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PNL-3324

Population Dose Commitments Due to Radioactive Releases from Nuclear Power Plant Sites in 1977

Prepared by D. A. Baker

Pacific Northwest Laboratory
Operated by
Battelle Memorial Institute

Prepared for
U.S. Nuclear Regulatory Commission

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Prepared for
Division of Technical Support
Office of Management and Program Analysis
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555
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ABSTRACT

Population radiation dose commitments have been estimated from reported radionuclide releases from commercial power reactors operating during 1977. 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 site. 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 site 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 commitment from both liquid and airborne pathways ranged from a high of 220 person-rem to a low of 0.003 person-rem with an arithmetic mean of 16 person-rem. The total population dose for all sites was estimated at 700 person-rem for the 92 million people considered at risk.

The average individual dose commitment from all pathways on a site basis ranged from a low of 2×10^{-5} mrem to a high of 0.1 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.

CONTENTS

INTRODUCTION

The Pacific Northwest Laboratory (PNL) is operated by Battelle Memorial Institute for the Department of Energy (DOE). This study, sponsored by the Nuclear Regulatory Commission (NRC) and conducted at PNL, estimates radiation dose commitments from reported radionuclide releases at 60 commercial power reactors operating during 1977. This work is a continuation of the study done for 1975 and 1976 releases (Baker, Soldat and Watson 1977, Baker 1979). In this study, as in the last, we estimated the population (collective) dose commitment[a] 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

TABLE 1. Organs Considered in This Study

Organs Affected by Airborne Releases	Organs Affected by Waterborne Releases
Total body	Total body
Thyroid	Thyroid
Bone	Bone
GI tract	GI tract
Liver	Liver
Lung	

TABLE 2. Pathways Considered in This Study by Which Radionuclides Travel from Reactors to Persons

Pathways for Airborne Releases	Pathways for Waterborne Releases
Air submersion	Ingestion of drinking water
Contaminated ground	Ingestion of fish and invertebrates
Inhalation	
Ingestion of food crops and animal products	

(a) As used in this report, dose commitment describes the total-body dose equivalent received over 50 years from intake during the year 1977.

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. This was because we have found from past experience that the doses from these pathways is generally much smaller than the doses from the pathways considered in this study.

The regional population for which we estimated doses included those persons estimated to be living in a region between 2 and 80 km around the reactor sites during 1977. We estimated the numbers of persons by extrapolating Bureau of Census data for 1970 to 1977. 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's Office of Nuclear Reactor Regulation. To calculate the doses, we used models approved by the NRC. We incorporated these models into two small computer codes to expedite the dose calculations involved for each site.

Site-specific parameters other than releases, meteorology and population were obtained from environmental statements for the various reactors when available (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 region, and dilution factors for drinking water and aquatic foods.

The reactors included in this study, their type, licensed thermal power rating and net electrical output for 1977 are listed in Table 4. Those reactors which had an operating augmented gaseous radioactive waste system in 1977 are identified in the table. Populations at risk and the dose commitments derived in this study are also tabulated.

SITE-DEPENDENT PARAMETERS

The section entitled Site Summaries gives the location (including latitude and longitude) for each reactor site and the estimated 1977 population within 2 to 80 km around the site. This population is derived from the 1970 census by extrapolation to 1977. In addition, the location of major metropolitan centers within 80 km are listed along with their 1977 extrapolated populations. The populations of the Standard Metropolitan Statistical Areas (SMSA) are given where applicable. Next, 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 location of the meteorological station used in the acquisition of diffusion climatology data is indicated, along with the percent data recovery and period of record.

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

Site Number	Reactor Site	Docket Number	Date	Remarks
1	Big Rock Point			ES[a] not available
2	Brown's Ferry 1, 2, 3		Jul 71	ES published by Tennessee Valley Authority
3	Cooper Station	50-298	Feb 73	Draft ES
4	Dresden 1			ES of Dresden 2, 3 used
4	Dresden 2, 3	50-237, 50-249	Nov 73	
5	Beaver Valley 1	50-334	Jul 73	
6	Humboldt Bay			ES not available
7	LaCrosse	50-409	Jun 76	Draft ES
8	Millstone Point 1, 2	50-245, 50-336	Jun 73	
9	Monticello	50-263	Nov 72	
10	Nine Mile Point 1	50-220	Jan 74	
11	Oyster Creek	50-219	Dec 74	
12	Peach Bottom 2, 3	50-277, 50-278	Apr 73	
13	Pilgrim 1	50-293	May 72	
14	Quad Cities 1, 2	50-254, 50-265	Sep 72	
15	Vermont Yankee	50-271	Jul 72	
16	St. Lucie	50-335	Jun 73	
17	Brunswick 1, 2	50-324, 50-325	Jun 73	Draft ES
18	Duane Arnold	50-331	Mar 73	
19	J. A. Fitzpatrick	50-333	Mar 73	
20	E. I. Hatch	50-321	Oct 72	
21	Arkansas 1	50-313	Feb 73	
22	Connecticut Yankee (Haddam Neck)	50-213	Oct 73	
23	Fort Calhoun	50-285	Aug 72	
24	H. B. Robinson	50-261	Apr 74	
25	Indian Point 1, 2	50-247	Sep 72	ES of Indian Point 2 used
26	Salem	50-272, 50-311	Apr 73	
27	Kewaunee	50-305	Dec 72	
28	Maine Yankee	50-309	Jul 72	
29	Oconee 1, 2, 3	50-269, 50-270 50-287	Mar 72	
30	Palisades	50-255	Jun 72	
31	Point Beach 1, 2	50-266, 50-301	May 72	
32	Prairie Island 1, 2	50-282, 50-306	May 73	
33	R. E. Ginna	50-244	Dec 73	
34	San Onofre 1	50-206	Oct 73	
35	Surry 1, 2	50-281	Jun 72	ES of Surry 2 used
36	Three Mile Island 1	50-289	Dec 72	
37	Turkey Point 3, 4	50-250, 50-251	Feb 72	Draft ES
38	Yankee Rowe			ES not available
39	Zion 1, 2	50-295,50-304	Dec 72	
40	Calvert Cliffs 1	50-317	Apr 73	
41	Cook 1	50-315	Aug 73	
42	Trojan	50-344	Jan 73	Draft ES
43	Rancho Seco	50-312	Mar 73	
44	Crystal River 3[b]	50-302	May 73	
45	Davis-Besse[b]	50-346	Mar 73	

(a) Environmental Statement
(b) Added for 1977

TABLE 4. Reactor Characteristics and Population Total Body Dose Commitments, 1977

Site	Unit	Type	Licensed Thermal Power (MW)	Electric Energy Generation 1977 (TW-hr)[a]	Boiling Water Reactor Augmented Radioactive Waste System (1977)	Population Dose Commitment (Person-rem) Liquid	Air	Total	Population At Risk	Average Individual Total Body Dose Commitment (mrem)
Arkansas	1	PWR[b]	2568	5.10	-	1.5	0.09	1.6	1.6E5	9.7E-3
Beaver Valley	1	PWR	2652	2.87	-	0.017	0.38	0.40	3.7E6	1.1E-4
Big Rock Point	1	BWR[c]	240	0.361	No	2.3	0.28	2.6	1.3E5	2.0E-2
Brown's Ferry	1	BWR	3293	5.04	Yes					
	2	BWR	3293	6.73	Yes					
	3	BWR	3293	5.85	Yes					
Brown's Ferry	TOTAL		9879	17.12		0.55	2.7	3.2	6.7E5	4.9E-3
Brunswick	1	BWR	2436	2.52	No					
	2	BWR	2436	2.44	No					
Brunswick	TOTAL		5877	4.96		0.066	6.3	6.4	1.9E5	3.4E-2
Calvert Cliffs	1	PWR	2700	4.88	-					
	2	PWR	2700	4.54	-					
Calvert Cliffs	TOTAL		5400	9.42		1.2	0.7	1.9	2.4E6	7.8E-4
Cook	1	PWR	3250	4.79	-	23	0.063	23	1.1E6	2.1E-2
Cooper Station	1	BWR	2381	4.54	Yes	---[d]	0.017	0.017	1.8E5	9.7E-5
Crystal River	1	PWR	2452	4.04	-	0.0072	0.014	0.021	2.2E5	9.5E-5
Davis-Besse	2	PWR	2772	0.43	-	14	0.0082	14	1.8E6	8.0E-3
Dresden	1	BWR	700	0.694	No					
	2	BWR	2527	3.53	No					
	3	BWR	2527	5.19	No					
Dresden	TOTAL		5754	9.41		0	180	180	6.4E6	2.8E-2
Duane Arnold	1	BWR	1658	9.32	Yes	0.0076	0.30	0.31	5.7E5	5.4E-4
J. A. Fitzpatrick	1	BWR	2436	3.89	Yes	0.015	0.54	0.56	8.3E5	6.7E-4
Fort Calhoun	1	PWR	1420	2.92	-	0.29	0.044	0.33	7.5E5	4.5E-4
R. E. Ginna	1	PWR	1520	3.03	-	0.082	0.056	0.14	1.2E6	1.2E-4
Haddam Neck	1	PWR	1825	4.01	-	0.23	2.2	2.4	3.4E6	7.3E-4
E. I. Hatch	1	BWR	2436	3.71	Yes	35	0.095	35	2.8E5	1.3E-1
Humboldt Bay	3	BWR	220	0	No	0.0018	---	0.0027	1.1E5	2.4E-5
Indian Point	1	PWR	615	0	-					
	2	PWR	2758	5.21	-					
	3	PWR	2760	5.52	-					
Indian Point	TOTAL		6133	10.73		0.88	12	13	1.6E7	8.0E-4
Kewaunee	1	PWR	1650	3.55	-	1.9	0.021	1.9	6.0E5	3.2E-3
LaCrosse	1	BWR	165	0.0893	No	7.8	1.6	9.4	3.3E5	2.8E-2
Maine Yankee	1	PWR	2440	5.14	-	0.0042	0.010	0.014	5.7E5	2.5E-5
Millstone Point	1	BWR	2011	4.82	No					
	2	PWR	2560	4.34	-					
Millstone Point	TOTAL		4571	9.16		0.024	220	220	2.5E6	8.8E-2

TABLE 4 (contd)

Monticello	1	BWR	1670	3.57	Yes	0	0.20	0.20	2.1E6	9.6E-5
Nine Mile Point	1	BWR	1850	2.95	No	3.0	0.098	3.1	8.3E5	3.7E-3
Oconee	1	PWR	2568	3.94	-					
	2	PWR	2568	3.83	-					
	3	PWR	2568	5.24	-					
Oconee	TOTAL		7704	13.01		37	0.69	38	7.4E5	5.1E-2
Oyster Creek	1	BWR	1930	3.25	No	0.011	41	41	3.3E6	1.2E-2
Palisades	1	PWR	2530	5.08	-	0.63	0.0015	0.63	1.0E6	6.2E-4
Peach Bottom	2	BWR	3293	4.02	Yes					
	3	BWR	3293	4.77	Yes					
Peach Bottom	TOTAL		6586	8.79		6.4	5.0	11	4.1E6	2.8E-3
Pilgrim	1	BWR	1998	2.65	Yes	0.093	52	52	4.4E6	1.2E-2
Point Beach	1	PWR	1518	3.69	-					
	2	PWR	1518	3.62	-					
Point Beach	TOTAL		3036	7.31		0.11	0.071	0.18	5.9E5	3.0E-4
Prairie Island	1	PWR	1650	3.71	-					
	2	PWR	1650	3.88	-					
Prairie Island	TOTAL		3300	7.59		0.27	0.32	0.59	2.1E6	2.8E-4
Quad Cities	1	BWR	2511	3.52	Yes					
	2	BWR	2511	4.37	Yes					
Quad Cities	TOTAL		5022	7.89		2.7	1.3	4.0	6.7E5	5.9E-3
Rancho Seco	1	PWR	2772	5.88	-	0	0.064	0.064	1.5E6	4.3E-5
H. B. Robinson	1	PWR	2200	4.23	-	0.45	0.024	0.47	6.4E5	7.5E-4
St. Lucie	1	PWR	2560	5.34	-	0.067	0.58	0.65	2.9E5	2.3E-3
Salem	1	PWR	3338	7.06	-	0.087	0.038	0.12	4.9E6	2.6E-5
San Onofre	1	PWR	1347	2.33	-	0.74	0.036	0.78	3.8E6	2.0E-4
Surry	1	PWR	2441	5.02	-					
	2	PWR	2441	4.46	-					
Surry	TOTAL		4882	9.48		2.4	1.3	3.7	1.8E6	2.1E-3
Three Mile Island	1	PWR	2535	5.46	-	0.28	1.7	2.0	1.8E6	1.1E-3
Trojan	1	PWR	3411	6.49	-	0.026	0.088	0.11	1.3E6	8.8E-5
Turkey Point	3	PWR	2200	4.47	-					
	4	PWR	2200	3.67	-					
Turkey Point	TOTAL		4400	8.14		0.02	0.38	0.40	2.1E6	2.0E-4
Vermont Yankee	1	BWR	1593	3.54	Yes	0.24	0.13	0.37	1.4E6	2.6E-4
Yankee Rowe	1	PWR	600	1.03	-	0.18	0.016	0.20	1.6E6	1.3E-4
Zion	1	PWR	3250	5.03	-					
	2	PWR	3250	6.28	-					
Zion	TOTAL		6500	11.31		13	9.5	22	7.0E6	3.2E-3
TOTAL FOR ALL SITES				246		160	540	700	9.2E7	---
Arithmetic Mean				5.5		3.5	12	16	2.0E6	1.1E-2
Geometric Mean				4.0		0.29	0.30	1.3	1.1E6	1.2E-3

(a) 1 TW-hr = 3.6E15 joules
(b) Pressurized water reactor
(c) Boiling water reactor
(d) Indicates dose commitment <0.001 person-rem.

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 1977 specified by Decker (1979). 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 1977 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.

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 liquid 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 partitioning the region around the site[a] 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 liquid 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 liquid pathways and airborne pathways varied widely over the 45 sites (60 reactors) studied. The total dose commitments (from both pathways) varied from a high of 220 to a low of 0.003 person-rem. The arithmetic mean for the dose from liquid pathways was 3 person-rem and the mean for the dose from airborne pathways was 12 person-rem (see Table 4).

Releases from Monticello, Rancho Seco and Dresden resulted in the smallest doses from liquid pathways (zero, zero, and near zero, respectively). This was because no liquid releases were reported for Monticello and Rancho Seco, and the receiving waters for the Dresden site are contaminated with Chicago sewage to such an extent as to severely limit use of this water for drinking or fishing. The largest liquid pathway doses to the total body calculated were 37 person-rem at Dconee and 35 person-rem at Hatch. These doses resulted primarily from the radioactive cesium (Cs-134 and Cs-137) released by these plants.

The lowest total airborne pathway dose to the total body was estimated for Palisades (0.0015 person-rem); while the highest were at Millstone Point (220 person-rem) and Dresden (180 person-rem). The major contributors to these doses were the noble gases: Kr-88 and Xe-135. The total population dose commitments from all sites for 1977 were estimated to be 160 person-rem via liquid pathways and 540 person-rem via the airborne pathways (Table 4). Compared to 1976, the "liquid dose" is higher (160 vs. 82); and also, the "air dose" is higher (540 vs. 390).

We should point out here, however, that the doses estimated in this study are extremely low compared to an average annual background dose of 0.1 rem,

(a) See Appendix for definition of segments.

and they are well within all limits. Even the highest site average individual dose commitment of 0.13 mrem (Table 4) from one site (Hatch) is well within any national limits.

Figure 1 shows graphically 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. Figure 2 is a histogram for all 45 sites taken together. We can see from this plot that about 25% of the total population at risk (92 million) would each receive a dose commitment of between 0.0003 and 0.001 mrem. We can see further that less than 0.5% receive a dose which is less than 1×10^{-6} mrem. Although not discernible from the plot, less than 0.01% received a dose of between 3 and 10 mrem. There were no average dose commitments greater than 10 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.

It should be noted that we have been comparing dose commitments calculated in this study with annual background. This comparison is not quite exact, since these dose commitments are those total-body doses received from the year's (1977) 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.

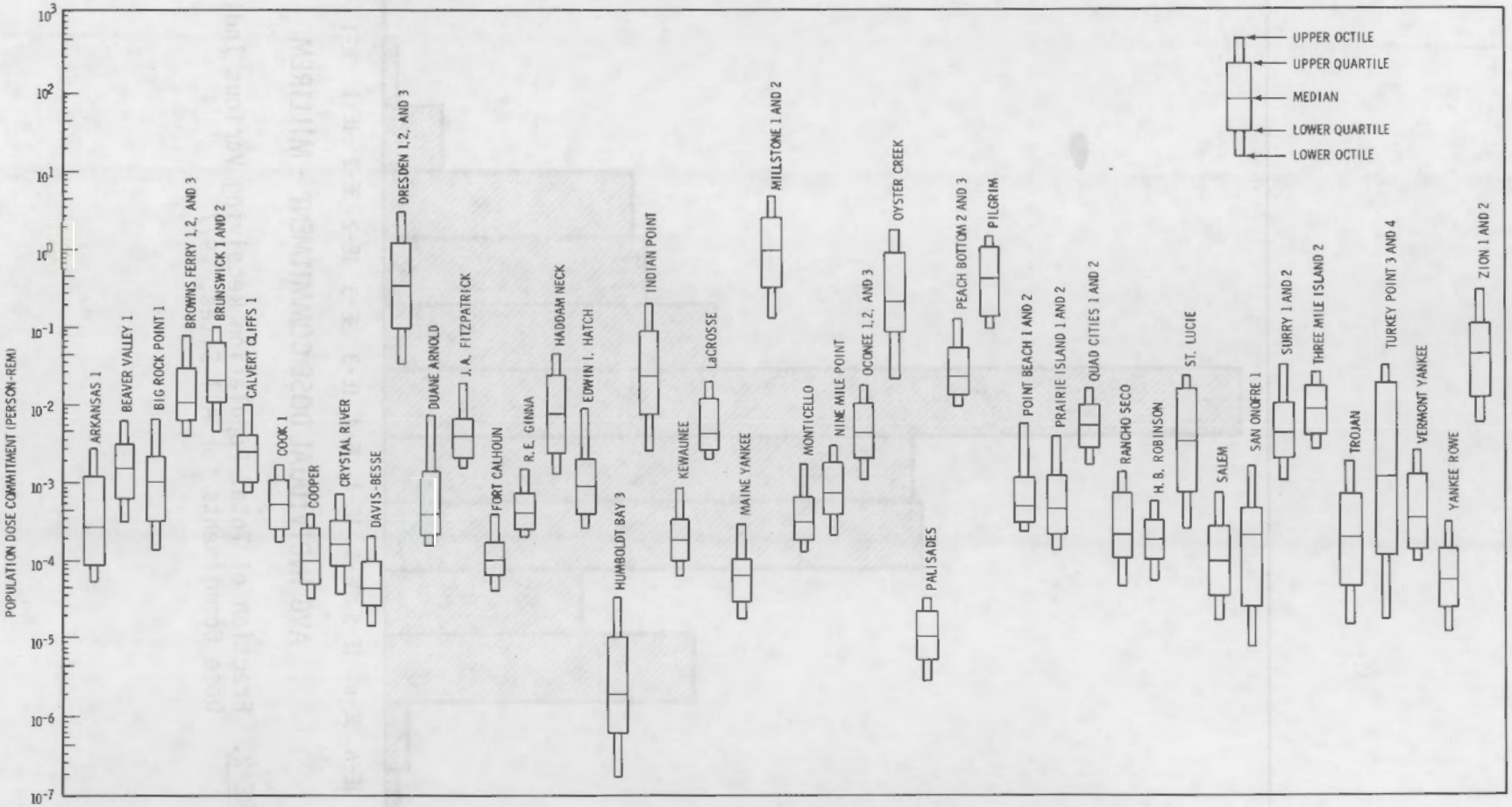


FIGURE 1. Airborne Population Dose Commitments for the Reactor Sites, 1977

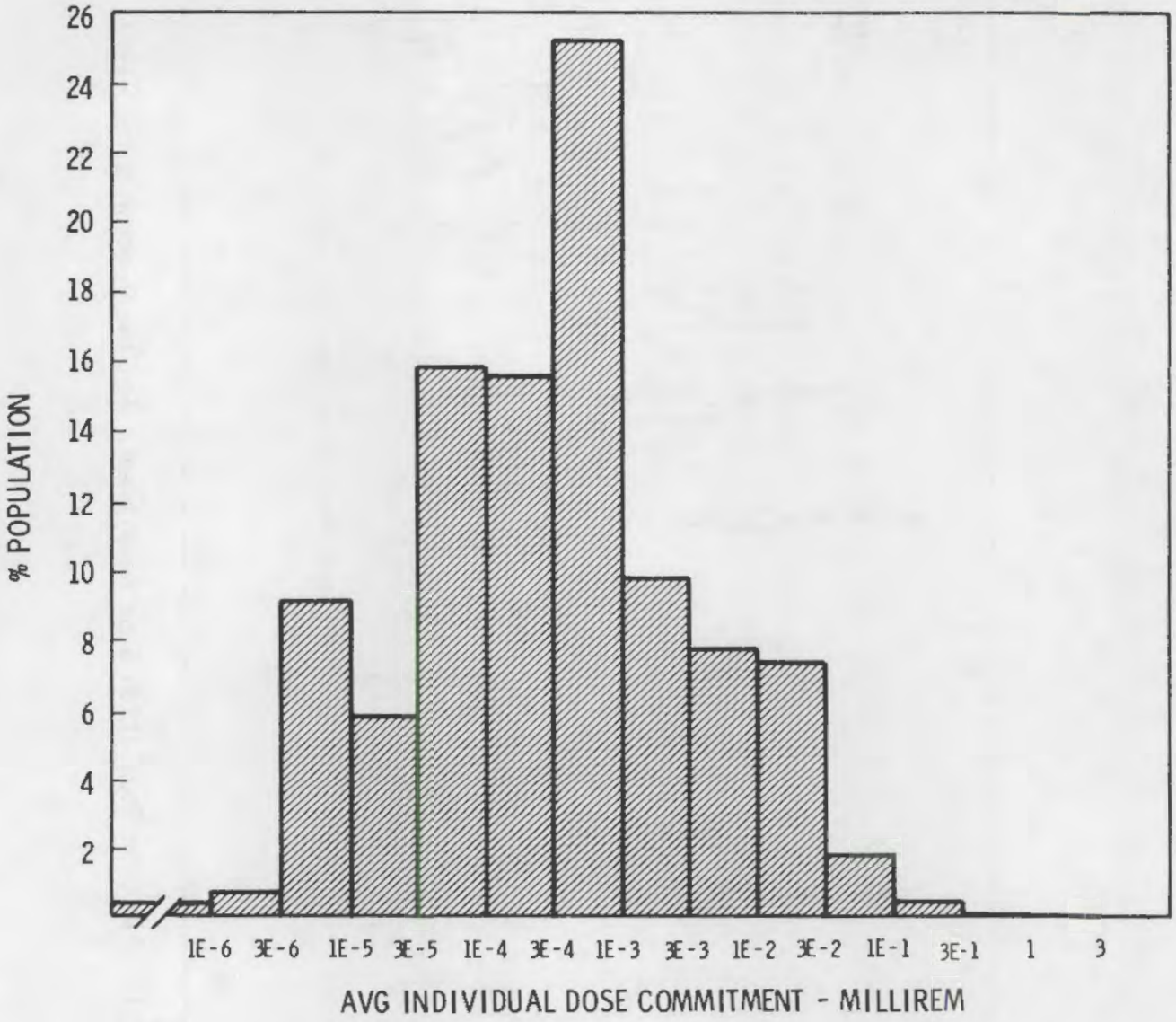


FIGURE 2. Fraction of Total Population Receiving Various Individual Dose Commitments for All Sites, 1977

SITE SUMMARIES

1977

Site ARKANSAS POPE COUNTY, ARKANSAS

Location N 35.3075° W 93.2308°

Total Population Within 2-to-80-km Region 1.6E5

Major Metropolitan Centers Within Region

Center	Population	Location
Russellville	13,000	10 km E
Conway	17,000	77 km ESE

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

Veg 5.8E6 kg Milk 4.8E7 ℓ Meat 7.2E7 kg

Regional Productivity Factor 1

Animal Grazing Factor 0.7

Location of Meteorological Station Site Recovery 97%

Period of Record 1 JAN 75 - 31 DEC 75

Average Arkansas River Flow at Site 36,000 ft^3/s

Drinking Water

Exposed Population None Dilution Factor

Fish

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

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

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

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	6.5E-02	1.0E-02	5.9E-03	3.2E-01	3.4E-01
Teen	1.2E-01	2.1E-02	4.3E-03	2.0E-01	2.9E-01
Adult	1.3E+00	1.8E-01	2.8E-02	1.2E+00	1.7E+00
TOTAL	1.5E+00	2.1E-01	3.8E-02	1.7E+00	2.4E+00

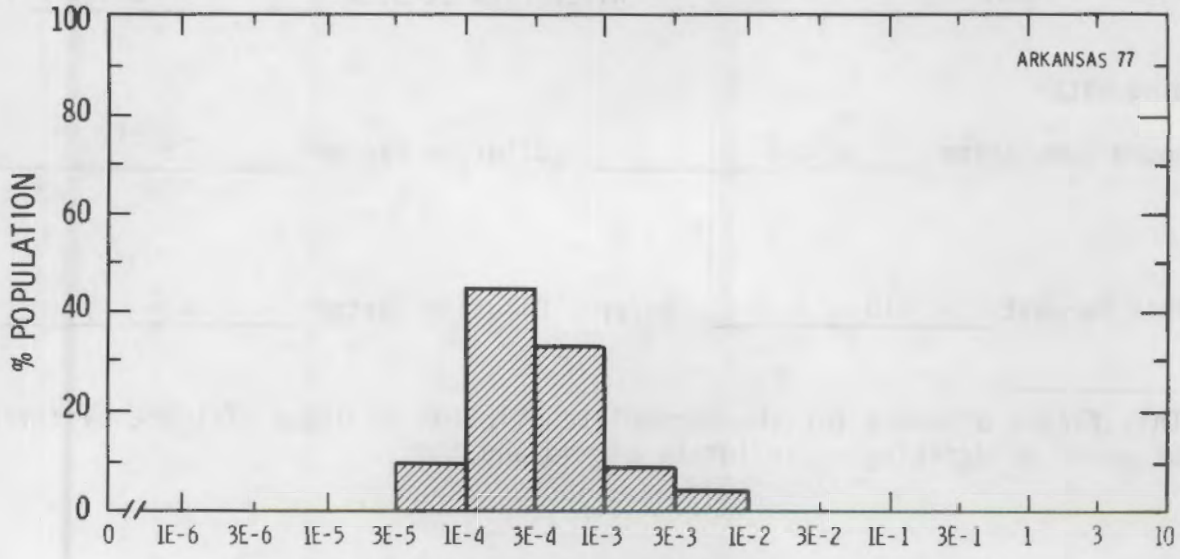
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.2E-03	1.2E-03	2.5E-03	1.1E-03	1.3E-03	1.3E-03
Child	1.5E-02	1.5E-02	2.2E-02	1.2E-02	1.5E-02	1.6E-02
Teen	1.1E-02	1.1E-02	1.4E-02	8.7E-03	1.1E-02	1.2E-02
Adult	6.4E-02	6.4E-02	7.4E-02	5.2E-02	6.4E-02	6.9E-02
TOTAL	9.0E-02	9.0E-02	1.1E-01	7.4E-02	9.0E-02	9.8E-02

Production/consumption factors:

Produce: <1 Milk: 2.2 Meat: 5.4

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



AVG INDIVIDUAL DOSE COMMITMENT - MILLIREM

Site BEAVER VALLEY SHIPPINGPORT, PENNSYLVANIA

Location N 40.6214° W 80.4347°

Total Population Within 2-to-80-km Region 3.7E6

Major Metropolitan Centers Within Region

Center	Population	Location
Pittsburg SMSA	2.41E6	32 km SE
Youngstown-Warren SMSA	539,000	56 km NNW
Steubenville	31,000	31 km SW
Wheeling	50,000	69 km SSW

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

Veg 5.3E7 kg Milk 5.3E8 ℓ Meat 5.4E7 kg

Regional Productivity Factor 1

Animal Grazing Factor 0.5

Location of Meteorological Station Site Recovery 92%

Period of Record 1 JAN 77 - 31 DEC 77

Average Ohio River Flow at Site 30,000 ft^3/s

Drinking Water

Exposed Population 6,400 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 Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	3.3E-04	2.8E-04	3.1E-04	1.9E-04	2.6E-04
Child	3.9E-03	3.6E-03	3.1E-03	2.9E-03	2.8E-03
Teen	1.4E-03	1.9E-03	1.2E-03	1.0E-03	1.1E-03
Adult	1.2E-02	1.7E-02	9.7E-03	8.2E-03	9.0E-03
TOTAL	1.7E-02	2.3E-02	1.4E-02	1.2E-02	1.3E-02

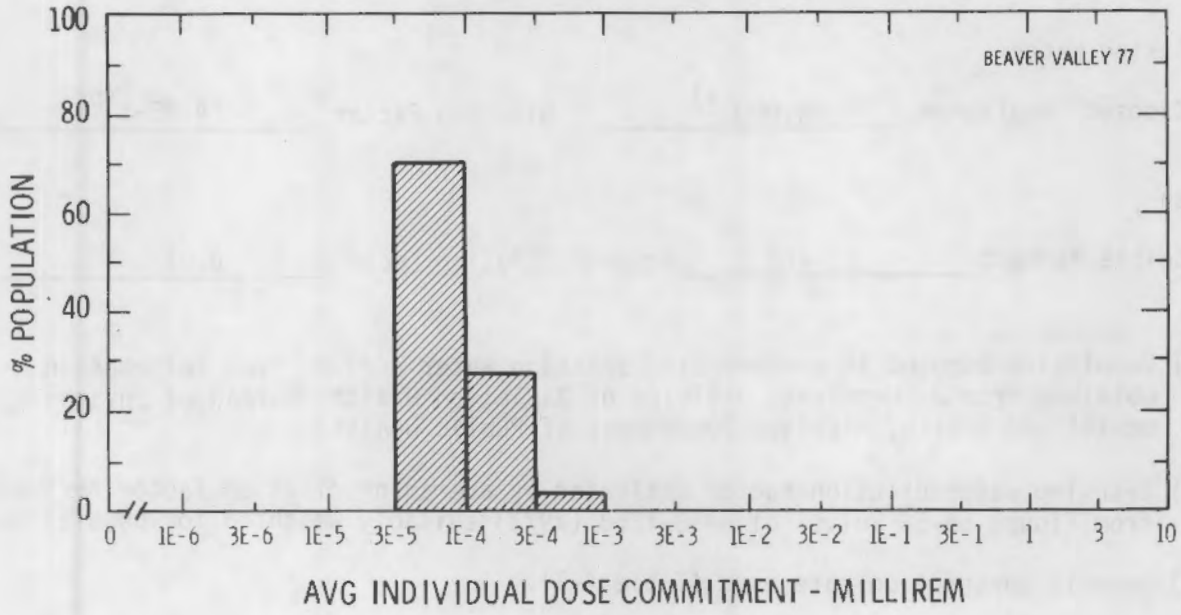
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	6.7E-03	6.7E-03	7.0E-03	5.9E-05	6.7E-03	6.7E-03
Child	7.9E-02	7.9E-02	8.0E-02	7.2E-04	7.9E-02	7.9E-02
Teen	4.9E-02	4.9E-02	4.9E-02	5.1E-04	4.9E-02	4.9E-02
Adult	2.5E-01	2.5E-01	2.5E-01	3.0E-03	2.5E-01	2.5E-01
TOTAL	3.8E-01	3.8E-01	3.9E-01	4.3E-03	3.8E-01	3.9E-01

Production/consumption factors:

Produce: <1 Milk: 1.1 Meat: <1

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE
TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site BIG ROCK POINT CHARLEVOIX COUNTY, MICHIGAN

Location N 45.3589° W 85.1958°

Total Population Within 2-to-80-km Region 1.3E5

Major Metropolitan Centers Within Region

Center	Population	Location
Traverse City	18,000	70 km SSW

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

Veg 6.9E7 kg Milk 2.9E8 ℓ Meat 4.5E7 kg

Regional Productivity Factor 0.5

Animal Grazing Factor 0.5

Location of Meteorological Station Site Recovery 85%

Period of Record 9 FEB 61 - 8 FEB 63

Average Water Dilution Flow from Plant 83 ft^3/s

Drinking Water

Exposed Population 24,000(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 Environmental 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 Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	5.2E-07	2.1E-07	1.2E-07	3.0E-06	3.7E-06
Child	9.6E-02	6.2E-03	2.5E-05	5.4E-01	5.8E-01
Teen	1.8E-01	1.3E-02	1.9E-05	3.2E-01	4.8E-01
Adult	2.0E+00	1.1E-01	1.4E-04	1.9E+00	2.9E+00
TOTAL	2.3E+00	1.3E-01	1.8E-04	2.7E+00	3.9E+00

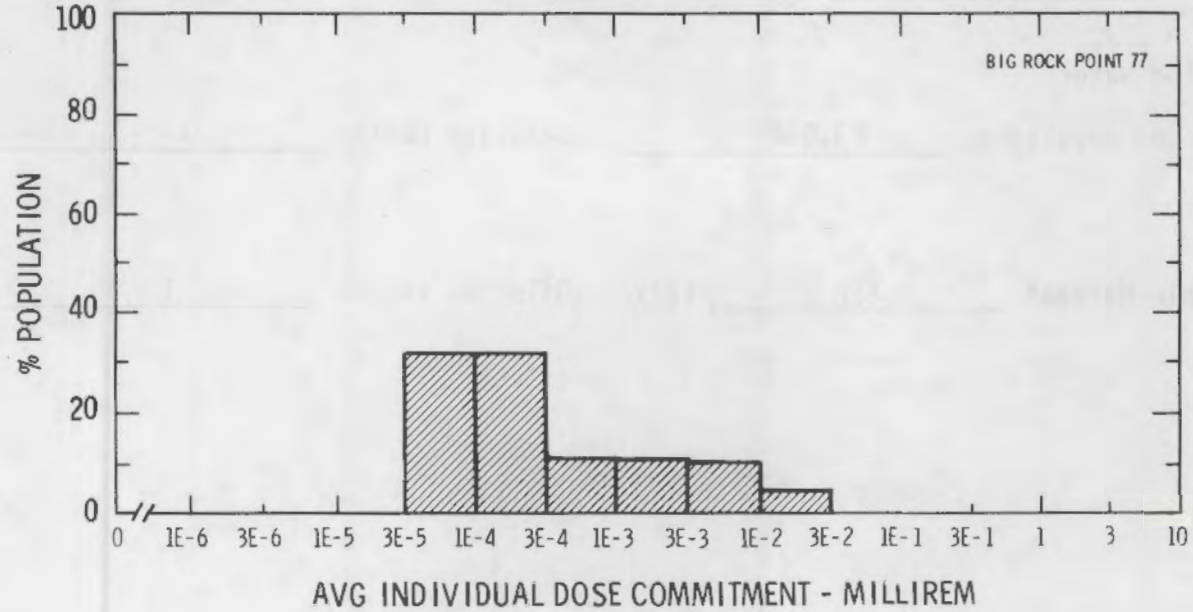
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	4.0E-03	4.0E-03	4.1E-03	4.0E-03	4.0E-03	4.1E-03
Child	4.4E-02	4.4E-02	4.6E-02	4.4E-02	4.4E-02	4.6E-02
Teen	3.2E-02	3.2E-02	3.3E-02	3.2E-02	3.2E-02	3.4E-02
Adult	2.0E-01	2.0E-01	2.0E-01	2.0E-01	2.0E-01	2.0E-01
TOTAL	2.8E-01	2.8E-01	2.8E-01	2.8E-01	2.8E-01	2.9E-01

Production/consumption factors:

Produce: 1.4 Milk: 8.5 Meat: 2.2

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE
TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site BROWNS FERRY DECATUR, ALABAMA

Location N 34.7036° W 87.1211°

Total Population Within 2-to-80-km Region 6.7E5

Major Metropolitan Centers Within Region

Center	Population	Location
Decatur	40,000	16 km SE
Huntsville	150,000	48 km E

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

Veg 1.7E7 kg Milk 5.7E7 ℓ Meat 8.6E7 kg

Regional Productivity Factor 1

Animal Grazing Factor 0.7

Location of Meteorological Station Site Recovery 94%

Period of Record 1 JAN 74 - 31 DEC 75

Average Tennessee River Flow at Site 45,000 ft^3/s

Drinking Water

Exposed Population 23,000 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 & 3

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	4.1E-05	3.1E-05	1.5E-03	1.3E-04	9.6E-05
Child	3.4E-02	4.1E-02	2.0E-02	1.2E-01	1.4E-01
Teen	4.8E-02	8.6E-02	1.0E-02	7.1E-02	1.2E-01
Adult	4.7E-01	7.5E-01	6.7E-02	4.2E-01	7.0E-01
TOTAL	5.5E-01	8.8E-01	9.8E-02	6.1E-01	9.5E-01

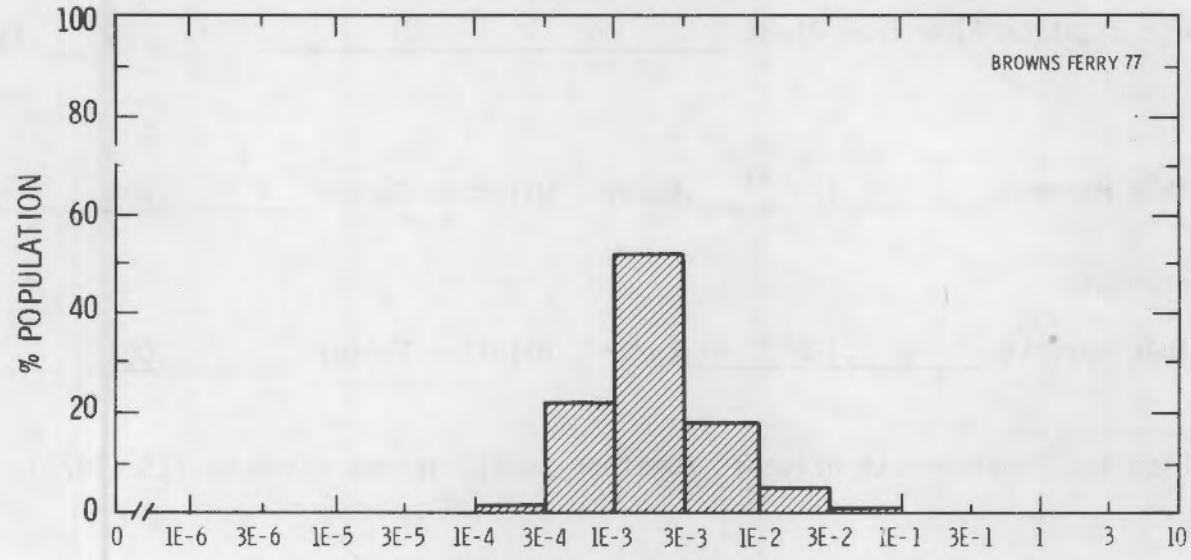
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	3.8E-02	3.8E-02	5.0E-02	3.8E-02	3.9E-02	4.2E-02
Child	4.3E-01	4.2E-01	5.0E-01	4.3E-01	4.3E-01	4.8E-01
Teen	3.1E-01	3.1E-01	3.4E-01	3.1E-01	3.1E-01	3.8E-01
Adult	1.9E+00	1.9E+00	2.0E+00	1.9E+00	1.9E+00	2.1E+00
TOTAL	2.7E+00	2.7E+00	2.9E+00	2.7E+00	2.7E+00	3.0E+00

Production/consumption factors:

Produce: <1 Milk: <1 Meat: 1.6

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE
TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site BRUNSWICK BRUNSWICK COUNTY, NORTH CAROLINA

Location N 33.9586° W 78.0208°

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

Major Metropolitan Centers Within Region

Center	Population	Location
Wilmington	51,000	32 km N

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

Veg 2.6E7 kg Milk 1.0E8 ℓ Meat 5.8E7 kg

Regional Productivity Factor 0.3

Animal Grazing Factor 0.7

Location of Meteorological Station Site Recovery 93%

Period of Record 1 JAN 75 - 31 DEC 75

Average Dilution Flow from Plant 250 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 INOIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
BRUNSWICK 1 & 2

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	1.1E-02	1.0E-02	7.4E-03	9.2E-03	1.9E-02
Teen	7.6E-03	2.1E-02	5.2E-03	5.9E-03	1.7E-02
Adult	4.7E-02	1.8E-01	3.4E-02	3.8E-02	1.0E-01
TOTAL	6.6E-02	2.2E-01	4.7E-02	5.3E-02	1.4E-01

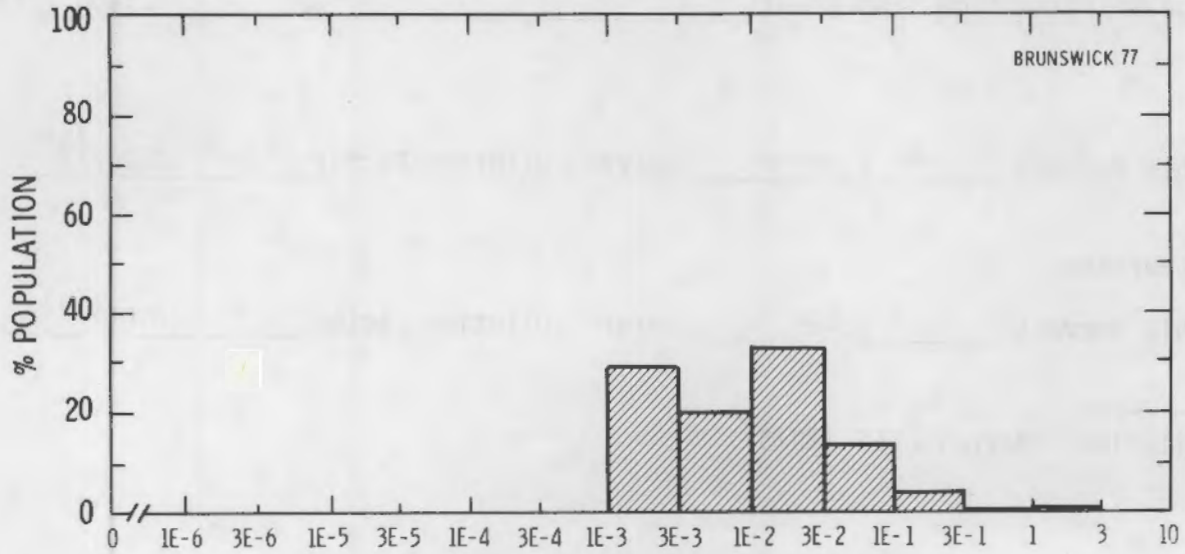
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	9.0E-02	9.0E-02	1.8E-01	9.3E-02	9.0E-02	9.2E-02
Child	1.0E+00	1.0E+00	1.6E+00	1.1E+00	1.0E+00	1.0E+00
Teen	7.4E-01	7.3E-01	9.5E-01	7.9E-01	7.3E-01	7.8E-01
Adult	4.5E+00	4.4E+00	5.2E+00	4.7E+00	4.4E+00	4.6E+00
TOTAL	6.3E+00	6.2E+00	7.9E+00	6.7E+00	6.2E+00	6.5E+00

Production/consumption factors:

Produce: <1 Milk: 1.3 Meat: 1.2

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE
TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



AVG INDIVIDUAL DOSE COMMITMENT - MILLIREM

Site CALVERT CLIFFS LUSBY, MARYLAND

Location N 38.4272° W 76.4261°

Total Population Within 2-to-80-km Region 2.4E6

Major Metropolitan Centers Within Region

Center	Population	Location
Washington, DC SMSA (3/4)	2,300,000	75 km NW
Cambridge	12,000	32 km ENE
Annapolis	31,000	61 km N

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

Veg 4.5E7 kg Milk 5.0E8 ℓ Meat 6.2E7 kg

Regional Productivity Factor 0.6

Animal Grazing Factor 0.6

Location of Meteorological Station Site Recovery 96%

Period of Record 1 JAN 75 - 31 DEC 75

Average Dilution Flow from Plant 2,400 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

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	1.2E-01	1.6E+00	3.3E-01	2.2E-01	2.7E-01
Teen	1.2E-01	3.4E+00	2.4E-01	1.3E-01	2.3E-01
Adult	9.9E-01	3.0E+01	1.6E+00	8.0E-01	1.4E+00
TOTAL	1.2E+00	3.5E+01	2.1E+00	1.2E+00	1.9E+00

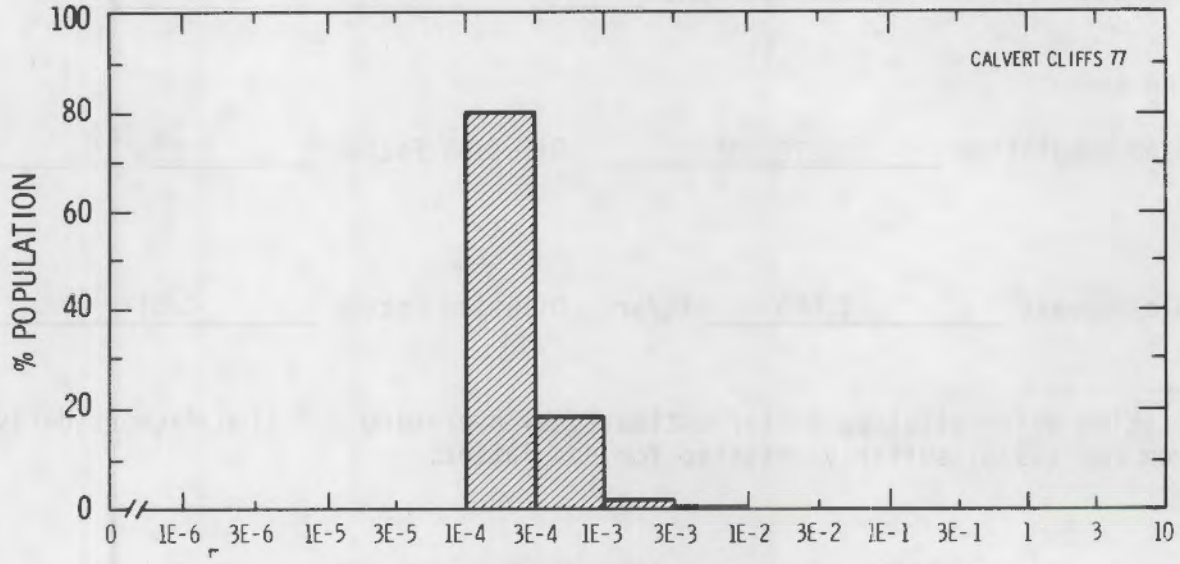
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.1E-02	1.0E-02	2.2E-01	9.7E-03	1.1E-02	1.2E-02
Child	1.2E-01	1.2E-01	1.2E+00	1.0E-01	1.2E-01	1.3E-01
Teen	8.3E-02	8.3E-02	5.1E-01	7.5E-02	8.4E-02	1.0E-01
Adult	4.9E-01	4.9E-01	1.8E+00	4.5E-01	4.9E-01	5.6E-01
TOTAL	7.0E-01	7.0E-01	3.8E+00	6.4E-01	7.1E-01	8.0E-01

Production/consumption factors:

Produce: <1 Milk: <1 Meat: <1

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site COOK BENTON HARBOR, MICHIGAN

Location N 41.9742° W 86.5667°

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

Major Metropolitan Centers Within Region

Center	Population	Location
Gary SMSA	650,000	80 km SW
South Bend SMSA	290,000	42 km SE
Benton Harbor	17,000	18 km NE

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

Veg 1.1E8 kg Milk 2.3E8 ℓ Meat 1.9E8 kg

Regional Productivity Factor 0.6

Animal Grazing Factor 0.5

Location of Meteorological Station Site Recovery 95%

Period of Record 1 MAY 75 - 31 APR 76

Average Water Dilution Flow from Plant 78 ft^3/s

Drinking Water

Exposed Population 270,000 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

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	3.0E-02	2.3E-02	8.8E-02	5.5E-02	1.0E-01
Child	1.2E+00	4.6E-01	7.1E-01	4.2E+00	5.5E+00
Teen	1.8E+00	5.1E-01	2.4E-01	2.4E+00	4.3E+00
Adult	2.0E+01	4.4E+00	1.8E+00	1.4E+01	2.6E+01
TOTAL	2.3E+01	5.4E+00	2.9E+00	2.1E+01	3.6E+01

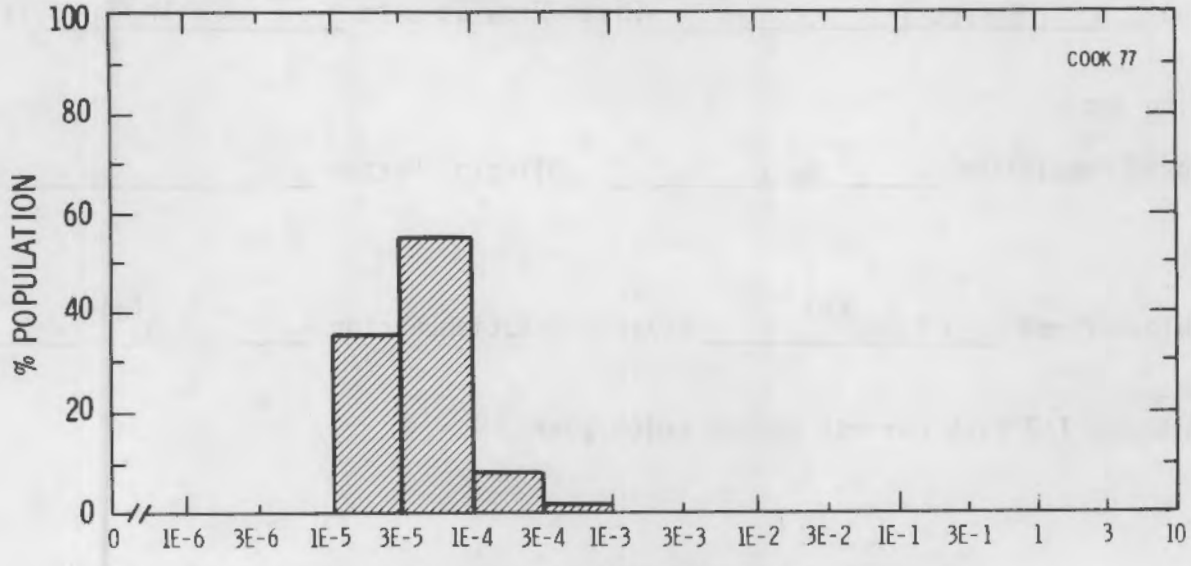
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	8.3E-04	7.1E-04	3.0E-02	1.5E-03	1.9E-03	9.7E-04
Child	9.8E-03	8.0E-03	2.1E-01	1.6E-02	1.8E-02	1.1E-02
Teen	7.5E-03	5.8E-03	8.2E-02	8.3E-03	1.0E-02	9.1E-03
Adult	4.4E-02	3.5E-02	2.9E-01	4.3E-02	4.8E-02	4.5E-02
TOTAL	6.3E-02	5.0E-02	6.1E-01	6.9E-02	7.8E-02	6.6E-02

Production/consumption factors:

Produce: <1 Milk: <1 Meat: 1.3

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site COOPER STATION NEMAHA COUNTY, NEBRASKA

Location N 40.3614° W 95.6378°

Total Population Within 2-to-80-km Region 1.8E5

Major Metropolitan Centers Within Region

Center	Population	Location
Shenandoah	6,000	58 km NNE

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

Veg 9.7E7 kg Milk 7.2E7 ℓ Meat 2.0E8 kg

Regional Productivity Factor 1

Animal Grazing Factor 0.6

Location of Meteorological Station Site Recovery 89%

Period of Record 1 MAR 70 - 31 DEC 75

Average Missouri River Flow at Site 31,000 ft^3/s

Drinking Water

Exposed Population None Dilution Factor

Fish

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

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

POPULATION DDSE-CDMMITMENT ESTIMATES AND AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR COOPER STATION

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	1.6E-05	1.0E-05	3.7E-06	7.6E-05	7.9E-05
Teen	2.7E-05	2.2E-05	2.6E-06	4.6E-05	6.8E-05
Adult	2.8E-04	2.0E-04	1.7E-05	2.7E-04	4.0E-04
TOTAL	3.2E-04	2.3E-04	2.4E-05	3.9E-04	5.5E-04

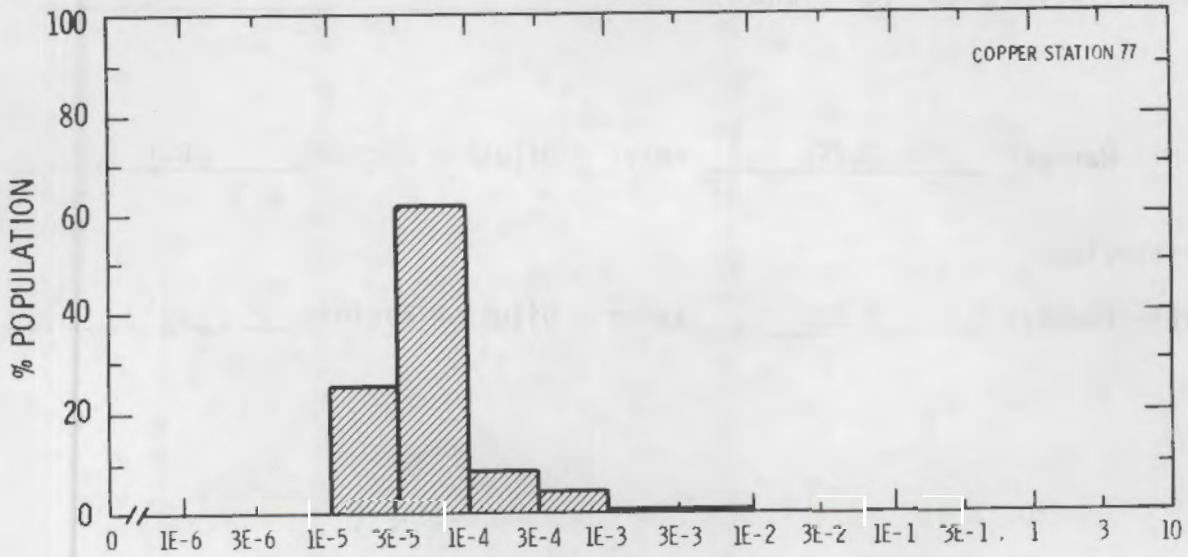
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	2.1E-04	2.1E-04	2.0E-03	1.8E-04	2.2E-04	2.2E-04
Child	3.0E-03	2.9E-03	2.0E-02	2.5E-03	3.0E-03	3.0E-03
Teen	2.0E-03	2.0E-03	8.7E-03	1.6E-03	2.0E-03	2.1E-03
Adult	1.2E-02	1.2E-02	3.5E-02	9.3E-03	1.1E-02	1.2E-02
TOTAL	1.7E-02	1.7E-02	6.7E-02	1.4E-02	1.7E-02	1.7E-02

Production/consumption factors:

Produce: 2.8 Milk: 3.1 Meat: 14

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site CRYSTAL RIVER CRYSTAL RIVER, FLORIDA

Location N 28.9567° W 82.6980°

Total Population Within 2-to-80-km Region 2.2E5

Major Metropolitan Centers Within Region

Center	Population	Location
Ocala	29,000	63 km ENE

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

Veg 2.8E7 kg Milk 1.1E8 ℓ Meat 7.2E7 kg

Regional Productivity Factor 0.5

Animal Grazing Factor 1

Location of Meteorological Station Site Recovery 93%

Period of Record 1 JAN 75 - 31 DEC 75

Average Dilution Flow from Plant 244 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 Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	8.9E-04	1.3E-03	7.3E-03	5.0E-04	1.1E-03
Teen	7.4E-04	2.2E-03	5.2E-03	3.2E-04	9.3E-04
Adult	5.5E-03	1.9E-02	3.5E-02	2.0E-03	6.4E-03
TOTAL	7.2E-03	2.3E-02	4.7E-02	2.8E-03	8.4E-03

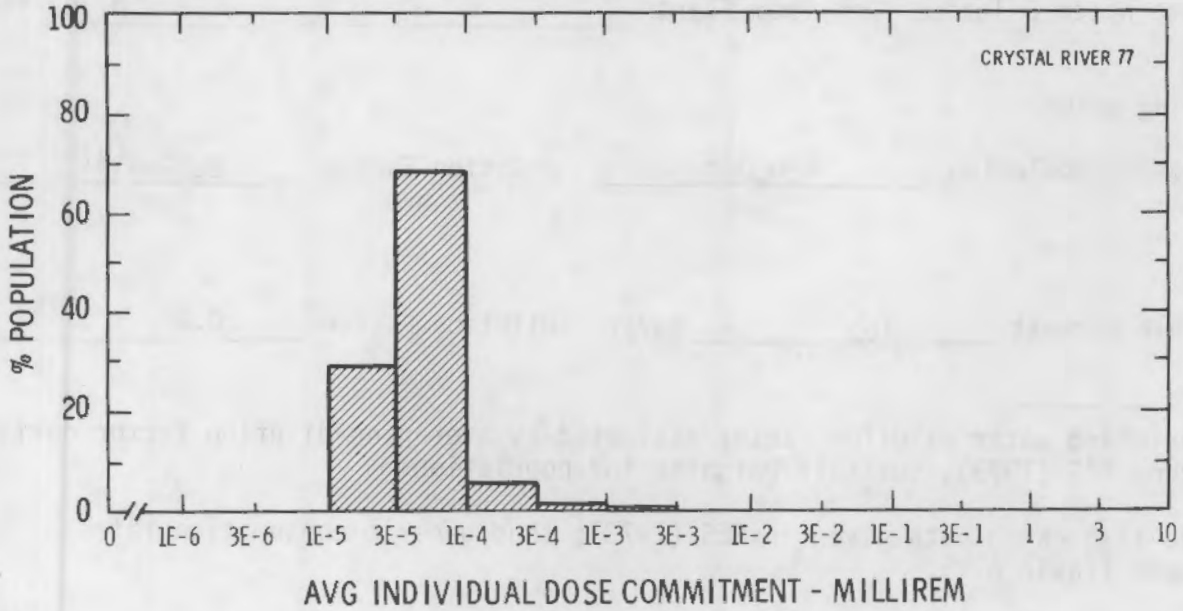
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	2.0E-04	2.0E-04	5.3E-04	1.3E-04	2.0E-04	2.1E-04
Child	2.6E-03	2.6E-03	4.5E-03	1.4E-03	2.6E-03	2.7E-03
Teen	1.7E-03	1.7E-03	2.4E-03	1.0E-03	1.7E-03	1.9E-03
Adult	1.0E-02	1.0E-02	1.2E-02	6.3E-03	1.0E-02	1.0E-02
TOTAL	1.4E-02	1.5E-02	2.0E-02	9.0E-03	1.5E-02	1.5E-02

Production/consumption factors:

Produce: <1 Milk: 1.9 Meat: 2.0

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site DAVIS-BESSE PORT CLINTON, OHIO

Location N 41.5947° W 83.0864°

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

Major Metropolitan Centers Within Region

Center	Population	Location	
Toledo	380,000	37 km	WNW
Sandusky	33,000	35 km	ESE
Findlay	36,000	77 km	SW
Dearborn	100,000	80 km	N

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

Veg 6.9E7 kg Milk 3.7E8 ℓ Meat 1.2E8 kg

Regional Productivity Factor 0.5

Animal Grazing Factor 0.5

Location of Meteorological Station Site Recovery 99%

Period of Record 4 AUG 74 - 3 AUG 76

Average Water Dilution Flow from Plant 0.707 ft^3/s

Drinking Water

Exposed Population 450,000 Dilution Factor 2.0E-4(a)

Fish

Edible Harvest (b) kg/yr Dilution Factor 0.01

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

(b) No fish catch data given in FES (1973); thus generic consumption rates used (Table A-1).

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

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	1.3E-03	8.6E-04	1.3E-03	2.1E-03	8.7E-04
Child	1.0E+00	7.1E-01	9.6E-02	3.9E+00	2.4E+00
Teen	1.2E+00	1.4E+00	6.8E-02	2.7E+00	2.1E+00
Adult	1.1E+01	1.3E+01	4.7E-01	1.8E+01	1.2E+01
TOTAL	1.4E+01	1.5E+01	6.4E-01	2.5E+01	1.7E+01

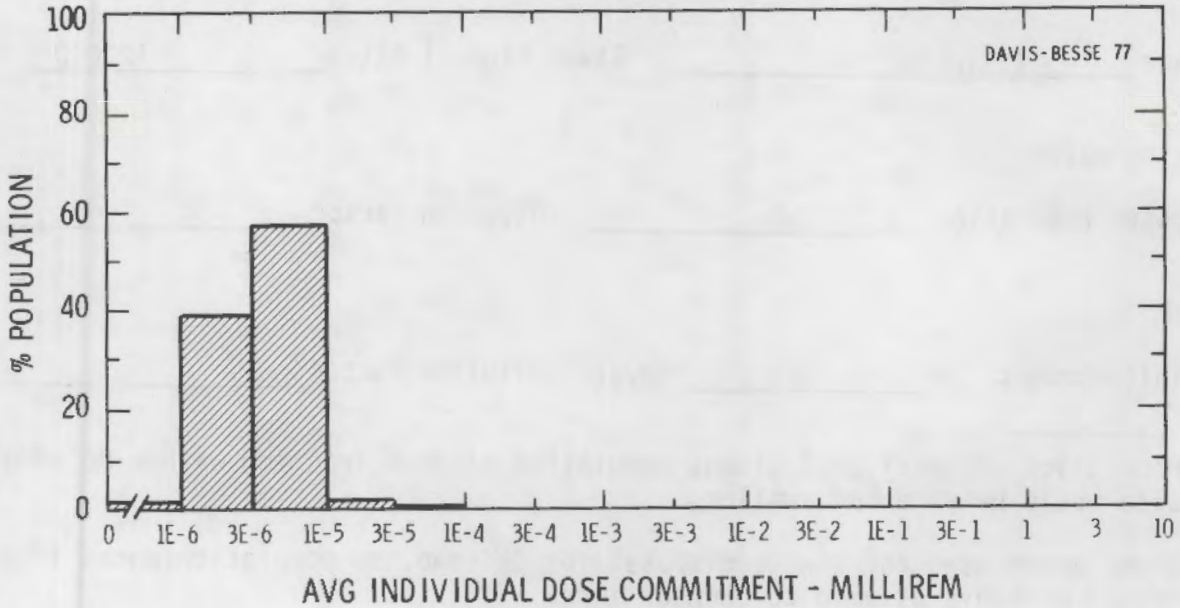
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.2E-04	1.2E-04	1.3E-04	1.2E-04	1.2E-04	1.5E-04
Child	1.3E-03	1.3E-03	1.4E-03	1.5E-03	1.3E-03	1.8E-03
Teen	9.6E-04	9.4E-04	9.8E-04	1.0E-03	9.6E-04	1.6E-03
Adult	5.8E-03	5.7E-03	5.8E-03	6.0E-03	5.7E-03	7.8E-03
TOTAL	8.2E-03	8.0E-03	8.3E-03	8.6E-03	8.1E-03	1.1E-02

Production/consumption factors:

Produce: <1 Milk: <1 Meat: <1

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site DRESDEN GRUNDY COUNTY, ILLINOIS

Location N 41.3897° W 88.2714°

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

Major Metropolitan Centers Within Region

Center	Population	Location	
Chicago SMSA	7,000,000[a]	72 km	NE
Gary-Hammond-E. Chicago-SMSA	640,000[a]	80 km	ENE
Joliet	80,000	24 km	NE
Aurora	75,000	43 km	N
Elgin	56,000	74 km	N

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

Veg 1.1E8 kg Milk 1.8E8 ℓ Meat 1.9E8 kg

Regional Productivity Factor 1

Animal Grazing Factor 0.5

Location of Meteorological Station Site Recovery 77%

Period of Record 1 JAN 74 - 31 JAN 75

Average Illinois River Flow at Site 12,000 ft^3/s

Drinking Water

Exposed Population (b) Dilution Factor -

Fish

Edible Harvest (b) kg/yr Dilution Factor -

(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 & 3

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	1.4E+00	3.3E-01	2.6E-01	7.7E+00	7.9E+00
Teen	2.6E+00	6.9E-01	1.9E-01	4.7E+00	6.6E+00
Adult	2.8E+01	6.0E+00	1.2E+00	2.7E+01	3.9E+01
TOTAL	3.2E+01	7.0E+00	1.7E+00	4.0E+01	5.4E+01

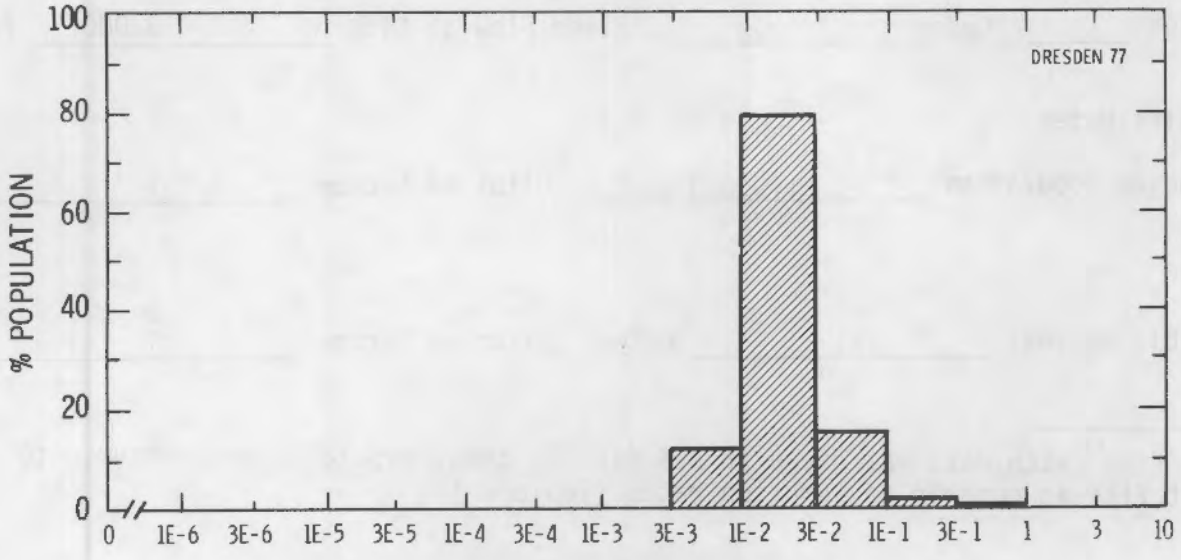
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	2.5E+00	2.5E+00	7.9E+00	2.6E+00	2.5E+00	2.7E+00
Child	2.8E+01	2.8E+01	7.8E+01	3.0E+01	2.8E+01	3.0E+01
Teen	2.1E+01	2.1E+01	4.5E+01	2.1E+01	2.1E+01	2.3E+01
Adult	1.2E+02	1.3E+02	2.3E+02	1.3E+02	1.2E+02	1.3E+02
TOTAL	1.8E+02	1.8E+02	3.6E+02	1.8E+02	1.8E+02	1.9E+02

Production/consumption factors:

Produce: <1 Milk: <1 Meat: <1

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE
TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site DUANE ARNOLD CEDAR RAPIDS, IOWA

Location N 42.0981° W 91.7725°

Total Population Within 2-to-80-km Region 5.7E5

Major Metropolitan Centers Within Region

Center	Population	Location	
Cedar Rapids	110,000	16 km	SE
Waterloo	77,000	66 km	NW
Iowa City	48,000	53 km	SSE

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

Veg 9.8E7 kg Milk 2.6E8 ℓ Meat 4.2E8 kg

Regional Productivity Factor 1

Animal Grazing Factor 0.5

Location of Meteorological Station Site Recovery 57%

Period of Record 1 FEB 71 - 31 DEC 75

Average Cedar River Flow at Site 3,000 ft^3/s

Drinking Water

Exposed Population 110,000 Dilution Factor 1

Fish

Edible Harvest (a) kg/yr Dilution Factor 1

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

POPULATION OOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
OUANE ARNOLO

Oose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	9.2E-06	8.8E-06	1.2E-04	5.2E-06	9.6E-06
Child	4.5E-04	2.3E-04	1.2E-03	9.6E-04	1.5E-03
Teen	6.3E-04	3.1E-04	5.0E-04	5.9E-04	1.3E-03
Adult	6.5E-03	2.8E-03	3.5E-03	3.7E-03	7.8E-03
TOTAL	7.6E-03	3.3E-03	5.3E-03	5.2E-03	1.1E-02

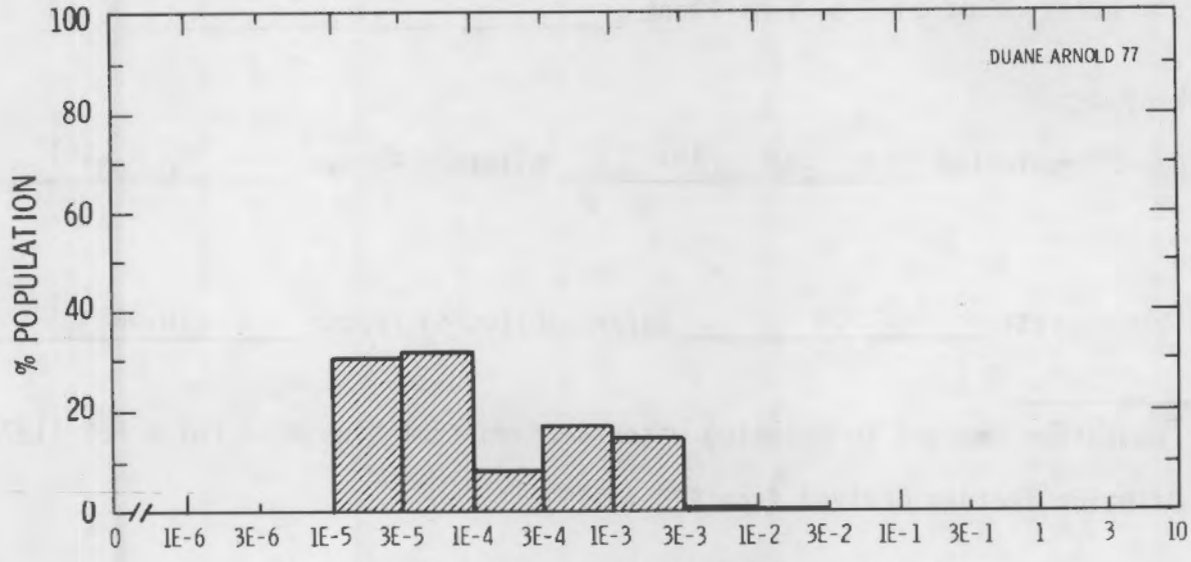
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	4.3E-03	4.3E-03	9.1E-03	4.3E-03	4.3E-03	4.4E-03
Child	4.8E-02	4.8E-02	9.7E-02	4.8E-02	4.9E-02	5.0E-02
Teen	3.5E-02	3.5E-02	5.5E-02	3.5E-02	3.5E-02	3.7E-02
Adult	2.1E-01	2.1E-01	2.9E-01	2.1E-01	2.1E-01	2.2E-01
TOTAL	3.0E-01	3.0E-01	4.5E-01	3.0E-01	3.0E-01	3.1E-01

Production/consumption factors:

Produce: <1 Milk: 3.4 Meat: 9.2

FRACTION OF POPULATION RECEIVING AN INOICATED AVERAGE
TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site J.A. FITZPATRICK OSWEGO, NEW YORK

Location N 43.5217° W 76.3980°

Total Population Within 2-to-80-km Region 8.3E5

Major Metropolitan Centers Within Region

Center	Population	Location
Syracuse SMSA	630,000	54 km SSE
Rome	50,000	80 km ESE
Auburn	34,000	66 km SSW

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

Veg 7.6E7 kg Milk 7.0E8 ℓ Meat 3.3E7 kg

Regional Productivity Factor 0.7

Animal Grazing Factor 0.5

Location of Meteorological Station Nine Mile Point Site Recovery 97%

Period of Record 1 JAN 74 - 31 DEC 75

Average Water Dilution Flow from Plant 610 ft^3/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 Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	1.2E-04	1.4E-04	3.2E-03	1.6E-04	2.7E-04
Child	2.5E-03	4.0E-03	2.3E-02	2.6E-03	4.6E-03
Teen	1.4E-03	5.6E-03	7.1E-03	1.0E-03	2.9E-03
Adult	1.1E-02	5.0E-02	5.0E-02	6.6E-03	1.8E-02
TOTAL	1.5E-02	6.0E-02	8.3E-02	1.0E-02	2.6E-02

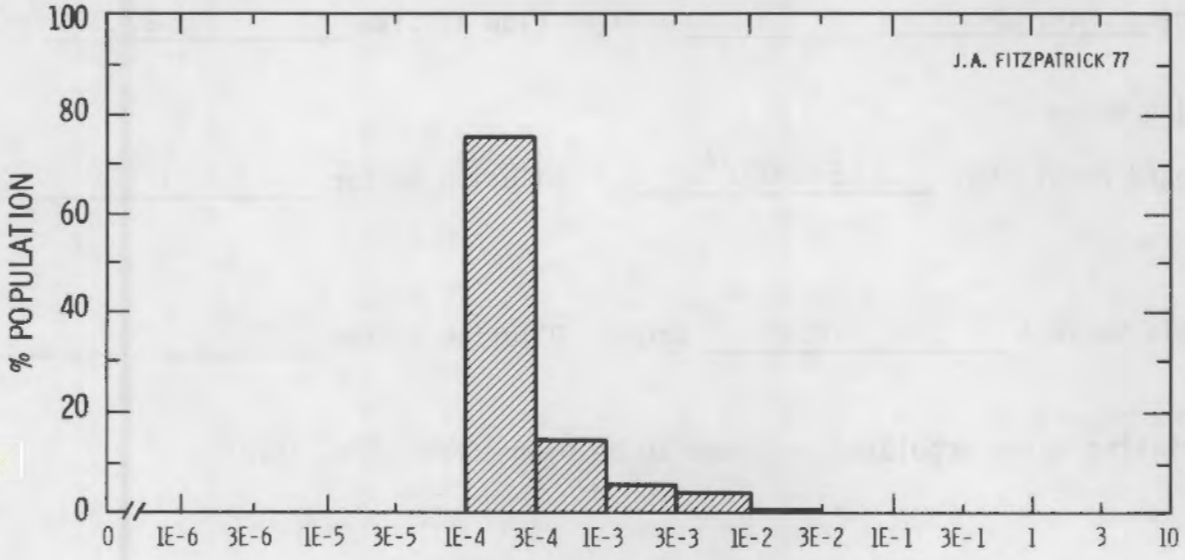
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	7.9E-03	7.8E-03	8.9E-02	8.0E-03	8.1E-03	8.1E-03
Child	8.8E-02	8.7E-02	6.3E-01	8.9E-02	8.9E-02	9.1E-02
Teen	6.4E-02	6.4E-02	2.6E-01	6.4E-02	6.4E-02	6.9E-02
Adult	3.8E-01	3.9E-01	1.0E+00	3.8E-01	3.9E-01	4.0E-01
TOTAL	5.4E-01	5.4E-01	2.0E+00	5.4E-01	5.5E-01	5.7E-01

Production/consumption factors:

Produce: <1 Milk: 4.5 Meat: <1

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE
TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site FORT CALHOUN WASHINGTON COUNTY, NEBRASKA

Location N 41.5200° W 96.0780°

Total Population Within 2-to-80-km Region 7.5E5

Major Metropolitan Centers Within Region

Center	Population	Location
Omaha SMSA	570,000	32 km SSE

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

Veg 9.7E7 kg Milk 7.2E7 ℓ Meat 2.0E8 kg

Regional Productivity Factor 1

Animal Grazing Factor 0.5

Location of Meteorological Station Site Recovery 98%

Period of Record 1 JAN 74 - 31 DEC 74

Average Missouri River Flow at Site 27,000 ft^3/s

Drinking Water

Exposed Population 570,000(a) Dilution Factor 1

Fish

Edible Harvest 1.0E4 kg/yr Dilution Factor 1

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

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

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	3.5E-03	2.9E-03	2.6E-02	5.0E-03	9.7E-03
Child	4.5E-02	3.4E-02	2.0E-01	5.6E-02	9.6E-02
Teen	2.3E-02	1.4E-02	6.2E-02	1.6E-02	3.7E-02
Adult	2.2E-01	1.2E-01	4.6E-01	9.8E-02	2.6E-01
TOTAL	2.9E-01	1.7E-01	7.4E-01	1.7E-01	4.0E-01

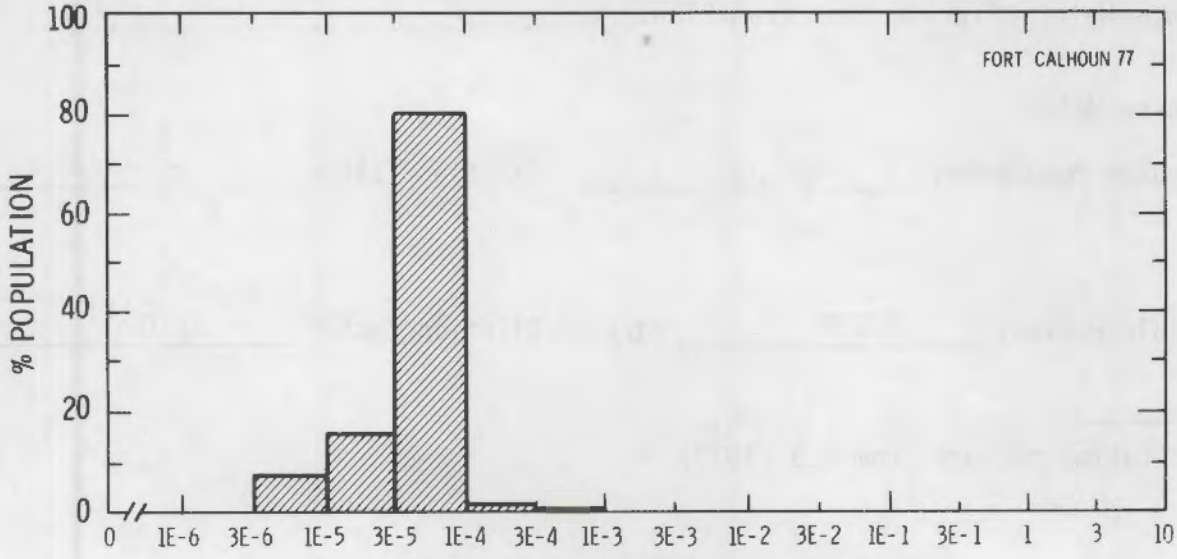
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	6.3E-04	6.3E-04	5.4E-03	6.3E-04	6.4E-04	6.7E-04
Child	7.1E-03	7.0E-03	5.5E-02	7.1E-03	7.2E-03	7.7E-03
Teen	5.2E-03	5.1E-03	2.4E-02	5.1E-03	5.2E-03	6.0E-03
Adult	3.1E-02	3.1E-02	9.9E-02	3.1E-02	3.1E-02	3.4E-02
TOTAL	4.4E-02	4.4E-02	1.8E-01	4.4E-02	4.4E-02	4.8E-02

Production/consumption factors:

Produce: <1 Milk: <1 Meat: 3.3

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE
TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site R. E. GINNA ONTARIO, NEW YORK

Location N 43.2772° W 77.3081°

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

Major Metropolitan Centers Within Region

Center	Population	Location
Rochester SMSA	940,000	34 km WSW
Auburn	34,000	64 km SE
Oswego	24,000	56 km ENE

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

Veg 7.6E7 kg Milk 7.0E8 ℓ Meat 3.3E7 kg

Regional Productivity Factor 0.6

Animal Grazing Factor 0.5

Location of Meteorological Station Site Recovery 89%

Period of Record 1 JAN 66 - 31 DEC 67 1 JAN 73 - 31 DEC 74

Average Water Dilution Flow from Plant 710 ft^3/s

Drinking Water

Exposed Population 540,000 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 Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	7.1E-04	6.9E-04	1.3E-03	2.3E-04	9.8E-04
Child	9.8E-03	8.6E-03	1.2E-02	1.2E-02	2.0E-02
Teen	6.5E-03	4.6E-03	4.3E-03	6.2E-03	1.2E-02
Adult	6.5E-02	3.9E-02	3.4E-02	3.6E-02	8.1E-02
TOTAL	8.2E-02	5.3E-02	5.2E-02	5.4E-02	1.1E-01

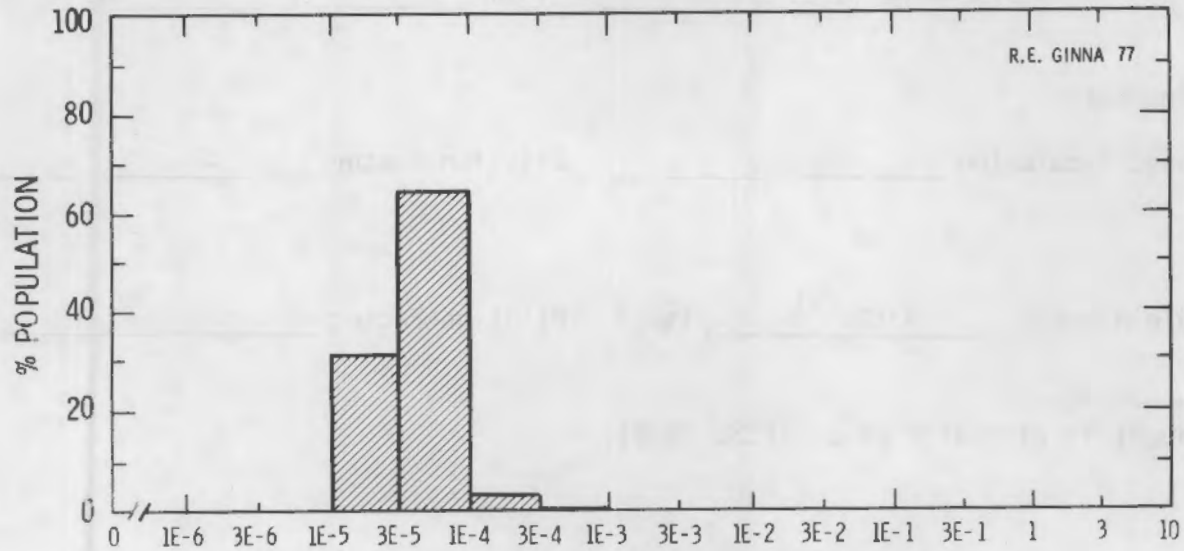
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	8.2E-04	8.0E-04	1.4E-02	6.6E-04	8.5E-04	8.6E-04
Child	9.5E-03	9.4E-03	9.1E-02	7.1E-03	9.7E-03	1.0E-02
Teen	6.6E-03	6.6E-03	3.8E-02	5.1E-03	6.7E-03	7.6E-03
Adult	3.9E-02	3.8E-02	1.4E-01	3.1E-02	3.9E-02	4.2E-02
TOTAL	5.6E-02	5.5E-02	2.9E-01	4.4E-02	5.6E-02	6.0E-02

Production/consumption factors:

Produce: <1 Milk: 2.8 Meat: <1

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE
TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site HADDAM NECK (CONN. YANKEE) HADDAM NECK, CONNECTICUT

Location N 41.4822° W 72.4989°

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

Major Metropolitan Centers Within Region

Center	Population	Location	
Hartford SMSA	830,000	37 km	NW
New Haven SMSA	760,000	40 km	WSW
Springfield SMSA	600,000	72 km	N
Waterbury	110,00	47 km	W

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

Veg 3.2E7 kg Milk 4.4E8 ℓ Meat 2.0E7 kg

Regional Productivity Factor 0.7

Animal Grazing Factor 0.6

Location of Meteorological Station Site Recovery 95%

Period of Record 1 JAN 75 - 31 DEC 75

Average Discharge Canal Flow 780 ft^3/s

Drinking Water

Exposed Population None Dilution Factor -

Fish

Edible Harvest 9.1E3(a) kg/yr Dilution Factor 1

(a) Caught in discharge canal (FES, 1973).

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

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	1.0E-02	7.1E-03	4.0E-02	4.8E-02	5.4E-02
Teen	1.9E-02	1.4E-02	2.9E-02	2.9E-02	4.6E-02
Adult	2.0E-01	1.2E-01	1.9E-01	1.7E-01	4.7E-01
TOTAL	2.3E-01	1.4E-01	2.6E-01	2.4E-01	3.7E-01

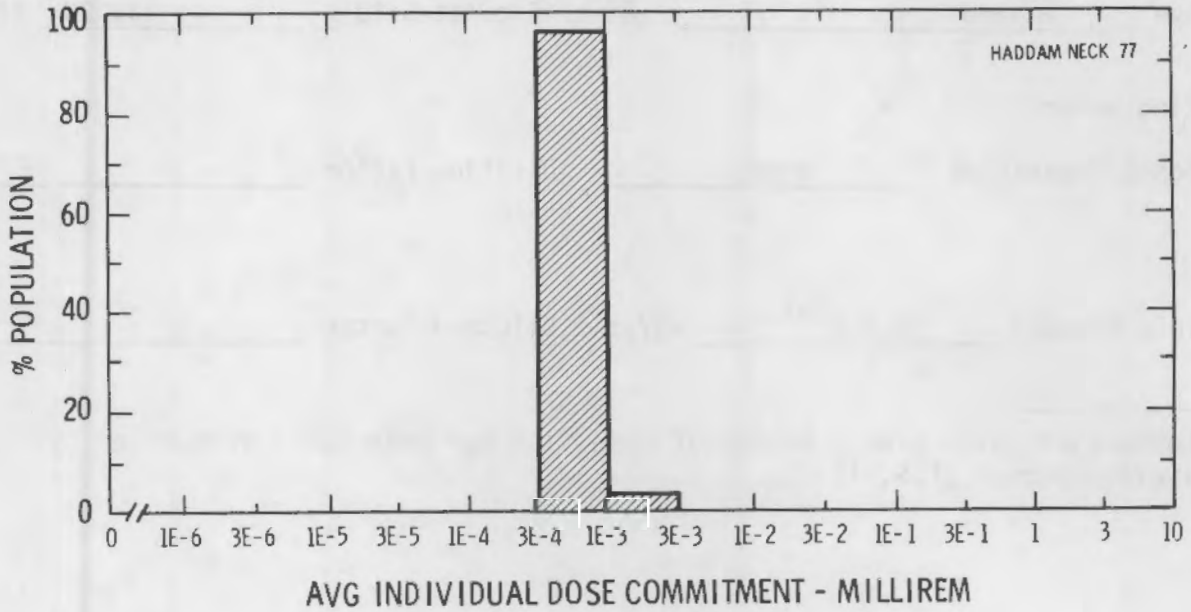
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.3E-01	1.3E-01	1.3E-01	5.8E-01	1.3E-01	1.3E-01
Child	8.4E-01	8.4E-01	8.5E-01	3.9E+00	8.4E-01	8.5E-01
Teen	2.9E-01	2.9E-01	2.9E-01	1.2E+00	2.9E-01	3.0E-01
Adult	9.8E-01	9.8E-01	9.9E-01	3.4E+00	9.8E-01	1.0E+00
TOTAL	2.2E+00	2.2E+00	2.3E+00	9.1E+00	2.2E+00	2.3E+00

Production/consumption factors:

Produce: <1 Milk: <1 Meat: <1

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE
TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site E. I. HATCH BAXLEY, GEORGIA

Location N 31.9344° W 82.3444°

Total Population Within 2-to-80-km Region 2.8E5

Major Metropolitan Centers Within Region

Center	Population	Location
Waycross	21,000	80 km S

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

Veg 8.8E6 kg Milk 7.0E7 ℓ Meat 8.1E7 kg

Regional Productivity Factor 1

Animal Grazing Factor 0.8

Location of Meteorological Station Site Recovery 87%

Period of Record 1 JUN 70 - 31 AUG 74

Average Altamaha River Flow at Site 13,000 ft^3/s

Drinking Water

Exposed Population None Dilution Factor -

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 (FES, 1972).

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INOIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
E. I. HATCH

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	1.9E+00	8.8E-01	2.6E-01	7.0E+00	8.4E+00
Teen	3.0E+00	1.9E+00	1.9E-01	4.3E+00	7.2E+00
Adult	3.0E+01	1.6E+01	1.2E+00	2.5E+01	4.3E+01
TOTAL	3.5E+01	1.9E+01	1.7E+00	3.6E+01	5.9E+01

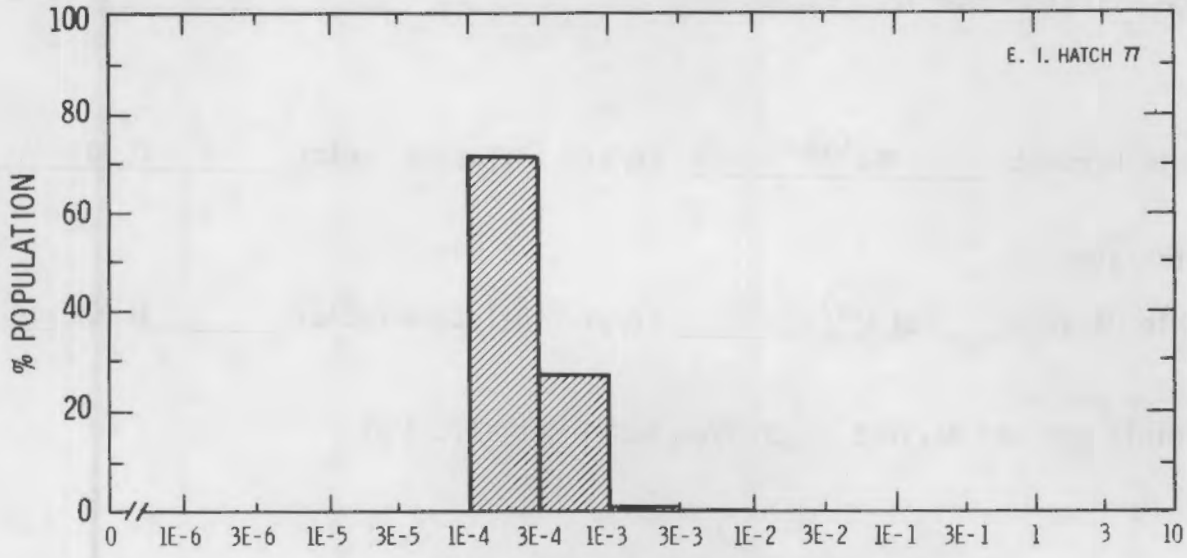
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.9E-03	1.8E-03	1.5E-03	6.0E-02	2.4E-04	1.3E-02
Child	3.6E-02	5.8E-02	9.7E-03	1.2E+00	2.6E-03	1.6E-01
Teen	1.2E-02	6.1E-02	4.6E-03	3.5E-01	1.9E-03	1.3E-01
Adult	4.5E-02	2.9E-01	2.1E-02	1.2E+00	1.1E-02	4.6E-01
TOTAL	9.5E-02	4.1E-01	3.6E-02	2.8E+00	1.6E-02	7.6E-01

Production/consumption factors:

Produce: <1 Milk: 2.0 Meat: 3.7

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE
TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site HUMBOLDT BAY EUREKA, CALIFORNIA

Location N 40.7417° W 124.2081°

Total Population Within 2-to-80-km Region 1.1E5

Major Metropolitan Centers Within Region

Center	Population	Location
Eureka	26,000	6.4 km N

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

Veg 4.8E7 kg Milk 2.3E8 ℓ Meat 5.0E7 kg

Regional Productivity Factor 0.5

Animal Grazing Factor 1

Location of Meteorological Station Site Recovery 96%

Period of Record 1 JAN 66 - 31 DEC 67

Average Dilution Flow from Plant 150 ft^3/s

Fish

Edible Harvest 4E4(a) kg/yr Dilution Factor 0.001

Invertebrates

Edible Harvest 5E3(a) kg/yr Dilution Factor 0.002

(a) Edible seafood harvest taken from Noskin et al., 1976.

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
HUMBOLDT BAY

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	2.3E-04	1.6E-04	9.8E-09	2.6E-04	4.6E-04
Teen	1.9E-04	3.4E-04	7.5E-09	1.7E-04	4.1E-04
Adult	1.4E-03	3.0E-03	5.3E-08	1.0E-03	2.5E-03
TOTAL	1.8E-03	3.5E-03	7.0E-08	1.4E-03	3.4E-03

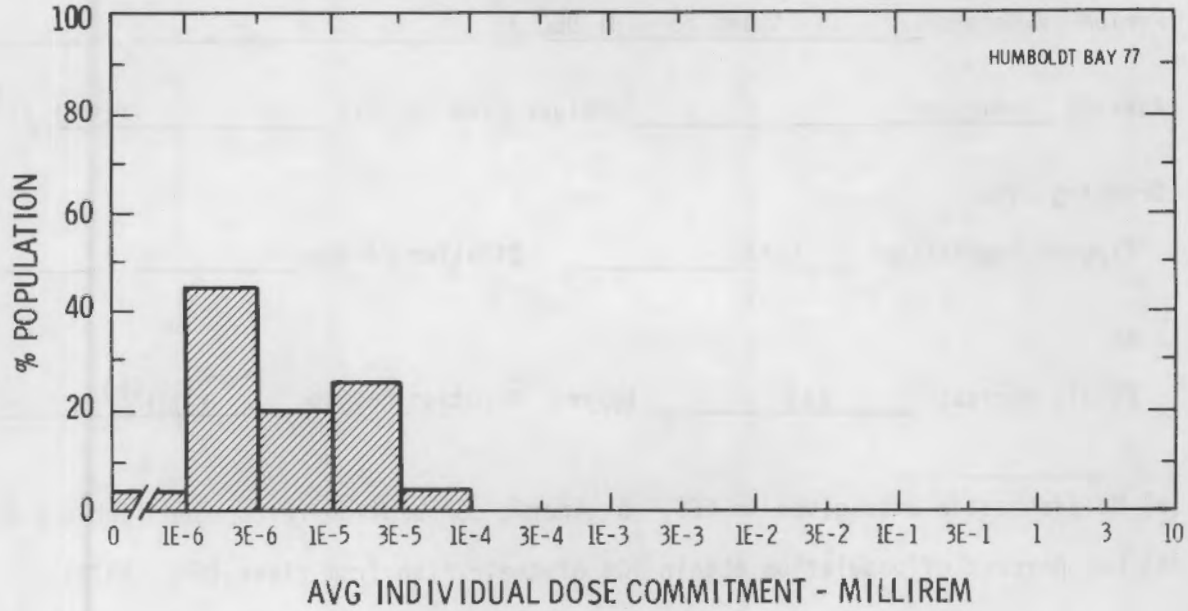
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.1E-05	1.1E-05	1.1E-05	1.4E-05	1.3E-05	1.0E-04
Child	1.4E-04	1.5E-04	1.3E-04	2.1E-04	1.6E-04	1.8E-03
Teen	1.0E-04	1.4E-04	9.1E-05	1.5E-04	1.1E-04	1.6E-03
Adult	6.2E-04	8.7E-04	5.4E-04	8.2E-04	6.4E-04	6.6E-03
TOTAL	8.7E-04	1.2E-03	7.7E-04	1.2E-03	9.3E-04	1.0E-02

Production/consumption factors:

Produce: 1.1 Milk: 8.0 Meat: 2.8

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE
TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site INDIAN POINT BUCHANAN, NEW YORK

Location N 41.2656° W 73.9350°

Total Population Within 2-to-80-km Region 1.6E7

Major Metropolitan Centers Within Region

Center	Population	Location	
New York SMSA	9,900,000	60 km	S
Newark SMSA	2,100,000	64 km	SSW
Stamford	110,000	42 km	SE
Norwalk	78,000	48 km	ESE
Bridgeport	160,000	64 km	E
Poughkeepsie	32,000	48 km	N
White Plains	50,000	30 km	SSE

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

Veg 7.6E7 kg Milk 7.0E8 ℓ Meat 3.3E7 kg

Regional Productivity Factor 0.8

Animal Grazing Factor 0.5

Location of Meteorological Station Site Recovery 96%

Period of Record 1 JAN 75 - 31 DEC 75

Average Hudson River Flow at Site 20,000 ft^3/s

Drinking Water

Exposed Population None Dilution Factor -

Fish

Edible Harvest (a) kg/yr Dilution Factor 0.001 (b)

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

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

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
INDIAN POINT

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	3.7E-02	3.5E-03	4.2E-03	1.9E-01	2.1E-01
Teen	7.2E-02	7.2E-03	3.0E-03	1.1E-01	1.8E-01
Adult	7.8E-01	6.2E-02	2.0E-02	6.6E-01	1.1E+00
TOTAL	8.8E-01	7.2E-02	2.7E-02	9.6E-01	1.5E+00

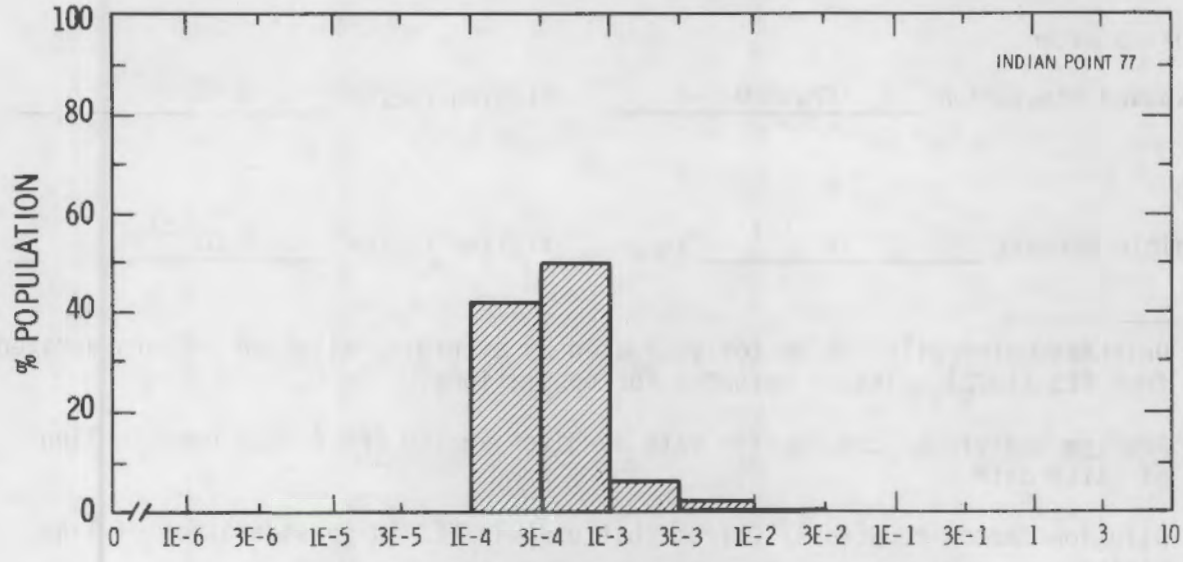
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.7E-01	1.7E-01	2.8E-01	1.7E-01	1.7E-01	1.8E-01
Child	1.9E+00	1.9E+00	2.7E+00	1.9E+00	1.9E+00	2.0E+00
Teen	1.4E+D0	1.4E+00	1.8E+00	1.4E+00	1.4E+00	1.6E+00
Adult	8.4E+00	8.4E+00	1.0E+01	8.3E+00	8.4E+00	9.0E+00
TOTAL	1.2E+01	1.2E+01	1.5E+01	1.2E+01	1.2E+01	1.3E+01

Production/consumption factors:

Produce: <1 Milk: <1 Meat: <1

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE
TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site KEWAUNEE CARLTON, WISCONSIN

Location N 44.3433° W 87.5350°

Total Population Within 2-to-80-km Region 6.0E5

Major Metropolitan Centers Within Region

Center	Population	Location	
Sheboygan	51,000	64 km	SSW
Manitowoc	35,000	30 km	SSW
Greenbay	93,000	40 km	W
Appleton	61,000	72 km	WSW

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

Veg 7.2E7 kg Milk 1.2E9 ℓ Meat 1.0E8 kg

Regional Productivity Factor 0.5

Animal Grazing Factor 0.5

Location of Meteorological Station Site Recovery 76%

Period of Record 2 JAN 69 - 31 DEC 69

Average Water Dilution Flow from Plant 140 ft^3/s

Drinking Water

Exposed Population 190,000 Dilution Factor 8.2E-3[a]

Fish

Edible Harvest 1.1[b] kg/yr Dilution Factor 0.01[c]

(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 the FES (1972) 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 Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	3.1E-03	2.8E-03	2.4E-02	2.7E-03	6.2E-03
Child	1.1E-01	4.8E-02	1.9E-01	3.5E-01	4.5E-01
Teen	1.5E-01	4.5E-02	6.3E-02	2.0E-01	3.5E-01
Adult	1.6E+00	4.0E-01	4.5E-01	1.2E+00	2.1E+00
TOTAL	1.9E+00	4.9E-01	7.3E-01	1.7E+00	3.0E+00

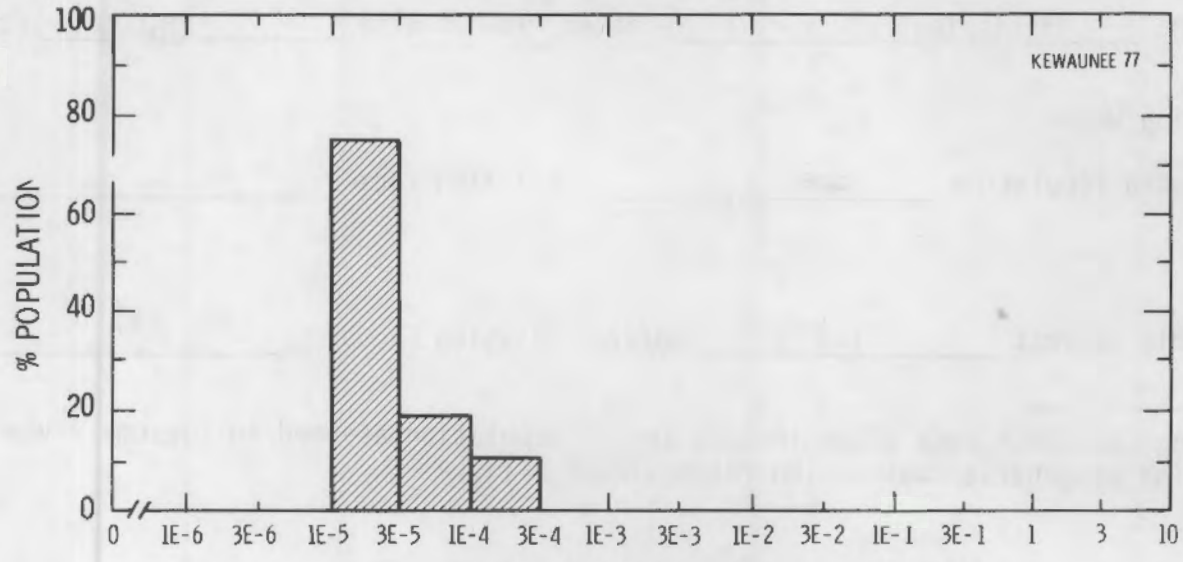
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	3.0E-04	2.9E-04	3.3E-03	3.1E-04	3.0E-04	3.2E-04
Child	3.5E-03	3.3E-03	2.6E-02	4.3E-03	3.4E-03	3.7E-03
Teen	2.5E-03	2.4E-03	1.2E-02	3.0E-03	2.4E-03	2.9E-03
Adult	1.5E-02	1.4E-02	5.4E-02	1.7E-02	1.4E-02	1.6E-02
TOTAL	2.1E-02	2.0E-02	9.6E-02	2.5E-02	2.0E-02	2.3E-02

Production/consumption factors:

Produce: <1 Milk: 7.4 Meat: 1.1

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site LA CROSSE GENOA, WISCONSIN

Location N 43.5597° W 91.2281°

Total Population Within 2-to-80-km Region 3.3E5

Major Metropolitan Centers Within Region

Center	Population	Location
La Crosse	54,000	32 km N

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

Veg 7.2E7 kg Milk 1.2E9 ℓ Meat 1.0E8 kg

Regional Productivity Factor 1

Animal Grazing Factor 0.5

Location of Meteorological Station Site Recovery 97%

Period of Record 1 JAN 75 - 31 DEC 75

Average Mississippi River Flow at Site 28,000 ft^3/s

Drinking Water

Exposed Population None Dilution Factor -

Fish

Edible Harvest (a) kg/yr Dilution Factor $0.5^{(a)}$

(a) No fish catch data given in FES, 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 LA CROSSE

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	3.6E-01	3.4E-02	3.2E-02	1.6E+00	1.8E+00
Teen	6.4E-01	7.3E-02	2.3E-02	1.0E+00	1.6E+00
Adult	6.8E+00	6.4E-01	1.5E-01	5.9E+00	9.3E+00
TOTAL	7.8E+00	7.4E-01	2.1E-01	8.5E+00	1.3E+01

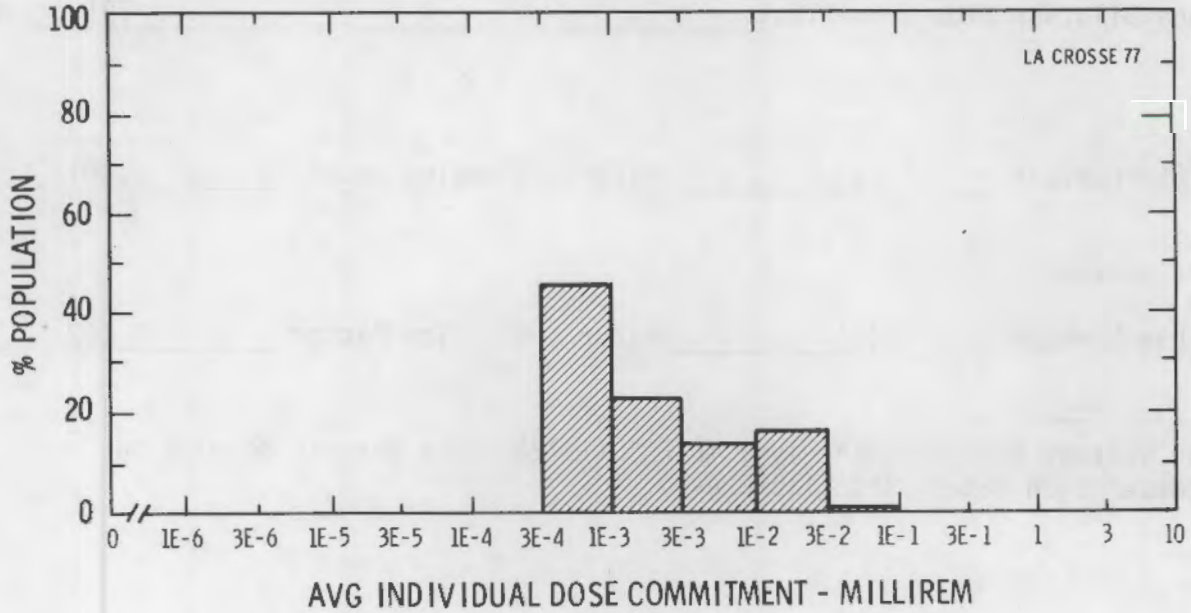
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	2.3E-02	2.2E-02	2.7E-01	2.3E-02	2.4E-02	2.2E-02
Child	2.6E-01	2.6E-01	3.4E+00	2.8E-01	2.8E-01	2.5E-01
Teen	1.9E-01	2.0E-01	1.9E+00	1.9E-01	2.0E-01	1.9E-01
Adult	1.1E+00	1.2E+00	8.6E+00	1.1E+00	1.2E+00	1.1E+00
TOTAL	1.6E+00	1.6E+00	1.4E+01	1.6E+00	1.7E+00	1.6E+00

Production/consumption factors:

Produce: 1.1 Milk: 27 Meat: 3.8

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site MAINE YANKEE LINCOLN COUNTY, MAINE

Location N 43.9503° W 69.6964°

Total Population Within 2-to-80-km Region 5.7E5

Major Metropolitan Centers Within Region

Center	Population	Location
Portland	71,000	51 km SW
Lewiston	46,000	40 km NW

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

Veg 2.4E8 kg Milk 6.6E7 ℓ Meat 4.3E6 kg

Regional Productivity Factor 0.6

Animal Grazing Factor 0.5

Location of Meteorological Station Site Recovery 98%

Period of Record 1 APR 75 - 31 MAR 76

Average Dilution Flow from Plant 791 ft^3/s

Fish

Edible Harvest (a) kg/yr Dilution Factor 0.001

Invertebrates

Edible Harvest (a) kg/yr 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 Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	2.7E-04	2.5E-04	1.8E-03	8.2E-04	9.2E-04
Teen	3.7E-04	5.1E-04	1.3E-03	4.8E-04	7.8E-D4
Adult	3.6E-03	4.6E-03	8.5E-03	2.8E-03	4.6E-03
TOTAL	4.2E-03	5.4E-03	1.2E-02	4.1E-03	6.3E-03

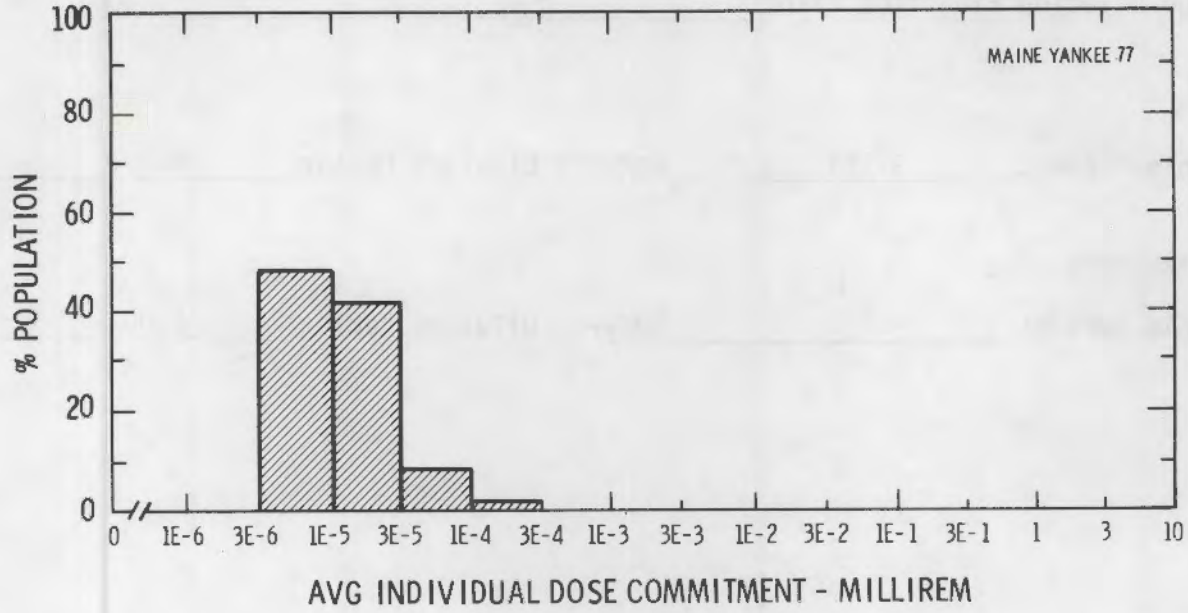
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.3E-04	1.3E-04	9.1E-04	1.3E-04	1.4E-04	1.4E-04
Child	1.6E-03	1.6E-03	1.3E-02	1.6E-03	1.8E-03	1.8E-03
Teen	1.2E-03	1.1E-03	5.9E-03	1.1E-03	1.2E-03	1.3E-03
Adult	7.0E-03	6.8E-03	2.6E-02	6.4E-03	7.1E-03	7.5E-03
TOTAL	1.0E-02	9.7E-03	4.6E-02	9.2E-03	1.0E-02	1.1E-02

Production/consumption factors:

Produce: 1.3 Milk: <1 Meat: <1

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE
TOTAL-BODY DOSE COMMITMENT FRDM AIRBORNE PATHWAYS



Site MILLSTONE POINT WATERFORD, CONNECTICUT

Location N 41.3086° W 72.1675°

Total Population Within 2-to-80-km Region 2.5E6

Major Metropolitan Centers Within Region

Center	Population	Location	
Hartford SMSA	840,000	72 km	NW
New Haven SMSA	760,000	64 km	W
Warwick	86,000	80 km	NE
Waterbury	110,000	70 km	WNW

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

Veg 3.2E7 kg Milk 4.4E8 ℓ Meat 2.0E7 kg

Regional Productivity Factor 0.6

Animal Grazing Factor 0.6

Location of Meteorological Station Site Recovery 95%

Period of Record 1 JAN 74 - 31 DEC 74

Average Dilution Flow from Plant 300 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 POINT 1 & 2

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	3.5E-03	9.0E-03	5.3E-04	1.7E-03	3.2E-03
Teen	2.6E-03	1.9E-02	3.7E-04	1.0E-03	2.7E-03
Adult	1.8E-02	1.6E-01	2.5E-03	6.1E-03	1.7E-02
TOTAL	2.4E-02	1.9E-01	3.4E-03	8.8E-03	2.3E-02

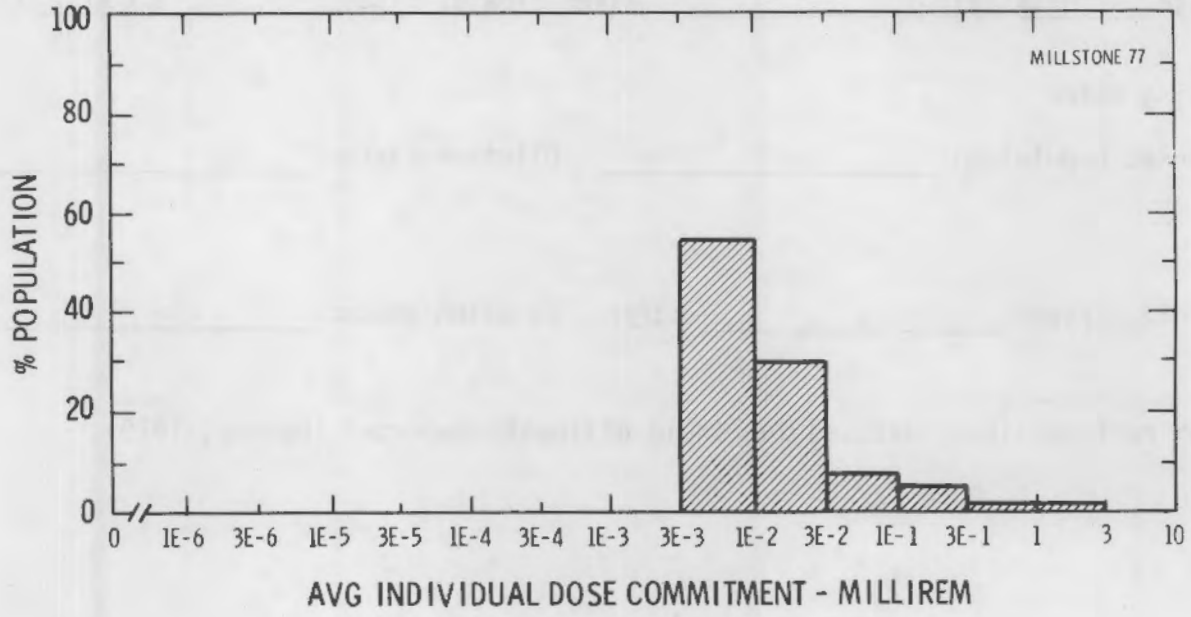
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	3.2E+00	3.2E+00	9.8E+00	3.2E+00	3.2E+00	3.3E+00
Child	3.6E+01	3.6E+01	7.1E+01	3.6E+01	3.6E+01	3.7E+01
Teen	2.6E+01	2.6E+01	4.1E+01	2.6E+01	2.6E+01	2.7E+01
Adult	1.6E+02	1.6E+02	2.1E+02	1.6E+02	1.6E+02	1.6E+02
TOTAL	2.2E+02	2.2E+02	3.3E+02	2.2E+02	2.2E+02	2.3E+02

Production/consumption factors:

Produce: <1 Milk: <1 Meat: <1

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE
TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site MONTICELLO MONTICELLO, MINNESOTA

Location N 45.3339° W 93.8486°

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

Major Metropolitan Centers Within Region

Center	Population	Location
Minneapolis-St. Paul SMSA	2,000,000	64 km SE
St. Cloud	41,000	37 km NW
Anoka	14,000	35 km ESE

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

Veg 1.2E8 kg Milk 4.0E8 ℓ Meat 1.1E8 kg

Regional Productivity Factor 1

Animal Grazing Factor 0.5

Location of Meteorological Station Site Recovery 92%

Period of Record 1 JAN 74 - 31 DEC 74

Average Mississippi River Flow at Site 4,600 ft^3/s

Drinking Water

Exposed Population (a) Dilution Factor -

Fish

Edible Harvest (a) kg/yr Dilution Factor -

(a) No radionuclides released in liquid effluents reported (Decker, 1979).

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

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
TOTAL	0	0	0	0	0

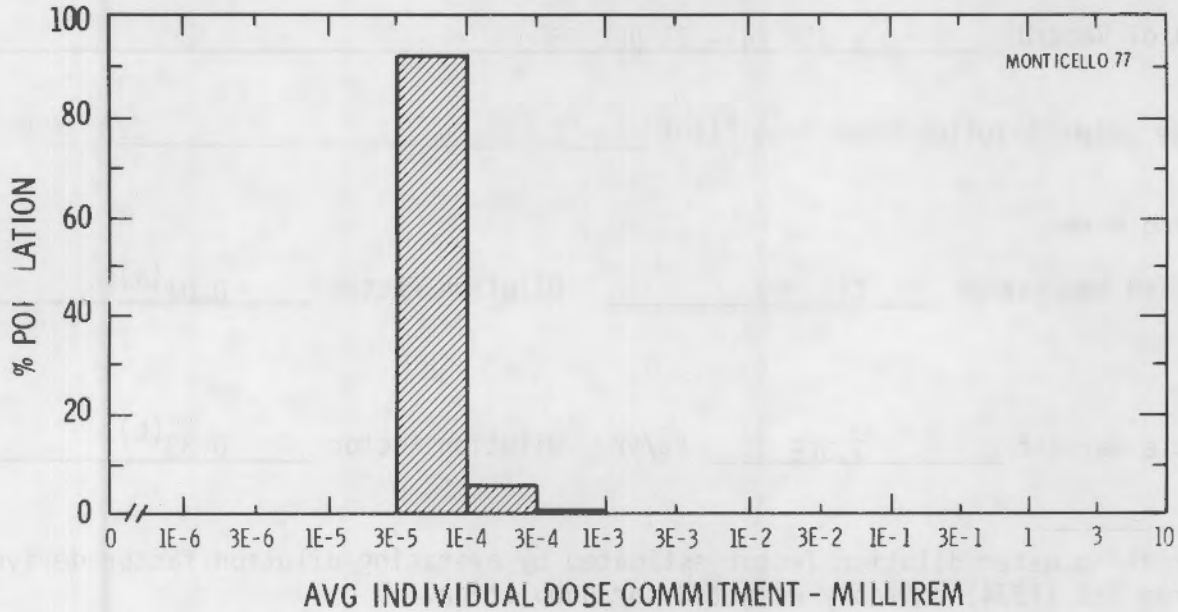
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	2.7E-03	2.5E-03	8.6E-02	2.6E-03	3.4E-03	2.7E-03
Child	3.6E-02	3.3E-02	5.9E-01	3.9E-02	3.9E-02	3.4E-02
Teen	2.4E-02	2.3E-02	2.4E-01	2.2E-02	2.5E-02	2.4E-02
Adult	1.4E-01	1.3E-01	8.7E-01	1.1E-01	1.3E-01	1.3E-01
TOTAL	2.0E-01	1.9E-01	1.8E+00	1.8E-01	2.0E-01	1.9E-01

Production/consumption factors:

Produce: <1 Milk: 1.5 Meat: <1

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site NINE MILE POINT OSWEGO, NEW YORK

Location N 43.5217° W 76.3980°

Total Population Within 2-to-80-km Region 8.3E5

Major Metropolitan Centers Within Region

Center	Population	Location
Syracuse SMSA	620,000	54 km SSE
Auburn	34,000	66 km SSW

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

Veg 7.6E7 kg Milk 7.0E8 ℓ Meat 3.3E7 kg

Regional Productivity Factor 0.7

Animal Grazing Factor 0.5

Location of Meteorological Station Site Recovery 97%

Period of Record 1 JAN 74 - 31 DEC 75

Average Water Dilution Flow from Plant 270 ft^3/s

Drinking Water

Exposed Population 540,000 Dilution Factor 0.01(a)

Fish

Edible Harvest 7.3E5 kg/yr Dilution Factor 0.33(b)

(a) Drinking water dilution factor estimated by averaging dilution factor derived from FES (1974) suitably weighted for population.

(b) Fish catch dilution factor (FES, 1974).

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

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	8.4E-03	4.1E-03	2.8E-02	3.5E-02	4.4E-02
Child	2.1E-01	8.6E-02	2.0E-01	8.0E-01	8.8E-01
Teen	2.4E-01	8.7E-02	6.3E-02	3.5E-01	5.6E-01
Adult	2.6E+00	8.0E-01	4.4E-01	2.1E+00	3.4E+00
TOTAL	3.0E+00	9.8E-01	7.4E-01	3.3E+00	4.9E+00

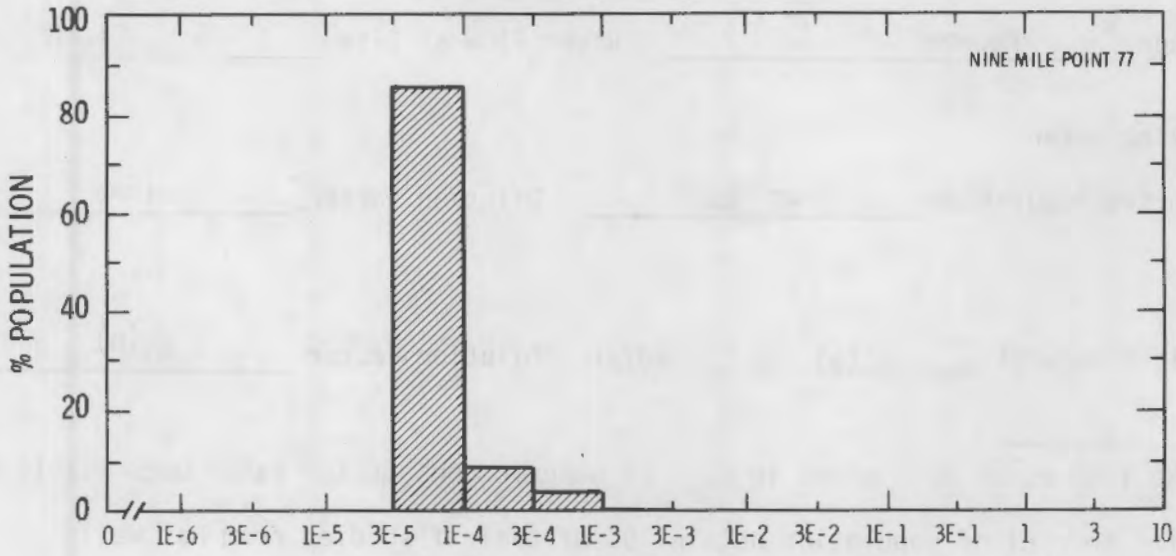
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.3E-03	1.1E-03	8.8E-02	2.0E-03	1.8E-03	1.2E-03
Child	1.9E-02	1.3E-02	5.9E-01	4.5E-02	1.8E-02	1.4E-02
Teen	1.2E-02	9.8E-03	2.3E-01	2.1E-02	1.1E-02	1.0E-02
Adult	6.5E-02	5.7E-02	7.7E-01	1.0E-01	5.7E-02	5.6E-02
TOTAL	9.8E-02	8.1E-02	1.7E+00	1.7E-01	8.8E-02	8.1E-02

Production/consumption factors:

Produce: <1 Milk: 4.5 Meat: <1

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site OCONEE OCONEE COUNTY, SOUTH CAROLINA

Location N 34.7500° W 83.0458°

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

Major Metropolitan Centers Within Region

Center	Population	Location
Anderson	30,000	39 km SE
Greenville	68,000	47 km E

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

Veg 7.4E6 kg Milk 5.7E7 ℓ Meat 5.0E7 kg

Regional Productivity Factor 1

Animal Grazing Factor 0.7

Location of Meteorological Station Site Recovery 86%

Period of Record 1 JAN 75 - 31 DEC 75

Average Keowee River Flow at Site 1,100 ft^3/s

Drinking Water

Exposed Population 44,000 Dilution Factor 1

Fish

Edible Harvest (a) kg/yr 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 (FES, 1972).

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

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	1.3E-01	8.1E-02	5.4E+00	5.6E-01	3.3E-01
Child	2.8E+00	1.2E+00	3.9E+01	1.2E+01	9.4E+00
Teen	3.0E+00	8.8E-01	1.2E+01	5.0E+00	6.5E+00
Adult	3.1E+01	7.4E+00	8.5E+01	3.1E+01	4.0E+01
TOTAL	3.7E+01	9.5E+00	1.4E+02	4.8E+01	5.6E+01

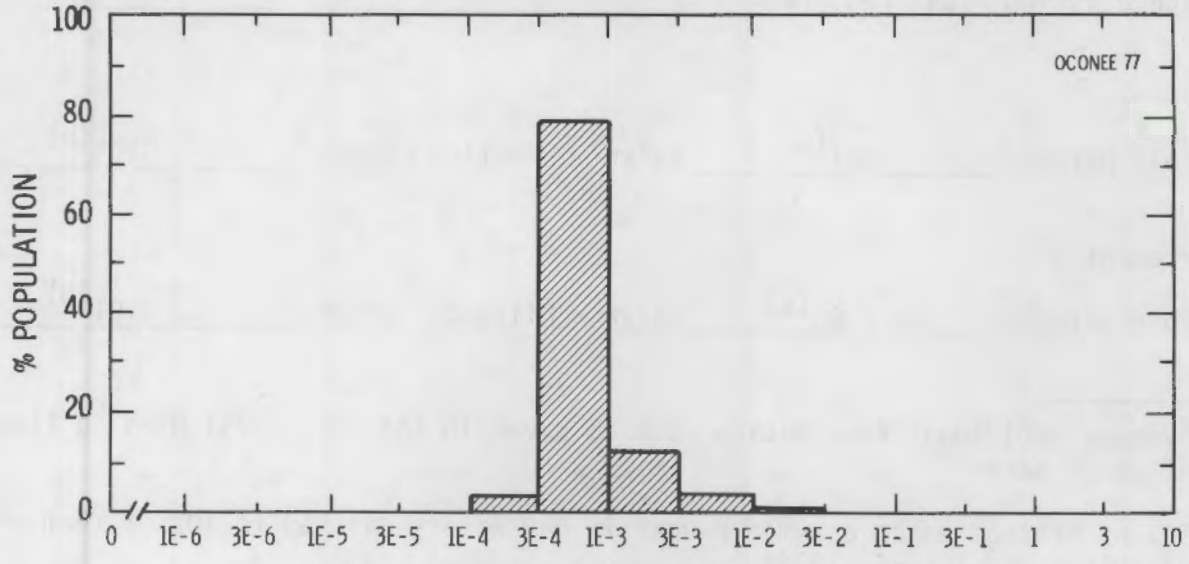
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	9.9E-03	9.7E-03	1.0E-01	1.0E-02	1.0E-02	1.1E-02
Child	1.1E-01	1.1E-01	6.6E-01	1.1E-01	1.1E-01	1.2E-01
Teen	8.0E-02	8.0E-02	3.1E-01	8.0E-02	8.1E-02	9.4E-02
Adult	4.9E-01	4.8E-01	1.3E+00	4.8E-01	4.9E-01	5.3E-01
TOTAL	6.9E-01	6.8E-01	2.4E+00	6.8E-01	6.9E-01	7.5E-01

Production/consumption factors:

Produce: <1 Milk: <1 Meat: <1

FRACTIDN OF POPULATION RECEIVING AN INDICATED AVERAGE
TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site OYSTER CREEK OYSTER CREEK, NEW JERSEY

Location N 39.8139° W 74.2114°

Total Population Within 2-to-80-km Region 3.3E6

Major Metropolitan Centers Within Region

Center	Population	Location
Atlantic City	49,000	56 km SSW
Trenton	110,000	64 km NW

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

Veg 7.4E7 kg Milk 2.7E8 ℓ Meat 2.4E7 kg

Regional Productivity Factor 0.5

Animal Grazing Factor 0.6

Location of Meteorological Station Site Recovery 63%

Period of Record 15 FEB 66 - 31 DEC 68

Average Dilution Flow from Plant 1,800 ft^3/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 (FES, 1974).

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

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	1.8E-03	3.3E-03	2.8E-04	7.1E-04	1.1E-03
Teen	1.3E-03	6.9E-03	2.0E-04	5.1E-04	9.4E-04
Adult	7.9E-03	6.2E-02	1.3E-03	3.5E-03	5.8E-03
TOTAL	1.1E-02	7.2E-02	1.8E-03	4.7E-03	7.8E-03

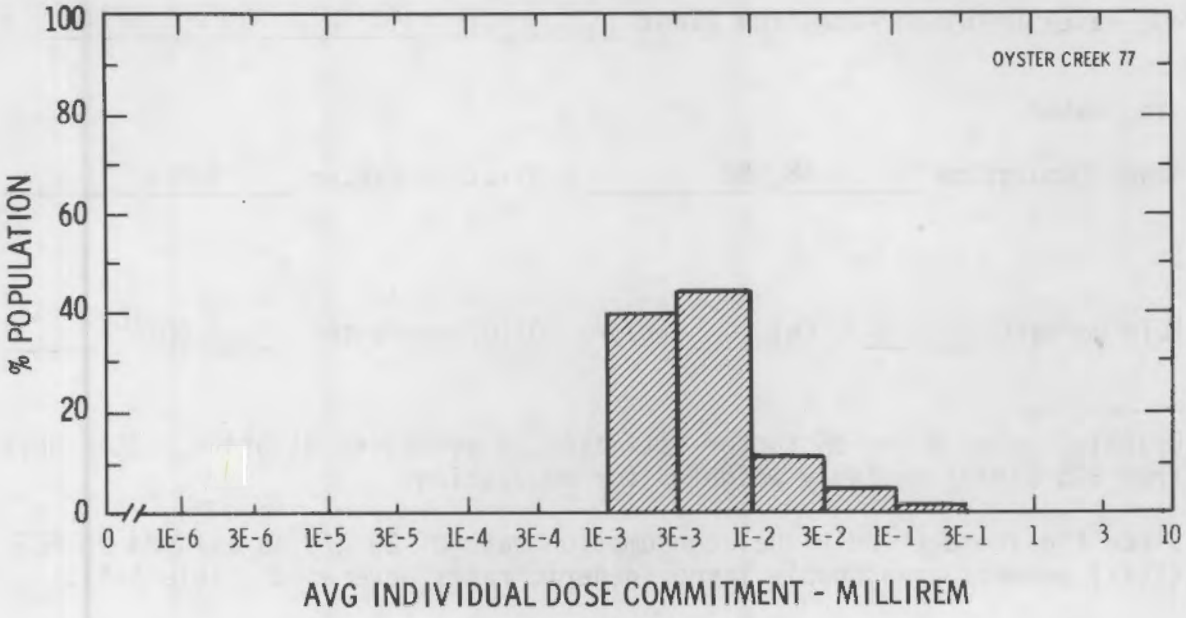
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	6.0E-01	5.9E-01	4.5E+00	6.1E-01	6.1E-01	6.2E-01
Child	6.6E+00	6.6E+00	3.3E+01	6.8E+00	6.7E+00	6.9E+00
Teen	4.8E+00	4.9E+00	1.7E+01	4.9E+00	4.9E+00	5.2E+00
Adult	2.9E+01	2.9E+01	7.6E+01	3.0E+01	2.9E+01	3.0E+01
TOTAL	4.1E+01	4.2E+01	1.3E+02	4.2E+01	4.2E+01	4.3E+01

Production/consumption factors:

Produce: <1 Milk: <1 Meat: <1

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE
TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site PALISADES COVERT TOWNSHIP, MICHIGAN

Location N 42.3233° W 86.3142°

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

Major Metropolitan Centers Within Region

Center	Population	Location
Kalamazoo	88,000	56 km E
South Bend SMSA	290,000	72 km S
Michigan City	40,000	66 km SW

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

Veg 6.8E7 kg Milk 2.9E8 ℓ Meat 4.5E7 kg

Regional Productivity Factor 0.6

Animal Grazing Factor 0.5

Location of Meteorological Station Site Recovery 67%

Period of Record 1 SEP 73 - 31 AUG 74

Average Water Dilution Flow from Plant 140 ft^3/s

Drinking Water

Exposed Population 48,000 Dilution Factor 3.5E-3(a)

Fish

Edible Harvest (b) kg/yr Dilution Factor 0.001(b)

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

(b) Since the average individual consumption rate of 20 g/d as assumed in FES (1972) seemed unreasonably large, generic rates were used (Table A-1).

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

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	8.6E-05	7.3E-05	7.3E-05	1.4E-04	2.5E-04
Child	2.7E-02	1.9E-03	8.5E-04	1.5E-01	1.6E-01
Teen	5.1E-02	2.4E-03	3.4E-04	9.1E-02	1.3E-01
Adult	5.6E-01	2.0E-02	2.9E-03	5.2E-01	8.0E-01
TOTAL	6.3E-01	2.4E-02	4.2E-03	7.7E-01	1.1E+00

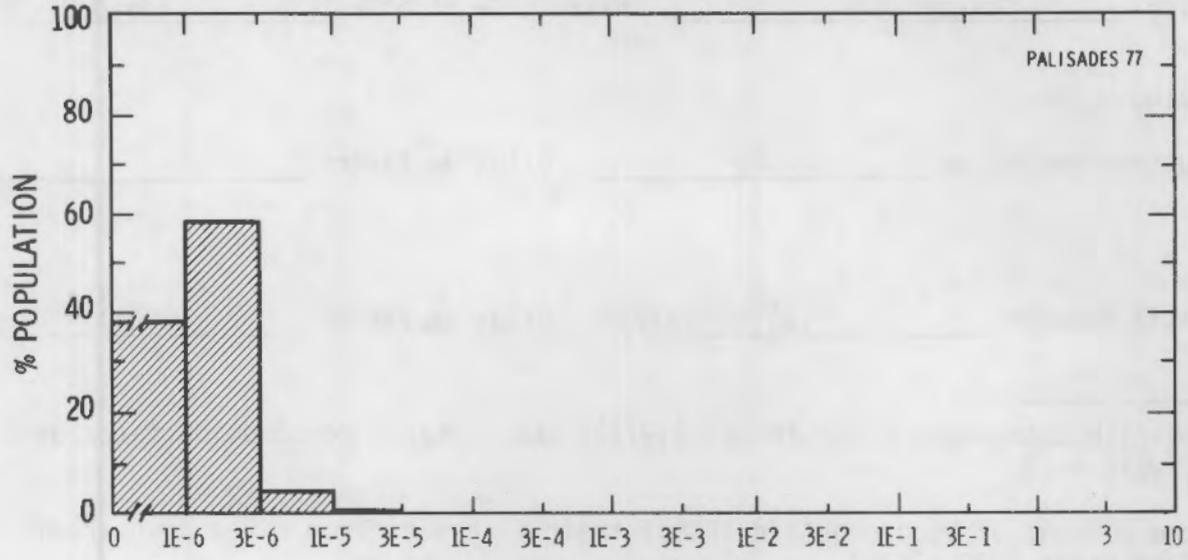
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	2.6E-05	1.7E-05	6.0E-03	4.3E-05	5.7E-05	2.2E-05
Child	2.9E-04	2.2E-04	3.7E-02	3.8E-04	4.7E-04	2.6E-04
Teen	1.9E-04	1.5E-04	1.4E-02	1.7E-04	2.6E-04	1.9E-04
Adult	1.0E-03	8.7E-04	4.8E-02	7.6E-04	1.1E-03	9.7E-04
TOTAL	1.5E-03	1.3E-03	1.1E-01	1.4E-03	1.9E-03	1.4E-03

Production/consumption factors:

Produce: <1 Milk: 1.3 Meat: <1

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site PEACH BOTTOM YORK COUNTY, PENNSYLVANIA

Location N 39.7592° W 76.2689°

Total Population Within 2-to-80-km Region 4.1E6

Major Metropolitan Centers Within Region

Center	Population	Location
Lancaster SMSA	320,000	31 km N
Baltimore SMSA	2,100,000	58 km SW
Wilmington	500,000	64 km E
Reading	300,000	72 km NNE

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

Veg 5.3E7 kg Milk 5.3E8 ℓ Meat 5.4E7 kg

Regional Productivity Factor 0.95

Animal Grazing Factor 0.6

Location of Meteorological Station Site Recovery 72%

Period of Record 1 AUG 67 - 31 JUL 71

Average Susquehanna River Flow at Site 36,000 ft^3/s

Drinking Water

Exposed Population 2.1E6 Dilution Factor 1

Fish

Edible Harvest (a) kg/yr 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 (FES, 1973).

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

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	4.2E-02	2.0E-02	5.3E+00	2.2E-01	3.1E-01
Child	6.8E-01	1.9E-01	3.7E+01	2.3E+00	2.9E+00
Teen	4.8E-01	1.3E-01	1.1E+01	6.3E-01	1.1E+00
Adult	5.2E+00	1.1E+00	8.0E+01	4.0E+00	7.0E+00
TOTAL	6.4E+00	1.5E+00	1.3E+02	7.2E+00	1.1E+01

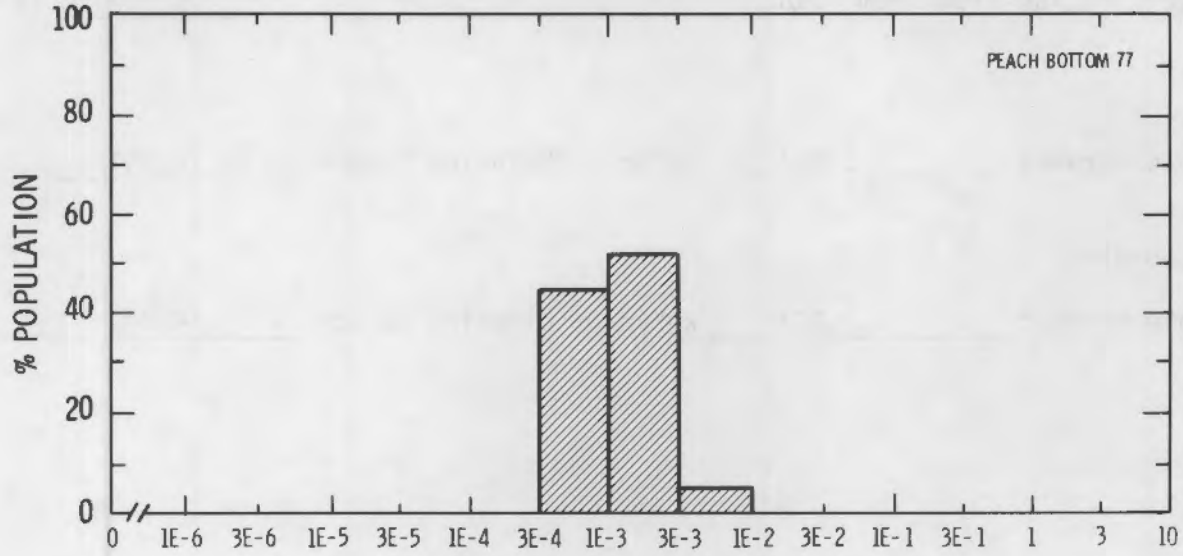
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	7.3E-02	7.3E-02	5.4E-01	7.3E-02	7.7E-02	7.8E-02
Child	8.1E-01	8.0E-01	3.6E+00	8.0E-01	8.3E-01	8.9E-01
Teen	5.9E-01	5.9E-01	1.8E+00	5.7E-01	6.0E-01	6.9E-01
Adult	3.5E+00	3.5E+00	7.9E+00	3.4E+00	3.6E+00	3.9E+00
TOTAL	5.0E+00	5.0E+00	1.4E+01	4.9E+00	5.1E+00	5.5E+00

Production/consumption factors:

Produce: <1 Milk: <1 Meat: <1

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE
TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site PILGRIM PLYMOUTH, MASSACHUSETTS

Location N 41.9444° W 70.5778°

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

Major Metropolitan Centers Within Region

Center	Population	Location	
Boston SMSA	3,500,000	64 km	NW
Providence SMSA	780,000	70 km	WSW
Brockton	91,000	40 km	WNW
New Bedford	100,000	45 km	SW

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

Veg 2.0E7 kg Milk 2.6E8 ℓ Meat 1.6E7 kg

Regional Productivity Factor 0.3

Animal Grazing Factor 0.6

Location of Meteorological Station Site Recovery 93%

Period of Record 1 MAY 74 - 30 APR 75

Average Dilution Flow from Plant 21 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 Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	1.7E-02	1.5E-02	6.8E-03	6.1E-02	4.1E-02
Teen	1.1E-02	2.9E-02	4.7E-03	3.4E-02	3.2E-02
Adult	6.5E-02	2.4E-01	3.1E-02	2.0E-01	1.9E-01
TOTAL	9.3E-02	2.9E-01	4.2E-02	3.0E-01	2.6E-01

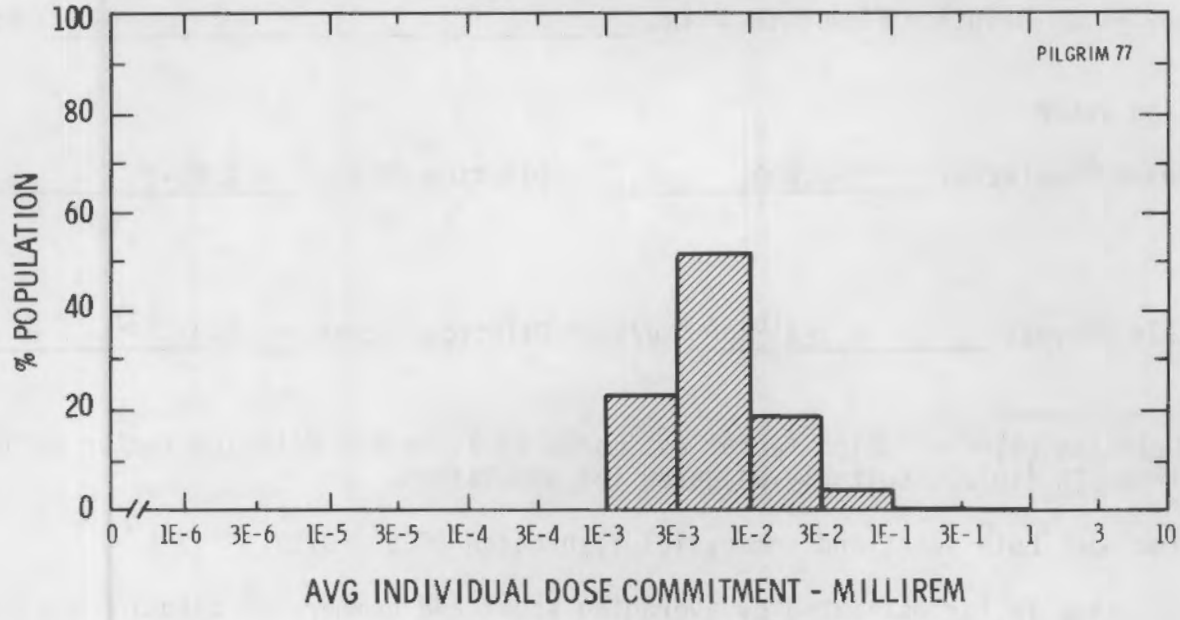
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	7.5E-01	7.5E-01	9.6E-01	7.5E-01	7.5E-01	7.7E-01
Child	8.3E+00	8.3E+00	9.6E+00	8.3E+00	8.3E+00	8.6E+00
Teen	6.1E+00	6.1E+00	6.7E+00	6.1E+00	6.1E+00	6.5E+00
Adult	3.7E+01	3.7E+01	3.9E+01	3.7E+01	3.7E+01	3.8E+01
TOTAL	5.2E+01	5.2E+01	5.6E+01	5.2E+01	5.2E+01	5.4E+01

Production/consumption factors:

Produce: <1 Milk: <1 Meat: <1

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE
TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site POINT BEACH MANITOWOC COUNTY, WISCONSIN

Location N 44.2764° W 87.5186°

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

Major Metropolitan Centers Within Region

Center	Population	Location	
Sheboygan	51,000	56 km	SSW
Manitowoc	35,000	19 km	SSW
Greenbay	93,000	48 km	NW
Appleton	61,000	72 km	W

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

Veg 7.2E7 kg Milk 1.2E9 ℓ Meat 1.0E8 kg

Regional Productivity Factor 0.5

Animal Grazing Factor 0.5

Location of Meteorological Station Site Recovery 83%

Period of Record 19 APR 67 - 18 APR 69

Average Water Dilution Flow from Plant 590 ft^3/s

Drinking Water

Exposed Population 190,000 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 (FES, 1972).

(c) Dilution factor estimated by averaging sport and commercial dilution factor derived from FES (1972).

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

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	7.0E-04	6.7E-04	7.0E-03	2.6E-04	1.0E-03
Child	1.1E-02	7.7E-03	5.3E-02	1.5E-02	2.6E-02
Teen	8.5E-03	3.2E-03	1.7E-02	8.2E-03	1.7E-02
Adult	8.6E-02	2.8E-02	1.2E-01	4.8E-02	1.1E-01
TOTAL	1.1E-01	3.9E-02	2.0E-01	7.2E-02	1.5E-01

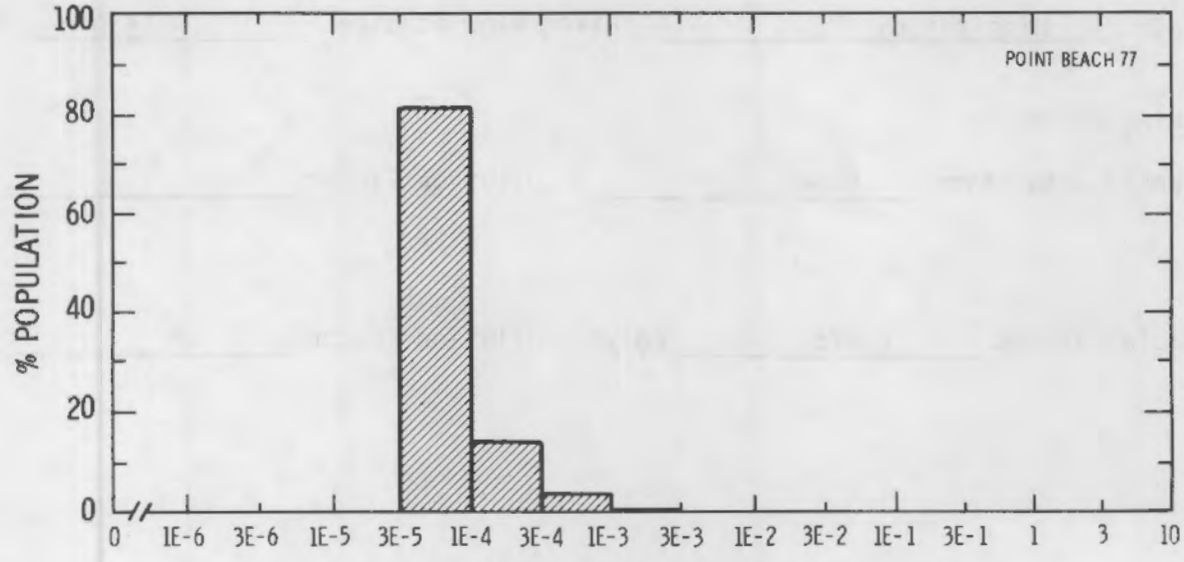
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	9.5E-04	9.5E-04	1.8E-03	4.5E-04	9.6E-04	9.7E-04
Child	1.3E-02	1.3E-02	1.9E-02	5.0E-03	1.3E-02	1.3E-02
Teen	8.5E-03	8.5E-03	1.1E-02	3.6E-03	8.5E-03	8.8E-03
Adult	4.8E-02	4.8E-02	5.7E-02	2.2E-02	4.8E-02	4.9E-02
TOTAL	7.1E-02	7.1E-02	8.8E-02	3.1E-02	7.1E-02	7.2E-02

Production/consumption factors:

Produce: <1 Milk: 7.5 Meat: 1.1

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE
TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site PRAIRIE ISLAND RED WING, MINNESOTA

Location N 44.6217° W 92.6330°

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

Major Metropolitan Centers Within Region

Center	Population	Location
Minneapolis-St. Paul SMSA	2.0E6	50 km NW
Rochester	60,000	64 km SSE
Hastings	13,000	19 km NW

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

Veg 1.2E8 kg Milk 4.0E8 ℓ Meat 1.0E8 kg

Regional Productivity Factor 1

Animal Grazing Factor 0.5

Location of Meteorological Station Site Recovery 65%

Period of Record 22 MAR 74 - 21 MAR 75

Average Mississippi River Flow at Site 15,000 ft^3/s

Drinking Water

Exposed Population None Dilution Factor -

Fish

Edible Harvest 6.8E5 kg/yr Dilution Factor 1

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

Oose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	1.7E-02	1.9E-02	2.5E-03	5.0E-02	5.8E-02
Teen	2.4E-02	3.9E-02	1.9E-03	3.2E-02	5.1E-02
Adult	2.3E-01	3.4E-01	1.4E-02	2.0E-01	3.1E-01
TOTAL	2.7E-01	4.0E-01	1.8E-02	2.8E-01	4.1E-01

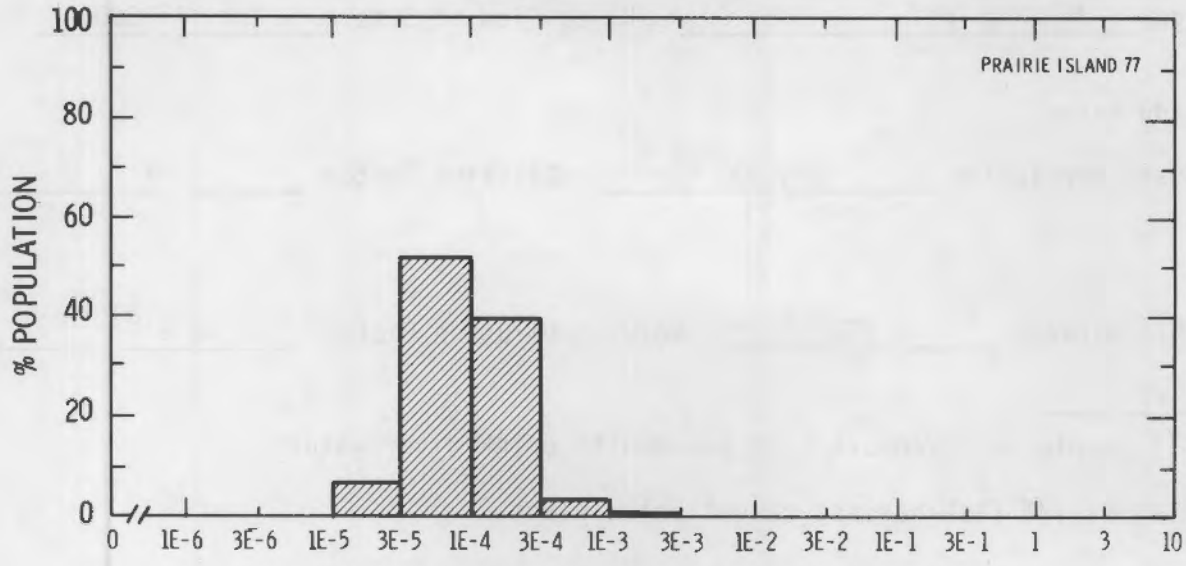
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	4.6E-03	4.6E-03	1.4E-02	4.1E-03	4.6E-03	5.6E-03
Child	5.3E-02	5.4E-02	1.1E-01	4.6E-02	5.4E-02	6.7E-02
Teen	3.8E-02	3.8E-02	6.2E-02	3.3E-02	3.8E-02	5.6E-02
Adult	2.3E-01	2.3E-01	3.1E-01	2.0E-01	2.3E-01	2.9E-01
TOTAL	3.2E-01	3.3E-01	5.0E-01	2.8E-01	3.3E-01	4.1E-01

Production/consumption factors:

Produce: <1 Milk: 1.4 Meat: <1

FRACTION OF POPULATION RECEIVING AN INOICATED AVERAGE
TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site QUAD CITIES ROCK ISLAND, ILLINOIS

Location N 41.7272° W 90.3417°

Total Population Within 2-to-80-km Region 6.7E5

Major Metropolitan Centers Within Region

Center	Population	Location
Davenport SMSA	360,000	40 km SW

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

Veg 1.1E8 kg Milk 1.8E8 ℓ Meat 1.9E8 kg

Regional Productivity Factor 1

Animal Grazing Factor 0.5

Location of Meteorological Station Site Recovery 88%

Period of Record 1 JAN 74 - 31 DEC 75

Average Mississippi River Flow at Site 47,000 ft^3/s

Drinking Water

Exposed Population 370,000(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 & 2

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	1.1E-03	3.5E-04	2.2E-02	6.9E-03	8.6E-03
Child	1.2E-01	9.5E-03	1.6E-01	6.1E-01	6.9E-01
Teen	2.2E-01	1.2E-02	5.1E-02	3.4E-01	5.5E-01
Adult	2.4E+00	1.0E-01	3.6E-01	2.0E+00	3.3E+00
TOTAL	2.7E+00	1.2E-01	5.9E-01	3.0E+00	4.5E+00

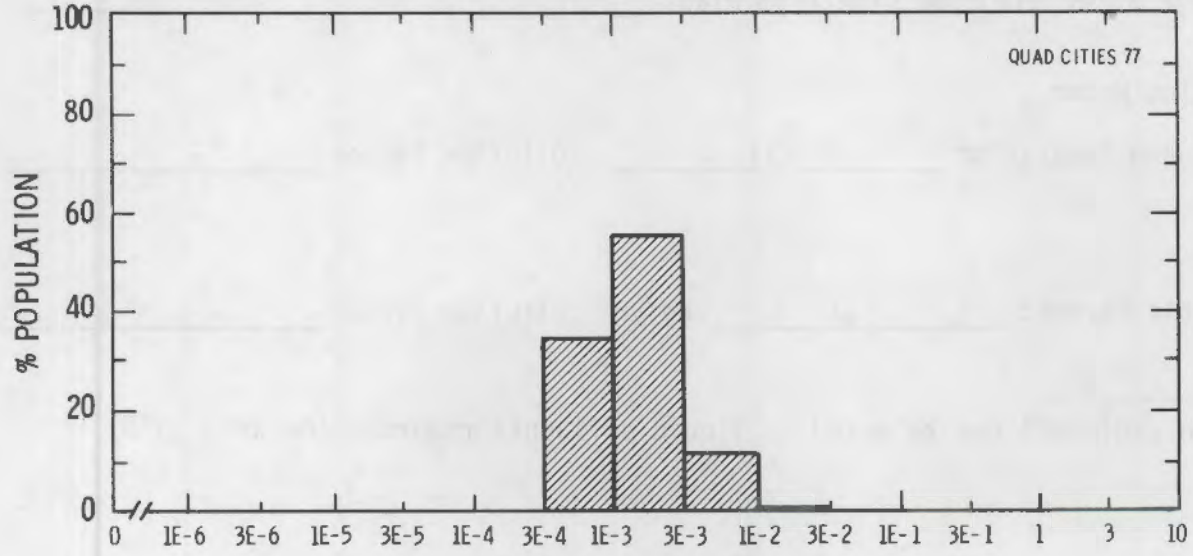
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.8E-02	1.8E-02	2.9E-01	2.0E-02	2.0E-02	1.9E-02
Child	2.1E-01	2.0E-01	2.8E+00	2.8E-01	2.2E-01	2.1E-01
Teen	1.5E-01	1.5E-01	1.2E+00	1.7E-01	1.5E-01	1.6E-01
Adult	9.1E-01	9.1E-01	4.7E+00	9.7E-01	9.1E-01	9.4E-01
TOTAL	1.3E+00	1.3E+00	9.1E+00	1.4E+00	1.3E+00	1.3E+00

Production/consumption factors:

Produce: <1 Milk: 2.0 Meat: 3.5

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE
TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site RANCHO SECO SACRAMENTO COUNTY, CALIFORNIA

Location N 38.3461° W 121.1186°

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

Major Metropolitan Centers Within Region

Center	Population	Location	
Sacramento	870,000	35 km	NNW
Stockton	120,000	45 km	SW

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

Veg 4.8E7 kg Milk 2.3E8 ℓ Meat 5.0E7 kg

Regional Productivity Factor 1

Animal Grazing Factor 0.9

Location of Meteorological Station Site Recovery 98%

Period of Record 1 FEB 75 - 31 JAN 76

Average Water Dilution Flow from Plant (a) ft^3/s

Drinking Water

Exposed Population (a) Dilution Factor -

Fish

Edible Harvest (a) kg/yr Dilution Factor -

(a) No radionuclides released in liquid effluents reported (Decker, 1979).

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

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
TOTAL	0	0	0	0	0

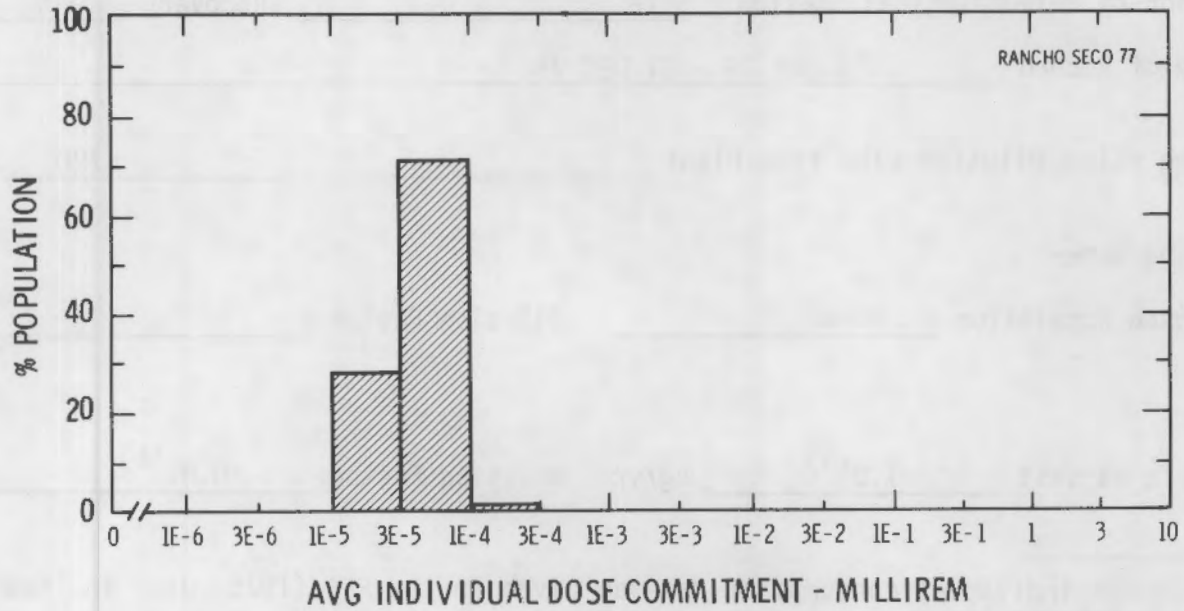
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	9.3E-04	9.2E-04	3.2E-03	8.2E-04	9.3E-04	9.8E-04
Child	1.1E-02	1.1E-02	2.3E-02	9.2E-03	1.1E-02	1.1E-02
Teen	7.6E-03	7.5E-03	1.2E-02	6.6E-03	7.6E-03	8.7E-03
Adult	4.5E-02	4.5E-02	6.0E-02	4.0E-02	4.5E-02	4.8E-02
TOTAL	6.4E-02	6.4E-02	9.8E-02	5.7E-02	6.4E-02	7.0E-02

Production/consumption factors:

Produce: <1 Milk: 1.2 Meat: <1

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site H. B. ROBINSON HARTSVILLE, SOUTH CAROLINA

Location N 34.4014° W 80.1567°

Total Population Within 2-to-80-km Region 6.4E5

Major Metropolitan Centers Within Region

Center	Population	Location
Florence	29,000	40 km SE
Sumter	27,000	53 km SSW

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

Veg 7.4E6 kg Milk 5.7E7 ℓ Meat 5.0E7 kg

Regional Productivity Factor 1

Animal Grazing Factor 0.8

Location of Meteorological Station Site . Recovery 94%

Period of Record 1 JAN 75 - 31 DEC 75

Average Water Dilution Flow from Plant 720 ft^3/s

Drinking Water

Exposed Population None Dilution Factor -

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 (FES, 1975).

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

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	1.9E-02	2.0E-03	3.4E-04	8.7E-02	1.0E-01
Teen	3.7E-02	4.0E-03	2.9E-04	5.3E-02	9.0E-02
Adult	3.9E-01	3.4E-02	2.2E-03	3.1E-01	5.3E-01
TOTAL	4.5E-01	4.0E-02	2.8E-03	4.5E-01	7.3E-01

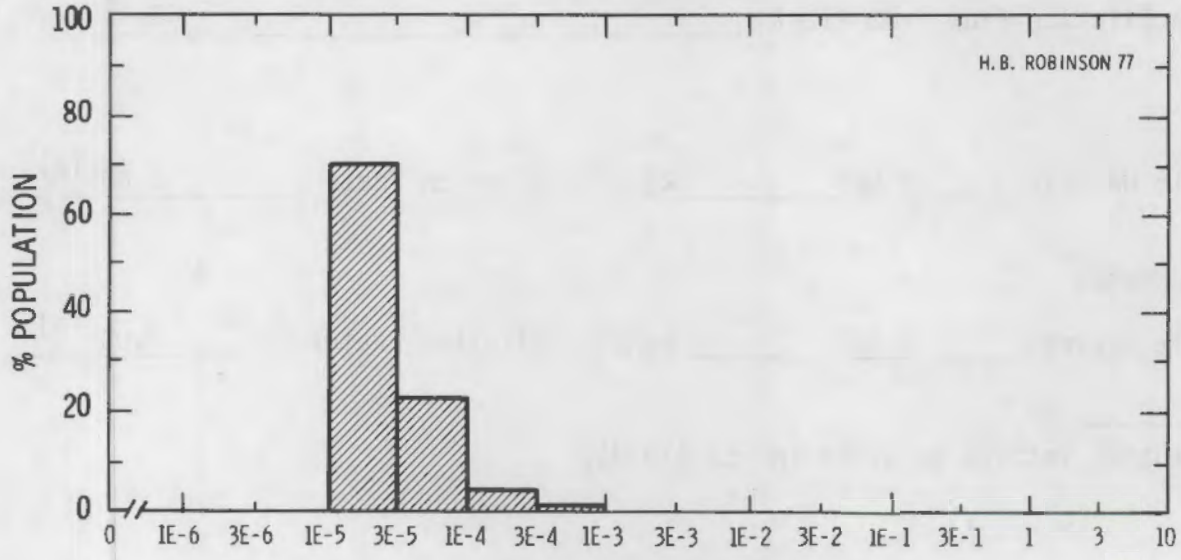
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	3.1E-04	3.1E-04	1.7E-03	1.5E-04	3.1E-04	3.2E-04
Child	4.1E-03	4.1E-03	1.2E-02	1.6E-03	4.1E-03	4.2E-03
Teen	2.8E-03	2.8E-03	6.1E-03	1.2E-03	2.8E-03	3.0E-03
Adult	1.7E-02	1.7E-02	2.8E-02	7.1E-03	1.7E-02	1.7E-02
TOTAL	2.4E-02	2.4E-02	4.8E-02	1.0E-02	2.4E-02	2.5E-02

Production/consumption factors:

Produce: <1 Milk: <1 Meat: <1

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE
TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site ST. LUCIE FORT PIERCE, FLORIDA

Location N 27.4466° W 80.3266°

Total Population Within 2-to-80-km Region 2.9E5

Major Metropolitan Centers Within Region

Center	Population	Location	
West Palm Beach	71,000	80 km	SSE
Ft. Pierce	37,000	13 km	NW
Vero Beach	15,000	40 km	NNW

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

Veg 2.8E7 kg Milk 1.1E8 ℓ Meat 7.2E7 kg

Regional Productivity Factor 0.5

Animal Grazing Factor 1

Location of Meteorological Station Site Recovery 92%

Period of Record 1 JAN 76 - 31 DEC 76

Average Dilution Flow from Plant 41 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 OOSE-COMMITMENT ESTIMATES AND
AVERAGE INOIVIDUAL OOSE-COMMITMENT HISTOGRAM FOR
ST. LUCIE

Oose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	7.0E-03	2.6E-02	5.8E-02	1.3E-02	1.1E-02
Teen	6.6E-03	5.5E-02	4.1E-02	9.3E-03	9.4E-03
Adult	5.3E-02	4.8E-01	2.7E-01	6.0E-02	5.6E-02
TOTAL	6.7E-02	5.6E-01	3.7E-01	8.3E-02	7.7E-02

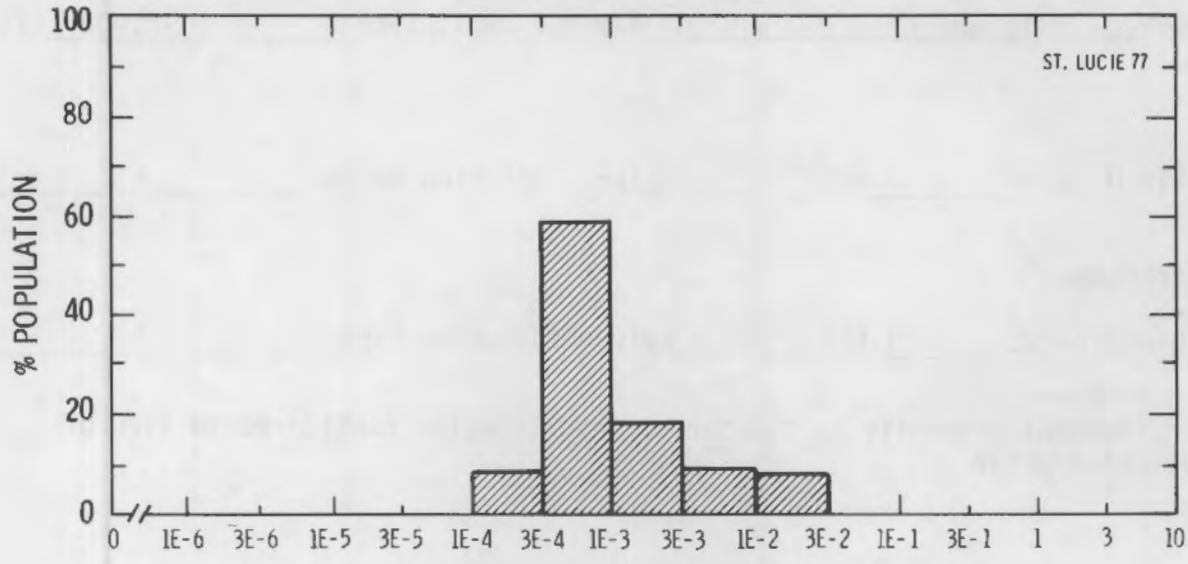
Oose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	8.1E-03	8.1E-03	2.8E-02	7.5E-03	8.2E-03	8.7E-03
Child	9.4E-02	9.4E-02	2.1E-01	8.4E-02	9.4E-02	1.0E-01
Teen	6.9E-02	6.9E-02	1.2E-01	6.1E-02	6.9E-02	8.0E-02
Adult	4.1E-01	4.1E-01	6.0E-01	3.7E-01	4.1E-01	4.5E-01
TOTAL	5.8E-01	5.8E-01	9.6E-01	5.2E-01	5.9E-01	6.4E-01

Production/consumption factors:

Produce: <1 Milk: 1.5 Meat: 1.6

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE
TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site SALEM SALEM, NEW JERSEY

Location N 39.4628° W 75.5356°

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

Major Metropolitan Centers Within Region

Center	Population	Location
Philadelphia SMSA	4,850,000	64 km NE
Wilmington	501,000	29 km N
Chester	56,600	45 km NNE

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

Veg 7.4E7 kg Milk 2.7E8 ℓ Meat 2.4E7 kg

Regional Productivity Factor 0.9

Animal Grazing Factor 0.6

Location of Meteorological Station Site Recovery 95%

Period of Record 1 JUN 70 - 31 MAY 71

Average Delaware 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

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	1.5E-02	3.0E-02	5.6E-04	4.3E-03	1.3E-02
Teen	1.0E-02	6.3E-02	4.1E-04	2.6E-03	1.1E-02
Adult	6.2E-02	5.6E-01	2.9E-03	1.6E-02	7.0E-02
TOTAL	8.7E-02	6.5E-01	3.8E-03	2.3E-02	9.4E-02

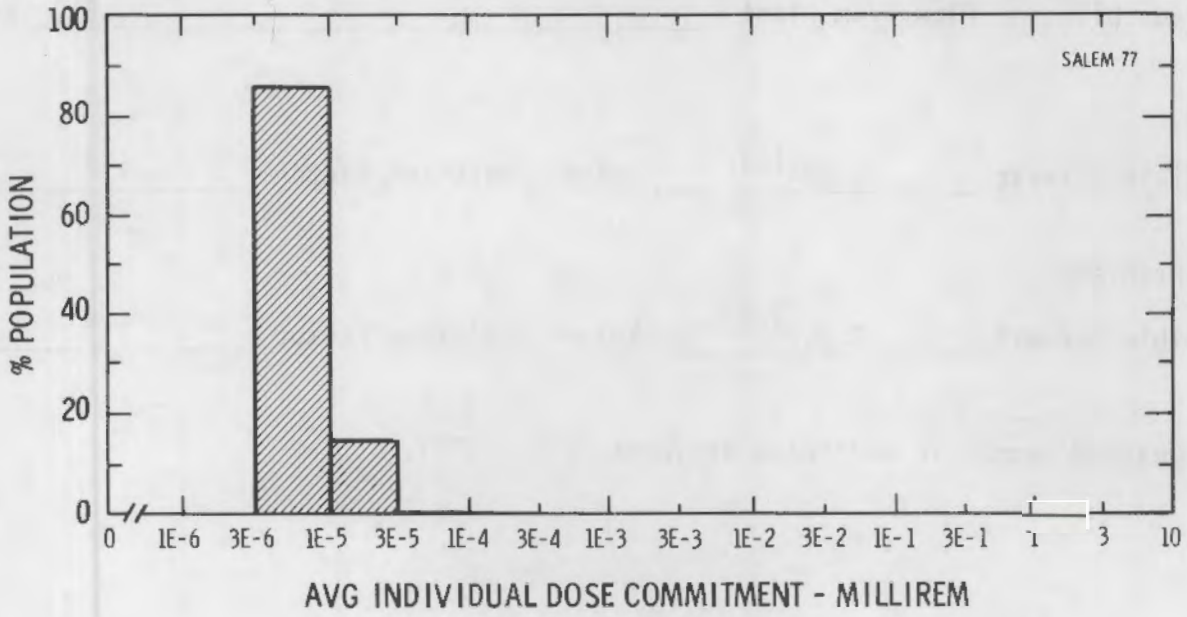
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	4.6E-04	4.6E-04	4.6E-04	2.9E-05	4.6E-04	4.6E-04
Child	6.8E-03	6.8E-03	6.8E-03	3.6E-04	6.8E-03	6.8E-03
Teen	4.7E-03	4.6E-03	4.6E-03	2.3E-04	4.6E-03	4.7E-03
Adult	2.6E-02	2.6E-02	2.6E-02	1.2E-03	2.6E-02	2.6E-02
TOTAL	3.8E-02	3.7E-02	3.7E-02	1.8E-03	3.7E-02	3.8E-02

Production/consumption factors:

Produce: <1 Milk: <1 Meat: <1

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site SAN ONOFRE CAMP PENDLETON, CALIFORNIA

Location N 33.3686° W 117.5544°

Total Population Within 2-to-80-km Region 3.8E6

Major Metropolitan Centers Within Region

Center	Population	Location	
San Diego SMSA	1,400,000	68 km	SSE
Riverside	150,000	69 km	NE
Anaheim	180,000	69 km	NNW
Santa Ana	170,000	55 km	NNW

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

Veg 4.8E7 kg Milk 2.3E8 ℓ Meat 5.0E7 kg

Regional Productivity Factor 0.6

Animal Grazing Factor 1

Location of Meteorological Station Site Recovery 88%

Period of Record 25 JAN 73 - 24 JAN 76

Average Dilution Flow from Plant 510 ft^3/s

Fish

Edible Harvest 2.9E4(a) kg/yr Dilution Factor 1(a)

Invertebrates

Edible Harvest 2.9E3(a) kg/yr Dilution Factor 1(a)

(a) Seafood caught in undiluted effluent (FES, 1973).

POPULATION DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
SAN ONOFRE

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	4.6E-02	1.5E-01	3.9E-03	1.5E-01	1.7E-01
Teen	6.4E-02	3.2E-01	3.0E-03	8.8E-02	1.5E-01
Adult	6.3E-01	2.9E+00	2.1E-02	5.1E-01	8.7E-01
TOTAL	7.4E-01	3.3E+00	2.8E-02	7.5E-01	1.2E+00

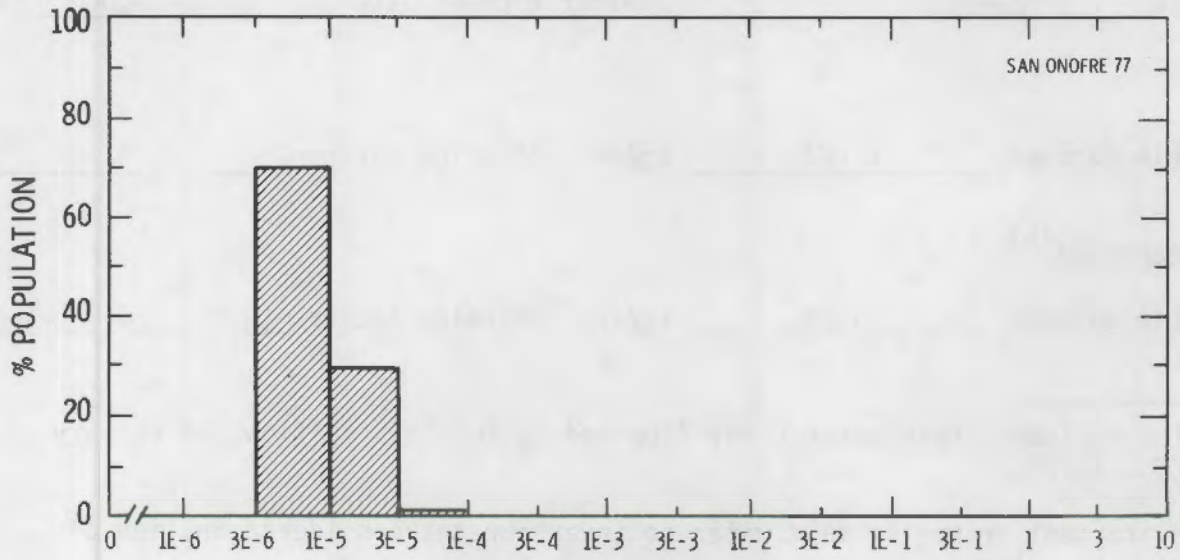
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	4.3E-04	4.3E-04	6.4E-04	8.1E-05	4.3E-04	4.3E-04
Child	6.1E-03	6.1E-03	7.3E-03	9.0E-04	6.1E-03	6.2E-03
Teen	4.3E-03	4.3E-03	4.8E-03	6.6E-04	4.3E-03	4.5E-03
Adult	2.5E-02	2.5E-02	2.6E-02	4.0E-03	2.5E-02	2.5E-02
TOTAL	3.6E-02	3.6E-02	3.9E-02	5.6E-03	3.6E-02	3.6E-02

Production/consumption factors:

Produce: <1 Milk: <1 Meat: <1

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE
TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site SURRY SURRY COUNTY, VIRGINIA

Location N 37.1664° W 76.6972°

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

Major Metropolitan Centers Within Region

Center	Population	Location	
Newport News SMSA	370,000	16 km	ESE
Norfolk SMSA	800,000	50 km	SE
Richmond SMSA	590,000	78 km	NW

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

Veg 3.5E7 kg Milk 1.5E8 ℓ Meat 7.4E7 kg

Regional Productivity Factor 0.8

Animal Grazing Factor 0.7

Location of Meteorological Station Site Recovery 91%

Period of Record 3 MAR 74 - 2 MAR 75

Average James River Flow at Site 25,000 ft^3/s

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 (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 & 2

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	2.2E-01	3.1E-01	2.7E+00	3.2E-01	4.3E-01
Teen	2.2E-01	6.6E-01	1.9E+00	1.9E-01	3.6E-01
Adult	1.9E+00	5.8E+00	1.2E+01	1.1E+00	2.2E+00
TOTAL	2.4E+00	6.8E+00	1.7E+01	1.6E+00	3.0E+00

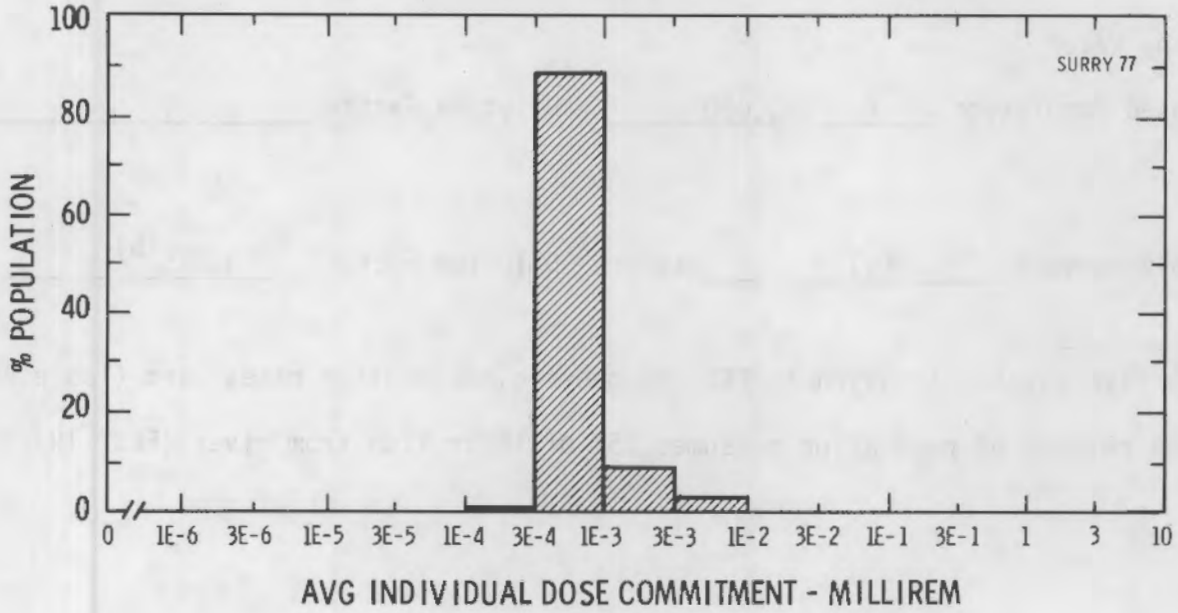
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.8E-02	1.8E-02	8.9E-02	1.2E-02	1.8E-02	1.9E-02
Child	2.2E-01	2.2E-01	6.7E-01	1.3E-01	2.3E-01	2.4E-01
Teen	1.6E-01	1.6E-01	3.5E-01	9.3E-02	1.6E-01	1.8E-01
Adult	9.3E-01	9.3E-01	1.6E+00	5.6E-01	9.3E-01	1.0E+00
TOTAL	1.3E+00	1.3E+00	2.7E+00	7.9E-01	1.3E+00	1.4E+00

Production/consumption factors:

Produce: <1 Milk: <1 Meat: <1

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site THREE MILE ISLAND — THREE MILE ISLAND, PENNSYLVANIA

Location N 40.1533° W 76.7269°

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

Major Metropolitan Centers Within Region

Center	Population	Location	
Lancaster SMSA	320,000	40 km	ESE
Harrisburg SMSA	410,000	16 km	NW
Reading SMSA	300,000	71 km	ENE
York SMSA	330,000	23 km	S

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

Veg 5.3E7 kg Milk 5.3E8 ℓ Meat 5.4E7 kg

Regional Productivity Factor 1

Animal Grazing Factor 0.5

Location of Meteorological Station Site Recovery 80%

Period of Record 1 OCT 72 - 30 SEP 73

Average Susquehanna River Flow at Site 34,000 ft^3/s

Drinking Water

Exposed Population 200,000 Dilution Factor 1

Fish

Edible Harvest (a) kg/yr Dilution Factor 0.025(b)

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

(b) Ten percent of population consumes 25% of their fish from river (FES, 1972).

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

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	1.1E-03	9.6E-04	1.3E-03	1.0E-03	2.3E-03
Child	2.2E-02	1.1E-02	1.3E-02	5.1E-02	7.1E-02
Teen	2.3E-02	5.0E-03	5.0E-03	2.7E-02	5.0E-02
Adult	2.4E-01	4.3E-02	4.1E-02	1.6E-01	3.1E-01
TOTAL	2.8E-01	6.0E-02	6.1E-02	2.4E-01	4.3E-01

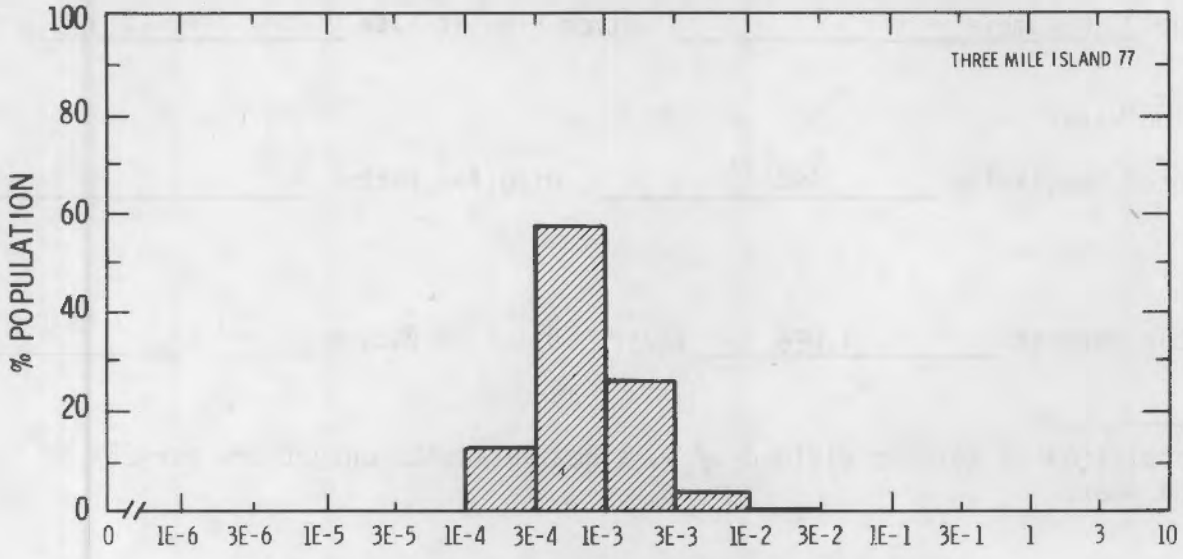
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	2.4E-02	2.4E-02	4.6E-02	2.2E-02	2.5E-02	2.6E-02
Child	2.8E-01	2.8E-01	4.2E-01	2.5E-01	2.8E-01	3.1E-01
Teen	2.0E-01	2.0E-01	2.6E-01	1.8E-01	2.0E-01	2.4E-01
Adult	1.2E+00	1.2E+00	1.4E+00	1.1E+00	1.2E+00	1.3E+00
TOTAL	1.7E+00	1.7E+00	2.2E+00	1.5E+00	1.7E+00	1.9E+00

Production/consumption factors:

Produce: <1 Milk: 2.2 Meat: <1

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site TROJAN PRESCOTT, OREGON

Location N 46.0372° W 122.8847°

Total Population Within 2-to-80-km Region 1.3E6

Major Metropolitan Centers Within Region

Center	Population	Location	
Portland SMSA	1.1E6	63 km	SSE
Longview	30,000	14 km	NNW
Astoria	11,000	72 km	WNW

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

Veg 6.4E7 kg Milk 3.7E7 ℓ Meat 2.6E7 kg

Regional Productivity Factor 0.9

Animal Grazing Factor 0.75

Location of Meteorological Station Site Recovery 90%

Period of Record 1 SEP 71 - 31 AUG 74

Average Columbia River Flow at Site 2.3E5 ft^3/s

Drinking Water

Exposed Population 490(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 Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	8.9E-07	8.2E-07	1.5E-D5	4.4E-07	8.3E-07
Child	1.4E-03	1.4E-03	2.7E-03	6.0E-03	6.1E-03
Teen	2.2E-03	3.0E-03	1.9E-03	3.6E-03	5.1E-03
Adult	2.2E-02	2.6E-02	1.2E-02	2.1E-02	3.0E-02
TOTAL	2.6E-02	3.1E-02	1.7E-02	3.1E-02	4.1E-02

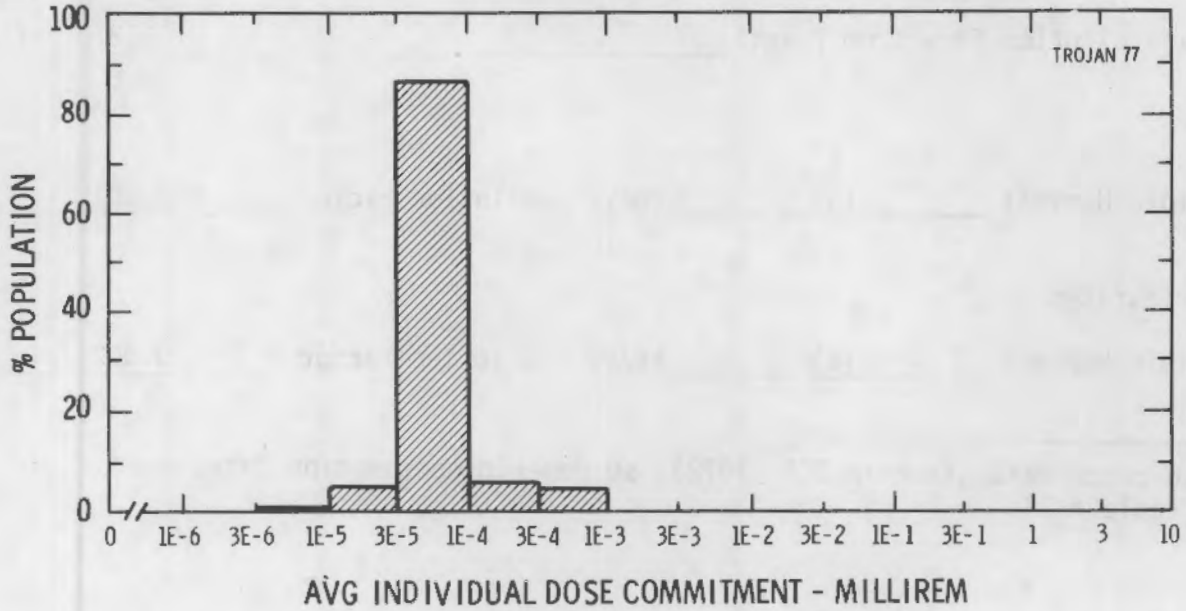
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.2E-03	1.2E-03	6.4E-03	1.3E-03	1.2E-03	1.3E-03
Child	1.5E-02	1.3E-02	6.6E-02	2.1E-02	1.3E-02	1.5E-02
Teen	1.0E-02	9.8E-03	3.4E-02	1.4E-02	9.7E-03	1.2E-02
Adult	6.2E-02	5.9E-02	1.6E-01	8.0E-02	5.9E-02	6.6E-02
TOTAL	8.8E-02	8.3E-02	2.7E-01	1.2E-01	8.3E-02	9.5E-02

Production/consumption factors:

Produce: <1 Milk: <1 Meat: <1

FRACTION OF PDPULATION RECEIVING AN INDICATED AVERAGE TDTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site TURKEY POINT DADE COUNTY, FLORIDA

Location N 25.4336° W 80.3317°

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

Major Metropolitan Centers Within Region

Center	Population	Location
Miami SMSA	1,500,000	48 km NNE

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

Veg 2.8E7 kg Milk 1.1E8 ℓ Meat 7.2E7 kg

Regional Productivity Factor 0.4

Animal Grazing Factor 1

Location of Meteorological Station Site Recovery 98%

Period of Record 1 JAN 73 - 31 DEC 73

Average Dilution Flow from Plant 3,310 ft^3/s

Fish

Edible Harvest (a) kg/yr Dilution Factor 0.001

Invertebrates

Edible Harvest (a) kg/yr 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 & 4

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	1.7E-03	4.1E-03	6.9E-02	3.3E-03	4.2E-03
Teen	1.9E-03	8.5E-03	4.9E-02	2.0E-03	3.6E-03
Adult	1.7E-02	7.5E-02	3.2E-01	1.1E-02	2.1E-02
TOTAL	2.0E-02	8.7E-02	4.4E-01	1.7E-02	2.9E-02

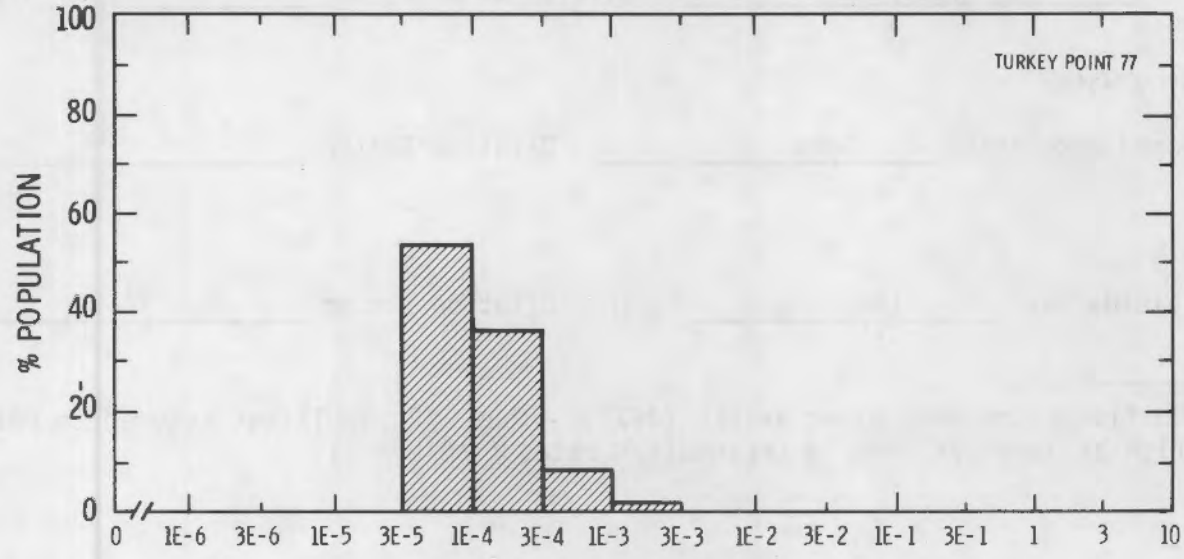
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	5.9E-03	5.3E-03	5.0E-01	6.6E-03	6.8E-03	5.7E-03
Child	6.3E-02	5.9E-02	2.8E+00	6.7E-02	6.7E-02	6.6E-02
Teen	4.5E-02	4.4E-02	1.1E+00	4.5E-02	4.7E-02	5.1E-02
Adult	2.7E-01	2.7E-01	3.7E+00	2.7E-01	2.7E-01	2.9E-01
TOTAL	3.8E-01	3.7E-01	8.1E+00	3.8E-01	3.9E-01	4.1E-01

Production/consumption factors:

Produce: <1 Milk: <1 Meat: <1

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE
TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site VERMONT YANKEE VERNON, VERMONT

Location N 42.7803° W 72.5158°

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

Major Metropolitan Centers Within Region

Center	Population	Location	
Pittsfield	58,000	70 km	SW
Springfield SMSA	620,000	72 km	S
Worcester SMSA	680,000	80 km	SE

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

Veg 4.4E6 kg Milk 7.3E8 ℓ Meat 2.7E7 kg

Regional Productivity Factor 1

Animal Grazing Factor 0.4

Location of Meteorological Station Site Recovery 97%

Period of Record 1 APR 75 - 31 MAR 76

Average Connecticut River Flow at Site 10,000 ft^3/s

Drinking Water

Exposed Population None Dilution Factor -

Fish

Edible Harvest (a) kg/yr Dilution Factor 0.5(a)

(a) No fish catch data given in FES (1972). Thus 1/2 population assumed to eat fish at level of generic consumption rates (Table A-1).

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

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	1.1E-02	1.7E-03	1.8E-03	5.6E-02	6.0E-02
Teen	2.0E-02	3.5E-03	1.3E-03	3.4E-02	5.0E-02
Adult	2.1E-01	3.0E-02	8.5E-03	2.0E-01	3.0E-01
TOTAL	2.4E-01	3.5E-02	1.2E-02	2.9E-01	4.1E-01

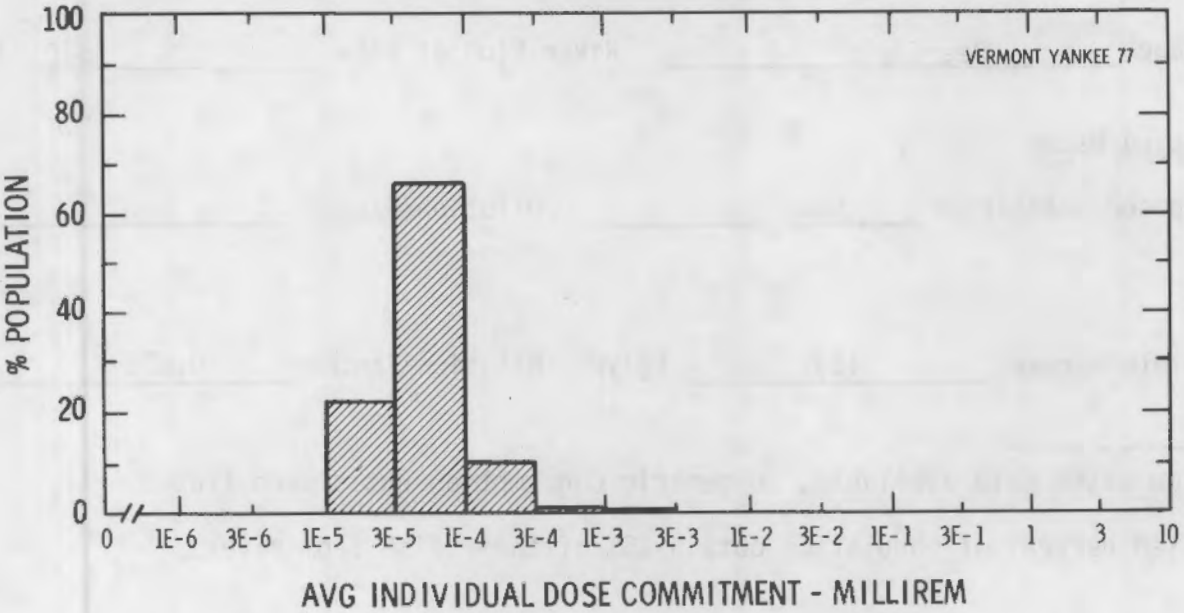
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.9E-03	1.9E-03	6.2E-03	1.5E-03	2.0E-03	2.1E-03
Child	2.2E-02	2.1E-02	5.1E-02	1.6E-02	2.2E-02	2.5E-02
Teen	1.5E-02	1.5E-02	3.0E-02	1.2E-02	1.6E-02	1.9E-02
Adult	9.0E-02	9.1E-02	1.5E-01	7.1E-02	9.1E-02	1.0E-01
TOTAL	1.3E-01	1.3E-01	2.4E-01	1.0E-01	1.3E-01	1.5E-01

Production/consumption factors:

Produce: <1 Milk: 4.0 Meat: <1

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE
TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



Site YANKEE ROWE ROWE, MASSACHUSETTS

Location N 42.7281° W 72.9247°

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

Major Metropolitan Centers Within Region

Center	Population	Location
Springfield SMSA	600,000	64 km SSE
Pittsfield	58,000	34 km SW
Albany SMSA	790,000	72 km W

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

Veg 2.0E7 kg Milk 2.6E8 ℓ Meat 1.6E7 kg

Regional Productivity Factor 1

Animal Grazing Factor 0.5

Location of Meteorological Station Site Recovery 94%

Period of Record 1 OCT 71 - 30 SEP 72

Average Deerfield River Flow at Site 570 ft^3/s

Drinking Water

Exposed Population None Dilution Factor

Fish

Edible Harvest (a) kg/yr 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 Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	1.6E-02	1.2E-02	2.1E-02	7.1E-02	4.0E-02
Teen	1.7E-02	9.2E-03	1.4E-02	4.2E-02	3.2E-02
Adult	1.5E-01	6.3E-02	9.2E-02	2.4E-01	1.9E-01
TOTAL	1.8E-01	8.4E-02	1.3E-01	3.5E-01	2.6E-01

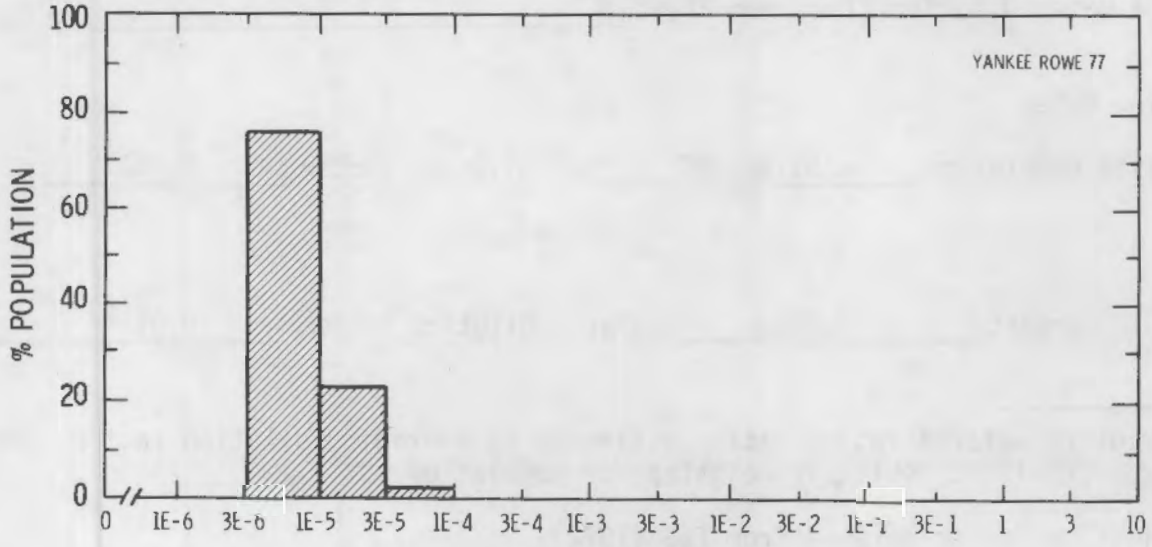
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	6.9E-04	6.9E-04	7.3E-04	2.7E-03	6.9E-04	6.9E-04
Child	5.0E-03	5.0E-03	5.3E-03	1.9E-02	5.0E-03	5.1E-03
Teen	2.0E-03	2.0E-03	2.2E-03	6.2E-03	2.0E-03	2.2E-03
Adult	8.6E-03	8.6E-03	9.0E-03	2.0E-02	8.6E-03	9.0E-03
TOTAL	1.6E-02	1.6E-02	1.7E-02	4.8E-02	1.6E-02	1.7E-02

Production/consumption factors:

Produce: <1 Milk: 1.3 Meat: <1

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE
TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



AVG INDIVIDUAL DOSE COMMITMENT - MILLIREM

Site ZION ZION, ILLINOIS

Location N 42.4594° W 87.8061°

Total Population Within 2-to-80-km Region 7.0E6

Major Metropolitan Centers Within Region

Center	Population	Location	
Chicago SMSA (2/3)	4,600,000	64 km	SSE
Milwaukee	1,400,000	64 km	N
Kenosha	80,000	14 km	NNW

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

Veg 1.1E8 kg Milk 1.8E8 ℓ Meat 1.9E8 kg

Regional Productivity Factor 0.5

Animal Grazing Factor 0.5

Location of Meteorological Station Site Recovery 88%

Period of Record 1 JAN 74 - 31 DEC 75

Average Water Dilution Flow from Plant 1100 ft^3/s

Drinking Water

Exposed Population 6,700,000 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 (1972).

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

Dose Commitments (person-rem) from Liquid Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	1.5E-01	1.4E-01	1.4E-01	1.2E-01	2.9E-01
Child	1.9E+00	1.6E+00	1.6E+00	1.9E+00	3.8E+00
Teen	1.1E+00	7.0E-01	6.0E-01	7.4E-01	1.8E+00
Adult	1.0E+01	6.0E+00	5.1E+00	4.4E+00	1.2E+01
TOTAL	1.3E+01	8.4E+00	7.4E+00	7.2E+00	1.8E+01

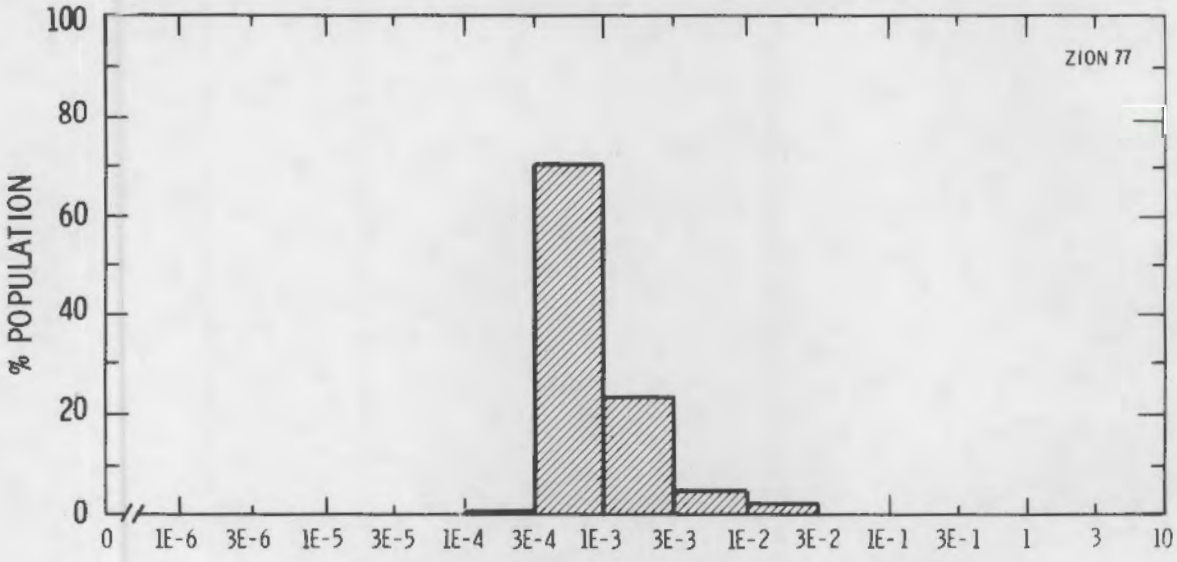
Dose Commitments (person-rem) from Airborne Pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	1.4E-01	1.3E-01	1.5E-01	1.4E-01	1.4E-01	1.4E-01
Child	1.5E+00	1.5E+00	1.6E+00	1.6E+00	1.6E+00	1.6E+00
Teen	1.1E+00	1.1E+00	1.2E+00	1.1E+00	1.1E+00	1.2E+00
Adult	6.7E+00	6.7E+00	6.9E+00	6.7E+00	6.7E+00	7.2E+00
TOTAL	9.5E+00	9.4E+00	9.8E+00	9.5E+00	9.6E+00	1.0E+01

Production/consumption factors:

Produce: <1 Milk: <1 Meat: <1

FRACTION OF POPULATION RECEIVING AN INDICATED AVERAGE
TOTAL-BODY DOSE COMMITMENT FROM AIRBORNE PATHWAYS



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Noshkin, V. E., W. L. Robison and F. L. Harrison. 1976. Radiological Dose to Man Through the Marine Pathway from Reactor Operations at Humboldt Bay, California, UCRL-52160. Lawrence Livermore Laboratory, Livermore, CA.

*Available for purchase from the NRC/GPO Sales Program, U.S. Nuclear Regulatory Commission, Washington, DC 20555, and the National Technical Information Service, Springfield, VA 22161.

APPENDIX

APPENDIX

MODELS

The calculational models used were primarily those given in the Nuclear Regulatory Commission's Regulatory Guide 1.109 (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%, teen-ager; 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 (Table 3). The generic parameters used for this study such as consumption rates, occupancy factors and holdup times are given in Table 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 (1977). Bioaccumulation factors and terrestrial food transfer factors were taken from Regulatory Guide 1.109 (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]

Pathway	Infant	Child	Teen-ager	Adult
Fruits, vegetables and grain (kg/yr)	0	200	240	190
Milk (ℓ/yr)	170	170	200	110
Meat and poultry (kg/yr)	0	37	59	95
Fish (kg/yr)[b]	0	2.2	5.2	6.9
Invertebrates (kg/yr)	0	0.33	0.75	1.0
Drinking water (ℓ/yr)	170[c]	260	260	370
Inhalation (m^3/yr)	1400[d]	3700	8000	8000
Air submersion and ground irradiation occupancy factor	0.5	0.5	0.5	0.5

(a) Regulatory Guide 1.109 (1977)
(b) Both fresh- and saltwater
(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]

Food	Holdup Time (days)
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 (1977)
(b) Value given is time after milking or slaughter. For the portion of the time animals were fed stored feed, an additional 90 days was added to the holdup time.

RELEASES

The doses were estimated using the measured releases as reported by the site operators for 1977 (Decker, 1979).[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 half-lives, 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 will be as though an additional equilibrium amount of the daughter nuclide is specified. The daughter nuclide itself will be included separately if it can be released independently of the parent and/or if it has a relatively long half-life.

METEORDLDGY

When more than one set of meteorological (joint frequency) data were 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 ten radii from 2 to 80 km (see Table A-4) using the NRC computer program XOQDOQ (Sagendorf 1977).

(a) Very short-lived isotopes such as Kr-90, 91, 93, 94, Xe-139, 140, 141, 143 and Rb-88M; those not likely to be produced; and those which 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+0	1.14E-05	83	Np-239	3.42E-06
42	Nb-95	2.29E-07			

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

Interval	Midpoint
2 - 3	2.5
3 - 4	3.5
4 - 6	5
6 - 9	7.5
9 - 14	11.5
14 - 20	17
20 - 30	25
30 - 40	35
40 - 60	50
60 - 80	70

The XOQDOQ program generates four sets of atmospheric transport factors:

- average annual atmospheric dilution factors which are not corrected for cloud depletion or radioactive decay
- dilution factors which are only corrected for decay assuming a 2.26-day half-life
- dilution factors which 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 GASPAR program (Eckerman 1976). Except for the two additional sites, the transport factors used this year were the same as those used for the 1976 estimates. The assumptions used in the calculation of these transport factors were as follows:

- 50-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 Decker (1979) 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 by using a computer program and data base derived from the 1970 census. The program and data base were developed by the Department of Commerce and subsequently adopted by the Environmental Protection Agency (EPA) for use with population exposure problems (Athey, Tell and Janis 1974, Hill 1977).

The population data base used was an edited and compressed version of the 1970 Census Bureau's Master Enumeration District List with Coordinates. It contains housing and population counts for each census enumeration district and the geographic coordinates of the population centroid for each district. Using a modified version of the EPA program and the data base, the population in each of the 160 segments around each site was estimated from a distance of 2 to 80 km. The populations for 1977 were estimated using the "net increase" factors by state over the population values for 1970 as given in Statistical Abstract of the United States, 1978 (Table 12).

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 $\div$ consumption (production/consumption < 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 it is concerned only with the dose within the 80-km radius. These production/consumption factors are given as footnotes to the tables showing airborne dose commitment in the Site Summary section for reference.

ORINKING WATER

The population between 2 and 80 km of 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 consumption rates used are given in Table A-1 for drinking water.

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) which consume 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 was used to estimate aquatic food consumption rates for the population in the region. When this data was not found in the ES or was 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, a generic value of 0.001 and 0.002 was 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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16. ABSTRACT *(200 words or less)*

Population radiation dose commitments have been estimated from reported radionuclide releases from commercial power reactors operating during 1977. 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 site. This report tabulates the results of these calculations, showing the dose commitments for both liquid and airborne pathways for each age group and organ. The total dose commitment from both liquid and airborne pathways ranged from a high of 220 person-rem to a low of 0.003 person-rem with an arithmetic mean of 16 person-rem. The total population dose for all sites was estimated at 700 person-rem for the 92 million people considered at risk. The average individual dose commitment from all pathways on a site basis ranged from a low of 2×10^{-5} mrem to a high of 0.1 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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