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Population Dose Commitments Due to Radioactive Releases from Nuclear Power Plant Sites in 1986

Prepared by D. A. Baker

Pacific Northwest Laboratory
Operated by
Battelle Memorial Institute

Prepared for
U.S. Nuclear Regulatory Commission

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Population Dose Commitments Due to Radioactive Releases from Nuclear Power Plant Sites in 1986

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PREVIOUS REPORTS IN THIS SERIES

1. Population Dose Commitments Due to Radioactive Releases from Nuclear Power Plant Sites in 1975, PNL-2439, October 1977.
2. Population Dose Commitments Due to Radioactive Releases from Nuclear Power Plant Sites in 1976, NUREG/CR-1125, PNL-2940, December 1979.
3. Population Dose Commitments Due to Radioactive Releases from Nuclear Power Plant Sites in 1977, NUREG/CR-1498, PNL-3324, October 1980.
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5. Population Dose Commitments Due to Radioactive Releases from Nuclear Power Plant Sites in 1979, NUREG/CR-2850, PNL-4221, Vol. 1, December 1982.
6. Population Dose Commitments Due to Radioactive Releases from Nuclear Power Plant Sites in 1980, NUREG/CR-2850, PNL-4221, Vol. 2, August 1983.
7. Population Dose Commitments Due to Radioactive Releases from Nuclear Power Plant Sites in 1981, NUREG/CR-2850, PNL-4221, Vol. 3, January 1985.
8. Population Dose Commitments Due to Radioactive Releases from Nuclear Power Plant Sites in 1982, NUREG/CR-2850, PNL-4221, Vol. 4, June 1986.
9. Population Dose Commitments Due to Radioactive Releases from Nuclear Power Plant Sites in 1983, NUREG/CR-2850, PNL-4221, Vol. 5, January 1987.
10. Population Dose Commitments Due to Radioactive Releases from Nuclear Power Plant Sites in 1984, NUREG/CR-2850, PNL-4221, Vol. 6, January 1988.
11. Population Dose Commitments Due to Radioactive Releases from Nuclear Power Plant Sites in 1985, NUREG/CR-2850, PNL-4221, Vol. 7, August 1988.

ABSTRACT

Population radiation dose commitments have been estimated from reported radionuclide releases from commercial power reactors operating during 1986. Fifty-year dose commitments for a one-year exposure from both liquid and atmospheric releases were calculated for four population groups (infant, child, teen-ager and adult) residing between 2 and 80 km from each of 66 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 a histogram showing the fraction of the total population within 2 to 80 km around each site receiving various average dose commitments from the airborne pathways.

The total dose commitments (from both liquid and airborne pathways) for each site ranged from a high of 31 person-rem to a low of 0.0007 person-rem for the sites with plants operating throughout the year with an arithmetic mean of 1.7 person-rem. The total population dose for all sites was estimated at 110 person-rem for the 140 million people considered at risk.

The site average individual dose commitment from all pathways ranged from a low of 2×10^{-6} mrem to a high of 0.02 mrem. No attempt was made in this study to determine the maximum dose commitment received by any one individual from the radionuclides released at any of the sites.

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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 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 1986. In this study, as in those previous, 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), teen-ager (11 to 17 yr), and adult (17 yr and older).

The particular organs of reference in this study are listed in Table 1. The major pathways by which radionuclides travel from the reactor to the individual receptors are shown in Table 2. Other possible liquid pathways such as direct exposure from waterborne activities (swimming, boating, shoreline recreation) and internal exposure through ingestion of food produced using contaminated irrigation water were not included; we have found from past experience that the doses from these pathways are generally much smaller than the doses from the pathways considered in this study.

TABLE 1. Organs Considered in This Study

<u>Organs Affected by Airborne Releases</u>	<u>Organs Affected by Waterborne Releases</u>
Total body	Total body
Thyroid	Thyroid
Bone	Bone
GI tract	GI tract
Liver	Liver
Lung	

-
- (a) Operated by Battelle Memorial Institute for the Department of Energy.
- (b) As used in this report, dose commitment describes the total-body 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 2. Pathways Considered in This Study by Which Radionuclides Travel from Reactors to Persons

<u>Pathways for Airborne Releases</u>	<u>Pathways for Waterborne Releases</u>
Air submersion	Ingestion of drinking water
Ground irradiation	Ingestion of fish and invertebrates
Inhalation	
Ingestion of food crops and animal products	

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 operators and subsequently published in an NRC public document (Tichler, et al. 1988).

The regional population for which we estimated dose commitments included those persons estimated to be living in a region between 2 and 80 km around the reactor sites during 1986. 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 NRC or the utility. To calculate the doses, we used models approved by the NRC. We incorporated these models into two computer programs to expedite the dose calculations involved for each site.

Site-specific parameters other than releases, meteorology, and population were obtained from environmental statements [both final (FES) and draft (DES)] for the various reactors when available (see Table 3). Such parameter values include the total population drinking contaminated water, river flow, dilution flow from the reactors (for sites not on rivers), fish and invertebrate harvest for the region, and dilution factors for drinking water and 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 1986 are listed in Table 4. Populations at risk and the dose commitments derived in the study are also shown in this table.

**TABLE 3. Environmental Statements for Power Plants
Included in This Study**

Site Number	Regulator Site	Docket Number	Date	Remarks
1	Big Rock Point			
2	Brown's Ferry		JUL 71	ES not available ES Published by Town Valley Authority Draft ES
3	Cooper	50-298	Feb 73	
4	Dresden	50-237, 50-249	Nov 73	
5	Beaver Valley	50-334	JUL 73	
6	Humboldt Bay			Shut down - excluded from this survey Draft ES
7	LaCrosse	50-409	JUN 76	
8	Allistone Point	50-245, 50-336	JUN 73	
9	Monticello	50-263	Nov 72	
10	Nine Mile Point	50-220	JAN 74	
11	Oyster Creek	50-319	Dec 74	
12	Peach Bottom	50-277, 50-278	Apr 73	
13	Pilgrim	50-293	May 73	
14	Quad Cities	50-254, 50-265	Sep 72	
15	Vermont Yankee	50-271	JUL 72	
16	St. Lucie	50-335	JUN 73	
17	Brunswick	50-324, 50-325	JUN 73	Draft ES
18	Duane Arnold	50-331	Mar 75	
19	J. A. Fitzpatrick	50-333	Mar 73	
20	E. I. Hatch	50-321	OCT 72	
21	Arkansas One	50-313, 50-368	Feb 73, Sep 72	
22	Connecticut Yankee (Middletown Neck)	50-213	OCT 73	
23	Fort Calhoun	50-265	AUG 72	
24	H. B. Robinson	50-261	Apr 74	
25	Indian Point	50-247	Sep 73	FES of Indian Point 2 used
26	Salmon	50-272, 50-311	Apr 73	
27	Kewaunee	50-305	Dec 72	
28	Maine Yankee	50-309	JUL 72	
29	Oconee	50-269, 50-270, 50-287	Mar 72	
30	Palisades	50-255	JUN 72	
31	Point Beach	50-286, 50-301	May 72	
32	Prairie Island	50-282, 50-306	May 73	
33	R. E. Ginna	50-244	Dec 73	
34	San Onofre	50-206	OCT 73	
35	Surry	50-281	JUN 72	FES of Surry 2 used
36	Three Mile Island	50-289	Dec 72	
37	Turkey Point	50-250, 50-251	Feb 72	Draft ES ES not available
38	Yankee Rowe			
39	Zion	50-295, 50-304	Dec 72	
40	Calvert Cliffs	50-317	Apr 73	
41	Cook	50-315	AUG 73	
42	Trojan	50-344	JAN 73	Draft ES
43	Cancho Seco	50-312	Mar 73	
44	Crystal River	50-302	May 73	
45	DeWitt-Besse	50-348	Mar 73	
46	J. M. Farley	50-348, 50-364	JUN 72	
47	North Anna	50-336, 50-339	Apr 73	
48	Seminole	50-327, 50-328	Feb 74	
49	McGuire	50-369, 50-370	Apr 76	
50	LaSalle	50-373, 50-374	Nov 76	
51	Summer	50-395	JAN 73	
52	Susquehanna	50-387, 50-388	JUN 73	
53	Grand Gulf	50-416, 50-417	AUG 73	
54	Callaway	50-483, 50-496	Mar 75	
55	Limerick	50-352, 50-353	Nov 73	
56	Diablo Canyon	50-275, 50-323	May 73	
57	WMP-2	50-397	Dec 72	
58	Palo Verde	STN 50-526, 529, 530	Sep 75	
59	Byron	STN 50-454, 455	JUL 74	
60	Waterford	50-382	Mar 73	
61	Wolf Creek	STN 50-482	JUN 82	
62	Catawba	50-413, 50-414	Dec 73	
63	Fermi (b)	50-341	JUL 72	
64	Shoreham (b)	50-322	Sep 72	
65	Hope Creek (b)	50-354, 50-755	Feb 74	
66	Perry (b)	50-440, 50-441	Apr 74	
67	Elver Bern (b)	50-458, 50-459	Sep 74	

(a) Environmental Statement.
(b) Sites added for 1986.

TABLE 4. Reactor Characteristics and Population Total-Body Dose Commitments, 1986

SITE	UNIT	TYPE	Licensed Thermal Power (MW)	Electric Energy Generation 1986 (TWh/yr) (a)	Population Dose Commitment (per 500-yr)			Population at Risk	Average Individual Total-Body Dose Commitment (mrem)
					Liquor	Air	Total		
Arkansas One	1	PWR	2568	3.87					
	2	PWR	2815	5.31					
Arkansas One	TOTAL		5383	8.88	4.7	0.035	4.7	1.915	2.5E-2
Beaver Valley	1	PWR	2652	4.78	0.024	0.047	0.071	3.6E6	2.0E-5
Big Rock Point (b)	1	BWR	240	0.506	0.27	1.7	2.0	1.7E5	1.2E-2
Browns Ferry	1	BWR	3293	0.					
	2	BWR	3293	0.					
	3	BWR	3293	0.					
Browns Ferry	TOTAL		9879	0.	2.6	0.04	2.6	7.4E5	3.5E-3
Brunswick	1	BWR	2436	5.97					
	2	BWR	2436	2.91					
Brunswick	TOTAL		4872	8.83	0.0021	0.71	0.71	2.3E5	3.1E-3
Byron	1	PWR	3411	7.40	0.49	0.012	0.50	9.4E5	5.4E-4
Callaway	1	PWR	3411	7.20	0	0.038	0.038	3.7E5	1.0E-4
Calvert Cliffs	1	PWR	2700	5.83					
	2	PWR	2700	7.01					
Calvert Cliffs	TOTAL		5400	12.84	0.55	0.26	0.81	2.8E6	2.9E-4
Catawba	1	PWR	3411	6.48	2.0	0.15	2.2	1.6E6	1.4E-3
Cook	1	PWR	3250	6.65					
	2	PWR	3301	4.34					
Cook	TOTAL		6641	10.99	0.16	0.0095	0.17	1.1E6	1.5E-4
Cooper	1	BWR	2381	4.05	0.028	0.014	0.042	1.7E5	2.4E-4
Crystal River	3	PWR	2452	2.65	2.3	0.11	2.4	4.4E5	5.5E-3
Davis-Besse	1	PWR	2772	0.003	0.054	0.0028	0.057	1.8E6	3.2E-5
Diablo Canyon	1	PWR	3338	5.29					
	2	PWR	3411	6.50					
Diablo Canyon	TOTAL		6749	11.84	0.013	0.024	0.037	3.0E5	1.3E-4
Dresden	1	BWR	700	0					
	2	BWR	2527	4.65					
	3	BWR	2527	1.46					
Dresden	TOTAL		5754	6.11	0	0.21	0.21	6.4E6	3.3E-5
Duane Arnold	1	BWR	1638	3.01	0	0.062	0.062	5.8E5	1.1E-4
J. M. Farley	1	PWR	2652	5.73					
	2	PWR	2652	5.96					
J. M. Farley	TOTAL		5304	11.69	0.015	0.076	0.091	3.7E5	2.5E-4
Fermi	2	BWR	3292	0.0	0.07	0	0.07	4.9E6	1.4E-5
J. A. Fitzpatrick	1	BWR	2436	6.02	0.0015	0.098	0.10	8.5E5	1.2E-4
Fort Calhoun	1	PWR	1420	3.61	0.21	0.0060	0.22	7.6E5	2.8E-4
R. J. Ginna	1	PWR	1520	3.61	0.25	0.024	0.27	1.2E6	2.3E-4
Grand Gulf	1	BWR	3833	4.16	0.0002	0.0006	0.0007	3.4E5	2.2E-6
Haddam Neck	1	PWR	1825	2.13	0.19	0.35	0.54	3.5E6	1.6E-4
E. I. Hatch	1	BWR	2436	3.65					
	2	BWR	2436	3.62					
E. I. Hatch	TOTAL		4872	7.27	2.0	0.15	2.8	3.4E5	8.2E-3
Hope Creek	1	BWR	3293	1.03	0.051	0.0083	0.059	4.8E6	1.3E-5
Indian Point	1	PWR	615	0					
	2	PWR	2758	3.81					
	3	PWR	2760	5.53					
Indian Point	TOTAL		6133	9.34	0.50	2.7	3.2	1.5E7	2.1E-4
Kewaunee	1	PWR	1850	3.85	0.91	0.016	0.93	8.2E5	1.5E-3
LaCrosse (b)	1	BWR	165	0.157	0.60	0.21	0.81	3.5E5	2.3E-3
LaSalle	1	BWR	3323	7.02					
	2	BWR	3293	7.72					
LaSalle	TOTAL		6616	14.74	0	0.27	0.27	1.0E6	2.6E-4
Limerick		BWR	3293	6.85	0.099	0.11	0.5	6.8E6	3.1E-5
Maine Yankee	1	PWR	2440	6.24	0.0009	0.023	0.024	6.2E5	3.9E-5
McGuire	1	PWR	3411	8.16					
	2	PWR	3411	4.21					
McGuire	TOTAL		6822	11.37	31.	0.10	31.	1.7E6	1.6E-2
Millstone	1	BWR	2011	5.25					
	2	PWR	2700	5.16					
	3	PWR	3411	5.86					
Millstone	TOTAL		4571	16.27	0.032	1.2	1.2	2.6E6	4.8E-4
Monticello	1	BWR	1670	3.38	0	0.096	0.096	2.2E6	4.3E-5
Nine Mile Point	1	BWR	1850	2.15	0.0013	0.023	0.024	8.5E5	2.9E-5
North Anna	1	PWR	2775	6.31					
	2	PWR	2775	6.02					
North Anna	TOTAL		5550	12.33	1.6	0.075	1.7	1.1E6	1.5E-3

TABLE 4. (Contd)

SITE	UNIT	TYPE	Licensed Thermal Power (MW)	Electric Energy Generation 1986 (TW-hr) (a)	Population Dose Commitment (DE/1001-100)			Population at Risk	Average Individual To 1-Body Dose Commitment (mrem)
					LIQUID	AIR	TOTAL		
Ocoee	1	PWR	2568	4.78					
	2	PWR	2568	5.80					
	3	PWR	2568	5.06					
Ocoee	TOTAL		7704	16.64	5.3	0.43	5.9	6.765	6.1E-3
Oyster Creek	1	BWR	1630	1.30	0.00002	25	25	3.816	6.9E-5
Palisades	1	PWR	2530	0.841	0.12	0.0023	0.12	1.016	1.2E-4
Palo Verde	1	PWR	3800	8.50	0	0.13	0.13	1.216	1.1E-4
Peach Bottom	2	BWR	3293	6.90					
	3	BWR	3293	4.85					
Peach Bottom	TOTAL		6586	11.75	0.61	4.1	4.7	4.316	1.1E-3
Perry	1	BWR	3575	0	0.0005	0.0007	0.0012	2.416	4.9E-7
Pilgrim	1	BWR	1998	1.03	0.0026	0.018	0.019	4.416	4.3E-6
Point Beach	1	PWR	1518	3.77					
	2	PWR	1518	3.42					
Point Beach	TOTAL		3036	7.19	0.042	0.027	0.069	6.316	1.1E-4
Prairie Island	1	PWR	1650	3.82					
	2	PWR	1650	3.88					
Prairie Island	TOTAL		3300	7.68	0.0060	0.057	0.063	2.316	2.8E-5
Quad Cities	1	BWR	2511	4.42					
	2	BWR	2511	4.72					
Quad Cities	TOTAL		5022	9.14	0.62	0.18	0.80	7.316	1.1E-3
Rancho Seco	1	PWR	2772	0	0.0090	0.015	0.024	2.016	1.2E-5
River Bend	1	BWR	2894	3.00	0.0004	0.17	0.17	7.716	2.2E-4
H. B. Robinson	2	PWR	2200	4.80	0.092	0.013	0.10	7.116	1.5E-4
St. Lucie	1	PWR	2560	7.05					
	2	PWR	2700	6.15					
St. Lucie	TOTAL		5260	13.20	0.0027	1.3	1.3	6.816	1.9E-3
Salmon	1	PWR	3338	7.08					
	2	PWR	3338	5.31					
Salmon	TOTAL		6676	12.39	0.45	0.27	0.72	4.816	1.5E-4
San Onofre	1	PWR	1347	0.674					
	2	PWR	3410	6.36					
	3	PWR	3390	6.76					
San Onofre	TOTAL		8147	13.39	0.026	0.54	0.57	5.316	1.1E-4
Sequoyah	1	PWR	2815	0					
	2	PWR	2815	0					
Sequoyah	TOTAL		5630	0	0.18	0.017	0.20	2.616	2.3E-4
Shoreham	1	BWR	1218	0	0.0069	0	0.0069	5.216	1.3E-6
Summer	1	PWR	2775	7.18	3.6	0.0002	3.6	0.816	4.1E-3
Surry	1	PWR	2441	4.49					
	2	PWR	2441	4.50					
Surry	TOTAL		4882	8.99	1.6	0.10	1.7	1.816	9.3E-4
Susquehanna	1	BWR	3293	5.83					
	2	BWR	3293	5.45					
Susquehanna	TOTAL		6586	11.28	0.045	0.036	0.081	1.516	5.4E-5
Three Mile Island	1	PWR	2535	4.82					
	2	PWR	2772	0					
Three Mile Island	TOTAL		5307	4.82	0.060	0.51	0.57	2.116	2.7E-4
Trojan	1	PWR	3411	7.09	0.030	0.073	0.10	1.416	7.2E-5
Turkey Point	3	PWR	2200	4.51					
	4	PWR	2200	1.72					
Turkey Point	TOTAL		4400	6.23	0.0032	0.20	0.20	2.816	7.2E-5
Vermont Yankee	1	BWR	1563	2.06	0	0.12	0.12	1.416	8.5E-5
Waterford	3	PWR	3390	7.30	0.059	0.74	0.80	1.916	4.3E-4
WNP-2	1	BWR	3323	5.18	0.0004	0.0085	0.0089	2.716	5.3E-5
Wolf Creek	1	PWR	3411	6.97	0.34	0.056	0.40	1.916	2.1E-3
Yankee Rowe	1	PWR	600	1.39	0.32	0.057	0.38	1.616	2.3E-4
Zion	1	PWR	3250	4.90					
	2	PWR	3250	7.33					
Zion	TOTAL		6500	12.23	5.7	0.34	6.0	7.216	8.4E-4
TOTAL FOR ALL SITES				407.37	71	44	110	1.416	---
Arithmetic Mean				6.2	1.1	0.66	1.7	2.116	1.7E-3
Geometric Mean				0.35	0.078	0.076	0.27	1.216	2.2E-4

(a) 1 TW-hr = 3.6E15 Joules

(b) Does not have charcoal debr' beds in the gaseous effluent line from air ejector.

Site-Dependent Parameters

In the Site Summaries section, the location (including latitude and longitude) for each reactor site and the estimated 1986 population within 2 to 80 km around each site is given. In addition, the locations of major metropolitan centers within 80 km are listed along with their 1986 extrapolated populations. The populations of the Standard Metropolitan Statistical Areas (SMSA) are given where applicable. 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.

Various site-dependent factors associated with the waterborne pathways are presented next. For lake and ocean sites, we used the average dilution of plant effluents for the year 1986 specified by Tichler, et al. (1988). For river sites, the average annual river flow is tabulated. This flow was used in place of a dilution flow from the plant to account for dilutions of liquid releases at the locations of probable intake of drinking water and aquatic food catch. Any exceptions to this scheme have been footnoted. Next is shown the estimated 1986 population utilizing drinking water drawn from supplies containing diluted effluents from the site. These are shown with an estimated dilution factor where applicable. Fish and invertebrate catch data taken from the respective plant environmental statement, when available (see Table 3), are listed next, along with estimated dilution factors for the lake and ocean sites. When site-specific fish and invertebrate catch data were not available, the generic consumption rates were used for the particular site. Sites on salt water were assumed to contribute no dose from drinking water. Any invertebrate catch from fresh water was not considered.

RESULTS

This report consists of a summary of values used for site-specific parameters at each site, as explained above, and the results of population dose commitment calculations. The population dose commitments are presented in two tables facing the page summarizing 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 airborne population dose commitments for each of 160 segments^(a) partitioning the region around the site were divided by the population residing within that segment to derive an average individual dose for that segment. These doses are summarized as a histogram showing percent of the population receiving a given dose level for each site. The fractional population dose from the waterborne pathway was not determined in this manner, because the NRC does not at present take into account the location of individuals exposed via this pathway, except those exposed through ingestion of drinking water.

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 31 to a low of 0.0007 person-rem for plants in operation during the whole year. The arithmetic mean for the total dose from liquid pathways (1.1 person-rem) and airborne pathways (0.66 person-rem) was 1.7 person-rem (see Table 4).

As in past years, most of the plants accounted for less than a person-rem to their surrounding population from plant releases of radionuclides into liquid effluent streams. Only one site had waterborne releases that resulted in population doses exceeding 10 person-rem. The site was McGuire (31 person-rem). This waterborne dose was due almost totally to radioactive cesium and tritium.

The doses from radionuclide releases from plant vents and/or stacks into the atmosphere also accounted for less than a person-rem for most sites. Only one site had airborne releases resulting in 10 or more person-rem. The site was Oyster Creek (25 person-rem). This airborne dose was the result of xenon-135 and krypton-88 and its daughters.

The total population dose commitments from all sites for 1986 were estimated to be 71 person-rem via waterborne pathways and 44 person-rem via airborne pathways (see Table 4).

(a) See Appendix for definition of segments.

Figure 1 is a histogram for all 66 sites taken together. We can see from this plot that about 86% of the total population at risk from airborne releases (130 million) would each receive a dose commitment of between 1×10^{-6} and 3×10^{-4} mrem. We can see further that about 3% receive a dose which is less than 3×10^{-6} mrem. Although not discernible from the plot, 0.3% received a dose of between 0.01 and 0.1 mrem. However, no attempt was made in this study to estimate the maximum dose commitment received by any one individual from the radionuclides released at any of the sites.

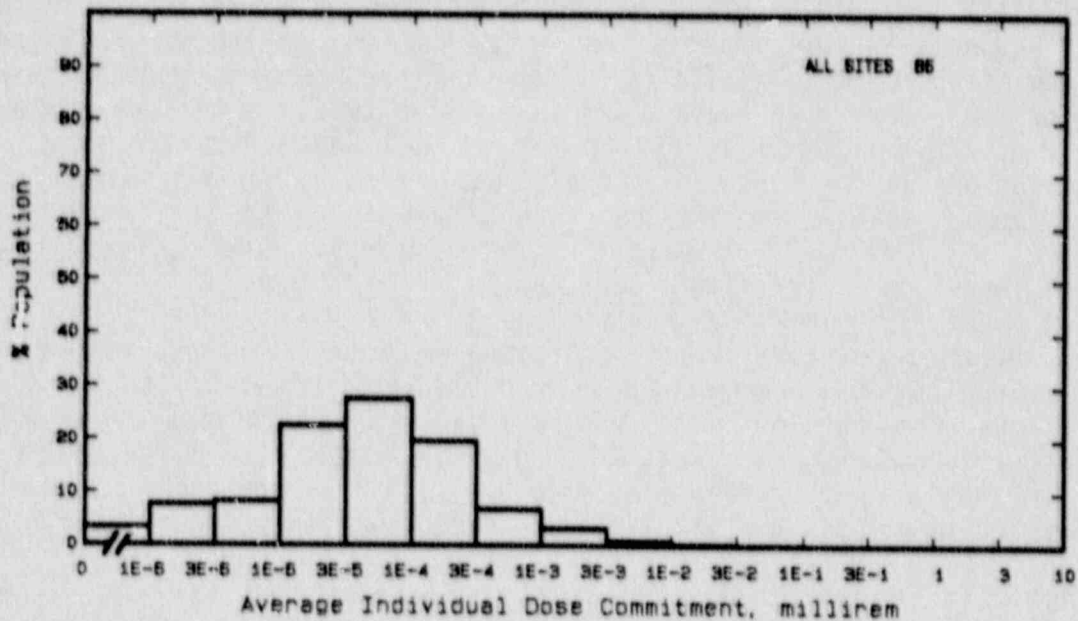


FIGURE 1. Fraction of Total Population Receiving Various Average Individual Total-Body Dose Commitments for All Sites

Figure 2 shows graphically by "Box-and-Whisker Plots" the wide range of the airborne population dose commitments for the reactor sites. The median, upper and lower quartiles and upper and lower octiles for the distribution of doses calculated for each of 160 segments are indicated for each site. The upper and lower octiles are shown as the horizontal bars on the "whiskers;" the upper and lower quartiles are indicated as the top and bottom of the "box." The median is indicated as the horizontal line inside the box. No airborne releases were reported for the Fermi and Shoreham sites for 1986; therefore, none are plotted.

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. We have compared dose commitments calculated in this

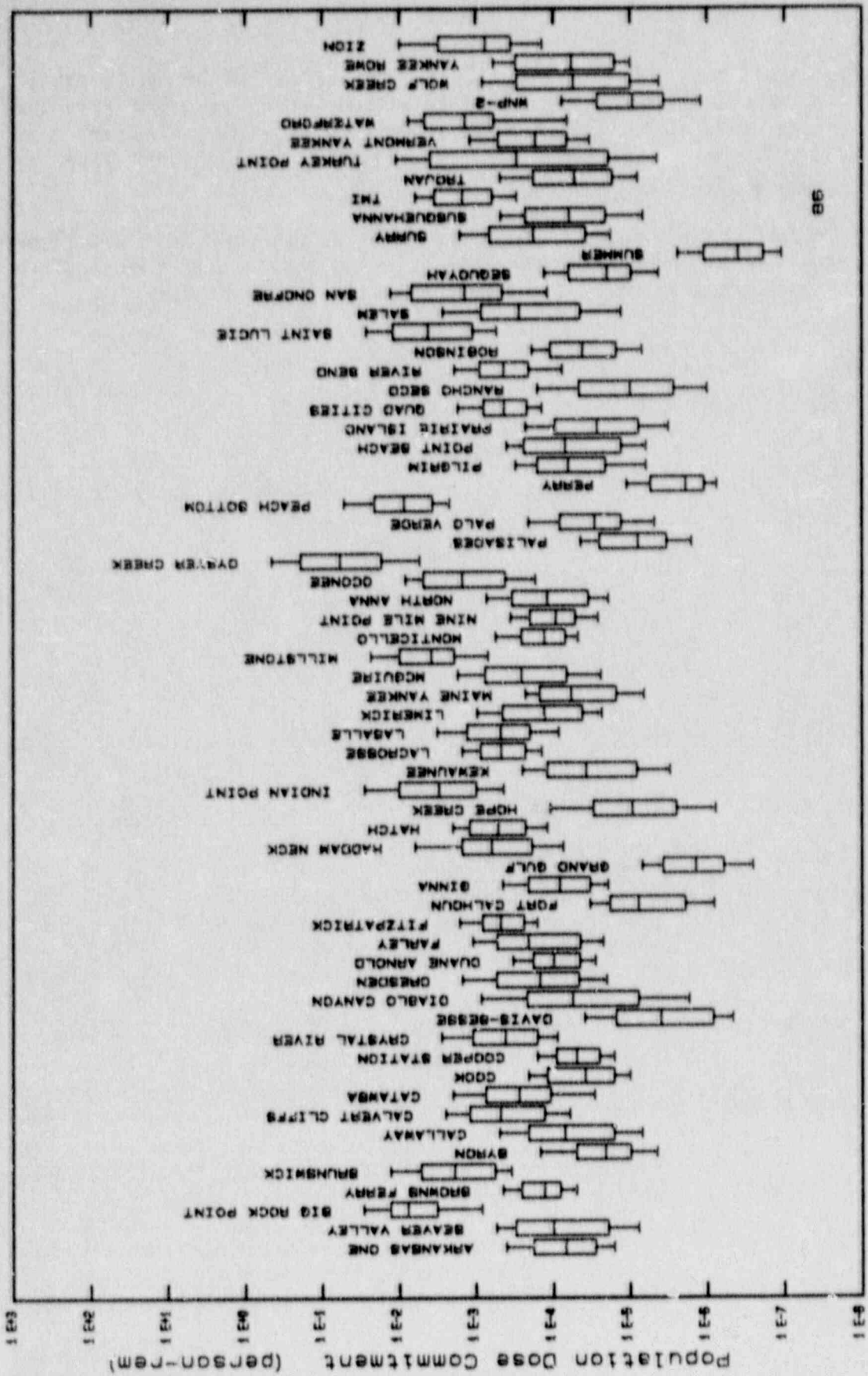


FIGURE 2. Airborne Population Dose Commitment for the Reactor Sites, 1986

study with annual background. However, this comparison is not quite exact, since these dose commitments are those 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 in the site summary 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.

SITE COMPARISONS

Compared to 1985, the total dose from waterborne pathways was lower (71 vs. 91), and also, the total dose from airborne pathways was lower (44 vs. 110). Table 5 compares the total population dose commitments estimated for the past 12 years. Note that totals are rounded.

TABLE 5. Comparison of Annual Population Dose Commitments for the Past 12 Years (person-rem)

	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Liquid	76	82	160	110	220	120	87	50	95	160	91	71
Air	<u>1300</u>	<u>390</u>	<u>540</u>	<u>530</u>	<u>1600</u>	<u>57</u>	<u>63</u>	<u>87</u>	<u>76</u>	<u>120</u>	<u>110</u>	<u>44</u>
TOTAL	1300	470	700	640	1800	180	150	140	170	280	200	110

The reactor sites are compared in Table 6 as to the total population dose over the years of this study, 1975-1986. The sites were placed within six groupings by person-rem depending on resulting population dose summed over each of the years through 1986:

- I Greater than 100
- II 31 - 100
- III 11 - 30
- IV 3.05 - 10
- V 1 - 3
- VI Less than 1

Table 6 shows the sites within the groups along with the reactor manufacturer, year of commercial operation commencement, and the 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 6. Total-Body Population Doses from Nuclear Power Plant Effluents During Normal Operations, (a) 1975-1986

Site	Year Commercial Operation	Total Person-rem for Year													TOTAL
		1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986		
I. >100 person-rem															
Allstone, GE, CE	71.75	750	160	220	200	1.8	2.9	4.8	1.8	0.96	1.3	0.26	1.2	1300	
Dresden, GE	60.70, 71	360	120	180	170	15	13	10	6.2	2.2	1.1	0.96	0.21	460	
Oyster Creek, GE	69	47	37	41	110	220	9.5	15	7.6	0.71	1.8	73	25.00	590	
Nine Mile Point, GE	69	69	8.7	3.1	0.07	140	0.04	5.2	0.03	0.05	0.03	0.02	0.02	230	
Brown's Ferry, GE	74, 75, 77	2.9	1.1	3.2	2.2	9.6	2.8	7.8	0.4	45	110	7.9	2.6	230	
Zion, W	73, 74	4.1	17	22	23	14	11	1.7	2.6	8.1	34	7.2	4.0	150	
Oconee, E	73, 74, 74	5.2	20	38	12	5.8	10	13	4.9	5.6	4.7	6.9	5.9	140	
French Bottom, GE	74, 74	2.4	17	11	15	30	4.7	2.7	5.3	9.7	4.6	16	4.7	130	
Quad Cities, GE	73, 73	25	11	4	7.3	6.5	42	16	1.0	0.99	0.57	5.7	0.80	120	
North Anna, W	78, 80	---	---	---	0.46	4.9	3.1	4.2	5.2	28	44	27	1.7	120	
II. 31 - 100 person-rem															
Pilgrim, GE	72	6.2	14	52	7.3	3.1	4.3	0.74	2.3	4.1	0.05	0.56	0.02	95	
McGuire, W	81, 84	---	---	---	---	---	---	0.20	2.8	14	20	20	31	89	
Cook, W	75, 78	0.21	5.0	23	46	17	0.34	0.47	0.72	0.21	0.34	0.54	0.17	88	
Indian Point, E, W, W	62, 74, 76	3.8	9.1	13	8.4	5.9	4.9	8.6	5.5	4.6	3.2	2.8	3.2	73	
Hatch, GE	75, 79	---	0.03	25	0.09	0.13	0.34	2.2	2.8	5.8	8.0	3.4	2.8	61	
Lacrosse, AC	69	7.0	12	5.4	5.9	4.1	2.1	4.9	7.0	1.8	1.1	1.0	0.81	57	
Big Rock Point, GE	63	4.6	7.7	2.6	2.6	9.0	10	3.6	1.2	0.57	4.5	3.3	2.0	52	
Brunswick, GE	75, 77	0.02	0.53	6.4	2.3	2.2	2.0	1.5	14	10	4.1	0.18	0.71	44	
Crystal River, E	77	---	---	0.02	0.29	0.65	0.32	19	0.03	4.8	6.8	4.4	2.4	39	
Arkansas One, E	74, 80	0.38	4.5	1.6	2.2	0.47	3.4	3.6	4.5	3.6	3.8	2.0	4.7	35	
Rancho Seco, E	75	0.05	0.01	0.06	0.15	0.32	15	1.8	1.7	2.9	9.7	0.25	0.02	32	
III. 11 - 30 person-rem															
DeWitt-Beze, E	77	---	---	14	0.60	0.52	11	0.65	0.09	0.13	0.38	0.50	0.06	28	
Hedges Neck, W	64	0.54	3.7	2.4	5.6	3.6	7.5	0.55	0.20	1.0	1.5	0.61	0.54	28	
Kewaunee, W	74	8.5	5.1	1.9	0.59	1.8	3.0	1.6	1.7	0.74	0.55	1.2	0.93	28	
Surry, W	72, 73	5.4	3.4	3.7	1.4	1.0	1.2	1.7	2.3	2.0	1.9	1.6	1.7	27	
Ambler Bay, GE	73	18	5.8	---	---	---	---	---	---	---	---	---	---	24	
Fitzpatrick, GE	75	0.09	1.4	0.56	0.37	0.24	2.8	6.7	6.9	2.8	0.97	0.40	0.10	23	
San Onofre, W	68, 83, 84	0.28	1.4	0.78	1.8	0.52	3.1	1.6	0.51	0.71	3.8	2.0	0.57	17	
Calvert Cliffs, CE	75, 77	0.50	0.74	1.9	2.6	3.0	1.7	0.72	2.2	0.92	0.70	0.82	0.81	17	
Robinson, W	71	9.3	0.28	0.47	0.45	0.19	0.20	1.3	0.05	0.44	0.26	0.21	0.10	13	
Turkey Point, W	72, 77	0.22	0.28	0.40	9.1	0.17	0.08	0.07	0.31	0.26	0.17	0.14	0.20	11	
IV. 3.05 - 10 person-rem															
Three Mile Island, E	74, 78	0.57	1.4	2.0	2.2	0.29	2.2	0.24	0.28	0.06	0.08	0.06	0.57	10	
St. Lucie, CE	76, 83	---	0.03	0.85	1.1	0.76	0.51	0.52	0.87	0.59	1.4	1.6	1.3	9.4	
Salmon, W	77, 81	---	---	0.12	0.37	2.3	0.26	0.85	0.58	2.4	0.52	0.56	0.72	8.7	
Yankee Rowe, W	81	0.11	0.07	0.20	4.8	0.40	0.55	0.72	0.19	0.15	0.48	0.39	0.38	8.2	
Monticello, GE	71	5.2	0.25	0.20	0.20	0.18	0.16	0.14	0.19	0.10	0.05	0.14	0.10	6.9	
Saguavah, W	81, 82	---	---	---	---	---	---	0.22	0.67	1.2	1.6	1.8	1.1	6.8	
Fairley, W	77, 81	---	---	---	0.19	0.19	0.52	3.2	1.5	0.36	0.23	0.14	0.20	6.5	
Fl. Calhoun, CE	74	0.13	0.26	0.33	0.48	0.39	0.48	0.35	0.36	0.19	1.9	0.24	0.22	5.3	
Summer, W	82	---	---	---	---	---	---	---	10.01	0.44	0.55	0.56	3.6	5.2	
Cinna, W	70	0.28	0.51	0.14	0.13	0.11	0.58	0.15	0.23	0.41	0.69	0.31	0.27	3.8	
Pelissades, CE	71	0.62	0.64	0.63	0.11	0.12	0.03	0.16	0.62	0.29	0.12	0.30	0.12	3.8	
Point Beach, W	70, 71	1.2	0.33	0.18	0.12	0.25	0.20	0.19	0.41	0.33	0.24	0.09	0.07	3.6	
Prattville Island, W	73, 74	0.12	1.4	0.59	0.46	0.10	0.06	0.04	0.07	0.05	0.06	0.04	0.06	3.0	
V. 1 - 3 person-rem															
Catawba, W	85	---	---	---	---	---	---	---	---	---	---	0.74	2.7	2.6	
Duane Arnold, GE	75	0.19	0.32	0.31	0.87	0.54	0.11	0.03	0.01	0.04	0.03	0.02	0.06	2.5	
Vermont Yankee, GE	72	0.08	0.11	0.37	0.24	0.46	0.06	0.60	0.06	0.11	0.10	0.10	0.12	2.4	
Beaver Valley, W	76	---	0.04	0.40	0.83	0.17	0.02	0.11	0.04	0.11	0.19	0.06	0.07	2.0	
Cooper, GE	75	0.18	0.39	0.02	0.05	0.05	0.07	0.07	0.17	0.10	0.34	0.07	0.04	1.6	
Waterford, CE	85	---	---	---	---	---	---	---	---	---	---	0.47	0.80	1.3	
Trojan, W	76	---	0.02	0.11	0.04	0.05	0.06	0.20	0.17	0.11	0.08	0.10	0.10	1.0	
VI. <1 person-rem															
Byron, W	85	---	---	---	---	---	---	---	---	---	---	0.27	0.50	0.77	
WNP-2, GE	84	---	---	---	---	---	---	---	---	0.03	0.47	<0.01	0.40	0.51	
Wolf Creek, W	85	---	---	---	---	---	---	---	---	---	---	0.11	0.40	0.51	
Susquehanna, GE	82, 85	---	---	---	---	---	---	---	0.21	0.04	0.05	0.11	0.08	0.46	
LaSalle, GE	82, 84	---	---	---	---	---	---	---	<0.01	<0.01	0.03	0.07	0.27	0.37	
Nine Mile, W	72	0.10	0.06	0.01	0.03	0.04	0.03	<0.01	<0.01	<0.01	<0.01	0.01	0.02	0.33	
Limerick, GE	84	---	---	---	---	---	---	---	---	---	<0.01	0.08	0.21	0.29	
River Bend, GE	85	---	---	---	---	---	---	---	---	---	---	---	0.17	0.17	
Palo Verde, CE	85, 86	---	---	---	---	---	---	---	---	---	---	---	0.13	0.13	
Fernald, GE	86	---	---	---	---	---	---	---	---	---	---	---	0.07	0.07	
Hope Creek, GE	86	---	---	---	---	---	---	---	---	---	---	---	0.06	0.06	
Callaway, W	84	---	---	---	---	---	---	---	---	---	<0.01	0.01	0.04	0.05	
Diablo Canyon, W	84	---	---	---	---	---	---	---	---	---	<0.01	0.01	0.04	0.05	
Grand Gulf, GE	83	---	---	---	---	---	---	---	---	<0.01	<0.01	<0.01	<0.01	<0.01	
Shoreham, GE	86	---	---	---	---	---	---	---	---	---	---	---	<0.01	<0.01	
Perry, GE	86	---	---	---	---	---	---	---	---	---	---	---	<0.01	<0.01	
TOTAL		1300	470	700	640	510	180	150	140	170	260	200	110	4900	

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

SITE SUMMARIES

1986

Site: ARKANSAS ONE

POPE COUNTY, ARKANSAS

Location: N 35.3100°

W 93.2308°

POPULATION DATA

Total Population Within 2-to-80-km Region: 1.9E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Russellville	14,000	10 km E
Conway	20,000	76 km ESE

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 5.8E6 kilogram Milk: 4.8E7 liter Meat: 7.2E7 kilogram
---	--

Regional Productivity Factor:	1
Animal Grazing Factor:	0.7

Meteorology Period of Record: 1 JAN 75 - 31 DEC 75 Recovery: 97%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via ARKANSAS RIVER

Average River Flow
at Site: 36,000 ft³/s

Drinking Water: Exposed Population: None

Fish: Edible Harvest: 1.4^(a) kg/yr
Dilution Factor: 1

(a) Average individual consumption rates as given in the Final Environmental Statement (FES) (1973) were used in lieu of catch data. The reference to environmental statements here and on succeeding pages may be found in Table 3.

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
ARKANSAS ONE 1 AND 2

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	2.0E-01	1.8E-02	1.1E-02	1.0E+00	1.1E+00
Teen	3.8E-01	3.7E-02	8.2E-03	6.0E-01	9.7E-01
Adult	4.2E+00	3.2E-01	5.4E-02	3.5E+00	5.8E+00
TOTAL	4.7E+00	3.7E-01	7.4E-02	5.1E+00	7.9E+00

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	5.0E-04	5.0E-04	1.1E-03	4.9E-04	5.0E-04	5.4E-04
Child	5.6E-03	5.6E-03	9.3E-03	5.5E-03	5.6E-03	6.2E-02
Teen	4.1E-03	4.1E-03	5.6E-03	4.0E-03	4.1E-03	4.9E-03
Adult	2.5E-02	2.5E-02	3.0E-02	2.4E-02	2.5E-02	2.7E-02
TOTAL	3.5E-02	3.5E-02	4.6E-02	3.4E-02	3.5E-02	3.9E-02

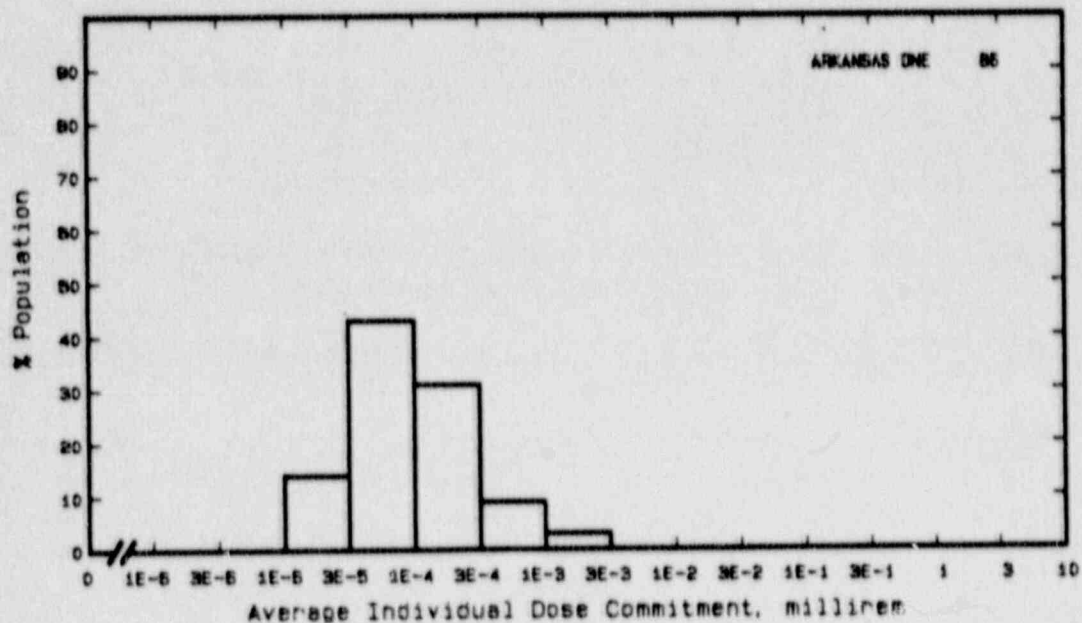
Production/Consumption factors: (a)

Produce: 0.16

Milk: 1.9

Meat: 4.7

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



(a) See Appendix A, Page A-5, for explanation of this ratio.

Site: BEAVER VALLEY

SHIPPINGPORT, PENNSYLVANIA

Location: N 40.6219°

W 80.4339°

POPULATION DATA

Total Population Within 2-to-80-km Region: 3.6E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Pittsburgh SMSA	2,100,000	42 km ESE
Youngstown-Warren SMSA	510,000	56 km NNW
Stuebenville-Weirton SMSA	160,000	33 km SSW
Wheeling SMSA	190,000	66 km SSW
New Castle	34,000	43 km N

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 5.3E7 kilogram Milk: 5.3E8 liter Meat: 5.4E7 kilogram
---	--

Regional Productivity Factor:	1
Animal Grazing Factor:	0.5

Meteorology Period of Record: 1 JAN 77 - 31 DEC 77 Recovery: 92%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via OHIO RIVER

	Average River Flow at Site: 30,000 ft ³ /s
Drinking Water:	Exposed Population: 6,200 Dilution Factor: 12 ^(a)
Fish:	Edible Harvest: 410 kg/yr Dilution Factor: 1

(a) This factor accounts for the incomplete dilution of plant effluent by river at point of drinking water intake at Midland.

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
BEAVER VALLEY

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	4.4E-04	4.4E-04	4.4E-04	2.0E-05	4.5E-04
Child	5.0E-03	5.1E-03	4.9E-03	2.5E-04	5.0E-03
Teen	1.9E-03	2.1E-03	1.9E-03	7.5E-05	1.9E-03
Adult	1.6E-02	1.8E-02	1.6E-02	5.3E-04	1.6E-02
TOTAL	2.4E-02	2.5E-02	2.3E-02	8.8E-04	2.3E-02

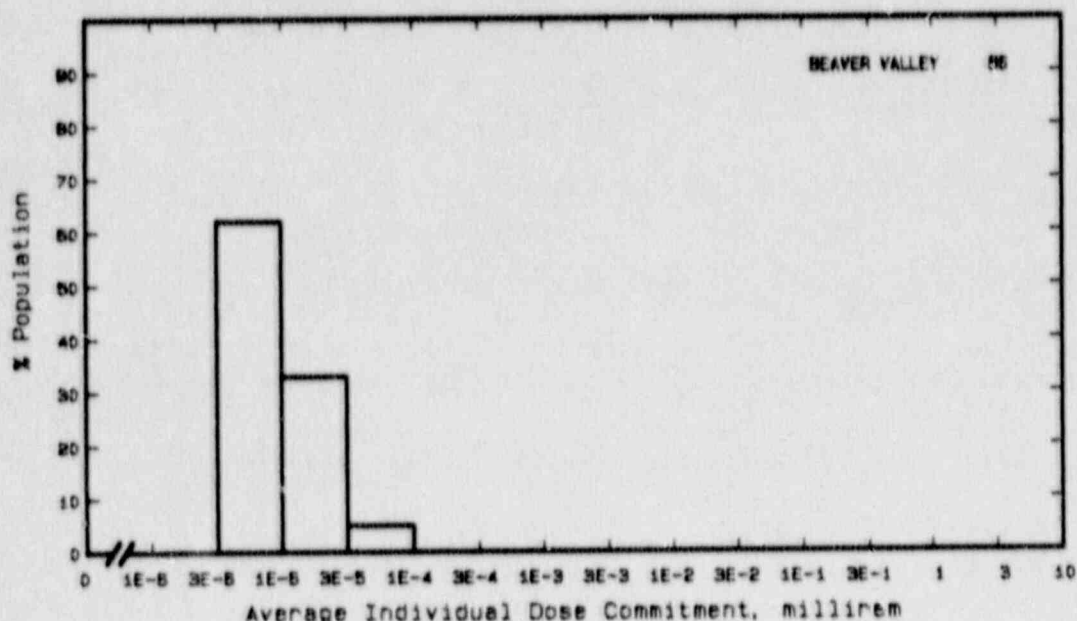
Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	7.8E-04	7.7E-04	1.1E-02	2.3E-04	8.5E-04	8.4E-04
Child	9.1E-03	9.0E-03	6.8E-02	2.3E-03	9.5E-03	1.0E-02
Teen	5.9E-03	5.9E-03	3.1E-02	1.5E-03	6.0E-03	7.0E-03
Adult	3.1E-02	3.2E-02	1.2E-01	8.5E-02	3.2E-02	3.6E-02
TOTAL	4.7E-02	4.7E-02	2.3E-01	1.3E-02	4.8E-02	5.4E-02

Production/Consumption factors:

Produce: 0.075 Milk: 1.1 Meat: 0.19

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: BIG ROCK POINT

CHARLEVOIX COUNTY, MICHIGAN

Location: N 45.3592°

W 85.1947°

POPULATION DATA

Total Population Within 2-to-80-km Region: 1.7E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Traverse City	16,000	75 km SSW
Petoskey	6,100	18 km E
Cheboygan	5,100	65 km ENE

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 6.9E7 kilogram Milk: 2.9E8 liter Meat: 4.5E7 kilogram
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Regional Productivity Factor:	0.5
Animal Grazing Factor:	0.5

Meteorology Period of Record: 9 FEB 61 - 8 FEB 63 Recovery: 85%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via LAKE MICHIGAN

	Average Dilution Flow from Plant: 110 ft ³ /s
Drinking Water:	Exposed Population: 31,000 ^(a) Dilution Factor: 4.9E-5 ^(b)
Fish:	Edible Harvest: (c) kg/yr Dilution Factor: 0.01

(a) Population exposed to contaminated drinking water derived from information obtained from J. Hennigan, Division of Radiation Health, Bureau of Environment and Health, Michigan Department of Public Health.

(b) Drinking water dilution factor estimated by averaging dilution factor derived from Figure 6B-5, Vol. 1 of WASH-1258 (1973) suitably weighted for population.

(c) Generic consumption rate used (Table A-1).

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
BIG ROCK POINT

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	6.3E-08	2.3E-08	8.9E-07	3.6E-07	4.2E-07
Child	1.1E-02	7.6E-04	5.2E-04	6.1E-02	6.7E-02
Teen	2.2E-02	1.6E-03	3.7E-04	3.7E-02	5.6E-02
Adult	2.3E-01	1.4E-02	2.5E-03	2.1E-01	3.3E-01
TOTAL	2.7E-01	1.6E-02	3.4E-03	3.1E-01	4.6E-01

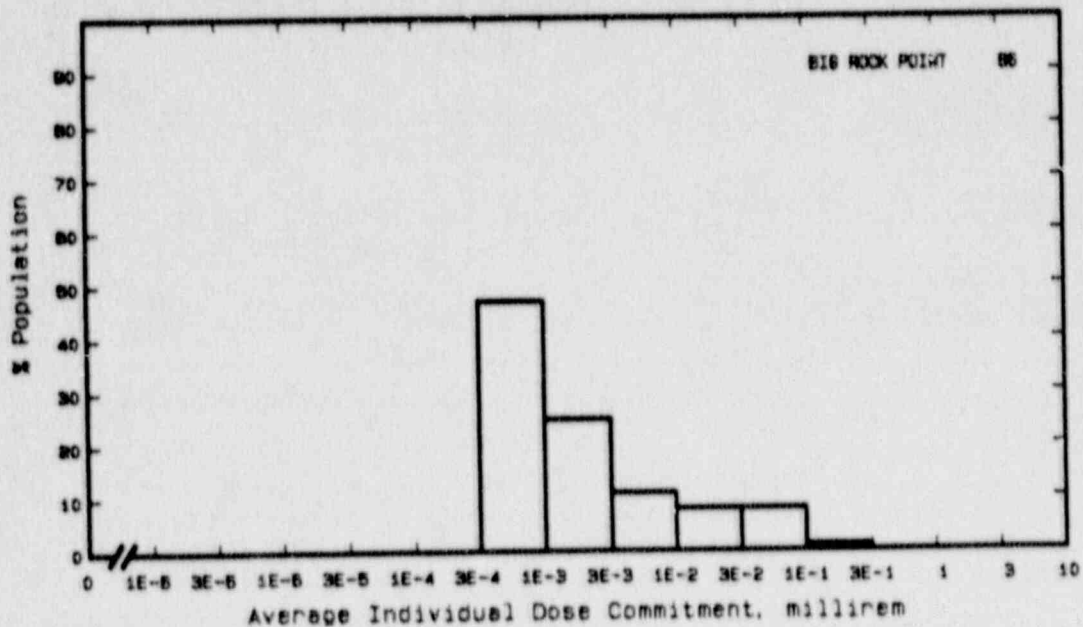
Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	2.5E-02	2.5E-02	2.6E-02	2.5E-02	2.5E-02	2.6E-02
Child	2.8E-01	2.8E-01	2.9E-01	2.8E-01	2.8E-01	2.9E-01
Teen	2.0E-01	2.0E-01	2.1E-01	2.0E-01	2.0E-01	2.1E-01
Adult	1.2E+00	1.2E+00	1.3E+00	1.2E+00	1.2E+00	1.3E+00
TOTAL	1.7E+00	1.7E+00	1.8E+00	1.7E+00	1.7E+00	1.8E+00

Production/Consumption factors:

Produce: 1.1 Milk: 6.6 Meat: 1.7

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: BROWNS FERRY

DECATUR, ALABAMA

Location: N 34.7042°

W 87.1186°

POPULATION DATA

Total Population Within 2-to-80-km Region: 7.4E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Huntsville SMSA	310,000	49 km E
Florence SMSA	140,000	52 km WNW
Decatur	42,000	16 km SE
Athens	15,000	17 km NE
Cullman	13,000	64 km SSE

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 1.7E7 kilogram Milk: 5.7E7 liter Meat: 8.6E7 kilogram
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Regional Productivity Factor:	1
Animal Grazing Factor:	0.7

Meteorology Period of Record: 1 JAN 74 - 31 DEC 75 Recovery: 94%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via TENNESSEE RIVER at WHEELER LAKE

	Average River Flow at Site: 45,000 ft ³ /s
Drinking Water:	Exposed Population: 26,000 Dilution Factor: 1
Fish:	Edible Harvest: 1.6E6 kg/yr Dilution Factor: 1

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
BROWNS FERRY 1, 2 AND 3

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	5.0E-05	1.9E-05	1.1E-04	3.3E-04	4.0E-04
Child	1.2E-01	1.4E-02	5.4E-01	5.4E-01	6.2E-01
Teen	2.1E-01	2.9E-02	7.0E-04	3.2E-01	5.3E-01
Adult	2.2E+00	2.5E-01	4.7E-03	1.9E+00	3.1E+00
TOTAL	2.6E+00	2.9E-01	7.0E-03	2.8E+00	4.3E+00

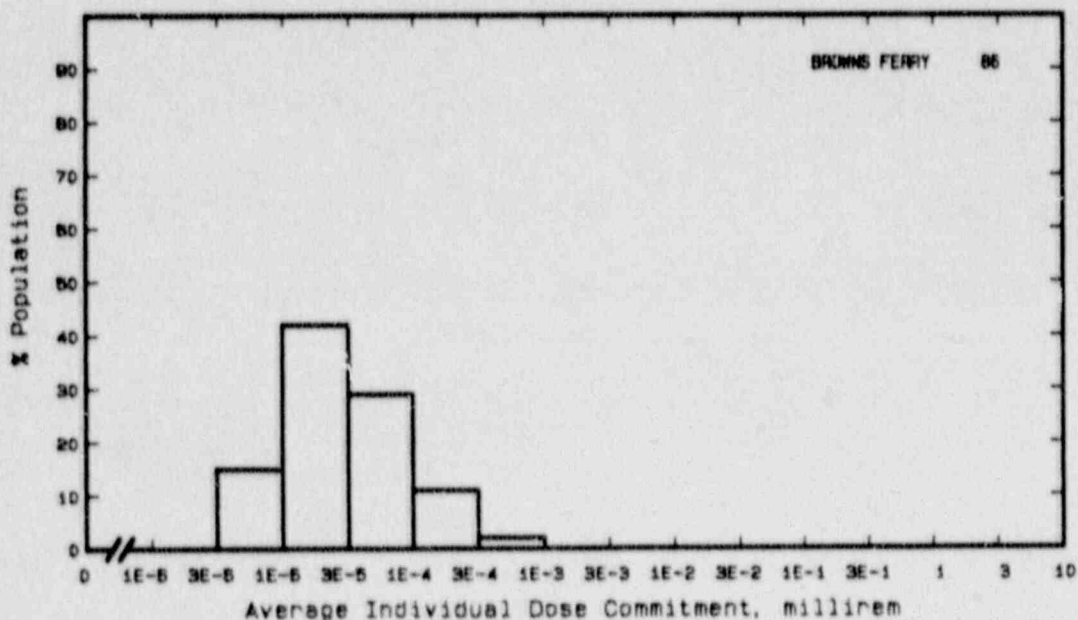
Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	5.6E-04	5.5E-04	4.4E-03	6.1E-04	6.6E-04	6.6E-04
Child	6.3E-03	6.2E-03	4.8E-02	6.8E-03	7.1E-03	7.7E-03
Teen	4.6E-03	4.6E-03	2.7E-02	4.7E-03	5.0E-03	6.3E-03
Adult	2.8E-02	2.8E-02	1.2E-01	2.8E-02	2.9E-02	3.3E-02
TOTAL	4.0E-02	3.9E-02	2.0E-01	4.0E-02	4.1E-02	4.7E-02

Production/Consumption factors:

Produce: 0.12 Milk: 0.59 Meat: 1.4

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: BRUNSWICK

BRUNSWICK COUNTY, NORTH CAROLINA

Location: N 33.9583°

W 78.0106°

POPULATION DATA

Total Population Within 2-to-80-km Region: 2.3E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Wilmington SMSA	140,000	32 km NNE
Whiteville	5,700	75 km WNW
N. Myrtle Beach	4,100	65 km WSW

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 2.6E7 kilogram Milk: 1.0E8 liter Meat: 5.8E7 kilogram
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Regional Productivity Factor:	0.3
Animal Grazing Factor:	0.7

Meteorology Period of Record: 1 JAN 75 - 31 DEC 75 Recovery: 93%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via ATLANTIC OCEAN

	Average Dilution Flow from Plant: 78 ft ³ /s
Fish:	Edible Harvest: 2.1E5 ^(a) kg/yr Dilution Factor: 0.001
Invertebrates:	Edible Harvest: 1.1E5 ^(a) kg/yr Dilution Factor: 0.002

(a) Fish and invertebrate harvests together total harvest given in FES (1973).

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
BRUNSWICK 1 AND 2

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	3.9E-04	4.4E-04	2.5E-05	1.5E-03	9.0E-04
Teen	2.4E-04	8.7E-04	1.7E-05	8.1E-04	6.8E-04
Adult	1.5E-03	7.4E-03	1.2E-04	4.8E-03	3.9E-03
TOTAL	2.1E-03	8.8E-03	1.6E-04	7.0E-03	5.5E-03

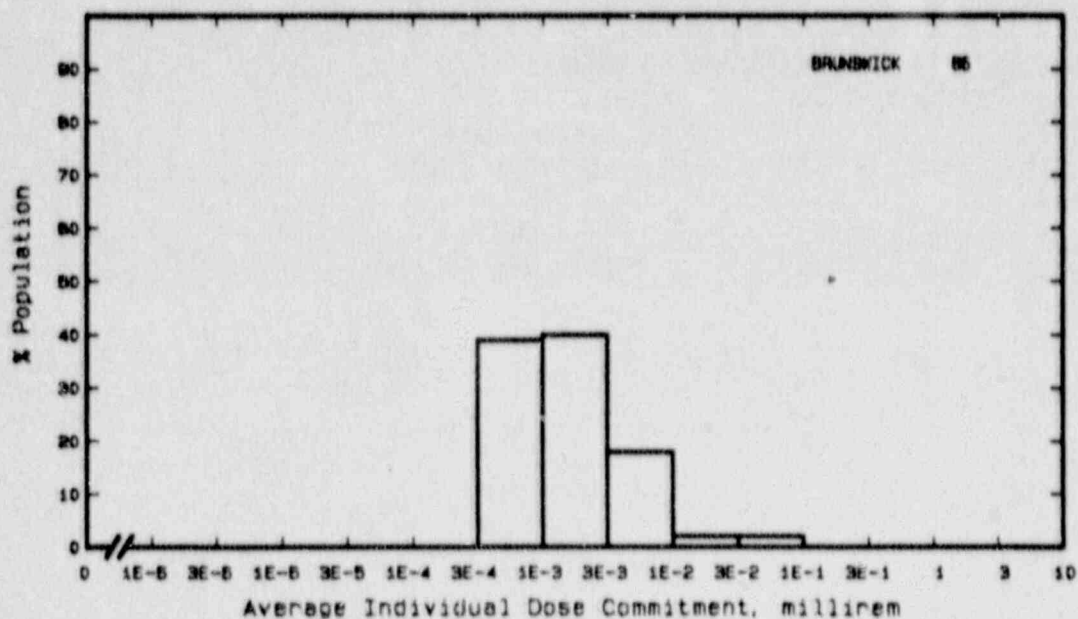
Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.0E-02	1.0E-02	1.3E-02	1.0E-02	1.0E-02	1.1E-02
Child	1.1E-01	1.1E-01	1.3E-01	1.1E-01	1.1E-01	1.2E-01
Teen	8.4E-02	8.4E-02	9.0E-02	8.4E-02	8.4E-02	9.1E-02
Adult	5.1E-01	5.1E-01	5.3E-01	5.1E-01	5.1E-01	5.3E-01
TOTAL	7.1E-01	7.1E-01	7.6E-01	7.1E-01	7.1E-01	7.5E-01

Production/Consumption factors:

Produce: 0.17 Milk: 1.0 Meat: 0.93

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: BYRON

BYRON, ILLINOIS

Location: N 42.1300°

W 89.2550°

POPULATION DATA

Total Population Within 2-to-80-km Region: 9.4E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Rockford SMSA	280,000	27 km NE
Freeport	26,000	35 km NNW
Belvedere	42,000	40 km NE
Janesville	61,000	67 km N
Beloit	35,000	48 km NNE
De Kalb	33,000	48 km ESE
Elgin	64,000	80 km E

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 1.1E8 kilogram Milk: 1.8E8 liter Meat: 1.9E8 kilogram
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Regional Productivity Factor:	0.9
Animal Grazing Factor:	0.5

Meteorology Period of Record: 1 JAN 74 - 31 DEC 74 Recovery: 95%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via ROCK RIVER

Average River Flow
at Site: 4,600 ft³/s

Drinking Water:	Exposed Population: None
	Dilution Factor:

Fish:	Edible Harvest: 2.1E4 kg/yr
	Dilution Factor: 1

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
BYRON

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	2.1E-02	6.7E-03	1.2E-03	1.0E-01	1.2E-01
Teen	4.0E-02	1.4E-02	9.0E-04	6.2E-02	1.0E-01
Adult	4.3E-01	1.2E-01	5.9E-03	3.6E-01	6.0E-01
TOTAL	4.9E-01	1.4E-01	8.1E-03	5.2E-01	8.2E-01

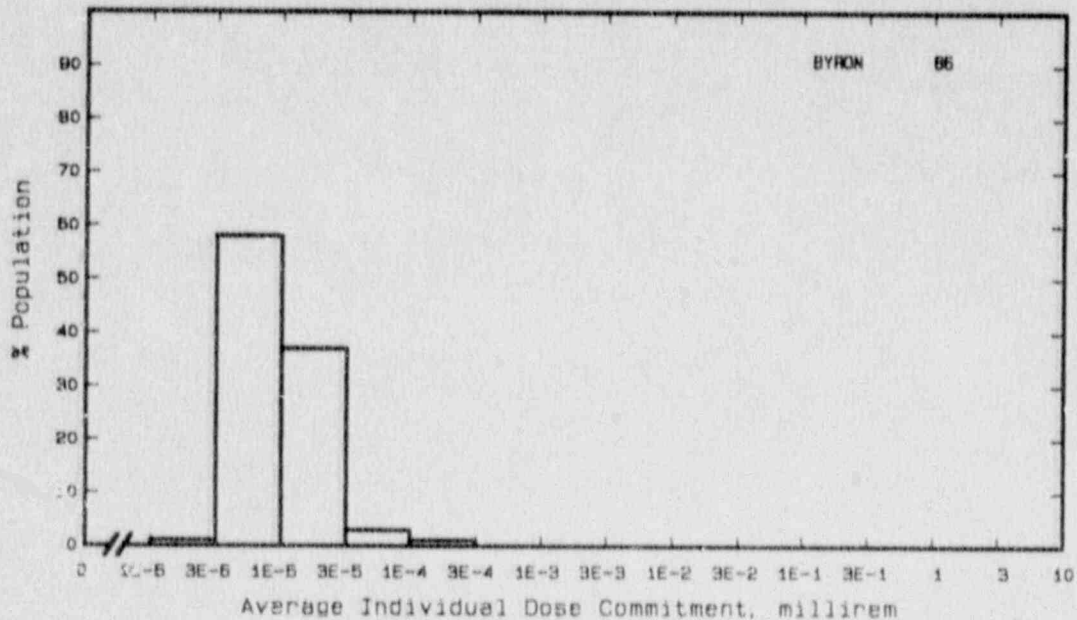
Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.9E-04	1.7E-04	2.3E-02	2.2E-04	2.4E-04	1.8E-04
Child	2.1E-03	1.9E-03	1.9E-01	2.4E-03	2.4E-03	2.0E-03
Teen	1.5E-03	1.4E-03	7.5E-02	1.5E-03	1.6E-03	1.6E-03
Adult	8.5E-03	8.3E-03	2.7E-01	8.5E-03	8.9E-03	8.9E-03
TOTAL	1.2E-02	1.2E-02	5.6E-01	1.3E-02	1.3E-02	1.3E-02

Production/Consumption factors:

Produce: 0.56 Milk: 1.3 Meat: 2.3

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: CALLAWAY

FULTON, MISSOURI

Location: N 38.7618°

W 91.7979°

POPULATION DATA

Total Population Within 2-to-80-km Region: 3.7E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Columbia	60,000	48 km WNW
Jefferson City	33,000	40 km WSW
Mexico	12,000	45 km NNW
Washington	8,500	69 km ESE
Fulton	13,000	19 km NW

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production
Of Crops and Animal Products
in 80-km Radius Circle

Veg: 3.3E7 kilogram
Milk: 1.5E8 liter
Meat: 1.9E8 kilogram

Regional Productivity Factor: 0.9
Animal Grazing Factor: 0.6

Meteorology Period of Record: 4 MAY 74 - 3 MAY 75 Recovery: 89%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via MISSOURI RIVER

Average River Flow
at Site: 80,000 ft³/s

Drinking Water: Exposed Population: None

Fish: Edible Harvest: 1.0E3 kg/yr
Dilution Factor: 1

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
CALLAWAY

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	1.3E-06	4.9E-07	1.1E-06	5.8E-06	6.9E-06
Teen	2.4E-06	9.4E-07	8.2E-07	3.5E-06	5.8E-06
Adult	2.6E-05	8.1E-06	5.5E-06	2.0E-05	3.5E-05
TOTAL	2.9E-05	9.5E-06	7.4E-06	3.0E-05	4.8E-05

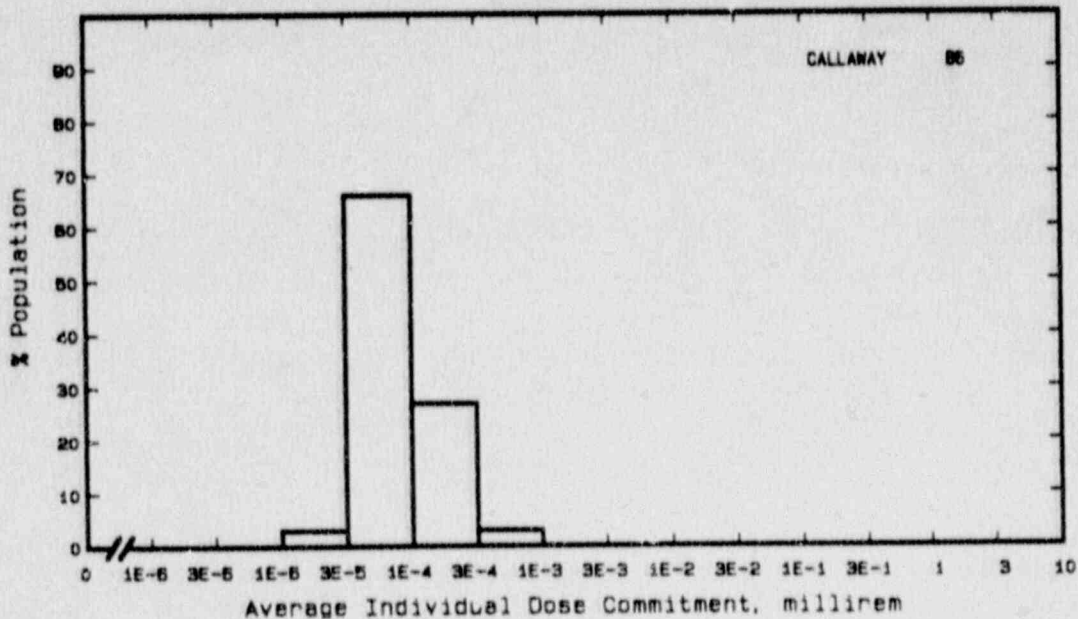
Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	5.4E-04	5.4E-04	7.9E-04	5.1E-04	5.4E-04	5.8E-04
Child	6.2E-03	6.2E-03	7.9E-03	5.7E-03	6.2E-03	6.8E-03
Teen	4.5E-03	4.5E-03	5.1E-03	4.1E-03	4.5E-03	5.2E-03
Adult	2.7E-02	2.7E-02	2.9E-02	2.5E-02	2.7E-02	2.9E-02
TOTAL	3.8E-02	3.8E-02	4.3E-02	3.5E-02	3.8E-02	4.2E-02

Production/Consumption factors:

Produce: 0.41 Milk: 2.9 Meat: 5.9

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: CALVERT CLIFFS

LUSBY, MARYLAND

Location: N 38.4347°

W 76.4419°

POPULATION DATA

Total Population Within 2-to-80-km Region: 2.8E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Washington, DC SMSA (3/4)	2,700,000	73 km NW
Bowie	35,000	71 km NNW
Annapolis	33,000	61 km N
Waldorf	10,800	46 km WNW
Salisbury	16,000	75 km E
Cambridge	12,000	32 km ENE

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 4.5E7 kilogram Milk: 5.0E8 liter Meat: 6.2E7 kilogram
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Regional Productivity Factor:	0.6
Animal Grazing Factor:	0.6

Meteorology Period of Record: 1 JAN 75 - 31 DEC 75 Recovery: 96%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via CHESAPEAKE BAY

	Average Dilution Flow from Plant: 2,700 ft ³ /s
Fish:	Edible Harvest: 1.0E7 kg/yr Dilution Factor: 0.062 ^(a)
Invertebrates:	Edible Harvest: 7.4E6 kg/yr Dilution Factor: 0.062 ^(a)

(a) Dilutions given in FES (1973).

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
CALVERT CLIFFS 1 AND 2

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	4.4E-02	4.4E-01	2.7E-01	8.7E-02	1.1E-01
Teen	5.0E-02	9.3E-01	1.9E-01	5.2E-02	9.0E-02
Adult	4.5E-01	8.1E+00	1.3E+00	3.1E-01	5.4E-01
TOTAL	5.5E-01	9.5E+00	1.7E+00	4.5E-01	7.3E-01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	3.8E-03	3.7E-03	1.2E-01	3.9E-03	4.0E-03	4.0E-03
Child	4.1E-02	4.1E-02	6.5E-01	4.2E-02	4.2E-02	4.5E-02
Teen	3.0E-02	3.0E-02	2.7E-01	3.0E-02	3.0E-02	3.6E-02
Adult	1.8E-01	1.8E-01	9.7E-01	1.8E-01	1.8E-01	2.0E-01
TOTAL	2.6E-01	2.5E-01	2.0E+00	2.5E-01	2.6E-01	2.8E-01

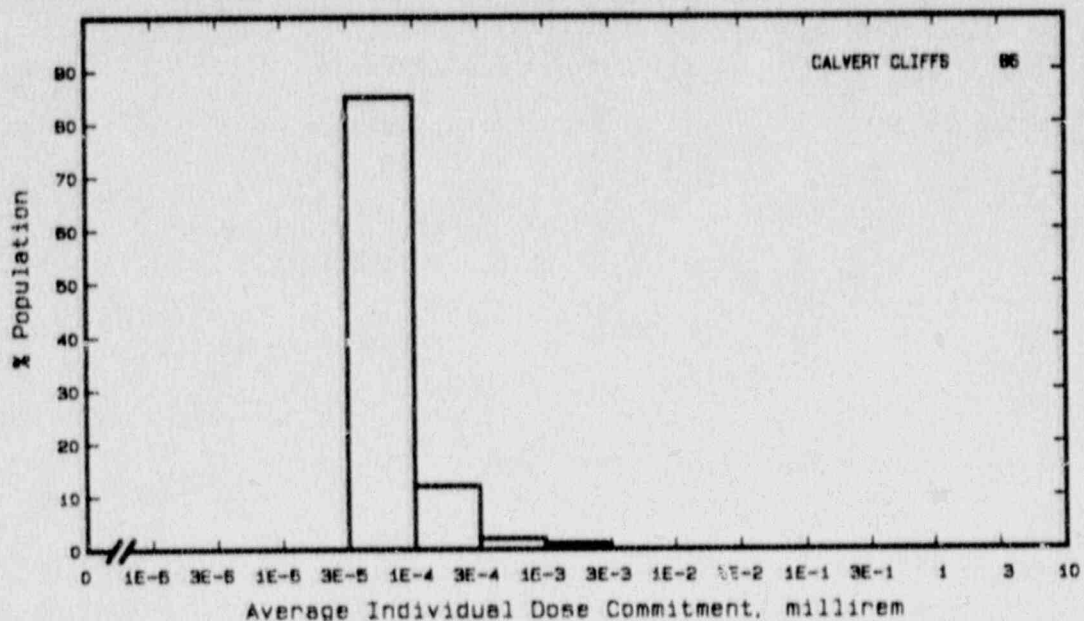
Production/Consumption factors:

Produce: 0.050

Milk: 0.83

Meat: 0.17

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: CATAWBA

CLOVER, SOUTH CAROLINA

Location: N 34.9950°

W 81.2450°

POPULATION DATA

Total Population Within 2-to-80-km Region: 1.6E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Charlotte-Gastonia SMSA	680,000	29 km NE
Kannapolis	37,000	64 km NE
Rock Hill	37,000	11 km S
Spartanburg	16,000	80 km W

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production
Of Crops and Animal Products
In 80-km Radius Circle

Veg: 7.4E6 kilogram
Milk: 5.7E7 liter
Meat: 5.0E7 kilogram

Regional Productivity Factor: 0.9
Animal Grazing Factor: 0.75

Meteorology Period of Record: 17 DEC 75 - 16 DEC 76 Recovery: 94%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via CATAWBA RIVER

Average River Flow
at Site: 4,400 ft³/s

Drinking Water: Exposed Population: None
Dilution Factor:

Fish: Edible Harvest: 1.0E6 kg/yr
Dilution Factor: 1

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
CATAWBA 1 AND 2

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	8.7E-02	1.4E-01	3.0E-02	4.2E-01	4.8E-01
Teen	1.6E-01	2.9E-01	2.2E-02	2.5E-01	4.1E-01
Adult	1.7E+00	2.5E+00	1.5E-01	1.5E+00	2.4E+00
TOTAL	2.0E+00	2.9E+00	2.0E-01	2.1E+00	3.3E+00

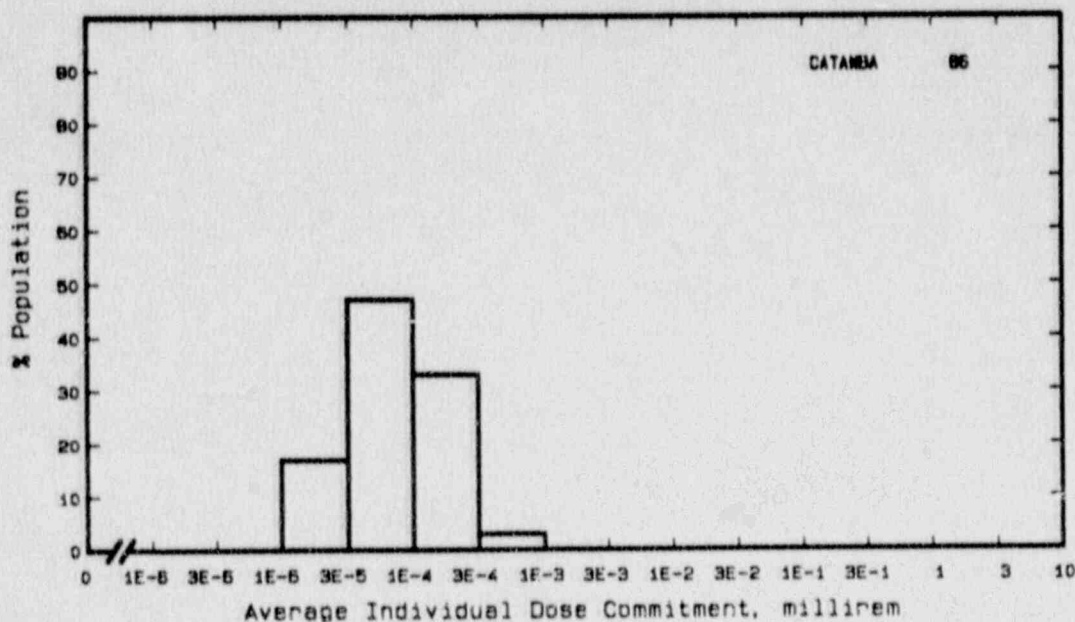
Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	2.1E-03	2.1E-03	4.3E-03	2.1E-03	2.1E-03	2.3E-03
Child	2.4E-02	2.4E-02	3.8E-02	2.3E-02	2.4E-02	2.6E-02
Teen	1.7E-02	1.7E-02	2.4E-02	1.7E-02	1.7E-02	2.1E-02
Adult	1.0E-01	1.0E-01	1.3E-01	1.0E-01	1.0E-01	1.2E-01
TOTAL	1.5E-01	1.5E-01	2.0E-01	1.4E-01	1.5E-01	1.6E-01

Production/Consumption factors:

Produce: 0.022 Milk: 0.25 Meat: 0.36

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: COOK

BENTON HARBOR, MICHIGAN

Location: N 41.9761°

W 86.5664°

POPULATION DATA

Total Population Within 2-to-80-km Region: 1.1E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Gary	140,000	77 km SW
South Bend SMSA	280,000	42 km SE
Elkhart SMSA	140,000	58 km SE
Mishiwaka	40,000	47 km SE
Michigan City	37,000	40 km SW

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 1.1E8 kilogram Milk: 2.3E8 liter Meat: 1.9E8 kilogram
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Regional Productivity Factor:	0.6
Animal Grazing Factor:	0.5

Meteorology Period of Record: 1 MAY 75 - 31 APR 76 Recovery: 95%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via LAKE MICHIGAN

	Average Dilution Flow from Plant: 3,100 ft ³ /s
Drinking Water:	Exposed Population: 260,000 Dilution Factor: 0.025 ^(a)
Fish:	Edible Harvest: 1.5E6 kg/yr Dilution Factor: 0.01

(a) Drinking water dilution factor estimated by averaging dilution factors derived from FES (1973) suitably weighted for population.

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
COOK 1 AND 2

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	1.3E-03	1.2E-03	1.8E-03	2.7E-04	1.6E-03
Child	1.8E-02	1.5E-02	1.8E-02	2.1E-02	3.8E-02
Teen	1.3E-02	7.4E-03	6.5E-03	1.1E-02	2.5E-02
Adult	1.3E-01	6.4E-02	5.3E-02	6.7E-02	1.6E-01
TOTAL	1.6E-01	8.7E-02	7.9E-02	9.9E-02	2.2E-01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.2E-04	8.5E-05	7.9E-03	2.8E-04	3.8E-04	1.2E-04
Child	1.5E-03	1.1E-03	5.4E-02	2.9E-03	3.5E-03	1.4E-03
Teen	1.2E-03	7.6E-04	2.1E-02	1.2E-03	1.8E-03	9.6E-04
Adult	6.7E-03	4.5E-03	7.3E-02	5.4E-03	7.7E-03	5.0E-03
TOTAL	9.5E-03	6.4E-03	1.6E-01	9.8E-03	1.3E-02	7.4E-03

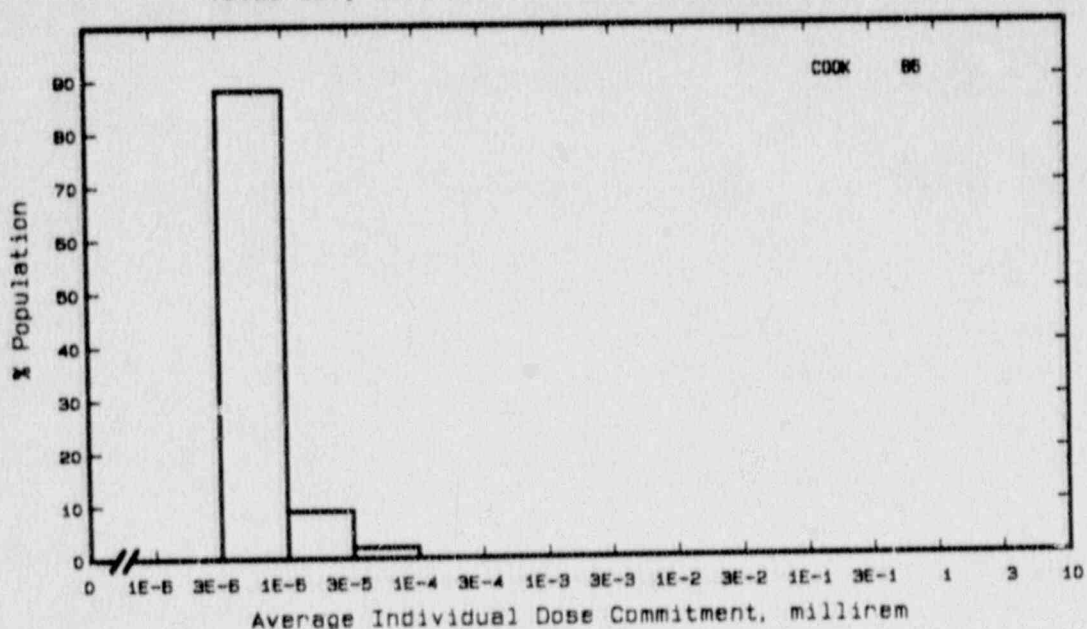
Production/Consumption factors:

Produce: 0.30

Milk: 0.92

Meat: 1.2

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: COOPER

NEMAHA COUNTY, NEBRASKA

Location: N 40.3619°

W 95.6411°

POPULATION DATA

Total Population Within 2-to-80-km Region: 1.7E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Nebraska City	7,100	40 km NNW
Red Oak	6,800	80 km NNE
Plattsmouth	6,300	76 km NNW
Shenandoah	6,300	51 km NNE
Falls City	5,400	33 km S

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 9.7E7 kilogram Milk: 7.2E7 liter Meat: 2.0E8 kilogram
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Regional Productivity Factor:	1
Animal Grazing Factor:	0.6

Meteorology Period of Record: 1 MAR 70 - 31 DEC 75 Recovery: 89%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via MISSOURI RIVER

Average River Flow
at Site: 31,000 ft³/s

Drinking Water: Exposed Population: None

Fish: Edible Harvest: 5.0E3^(a) kg/yr
Dilution Factor: 0.5^(a)

(a) Assumes 1/2 fish harvest caught below plant.

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
COOPER

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	1.2E-03	1.0E-04	2.7E-06	6.3E-03	6.9E-03
Teen	2.3E-03	2.1E-04	1.9E-06	3.8E-03	5.8E-03
Adult	2.5E-02	1.8E-03	1.3E-05	2.2E-02	3.4E-02
TOTAL	2.8E-02	2.1E-03	1.7E-05	3.2E-02	4.7E-02

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	2.0E-04	2.0E-04	1.2E-03	2.1E-04	2.1E-04	2.1E-04
Child	2.3E-03	2.3E-03	1.1E-02	2.8E-03	2.3E-03	2.4E-03
Teen	1.7E-03	1.7E-03	5.1E-03	1.9E-03	1.7E-03	1.8E-03
Adult	1.0E-02	1.0E-02	2.2E-02	1.1E-02	1.0E-02	1.0E-02
TOTAL	1.4E-02	1.4E-02	4.0E-02	1.6E-02	1.4E-02	1.5E-02

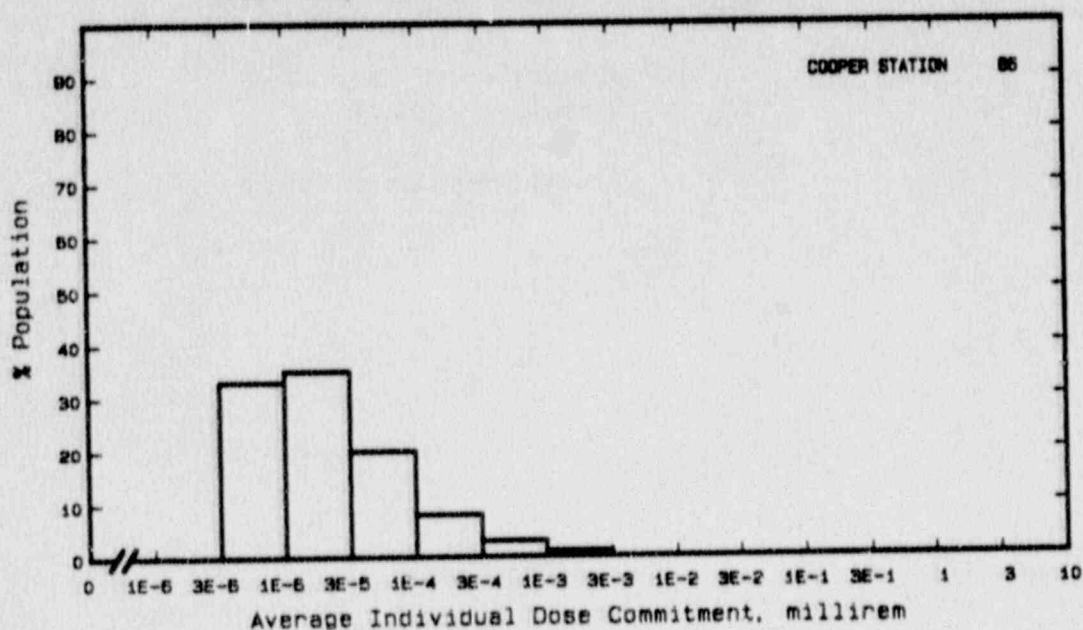
Production/Consumption factors:

Produce: 2.9

Milk: 3.2

Meat: 14

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: CRYSTAL RIVER

CRYSTAL RIVER, FLORIDA

Location: N 28.9572°

W 82.6989°

POPULATION DATA

Total Population Within 2-to-80-km Region: 4.4E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Ocala	45,000	60 km ENE
Leesburg	15,000	80 km E
New Port Richey	13,000	79 km S

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 2.8E7 kilogram Milk: 1.1E8 liter Meat: 7.2E7 kilogram
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Regional Productivity Factor:	0.5
Animal Grazing Factor:	1

Meteorology Period of Record: 1 JAN 75 - 31 DEC 75 Recovery: 93%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via GULF of MEXICO

	Average Dilution Flow from Plant: 62 ft ³ /s
Fish:	Edible Harvest: 3.2E5 kg/yr Dilution Factor: 0.1
Invertebrates:	Edible Harvest: 1.8E5 kg/yr Dilution Factor: 0.1

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
CRYSTAL RIVER

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	3.3E-01	3.7E-01	6.3E-02	1.1E+00	8.1E-01
Teen	2.4E-01	7.5E-01	4.5E-02	5.0E-01	6.5E-01
Adult	1.7E+00	6.4E+00	3.0E+00	3.6E+00	3.8E+00
TOTAL	2.3E+00	7.5E+00	4.0E-01	5.3E+00	5.3E+00

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.2E-03	7.7E-04	8.6E-04	3.2E-03	9.6E-04	7.4E-04
Child	2.6E-02	9.0E-03	7.9E-03	8.9E-02	9.5E-03	8.6E-03
Teen	1.3E-02	7.1E-03	5.2E-03	4.3E-02	6.1E-03	6.5E-03
Adult	6.6E-02	3.9E-02	3.0E-02	2.0E-01	3.3E-02	3.5E-02
TOTAL	1.1E-01	5.6E-02	4.4E-02	3.3E-01	4.9E-02	5.0E-02

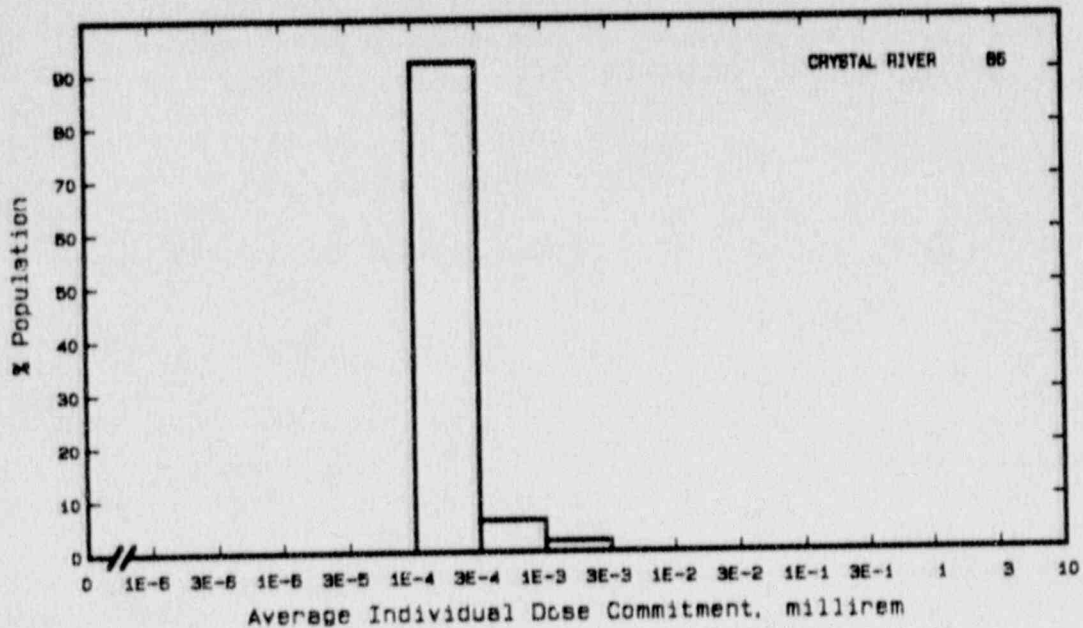
Production/Consumption factors:

Produce: 0.16

Milk: 0.97

Meat: 1.0

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: DAVIS-BESSE

PORT CLINTON, OHIO

Location: N 41.5972°

W 83.0864°

POPULATION DATA

Total Population Within 2-to-80-km Region: 1.8E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Toledo SMSA	610,000	38 km WNW
Dearborn	91,000	80 km N
Taylor	77,000	71 km N
Lorain	75,000	77 km ESE
Lincoln Park	45,000	73 km N
Findlay	36,000	77 km SW
Sandusky	33,000	35 km ESE

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 6.9E7 kilogram Milk: 3.7E8 liter Meat: 1.2E8 kilogram
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Regional Productivity Factor:	0.6
Animal Grazing Factor:	0.5

Meteorology Period of Record: 4 AUG 74 - 3 AUG 76 Recovery: 99%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via LAKE ERIE

	Average Dilution Flow from Plant: 28 ft ³ /s
Drinking Water:	Exposed Population: 450,000 Dilution Factor: 1.6E-4 ^(a)
Fish:	Edible Harvest: 5.7E6 ^(t) kg/yr Dilution Factor: 1.8E-4 ^(b)

(a) Drinking water dilution factor estimated by averaging dilution factor derived from FES (1973), suitably weighted for population.

(b) Letter from Terry D. Murray, Toledo Edison Company to Charles A. Willis, NRC, July 20, 1984.

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
DAVIS-BESSE

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	5.0E-05	4.8E-05	4.5E-05	3.2E-05	8.4E-05
Child	2.7E-02	6.8E-04	5.2E-04	1.3E-02	1.4E-02
Teen	4.4E-03	4.7E-04	2.0E-04	7.5E-03	1.1E-02
Adult	4.7E-02	4.0E-03	1.7E-03	4.3E-02	6.7E-02
TOTAL	5.4E-02	5.2E-03	2.5E-03	6.4E-02	9.2E-02

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	4.5E-05	4.5E-05	4.5E-05	8.4E-10	4.5E-05	4.5E-05
Child	5.8E-04	5.8E-04	5.8E-04	9.3E-09	5.8E-04	5.8E-04
Teen	3.5E-04	3.5E-04	3.5E-04	6.8E-09	3.5E-04	3.5E-04
Adult	1.8E-03	1.8E-03	1.8E-03	4.1E-08	1.8E-03	1.8E-03
TOTAL	2.8E-03	2.8E-03	2.8E-03	5.8E-08	2.8E-03	2.8E-03

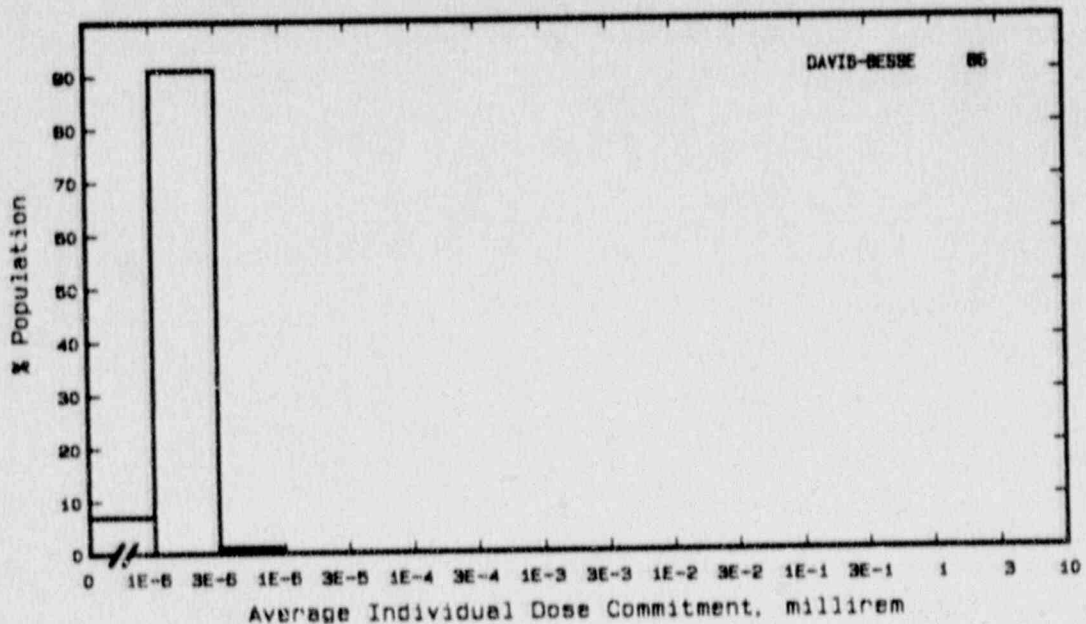
Production/Consumption factors:

Produce: 0.12

Milk: 0.96

Meat: 0.68

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: DIABLO CANYON

AVILA BEACH, CALIFORNIA

Location: N 35.2111°

W 120.8522°

POPULATION DATA

Total Population Within 2-to-80-km Region: 3.0E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
San Luis Obispo	39,000	19 km ENE
Atascadero	13,000	34 km NNE
Lompoc	27,000	74 km SSE
Morro Bay	9,600	18 km N

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 4.8E7 kilogram Milk: 2.3E8 liter Meat: 5.0E7 kilogram
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Regional Productivity Factor:	0.5
Animal Grazing Factor:	1

Meteorology Period of Record: 1 JAN 84 - 31 DEC 84 Recovery: 98%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via Pacific Ocean

	Average Dilution Flow from Plant: 1,100 ft ³ /s
Fish:	Edible Harvest: 2.0E6 kg/yr Dilution Factor: 0.001
Invertebrates:	Edible Harvest: None

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
DIABLO CANYON 1 AND 2

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	2.3E-03	3.6E-03	1.2E-03	5.5E-03	4.6E-03
Teen	1.5E-03	7.4E-03	8.9E-04	3.2E-03	3.3E-03
Adult	9.3E-03	6.3E-02	5.9E-03	1.9E-02	7.2E-02
TOTAL	1.3E-02	7.4E-02	8.0E-03	2.7E-02	3.1E-02

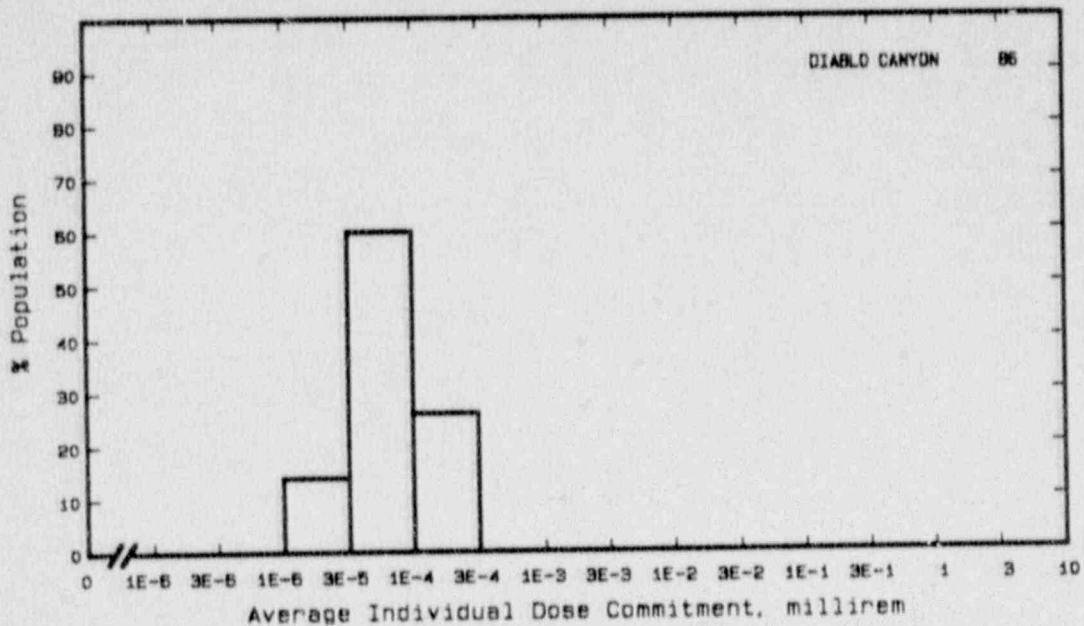
Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	3.4E-04	3.4E-04	7.6E-04	3.2E-04	3.4E-04	3.7E-04
Child	4.0E-03	4.0E-03	6.6E-03	3.5E-03	4.0E-03	4.3E-03
Teen	2.9E-03	2.9E-03	3.9E-03	2.6E-03	2.9E-03	3.3E-03
Adult	1.7E-02	1.7E-02	2.1E-02	1.5E-02	1.7E-02	1.9E-02
TOTAL	2.4E-02	2.4E-02	3.2E-02	2.2E-02	2.4E-02	2.7E-02

Production/Consumption factors:

Produce: 0.41 Milk: 3.0 Meat: 1.1

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: DRESDEN

GRUNDY COUNTY, ILLINOIS

Location: N 41.3897°

W 88.2711°

POPULATION DATA

Total Population Within 2-to-80-km Region: 6.4E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Chicago SMSA	7,100,000 ^(a)	75 km NE
Gary-Hammond-E.Chicago-SMSA	640,000 ^(a)	80 km ENE
Kankakee SMSA	100,000	45 km SE
Aurora	81,000	41 km N
Joliet	78,000	22 km NE
Elgin	56,000	74 km N

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 1.1E8 kilogram Milk: 1.8E8 liter Meat: 1.9E8 kilogram
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Regional Productivity Factor:	1
Animal Grazing Factor:	0.5

Meteorology Period of Record: 1 JAN 74 - 31 JAN 75 Recovery: 77%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via ILLINOIS RIVER

Average River Flow
at Site: 12,000 ft³/s

Drinking Water: Exposed Population: (b)

Fish: Edible Harvest: (b)

(a) Population of total SMSA given; population of SMSA fraction within 80 km of site would be somewhat smaller.

(b) River water used for sewage disposal for Chicago, so population doses from liquid pathways assumed to be near zero.

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
DRESDEN 1, 2 AND 3

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant					
Child					
Teen					
Adult					
TOTAL					

(Little or No Waterborne Pathway Doses)

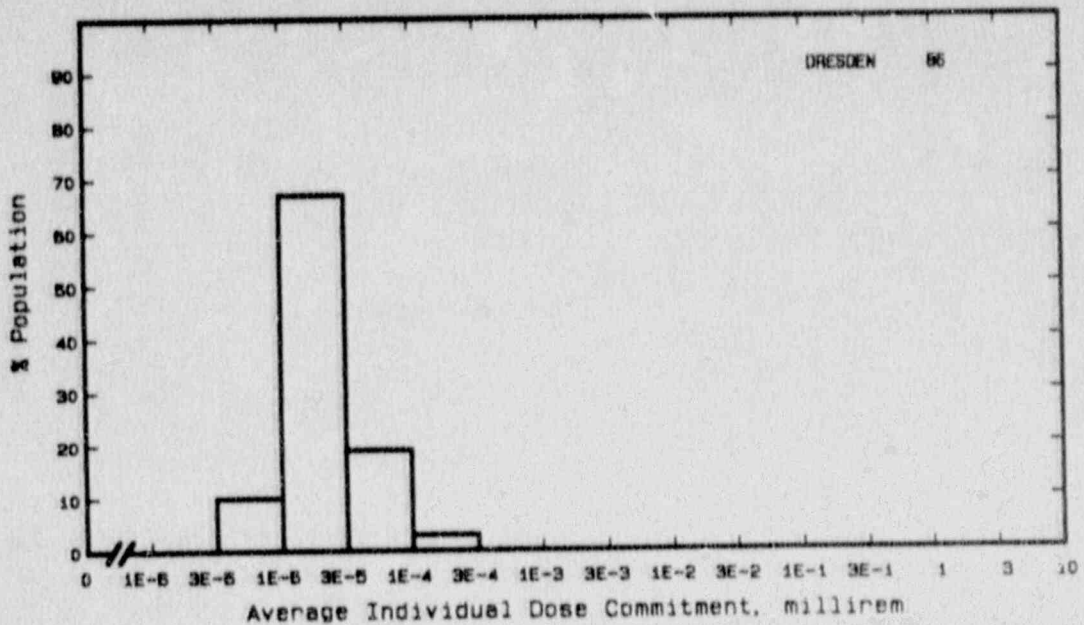
Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	3.0E-03	3.0E-03	1.3E-02	3.0E-03	3.0E-03	4.0E-03
Child	3.4E-02	3.5E-02	1.3E-01	3.6E-02	3.4E-02	5.1E-02
Teen	2.5E-02	2.6E-02	7.1E-02	2.5E-02	2.5E-02	4.0E-02
Adult	1.5E-01	1.6E-01	3.4E-01	1.5E-01	1.5E-01	2.1E-01
TOTAL	2.1E-01	2.2E-01	5.5E-01	2.1E-01	2.1E-01	3.1E-01

Production/Consumption factors:

Produce: 0.090 Milk: 0.21 Meat: 0.36

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: DUANE ARNOLD

CEDAR RAPIDS, IOWA

Location: N 42.1006⁰

W 91.7772⁰

POPULATION DATA

Total Population Within 2-to-80-km Region: 5.9E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Cedar Rapids SMSA	170,000	17 km SE
Waterloo-Cedar Falls SMSA	140,000	64 km NW
Iowa City SMSA	81,000	52 km SSE
Marion	19,000	16 km ESE

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 9.8E7 kilogram Milk: 2.6E8 liter Meat: 4.2E8 kilogram
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Regional Productivity Factor:	1
Animal Grazing Factor:	0.5

Meteorology Period of Record: 1 FEB 71 - 31 DEC 75 Recovery: 57%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via CEDAR RIVER

	Average River Flow at Site: 3,100 ft ³ /s
Drinking Water:	Exposed Population: 170,000 ^(a) Dilution Factor: 1
Fish:	Edible Harvest: (b) Dilution Factor: 1

(a) All persons in the Cedar Rapids SMSA assumed to drink river water.

(b) No fish catch data given in FES (1973); thus population was assumed to eat fish at generic consumption rates (Table A.1).

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
DUANE ARNOLD

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant					
Child					
Teen					
Adult					
TOTAL					

(No Liquid Releases Reported^(a))

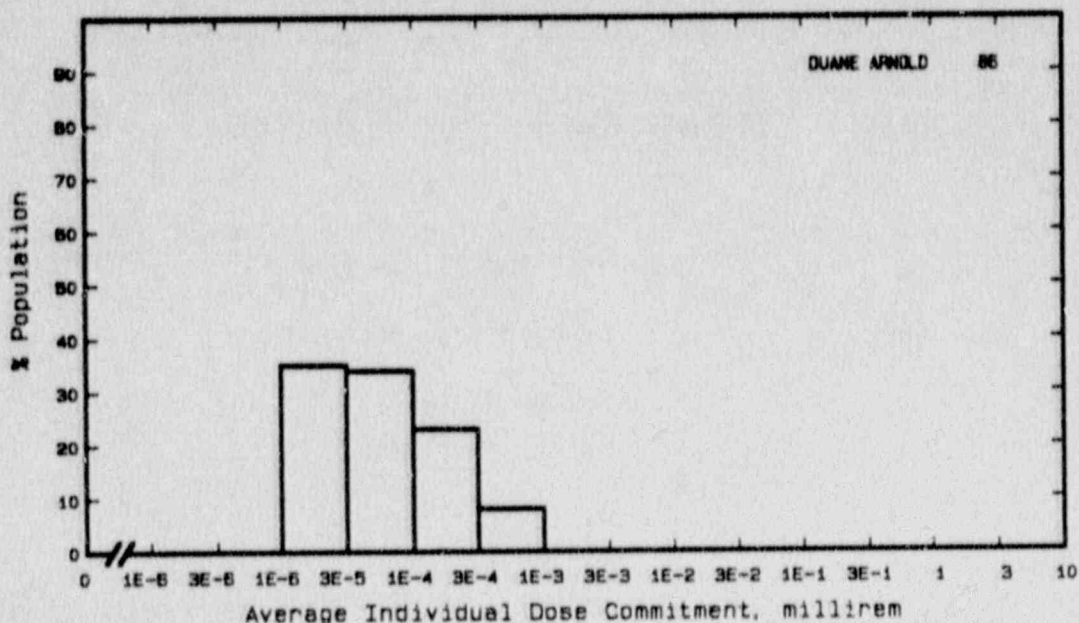
Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	8.5E-04	8.5E-04	3.1E-03	8.0E-04	8.5E-04	1.1E-03
Child	1.1E-02	1.1E-02	3.2E-02	9.0E-02	1.0E-02	1.5E-02
Teen	7.3E-03	8.8E-03	1.6E-02	6.5E-03	7.2E-03	1.2E-02
Adult	4.3E-02	5.4E-02	7.4E-02	3.9E-02	4.3E-02	6.2E-02
TOTAL	6.2E-02	7.5E-02	1.2E-01	5.6E-02	6.1E-02	9.0E-02

Production/Consumption factors:

Produce: 0.86 Milk: 3.3 Meat: 8.9

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



(a) Tichler, et al. 1988.

Site: J. M. FARLEY

DOTHAN, ALABAMA

Location: N 31.2228°

W 85.1126°

POPULATION DATA

Total Population Within 2-to-80-km Region: 3.7E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Dothan	51,000	27 km W
Enterprise	18,000	71 km W
Ozark	13,000	56 km WNW
Eufaula	12,000	75 km N
Bainbridge	11,000	62 km SE

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 1.7E7 kilogram Milk: 5.7E7 liter Meat: 8.6E7 kilogram
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Regional Productivity Factor:	0.95
Animal Grazing Factor:	0.8

Meteorology Period of Record: 1 APR 71 - 31 MAR 75 Recovery: 100%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via CHATTAHOOCHEE RIVER

Average River Flow
at Site: 12,000 ft³/s

Drinking Water: Exposed Population: None

Fish: Edible Harvest: 2.3E5 kg/yr
Dilution Factor: 1

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
J. M. FARLEY 1 AND 2

Dose Commitments (pers...-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	8.4E-04	1.6E-03	4.5E-04	2.8E-03	3.3E-03
Teen	1.2E-03	3.0E-03	3.8E-04	1.7E-03	2.8E-03
Adult	1.3E-02	2.6E-02	2.9E-03	9.7E-03	1.7E-02
TOTAL	1.5E-02	3.1E-02	3.8E-03	1.4E-02	2.3E-02

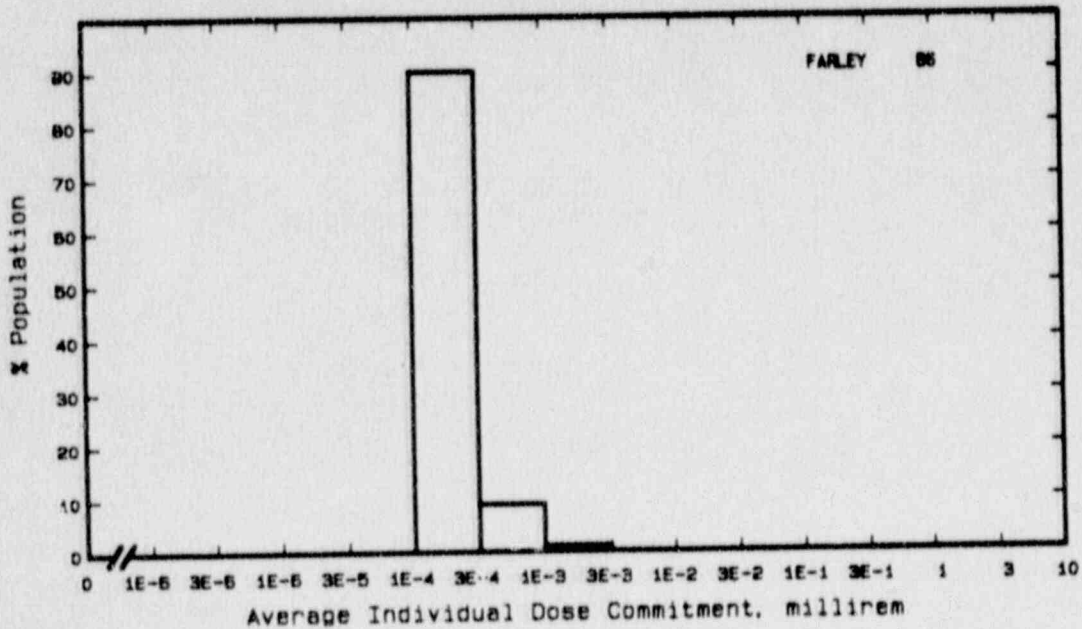
Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.0E-03	1.0E-03	1.6E-03	5.1E-04	1.0E-03	1.1E-03
Child	1.4E-02	1.4E-02	1.7E-02	5.6E-03	1.4E-02	1.4E-02
Teen	9.1E-03	9.1E-03	1.0E-02	4.1E-03	9.1E-03	9.8E-03
Adult	5.2E-02	5.2E-02	5.7E-02	2.5E-02	5.2E-02	5.5E-02
TOTAL	7.6E-02	7.6E-02	8.6E-02	3.5E-02	7.6E-02	8.0E-02

Production/Consumption factors:

Produce: 0.22 Milk: 1.1 Meat: 2.8

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: FERMI

LAGOONA BEACH, MICHIGAN

Location: N 41.9781⁰

W 83.2594⁰

POPULATION DATA

Total Population Within 2-to-80-km Region: 4.9E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Detroit	1,200,000	24-80 km NNW
Toledo	350,000	40 km SW
Ann Arbor	110,000	48 km NW
Sandusky	31,000	72 km SE
Monroe	26,000	13 km WSW

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 6.8E7 kilogram Milk: 2.9E8 liter Meat: 4.5E7 kilogram
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Regional Productivity Factor:	0.6
Animal Grazing Factor:	0.5

Meteorology Period of Record: 1 JUN 74 - 31 MAY 75 Recovery: 90%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via LAKE ERIE

	Average Dilution Flow from Plant: 25 ft ³ /s
Drinking Water:	Exposed Population: 530,000 Dilution Factor: 0.00056
Fish:	Edible Harvest: 8.9E6 kg/yr Dilution Factor: 0.001

POPULATION DOSE-COMMITMENT ESTIMATES AND
 AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
 FERMI 2

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	5.8E-06	4.1E-06	3.0E-06	2.2E-05	2.9E-05
Child	3.0E-03	2.2E-04	3.5E-05	2.0E-02	2.0E-02
Teen	5.6E-03	3.6E-04	1.4E-05	1.2E-02	1.6E-02
Adult	6.2E-02	3.0E-03	1.2E-04	6.9E-02	9.4E-02
TOTAL	7.0E-02	3.6E-03	1.7E-04	1.0E-01	1.3E-01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant						
Child						
Teen						
Adult						
TOTAL						

(No Airborne Releases Reported^(a))

(a) Tichler, et al. 1988.

Site: J. A. FITZPATRICK

OSWEGO, NEW YORK

Location: N 43.5239⁰

W 76.3983⁰

POPULATION DATA

Total Population Within 2-to-80-km Region: 8.5E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Syracuse SMSA	650,000	56 km SSE
Rome	48,000	80 km ESE
Auburn	33,000	66 km SSW
Watertown	28,000	64 km NE
Kingston	24,000	79 km N

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production
Of Crops and Animal Products
in 80-km Radius Circle

Veg: 7.6E7 kilogram
Milk: 7.0E8 liter
Meat: 3.3E7 kilogram

Regional Productivity Factor: 0.7
Animal Grazing Factor: 0.5

Meteorology Period of Record: 1 JAN 74 - 31 DEC 75 Recovery: 97%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via LAKE ONTARIO

Average Dilution Flow
from Plant: 800 ft³/s

Drinking Water: Exposed Population: 540,000^(a)
Dilution Factor: 0.003^(b)

Fish: Edible Harvest: 7.3E5 kg/yr
Dilution Factor: 0.005^(b)

(a) Population exposed to drinking water derived from Nine Mile Point FES (1974).

(b) Dilution factors derived from FES (1973).

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
J. A. FITZPATRICK

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	1.1E-05	1.1E-06	8.5E-06	3.1E-06	1.3E-05
Child	1.7E-04	1.5E-04	9.5E-05	2.5E-04	3.7E-04
Teen	1.2E-04	1.1E-04	3.7E-05	1.4E-04	2.4E-04
Adult	1.1E-03	9.4E-04	3.1E-04	8.0E-04	1.5E-03
TOTAL	1.5E-03	1.2E-03	4.5E-04	1.2E-03	2.2E-03

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.4E-03	1.4E-03	8.7E-03	1.4E-03	1.4E-03	1.4E-03
Child	1.6E-02	1.6E-02	6.4E-02	1.6E-02	1.6E-02	1.6E-02
Teen	1.1E-02	1.2E-02	3.0E-02	1.1E-02	1.2E-02	1.2E-02
Adult	6.9E-02	7.0E-02	1.3E-01	6.9E-02	6.9E-02	7.1E-02
TOTAL	9.8E-02	9.8E-02	2.3E-01	9.7E-02	9.8E-02	1.0E-01

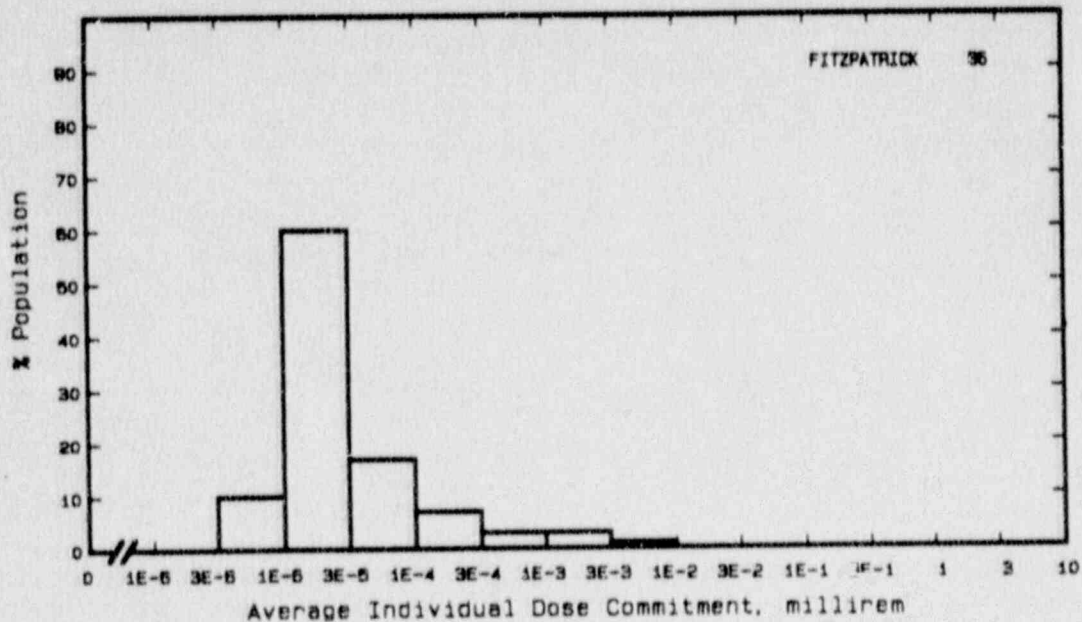
Production/Consumption factors:

Produce: 0.32

Milk: 4.4

Meat: 0.34

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: FORT CALHOUN

WASHINGTON COUNTY, NEBRASKA

Location: N 41.5208°

W 96.0767°

POPULATION DATA

Total Population Within 2-to-80-km Region: 7.6E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Omaha SMSA	610,000	32 km SSE
Council Bluffs	56,000	34 km SE
Freemont	24,000	36 km WSW
Bellevue	22,000	44 km SSE

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production
Of Crops and Animal Products
In 80-km Radius Circle

Veg: 9.7E7 kilogram
Milk: 7.2E7 liter
Meat: 2.0E8 kilogram

Regional Productivity Factor: 1
Animal Grazing Factor: 0.5

Meteorology Period of Record: 1 JAN 74 - 31 DEC 74 Recovery: 98%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via MISSOURI RIVER

Average River Flow
at Site: 27,000 ft³/s

Drinking Water: Exposed Population: 580,000^(a)
Dilution Factor: 1

Fish: Edible Harvest: 1.0E4 kg/yr
Dilution Factor: 1

(a) Drinking water population assumed to be approximately Omaha SMSA (FES 1972).

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
FORT CALHOUN

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	3.6E-03	3.4E-03	4.1E-03	2.0E-03	4.7E-03
Child	4.2E-02	3.8E-02	4.2E-02	2.4E-02	4.0E-02
Teen	1.7E-02	1.5E-02	1.6E-02	7.2E-03	1.9E-02
Adult	1.5E-01	1.3E-01	1.3E-01	5.0E-02	1.5E-01
TOTAL	2.1E-01	1.9E-01	1.9E-01	8.4E-02	2.3E-01

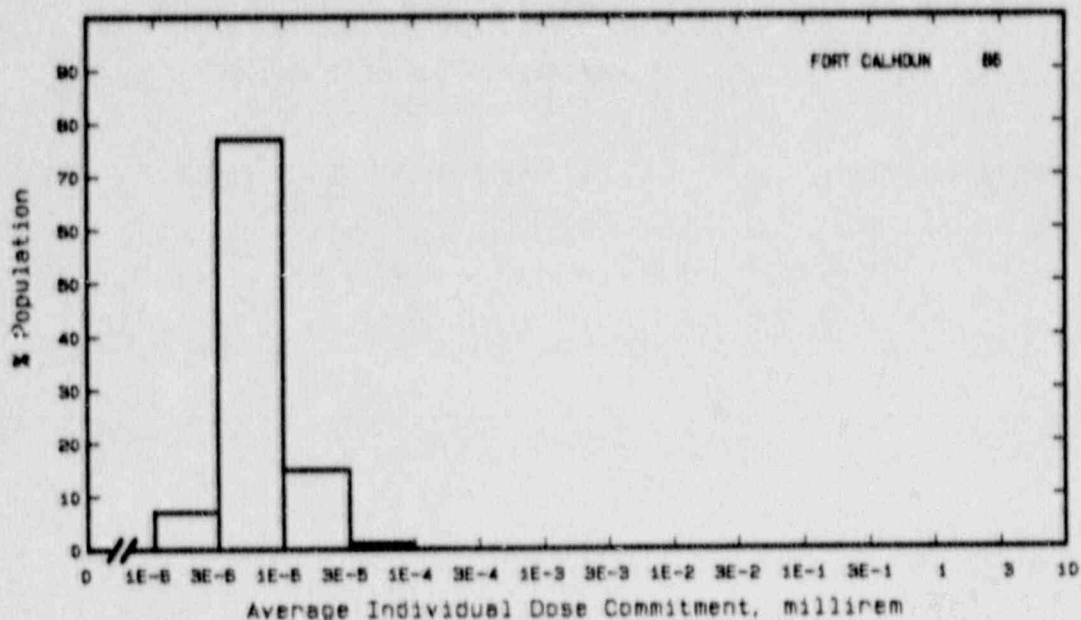
Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	8.4E-05	8.4E-05	6.4E-04	8.4E-05	8.6E-05	9.1E-05
Child	9.7E-04	9.6E-04	6.5E-03	9.9E-04	9.9E-04	1.1E-03
Teen	7.0E-04	7.0E-04	2.9E-03	6.9E-04	7.1E-04	8.3E-04
Adult	4.2E-03	4.2E-03	1.2E-02	4.1E-03	4.2E-03	4.6E-03
TOTAL	6.0E-03	6.0E-03	2.2E-02	5.9E-03	6.0E-03	6.6E-03

Production/Consumption factors:

Produce: 0.65 Milk: 0.72 Meat: 3.2

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: R. E. GINNA

ONTARIO, NEW YORK

Location: N 43.2778⁰

W 77.3089⁰

POPULATION DATA

Total Population Within 2-to-80-km Region: 1.2E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Rochester SMSA	990,000	27 km WSW
Auburn	32,000	71 km ESE
Oswego	20,000	67 km ENE
Batavia	17,000	78 km WSW
Geneva	15,000	52 km SSE

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 7.6E7 kilogram Milk: 7.0E8 liter Meat: 3.3E7 kilogram
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Regional Productivity Factor:	0.6
Animal Grazing Factor:	0.5

Meteorology Period of Record: 1 JAN 66 - 31 DEC 67 Recovery: 89%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via LAKE ONTARIO

	Average Dilution Flow from Plant: 660 ft ³ /s
Drinking Water:	Exposed Population: 570,000 Dilution Factor: 0.01 ^(a)
Fish:	Edible Harvest: 7.3E5 kg/yr Dilution Factor: 0.01 ^(a)

(a) Dilution factors from FES (1973).

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
R. E. GINNA

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	2.7E-03	2.6E-03	3.2E-03	8.1E-04	3.3E-03
Child	3.6E-02	3.0E-02	3.4E-02	2.9E-02	5.8E-02
Teen	2.1E-02	1.2E-02	1.3E-02	1.5E-02	3.3E-02
Adult	2.0E-01	9.9E-02	1.0E-01	9.0E-02	2.3E-01
TOTAL	2.5E-01	1.4E-01	1.5E-01	1.4E-01	3.2E-01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	3.7E-04	3.7E-04	5.3E-04	6.8E-05	3.7E-04	3.7E-04
Child	4.8E-03	4.8E-03	5.8E-03	7.5E-04	4.8E-03	4.9E-03
Teen	3.0E-03	3.0E-03	3.4E-03	5.5E-04	3.0E-03	3.1E-03
Adult	1.6E-02	1.6E-02	1.8E-02	3.3E-03	1.6E-02	1.6E-02
TOTAL	2.4E-02	2.4E-02	2.7E-02	4.7E-03	2.4E-02	2.5E-02

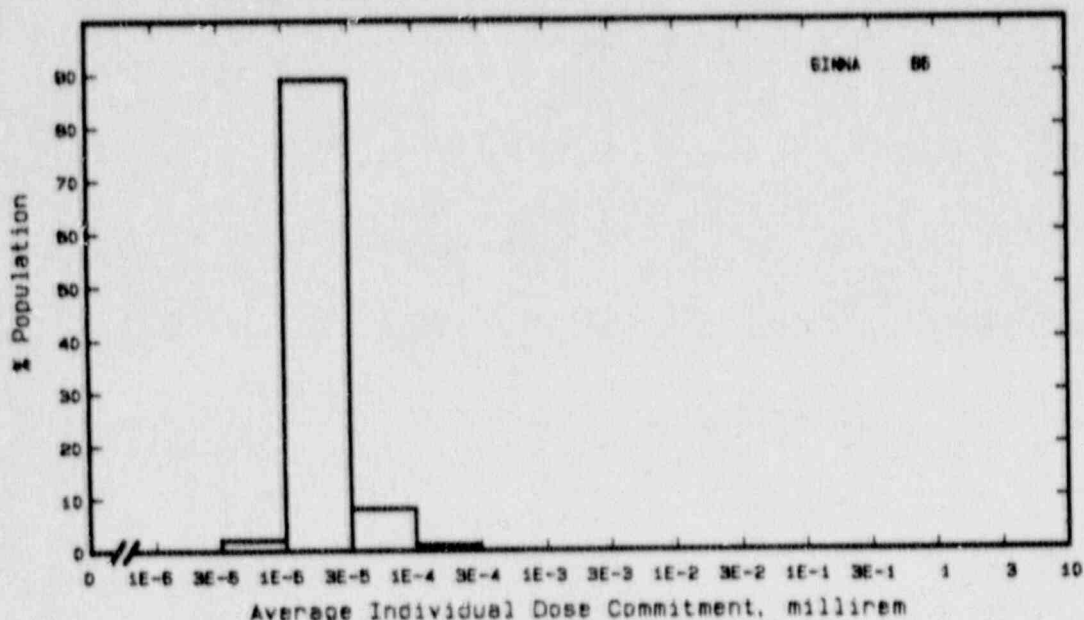
Production/Consumption factors:

Produce: 0.20

Milk: 2.7

Meat: 0.21

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: GRAND GULF

PORT GIBSON, MISSISSIPPI

Location: N 32.0270°

W 91.2530°

POPULATION DATA

Total Population Within 2-to-80-km Region: 3.4E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Vicksburg	27,000	40 km NNE
Tallulah	10,000	45 km NNW
Natches	20,000	60 km SSW
Brookhaven	11,000	76 km SE

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 4.4E6 kilogram Milk: 7.1E7 liter Meat: 9.9E7 kilogram
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Regional Productivity Factor:	0.9
Animal Grazing Factor:	0.8

Meteorology Period of Record: 1 AUG 72 - 31 JUL 73 Recovery: 99%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via MISSISSIPPI RIVER

	Average River Flow at Site: 430,000 ft ³ /s
Drinking Water:	Exposed Population: None
Fish:	Edible Harvest: 7.0E5 kg/yr Dilution Factor: 1
Invertebrates:	Edible Harvest: (a) Dilution Factor:

(a) Freshwater shellfish not considered.

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
GRAND GULF

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	2.6E-05	4.9E-05	5.5E-07	1.8E-05	5.9E-05
Teen	1.9E-05	4.5E-04	4.5E-07	1.1E-05	5.6E-05
Adult	1.1E-04	1.0E-03	3.3E-06	7.2E-05	3.5E-04
TOTAL	1.6E-04	1.2E-03	4.3E-06	1.0E-04	4.6E-04

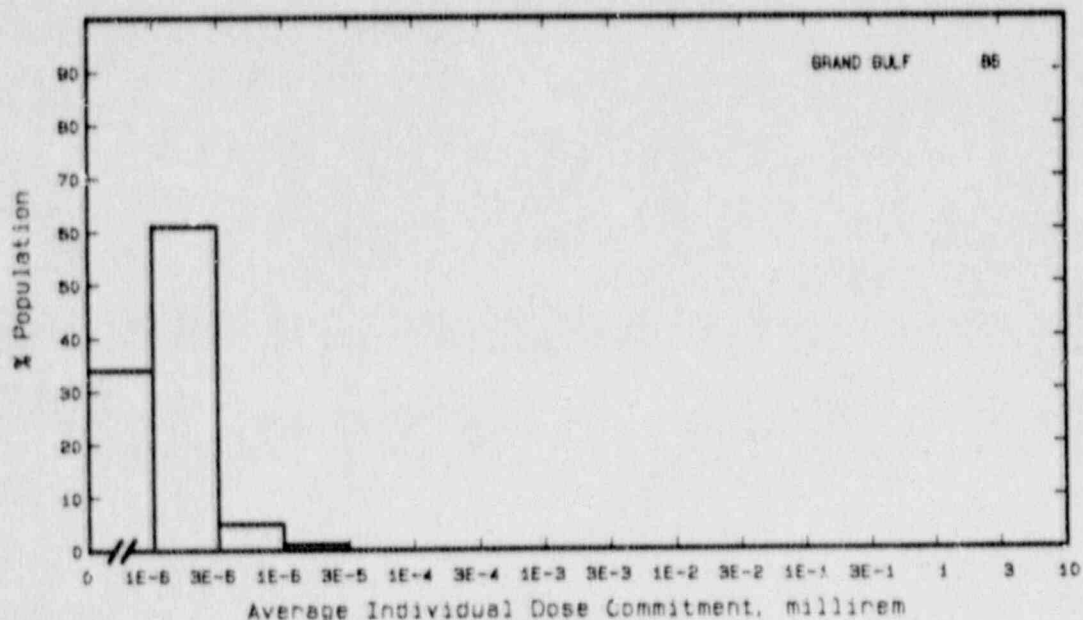
Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	8.1E-06	8.1E-06	4.3E-05	3.3E-06	8.2E-06	9.2E-06
Child	1.0E-04	1.6E-04	2.9E-04	4.1E-05	1.0E-04	1.2E-04
Teen	6.8E-05	1.3E-04	1.4E-04	2.8E-05	6.8E-05	8.1E-05
Adult	3.9E-04	1.0E-03	6.4E-04	1.7E-04	3.9E-04	4.4E-04
TOTAL	5.7E-04	1.3E-03	1.1E-03	2.4E-04	5.7E-04	6.5E-04

Production/Consumption factors:

Produce: 0.060 Milk: 1.5 Meat: 3.3

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: HADDAM NECK

HADDAM NECK, CONNECTICUT

Location: N 41.4819⁰

W 72.4992⁰

POPULATION DATA

Total Population Within 2-to-80-km Region: 3.5E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Hartford SMSA	750,000	35 km NNW
Springfield-Chicopee-Holyoke SMSA	550,000	70 km N
New Haven-West Haven SMSA	440,000	40 km WSW
Bridgeport SMSA	420,000	66 km WSW
New London-Norwich	250,000	35 km ESE

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 3.2E7 kilogram Milk: 4.4E8 liter Meat: 2.0E7 kilogram
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Regional Productivity Factor:	0.7
Animal Grazing Factor:	0.6

Meteorology Period of Record: 1 JAN 75 - 31 DEC 75 Recovery: 95%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via DISCHARGE CANAL TO CONN
RIVER

	Average Discharge Canal Flow at Site: 870 ft ³ /s
Drinking Water:	Exposed Population: None
Fish:	Edible Harvest: 9.1E3 ^(a) kg/yr Dilution Factor: 1

(a) Caught in discharge canal according to FES (1973).

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
HADDAM NECK

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	8.2E-03	6.6E-04	3.6E-03	4.0E-02	4.6E-02
Teen	1.5E-02	9.4E-04	2.6E-03	2.4E-02	3.9E-02
Adult	1.7E-01	7.7E-03	1.8E-02	1.4E-01	2.3E-01
TOTAL	1.9E-01	9.3E-03	2.4E-02	2.0E-01	3.1E-01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	5.0E-03	4.9E-03	1.8E-02	3.8E-03	5.0E-03	5.4E-03
Child	5.7E-02	5.7E-02	1.3E-01	4.2E-02	5.7E-02	6.4E-02
Teen	4.1E-02	4.1E-02	7.5E-02	3.1E-02	4.1E-02	4.9E-02
Adult	2.4E-01	2.4E-01	3.7E-01	1.8E-01	2.4E-01	2.7E-01
TOTAL	3.5E-01	3.5E-01	5.9E-01	2.6E-01	3.5E-01	3.9E-01

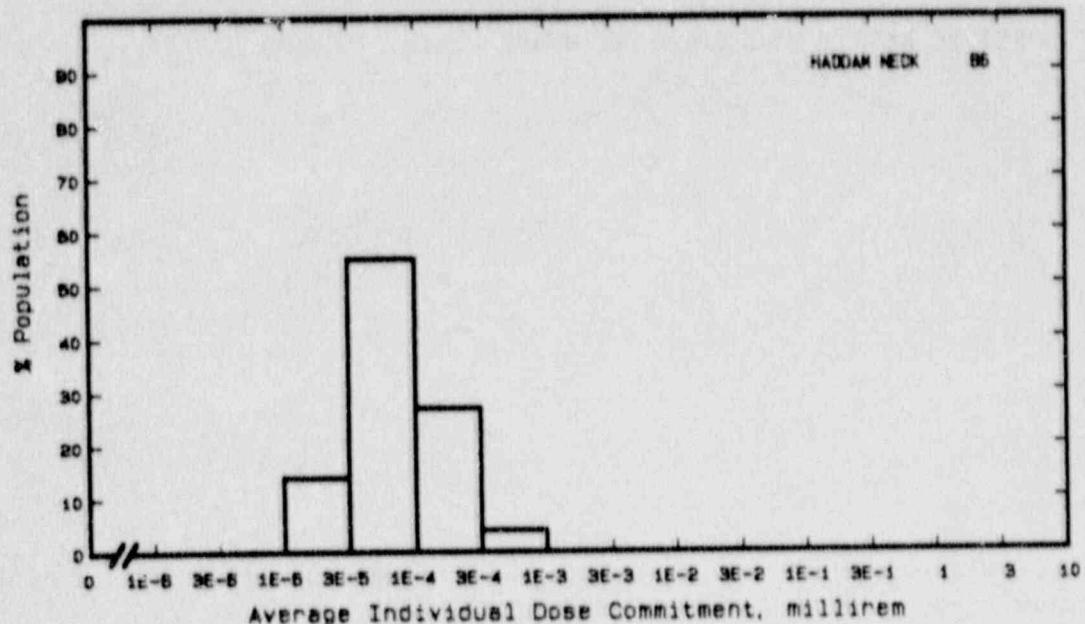
Production/Consumption factors:

Produce: 0.033

Milk: 0.67

Meat: 0.051

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: E. I. HATCH

BAXLEY, GEORGIA

Location: N 31.9342°

W 82.3444°

POPULATION DATA

Total Population Within 2-to-80-km Region: 3.4E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Waycross	22,000	80 km S
Statesboro	16,000	78 km NE
Hinesville	12,000	71 km E
Douglas	12,000	67 km SW
Vidalia	10,000	32 km N

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 8.8E6 kilogram Milk: 7.0E7 liter Meat: 8.1E7 kilogram
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Regional Productivity Factor:	1
Animal Grazing Factor:	0.8

Meteorology Period of Record: 1 JUN 70 - 31 AUG 74 Recovery: 87%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via ALTAMAHA RIVER

	Average River Flow at Site: 13,000 ft ³ /s
Drinking Water:	Exposed Population: None
Fish:	Edible Harvest: 6.3E5 ^(a) kg/yr Dilution Factor: 1

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

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
E. I. HATCH 1 AND 2

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	1.2E-01	8.8E-03	6.2E-03	5.3E-01	6.3E-01
Teen	2.1E-01	1.9E-02	4.5E-03	3.2E-01	5.3E-01
Adult	2.3E+00	1.7E-01	3.0E-02	1.9E+00	3.2E+00
TOTAL	2.6E+00	1.9E-01	4.0E-02	2.7E+00	4.3E+00

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	2.2E-03	2.2E-03	9.8E-03	2.1E-03	2.2E-03	2.3E-03
Child	2.4E-02	2.4E-02	6.6E-02	2.4E-02	2.4E-02	2.6E-02
Teen	1.7E-02	1.7E-02	3.4E-02	1.7E-02	1.8E-02	2.0E-02
Adult	1.1E-01	1.1E-01	1.6E-01	1.0E-01	1.1E-01	1.1E-01
TOTAL	1.5E-01	1.5E-01	2.7E-01	1.5E-01	1.5E-01	1.6E-01

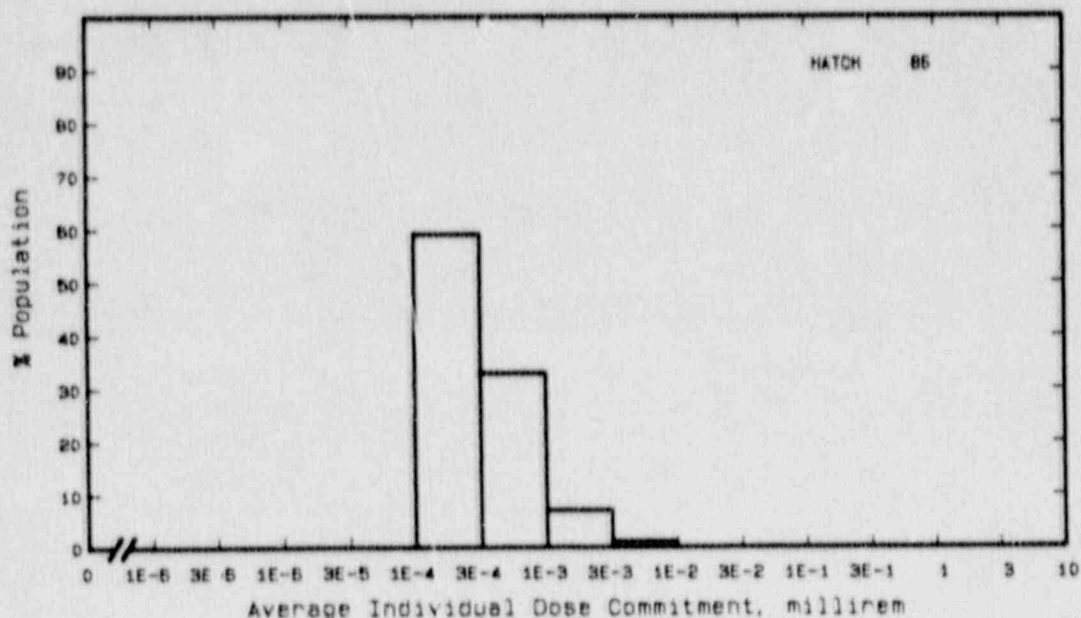
Production/Consumption factors:

Produce: 0.13

Milk: 1.6

Meat: 3.0

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: HOPE CREEK

SALEM COUNTY, NEW JERSEY

Location: N 39.5733°

W 75.4667°

POPULATION DATA

Total Population Within 2-to-80-km Region: 4.8E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Philadelphia	1,700,000	64 km NNE
Camden	88,000	61 km NE
Wilmington	75,000	30 km N
Vineland	55,000	38 km E
Chester	46,000	43 km NNE

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 7.4E7 kilogram Milk: 2.7E8 liter Meat: 2.4E7 kilogram
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Regional Productivity Factor:	0.8
Animal Grazing Factor:	0.6

Meteorology Period of Record: 1 JAN 77 - 31 DEC 81 Recovery: 97%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via DELAWARE RIVER and BAY

	Average River Flow at Site: 16,000 ft ³ /s
Drinking Water:	Exposed Population: None
Fish:	Edible Harvest: 3.6E5 kg/yr Dilution Factor: 1
Invertebrates:	Edible Harvest: 1.6E5 kg/yr Dilution Factor: 1

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
HOPE CREEK

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	9.3E-03	1.5E-02	6.9E-05	2.1E-02	2.0E-02
Teen	6.0E-03	3.0E-02	4.8E-05	1.2E-02	1.7E-02
Adult	3.5E-02	2.5E-01	3.2E-04	7.0E-02	9.9E-02
TOTAL	5.1E-02	3.0E-01	4.3E-04	1.0E-01	1.4E-01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.1E-04	1.1E-04	1.6E-04	6.8E-05	1.1E-04	1.7E-04
Child	1.4E-03	1.4E-03	1.7E-03	7.6E-04	1.4E-03	2.4E-03
Teen	9.9E-04	1.1E-03	1.1E-03	5.6E-04	1.0E-03	1.9E-03
Adult	5.8E-03	6.5E-03	6.2E-03	3.4E-03	5.9E-03	9.8E-03
TOTAL	8.3E-03	9.1E-03	9.2E-03	4.7E-03	8.4E-03	1.4E-02

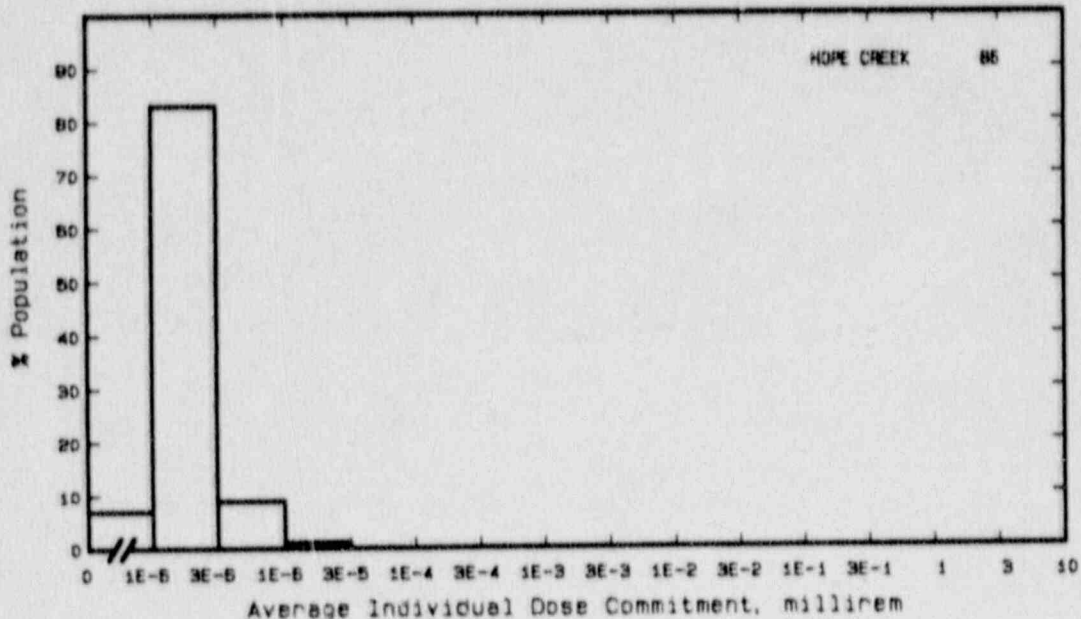
Production/Consumption factors:

Produce: 0.063

Milk: 0.34

Meat: 0.050

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: INDIAN POINT

BUCHANAN, NEW YORK

Location: N 41.2714⁰

W 73.9525⁰

POPULATION DATA

Total Population Within 2-to-80-km Region: 1.5E7

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
New York SMSA	8,600,000	57 km S
Newark SMSA	1,900,000	62 km SSW
Nassau County SMSA	1,300,000	70 km SSE
Jersey City SMSA	570,000	61 km S
Paterson-Clifton-Passaic SMSA	450,000	44 km SSW

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 7.6E7 kilogram Milk: 7.0E8 liter Meat: 3.3E7 kilogram
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Regional Productivity Factor:	0.8
Animal Grazing Factor:	0.5

Meteorology Period of Record: 1 JAN 75 - 31 DEC 75 Recovery: 96%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via HUDSON RIVER

	Average River Flow at Site: 20,000 ft ³ /s
Drinking Water:	Exposed Population: None
Fish:	Edible Harvest: (a) Dilution Factor: 0.001 ^(b)

(a) No fish catch data given in FES (1982), so generic consumption rates used (Table A-1).

(b) One percent of population obtain 10% of their fish from river according to FES (1972).

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
INDIAN POINT 1, 2 AND 3

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	2.1E-02	7.4E-03	1.1E-03	1.0E-01	1.2E-01
Teen	4.0E-02	1.5E-02	8.1E-04	6.3E-02	1.0E-01
Adult	4.4E-01	1.3E-01	5.4E-03	3.6E-01	6.0E-01
TOTAL	5.0E-01	1.5E-01	7.3E-03	5.3E-01	8.2E-01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	7.7E-02	7.7E-02	9.2E-02	2.6E-01	7.7E-02	7.9E-02
Child	6.4E-01	6.4E-01	7.5E-01	2.0E+00	6.4E-01	6.7E-01
Teen	3.3E-01	3.3E-01	3.9E-01	7.5E-01	3.3E-01	3.7E-01
Adult	1.7E+00	1.7E+00	1.9E+00	2.9E+00	1.7E+00	1.8E+00
TOTAL	2.7E+00	2.7E+00	3.1E+00	5.9E+00	2.7E+00	2.9E+00

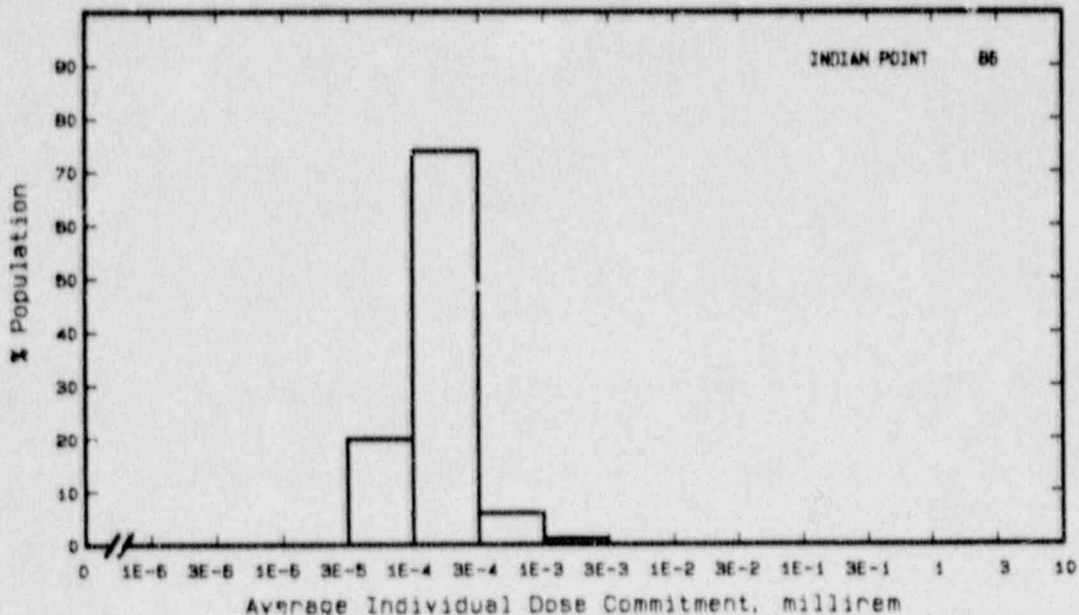
Production/Consumption factors:

Produce: 0.020

Milk: 0.28

Meat: 0.021

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: KEWAUNEE

CARLTON, WISCONSIN

Location: N 44.3431°

W 87.5361°

POPULATION DATA

Total Population Within 2-to-80-km Region: 6.2E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Greenbay SMSA	180,000	44 km NW
Appleton SMSA	290,000	72 km W
Sheboygan	48,000	65 km SSW
Manitowoc	33,000	29 km SSW
Neenah	22,000	72 km W

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 7.2E7 kilogram Milk: 1.2E9 liter Meat: 1.0E8 kilogram
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Regional Productivity Factor:	0.5
Animal Grazing Factor:	0.5

Meteorology Period of Record: 2 JAN 69 - 31 DEC 69 Recovery: 76%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via LAKE MICHIGAN

Average Dilution Flow from
Plant: 39 ft³/s

Drinking Water:	Exposed Population: 260,000 Dilution factor: 8.2E-3 ^(a)
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Fish:	Edible Harvest: 1.1 ^(b) kg/yr Dilution Factor: 0.01 ^(c)
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- (a) Drinking water dilution factor estimated by averaging dilution factors derived from FES (1972) suitably weighted for populations.
- (b) Average individual consumption rate as given in FES used in lieu of catch data.
- (c) Dilution factor reduced 1/10 from that used in FES in consideration of lake mixing.

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
KEWAUNEE

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	1.5E-02	1.5E-02	1.5E-02	2.8E-03	1.5E-02
Child	1.7E-01	1.9E-01	1.6E-01	8.5E-02	2.0E-01
Teen	7.4E-02	1.1E-01	6.2E-02	3.7E-02	9.2E-02
Adult	6.5E-01	9.3E-01	5.2E-01	2.2E-01	7.0E-01
TOTAL	9.1E-01	1.2E+00	7.6E-01	3.4E-01	1.0E+00

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	2.0E-04	2.0E-04	2.0E-04	4.7E-06	2.0E-04	2.0E-04
Child	3.1E-03	3.1E-03	3.2E-03	5.6E-05	3.1E-03	3.2E-03
Teen	1.9E-03	1.9E-03	1.9E-03	3.8E-05	1.9E-03	1.9E-03
Adult	1.0E-02	1.0E-02	1.0E-02	2.2E-04	1.0E-02	1.0E-02
TOTAL	1.6E-02	1.6E-02	1.6E-02	3.2E-04	1.6E-02	1.6E-02

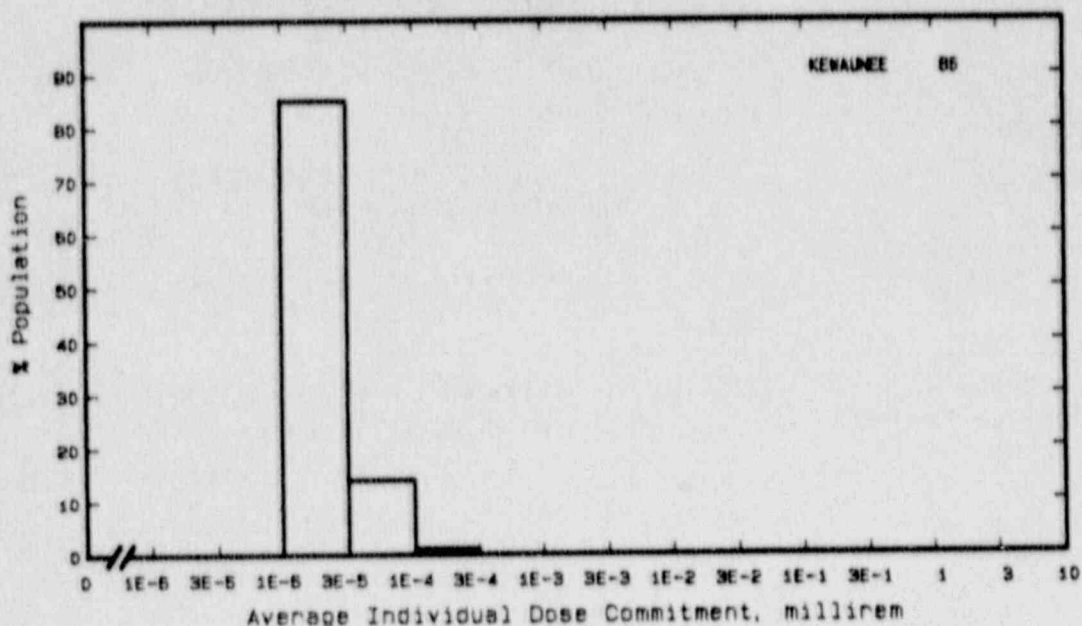
Production/Consumption factors:

Produce: 0.30

Milk: 7.2

Meat: 1.0

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: LACROSSE

GENOA, WISCONSIN

Location: N 43.5583°

W 91.2306°

POPULATION DATA

Total Population Within 2-to-80-km Region: 3.5E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
La Crosse SMSA	94,000	27 km N
Winona	25,000	64 km WNW

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 7.2E7 kilogram Milk: 1.2E9 liter Meat: 1.0E8 kilogram
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Regional Productivity Factor:	1
Animal Grazing Factor:	0.5

Meteorology Period of Record: 1 JAN 75 - 31 DEC 75 Recovery: 97%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via MISSISSIPPI RIVER

	Average River Flow at Site: 28,000 ft ³ /s
Drinking Water:	Exposed Population: None
Fish:	Edible Harvest: (a) Dilution Factor: 0.5(a)

(a) No fish catch data given in FES (1976), so 1/2 population assumed to consume river fish at generic consumption rates (Table A-1).

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
LACROSSE

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	3.4E-02	2.9E-02	3.6E-03	1.6E-01	1.6E-01
Teen	5.0E-02	6.3E-02	2.6E-03	9.9E-02	1.3E-01
Adult	5.1E-01	5.5E-01	1.7E-02	5.8E-01	7.9E-01
TOTAL	6.0E-01	6.4E-01	2.3E-02	8.4E-01	1.1E+00

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	3.0E-03	3.0E-03	3.9E-03	3.0E-03	3.1E-03	3.0E-03
Child	3.3E-02	3.3E-02	4.3E-02	3.3E-02	3.3E-02	3.4E-02
Teen	2.4E-02	2.4E-02	2.8E-02	2.4E-02	2.4E-02	2.6E-02
Adult	1.5E-01	1.5E-01	1.6E-01	1.5E-01	1.5E-01	1.5E-01
TOTAL	2.1E-01	2.1E-01	2.4E-01	2.1E-01	2.1E-01	2.2E-01

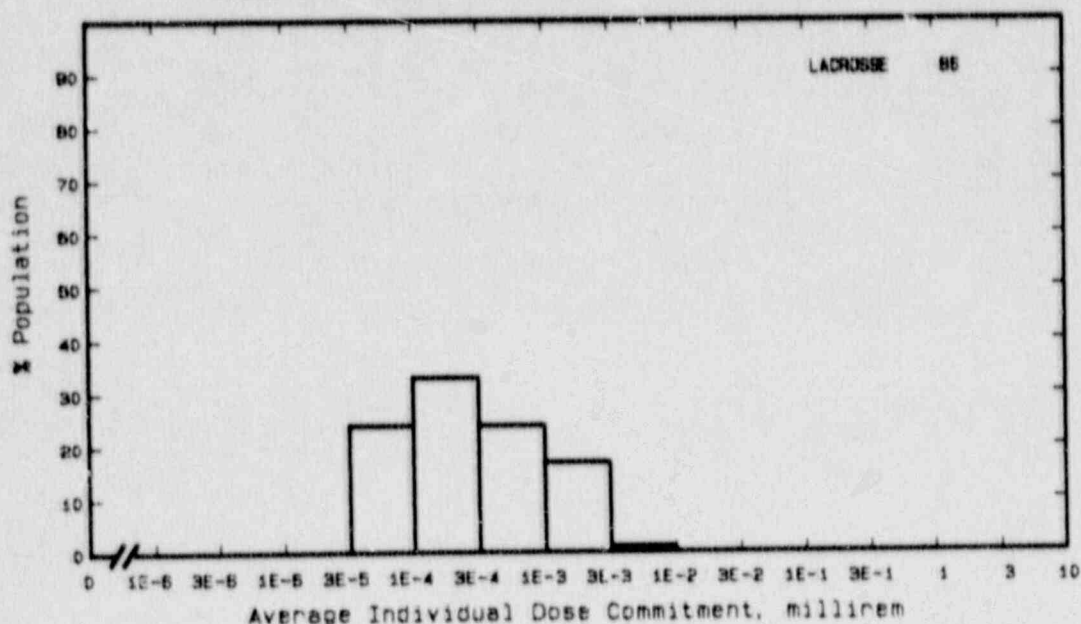
Production/Consumption factors:

Produce: 1.1

Milk: 26

Meat: 3.7

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: LASALLE

SENECA, ILLINOIS

Location: N 41.2439°

W 88.6708°

POPULATION DATA

Total Population Within 2-to-80-km Region: 1.0E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Joliet	78,000	59 km NNE
Aurora	80,000	65 km NNE
Kankakee	103,000	59 km ESE
Dekalb	33,000	77 km N
Naperville	42,000	73 km NE

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 1.1E8 kilogram Milk: 1.8E8 liter Meat: 1.9E8 kilogram
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Regional Productivity Factor:	0.9
Animal Grazing Factor:	0.5

Meteorology Period of Record: 1 Jan 82 - 31 Dec 82 Recovery: 99%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via ILLINOIS RIVER

Average River Flow
at site: 11,000 ft³/s

Drinking Water:	Exposed Population: None
	Dilution Factor:

Fish:	Edible Harvest: None ^(a)
	Dilution Factor:

(a) Because of river quality, no fish consumption is considered according to FES (1973).

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
LASALLE 1 and 2

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-III</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant					
Child					
Teen					
Adult					
TOTAL					

(Little or No Waterborne Pathway Doses)

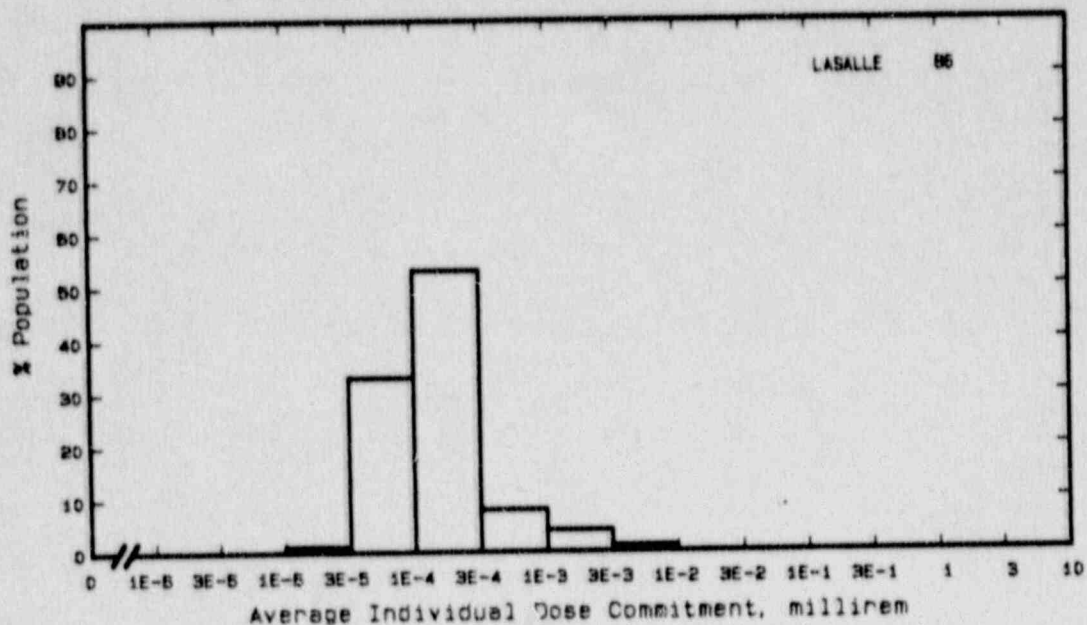
Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-III</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	3.9E-03	3.8E-03	4.2E-02	3.9E-03	3.9E-03	3.9E-03
Child	4.3E-02	4.3E-02	3.3E-01	4.3E-02	4.4E-02	4.4E-02
Teen	3.1E-02	3.1E-02	1.4E-01	3.1E-02	3.2E-02	3.3E-02
Adult	1.9E-01	1.9E-01	5.8E-01	1.9E-01	1.9E-01	2.0E-01
TOTAL	2.7E-01	2.7E-01	1.1E+00	2.7E-01	2.7E-01	2.8E-01

Production/Consumption factors:

Produce: 0.49 Milk: 1.1 Meat: 2.0

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: LIMERICK

POTTSTOWN, PENNSYLVANIA

Location: N 40.2242°

W 75.5875°

POPULATION DATA

Total Population Within 2-to-80-km Region: 6.8E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Philadelphia PMSA	4,800,000	40 km ESE
Allentown-Bethlehem MSA	65,000	42 km ENE
Reading MSA	310,000	34 km WNW
Lancaster MSA	360,000	68 km WSW
Wilmington PMSA	540,000	56 km S
Camdon	110,000	52 km SE
Trenton PMSA	310,000	71 km E

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 5.3E7 kilogram Milk: 5.3E8 liter Meat: 5.4E7 kilogram
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Regional Productivity Factor:	0.9
Animal Grazing Factor:	0.6

Meteorology Period of Record: 1 Jan 74 - 31 Dec 74 Recovery: 93%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via SCHUYLKILL RIVER

	Average River Flow at site: 3,000 ft ³ s
Drinking Water:	Exposed Population: 3,000,000 Dilution Factor: 1
Fish:	Edible Harvest: None

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
LIMERICK

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	1.9E-03	2.0E-03	1.8E-03	7.4E-05	2.0E-03
Child	2.1E-02	2.1E-02	2.0E-02	9.4E-04	2.2E-02
Teen	8.0E-03	8.6E-03	7.5E-03	2.9E-04	8.5E-03
Adult	6.7E-02	7.5E-02	6.4E-02	2.1E-03	7.0E-02
TOTAL	9.9E-02	1.1E-01	9.2E-02	3.4E-03	1.0E-01

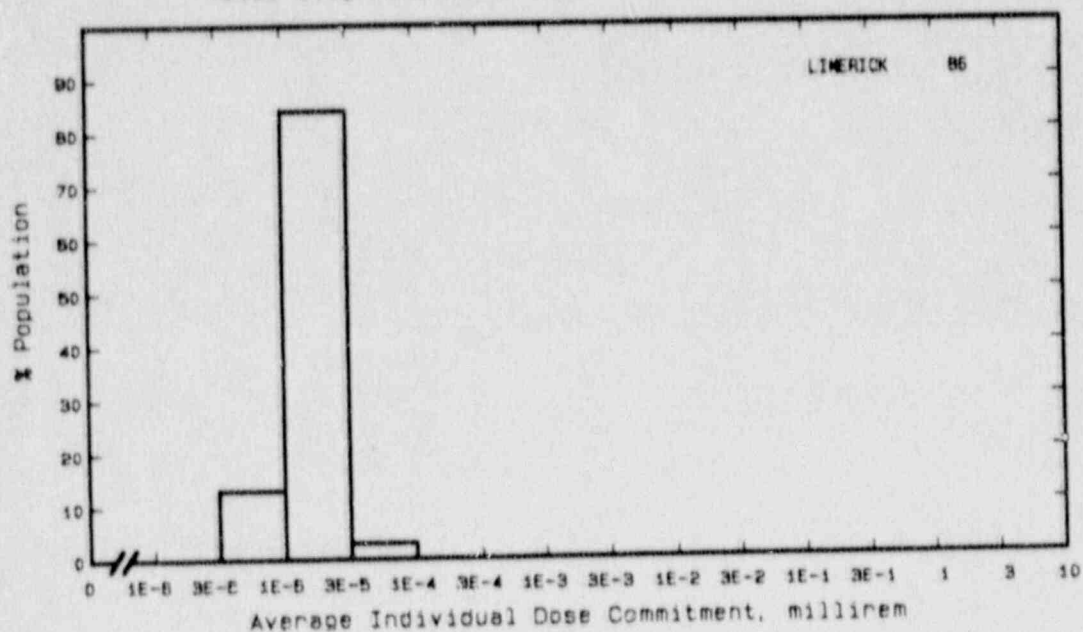
Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.1E-03	5.7E-05	3.6E-06	8.3E-02	3.6E-06	1.5E-03
Child	2.6E-02	1.4E-03	4.0E-05	2.1E-01	4.0E-05	2.2E-02
Teen	1.4E-02	1.6E-03	2.9E-05	1.4E-01	2.9E-05	1.8E-02
Adult	6.6E-02	7.9E-03	1.8E-04	7.5E-01	1.8E-04	6.2E-02
TOTAL	1.1E-01	1.1E-02	2.5E-04	1.1E+00	2.5E-04	1.0E-01

Production/Consumption factors:

Produce: 0.036 Milk: 0.53 Meat: 0.090

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: MAINE YANKEE

LINCOLN COUNTY, MAINE

Location: N 43.9506°

W 69.6961°

POPULATION DATA

Total Population Within 2-to-80-km Region: 6.1E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Portland SMSA	180,000	56 km WSW
Lewiston-Auburn SMSA	74,000	45 km WNW
Augusta	22,000	41 km N
Biddeford	20,000	80 km SW
Waterville	18,000	67 km N

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 2.4E8 kilogram Milk: 6.6E7 liter Meat: 4.3E6 kilogram
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Regional Productivity Factor:	0.6
Animal Grazing Factor:	0.5

Meteorology Period of Record: 1 APR 75 - 31 MAR 76 Recovery: 98%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via ATLANTIC OCEAN

	Average Dilution Flow from Plant: 880 ft ³ /s
Fish:	Edible Harvest: (a) Dilution Factor: 0.001
Invertebrates:	Edible Harvest: (a) Dilution Factor: 0.002

(a) No seafood harvest data given in FES (1972), thus generic population consumption rates used (Table A-1).

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
MAINE YANKEE

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	1.6E-04	1.7E-04	5.0E-03	6.6E-04	3.9E-04
Teen	1.1E-04	3.1E-04	3.5E-03	3.7E-04	3.0E-04
Adult	6.7E-04	2.6E-03	2.3E-02	2.2E-03	1.7E-03
TOTAL	9.4E-04	3.1E-03	3.2E-02	3.2E-03	2.4E-03

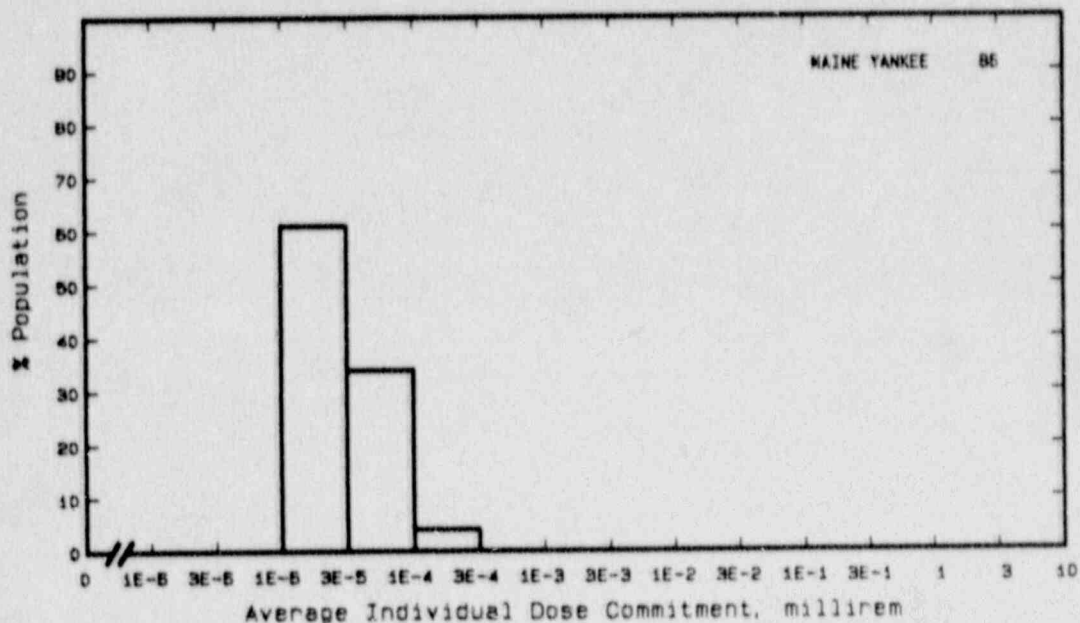
Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	3.1E-04	3.1E-04	6.8E-04	2.9E-04	3.1E-04	3.4E-04
Child	3.9E-03	3.9E-03	9.5E-03	3.3E-03	3.9E-03	4.3E-03
Teen	2.7E-03	2.7E-03	5.1E-03	2.4E-03	2.7E-03	3.3E-03
Adult	1.6E-02	1.6E-02	2.6E-02	1.4E-02	1.6E-02	1.8E-02
TOTAL	2.3E-02	2.3E-02	4.1E-02	2.0E-02	2.3E-02	2.6E-02

Production/Consumption factors:

Produce: 1.2 Milk: 0.49 Meat: 0.053

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: McGUIRE

CORNELIUS, NORTH CAROLINA

Location: N 35.4322°

W 80.9483°

POPULATION DATA

Total Population Within 2-to-80-km Region: 1.7E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Charlotte-Gastonia SMSA	680,000	25 km S
Rockhill	37,000	57 km S
Kannapolis	37,000	30 km E
Salisbury	25,000	51 km ENE
Hickory	23,000	49 km NW

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 2.6E7 kilogram Milk: 1.0E8 liter Meat: 5.8E7 kilogram
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Regional Productivity Factor:	0.9
Animal Grazing Factor:	0.7

Meteorology Period of Record: 17 OCT 70 - 16 OCT 71 Recovery: 90%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via LAKE NORMAN on CATAWBA
RIVER

	Average River Flow at Site: 2,600 ft ³ /s
Drinking Water:	Exposed Population: 720,000
Fish:	Edible Harvest: 1.8 ^(a) kg/yr Dilution Factor: 1

(a) Average individual consumption rate as given in FES (1976).

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
McGUIRE 1 AND 2

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	2.4E-01	2.4E-01	1.0E+00	3.5E-02	2.7E-01
Child	3.4E+00	3.7E+00	8.4E+00	3.7E+00	7.0E+00
Teen	2.5E+00	3.0E+00	2.9E+00	2.1E+00	4.6E+00
Adult	2.4E+01	2.6E+01	2.2E+01	1.2E+01	3.0E+01
TOTAL	3.1E+01	3.3E+01	3.4E+01	1.8E+01	4.2E+01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.4E-03	1.4E-03	8.1E-03	1.1E-03	1.4E-03	1.5E-03
Child	1.7E-02	1.7E-02	5.7E-02	1.2E-02	1.7E-02	1.8E-02
Teen	1.2E-02	1.2E-02	2.9E-02	9.0E-03	1.2E-02	1.4E-02
Adult	7.4E-02	7.4E-02	1.3E-01	5.4E-02	7.4E-02	7.9E-02
TOTAL	1.0E-01	1.0E-01	2.3E-01	7.7E-02	1.1E-01	1.1E-01

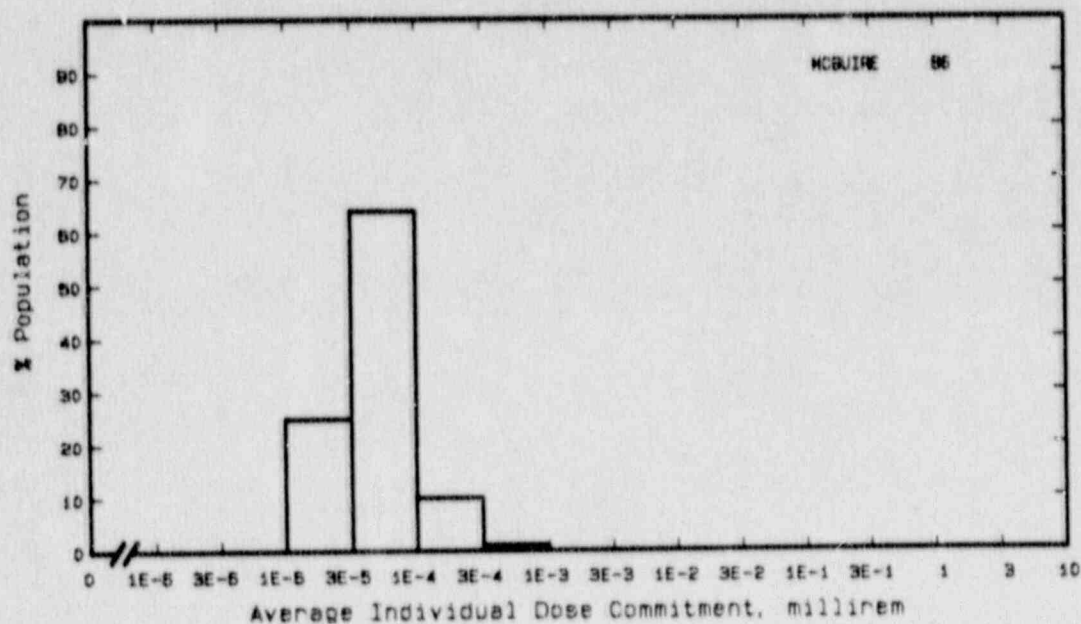
Production/Consumption factors:

Produce: 0.068

Milk: 0.41

Meat: 0.37

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: MILLSTONE

WATERFORD, CONNECTICUT

Location: N 41.3086°

W 72.1681°

POPULATION DATA

Total Population Within 2-to-80-km Region: 2.6E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Hartford SMSA	750,000	67 km NW
New Haven-West Haven SMSA	430,000	64 km W
New London-Norwich SMSA	250,000	8 km NNE
New Britain SMSA	140,000	65 km NW
Waterbury SMSA	230,000	78 km WNW

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 3.2E7 kilogram Milk: 4.4E8 liter Meat: 2.0E7 kilogram
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Regional Productivity Factor:	0.6
Animal Grazing Factor:	0.6

Meteorology Period of Record: 1 JAN 74 - 31 DEC 74 Recovery: 95%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via NIAN TIC BAY

	Average Dilution Flow from Plant: 3,500 ft ³ /s
Fish:	Edible Harvest: 9.1E4 kg/yr Dilution Factor: 0.001
Invertebrates:	Edible Harvest: 9.1E4 kg/yr Dilution Factor: 0.002

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
MILLSTONE 1, 2 AND 3

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	3.2E-03	8.4E-03	1.1E-03	1.1E-02	8.7E-03
Teen	3.0E-03	1.8E-02	7.7E-04	6.2E-03	7.0E-03
Adult	2.5E-02	1.5E-01	5.1E-03	3.6E-02	4.1E-02
TOTAL	3.2E-02	1.8E-01	7.0E-03	5.3E-02	5.7E-02

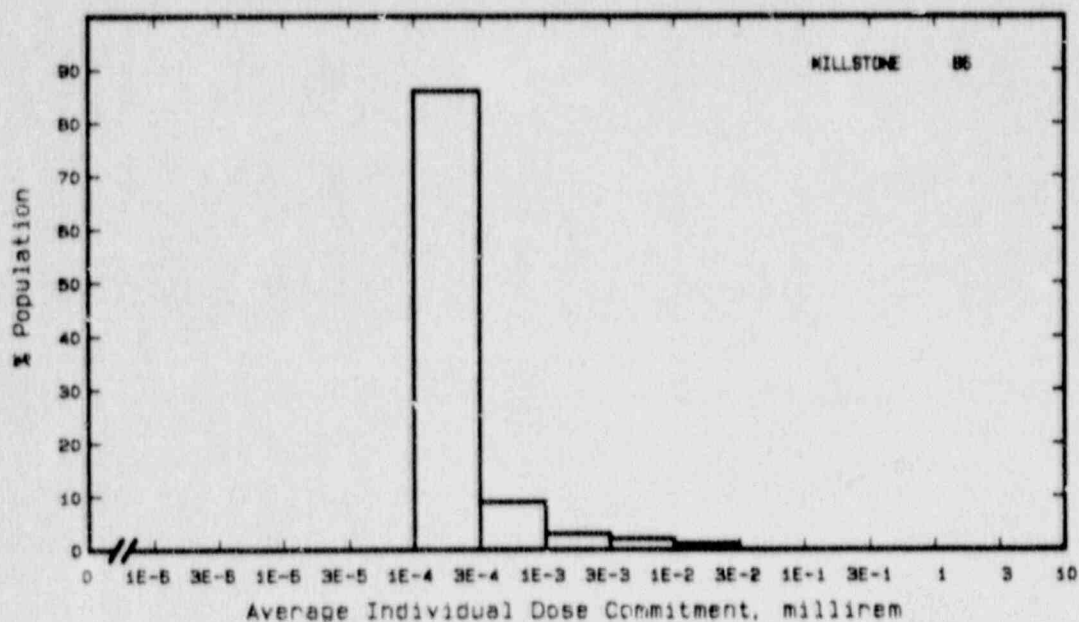
Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.8E-02	1.8E-02	4.1E-02	1.1E-02	1.8E-02	1.8E-02
Child	2.0E-01	2.0E-01	3.3E-01	1.2E-01	2.0E-01	2.1E-01
Teen	1.4E-01	1.4E-01	1.9E-01	8.9E-02	1.4E-01	1.5E-01
Adult	8.2E-01	8.2E-01	9.8E-01	5.4E-01	8.2E-01	8.5E-01
TOTAL	1.2E+00	1.2E+00	1.5E-01	7.6E-01	1.2E+00	1.2E+00

Production/Consumption factors:

Produce: 0.038 Milk: 0.78 Meat: 0.060

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: MONTICELLO

MONTICELLO, MINNESOTA

Location: N 45.3333⁰

W 93.8483⁰

POPULATION DATA

Total Population Within 2-to-80-km Region: 2.2E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Minneapolis-St. Paul SMSA	2,100,000	60 km SE
St. Cloud SMSA	160,000	36 km NW
Bloomington	84,000	72 km SE
Edina	47,000	63 km SE
Richfield	39,000	67 km SE

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 1.2E8 kilogram Milk: 4.0E8 liter Meat: 1.1E8 kilogram
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Regional Productivity Factor:	1
Animal Grazing Factor:	0.5

Meteorology Period of Record: 1 JAN 74 - 31 DEC 74 Recovery: 92%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via MISSISSIPPI RIVER

Average River Flow
at Site: 4,600 ft³/s

Drinking Water:	Exposed Population: (a)
Fish:	Edible Harvest: (a)

(a) No radionuclides released in liquid effluents reported (Tichler, et al. 1988).

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
MONTICELLO

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant					
Child					
Teen					
Adult					
TOTAL					

(No Waterborne Pathway Doses)

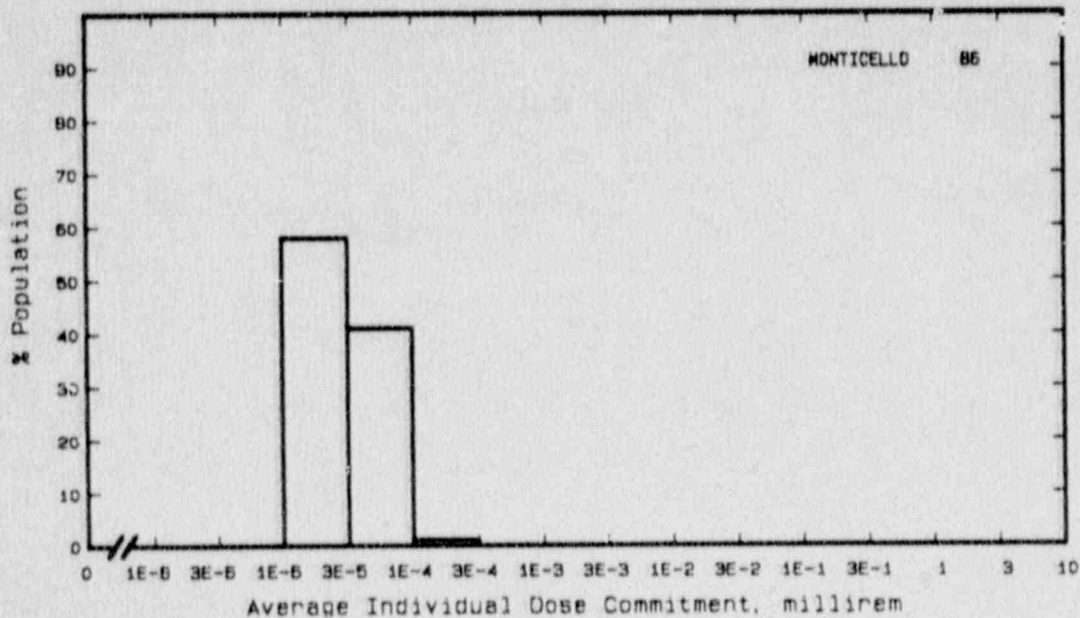
Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.4E-03	1.3E-03	8.1E-02	1.3E-03	1.7E-03	1.4E-03
Child	1.7E-02	1.6E-02	5.5E-01	1.5E-02	1.9E-02	1.7E-02
Teen	1.2E-02	1.1E-02	2.2E-01	9.1E-03	1.2E-02	1.2E-02
Adult	6.6E-02	6.6E-02	7.7E-01	5.0E-02	6.7E-02	6.8E-02
TOTAL	9.6E-02	9.5E-02	1.5E+00	7.6E-02	1.0E-01	9.9E-02

Production/Consumption factors:

Produce: 0.29 Milk: 1.4 Meat: 0.59

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: NINE MILE POINT

OSWEGO, NEW YORK

Location: N 43.5222°

W 76.4100°

POPULATION DATA

Total Population Within 2-to-80-km Region: 8.5E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Syracuse SMSA	670,000	56 km SSE
Auburn	33,000	67 km SSW
Watertown	28,000	64 km NE
Kingston	24,000	79 km N
Oswego	20,000	11 km SW

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production
Of Crops and Animal Products
In 80-km Radius Circle

Veg: 7.6E7 kilogram
Milk: 7.0E8 liter
Meat: 3.3E7 kilogram

Regional Productivity Factor: 0.7
Animal Grazing Factor: 0.5

Meteorology Period of Record: 1 JAN 74 - 31 DEC 75 Recovery: 97%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via LAKE ONTARIO

Average Dilution Flow
from Plant: 460 ft³/s

Drinking Water: Exposed Population: 560,000
Dilution Factor: 0.01

Fish: Edible Harvest: 7.3E5 kg/yr
Dilution Factor: 0.0033

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
NINE MILE POINT

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	2.3E-05	2.2E-05	2.2E-05	5.1E-06	2.3E-05
Child	2.6E-04	2.5E-04	2.5E-04	7.2E-05	2.7E-04
Teen	1.0E-04	9.8E-05	9.5E-05	2.5E-05	1.0E-04
Adult	8.8E-04	8.4E-04	8.1E-04	1.7E-04	8.7E-04
TOTAL	1.3E-03	1.2E-03	1.2E-03	2.8E-04	1.3E-03

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	3.4E-04	3.3E-04	5.0E-03	2.6E-04	4.4E-04	3.5E-04
Child	4.6E-03	4.5E-03	3.5E-02	3.8E-03	5.3E-03	4.7E-03
Teen	2.8E-03	2.9E-03	1.4E-02	1.8E-03	3.1E-03	3.0E-03
Adult	1.5E-02	1.5E-02	5.4E-02	8.7E-03	1.6E-02	1.6E-02
TOTAL	2.3E-02	2.3E-02	1.1E-01	1.5E-02	2.4E-02	2.4E-02

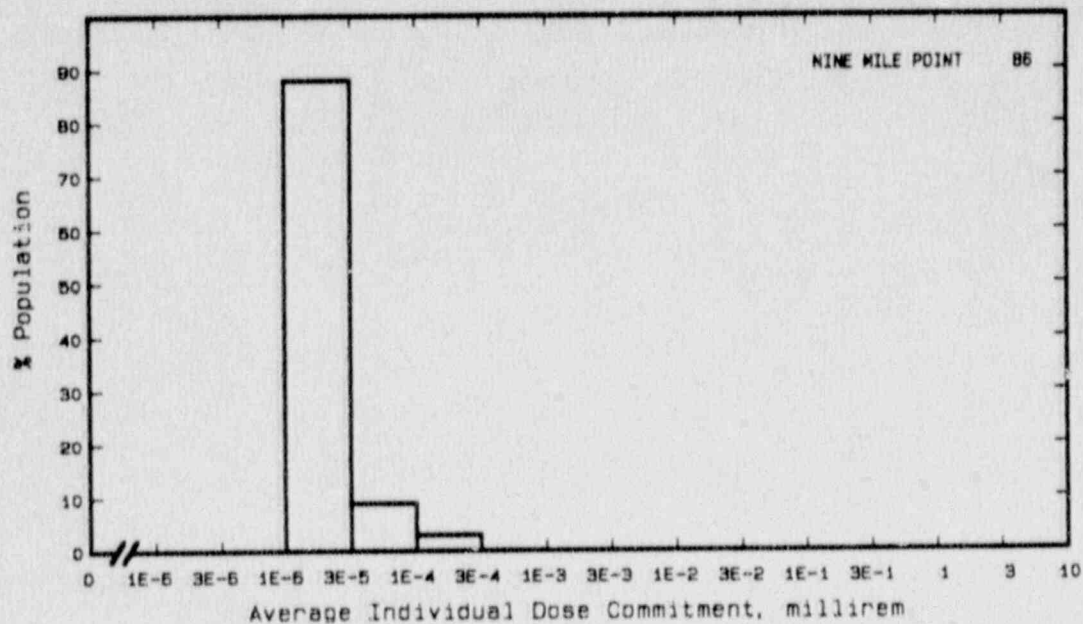
Production/Consumption factors:

Produce: 0.32

Milk: 4.4

Meat: 0.34

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: NORTH ANNA

LOUISA COUNTY, VIRGINIA

Location: N 38.0608°

W 77.7906°

POPULATION DATA

Total Population Within 2-to-80-km Region: 1.1E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Richmond SMSA	680,000	66 km SSE
Charlottesville	44,000	63 km W
Fredricksburg	16,000	40 km NE
Culpeper	7,000	54 km NNW
Ashland	5,000	41 km SE

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 3.5E7 kilogram Milk: 1.5E8 liter Meat: 7.4E7 kilogram
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Regional Productivity Factor:	0.9
Animal Grazing Factor:	0.7

Meteorology Period of Record: 1 APR 74 - 31 APR 75 Recovery: 99%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via LAKE ANNA^(a)

	Average Dilution Flow from Plant: 3,000 ft ³ /s
Drinking Water:	Exposed Population: None
Fish:	Edible Harvest: 7.3 ^(b) kg/yr Dilution Factor: 0.001 ^(b)

(a) Re-concentration of radionuclides in lake accounted for (FES 1973).

(b) Average individual consumption rates as given in FES (1973) were used in lieu of catch data.

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
NORTH ANNA 1 AND 2

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	6.7E-02	6.1E-03	1.4E-03	3.5E-01	3.9E-01
Teen	1.3E-01	1.1E-02	1.2E-03	2.1E-01	3.3E-01
Adult	1.4E+00	9.2E-02	9.4E-03	1.2E+00	2.0E+00
TOTAL	1.6E+00	1.1E-01	1.2E-02	1.8E+00	2.7E+00

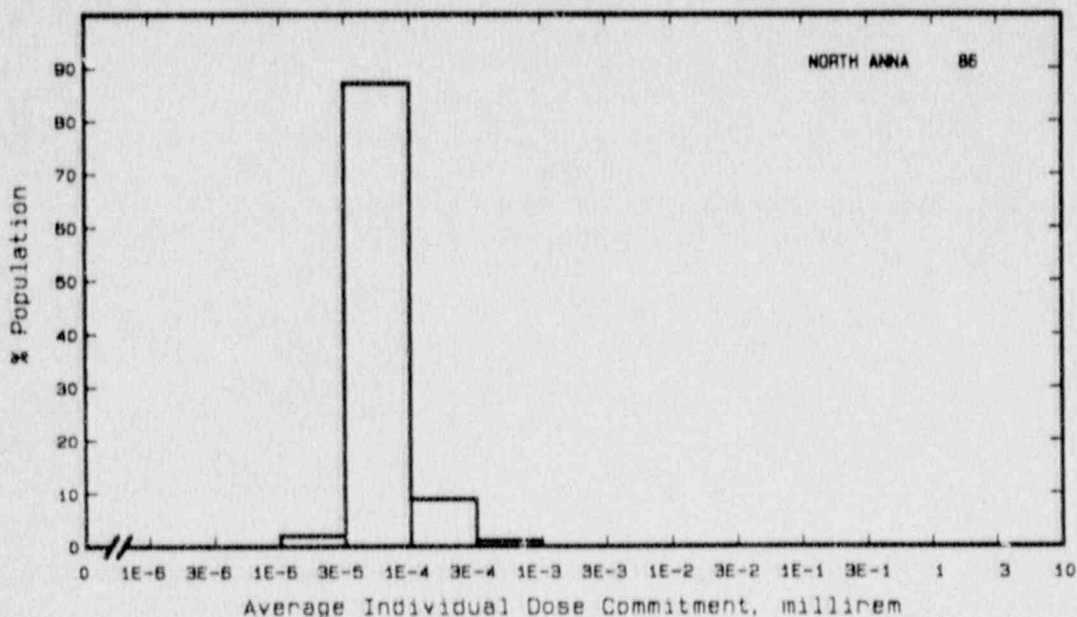
Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.1E-03	1.1E-03	2.0E-02	9.1E-04	1.2E-03	1.1E-03
Child	1.3E-02	1.3E-02	1.2E-01	9.9E-03	1.3E-02	1.4E-02
Teen	8.9E-03	8.8E-03	4.8E-02	7.0E-03	9.0E-03	1.0E-02
Adult	5.2E-02	5.2E-02	1.7E-01	4.2E-02	5.2E-02	5.6E-02
TOTAL	7.5E-02	7.5E-02	3.6E-01	6.0E-02	7.6E-02	8.1E-02

Production/Consumption factors:

Produce: 0.15 Milk: 0.93 Meat: 0.75

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: OCONEE

OCONEE COUNTY, SOUTH CAROLINA

Location: N 34.7917°

W 82.8986°

POPULATION DATA

Total Population Within 2-to-80-km Region: 9.7E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Greenville SMSA	610,000	46 km E
Anderson	29,000	39 km SE
Easley	15,000	27 km E
Greer	12,000	64 km ENE

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle

Veg:	7.4E6 kilogram
Milk:	5.7E7 liter
Meat:	5.0E7 kilogram

Regional Productivity Factor: 1
Animal Grazing Factor: 0.7

Meteorology Period of Record: 1 JAN 75 - 31 DEC 75 Recovery: 86%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via HARTWELL RES. on KEOWEE RIVER

Average River Flow at Site: 1,100 ft³/s

Drinking Water: Exposed Population: 57,000
 Dilution Factor: 1

Fish: Edible Harvest: (a)
 Dilution Factor: 0.01(b)

(a) No fish catch data given in FES, so generic consumption rates used (Table A-1).

(b) Ten percent of population obtain 10% of their fish diet from Hartwell Reservoir according to FES (1972).

POPULATION DOSE-COMMITMENT ESTIMATES AND
 AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
 OCONEE 1, 2 AND 3

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	6.3E-02	6.5E-02	2.0E-01	1.5E-02	7.7E-02
Child	7.8E-01	8.4E-01	1.7E-00	5.5E-01	1.3E+00
Teen	4.2E-01	4.8E-01	5.6E-01	2.7E-01	6.8E-01
Adult	4.0E+00	4.2E+00	4.3E+00	1.6E+00	4.7E+00
TOTAL	5.3E+00	5.6E+00	6.7E+00	2.4E+00	6.7E+00

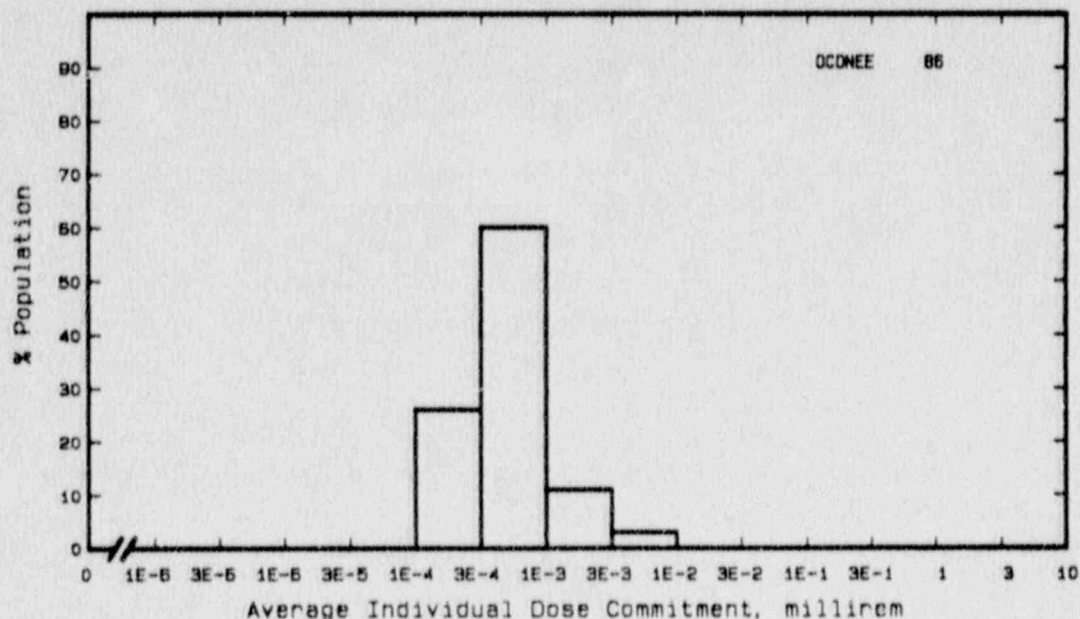
Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	9.1E-03	9.0E-03	1.6E-02	9.0E-03	9.2E-03	9.8E-03
Child	1.0E-01	1.0E-01	1.4E-01	1.0E-01	1.0E-01	1.1E-01
Teen	7.4E-02	7.4E-02	9.3E-02	7.3E-02	7.4E-02	8.7E-02
Adult	4.5E-01	4.5E-01	5.2E-01	4.4E-01	4.5E-01	4.9E-01
TOTAL	6.3E-01	6.3E-01	7.7E-01	6.2E-01	6.3E-01	7.0E-01

Production/Consumption factors:

Produce: 0.040 Milk: 0.45 Meat: 0.65

Fraction of Population Receiving an Average Individual
 Total-Body Dose Commitment from Airborne Pathways



Site: OYSTER CREEK

OYSTER CREEK, NEW JERSEY

Location: N 39.8142° W 74.2064°

POPULATION DATA

Total Population Within 2-to-80-km Region: 3.6E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
New Brunswick-Sayreville SMSA	630,000	77 km N
Long Branch-Asbury Park SMSA	510,000	57 km NNE
Trenton SMSA	320,000	66 km NW
Atlantic City SMSA	190,000	55 km SSW
Camden	87,000	79 km W

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production
Of Crops and Animal Products
In 80-km Radius Circle

Veg: 7.4E7 kilogram
Milk: 2.7E8 liter
Meat: 2.4E7 kilogram

Regional Productivity Factor: 0.5
Animal Grazing Factor: 0.6

Meteorology Period of Record: 15 FEB 66 - 31 DEC 68 Recovery: 63%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via BARNEGAT BAY

Average Dilution Flow
from Plant: 830 ft³/s

Fish: Edible Harvest: 2.1^(a) kg/yr
Dilution Factor: 0.01^(b)

Invertebrates: Edible Harvest: 0.96^(a) kg/yr
Dilution Factor: 0.01^(b)

(a) Average individual consumption rate as given in the FES (1974) used in lieu of catch data.

(b) 10% of seafood eaten assumed caught in bay waters diluted to 10% of that of discharge canal according to FES.

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
OYSTER CREEK

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	1.7E-06	1.7E-06	1.7E-06	0.0E+00	1.7E-06
Teen	1.5E-06	1.5E-06	1.5E-06	0.0E+00	1.5E-06
Adult	1.2E-05	1.2E-05	1.2E-05	0.0E+00	1.2E-05
TOTAL	1.5E-05	1.5E-05	1.5E-05	0.0E+00	1.5E-05

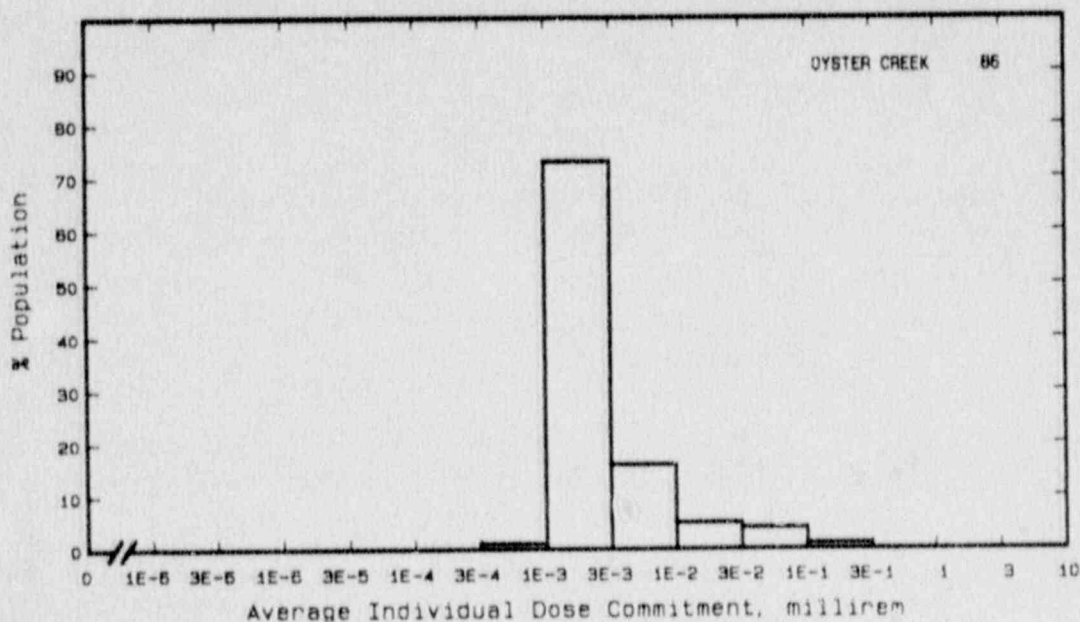
Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	3.6E-01	3.6E-01	6.9E-01	3.6E-01	3.6E-01	3.6E-01
Child	4.0E+00	4.0E+00	6.3E+00	4.0E+00	4.0E+00	4.1E+00
Teen	2.9E+00	2.9E+00	4.0E+00	2.9E+00	2.9E+00	3.1E+00
Adult	1.8E+01	1.8E+01	2.2E+01	1.8E+01	1.8E+01	1.8E+01
TOTAL	2.5E+01	2.5E+01	3.3E+01	2.5E+01	2.5E+01	2.6E+01

Production/Consumption factors:

Produce: 0.052 Milk: 0.28 Meat: 0.042

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: PALISADES

COVERT TOWNSHIP, MICHIGAN

Location: N 42.3222°

W 86.3153°

POPULATION DATA

Total Population Within 2-to-80-km Region: 1.1E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Kalamazon-Portage SMSA	280,000	61 km E
South Bend SMSA	280,000	72 km S
Elkhart SMSA	140,000	76 km SSE
Holland	26,000	53 km NNE
Benton harbor	15,000	25 km SSW

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 6.8E7 kilogram Milk: 2.9E8 liter Meat: 4.5E7 kilogram
---	--

Regional Productivity Factor:	0.6
Animal Grazing Factor:	0.5

Meteorology Period of Record: 1 SEP 73 - 31 AUG 74 Recovery: 67%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via LAKE MICHIGAN

	Average Dilution Flow from Plant: 110 ft ³ /s
Drinking Water:	Exposed Population: 50,000 Dilution Factor: 3.5E-3 ^(a)
Fish:	Edible Harvest: (b) Dilution Factor: 0.001

(a) Drinking water dilution factor estimated by averaging dilution factor derived from FES (1972) suitably weighted for population.

(b) Average individual consumption rate of 20 g/d (7.3 kg/yr) as given in FES used in lieu of catch data.

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
PALISADES

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	9.4E-05	9.0E-05	8.5E-05	4.2E-05	1.2E-04
Child	6.1E-03	2.0E-03	9.9E-04	3.0E-02	3.1E-02
Teen	1.0E-02	2.4E-03	4.0E-04	1.8E-02	2.6E-02
Adult	1.1E-01	2.1E-02	3.4E-03	1.0E-01	1.5E-01
TOTAL	1.2E-01	2.6E-02	4.9E-03	1.5E-01	2.1E-01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	3.3E-05	3.2E-05	4.0E-04	2.6E-05	3.3E-05	3.5E-05
Child	4.0E-04	3.8E-04	2.6E-03	3.4E-04	3.9E-04	4.2E-04
Teen	2.7E-04	2.7E-04	1.1E-03	2.3E-04	2.7E-04	3.1E-04
Adult	1.6E-03	1.5E-03	4.5E-03	1.3E-03	1.5E-03	1.7E-03
TOTAL	2.3E-03	2.2E-03	8.7E-03	1.9E-03	2.2E-03	2.4E-03

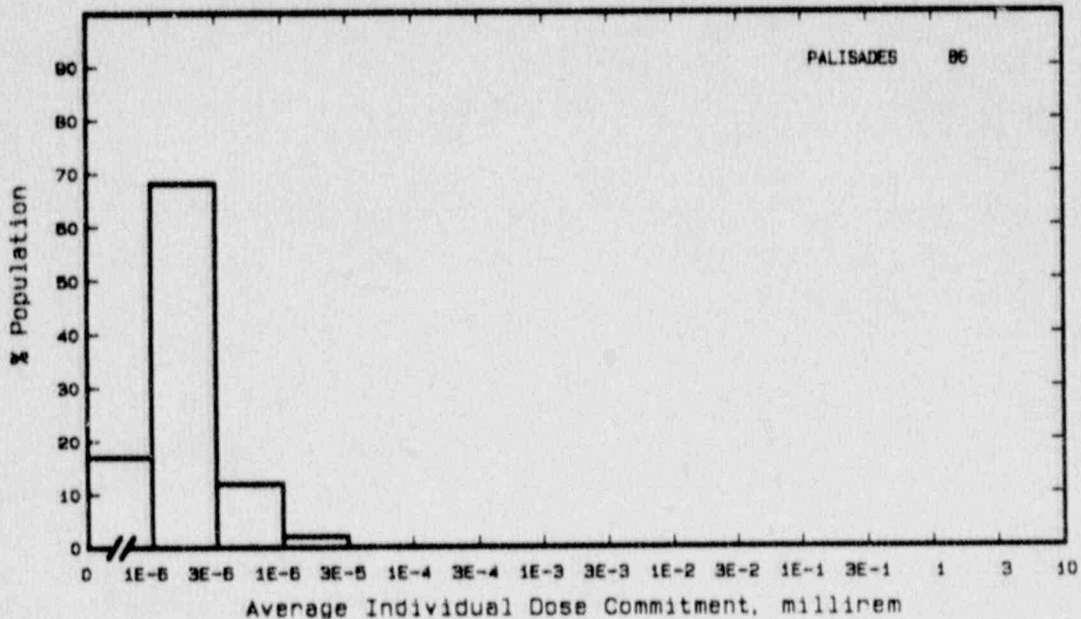
Production/Consumption factors:

Produce: 0.20

Milk: 1.2

Meat: 0.32

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: PALO VERDE

WINTERSBURG, ARIZONA

Location: N 33.4200⁰

W 112.8683⁰

POPULATION DATA

Total Population Within 2-to-80-km Region: 1.2E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Phoenix MSA	1,900,000	64 km E
Avondale	8,200	49 km E

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 1.2E7 kilogram Milk: 2.3E7 liter Meat: 2.1E7 kilogram
---	--

Regional Productivity Factor:	0.9
Animal Grazing Factor:	0.1 Milk ^(a) 0.9 Beef

Meteorology Period of Record: 13 AUG 73 - 8 AUG 78 Recovery: 93%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS None

	Average River Flow at Site: (b)
Drinking Water:	Exposed Population: (b)
Fish:	Edible Harvest: (b)

(a) Milk cows fed from dry lot 90% of time (FES 1975).

(b) No waterborne pathways

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
PALO VERDE 1 AND 2

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant					
Child					
Teen					
Adult					
TOTAL					

(No Waterborne Pathway Doses)

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.5E-03	1.5E-03	1.8E-03	8.2E-04	1.5E-03	1.5E-03
Child	2.1E-02	2.1E-02	2.6E-02	9.1E-03	2.1E-02	2.2E-02
Teen	1.5E-02	1.5E-02	1.8E-02	6.6E-03	1.5E-02	1.6E-02
Adult	9.1E-02	9.1E-02	1.0E-01	4.0E-02	9.1E-02	9.5E-02
TOTAL	1.3E-01	1.3E-01	1.5E-01	5.7E-02	1.3E-01	1.3E-01

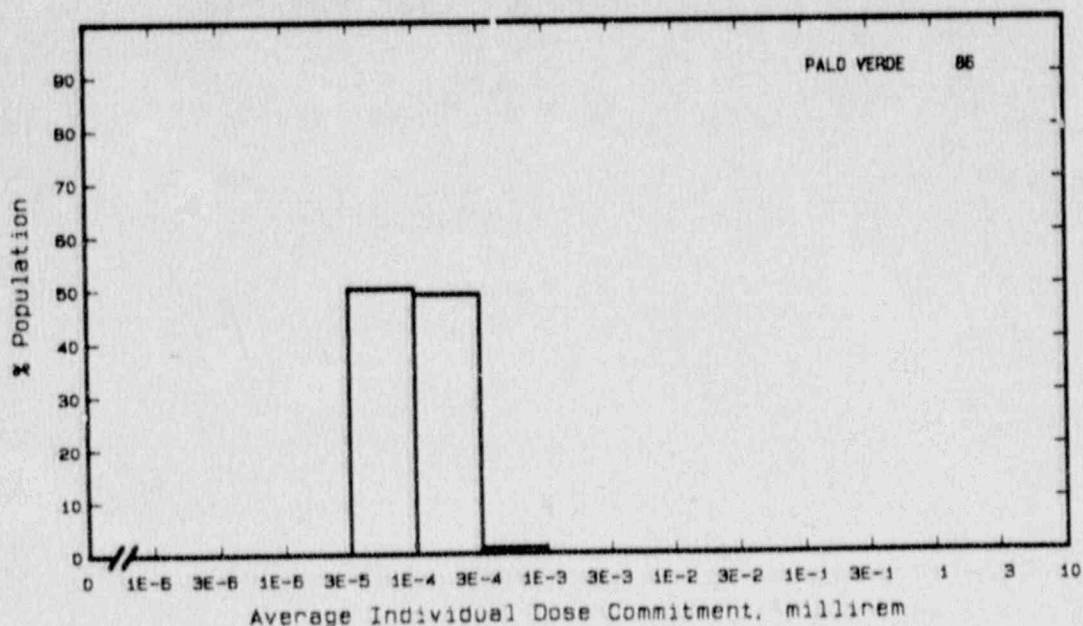
Production/Consumption factors:

Produce: 0.046

Milk: 0.14

Meat: 0.20

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: PEACH BOTTOM

YORK COUNTY, PENNSYLVANIA

Location: N 39.7589° W 76.2692°

POPULATION DATA

Total Population Within 2-to-80-km Region: 4.3E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Baltimore SMSA	2,200,000	60 km SSW
Harrisburg SMSA	450,000	77 km NNW
Wilmington SMSA	400,000	62 km E
York SMSA	380,000	45 km NW
Lancaster SMSA	360,000	31 km N

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 5.3E7 kilogram Milk: 5.3E8 liter Meat: 5.4E7 kilogram
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Regional Productivity Factor:	0.95
Animal Grazing Factor:	0.6

Meteorology Period of Record: 1 AUG 67 - 31 JUL 71 Recovery: 72%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via SUSQUEHANNA RIVER

	Average River Flow at Site: 36,000 ft ³ /s
Drinking Water:	Exposed Population: 2.2E6 Dilution Factor: 1
Fish:	Edible Harvest: (a) Dilution Factor: 0.001 (b)

(a) No fish catch data given in FES (1974), thus generic consumption rates used (Table A-1).

(b) One percent of people obtain 10% of their fish diet from river downstream from plant according to FES.

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
PEACH BOTTOM 2 AND 3

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	5.4E-03	3.9E-03	5.0E-02	1.7E-02	2.6E-02
Child	7.9E-02	3.5E-02	3.6E-01	1.9E-01	2.4E-01
Teen	4.6E-02	1.8E-02	1.1E-01	5.4E-02	9.2E-02
Adult	4.8E-01	1.6E-01	8.0E-01	3.5E-01	6.1E-01
TOTAL	6.1E-01	2.2E-01	1.3E+00	6.1E-01	9.7E-01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	5.9E-02	5.8E-02	2.2E-01	5.9E-02	5.9E-02	6.2E-02
Child	6.5E-01	6.5E-01	1.6E+00	6.5E-01	6.5E-01	7.0E-01
Teen	4.7E-01	4.7E-01	8.8E-01	4.7E-01	4.8E-01	5.4E-01
Adult	2.9E+00	2.9E+00	4.3E+00	2.9E+00	2.9E+00	3.1E+00
TOTAL	4.1E+00	4.1E+00	7.0E+00	4.0E+00	4.1E+00	4.4E+00

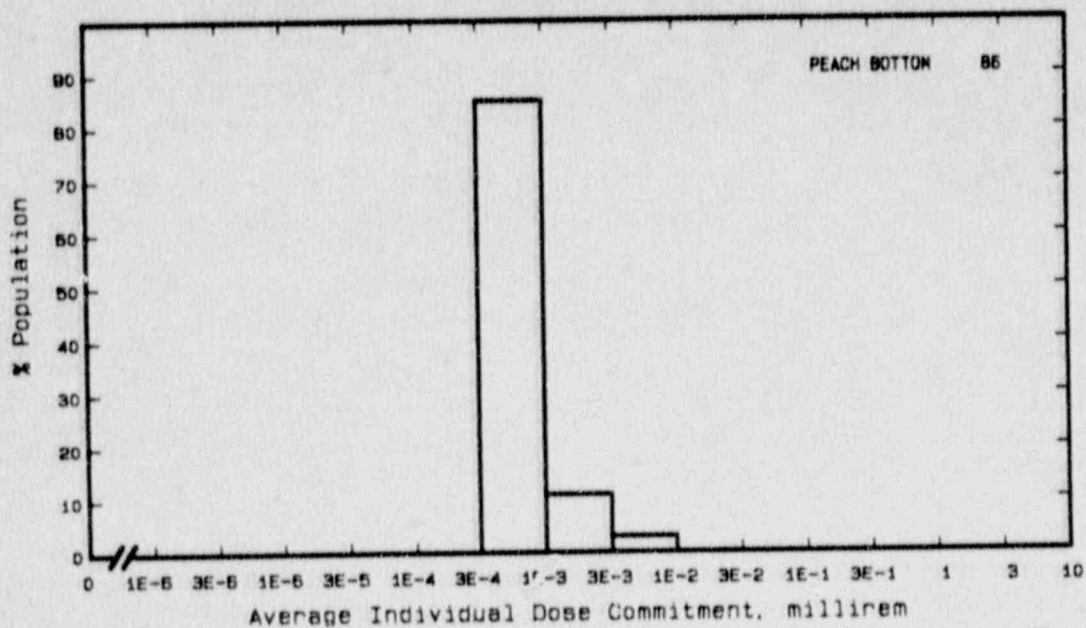
Production/Consumption factors:

Produce: 0.060

Milk: 0.89

Meat: 0.15

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: PERRY

NORTH PERRY, OHIO

Location: N 41.8008°

W 81.1433°

POPULATION DATA

Total Population Within 2-to-80-km Region: 2.3E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Cleveland SMS	570,000	53 km SW
Akron	240,000	80 km SSW
Warren	53,000	70 km SE
Ashtabula	23,000	35 km NE
Painesville City	16,000	11 km SW

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 6.9E7 kilogram Milk: 3.7E6 liter Meat: 1.2E8 kilogram
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Regional Productivity Factor:	0.45
Animal Grazing Factor:	0.5

Meteorology Period of Record: 1 MAY 72 - 31 AUG 78 Recovery: 92%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via LAKE ERIE

	Average Dilution Flow from Plant: 70 ft ³ /s
Drinking Water:	Exposed Population: 1,700,000 Dilution Factor: 0.02 ^(a)
Fish:	Edible Harvest: 1.2E6 kg/yr Dilution Factor: 0.016

(a) Estimated.

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
PERRY

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	1.1E-05	6.5E-06	1.1E-06	5.8E-05	3.9E-05
Child	1.6E-04	1.1E-04	1.2E-05	8.9E-04	4.8E-04
Teen	4.5E-05	9.0E-05	4.7E-06	2.3E-04	1.7E-04
Adult	2.8E-04	7.4E-04	4.0E-05	1.5E-03	1.0E-03
TOTAL	5.0E-04	9.5E-04	5.8E-05	2.6E-03	1.7E-03

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	4.6E-06	4.6E-06	4.6E-06	3.6E-07	4.6E-06	4.6E-06
Child	1.0E-04	1.0E-04	1.0E-04	4.1E-06	1.0E-04	1.0E-04
Teen	7.9E-05	7.9E-05	7.9E-05	3.0E-06	7.9E-05	7.9E-05
Adult	4.8E-04	4.8E-04	4.8E-04	1.8E-05	4.8E-04	4.8E-04
TOTAL	6.6E-04	6.6E-04	6.6E-04	2.5E-05	6.6E-04	6.7E-04

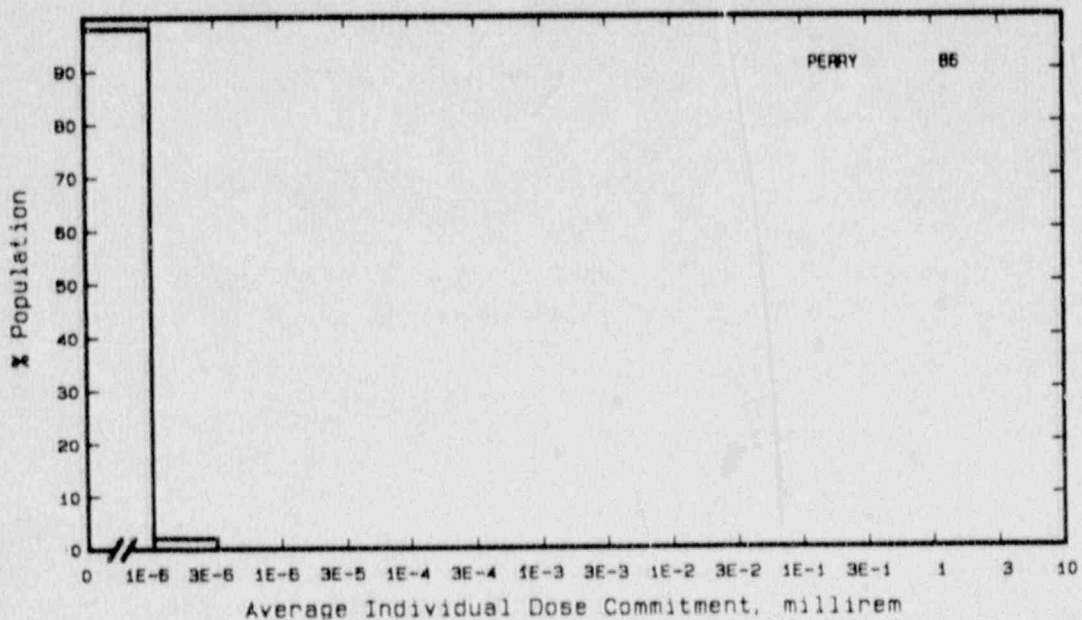
Production/Consumption factors:

Produce: 0.067

Milk: 0.0054

Meat: 0.27

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: PILGRIM

PLYMOUTH, MASSACHUSETTS

Location: N 41.9444°

W 70.5794°

POPULATION DATA

Total Population Within 2-to-80-km Region: 4.4E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Boston SMSA	2,800,000	61 km NW
Providence-Warwick-Pawtucket SMSA	830,000	70 km W
New Bedford SMSA	170,000	45 km SSW
Brockton SMSA	170,000	40 km WNW
Fall River SMSA	150,000	55 km SW

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 2.0E7 kilogram Milk: 2.6E8 liter Meat: 1.6E7 kilogram
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Regional Productivity Factor:	0.3
Animal Grazing Factor:	0.6

Meteorology Period of Record: 1 MAY 74 - 30 APR 75 Recovery: 93%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via CAPE COD BAY

	Average Dilution Flow from Plant: 26 ft ³ /s
Fish:	Edible Harvest: 2.6E4 kg/yr Dilution Factor: 0.001
Invertebrates:	Edible Harvest: 3.1E4 kg/yr Dilution Factor: 0.002

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
PILGRIM

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	5.0E-04	4.4E-04	2.7E-05	2.3E-03	1.3E-03
Teen	3.0E-04	8.3E-04	1.9E-05	1.3E-03	9.7E-04
Adult	1.8E-03	6.9E-03	1.2E-04	7.5E-03	5.6E-03
TOTAL	2.6E-03	8.1E-03	1.7E-04	1.1E-02	7.9E-03

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	2.2E-04	2.2E-04	4.1E-03	2.3E-04	2.4E-04	2.5E-04
Child	2.5E-03	2.5E-03	2.9E-02	2.4E-03	2.7E-03	3.0E-03
Teen	1.9E-03	1.9E-03	1.4E-02	1.7E-03	1.9E-03	2.3E-03
Adult	1.1E-02	1.1E-02	6.0E-02	1.0E-02	1.1E-02	1.3E-02
TOTAL	1.6E-02	1.6E-02	1.1E-01	1.4E-02	1.6E-02	1.8E-02

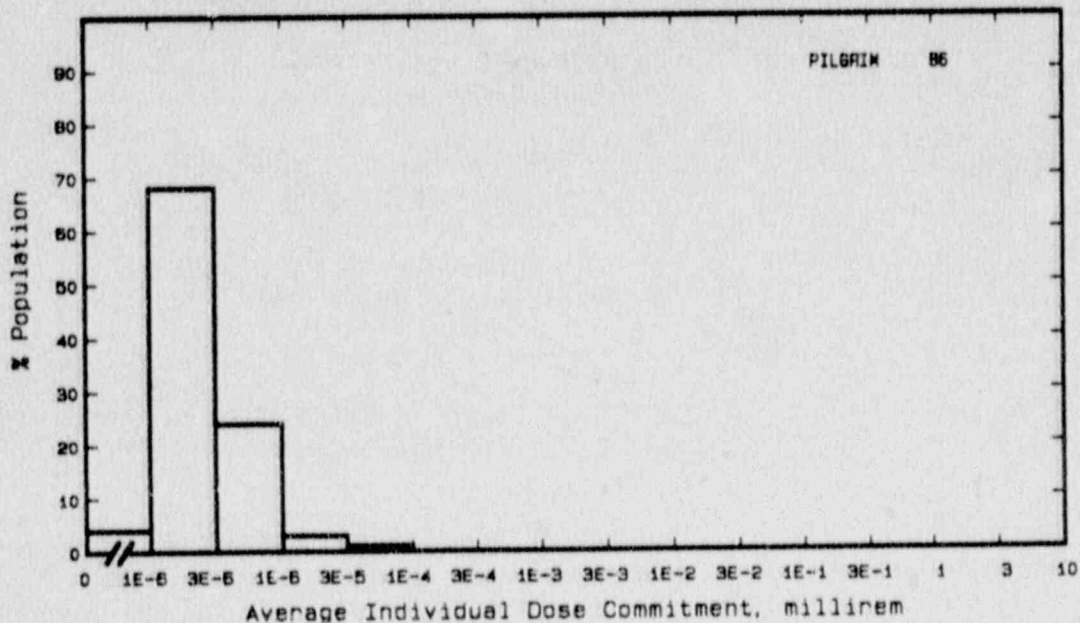
Production/Consumption factors:

Produce: 0.0071

Milk: 0.13

Meat: 0.014

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: POINT BEACH

MANITOWOC COUNTY, WISCONSIN

Location: N 44.2808°

W 87.5361°

POPULATION DATA

Total Population Within 2-to-80-km Region: 6.2E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Locatic</u>
Greenbay SMSA	180,000	47 km NW
Appleton	60,000	72 km W
Sheboygan	48,000	60 km SSW
Manitowoc	33,000	24 km SSW
Neenah	22,000	75 km W

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 7.2E7 kilogram Milk: 1.2E9 liter Meat: 1.0E8 kilogram
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Regional Productivity Factor:	0.5
Animal Grazing Factor:	0.5

Meteorology Period of Record: 19 APR 67 - 18 APR 69 Recovery: 83%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via LAKE MICHIGAN

	Average Dilution Flow from Plant: 730 ft ³ /s
Drinking Water:	Exposed Population: 260,000 Dilution Factor: 2.6E-3 ^(a)
Fish:	Edible Harvest: 6.7E4 ^(b) kg/yr Dilution Factor: 0.013 ^(c)

(a) Drinking water dilution factor estimated by averaging dilution factor derived from FES (1972), suitably weighted for population.

(b) Includes both sport and commercial fish catch from FES.

(c) Dilution factor estimated by averaging sport and commercial dilution factor derived from FES.

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
POINT BEACH 1 AND 2

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	6.6E-04	6.6E-04	2.5E-03	5.5E-04	7.0E-04
Child	7.7E-03	7.4E-03	2.0E-02	2.0E-03	9.2E-03
Teen	3.4E-03	2.9E-03	6.6E-03	1.0E-03	4.2E-03
Adult	3.0E-02	2.5E-02	5.0E-02	6.0E-03	3.2E-02
TOTAL	4.2E-02	3.6E-02	7.9E-02	9.0E-03	4.6E-02

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	3.5E-04	3.5E-04	6.6E-03	2.3E-05	3.6E-04	3.5E-04
Child	5.5E-03	5.5E-03	7.6E-03	2.4E-04	5.6E-03	5.5E-03
Teen	3.3E-03	3.3E-03	4.2E-03	1.2E-04	3.4E-03	3.3E-03
Adult	1.8E-02	1.8E-02	2.1E-02	6.0E-04	1.8E-02	1.8E-02
TOTAL	2.7E-02	2.7E-02	3.4E-02	9.9E-04	2.8E-02	2.7E-02

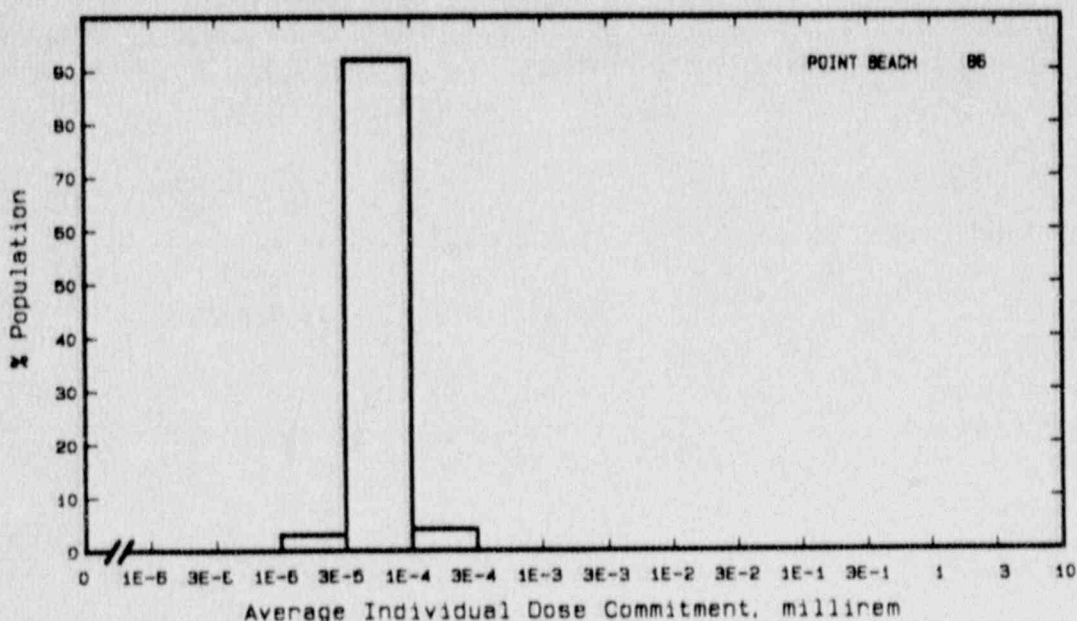
Production/Consumption factors:

Produce: 0.30

Milk: 7.1

Meat: 1.0

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: PRAIRIE ISLAND

RED WING, MINNESOTA

Location: N 44.6219°

W 92.6331°

POPULATION DATA

Total Population Within 2-to-80-km Region: 2.3E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Minneapolis-St. Paul SMSA	2,200,000	63 km NW
Rochester SMSA	98,000	68 km SSE
Owatonna	19,000	77 km SW
Faribault	16,000	63 km SW
Redwing	14,000	10 km SE

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production
Of Crops and Animal Products
In 80-km Radius Circle

Veg: 1.2E8 kilogram
Milk: 4.0E8 liter
Meat: 1.0E8 kilogram

Regional Productivity Factor: 1
Animal Grazing Factor: 0.5

Meteorology Period of Record: 22 MAR 74 - 21 MAR 75 Recovery: 65%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via MISSISSIPPI RIVER

Average River Flow
at Site: 15,000 ft³/s

Drinking Water: Exposed Population: None

Fish: Edible Harvest: 6.8E5 kg/yr
Dilution Factor: 1

POPULATION DOSE-COMMITMENT ESTIMATES AND
 AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
 PRAIRIE ISLAND 1 AND 2

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	7.6E-04	6.2E-04	4.6E-04	2.2E-03	1.6E-03
Teen	6.1E-04	7.8E-04	4.0E-04	1.2E-03	1.3E-03
Adult	4.6E-03	6.2E-03	3.1E-03	1.2E-03	8.4E-03
TOTAL	6.0E-03	7.6E-03	3.9E-03	1.1E-02	1.1E-02

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	7.2E-04	7.2E-04	4.0E-03	2.0E-05	7.3E-04	7.2E-04
Child	1.1E-02	1.1E-02	3.2E-02	1.9E-04	1.1E-02	1.1E-02
Teen	7.1E-03	7.1E-03	1.5E-02	1.1E-04	7.1E-03	7.1E-03
Adult	3.8E-02	3.8E-02	6.5E-02	6.2E-04	3.9E-02	3.9E-02
TOTAL	5.7E-02	5.7E-02	1.2E-01	9.5E-04	5.8E-02	5.7E-02

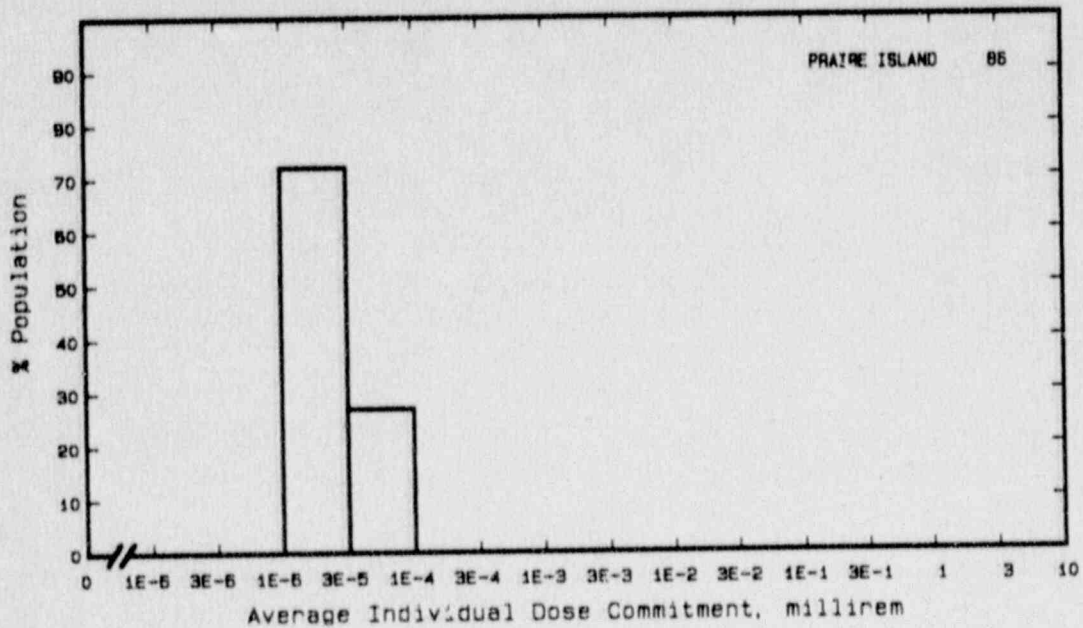
Production/Consumption factors:

Produce: 0.28

Milk: 1.3

Meat: 0.58

Fraction of Population Receiving an Average Individual
 Total-Body Dose Commitment from Airborne Pathways



Site: QUAD CITIES

ROCK ISLAND, ILLINOIS

Location: N 41.7261⁰

W 90.3100⁰

POPULATION DATA

Total Population Within 2-to-80-km Region: 7.3E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Davenport-Rock Island-Moline SMSA	380,000	30 km SW
Muscatine	23,000	70 km WSW
Sterling	16,000	52 km E
Dixon	16,000	70 km E
Kewanee	15,000	62 km SSE

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production
Of Crops and Animal Products
In 80-km Radius Circle

Veg: 1.1E8 kilogram
Milk: 1.8E8 liter
Meat: 1.9E8 kilogram

Regional Productivity Factor: 1
Animal Grazing Factor: 0.5

Meteorology Period of Record: 1 JAN 74 - 31 DEC 75 Recovery: 88%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via MISSISSIPPI RIVER

Average River Flow
at Site: 47,000 ft³/s

Drinking Water: Exposed Population: 380,000^(a)
Dilution Factor: 1

Fish: Edible Harvest: 2.1E6^(b) kg/yr
Dilution Factor: 0.5^(b)

(a) All people in Davenport SMSA assumed to drink river water.

(b) Assumes 1/2 fish harvest caught below plant.

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
QUAD CITIES 1 AND 2

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	5.6E-04	1.0E-04	3.6E-04	3.9E-03	2.2E-03
Child	3.2E-02	2.6E-03	2.8E-03	2.0E-01	1.7E-01
Teen	4.9E-02	3.1E-03	9.2E-04	1.1E-01	1.3E-01
Adult	5.4E-01	2.6E-02	6.7E-03	6.3E-01	7.8E-01
TOTAL	6.2E-01	3.2E-02	1.1E-02	9.4E-01	1.1E+00

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	2.4E-03	2.4E-03	9.7E-03	2.5E-03	2.6E-03	2.6E-03
Child	3.0E-02	2.9E-02	9.8E-02	3.3E-02	3.1E-02	3.1E-02
Teen	2.1E-02	2.1E-02	4.9E-02	2.1E-02	2.1E-02	2.3E-02
Adult	1.3E-01	1.3E-01	2.3E-01	1.2E-01	1.3E-01	1.3E-01
TOTAL	1.8E-01	1.8E-01	3.8E-01	1.8E-01	1.8E-01	1.9E-01

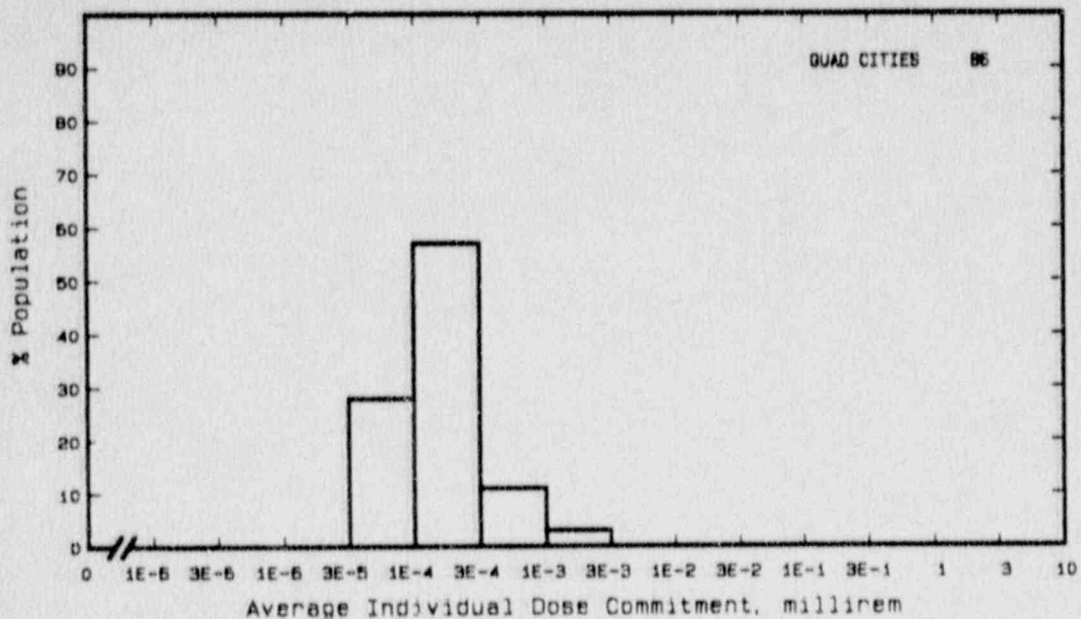
Production/Consumption factors:

Produce: 0.80

Milk: 1.9

Meat: 3.2

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: RANCHO SECO

SACRAMENTO COUNTY, CALIFORNIA

Location: N 38.3444°

W 121.1200°

POPULATION DATA

Total Population Within 2-to-80-km Region: 2.0E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Sacramento SMSA	1,300,000	42 km NW
Stockton SMSA	430,000	45 km SSW
Modesto SMSA	320,000	79 km S
Antioch	49,000	71 km WSW
Davis	42,000	58 km WNW

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 4.8E7 kilogram Milk: 2.3E8 liter Meat: 5.0E7 kilogram
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Regional Productivity Factor:	1
Animal Grazing Factor:	0.9

Meteorology Period of Record: 1 FEB 75 - 31 JAN 76 Recovery: 98%

SITE SPECIFIC DATA - WATERBORNE PATHWAYS via COSUMNES and MOKELUMNE
RIVERS

	Average Dilution Flow from Plant: 13 ft ³ /s
Drinking Water:	Exposed Population: None
Fish:	Edible Harvest: (a) Dilution Factor: 0.005

(a) One percent of population is assumed to obtain fish from river.
Average individual consumption rate of 7.3 kg/yr given in FES
(1973) used in lieu of catch data.

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
RANCHO SECO

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	4.0E-04	6.0E-05	4.4E-05	2.4E-03	2.4E-03
Teen	7.2E-04	7.0E-05	3.9E-05	1.4E-03	2.0E-03
Adult	7.9E-03	5.6E-04	3.1E-04	8.0E-03	1.2E-02
TOTAL	9.0E-03	6.9E-04	4.0E-04	1.2E-02	1.6E-02

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	2.2E-04	2.1E-04	2.2E-03	4.3E-05	2.2E-04	2.2E-04
Child	2.8E-03	2.8E-03	1.3E-02	4.5E-04	2.8E-03	2.8E-03
Teen	1.8E-03	1.8E-03	5.9E-03	3.1E-04	1.8E-03	1.9E-03
Adult	1.0E-02	1.0E-02	2.3E-02	1.9E-02	1.0E-02	1.0E-02
TOTAL	1.5E-02	1.5E-02	4.4E-02	2.7E-03	1.5E-02	1.5E-02

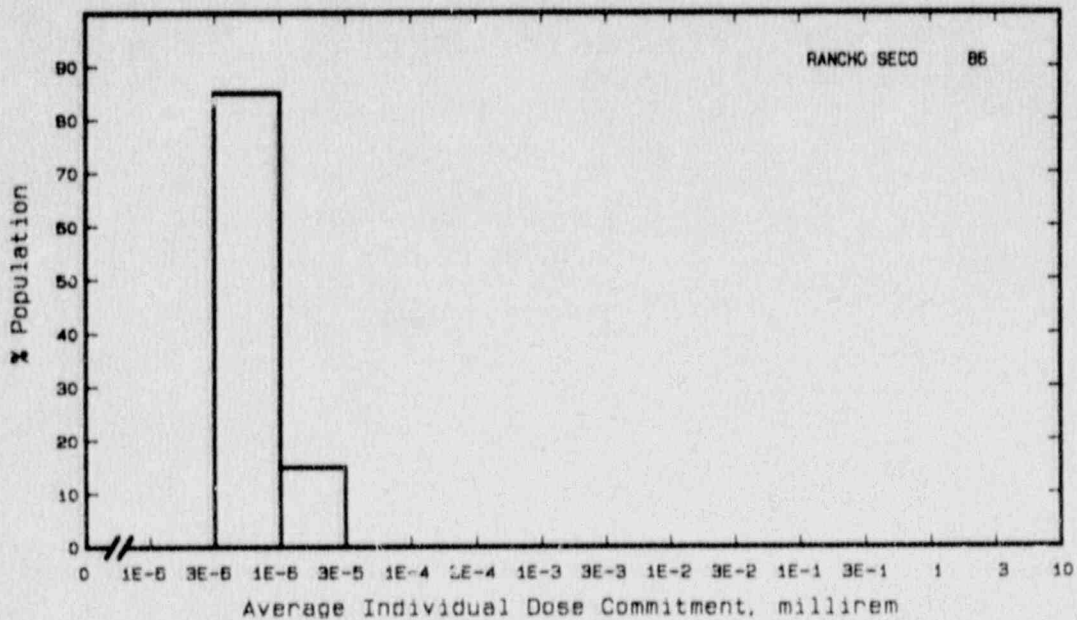
Production/Consumption factors:

Produce: 0.12

Milk: 0.88

Meat: 0.31

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: RIVER BEND

ST. FRANCISVILLE, LOUISIANA

Location: N 30.7572°

W 91.3317°

POPULATION DATA

Total Population Within 2-to-80-km Region: 7.7E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Baton Rouge	240,000	38 km SSE
Denham Springs	9,000	39 km SE

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 1.8E6 kilogram Milk: 7.8E7 liter Meat: 6.1E7 kilogram
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Regional Productivity Factor:	0.9
Animal Grazing Factor:	0.75

Meteorology Period of Record: 17 MAR 77 - 16 MAR 79 Recovery: 99%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via MISSISSIPPI RIVER

Average River Flow
at Site: 420,000 ft³/s

Drinking Water: None

Fish: Edible Harvest: 9.1^(a) kg/yr
Dilution Factor: 1.0

(a) Individual consumption rate as given in FES (Includes shellfish).

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
RIVER BEND

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	6.2E-05	7.8E-05	6.2E-07	3.2E-05	9.3E-05
Teen	4.4E-05	1.7E-04	5.6E-07	2.1E-05	5.7E-05
Adult	2.6E-04	1.5E-03	4.4E-06	1.4E-04	5.4E-04
TOTAL	3.7E-04	1.8E-03	5.6E-06	1.9E-04	7.1E-04

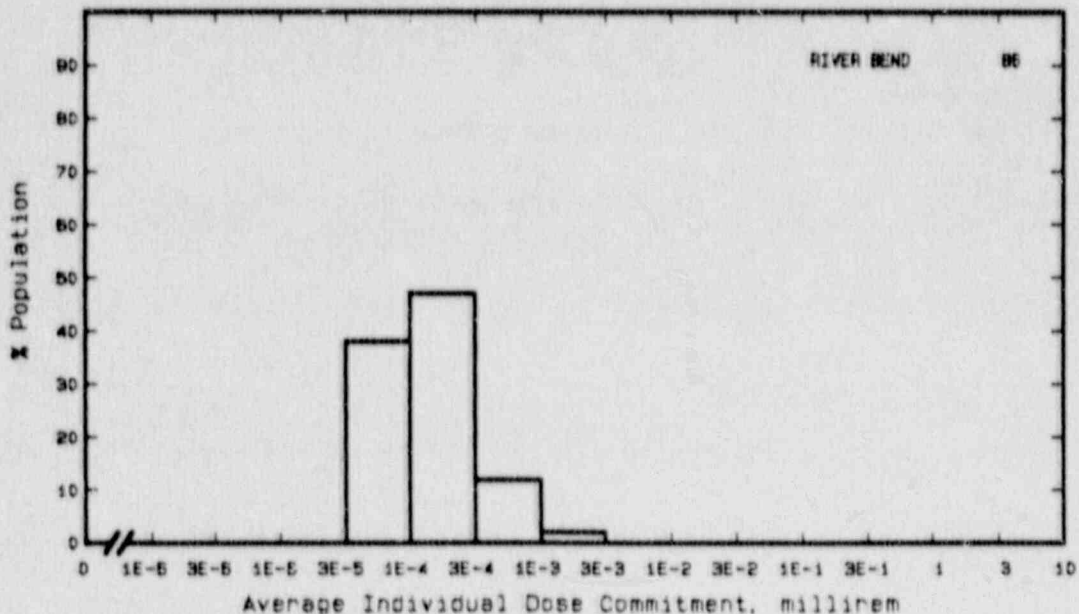
Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	2.4E-03	2.4E-03	2.5E-03	2.4E-03	2.4E-03	2.5E-03
Child	2.7E-02	2.7E-02	2.7E-02	2.7E-02	2.7E-02	2.8E-02
Teen	2.0E-02	2.0E-02	2.0E-02	2.0E-02	2.0E-02	2.1E-02
Adult	1.2E-01	1.2E-01	1.2E-01	1.2E-01	1.2E-01	1.2E-01
TOTAL	1.7E-01	1.7E-01	1.7E-01	1.7E-01	1.7E-01	1.9E-01

Production/Consumption factors:

Produce: 0.011 Milk: 0.70 Meat: 0.89

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: H. B. ROBINSON

HARTSVILLE, SOUTH CAROLINA

Location: N 34.4858°

W 80.1586°

POPULATION DATA

Total Population Within 2-to-80-km Region: 7.1E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Florence	32,000	42 km ESE
Sumter	27,000	56 km SSW
Monroe	14,000	74 km NNW
Lancaster	10,000	66 km WNW

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle

Veg:	7.4E6 kilogram
Milk:	5.7E7 liter
Meat:	5.0E7 kilogram

Regional Productivity Factor: 1
Animal Grazing Factor: 0.8

Meteorology Period of Record: 1 JAN 75 - 31 DEC 75 Recovery: 94%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via LAKE ROBINSON

	Average Dilution Flow from Plant: 1,100 ft ³ /s
Drinking Water:	Exposed Population: None
Fish:	Edible Harvest: 1.8 ^(a) kg/yr Dilution Factor: 0.02 ^(b)

(a) Average individual consumption rate as given in the FES (1975) used in lieu of catch data.

(b) Ten percent of population consumes fish taken from water diluted by a factor of 0.2 according to FES.

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
H. B. ROBINSON

Dose Commitments (person-rem) from ~~Waterborne~~ Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	4.0E-03	1.0E-04	2.1E-04	2.0E-02	2.2E-02
Teen	7.4E-03	2.0E-03	1.7E-04	1.2E-02	1.9E-02
Adult	8.0E-02	1.7E-02	1.3E-03	6.9E-02	1.1E-01
TOTAL	9.2E-02	2.0E-02	1.6E-03	1.0E-01	1.5E-01

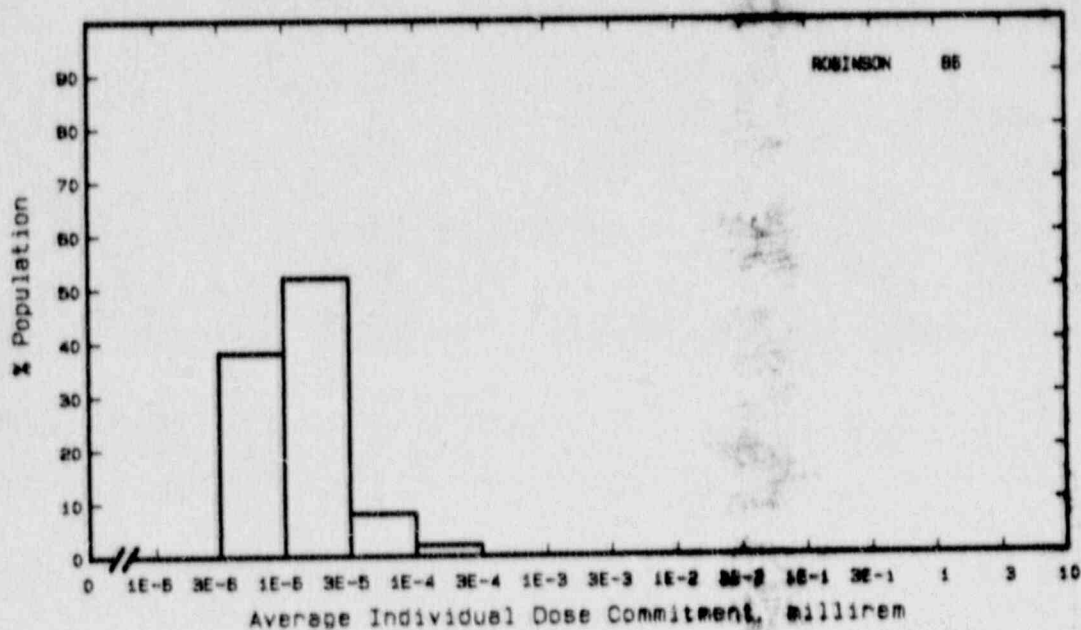
Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.9E-04	1.8E-04	4.0E-03	1.6E-04	1.9E-04	1.9E-04
Child	2.1E-03	2.1E-03	2.4E-02	1.8E-03	2.2E-03	2.3E-03
Teen	1.5E-03	1.5E-03	1.0E-02	1.3E-03	1.6E-03	1.8E-03
Adult	9.2E-03	9.2E-03	4.0E-02	7.6E-03	9.3E-03	1.0E-02
TOTAL	1.3E-02	1.3E-02	7.8E-02	1.1E-02	1.3E-02	1.4E-02

Production/Consumption factors:

Produce: 0.054 Milk: 0.61 Meat: 0.88

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: ST. LUCIE

FORT PIERCE, FLORIDA

Location: N 27.3486°

W 80.2464°

POPULATION DATA

Total Population Within 2-to-80-km Region: 6.8E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
West Palm Beach	75,000	73 km SSE
Ft. Pierce	40,000	14 km NW
Riviera Beach	31,000	65 km SSE
Vero Beach	20,000	36 km NNW
Palm Beach	12,000	72 km SSE

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 2.8E7 kilogram Milk: 1.1E8 liter Meat: 7.2E7 kilogram
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Regional Productivity Factor:	0.5
Animal Grazing Factor:	1

Meteorology Period of Record: 1 JAN 76 - 31 DEC 76 Recovery: 92%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via ATLANTIC OCEAN

	Average Dilution Flow from Plant: 4,200 ft ³ /s
Fish:	Edible Harvest: 2.6E5 kg/yr Dilution Factor: 0.005 ^(a)
Invertebrates:	Edible Harvest: 2.7E4 kg/yr Dilution Factor: 0.005 ^(a)

(a) Dilution factors as given in FES (1973).

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
SAINT LUCIE 1 AND 2

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	4.2E-04	9.4E-04	5.6E-04	2.2E-03	1.3E-03
Teen	2.9E-04	1.9E-03	4.0E-04	1.2E-03	1.0E-03
Adult	2.0E-03	1.6E-02	2.6E-03	7.3E-03	5.8E-03
TOTAL	2.7E-03	1.9E-02	3.6E-02	1.1E-02	8.1E-03

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.8E-02	1.8E-02	1.5E-01	1.8E-02	1.8E-02	1.9E-02
Child	2.0E-01	2.0E-01	9.8E-01	2.0E-01	2.0E-01	2.2E-01
Teen	1.5E-01	1.5E-01	4.7E-01	1.4E-01	1.5E-01	1.7E-01
Adult	8.9E-01	8.8E-01	2.1E+00	8.7E-01	8.9E-01	9.5E-01
TOTAL	1.3E+00	1.2E+00	3.6E+00	1.2E+00	1.3E+00	1.3E+00

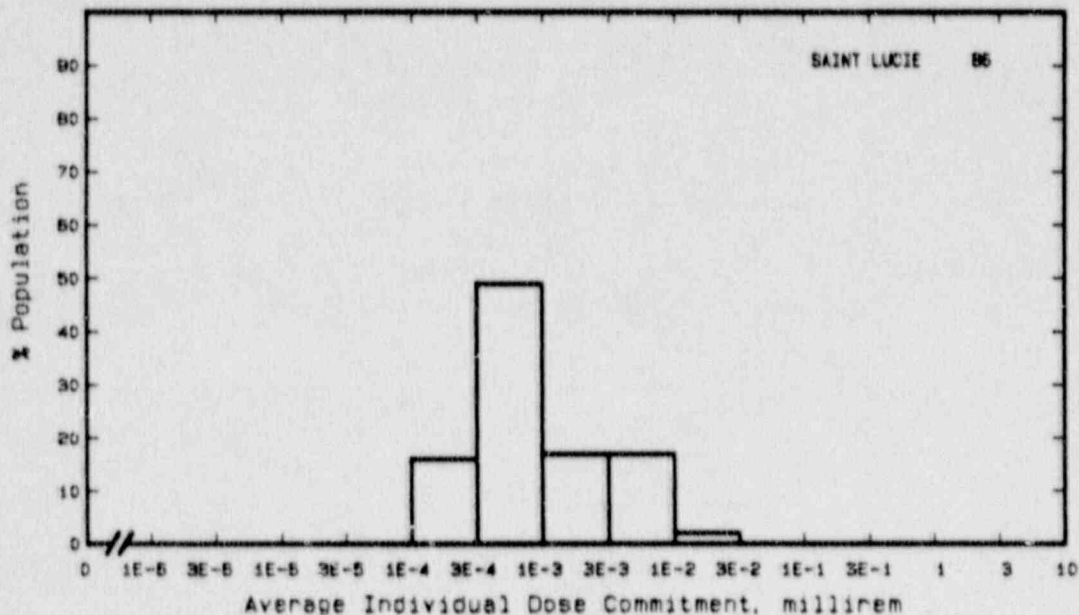
Production/Consumption factors:

Produce: 0.10

Milk: 0.62

Meat: 0.66

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: SALEM

SALEM, NEW JERSEY

Location: N 39.4628⁰ W 75.5358⁰

POPULATION DATA

Total Population Within 2-to-80-km Region: 4.8E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Philadelphia SMSA	4,800,000	63 km NNE
Wilmington SMSA	410,000	32 km NNW
Vineland-Millville-Bridgeton SMSA	130,000	48 km E
Chester	47,000	45 km NNW
Norristown	35,000	74 km N

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 7.4E7 kilogram Milk: 2.7E8 liter Meat: 2.4E7 kilogram
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Regional Productivity Factor:	0.9
Animal Grazing Factor:	0.6

Meteorology Period of Record: 1 JUN 70 - 31 MAY 71 Recovery: 95%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via DELAWARE RIVER ESTUARY

	Average River Flow at Site: 16,000 ft ³ /s
Fish:	Edible Harvest: 3.6E5 kg/yr Dilution Factor: 1
Invertebrates: (a)	Edible Harvest: 1.6E5 kg/yr Dilution Factor: 1

(a) Environment primarily salt water so invertebrates considered in lieu of drinking water.

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
SALEM 1 AND 2

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	5.8E-02	1.1E-01	3.6E-02	1.2E-01	1.1E-01
Teen	4.7E-02	2.3E-01	2.6E-02	6.9E-02	8.5E-02
Adult	3.5E-01	2.0E+00	1.7E-01	4.0E-01	5.0E-01
TOTAL	4.5E-01	2.3E+00	2.3E-01	5.9E-01	6.9E-01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	3.6E-03	3.6E-03	8.9E-03	1.7E-03	3.6E-03	3.7E-03
Child	4.7E-02	4.7E-02	7.9E-02	1.8E-02	4.7E-02	4.9E-02
Teen	3.3E-02	3.3E-02	4.6E-02	1.3E-02	3.3E-02	3.6E-02
Adult	1.9E-01	1.9E-01	2.3E-01	8.1E-02	1.9E-01	2.0E-01
TOTAL	2.7E-01	2.7E-01	3.7E-01	1.1E-01	2.7E-01	2.9E-01

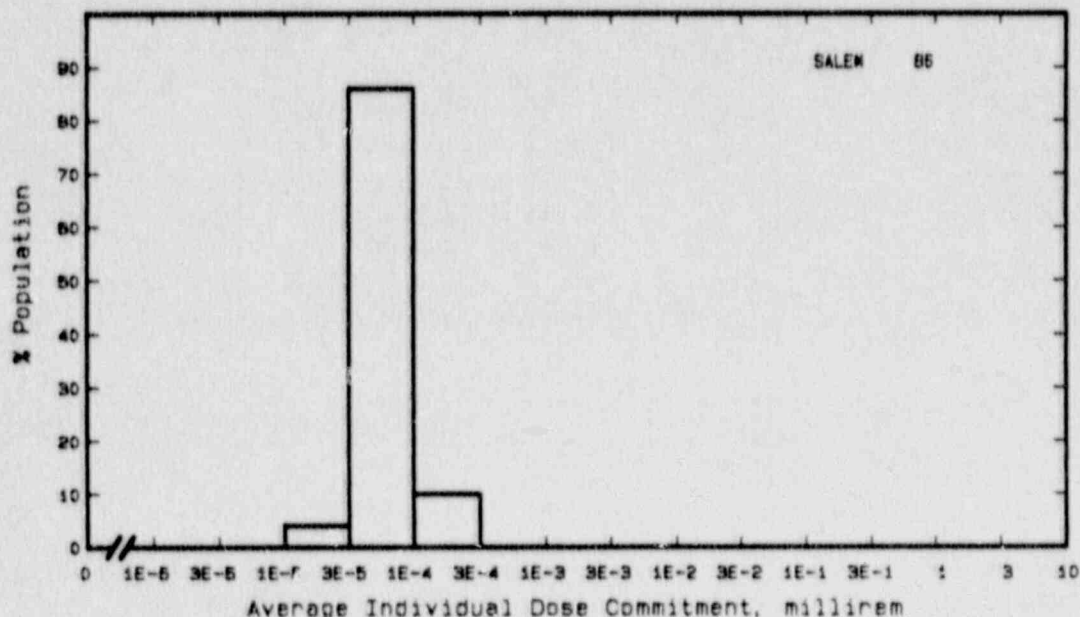
Production/Consumption factors:

Produce: 0.071

Milk: 0.38

Meat: 0.055

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: SAN ONOFRE

CAMP PENDLETON, CALIFORNIA

Location: N 33.3703°

W 117.5569°

POPULATION DATA

Total Population Within 2-to-80-km Region: 5.3E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
San Diego SMSA	2,100,000	68 km SSE
Anaheim-Santa Ana-Garden Grove SMSA	2,100,000	62 km NW
Long Beach	390,000	75 km NW
Huntington Beach	180,000	61 km NW
Riverside	180,000	68 km N
Pomona	110,000	79 km NNW

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 4.8E7 kilogram Milk: 2.3E8 liter Meat: 5.0E7 kilogram
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Regional Productivity Factor:	0.6
Animal Grazing Factor:	1

Meteorology Period of Record: 25 JAN 73 - 24 JAN 76 Recovery: 88%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via PACIFIC OCEAN

	Average Dilution Flow from Plant: 3,300 ft ³ /s
Fish:	Edible Harvest: 2.9E4 kg/yr Dilution Factor: 1 ^(a)
Invertebrates:	Edible Harvest: 2.9E3 kg/yr Dilution Factor: 1 ^(a)

(a) Seafood caught in undiluted effluent according to FES (1973).

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
SAN ONOFRE 1, 2 AND 3

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	3.2E-03	1.4E-02	1.6E-03	1.1E-02	8.5E-03
Teen	2.7E-03	2.8E-02	1.2E-03	6.4E-03	6.8E-03
Adult	2.0E-02	2.4E-01	8.1E-03	3.8E-02	4.0E-02
TOTAL	2.6E-02	2.9E-01	1.1E-02	5.5E-02	5.6E-02

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	7.9E-03	7.6E-03	2.0E-01	8.0E-03	8.2E-03	8.1E-03
Child	8.7E-02	8.5E-02	1.2E+00	8.7E-02	8.8E-02	9.3E-02
Teen	6.3E-02	6.2E-02	5.0E-01	6.2E-02	6.4E-02	7.2E-02
Adult	3.8E-01	3.8E-01	1.8E+00	3.7E-01	3.8E-01	4.1E-01
TOTAL	5.4E-01	5.2E-01	3.7E+00	5.3E-01	5.4E-01	5.8E-01

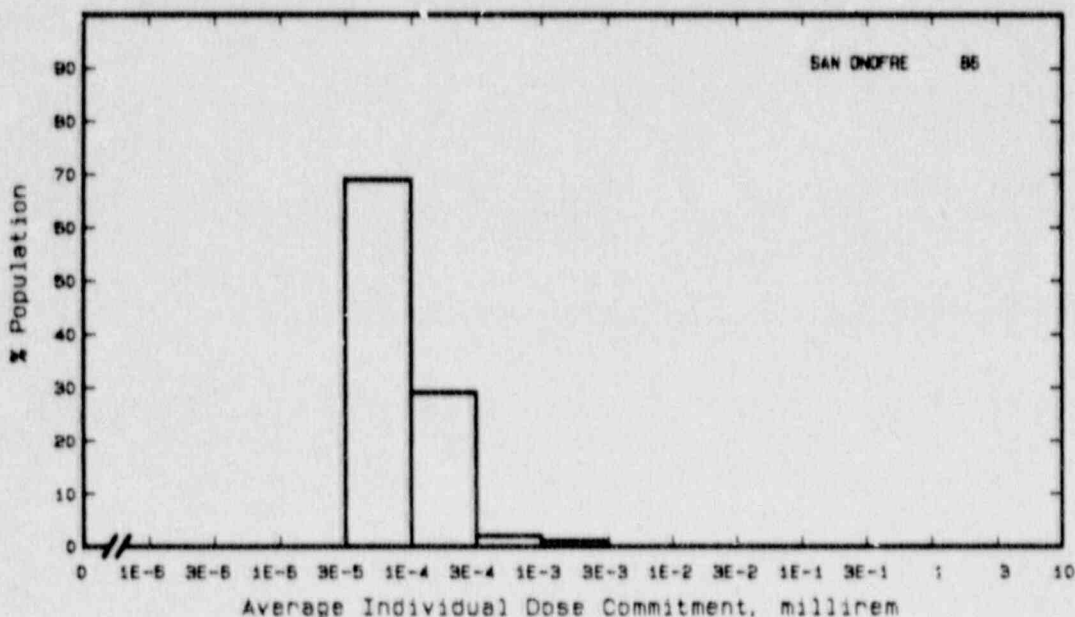
Production/Consumption factors:

Produce: 0.028

Milk: 0.20

Meat: 0.071

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: SEQUOYAH

HAMILTON COUNTY, TENNESSEE

Location: N 35.2233°

W 85.0878°

POPULATION DATA

Total Population Within 2-to-80-km Region: 8.6E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Chattanooga SMSA	430,000	28 km SW
Cleveland	26,000	21 km SE
East Ridge	21,000	27 km SSW
Dalton	21,000	50 km S
Athens	12,000	53 km ENE

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 1.1E7 kilogram Milk: 1.6E8 liter Meat: 1.2E8 kilogram
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Regional Productivity Factor:	0.25
Animal Grazing Factor:	0.7

Meteorology Period of Record: 1 JAN 72 - 31 DEC 72 Recovery: 93%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via TENNESSEE RIVER

	Average River Flow at Site: 35,000 ft ³ /s
Drinking Water:	Exposed Population: 450,000 Dilution Factor: 1
Fish:	Edible Harvest: 1.7E5 ^(a) kg/yr Dilution Factor: 1

(a) Catch data given in FES (1974).

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
SEQUOYAH 1 AND 2

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	2.8E-03	2.8E-03	2.7E-03	5.1E-04	3.4E-03
Child	3.3E-02	3.2E-02	3.0E-02	1.1E-02	4.3E-02
Teen	1.5E-02	1.3E-02	1.1E-02	4.8E-03	1.9E-02
Adult	1.3E-01	1.1E-01	9.8E-02	2.9E-02	1.5E-01
TOTAL	1.8E-01	1.6E-01	1.4E-01	4.5E-02	2.1E-01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.6E-04	1.6E-04	1.6E-04	1.1E-05	1.6E-04	1.9E-04
Child	2.7E-03	2.7E-03	2.7E-03	1.2E-04	2.7E-03	3.1E-03
Teen	2.1E-03	2.1E-03	2.0E-03	8.7E-05	2.1E-03	2.5E-03
Adult	1.2E-02	1.2E-02	1.2E-02	5.2E-04	1.2E-02	1.4E-02
TOTAL	1.7E-02	1.7E-02	1.7E-02	7.4E-04	1.7E-02	2.0E-02

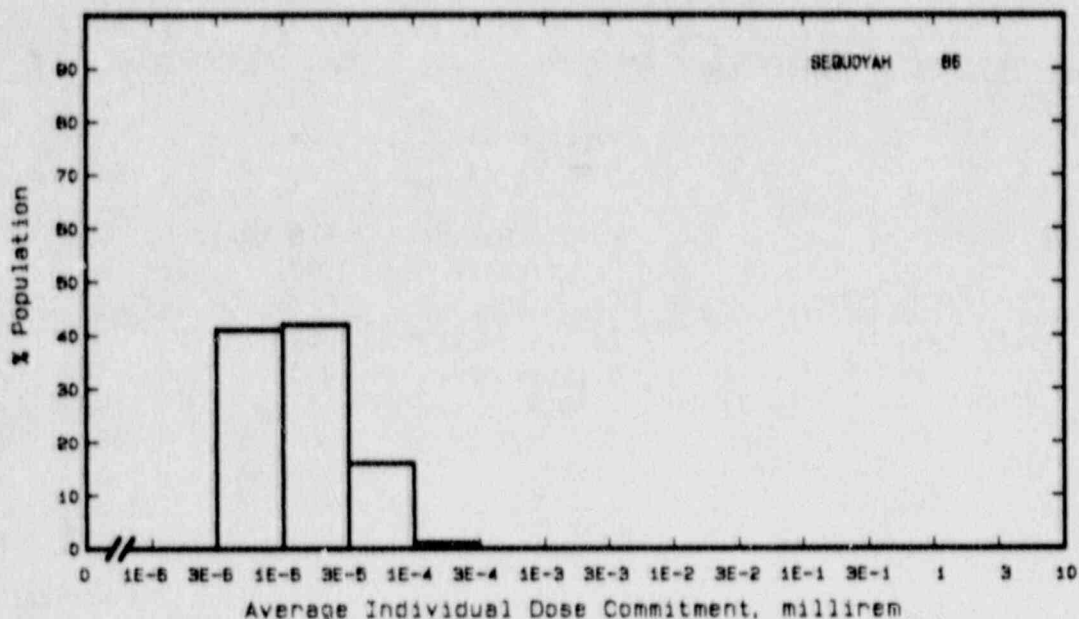
Production/Consumption factors:

Produce: 0.016

Milk: 0.36

Meat: 0.43

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: SHOREHAM

BROOKHAVEN, NEW YORK

Location: N 40.9608°

W 72.8658°

POPULATION DATA

Total Population Within 2-to-80-km Region: 5.2E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Nassau county - Suffolk County SMSA	2,600,000	50 km WSW
New Haven - West Haven SMSA	430,000	38 km NW
Bridgeport SMSA	400,000	37 km NW
Waterbury SMSA	230,000	68 km NNW
Stamford SMSA	130,000	57 km WNW
Norwalk	80,000	26 km WNW
Meriden	59,000	68 km N

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 7.6E7 kilogram Milk: 7.0E8 liter Meat: 3.3E7 kilogram
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Regional Productivity Factor:	0.5
Animal Grazing Factor:	0.6

Meteorology Period of Record: 1 OCT 73 - 30 SEP 74 Recovery: 90%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via LONG ISLAND SOUND

	Average Dilution Flow from Plant: 23 ft ³ /s
Fish:	Edible Harvest: 2.9E5 kg/yr Dilution Factor: 0.001
Invertebrates:	Edible Harvest: 3.6E5 kg/yr Dilution Factor: 0.1

POPULATION DOSE-COMMITMENT ESTIMATES AND
 AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
 SHOREHAM

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	1.2E-03	2.7E-03	6.0E-06	1.5E-07	3.9E-04
Teen	8.1E-04	5.7E-03	3.9E-06	8.9E-08	3.5E-04
Adult	4.9E-03	5.1E-02	2.5E-05	5.2E-07	2.2E-03
TOTAL	6.9E-03	6.0E-02	3.5E-05	7.7E-07	2.9E-03

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant						
Child						
Teen						
Adult						
TOTAL						

(No Airborne Releases Reported^(a))

(a) Tichler, et al. 1988.

Site: SUMMER

JENKINSVILLE, SOUTH CAROLINA

Location: N 34.2958°

W 81.3203°

POPULATION DATA

Total Population Within 2-to-80-km Region: 8.8E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Columbia SMSA	450,000	42 km SE
Rock Hill	36,000	75 km NNE
Greenwood	23,000	78 km W
Union	11,000	54 km NNW
Laurens	11,000	68 km WNW

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 7.4E6 kilogram Milk: 5.7E7 liter Meat: 5.0E7 kilogram
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Regional Productivity Factor:	0.9
Animal Grazing Factor:	0.7

Meteorology Period of Record: 1 Jan 75 - 31 Dec 75 Recovery: 98%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via PARR RES. and BROAD RIVER

Average River Flow
at Site: 6,000 ft³/s

Drinking Water:	Exposed Population: 130,000 Dilution Factor: 1
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Fish:	Edible Harvest: (a) Dilution Factor: 1
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(a) Average individual consumption rate of 2.2 kg/yr as given in the FES (1973) used in lieu of catch data.

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
SUMMER

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	7.2E-03	7.1E-03	1.4E-02	1.3E-03	8.8E-03
Child	2.2E-01	1.1E-01	1.4E-01	5.6E-01	8.0E-01
Teen	2.9E-01	9.7E-02	5.3E-02	3.4E-01	6.5E-01
Adult	3.1E+00	8.4E-01	4.2E-01	2.0E+00	4.0E+00
TOTAL	3.6E+00	1.1E+00	6.3E-01	2.9E+00	5.4E+00

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	3.3E-06	3.3E-06	1.1E-05	3.3E-06	3.3E-06	3.6E-06
Child	3.7E-05	3.7E-05	8.4E-05	3.7E-05	3.7E-05	4.1E-05
Teen	2.7E-05	2.7E-05	4.8E-05	2.7E-05	2.7E-05	3.3E-05
Adult	1.6E-04	1.6E-04	2.4E-04	1.6E-04	1.6E-04	1.8E-04
TOTAL	2.3E-04	2.3E-04	3.8E-04	2.3E-04	2.3E-04	2.6E-04

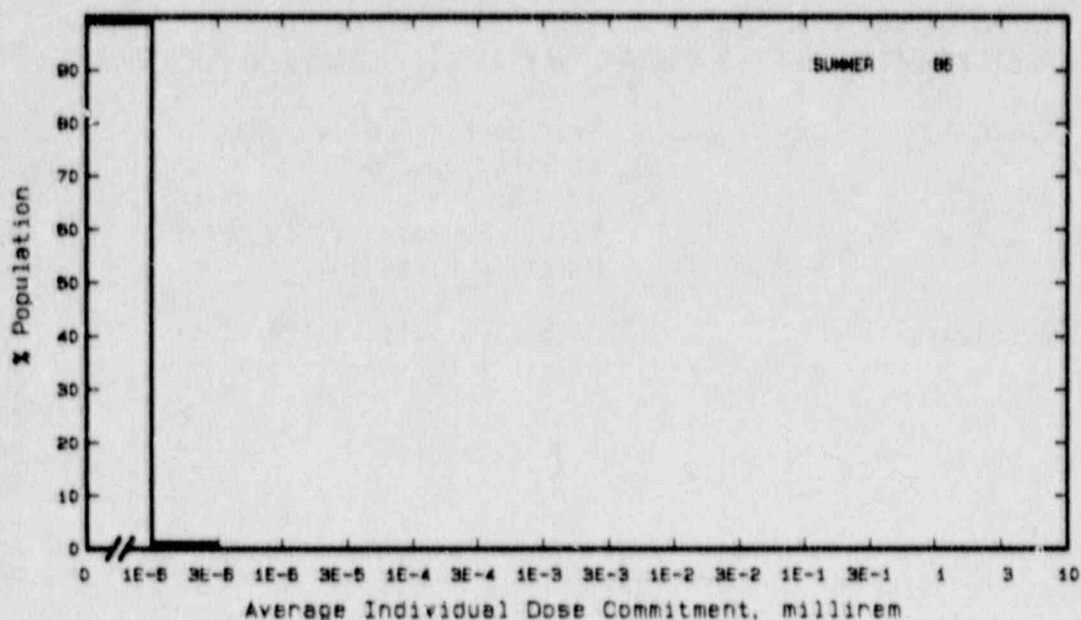
Production/Consumption factors:

Produce: 0.039

Milk: 0.45

Meat: 0.64

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: SURRY

SURRY COUNTY, VIRGINIA

Location: N 37.1656°

W 76.6983°

POPULATION DATA

Total Population Within 2-to-80-km Region: 1.8E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Norfolk-Virginia Beach-Portsmouth SMSA	830,000	50 km SE
Richmond SMSA	660,000	77 km WNW
Newport News-Hampton SMSA	370,000	33 km ESE
Petersburg-Colonial Heights-Hopewell SMSA	130,000	63 km W
Williamsburg	10,000	12 km N

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 3.5E7 kilogram Milk: 1.5E8 liter Meat: 7.4E7 kilogram
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Regional Productivity Factor:	0.8
Animal Grazing Factor:	0.7

Meteorology Period of Record: 3 MAR 74 - 2 MAR 75 Recovery: 91%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via JAMES RIVER ESTUARY

	Average River Flow at Site: 25,000 ft ³ /s (a)
Fish:	Edible Harvest: 6.0E5 kg/yr Dilution Factor: 1
Invertebrates: (b)	Edible Harvest: 1.1E6 kg/yr Dilution Factor: 1

(a) Flow includes fresh water river flow and saline "mixing flow" of estuary as given in FES (1972).

(b) Environment primarily salt water so invertebrates considered in lieu of drinking water.

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
SURRY 1 AND 2

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	1.9E-01	3.4E-01	2.2E-01	3.2E-01	3.1E-01
Teen	1.6E-01	6.9E-01	1.5E-01	1.8E-01	2.5E-01
Adult	1.2E+00	6.0E+00	1.0E+00	1.1E+00	1.5E+00
TOTAL	1.6E+00	7.1E+00	1.4E+00	1.6E+00	2.1E+00

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.4E-03	1.4E-03	1.3E-02	1.3E-03	1.6E-03	1.5E-03
Child	1.6E-02	1.6E-02	8.9E-02	1.4E-02	1.8E-02	1.8E-02
Teen	1.2E-02	1.2E-02	4.3E-02	9.9E-03	1.2E-02	1.4E-02
Adult	7.1E-02	7.0E-02	1.8E-01	5.8E-02	7.2E-02	7.7E-02
TOTAL	1.0E-01	9.9E-02	3.3E-01	8.4E-02	1.0E-01	1.1E-01

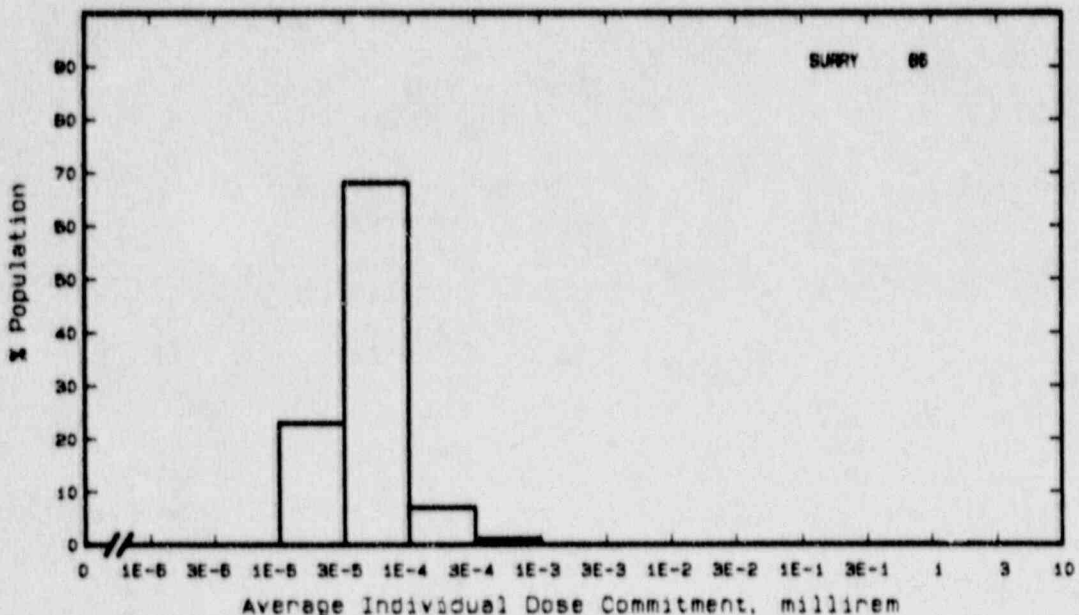
Production/Consumption factors:

Produce: 0.079

Milk: 0.50

Meat: 0.40

Fraction of Population Receiving An Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: SUSQUEHANNA

BERWICK, PENNSYLVANIA

Location: N 41.1000° W 76.1500°

POPULATION DATA

Total Population Within 2-to-80-km Region: 1.5E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Williamsport SMSA	118,000	73 km WNW
Allentown	100,000	79 km SE
Scranton	88,000	53 km NE
Wilkes-Barre	52,000	28 km NE
Hazleton	27,000	21 km SE

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 5.3E7 kilogram Milk: 5.3E8 liter Meat: 5.4E7 kilogram
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Regional Productivity Factor:	0.9
Animal Grazing Factor:	0.6

Meteorology Period of Record: 1 Jan 75 - 31 Dec 75 Recovery: 98%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via SUSQUEHANNA RIVER

	Average River Flow at Site: 13,000 ft ³ /s
Drinking Water:	Exposed Population: 100,000 Dilution Factor: 1
Fish:	Edible Harvest: (a) Dilution Factor: 0.1 ^(b)

(a) No fish catch data given in FES (1973), so generic consumption rates used (Table A.1).

(b) Ten percent of population consumes fish from river.

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
SUSQUEHANNA 1 AND 2

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	1.5E-04	1.8E-04	9.8E-05	2.5E-05	1.9E-04
Child	8.0E-03	5.5E-03	1.2E-03	4.0E-03	3.1E-02
Teen	5.1E-03	8.8E-03	4.3E-04	2.7E-03	1.1E-02
Adult	3.2E-02	8.1E-02	3.7E-03	1.8E-02	6.8E-02
TOTAL	4.5E-02	9.6E-02	5.3E-03	2.5E-02	9.2E-02

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	5.0E-04	5.1E-04	6.6E-04	1.3E-04	5.1E-04	5.2E-04
Child	6.7E-03	6.7E-03	7.7E-03	1.4E-03	6.7E-03	6.9E-03
Teen	4.4E-03	4.4E-03	4.8E-03	1.0E-03	4.4E-03	4.7E-03
Adult	2.5E-02	2.5E-02	2.6E-02	6.2E-03	2.5E-02	2.6E-02
TOTAL	3.6E-02	3.6E-02	3.9E-01	8.8E-03	3.5E-02	3.8E-02

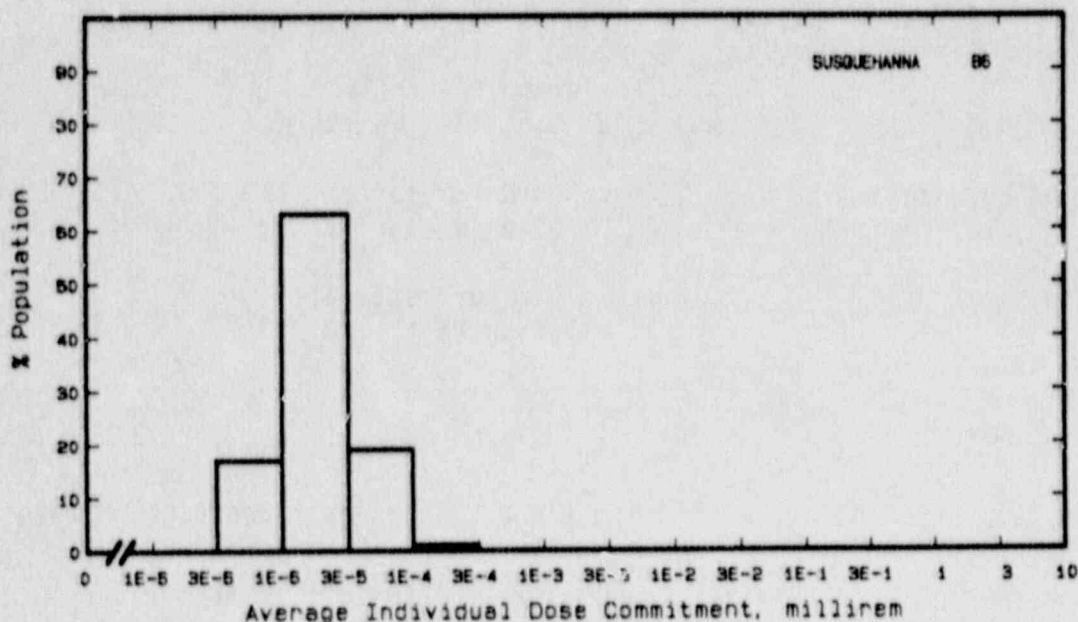
Production/Consumption factors:

Produce: 0.16

Milk: 2.4

Meat: 0.41

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: THREE MILE ISLAND

THREE MILE ISLAND, PENNSYLVANIA

Location: N 40.1531°

W 76.7250°

POPULATION DATA

Total Population Within 2-to-80-km Region: 2.1E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Harrisburg SMSA	460,000	18 km NW
York SMSA	390,000	21 km S
Lancaster SMSA	390,000	38 km ESE
Reading SMSA	320,000	71 km ENE
Lebanon	26,000	33 km NE

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 5.3E7 kilogram Milk: 5.3E8 liter Meat: 5.4E7 kilogram
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Regional Productivity Factor:	1
Animal Grazing Factor:	0.5

Meteorology Period of Record: 1 OCT 72 - 30 SEP 73 Recovery: 80%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via SUSQUEHANNA RIVER

	Average River Flow at Site: 34,000 ft ³ /s
Drinking Water:	Exposed Population: 230,000 Dilution Factor: 1
Fish:	Edible Harvest: (a) Dilution Factor: 0.025(b)

(a) No fish catch data given in FES (1972), so generic consumption rates used (Table A-1).

(b) Ten percent of population consumes 25% of their fish from river according to FES.

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
THREE MILE ISLAND 1 AND 2

Dose Commitments (person-rem) from Waterborne Pathways^(a)

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	9.8E-04	9.7E-04	1.1E-03	8.8E-05	1.0E-03
Child	1.1E-02	1.1E-02	1.2E-02	2.9E-03	1.3E-02
Teen	4.8E-03	4.2E-03	4.5E-03	1.4E-03	5.8E-03
Adult	4.3E-02	3.6E-02	3.8E-02	8.8E-03	4.5E-02
TOTAL	6.0E-02	5.2E-02	5.5E-02	1.3E-02	6.5E-02

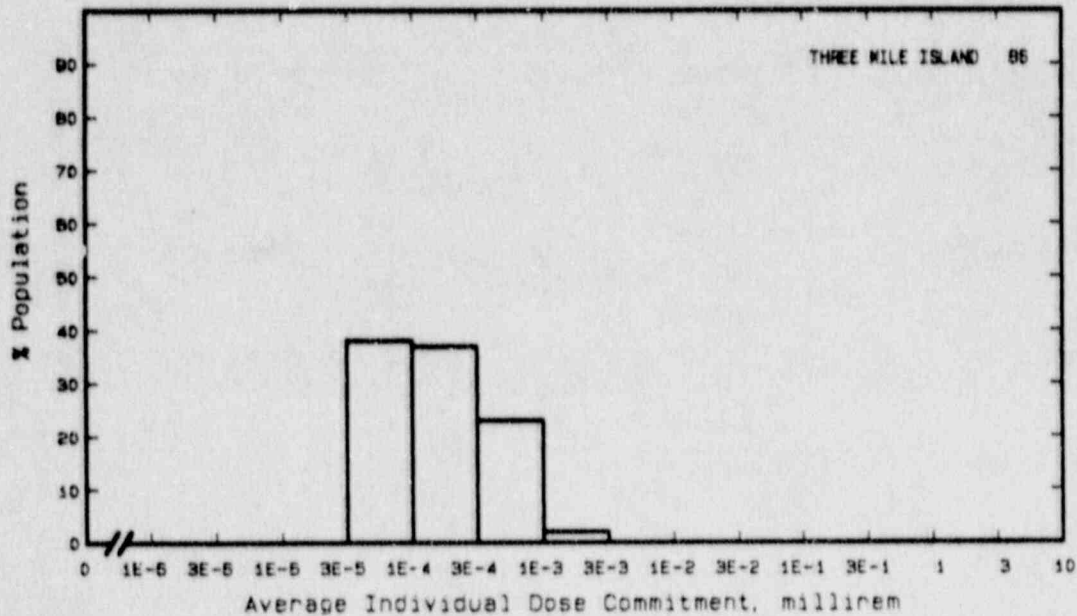
Dose Commitments (person-rem) from Airborne Pathways^(a)

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	7.1E-03	7.1E-03	7.2E-03	5.9E-03	7.2E-03	7.7E-03
Child	8.4E-02	8.3E-02	8.4E-02	6.7E-02	8.4E-02	9.1E-02
Teen	6.0E-02	6.0E-02	6.0E-02	4.8E-02	6.0E-02	6.9E-02
Adult	3.6E-01	3.5E-01	3.6E-01	2.9E-01	3.6E-01	3.9E-01
TOTAL	5.1E-01	5.0E-01	5.1E-01	4.1E-01	5.1E-01	5.5E-01

Production/Consumption factors:

Produce: 0.13 Milk: 1.9 Meat: 0.32

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



(a) Doses include releases from the TMI 2 / Epicore.

Site: TROJAN

PRESCOTT, OREGON

Location: N 46.0408°

W 122.8844°

POPULATION DATA

Total Population Within 2-to-80-km Region: 1.4E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Portland-Vancouver SMSA	1,400,000	60 km SSE
Longview	33,000	12 km NNW
Astoria	14,000	72 km WNW
Forest Grove	13,000	58 km SSW
Centralia	12,000	75 km N

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 6.4E7 kilogram Milk: 3.7E7 liter Meat: 2.6E7 kilogram
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Regional Productivity Factor:	0.9
Animal Grazing Factor:	0.75

Meteorology Period of Record: 1 SEP 71 - 31 AUG 74 Recovery: 90%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via COLUMBIA RIVER

	Average River Flow at Site: 230,000 ft ³ /s
Drinking Water:	Exposed Population: 540 ^(a) Dilution Factor: 1
Fish:	Edible Harvest: 1.0E6 kg/yr Dilution Factor: 1

(a) Population of Rainier divided by 4, since residents only there for 25% of the year.

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
TROJAN

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	5.2E-07	5.4E-07	1.2E-06	1.8E-07	6.4E-07
Child	1.3E-03	1.3E-03	1.4E-04	6.1E-03	7.1E-03
Teen	2.5E-03	2.7E-03	1.0E-04	3.7E-03	6.1E-03
Adult	2.7E-02	2.3E-02	6.8E-03	2.1E-02	3.6E-02
TOTAL	3.0E-02	2.8E-02	9.2E-04	3.1E-02	4.9E-02

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	9.4E-04	9.4E-04	2.3E-03	8.6E-04	9.5E-04	9.9E-04
Child	1.2E-02	1.2E-02	2.5E-02	1.1E-02	1.2E-02	1.2E-02
Teen	8.6E-03	8.5E-03	1.5E-03	7.5E-03	8.5E-03	9.3E-03
Adult	5.1E-02	5.1E-02	7.8E-02	4.5E-02	5.1E-02	5.4E-02
TOTAL	7.3E-02	7.2E-02	1.2E-01	6.4E-02	7.2E-02	7.6E-02

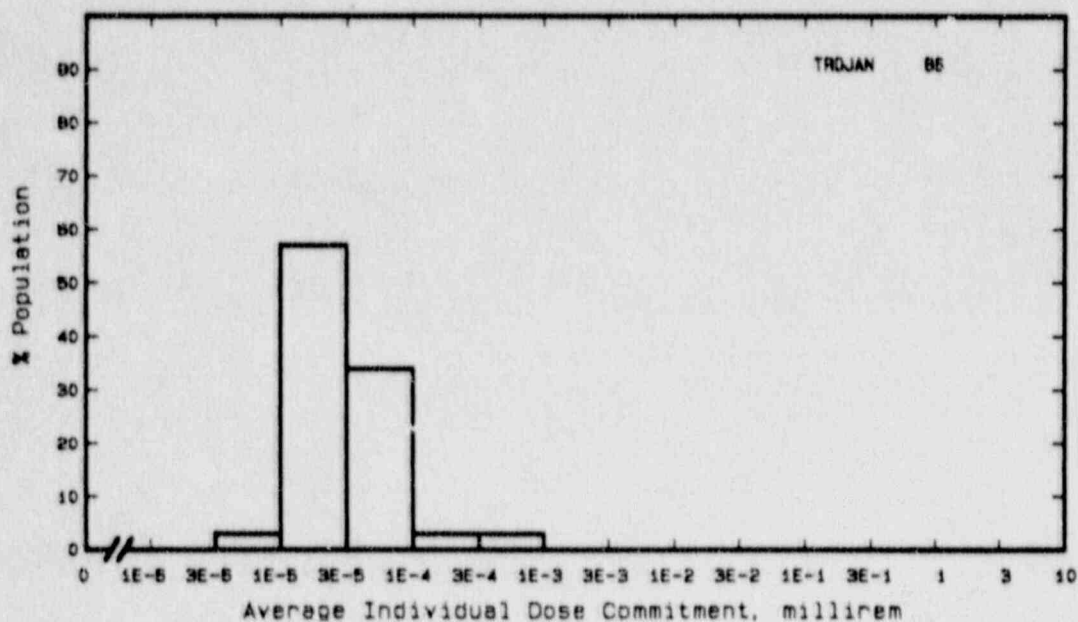
Production/Consumption factors:

Produce: 0.21

Milk: 0.18

Meat: 0.20

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: TURKEY POINT

DADE COUNTY, FLORIDA

Location: N 25.4350°

W 80.3314°

POPULATION DATA

Total Population Within 2-to-80-km Region: 2.8E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Miami-Hialeah SMSA	1,900,000	41 km NNE
Fort Lauderdale-Hollywood SMSA	1,200,000	79 km NNE
Homestead	23,000	16 km W
Upper Keys Division	17,000	42 km S

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 2.8E7 kilogram Milk: 1.1E8 liter Meat: 7.2E7 kilogram
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Regional Productivity Factor:	0.4
Animal Grazing Factor:	1

Meteorology Period of Record: 1 JAN 73 - 31 DEC 73 Recovery: 98%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via BISCAYNE BAY

	Average Dilution Flow from Plant: 5,600 ft ³ /s
Fish:	Edible Harvest: (a) Dilution Factor: 0.001
Invertebrates:	Edible Harvest: (a) Dilution Factor: 0.002

(a) No catch data given in DES (1972), so generic consumption rates used (Table A-1).

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
TURKEY POINT 3 AND 4

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	4.5E-04	1.2E-03	2.1E-04	1.2E-03	9.0E-04
Teen	3.4E-04	2.4E-03	1.5E-04	6.7E-04	7.1E-04
Adult	2.4E-03	2.1E-02	1.0E-03	3.9E-03	4.2E-03
TOTAL	3.2E-03	2.5E-02	1.4E-03	5.8E-03	5.8E-03

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	2.2E-03	2.1E-03	1.2E-02	1.3E-03	2.3E-03	2.3E-03
Child	3.1E-02	3.1E-02	8.6E-02	1.4E-02	3.2E-02	3.2E-02
Teen	2.3E-02	2.3E-02	4.5E-02	9.4E-03	2.4E-02	2.5E-02
Adult	1.4E-01	1.4E-01	2.1E-01	5.6E-02	1.4E-01	1.4E-01
TOTAL	2.0E-01	1.9E-01	3.6E-01	8.0E-02	2.0E-01	2.0E-01

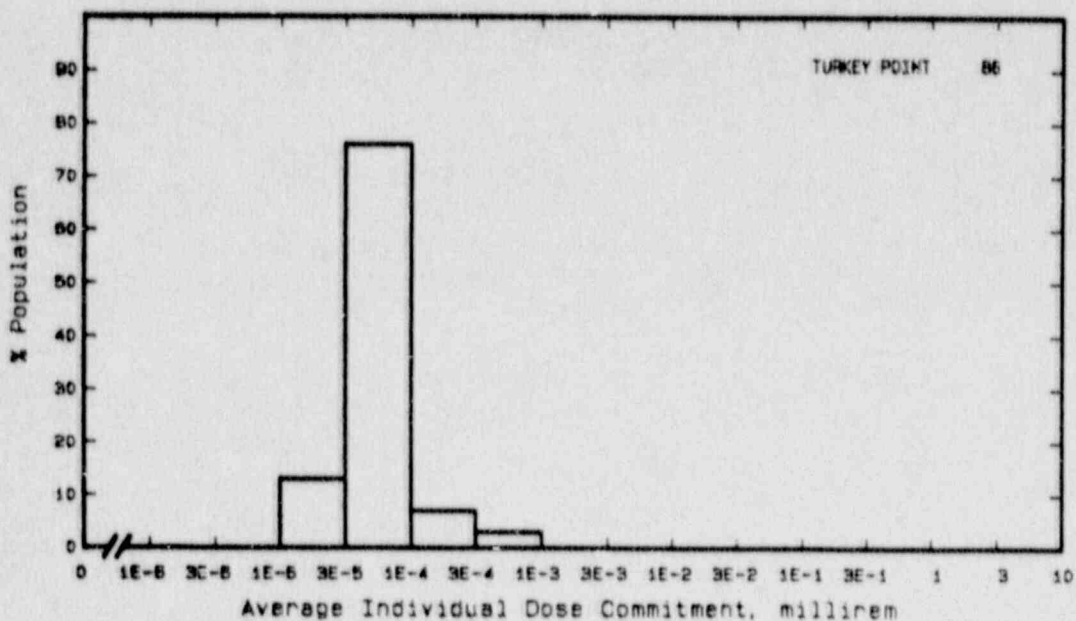
Production/Consumption factors:

Produce: 0.021

Milk: 0.12

Meat: 0.13

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: VERMONT YANKEE

VERNON, VERMONT

Location: N 42.7803°

W 72.5158°

POPULATION DATA

Total Population Within 2-to-80-km Region: 1.4E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Springfield-Chicopee-Holyoke SMSA	560,000	70 km S
Worcester SMSA (1/2)	200,000	80 km SE
Pittsfield	96,000	71 km SW
Fitchburg	43,000	63 km ESE
Leominster	38,000	68 km ESE
Keene	22,000	26 km NW

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 4.4E6 kilogram Milk: 7.3E8 liter Meat: 2.7E7 kilogram
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Regional Productivity Factor:	1
Animal Grazing Factor:	0.4

Meteorology Period of Record: 1 APR 75 - 31 MAR 76 Recovery: 97%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via CONNECTICUT RIVER at VERNON
POND

	Average River Flow at Site: 10,000 ft ³ /s
Drinking Water:	Exposed Population: None
Fish:	Edible Harvest: (a) Dilution Factor: (a)

(a) No radionuclides released in liquid effluents reported (Tichler, et al. 1988).

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
VERMONT YANKEE

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant					
Child					
Teen					
Adult					
TOTAL					

(No Waterborne Pathway Doses)

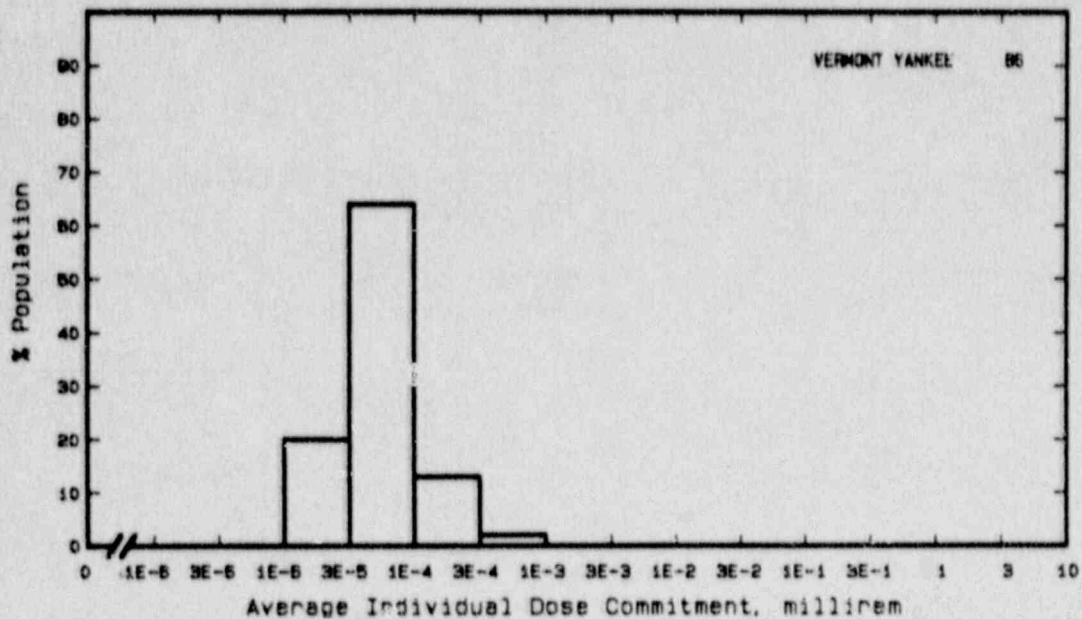
Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.7E-03	1.7E-03	1.7E-03	1.6E-03	1.7E-03	2.1E-03
Child	1.9E-02	1.9E-02	1.9E-02	1.8E-02	1.9E-02	2.6E-02
Teen	1.4E-02	1.4E-02	1.4E-02	1.3E-02	1.4E-02	2.1E-02
Adult	8.2E-02	8.4E-02	8.3E-02	8.0E-02	8.2E-02	1.1E-01
TOTAL	1.2E-01	1.2E-01	1.2E-01	1.1E-01	1.2E-01	1.6E-01

Production/Consumption factors:

Produce: 0.016 Milk: 3.9 Meat: 0.24

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: WATERFORD

TAFT, LOUISIANA

Location: N 29.9953°

W 90.4728°

POPULATION DATA

Total Population Within 2-to-80-km Region: 1.9E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
New Orleans MSA	1,300,000	32 km E
Metairie	140,000	26 km E
Kenner	30,000	16 km E
Marrero	29,000	32 km ESE
Houma	31,000	51 km SSW

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 1.8E6 kilogram Milk: 7.8E7 liter Meat: 6.1E7 kilogram
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Regional Productivity Factor:	0.6
Animal Grazing Factor:	1.0

Meteorology Period of Record: 2 FEB 77 - 1 FEB 78 Recovery: 89%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via MISSISSIPPI RIVER and GULF

	Average River Flow at Site: 490,000 ft ³ /s
Drinking Water:	Exposed Population: 1,100,000 Dilution Factor: 1
Fish:	Edible Harvest: 4.5E3 kg/yr (River) Dilution Factor: 1 Edible Harvest: 9.1E5 kg/yr (Gulf) Dilution Factor: 0.1
Gulf Invertebrates:	Edible Harvest: 5.1E6 kg/yr Dilution Factor: 0.1

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
WATERFORD

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	1.0E-03	1.0E-03	5.1E-02	3.9E-04	1.3E-03
Child	1.2E-02	1.5E-02	3.6E-01	6.4E-03	1.5E-02
Teen	5.0E-03	1.1E-02	1.1E-01	2.3E-03	6.6E-03
Adult	3.7E-02	9.6E-02	7.9E-01	1.4E-02	4.0E-02
TOTAL	5.9E-02	1.2E-01	1.3E+00	2.3E-02	1.7E-01

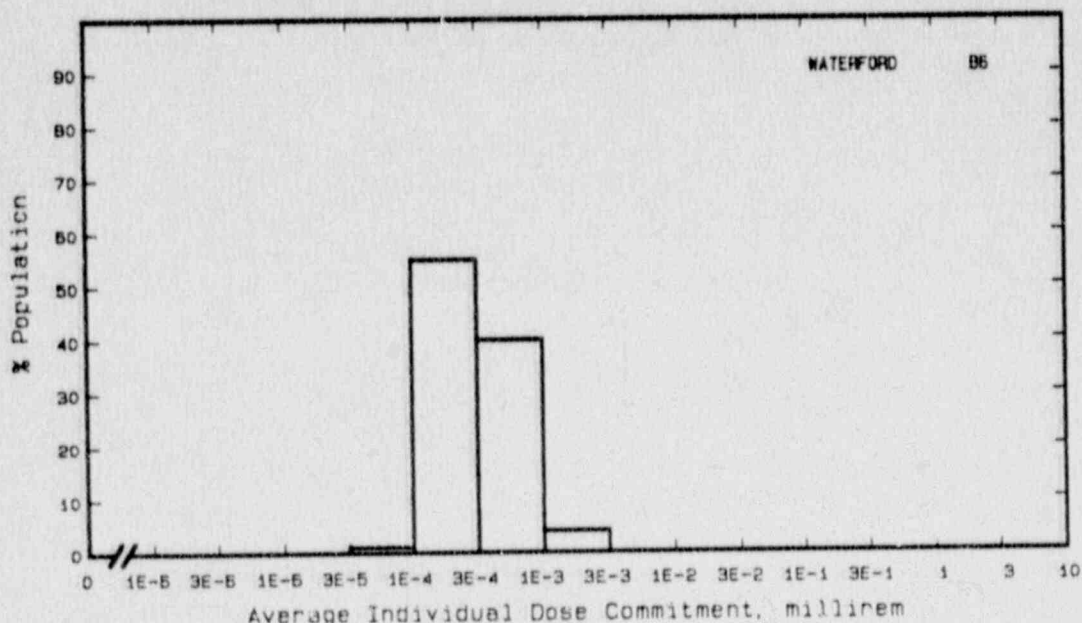
Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.0E-02	1.0E-02	1.2E-02	9.4E-03	1.0E-02	1.1E-02
Child	1.2E-01	1.2E-01	1.3E-01	1.0E-01	1.2E-01	1.3E-01
Teen	8.7E-02	8.7E-02	9.4E-02	7.6E-02	8.7E-02	1.0E-01
Adult	5.3E-01	5.3E-01	5.6E-01	4.6E-01	5.3E-01	5.7E-01
TOTAL	7.4E-01	7.4E-01	8.0E-01	6.5E-01	7.4E-01	8.2E-01

Production/Consumption factors:

Produce: 0.0029 Milk: 0.19 Meat: 0.24

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: WNP-2

RICHLAND, WASHINGTON

Location: N 46.2833⁰

W 119.2916⁰

POPULATION DATA

Total Population Within 2-to-80-km Region: 2.7E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Richland	35,000	14 km S
Kennewick	36,000	26 km SSE
Pasco	19,000	28 km SSE
Moses Lake	11,000	73 km N

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 2.1E8 kilogram Milk: 1.2E8 liter Meat: 3.2E7 kilogram
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Regional Productivity Factor:	0.8
Animal Grazing Factor:	0.7

Meteorology Period of Record: 1 APR 75 - 31 MAR 76 Recovery: 93%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via COLUMBIA RIVER

	Average River Flow at Site: 115,000 ft ³ /s
Drinking Water:	Exposed Population: 72,000 Dilution Factor: 3.4 ^(a)
Fish:	Edible Harvest: 7.5E3 kg/yr Dilution Factor: 1

(a) Effective factor for the cities of Richland, Kennewick, and Pasco accounting for only partial dilution.

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
WNP-2

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	8.6E-06	1.0E-05	6.1E-06	2.1E-06	1.1E-05
Child	1.0E-04	8.5E-05	6.8E-05	2.7E-05	1.2E-04
Teen	3.7E-05	4.5E-05	2.6E-05	8.6E-06	4.9E-05
Adult	2.9E-04	4.0E-04	2.2E-04	6.0E-05	3.7E-04
TOTAL	4.4E-04	5.4E-04	3.2E-04	9.8E-05	5.5E-04

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.3E-04	1.8E-04	1.6E-03	1.2E-04	2.0E-04	1.2E-04
Child	1.9E-03	1.3E-03	1.7E-02	2.0E-03	2.2E-03	1.7E-03
Teen	1.1E-03	1.1E-03	8.3E-03	1.1E-03	1.3E-03	1.3E-03
Adult	5.4E-03	6.5E-03	3.6E-02	5.7E-03	6.3E-03	6.6E-03
TOTAL	8.5E-03	9.2E-03	6.2E-02	8.9E-03	1.0E-02	9.7E-03

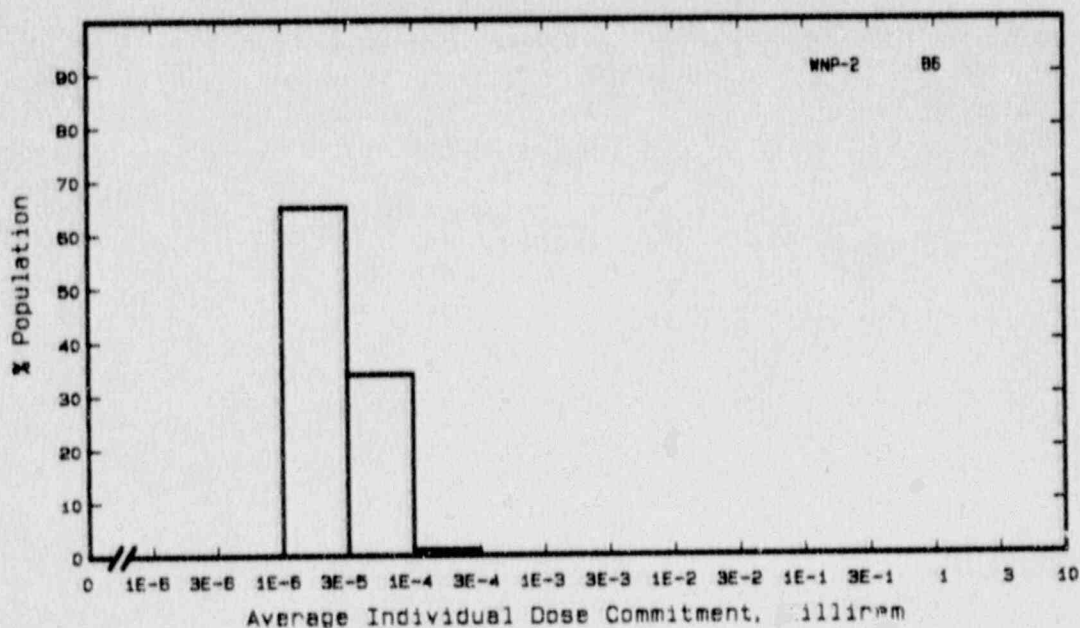
Production/Consumption factors:

Produce: 3.3

Milk: 2.8

Meat: 1.2

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: WOLF CREEK

BURLINGTON, KANSAS

Location: N 39.0267°

W 84.7233°

POPULATION DATA

Total Population Within 2-to-80-km Region: 1.9E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Chanute	11,000	62 km SSE
Emporia	26,000	42 km WNW
Ottawa	11,000	58 km NW

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 2.4E8 kilogram Milk: 6.5E7 liter Meat: 1.6E8 kilogram
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Regional Productivity Factor:	0.95
Animal Grazing Factor:	0.5

Meteorology Period of Record: 3 years	Recovery: 93%
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SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via NEOSHO RIVER

Average River Flow
at Site: 1,300 ft³/s

Drinking Water:	Exposed Population: None
	Dilution Factor:

Fish:	Edible Harvest: 1.8 kg/yr (a)
	Dilution Factor: 1

(a) Average consumption rate per person from FES.

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
WOLF CREEK

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	2.4E-02	3.9E-01	4.0E-03	5.0E-02	6.7E-02
Teen	3.1E-02	8.0E-01	3.1E-03	3.2E-02	5.8E-02
Adult	2.9E-01	7.0E+00	2.2E-02	1.9E-01	3.5E-01
TOTAL	3.4E-01	8.2E+00	2.9E-02	2.8E-01	4.8E-01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	2.0E-04	1.5E-04	2.7E-04	6.6E-04	4.4E-04	1.8E-04
Child	1.6E-02	3.3E-03	3.2E-03	6.2E-02	6.1E-03	2.8E-03
Teen	7.4E-03	2.7E-03	1.7E-03	2.7E-02	3.0E-03	1.9E-03
Adult	3.4E-02	1.4E-02	8.2E-03	1.2E-01	1.2E-02	8.4E-02
TOTAL	5.8E-02	2.0E-02	1.3E-02	2.1E-01	2.1E-02	1.3E-02

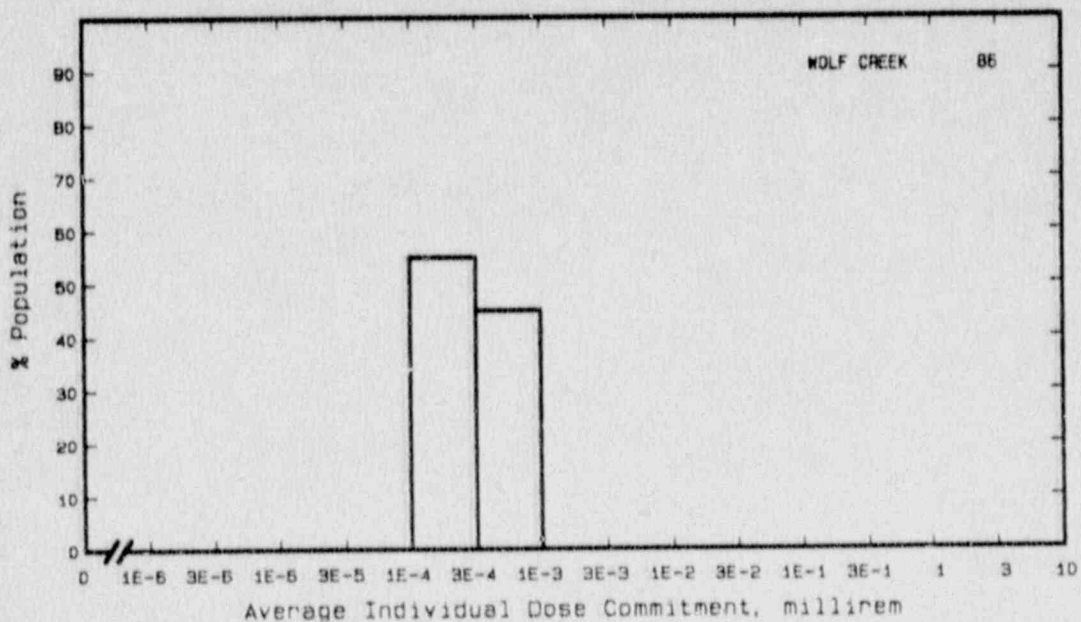
Production/Consumption factors:

Produce: 6.4

Milk: 2.5

Meat: 10

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: YANKEE ROWE

ROWE, MASSACHUSETTS

Location: N 42.7281°

W 72.9289°

POPULATION DATA

Total Population Within 2-to-80-km Region: 1.6E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Springfield-Chicopee-Holyoke SMSA	530,000	74 km SSE
Albany	100,000	68 km W
Pittsfield SMSA	92,000	41 km SW
Troy	57,000	62 km W
Amherst	18,000	51 km SE

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production
Of Crops and Animal Products
In 80-km Radius Circle

Veg: 2.0E7 kilogram
Milk: 2.6E8 liter
Meat: 1.6E7 kilogram

Regional Productivity Factor:

1

Animal Grazing Factor:

0.5

Meteorology Period of Record: 1 OCT 71 - 30 SEP 72 Recovery: 94%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via DEERFIELD RIVER

Average River Flow
at Site: 570 ft³/s

Drinking Water:

Exposed Population: None

Fish:

Edible Harvest: (a)
Dilution Factor: 0.025^(b)

(a) No catch data available, so generic consumption rates used (Table A-1).

(b) Ten percent of population obtain 25% of their fish from river.

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
YANKEE ROWE

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GJ-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	1.6E-02	4.2E-03	5.1E-03	7.2E-02	7.2E-02
Teen	2.6E-02	4.9E-03	3.6E-03	4.4E-02	6.1E-02
Adult	2.7E-01	3.8E-02	2.4E-02	2.6E-01	3.7E-01
TOTAL	3.2E-01	4.7E-02	3.2E-02	3.7E-01	5.0E-01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	2.1E-03	2.1E-03	2.3E-03	8.0E-02	2.1E-03	2.1E-03
Child	1.6E-02	1.6E-02	1.7E-02	5.7E-02	1.6E-02	1.6E-02
Teen	7.1E-03	7.1E-03	7.5E-03	1.9E-02	7.1E-03	7.5E-03
Adult	3.2E-02	3.2E-02	3.3E-02	6.4E-02	3.2E-02	3.3E-02
TOTAL	5.7E-02	5.7E-02	6.0E-02	1.5E-01	5.7E-02	6.0E-02

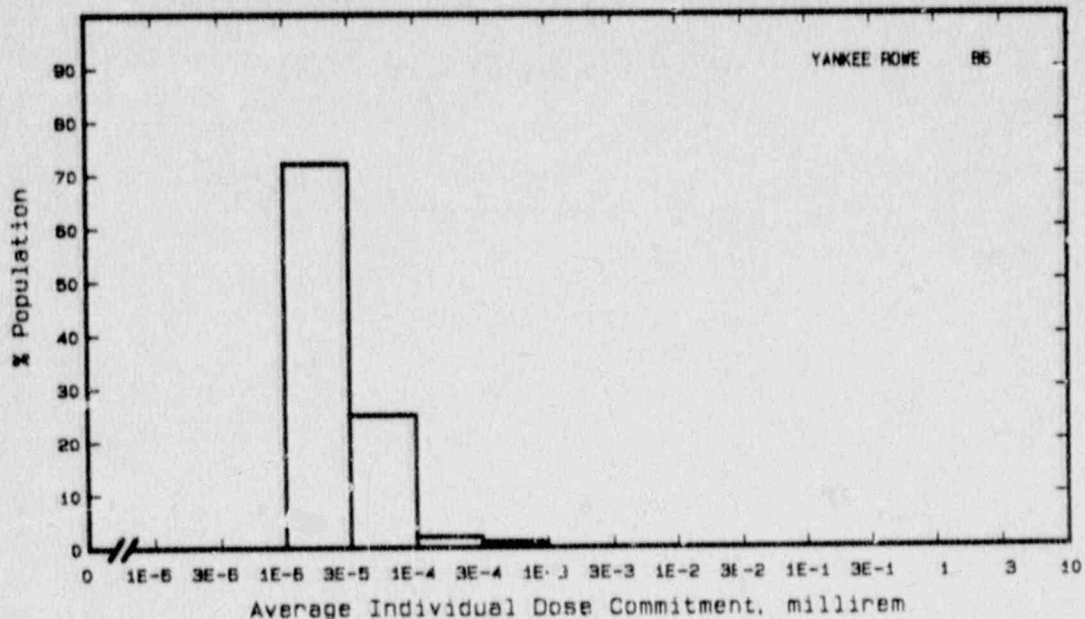
Production/Consumption factors:

Produce: 0.063

Milk: 1.2

Meat: 0.13

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways



Site: ZION

ZION, ILLINOIS

Location: N 42.4456°

W 87.8022°

POPULATION DATA

Total Population Within 2-to-80-km Region: 7.2E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Chicago SMSA (2/3)	4,700,000	66 km S
Milwaukee SMSA	1,400,000	65 km N
Racine SMSA	170,000	30 km N
Kenosha SMSA	120,000	14 km N
Waukesha	50,000	71 km NNW

SITE-SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production Of Crops and Animal Products In 80-km Radius Circle	Veg: 1.1E8 kilogram Milk: 1.8E8 liter Meat: 1.9E8 kilogram
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Regional Productivity Factor:	0.5
Animal Grazing Factor:	0.5

Meteorology Period of Record: 1 JAN 74 - 31 DEC 75 Recovery: 88%

SITE-SPECIFIC DATA - WATERBORNE PATHWAYS via LAKE MICHIGAN

	Average Dilution Flow from Plant: 2,600 ft ³ /s
Drinking Water:	Exposed Population: 6,900,000 Dilution Factor: 0.037 ^(a)
Fish:	Edible Harvest: 5.0E6 kg/yr Dilution Factor: 0.01 ^(b)

(a) Drinking water dilution factor estimated by averaging dilution factors derived from FES (1972) suitably weighted for population.

(b) Dilution factor derived from FES.

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
ZION 1 AND 2

Dose Commitments (person-rem) from Waterborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	6.8E-02	6.5E-02	9.8E-02	4.2E-02	1.2E-01
Child	8.5E-01	7.8E-01	9.3E-01	7.0E-01	1.7E+00
Teen	4.6E-01	3.7E-01	3.4E-01	2.6E-01	7.2E-01
Adult	4.4E+00	3.2E+00	2.7E+00	1.6E+00	5.0E+00
TOTAL	5.7E+00	4.4E+00	4.1E+00	2.6E+00	7.4E+00

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LII</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	4.5E-03	4.5E-03	5.8E-03	4.0E-03	4.5E-03	4.8E-03
Child	5.4E-02	5.4E-02	6.6E-02	4.4E-02	5.4E-02	5.8E-02
Teen	4.0E-02	4.0E-02	4.5E-02	3.2E-02	4.0E-02	4.5E-02
Adult	2.4E-01	2.4E-01	2.6E-01	2.0E-01	2.4E-01	2.6E-01
TOTAL	3.4E-01	3.4E-01	3.8E-01	2.8E-01	3.4E-01	3.7E-01

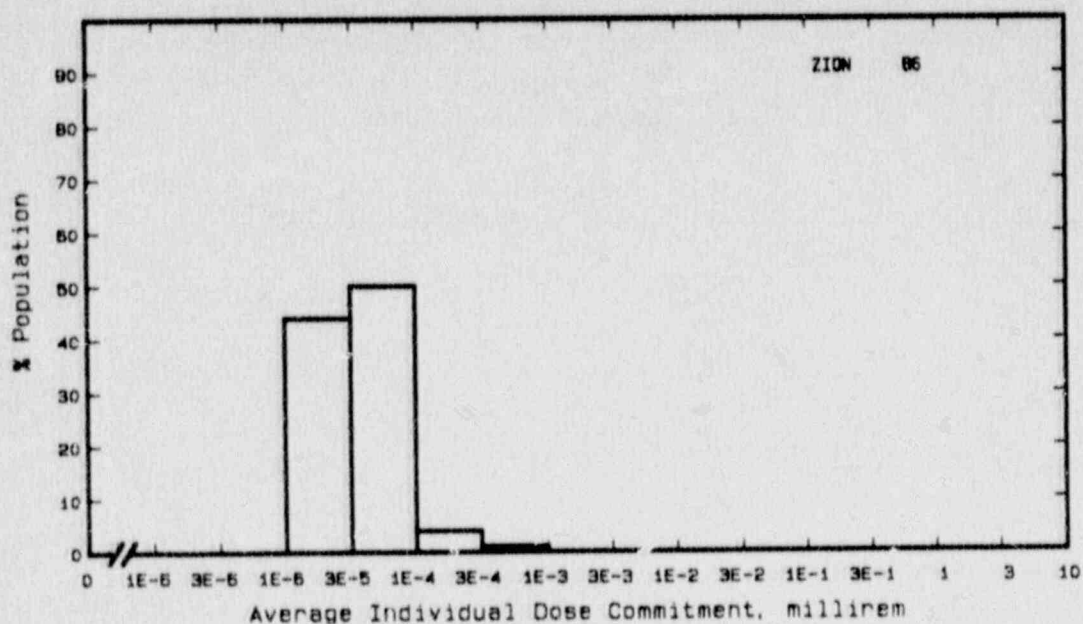
Production/Consumption factors:

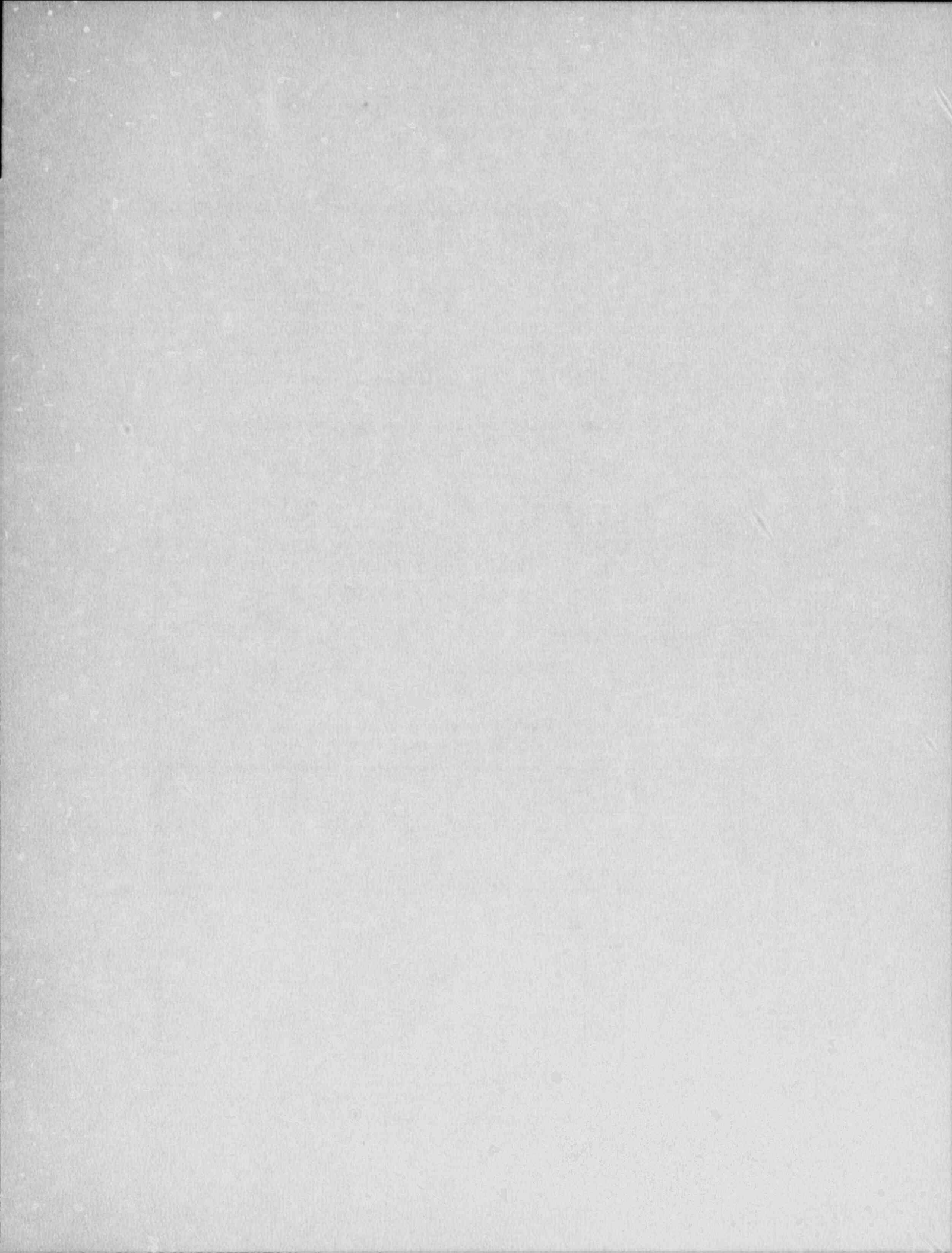
Produce: 0.040

Milk: 0.093

Meat: 0.16

Fraction of Population Receiving an Average Individual
Total-Body Dose Commitment from Airborne Pathways





REFERENCES

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.

Tichler, J., K. Norden, and J. Congemi. 1988. *Radioactive Materials Released from Nuclear Power Plants, Annual Report 1986.* NUREG/CR-2907, BNL-NUREG-51581, Vol. 7, U.S. Nuclear Regulatory Commission, Washington, D.C.

APPENDIX

MODELS AND GENERIC PARAMETERS

The calculational models used were primarily those given in the Nuclear Regulatory Commission's Regulatory Guide 1.109 (NRC 1977). 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; 16.0%, child; 11.7%, teenager; and 70.9%, adult (Population Estimates and Projections 1975). Where possible, the site-dependent parameters were taken from the environmental statements issued for each reactor (see Table 3). The generic parameters used for this study such as consumption rates, occupancy factors and holdup times are given in Tables A-1 and A-2 below. It should be noted that generic consumption rates for aquatic foods and inhalation rates are taken from Regulatory Guide 1.109 (NRC 1977). Bioaccumulation factors and terrestrial food transfer factors were taken from Regulatory Guide 1.109 (NRC 1977). Dose commitment factors for the four age groups were taken from Hoenes and Soldat (1977).

TABLE A-1. Generic Consumption Rates and Occupancy Factors Used for the Study of Average Members of the Population^(a)

<u>Pathway</u>	<u>Infant</u>	<u>Child</u>	<u>Teen-ager</u>	<u>Adult</u>
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 1977).

(b) Both fresh and salt water.

(c) Assumed to be equal to milk consumption.

(d) Same as for maximum individual.

TABLE A-2. Holdup Times Between Harvest and Consumption of Foods^(a)

<u>Food</u>	<u>Holdup Time (days)</u>
Fruits, grains and vegetables	14
Milk ^(b)	4
Meat ^(b)	20
Aquatic foods (fish and invertebrates)	7
Drinking Water	1

(a) Regulatory Guide 1.109 (NRC 1977)

(b) Value given is time after milking or slaughter. For the portion of the time animals were fed stored food, an additional 90 days was added to the holdup time.

SOURCE TERMS

The doses were estimated using the measured releases as reported by the site operators for 1986 (Tichler, et al. 1988).^(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-3. 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.

(a) Very shortlived 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-3. 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	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			

METEOROLOGY

When more than one set of meteorological (joint frequency) data was available for a site, the one which appeared to be the most reliable was used to generate atmospheric transport factors. Factors were calculated for 16 compass points and for ten radii from 2 to 80 km (see Table A-4) using the NRC computer program XOQDOQ (Sagendorf and Goll 1977).

TABLE A-4. Radius Intervals and Midpoints for Airborne Dose Calculations (km)

<u>Interval</u>	<u>Midpoint</u>
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, which 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 airborne releases using methods similar to the NRC GASPARG program (Eckerman et al. 1980). The transport factors used this year were the same as those used for the previous estimates. The assumptions used in the calculation of these transport factors were as follows:

- 30-m source height with no correction for plume rise or building wake effects

- semi-infinite cloud model with sector-average, Gaussian-plume dispersion
- no correction for terrain height variation.

Since information about height and locations at each site for the releases given in Tichler, et al. (1988) was unavailable, a single generic height of 50 m was used at each site for the release point. Because the heights and locations of releases are uncertain, estimates of dose to persons living within 2 km of the site could be in serious error; only persons living between 2 to 80 km from the site were included in the dose estimates.

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 (Brauner 1982) and D. P. Cleary.^(a) Population variations between 1980 and 1986 (population factors) were derived from census data (U. S. Bureau of the Census 1987).

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.

(a) Letter from D. P. Cleary, U.S. Nuclear Regulatory Commission, to D. A. Baker, Pacific Northwest Laboratory, June 1987.

DRINKING WATER

The population between 2 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 Table A-1.

The radionuclide concentration in the drinking water consumed by a population downstream from a site was usually estimated assuming 100% mixing of the plant effluent with the river. For lakes, an overall dilution factor was estimated from dilution factors given in the ES for each population center along the shore (within 80 km) that consumes the contaminated lake water. These individual factors were weighted by population and averaged to obtain an effective dilution factor for the total population exposed to contaminated drinking water.

AQUATIC FOOD

Wherever possible, the fish-catch data from the plant ES 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 were considered unrealistic, the generic values of Table A-1 were used.

The average radionuclide concentration of the waters in which this food was harvested was estimated 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, 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 yielded no values for these parameters. Invertebrates were not assumed to be caught in sufficient quantity at freshwater sites (river and lake) to affect the population dose and therefore were not included in the dose calculation. Any exceptions to these general guidelines are explained in the footnotes to the individual site summaries.

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13. ABSTRACT (200 words or less) <p>Population radiation dose commitments have been estimated from reported radionuclide releases from commercial power reactors operating during 1986. Fifty-year dose commitments from a one-year exposure were calculated from both liquid and atmospheric releases for four population groups (infant, child, teen-ager and adult) residing between 2 and 80 km from each of 66 sites. This report tabulates the results of these calculations, showing the dose commitments for both liquid and airborne pathways for each age group and organ. Also included for each of the sites is a histogram showing the fraction of the total population within 2 to 80 km around each site receiving various average dose commitments from the airborne pathways.</p> <p>The total dose commitments (from both liquid and airborne pathways) for each site ranged from a high of 31 person-rem to a low of 0.0007 person-rem for the sites with plants operating throughout the year with an arithmetic mean of 1.7 person-rem. The total population dose for all sites was estimated at 110 person-rem for the 140 million people considered at risk.</p> <p>The site average individual dose commitment from all pathways ranged from a low of 2×10^{-6} mrem to a high of 0.02 mrem. No attempt was made in this study to determine the maximum dose commitment received by any one individual from the radionuclides released at any of the sites.</p>										
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