40	Zr-95+D	1.22E-07	82	Th-232+D	1.57E-18
41	Zr-97+D	1.14E-05	83	Np-239	3.42E-06
42	Nb-95	2.29E-07			

(a) Carbon-14 is not reported by most licensees.

TABLE A.5. Radius Intervals and Midpoints for Airborne Dose Calculations (km)

Interval	Midpoint
2 - 3	2.5
3 - 4	3.5
4 - 6	5
6 - 9	7.5
9 - 14	11.5
14 - 20	17
20 - 30	25
30 - 40	35
40 - 60	50
60 - 80	70

The XOQDOQ program generates four sets of atmospheric transport factors:

- average annual atmospheric dilution factors that are not corrected for cloud depletion or radioactive decay
- dilution factors that are only corrected for decay assuming a 2.26-day half-life
- dilution factors that are corrected for depletion and for decay assuming an 8-day half-life
- relative deposition per unit area.

These factors were used to estimate the dose from semi-infinite airborne releases using methods similar to the NRC GASPAR program (Eckerman et al. 1980; Strenge et al. 1987). The assumptions used in the calculation of these transport factors were as follows:

- release heights used depended on type of release: ground, elevated, or mixed mode
- release heights corrected for plume rise or building wake effects where applicable
- semi-infinite cloud model with sector-average, Gaussian-plume dispersion
- no correction for terrain height variation or recirculation.

For sites with elevated releases, the site-boundary gamma and residential total-body doses from direct irradiation from noble gases contained in the plume were also estimated using the finite-plume model described in Regulatory Guide 1.109, p. 5 and Appendix F (NRC 1977a). For the final dose estimate, the maximum dose was selected from the two methods of calculation.

A.4 POPULATION

The population distribution within 2 to 80 km around each site was determined from information supplied by the NRC from an updated reduction of 1980 census data (Sinisgalli 1982). Also, the NRC supplied updated estimates of the number of people residing in major metropolitan centers within the 80-km region around each site (U.S. Bureau of the Census 1991 Brauner 1982, and D. P. Cleary[a]). Population variations between 1980 and 1992 were derived from census data (U.S. Bureau of the Census 1993).

A.5 FOOD PRODUCTION VERSUS FOOD CONSUMPTION

The total food production for the region within 80 km around each site was the product of the NRC state-wide productivity figure for each state and a site productivity factor. At some sites, this total production may be more or less than the total consumption, i.e., population times average individual consumption (see Table A.1 for generic consumption rates). When production was more than consumption for a site, it was assumed that all persons in the 2-to-80-km region ate contaminated food; when production was less than consumption, it was assumed that dilution would occur because uncontaminated food would be shipped into the area from outside. Thus, the calculated doses for a particular food type were reduced in proportion to the ratio of production divided by consumption (production/consumption less than 1).

The dose to persons outside the 80-km limit from food shipped out of the region, in the case of production being greater than consumption, is not included in this report because we are concerned only with the dose within the 80-km radius. These production/consumption factors are given for reference as footnotes to the tables showing airborne dose commitment in the Site Summaries section (Section 2.0).

A.6 DRINKING WATER

The population between 2-km and 80-km distance from each plant site exposed to drinking water contaminated with released radionuclides was generally obtained from the environmental statement (ES) for the plant. For all sites located on salt water, it was assumed that no dose was received from drinking water. The generic consumption rates used for drinking water are given in Tables A.1 for population doses and A.2 for individual doses.

The radionuclide concentration in the drinking water consumed by a population downstream from a site was usually estimated by assuming 100% mixing of the plant effluent with the river. For lakes, an overall dilution factor was estimated from dilution factors given in the licensee ES or ODCM for each population center along the shore (within 80 km) that consumes the contaminated lake water. These individual factors were weighted by population

---

(a) Letter from D. P. Cleary, U.S. Nuclear Regulatory Commission, to D.A. Baker, Pacific Northwest Laboratory, June 1987.

and averaged to obtain an effective dilution factor for the total population exposed to contaminated drinking water. For individual doses, the mixing ratio (reciprocal of the dilution factor) taken from the ODCM was used.

A.7 AQUATIC FOOD

Wherever possible, the fish-catch data from the licensee ES or ODCM were used to estimate aquatic food consumption rates for the population living within the region. When these data were not found in the ES or ODCM, the generic values of Table A.1 were used. For the individual 10 CFR 50, Appendix I dose estimates, the generic values of Table A.2 were used for all sites.

For population dose estimates, the average radionuclide concentration of the waters in which this food was harvested was estimated by assuming an additional dilution over the effluent flow from the reactor. For rivers, it was assumed that the fish were caught in waters in which the plant effluent was completely diluted. For lakes, an additional factor as given in the ES was used; when none was given in the ES or ODCM, a generic value of 0.01 was used. For ocean and bay sites, generic values of 0.001 and 0.002 were used for fish and invertebrates, respectively, if the ES or ODCM yielded no values for these parameters. Any exceptions to these general guidelines are explained in notes at the bottom of the page.

For individual dose estimates, the mixing ratio designated by the licensee ODCM for the site was used to determine typical water concentrations for the fish and shellfish (invertebrate) pathway.

A.8 IRRIGATED FOOD PRODUCTS

Only a few sites reported the irrigation pathway. This pathway was evaluated for the individual only. Assumptions of Regulatory Guide 1.109 (NRC 1977a) were used. Site-specific values for irrigation rate, mixing ratio, and growing period were taken from the licensee ODCM when available.

A.9 SHORELINE RECREATION

The shoreline recreation pathway dose was not estimated for populations, because it is trivial compared with the drinking water and aquatic food pathways. However, for individual dose estimates, the shoreline path was included, even though it was not reported for many sites by the licensees. The mixing ratio for this path was assumed to be the same as for fish when no licensee value was reported. Occupancy factors used for this path are listed in Table A.2 (taken from NRC 1977a). As expected, for all sites, this pathway proved insignificant, assuming only a 1-year buildup of concentration in the shoreline sediments and NRC occupancy factors.

A.10 REFERENCES

Brauner, A. 1982. Population Estimates, Nuclear Power Plant Nearby Population Concentrations. U.S. Nuclear Regulatory Commission, Washington, D.C.

Eckerman, K. F., F. J. Congel, A. K. Roecklein, and W. J. Pasciak. 1980. Users Guide to GASPAR Code. NUREG-0597, U.S. Nuclear Regulatory Commission, Washington, D.C.

Hoenes, G. R., and J. K. Soldat. 1977. Age-Specific Radiation Dose Commitment Factors for a One-Year Chronic Intake. NUREG-0172, U.S. Nuclear Regulatory Commission, Washington, D.C.

Sagendorf, J. F., J. T. Goll, and W. F. Sandusky. 1982. XOQDOQ: Computer Program for the Meteorological Evaluation of Routine Effluent Releases at Nuclear Power Stations. NUREG/CR-2919, PNL-4380, U.S. Nuclear Regulatory Commission, Washington, D.C.

Sinisgalli, A. 1982. 1980 Residential Population Estimates, 0-80 Kilometers for Nuclear Power Plants. U. S. Nuclear Regulatory Commission, Washington, D.C.

Strenge, D. L., T. J. Bander, and J. K. Soldat. 1987. GASPAR II - Technical Reference and User Guide. NUREG/CR-4653, PNL-5907, U.S. Nuclear Regulatory Commission, Washington, D.C.

Tichler, J., K. Doty, and J. Congemi. 1995. Radioactive Materials Released from Nuclear Power Plants, Annual Report 1992. NUREG-CR-2907, BNL-NUREG-51581, Vol. 13, U.S. Nuclear Regulatory Commission, Washington, D.C.

U.S. Bureau of the Census. 1975. Population Estimates and Projections, Current Population Reports. Series P-25, No. 541, U.S. Government Printing Office, Washington, D.C.

U.S. Bureau of the Census. 1991. State and Metropolitan Area Data Book, 1991. U.S. Government Printing Office, Washington, D.C.

U.S. Bureau of the Census. 1993. Statistical Abstract of the United States: 1993, The National Data Book. U.S. Government Printing Office, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1977a. Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I, Revision 1. Regulatory Guide 1.109, NRC, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1977b. Methods for Estimating Atmospheric transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors, Revision 1. Regulatory Guide 1.111, NRC, Washington, D.C.

DISTRIBUTION

No. of Copies

OFFSITE

U.S. Nuclear Regulatory Commission
Division of Freedom of Information and Publication Services
Washington, D.C. 20555

Steve Baker
ICF Kaiser Engineers
601 Williams
Richland, WA 99352

Cathy Behling
263 Old Limekiln Road
Chalsont, PA 18914

Deborah Beres
50 Wisteria St.
Edison, NJ 08817

W. E. Bolch
University of Florida
Department of Environmental Engineering Sciences
AP Black Hall
Gainesville, FL 32611

F. J. Borst
Fort St. Vrain Nuclear Generating Station
16805 Weld County Road 19 1/2
Platteville, CO 80651

K. R. Bräutigam
Kernsforschungszentrum Karlsruhe
7514 Eggenstein - Leopoldshafen
Karlsruhe
Federal Republic of Germany

H. D. Brenk
Zentralabteilung
Strahlenschutz der Kernforschungsanlage Jülich GmbH
Postfach 1913 - 5170 Jülich 1
Federal Republic of Germany

No. of Copies

J. T. Brennen, M.D.
Radiation Management Corp.
3508 Market Street
Philadelphia, PA 19104

A. J. Colli
Office of Air and Radiation
U.S. Environmental Protection Agency
Washington, DC 20460

R. M. DeNulman
Instituto Nacional De Investigaciones Nucleares
Benjamin Franklin 161
MEXICO 11, D. F.

T. Dipierro
Building 475
Brookhaven National Laboratory
Upton, NY 11973

P. J. Dostie
State of Maine
Department of Human Services
Augusta, ME 04333

D. E. Dunning, Jr.
Evaluation Research Corporation
800 Oak Ridge Turnpike Suite 501
Oak Ridge, TN 37830

K. F. Eckerman
Oak Ridge National Laboratory
P.O. Box X
Oak Ridge, TN 37830

Ecological Sciences Information Center
Oak Ridge National Laboratory
Oak Ridge, TN 37830

T. H. Essig
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

No. of
Copies

R. J. Feinberg
Knolls Atomic Power Laboratory
General Electric Company
Box 1072
Schenectady, NY 12301

B. Feldman
Energy Systems Research Group
120 Milk Street
Boston, MA 02107

J. W. Ferman
Division of Water Quality
Minnesota Pollution Control Agency
1935 West County Road B-2
Roseville, MN 55113

Greg Gowdy
Nuclear Training Center
P.O. Box 88
Jenkinsville, SC 29065

J. F. Greene
Mecklenburg County Department of Environmental Health
1200 Blythe Boulevard
Charlotte, NC 28203

D. Hahn
Division of Radiation Health
Bureau of Environmental Health
Michigan Department of Public Health
3500 North Logan
Lansing, MI 48906

William Hallenbeck
U. of Illinois at Chicago
School of Public Health
Box 6998
Chicago, IL 60680

E. Hewitt
FMC Corporation
Box 41111
Pocatello, ID 83202

F. O. Hoffman
Senes Oak Ridge, Inc.
677 Emory Valley Road, Suite C
Oak Ridge, TN 37830

No. of
Copies

Mark Howard
Congressional Info. Service
4520 EW Highway
Suite 800
Bethesda, MD 20814-3389

L. Huebner
Hazleton Environmental Sciences
1500 Frontage Road
Northbrook, IL 60062

A. P. Hull
Brookhaven National Laboratory
Upton, NY 11973

J. Iacovino
Nuclear Safety and Licensing
Westinghouse Electric Corporation
Box 355
Pittsburgh, PA 15230

M. L. Joshi
Government of India
Department of Atomic Energy
Rajasthan Atomic Power Project
Nuclear Training Centre
INDIA

B. Kahn
Environmental Resources Center
Georgia Institute of Technology
Atlanta, GA 30332

20 S. P. Klementowicz
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

M. Laraia
C.N.E.N., Disp/Centr
00198 Roma
Viale Regina Margherita, 125
ITALY

L. Lewis
Duke Power Company
422 S. Church Street
Charlotte, NC 28242

No. of
Copies

S. Mattsson
Lunds Universitet
Radiofysiska Institutionen
Lasarettet, S-221 85 Lund
SWEDEN

H. R. Meyer
Oak Ridge National Laboratory
Oak Ridge, TN 37830

Sara Miller
Congressional Information
Service
4520 East West Highway
Washington, DC 20014

S. Morris
Building 475
Brookhaven National Laboratory
Upton, NY 11973

J. Nagy
Building 475
Brookhaven National Laboratory
Upton, NY 11973

L. Namestek, Ing.
Prager Gasse 11/5
A-3002 Purkersdorf
AUSTRIA

K. K. Narayanan
Bhabha Atomic Research Centre
Bombay - 400 085
INDIA

W. Ogg
PSD CRBRP
P.O. Box U
Oak Ridge, TN 37830

G. V. Oldfield
WPPSS
Mail Drop 1020
P. O. Box 968
Richland, WA 99352

K. C. Pillai
Health Physics Division
Bhabha Atomic Research Centre
Bombay - 400 085
INDIA

No. of
Copies

C. Pomroy
Health and Welfare Canada
Health Protection Branch
Radiation Protection Bureau
Ottawa, K1A 1C1
CANADA

G. Poretti
Radiuminstitut
Inselspital
P. O. Box 9
CH-3010 BERNE
SWITZERLAND

J. W. Poston
School of Nuclear Engineering
Georgia Institute of Technology
Atlanta, GA 30332

R. R. Roselius
Consumers Power Company
Midland Plant Operations
P.O. Box 1593
Midland, MI 48640

V. Sailor
Building 701
Brookhaven National Laboratory
Upton, NY 11973

Leland Schneider
American Nuclear Insurers
The Exchange, Suite 245
270 Farmington Avenue
Farmington, CT 06032

J. Tadmor
Advisory Committee for
Nuclear Safety
Soreq Nuclear Research Centre
Yavne
ISRAEL

T. Thomas
National Institutes of Health
Landow Building, Room 3C16
9000 Rockville Pike
Bethesda, MD 20014

J. Tichler
Building 51
Brookhaven National Laboratory
Upton, NY 11973

No. of
Copies

A. N. Tshaeche
Winco, MS 5209
Box 4000
Idaho Falls, ID 83403

F. Valerio
Universita Di Genova
Instituto Di Oncologia
16132 Genova
Viale Benedetto XV N.10
ITALY

P. Vasudev
Environment Canada
Place Vincent Massey
45th Floor
Ottawa, K1A 1C8
CANADA

G. H. Whipple
3301 Rutland Loop
Tallahassee, FL 32312

E. I. White
9139 S. Bentham Avenue
Sandy, UT 84093

C. A. Willis
Office of Nuclear Reactor
Regulation
U.S. Nuclear Regulatory
Commission
Washington, DC 20555

F. E. Yost
Utility Data Institute, Inc.
2011 I Street, NW, Suite 700
Washington, DC 20006

ONSITE

2 Westinghouse Hanford Company

H. R. Brager HO-36
P. R. Prevo N1-73

50 Pacific Northwest Laboratory

R. L. Aaberg (40) K3-54
M. E. Cunningham K8-43
K. L. Soldat K3-53
R. A. Walters K1-50
Information Release (7)

NRC FORM 335 (2-89) NRCM 1102, 3201, 3202

U.S. NUCLEAR REGULATORY COMMISSION

BIBLIOGRAPHIC DATA SHEET

(See instructions on the reverse)

1. REPORT NUMBER (Assigned by NRC. Add Vol., Supp., Rev., and Addendum Numbers, if any.)

NUREG/CR-2850
PNL-4221
Vol. 14

2. TITLE AND SUBTITLE

Dose Commitments Due to Radioactive Releases from Nuclear Power Plant Sites in 1992

3. DATE REPORT PUBLISHED

MONTH	YEAR
March	1996

4. FIN OR GRANT NUMBER

J2138

5. AUTHOR(S)

Aaberg, R.L., D.A. Baker

6. TYPE OF REPORT

7. PERIOD COVERED *(Inclusive Dates)*

1992

8. PERFORMING ORGANIZATION — NAME AND ADDRESS *(If NRC, provide Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address; if contractor, provide name and mailing address.)*

Pacific Northwest National Laboratory
Richland, WA 99352

9. SPONSORING ORGANIZATION — NAME AND ADDRESS *(If NRC, type "Same as above"; if contractor, provide NRC Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address.)*

Division of Radiation Safety and Safeguards
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

10. SUPPLEMENTARY NOTES

S.P. Klementowicz, NRC Project Manager

11. ABSTRACT *(200 words or less)*

Population and individual radiation dose commitments have been estimated from reported radionuclide releases from commercial power reactors operating during 1992. Fifty-year dose commitments for a one-year exposure from both liquid and atmospheric releases were calculated for four population groups (infant, child, teenager, and adult) residing between 2 and 80 km from each of 72 reactor sites. This report tabulates the results of these calculations, showing the dose commitments for both water and airborne pathways for each age group and organ. Also included for each of the sites is an estimate of individual doses that are compared with 10 CFR Part 50, Appendix I design objectives. The total collective dose commitments (from both liquid and airborne pathways) for each site ranged from a high of 3.7 person-rem to a low of 0.0015 person-rem for the sites with plants in operation and producing power during the year. The arithmetic mean was 0.66 person-rem. The total population dose for all sites was estimated at 47 person-rem for the 130 million people considered at risk. The individual dose commitments estimated for all sites were below the Appendix I design objectives.

12. KEY WORDS/DESCRIPTORS *(List words or phrases that will assist researchers in locating the report.)*

Population dose commitments
Radionuclide releases
Liquid and atmospheric releases

13. AVAILABILITY STATEMENT

Unlimited

14. SECURITY CLASSIFICATION

(This Page)

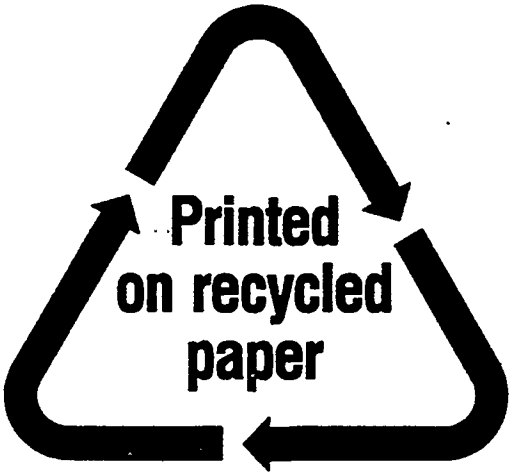
Unclassified

(This Report)

Unclassified

15. NUMBER OF PAGES

16. PRICE



Federal Recycling Program