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Population Dose Commitments Due to Radioactive Releases from Nuclear Power Plant Sites in 1978

Prepared by R. A. Peloquin, J. D. Schwab, D. A. Baker

Pacific Northwest Laboratory
Operated by
Battelle Memorial Institute

Prepared for
U.S. Nuclear Regulatory
Commission

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PREVIOUS REPORTS IN THIS SERIES

1. Population Dose Commitments Due to Radioactive Releases from Nuclear Power Plant Sites in 1975, PNL-2439, October 1977.
2. Population Dose Commitments Due to Radioactive Releases from Nuclear Power Plant Sites in 1976, NUREG/CR-1125, PNL-2940, December 1979.
3. Population Dose Commitments Due to Radioactive Releases from Nuclear Power Plant Sites in 1977, NUREG/CR-1498, PNL-3324, October 1980.

ABSTRACT

Population radiation dose commitments have been estimated from reported radionuclide releases from commercial power reactors operating during 1978. 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 200 person-rem to a low of 0.0004 person-rem with an arithmetic mean of 14 person-rem. The total population dose for all sites was estimated at 660 person-rem for the 93 million people considered at risk.

The average individual dose commitment from all pathways on a site basis ranged from a low of 3×10^{-6} mrem to a high of 0.08 mrem. No attempt was made in this study to determine the maximum dose commitment received by any one individual from the radionuclides released at any of the sites.

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INTRODUCTION

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 67 commercial power reactors operating during 1978. This work is a continuation of the study done for 1975, 1976 and 1977 releases (Baker, Soldat and Watson 1977, Baker 1979 and 1980). 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 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 1978. We estimated the numbers of persons by extrapolating Bureau of Census data for 1970 to 1978. 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.

(a) As used in this report, dose commitment describes the total-body dose equivalent received over 50 years from intake during the year 1978.

The reactors included in this study, their type, licensed thermal power rating and net electrical output for 1978 are listed in Table 4. Those reactors which had an operating augmented gaseous radioactive waste system in 1978 are identified in the table. Populations at risk and the dose commitments derived in the 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 1978 population within 2 to 80 km around the site. This population is derived from the 1970 census by extrapolation to 1978. In addition, the location of major metropolitan centers within 80 km are listed along with their 1978 extrapolated populations. The populations of the Standard Metropolitan Statistical Areas (SMSA) are given where applicable. Next, the site-specific data pertinent to the airborne pathways are specified. The average production rates of vegetable crops and animal products are given for the area within an 80-km radius based upon the statewide average. This production has been reduced for sites on lakes and seacoasts to account for the presence of the body of water. An animal grazing factor is estimated for each site location. This factor accounts for the fraction of the year during which grazing animals such as milk cows and beef cattle graze on fresh pasture in the region around the site. After average production rates are given, the period of record and the percent data recovery of the meteorological data used in calculating diffusion factors is indicated.

Various site-dependent factors associated with the waterborne pathways are presented next. For lake and ocean sites, we used the average dilution of plant effluents for the year 1978 specified by Tichler and Benkovitz (1981). 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 1978 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.

TABLE 1. Organs Considered in This Study

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

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

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

**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 Tenn. Valley Authority
3	Cooper Station	50-298	Feb 73	Draft ES
4	Dresden			ES of Dresden 2,3 used
4	Dresden 2,3	50-237,50-249	Nov 73	
5	Beaver Valley	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	50-220	Jan 74	
11	Oyster Creek	50-219	Dec 74	
12	Peach Bottom 2,3	50-277,50-278	Apr 73	
13	Pilgrim	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	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	Mar 72	
		50-287		
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	50-206	Oct 73	
35	Surry 1,2	50-281	Jun 72	ES of Surry 2 used
36	Three Mile Island	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	50-317	Apr 73	
41	Cook	50-315	Aug 73	
42	Trojan	50-344	Jan 73	Draft ES
43	Rancho Seco	50-312	Mar 73	
44	Crystal River	50-302	May 73	
45	Davis-Besse	50-346	Mar 73	
46	J. M. Farley(b)	50-348,50-364	Jun 72	
47	North Anna(b)	50-338,50-339	Apr 73	

(a) Environmental Statement

(b) Added for 1978

TABLE 4. Reactor Characteristics and Population Total-Body Dose Commitments, 1978

Site	Unit	Type	Licensed Thermal Power (MW)	Electric Energy Generation 1978 ^(a) (TW.hr)	Boiling Water Reactor Augmented Radioactive Waste System (1978)	Population Dose Commitment (Person-rem)			Population At Risk	Average Individual Total Body Dose Commitment (mrem)
						Liquid	Air	Total		
Arkansas	1	PWR ^(b)	2568	5.29	-	2.1	0.065	2.2	1.7E5	1.3E-2
Beaver Valley	1	PWR	2652	2.48	-	0.045	0.78	0.83	3.7E6	2.2E-4
Big Rock Point	1	BWR ^(c)	240	0.401	NO	2.2	0.36	2.6	1.3E5	2.0E-2
Brown's Ferry	1	BWR	3293	5.82	YES					
	2	BWR	3293	5.55	YES					
	3	BWR	3293	5.55	YES					
Brown's Ferry	TOTAL		9879	16.92		0.89	1.3	2.2	6.8E5	3.2E-3
Brunswick	1	BWR	2436	5.12	NO					
	2	BWR	2436	4.79	NO					
Brunswick	TOTAL		4872	9.91		0.45	1.8	2.3	1.9E5	1.2E-2
Calvert Cliffs	1	PWR	2700	4.68	-					
	2	PWR	2700	5.23	-					
Calvert Cliffs	TOTAL		5400	9.91		1.9	0.72	2.6	2.4E6	1.1E-3
Cook	1	PWR	3250	6.29	-					
	2	PWR	3391	3.81	-					
Cook	TOTAL		6641	10.10		39	0.53	40	1.1E6	3.6E-2
Cooper Station	1	BWR	2381	4.89	YES	0.012	0.042	0.054	1.8E5	3.0E-4
Crystal River	3	PWR	2452	2.59	-	0.25	0.039	0.29	2.3E5	1.3E-3
Davis-Besse	1	PWR	2772	2.61	-	0.58	0.022	0.60	1.8E6	3.4E-4
Dresden	1	BWR	700	0.759	NO					
	2	BWR	2527	5.70	NO					
	3	BWR	2527	3.83	NO					
Dresden	TOTAL		5754	10.29		0	170	170	6.4E6	2.7E-2
Duane Arnold	1	BWR	1658	1.23	YES	0.68	0.19	0.87	5.7E5	1.5E-3
J. M. Farley	1	PWR	2652	5.92	-	0.0097	0.18	0.19	3.3E5	5.8E-4
J. A. Fitzpatrick	1	BWR	2436	4.20	YES	0.21	0.16	0.37	8.2E5	4.5E-4
Fort Calhoun	1	PWR	1420	2.85	-	0.46	0.015	0.48	7.5E5	6.4E-4
R. E. Ginna	1	PWR	1520	3.22	-	0.11	0.022	0.13	1.1E6	1.2E-4
Haddam Neck	1	PWR	1825	4.71	-	1.2	4.4	5.6	3.3E6	1.7E-3
E. I. Hatch	1	BWR	2436	4.77	YES	0.076	0.011	0.087	2.8E5	3.1E-4
Humboldt Bay	1	BWR	220	0	NO	---	---	---	1.1E5	3.4E-6
Indian Point	1	PWR	615	0	-					
	2	PWR	2758	4.37	-					
	3	PWR	2760	5.46	-					
Indian Point	TOTAL		6133	9.83		0.87	7.5	8.4	1.6E7	5.3E-4
Kewaunee	1	PWR	1650	3.89	-	0.58	0.0097	0.59	6.0E5	9.8E-4
LaCrosse	1	BWR	165	0.174	NO	5.5	0.37	5.9	3.3E5	1.8E-2
Maine Yankee	1	PWR	2440	5.35	-	---	0.026	0.026	5.7E5	4.6E-5
Millstone Point	1	BWR	2011	4.65	NO					
	2	PWR	2560	4.50	-					
Millstone Point	TOTAL		4571	9.15		0.008	200	200	2.5E6	8.0E-2
Monticello	1	BWR	1670	3.86	YES	0	0.20	0.20	2.1E6	9.6E-5
Nine Mile Point	1	BWR	1850	4.47	NO	0	0.071	0.071	8.2E5	8.7E-5
North Anna	1	PWR	2775	3.66	-	0.27	0.21	0.48	9.5E5	5.1E-4
Oconee	1	PWR	2568	5.05	-					
	2	PWR	2568	4.79	-					
	3	PWR	2568	6.06	-					
Oconee	TOTAL		7704	15.90		11	0.73	12	7.5E5	1.6E-2
Oyster Creek	1	BWR	1930	3.65	NO	0.012	110	110	3.3E6	3.3E-2
Palisades	1	PWR	2530	2.62	-	0.10	0.0052	0.11	1.0E6	1.0E-4
Peach Bottom	2	BWR	3293	6.79	YES					
	3	BWR	3293	6.97	YES					
Peach Bottom	TOTAL		6586	13.76		9.3	5.3	15	4.1E6	3.6E-3
Pilgrim	1	BWR	1998	4.38	YES	0.047	7.3	7.3	4.3E6	1.7E-3
Point Beach	1	PWR	1518	3.79	-					
	2	PWR	1518	3.86	-					
Point Beach	TOTAL		3036	7.65		0.069	0.052	0.12	6.0E5	2.0E-4
Prairie Island	1	PWR	1650	3.81	-					
	2	PWR	1650	3.92	-					
Prairie Island	TOTAL		3300	7.73		0.20	0.26	0.46	2.2E6	2.1E-4
Quad Cities	1	BWR	2511	4.72	YES					
	2	BWR	2511	4.43	YES					
Quad Cities	TOTAL		5022	9.15		6.0	1.3	7.3	6.7E5	1.1E-2
Rancho Seco	1	PWR	2772	4.99	-	0	0.15	0.15	1.5E6	9.9E-5
H. B. Robinson	2	PWR	2200	3.98	-	0.40	0.049	0.45	6.4E5	7.0E-4
St. Lucie	1	PWR	2560	5.00	-	0.056	1.0	1.1	2.9E5	3.7E-3
Salem	1	PWR	3338	4.53	-	0.16	0.21	0.37	4.9E6	7.6E-5
San Onofre	1	PWR	1347	2.68	-	1.7	0.051	1.8	3.9E6	4.5E-4
Surry	1	PWR	2441	4.70	-					
	2	PWR	2441	5.37	-					
Surry	TOTAL		4882	10.07		1.1	0.32	1.4	1.8E6	8.1E-4
Three Mile Island	1	PWR	2535	5.67	-					
	2	PWR	2772	0.577	-					
Three Mile Island	TOTAL		5307	6.25		0.63	1.6	2.2	1.8E6	1.2E-3
Trojan	1	PWR	3411	1.67	-	0.024	0.016	0.04	1.3E6	3.0E-5
Turkey Point	3	PWR	2200	4.50	-					
	4	PWR	2200	3.79	-					
Turkey Point	TOTAL		4400	8.29		8.8	0.32	9.1	2.1E6	4.4E-3
Vermont Yankee	1	BWR	1593	3.24	YES	0	0.24	0.24	1.4E6	1.7E-4
Yankee Rowe	1	PWR	600	1.19	-	0.86	3.7	4.6	1.6E6	2.9E-3
Zion	1	PWR	3250	6.77	-					
	2	PWR	3250	6.73	-					
Zion	TOTAL		6500	13.50		16	6.6	23	7.0E6	3.2E-3
TOTAL FOR ALL SITES				273.		110	530	640	9.3E7	
Arithmetic Mean				5.8		2.4	11	14	2.0E6	6.4E-3
Geometric Mean				4.4		0.34	0.30	1.1	1.1E6	9.9E-4

(a) 1 TW.hr = 3.6E15 joules

(b) Pressurized water reactor

(c) Boiling water reactor

(d) Indicates dose commitment <0.001 person-rem.

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 47 sites (67 reactors) studied. The total dose commitments (from both pathways) varied from a high of 200 to a low of 0.0004 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 11 person-rem (see Table 4).

Releases from Monticello, Nine Mile Point, Rancho Seco, Vermont Yankee and Dresden resulted in the smallest doses from liquid pathways (zero to near zero, respectively). This was because no liquid releases were reported for Nine Mile Point, Vermont Yankee, 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 39 person-rem at Cook. 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 Humboldt Bay (0.0002 person-rem); while the highest doses were at Millstone Point (200 person-rem) and Dresden (170 person-rem). The major contributors

(a) See Appendix for definition of segments.

to these doses were the noble gases: Kr-88 and Xe-135. The total population dose commitments from all sites for 1978 were estimated to be 130 person-rem via liquid pathways and 530 person-rem via the airborne pathways (Table 4). Compared to 1977, the "liquid dose" is lower (130 vs. 160); and also, the "air dose" is lower (530 vs. 540). Table 5 compares the total population dose commitments estimated for the past four years.

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, and they are well within all limits. Even the highest site average individual dose commitment of 0.08 mrem (Table 4) from one site (Milestone Point) 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 47 sites taken together. We can see from this plot that about 24% of the total population at risk (93 million) would each receive a dose commitment of between 0.0003 and 0.001 mrem. We can see further that <0.6% receive a dose which is less than 1×10^{-6} mrem. Although not discernible from the plot, 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 (1978) 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.

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

	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
Liquid	76	82	160	130
Air	<u>1300</u>	<u>390</u>	<u>540</u>	<u>530</u>
TOTAL	1400	470	700	660

FIGURE 1. Airborne Population Dose Commitments for the Reactor Sites, 1978

FIGURE 2. Fraction of Total Population Receiving Various Individual Dose Commitments for all Sites, 1978

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

Drinking Water:
 Fish:
 Benthic Harvest: 1.4 (kg/yr)
 Exposed Population: None
 Flow at Site: 36,000 cfs
 Average Arkansas River

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Metecology Period of Record: 1 JAN 75 - 31 DEC 75 Recovery: 92%
 Animal Grazing Factor:
 Regional Productivity Factor:
 In 80-km Radius Circle
 Of Crops and Animal Products
 Average Annual State Product
 1978
 Veg: 5.366 kilogram
 Milk: 4.863 liter
 Meat: 7.257 kilogram

SITE SUMMARIES

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

Center	Population	Location
Russellville	13,000	10 km E
Conway	18,000	77 km ESE

Major Metropolitan Centers Within Region
 Total Population Within 50- to 80-km Region: 1,758

POPULATION DATA

Location: N 25.30750 W 93.23080
 State: ARKANSAS
 POPE COUNTY, ARKANSAS

Site: ARKANSAS

POPE COUNTY, ARKANSAS

Location: N 35.30750

W 93.23080

POPULATION DATA

Total Population Within 20-to-80-km Region: 1.7E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Russellville	13,000	10 km E
Conway	18,000	77 km ESE

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

Veg: 5.8E6 kilogram
Milk: 4.8E7 liter
Meat: 7.2E7 kilogram

Regional Productivity Factor:
Animal Grazing Factor:

1
0.7

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

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

Drinking Water:

Exposed Population: None

Fish:

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

(a) Average individual consumption rates as given in the 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

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	8.9E-02	1.3E-02	1.3E-02	4.3E-01	5.0E-01
Teen	1.7E-01	2.7E-02	9.7E-03	2.6E-01	4.3E-01
Adult	1.9E+00	2.3E-01	6.4E-02	1.5E+00	2.6E+00
TOTAL	2.1E+00	2.7E-01	8.7E-02	2.2E+00	3.5E+00

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	9.4E-04	9.3E-04	1.4E-03	9.5E-04	9.6E-04	1.0E-03
Child	1.0E-02	1.0E-02	1.3E-02	1.0E-02	1.1E-02	1.1E-02
Teen	7.6E-03	7.6E-03	8.7E-03	7.6E-03	7.7E-03	8.8E-03
Adult	4.6E-02	4.6E-02	5.0E-02	4.6E-02	4.6E-02	5.0E-02
TOTAL	6.5E-02	6.5E-02	7.3E-02	6.5E-02	6.5E-02	7.1E-02

Production/Consumption factors:(a)

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

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

Site: BEAVER VALLEY

SHIPPINGPORT, PENNSYLVANIA

Location: N 40.6214°

W 80.4347°

POPULATION DATA

Total Population Within 20-to-80-km Region: 3.7E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Pittsburgh SMSA	2.41E6	32 km SE
Youngstown-Warren SMSA	530,000	56 km NNW
Stuebenville	31,000	31 km SW
Wheeling	48,000	69 km SSW

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

Veg: 5.3E7 kilogram
Milk: 5.3E8 liter
Meat: 5.4E7 kilogram

Regional Productivity Factor:
Animal Grazing Factor:

1
0.5

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Ohio River
Flow at Site: 30,000 ft³/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

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	7.9E-04	7.7E-04	2.5E-03	1.7E-04	9.9E-04
Child	9.0E-03	8.8E-03	2.0E-02	1.9E-03	1.1E-02
Teen	3.6E-03	3.6E-03	6.9E-03	4.9E-04	4.0E-03
Adult	3.1E-02	3.1E-02	5.3E-02	3.0E-03	3.2E-02
TOTAL	4.5E-02	4.4E-02	8.3E-02	5.6E-03	4.8E-02

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.3E-02	1.3E-02	4.8E-02	1.7E-03	1.3E-02	1.3E-02
Child	1.6E-01	1.6E-01	3.5E-01	1.9E-02	1.6E-01	1.6E-01
Teen	9.8E-02	9.8E-02	1.8E-01	1.3E-02	9.8E-02	1.0E-01
Adult	5.2E-01	5.2E-01	8.0E-01	8.0E-02	5.2E-01	5.3E-01
TOTAL	7.8E-01	7.8E-01	1.4E+00	1.1E-01	7.8E-01	8.0E-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 45.35890

W 85.19580

POPULATION DATA

Total Population Within 20-to-80-km Region: 1.3E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Traverse City	19,000	70 km SSW

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

Veg: 6.9E7 kilogram
Milk: 2.9E8 liter
Meat: 4.5E7 kilogram

Regional Productivity Factor:

0.5

Animal Grazing Factor:

0.5

Meteorology Period of Record: 9 FEB 61 - 8 FEB 63

Recovery: 85%

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Dilution Flow from
Plant: 108 ft³/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

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Live</u>
Infant	3.7E-07	7.1E-08	3.7E-08	3.1E-06	3.5E-06
Child	8.9E-02	3.8E-03	3.9E-06	5.6E-01	5.7E-01
Teen	1.7E-01	7.2E-03	3.3E-01	3.3E-01	4.7E-01
Adult	1.9E+00	5.9E-02	2.7E-05	1.9E+00	2.8E+00
TOTAL	2.2E+00	7.0E-02	3.4E-05	2.8E+00	3.8E+00

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	5.1E-03	5.1E-03	5.3E-03	5.1E-03	5.1E-03	5.3E-03
Child	5.7E-02	5.7E-02	5.9E-02	5.7E-02	5.7E-02	5.9E-02
Teen	4.2E-02	4.2E-02	4.3E-02	4.2E-02	4.2E-02	4.4E-02
Adult	2.5E-01	2.5E-01	2.6E-01	2.5E-01	2.5E-01	2.6E-01
TOTAL	3.6E-01	3.6E-01	3.6E-01	3.6E-01	3.6E-01	3.7E-01

Production/Consumption factors:

Produce: 1.4

Milk: 8.4

Meat: 2.1

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

Site: BROWNS FERRY

DECATUR, ALABAMA

Location: N 34.70360

W 87.12110

POPULATION DATA

Total Population Within 20-to-80-km Region: 6.8E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Decatur	41,000	16 km SE
Huntsville	150,000	48 km E

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

Veg: 1.7E7 kilogram
Milk: 5.7E7 liter
Meat: 8.6E7 kilogram

Regional Productivity Factor:
Animal Grazing Factor:

1
0.7

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Drinking Water:

Average Tennessee River
Flow at Site: 45,000 ft³/s

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 AND 3

Dose Commitments (person-rem) from Liquid Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	3.9E-05	4.2E-05	1.5E-03	1.1E-04	1.4E-04
Child	6.3E-02	1.0E-01	1.9E-02	1.7E-01	2.2E-01
Teen	8.0E-02	2.1E-01	9.0E-03	1.0E-01	1.9E-01
Adult	7.5E-01	1.9E+00	6.0E-02	6.1E-01	1.2E+00
TOTAL	8.9E-01	2.2E+00	8.9E-02	8.9E-01	1.6E+00

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.9E-02	1.9E-02	6.1E-02	1.9E-02	2.0E-02	2.5E-02
Child	2.1E-01	2.1E-01	4.8E-01	2.2E-01	2.2E-01	2.9E-01
Teen	1.6E-01	1.6E-01	2.7E-01	1.6E-01	1.6E-01	2.6E-01
Adult	9.4E-01	9.5E-01	1.4E+00	9.4E-01	9.4E-01	1.3E+00
TOTAL	1.3E+00	1.3E+00	2.2E+00	1.3E+00	1.3E+00	1.8E+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 33.95860

W 78.02080

POPULATION DATA

Total Population Within 20-to-80-km Region: 1.9E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Wilmington	51,000	32 km N

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

Veg: 2.6E7 kilogram
Milk: 1.0E8 liter
Meat: 5.8E7 kilogram

Regional Productivity Factor:
Animal Grazing Factor:

0.3
0.7

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Dilution Flow from
Plant: 202 ft³/s

Fish:

Edible Harvest: 2.1E5(a) kg/yr
Dilution Factor: 0.001

Invertebrates:

Edible Harvest: 1.1E5(a) kg/yr
Dilution Factor: 0.002

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

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

Dose Commitments (person-rem) from Liquid Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	7.7E-02	1.8E+02	4.4E-04	2.6E-01	1.1E-01
Teen	5.4E-02	3.6E+02	3.1E-04	1.6E-01	9.9E-02
Adult	3.2E-01	3.2E+03	2.0E-03	9.9E-01	6.1E-01
TOTAL	4.5E-01	3.7E+03	2.8E-03	1.4E+00	8.2E-01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	2.7E-02	2.7E-02	6.1E-02	2.7E-02	2.7E-02	2.7E-02
Child	3.0E-01	2.9E-01	5.1E-01	3.0E-01	3.0E-01	3.1E-01
Teen	2.2E-01	2.2E-01	3.0E-01	2.2E-01	2.2E-01	2.3E-01
Adult	1.3E+00	1.3E+00	1.6E+00	1.3E+00	1.3E+00	1.4E+00
TOTAL	1.8E+00	1.8E+00	2.5E+00	1.8E+00	1.8E+00	1.9E+00

Production/Consumption factors:

Produce: <1

Milk: 1.2

Meat: 1.1

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

Site: CALVERT CLIFFS

LUSBY, MARYLAND

Location: N 38.4272°

W 76.4261°

POPULATION DATA

Total Population Within 20-to-80-km Region: 2.4E6

Major Metropolitan Centers Within Region:

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

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

Veg: 4.5E7 kilogram
Milk: 5.0E8 liter
Meat: 6.2E7 kilogram

Regional Productivity Factor:
Animal Grazing Factor:

0.6
0.6

Meteorology Period of Record: 1 JAN 75 - 31 DEC 75

Recovery: 96%

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Dilution Flow from
Plant: 2,600 ft³/s

Fish:

Edible Harvest: 1.0E7 kg/yr
Dilution Factor: 0.062^(a)

Invertebrates:

Edible Harvest: 7.4E6 kg/yr
Dilution Factor: 0.062^(a)

(a) Dilutions given in FES (1973).

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

Dose Commitments (person-rem) from Liquid Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	2.1E-01	1.6E+00	5.3E-01	2.8E-01	4.1E-01
Teen	1.9E-01	3.3E+00	3.7E-01	1.7E-01	3.5E-01
Adult	1.4E+00	2.8E+01	2.5E+00	1.0E+00	2.1E+00
TOTAL	1.9E+00	3.3E+01	3.4E+00	1.5E+00	2.9E+00

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.1E-02	1.0E-02	1.6E-01	1.1E-02	1.1E-02	1.1E-02
Child	1.2E-01	1.2E-01	9.2E-01	1.2E-01	1.2E-01	1.3E-01
Teen	8.5E-02	8.4E-02	4.0E-01	8.5E-02	8.6E-02	1.0E-01
Adult	5.1E-01	5.1E-01	1.5E+00	5.1E-01	5.1E-01	5.7E-01
TOTAL	7.2E-01	7.2E-01	3.0E+00	7.3E-01	7.3E-01	8.1E-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: COOK

BENTON HARBOR, MICHIGAN

Location: N 41.9742

W 86.5667°

POPULATION DATA

Total Population Within 20-to-80-km Region: 1.1E6

Major Metropolitan Centers Within Region:

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

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

Veg: 1.1E8 kilogram
Milk: 2.3E8 liter
Meat: 1.9E8 kilogram

Regional Productivity Factor:
Animal Grazing Factor:

0.6
0.5

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Dilution Flow from
Plant: 77 ft³/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 1 AND 2

Dose Commitments (person-rem) from Liquid Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	6.0E-02	5.0E-02	9.9E-02	9.5E-02	1.8E-01
Child	2.2E+00	1.1E+00	9.0E-01	7.4E+00	9.6E+00
Teen	3.1E+00	1.4E+00	3.2E-01	4.1E+00	7.3E+00
Adult	3.4E+01	1.2E+01	2.5E+00	2.4E+01	4.5E+01
TOTAL	3.9E+01	1.5E+01	3.8E+00	3.6E+01	6.2E+01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	7.7E-03	7.7E-03	1.4E-02	7.6E-03	7.7E-03	8.4E-03
Child	8.6E-02	8.7E-02	1.2E-01	8.5E-02	8.5E-02	9.7E-02
Teen	6.2E-02	6.4E-02	7.7E-02	6.2E-02	6.2E-02	7.6E-02
Adult	3.8E-01	3.9E-01	4.3E-01	3.7E-01	3.8E-01	4.3E-01
TOTAL	5.3E-01	5.5E-01	6.4E-01	5.3E-01	5.3E-01	6.1E-01

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 40.36140

W 95.63780

POPULATION DATA

Total Population Within 20-to-80-km Region: 1.8E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Shenandoah	6,300	58 km NNE

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

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

Regional Productivity Factor:
Animal Grazing Factor:

1
0.6

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

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

Drinking Water:

Exposed Population: None

Fish:

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

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

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

Dose Commitments (person-rem) from Liquid Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	5.2E-04	5.1E-05	4.2E-05	2.4E-03	2.9E-03
Teen	1.0E-03	1.1E-04	3.0E-05	1.4E-03	2.5E-03
Adult	1.1E-02	9.3E-04	2.0E-04	8.3E-03	1.5E-02
TOTAL	1.2E-02	1.1E-03	2.7E-04	1.2E-02	2.0E-02

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	5.9E-04	5.9E-04	1.0E-03	5.9E-04	6.0E-04	6.1E-04
Child	6.7E-03	6.7E-03	1.1E-02	6.7E-03	6.7E-03	6.9E-03
Teen	4.9E-03	4.9E-03	6.5E-03	4.9E-03	4.9E-03	5.2E-03
Adult	2.9E-02	2.9E-02	3.5E-02	2.9E-02	2.9E-02	3.1E-02
TOTAL	4.2E-02	4.1E-02	5.4E-02	4.1E-02	4.2E-02	4.3E-02

Production/Consumption factors:

Produce: 2.8

Milk: 3.1

Meat: 14.0

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°

POPULATION DATA

Total Population Within 20-to-80-km Region: 2.3E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Ocala	28,000	63 km ENE

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

Veg: 2.8E7 kilogram
Milk: 1.1E8 liter
Meat: 7.2E7 kilogram

Regional Productivity Factor:
Animal Grazing Factor:

0.5
1

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Dilution Flow from
Plant: 132 ft³/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

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	4.1E-02	3.8E-02	1.4E-02	3.0E-02	6.6E-02
Teen	2.9E-02	7.9E-02	1.0E-02	2.1E-02	6.0E-02
Adult	1.8E-01	6.9E-01	6.7E-02	1.4E-01	3.7E-01
TOTAL	2.5E-01	8.1E-01	9.1E-02	1.9E-01	5.0E-01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	5.6E-04	5.6E-04	8.9E-04	5.5E-04	5.7E-04	5.8E-04
Child	6.3E-03	6.3E-03	8.8E-03	6.1E-03	6.4E-03	6.6E-03
Teen	4.6E-03	4.5E-03	5.7E-03	4.4E-03	4.6E-03	5.0E-03
Adult	2.7E-02	2.7E-02	3.2E-02	2.7E-02	2.8E-02	2.9E-02
TOTAL	3.9E-02	3.9E-02	4.7E-02	3.8E-02	3.9E-02	4.1E-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°

POPULATION DATA

Total Population Within 20-to-80-km Region: 1.8E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Toledo	390,000	37 km WNW
Sandusky	33,000	35 km ESE
Findlay	36,000	77 km SW
Dearborn	110,000	80 km N

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

Veg: 6.9E7 kilogram
Milk: 3.7E8 liter
Meat: 1.2E8 kilogram

Regional Productivity Factor:
Animal Grazing Factor:

0.5
0.5

Meteorology Period of Record: 4 AUG 74 - 3 AUG 76

Recovery: 99%

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Dilution Flow from
Plant: 48 ft³/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

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	3.0E-04	2.8E-04	2.9E-04	1.1E-04	2.7E-04
Child	5.3E-02	8.5E-02	1.1E-02	1.6E-01	8.2E-02
Teen	5.4E-02	1.7E-01	7.8E-03	1.2E-01	6.9E-02
Adult	4.7E-01	1.4E+00	6.1E-02	8.3E-01	4.3E-01
TOTAL	5.8E-01	1.7E+00	8.0E-02	1.1E+00	5.8E-01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	3.3E-04	3.3E-04	5.2E-04	1.9E-04	3.4E-04	3.9E-04
Child	3.9E-03	3.9E-03	5.0E-03	2.2E-03	4.0E-03	4.8E-03
Teen	2.7E-03	2.7E-03	3.0E-03	1.5E-03	2.7E-03	3.8E-03
Adult	1.5E-02	1.5E-02	1.6E-02	9.2E-03	1.5E-02	1.9E-02
TOTAL	2.2E-02	2.2E-02	2.5E-02	1.3E-02	2.2E-02	2.8E-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: DRESDEN

GRUNDY COUNTY, ILLINOIS

Location: N 41.38970

W 88.27140

POPULATION DATA

Total Population Within 20-to-80-km Region: 6.4E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Chicago SMSA	7,000,000(a)	72 km NE
Gary-Hammond-E.Chicago-SMSA	640,000(a)	80 km ENE
Joliet	81,000	24 km NE
Aurora	75,000	43 km N
Elgin	56,000	74 km N

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

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

Regional Productivity Factor:
Animal Grazing Factor:

1
0.5

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

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

Drinking Water:

Exposed Population: (b)

Fish:

Edible Harvest: (b) kg/yr

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

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

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

Dose Commitments (person-rem) from Liquid Pathways

<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
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[No liquid pathways, thus doses essentially zero]

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	2.5E+00	2.5E+00	4.5E+00	2.5E+00	2.5E+00	2.6E+00
Child	2.7E+01	2.7E+01	4.7E+01	2.9E+01	2.8E+01	2.9E+01
Teen	2.0E+01	2.0E+01	3.0E+01	2.1E+01	2.0E+01	2.2E+01
Adult	1.2E+02	1.2E+02	1.6E+02	1.2E+02	1.2E+02	1.3E+02
TOTAL	1.7E+02	1.7E+02	2.5E+02	1.8E+02	1.7E+02	1.8E+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: DUANE ARNOLD

CEDAR RAPIDS, IOWA

Location: N 42.09810

W 91.77250

POPULATION DATA

Total Population Within 20-to-80-km Region: 5.7E5

Major Metropolitan Centers Within Region:

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

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

Veg: 9.8E7 kilogram
Milk: 2.6E8 liter
Meat: 4.2E8 kilogram

Regional Productivity Factor:
Animal Grazing Factor:

1
0.5

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Cedar River
Flow at Site: 3,000 ft³/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 DOSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
DUANE ARNOLD

Dose Commitments (person-rem) from Liquid Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	4.3E-03	3.8E-03	4.7E-03	2.6E-03	3.8E-03
Child	8.0E-02	1.2E-01	5.2E-02	1.4E-01	1.2E-01
Teen	5.8E-02	1.9E-01	2.1E-02	8.6E-02	8.3E-02
Adult	5.4E-01	1.6E+00	1.7E-01	5.9E-01	5.4E-01
TOTAL	6.8E-01	1.9E+00	2.5E-01	8.1E-01	7.4E-01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	2.7E-03	2.7E-03	3.6E-02	2.8E-03	3.0E-03	2.7E-03
Child	3.1E-02	3.1E-02	4.5E-01	3.1E-02	3.4E-02	3.0E-02
Teen	2.3E-02	2.4E-02	2.5E-01	2.2E-02	2.5E-02	2.3E-02
Adult	1.3E-01	1.4E-01	1.1E+00	1.3E-01	1.4E-01	1.3E-01
TOTAL	1.9E-01	2.0E-01	1.9E+00	1.9E-01	2.1E-01	1.9E-01

Production/Consumption factors:

Produce: <1

Milk: 3.4

Meat: 9.1

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

Site: J. M. FARLEY

DOTHAN, ALABAMA

Location: N 31.22330

W 85.39330

POPULATION DATA

Total Population Within 20-to-80-km Region: 3.3E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Dothan	40,000	27 km W
Enterprise	17,000	72 km W
Ozark	15,000	60 km NW

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

Veg: 1.7E7 kilogram
Milk: 5.7E7 liter
Meat: 8.6E7 kilogram

Regional Productivity Factor:
Animal Grazing Factor:

0.95
0.8

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

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

Drinking Water:

Exposed Population: None

Fish:

Edible Harvest: 2.27E5 kg/yr
Dilution Factor: 1

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

J. M. FARLEY

Dose Commitments (person-rem) from Liquid Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	4.4E-04	2.8E-04	3.7E-05	2.3E-03	2.5E-03
Teen	7.9E-04	5.8E-04	2.9E-05	1.4E-03	2.1E-03
Adult	8.5E-03	5.1E-03	2.1E-04	8.0E-03	1.2E-02
TOTAL	9.7E-03	5.9E-03	2.8E-04	1.2E-02	1.7E-02

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	2.5E-03	2.5E-03	2.5E-03	2.3E-03	2.5E-03	2.6E-03
Child	2.9E-02	2.9E-02	2.9E-02	2.5E-02	2.9E-02	3.1E-02
Teen	2.1E-02	2.1E-02	2.1E-02	1.8E-02	2.1E-02	2.3E-02
Adult	1.3E-01	1.3E-01	1.3E-01	1.1E-01	1.3E-01	1.3E-01
TOTAL	1.8E-01	1.8E-01	1.8E-01	1.6E-01	1.8E-01	1.9E-01

Production/Consumption factors:

Produce: <1

Milk: 1.3

Meat: 3.1

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

Site: J. A. FITZPATRICK

OSWEGO, NEW YORK

Location: N 43.5217°

W 76.3980°

POPULATION DATA

Total Population Within 20-to-80-km Region: 8.2E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Syracuse SMSA	620,000	54 km SSE
Rome	49,000	80 km ESE
Auburn	34,000	66 km SSW

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

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

Regional Productivity Factor:
Animal Grazing Factor:

0.7
0.5

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Dilution Flow from
Plant: 708 ft³/s

Drinking Water:

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

Fish:

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

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

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

Site: FORT CALHOUN

WASHINGTON COUNTY, NEBRASKA

Location: N 41.52000

W 96.07800

POPULATION DATA

Total Population Within 20-to-80-km Region: 7.5E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Omaha SMSA	570,000	32 km SSE

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

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

Regional Productivity Factor:

1

Animal Grazing Factor:

0.5

Meteorology Period of Record: 1 JAN 74 - 31 DEC 74

Recovery: 98%

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

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

Drinking Water:

Exposed Population: 570,000(a)
Dilution Factor: 1

Fish:

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

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

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

Dose Commitments (person-rem) from Liquid Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	2.1E-04	1.6E-04	2.8E-03	5.2E-04	8.6E-04
Child	1.1E-02	4.2E-03	2.0E-02	4.1E-02	5.2E-02
Teen	1.7E-02	5.6E-03	6.3E-03	2.3E-02	4.1E-02
Adult	1.8E-01	5.2E-02	4.4E-02	1.3E-01	2.5E-01
TOTAL	2.1E-01	6.2E-02	7.3E-02	2.0E-01	3.4E-01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	2.4E-03	2.3E-03	1.3E-01	2.7E-03	2.9E-03	2.4E-03
Child	2.7E-02	2.5E-02	8.5E-01	3.0E-02	3.0E-02	2.7E-02
Teen	1.9E-02	1.9E-02	3.2E-01	2.0E-02	2.0E-02	2.0E-02
Adult	1.1E-01	1.1E-01	1.1E+00	1.1E-01	1.2E-01	1.2E-01
TOTAL	1.6E-01	1.6E-01	2.4E+00	1.7E-01	1.7E-01	1.7E-01

Production/Consumption factors:

Produce: <1 Milk: 4.6 Meat: <1

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

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

Dose Commitments (person-rem) from Liquid Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	4.2E-03	2.9E-03	3.5E-02	1.1E-02	1.8E-02
Child	5.8E-02	3.3E-02	2.5E-01	1.3E-01	1.8E-01
Teen	3.5E-02	1.4E-02	8.0E-02	3.5E-02	6.7E-02
Adult	3.6E-01	1.2E-01	5.8E-01	2.2E-01	4.5E-01
TOTAL	4.6E-01	1.7E-01	9.5E-01	3.9E-01	7.1E-01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	2.2E-04	2.2E-04	2.5E-04	2.1E-04	2.2E-04	2.3E-04
Child	2.5E-03	2.5E-03	2.9E-03	2.3E-03	2.5E-03	2.7E-03
Teen	1.8E-03	1.8E-03	2.0E-03	1.7E-03	1.8E-03	2.1E-03
Adult	1.1E-02	1.1E-02	1.2E-02	1.0E-02	1.1E-02	1.2E-02
TOTAL	1.5E-02	1.5E-02	1.7E-02	1.5E-02	1.5E-02	1.7E-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 43.27720

W 77.30810

POPULATION DATA

Total Population Within 20-to-80-km Region: 1.1E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Rochester SMSA	940,000	34 km WSW
Auburn	34,000	64 km SE
Oswego	23,000	56 km ENE

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

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

Regional Productivity Factor:
Animal Grazing Factor:

0.6
0.5

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

Recovery: 89%

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Dilution Flow from
Plant: 753 ft³/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

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	1.5E-05	1.5E-03	4.3E-03	2.0E-04	1.7E-03
Child	1.8E-02	1.7E-02	3.7E-02	9.8E-03	2.7E-02
Teen	9.2E-03	7.2E-03	1.3E-02	5.1E-03	1.4E-02
Adult	8.5E-02	6.2E-02	9.8E-02	3.0E-02	9.9E-02
TOTAL	1.1E-01	8.7E-02	1.5E-01	4.5E-02	1.4E-01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	3.2E-04	3.2E-04	3.3E-03	1.7E-04	3.3E-04	3.4E-04
Child	4.0E-03	3.9E-03	2.2E-02	1.8E-03	4.0E-03	4.2E-03
Teen	2.6E-03	2.6E-03	9.6E-03	1.3E-03	2.6E-03	3.0E-03
Adult	1.5E-02	1.5E-02	3.8E-02	7.8E-03	1.5E-02	1.6E-02
TOTAL	2.2E-02	2.2E-02	7.3E-02	1.1E-02	2.2E-02	2.3E-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 41.48220 W 72.49890

POPULATION DATA

Total Population Within 20-to-80-km Region: 3.3E6

Major Metropolitan Centers Within Region:

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

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

Veg: 3.2E7 kilogram
Milk: 4.4E8 liter
Meat: 2.0E7 kilogram

Regional Productivity Factor:
Animal Grazing Factor:

0.7
0.6

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Discharge Canal River
Flow at Site: 862 ft³/s

Drinking Water:

Exposed Population: None

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

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	5.1E-02	2.5E-03	1.8E-03	2.3E-01	2.8E-01
Teen	9.9E-02	4.3E-03	1.4E-03	1.4E-01	2.4E-01
Adult	1.1E+00	3.6E-02	9.7E-03	8.1E-01	1.4E+00
TOTAL	1.2E+00	4.3E-02	1.3E-02	1.2E+00	2.0E+00

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	2.9E-01	2.9E-01	3.0E-01	1.3E+00	2.9E-01	2.9E-01
Child	1.8E+00	1.8E+00	1.9E+00	9.0E+00	1.8E+00	1.8E+00
Teen	5.8E-01	5.8E-01	5.9E-01	2.7E+00	5.8E-01	5.8E-01
Adult	1.7E+00	1.7E+00	1.8E+00	7.7E+00	1.7E+00	1.7E+00
TOTAL	4.4E+00	4.4E+00	4.5E+00	2.1E+01	4.4E+00	4.4E+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: E. I. HATCH BAXLEY, GEORGIA

Location: N 31.93440 W 82.34440

POPULATION DATA

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

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Waycross	21,000	80 km S

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

Regional Productivity Factor:	1
Animal Grazing Factor:	0.8

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Altamaha River
Flow at Site: 13,000 ft³/s

Drinking Water: Exposed Population: None

Fish: Edible Harvest: 6.3E5(a) kg/yr
Dilution Factor: 1

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

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

Dose Commitments (person-rem) from Liquid Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	4.3E-03	9.4E-04	1.1E-04	1.5E-02	1.8E-02
Teen	6.5E-03	2.0E-03	8.1E-05	9.1E-03	1.5E-02
Adult	6.5E-02	1.8E-02	5.4E-04	5.4E-02	9.2E-02
TOTAL	7.6E-02	2.1E-02	7.3E-04	7.8E-02	1.2E-01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.5E-04	1.4E-04	5.8E-04	1.7E-04	1.9E-04	1.6E-04
Child	1.7E-03	1.6E-03	4.0E-03	1.9E-03	2.0E-03	1.8E-03
Teen	1.2E-03	1.2E-03	2.1E-03	1.2E-03	1.3E-03	1.4E-03
Adult	7.5E-03	7.1E-03	1.0E-02	7.1E-03	7.6E-03	7.7E-03
TOTAL	1.1E-02	1.0E-02	1.7E-02	1.0E-02	1.1E-02	1.1E-02

Production/Consumption factors:

Produce: <1

Milk: 1.9

Meat: 3.6

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°

POPULATION DATA

Total Population Within 20-to-80-km Region: 1.1E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Eureka	27,000	6.4 km N

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

Veg: 4.8E7 kilogram
Milk: 2.3E8 liter
Meat: 5.0E7 kilogram

Regional Productivity Factor:

0.5

Animal Grazing Factor:

1

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

Recovery: 96%

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Dilution Flow from
Plant: 112 ft³/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

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	1.3E-05	1.6E-05	2.0E-10	4.4E-05	4.9E-05
Teen	1.8E-05	3.2E-05	1.8E-10	2.6E-05	4.1E-05
Adult	1.8E-04	2.8E-04	1.4E-09	1.5E-04	2.4E-04
TOTAL	2.1E-04	3.2E-04	1.8E-09	2.2E-04	3.3E-04

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	2.0E-06	1.9E-06	1.8E-06	3.9E-06	2.3E-06	1.8E-05
Child	2.7E-05	2.5E-05	2.0E-05	7.8E-05	2.8E-05	3.0E-04
Teen	2.0E-05	2.4E-05	1.5E-05	5.6E-05	2.0E-05	2.7E-04
Adult	1.2E-04	1.5E-04	9.0E-05	3.1E-04	1.1E-04	1.1E-03
TOTAL	1.7E-04	2.0E-04	1.3E-04	4.5E-04	1.6E-04	1.7E-03

Production/Consumption factors:

Produce: 1.1

Milk: 7.9

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°

POPULATION DATA

Total Population Within 20-to-80-km Region: 1.6E7

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
New York SMSA	9,700,000	60 km S
Newark SMSA	2,000,000	64 km SSW
Stamford	110,000	42 km SE
Norwalk	77,000	48 km ESE
Bridgeport	150,000	64 km E
Poughkeepsie	31,000	48 km N
White Plains	49,000	30 km SSE

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

	Average Hudson River Flow at Site: 20,000 ft ³ /s
Drinking Water:	Exposed Population: None
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 1, 2 AND 3

Dose Commitments (person-rem) from Liquid Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	3.7E-02	3.3E-03	3.8E-03	1.9E-01	2.1E-01
Teen	7.0E-02	6.7E-03	2.8E-03	1.1E-01	1.8E-01
Adult	7.6E-01	5.7E-02	1.8E-02	6.6E-01	1.1E+00
TOTAL	8.7E-01	6.7E-02	2.5E-02	9.6E-01	1.5E+00

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.1E-01	1.0E-01	1.6E-01	1.3E-01	1.3E-01	1.2E-01
Child	1.2E+00	1.2E+00	1.6E+00	1.3E+00	1.4E+00	1.3E+00
Teen	8.8E-01	8.4E-01	1.1E+00	9.0E-01	9.5E-01	1.0E+00
Adult	5.3E+00	5.1E+00	6.0E+00	5.3E+00	5.4E+00	5.7E+00
TOTAL	7.5E+00	7.2E+00	8.8E+00	7.6E+00	7.9E+00	8.2E+00

Production/Consumption factors:

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

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

AVG INDIVIDUAL DOSE COMMITMENT - MILLIREM

Site: KEWAUNEE

CARLTON, WISCONSIN

Location: N 44.34330

W 87.53500

POPULATION DATA

Total Population Within 20-to-80-km Region: 6.0E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Sheboygan	51,000	64 km SSW
Manitowoc	35,000	30 km SSW
Greenbay	93,000	40 km W
Appleton	60,000	72 km WSW

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

Veg: 7.2E7 kilogram
Milk: 1.2E9 liter
Meat: 1.0E8 kilogram

Regional Productivity Factor:
Animal Grazing Factor:

0.5
0.5

Meteorology Period of Record: 2 JAN 69 - 31 DEC 69

Recovery: 76%

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Dilution Flow from
Plant: 154 ft³/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)

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- (a) Drinking water dilution factor estimated by averaging dilution factors derived from FES (1972) suitably weighted for populations.
(b) Average individual consumption rate as given in 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

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	2.9E-03	2.9E-03	8.8E-03	7.1E-04	3.6E-03
Child	5.1E-02	4.2E-02	7.5E-02	8.7E-02	1.4E-01
Teen	4.7E-02	3.1E-02	2.6E-02	5.0E-02	9.8E-02
Adult	4.8E-01	2.7E-01	2.0E-01	2.9E-01	6.1E-01
TOTAL	5.8E-01	3.5E-01	3.1E-01	4.3E-01	8.5E-01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.3E-04	1.3E-04	6.2E-04	1.0E-04	1.3E-04	1.4E-04
Child	1.8E-03	1.6E-03	5.3E-03	1.8E-03	1.6E-03	1.8E-03
Teen	1.2E-03	1.1E-03	2.8E-03	1.1E-03	1.1E-03	1.3E-03
Adult	6.7E-03	6.4E-03	1.3E-02	6.4E-03	6.4E-03	7.0E-03
TOTAL	9.7E-03	9.3E-03	2.2E-02	9.4E-03	9.3E-03	1.0E-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°

POPULATION DATA

Total Population Within 20-to-80-km Region: 3.3E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
La Crosse	54,000	32 km N

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

Veg: 7.2E7 kilogram
Milk: 1.2E9 liter
Meat: 1.0E8 kilogram

Regional Productivity Factor:
Animal Grazing Factor:

1
0.5

Meteorology Period of Record: 1 JAN 75 - 31 DEC 75

Recovery: 97%

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Mississippi River
Flow at Site: 28,000 ft³/s

Drinking Water:

Exposed Population: None

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

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	2.5E-01	3.0E-01	2.2E-02	1.3E+00	1.3E+00
Teen	4.5E-01	6.2E-01	1.6E-02	7.8E-01	1.1E+00
Adult	4.8E+00	5.4E+00	1.0E-01	4.5E+00	6.8E+00
TOTAL	5.5E+00	6.3E+00	1.4E-01	6.6E+00	9.2E+00

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	5.3E-03	5.3E-03	9.3E-03	5.3E-03	5.3E-03	5.5E-03
Child	6.0E-02	5.9E-02	1.0E-01	6.0E-02	5.9E-02	6.2E-02
Teen	4.3E-02	4.3E-02	6.0E-02	4.4E-02	4.3E-02	4.6E-02
Adult	2.6E-01	2.6E-01	3.3E-01	2.6E-01	2.6E-01	2.7E-01
TOTAL	3.7E-01	3.7E-01	5.0E-01	3.7E-01	3.7E-00	3.9E-01

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°

POPULATION DATA

Total Population Within 20-to-80-km Region: 5.7E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Portland	71,000	51 km SW
Lewiston	46,000	40 km NW

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

Average Annual State Production	Veg: 2.4E8 kilogram
Df Crops and Animal Products	Milk: 6.6E7 liter
In 80-km Radius Circle	Meat: 4.3E6 kilogram

Regional Productivity Factor:	0.6
Animal Grazing Factor:	0.5

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

	Average Dilution Flow from Plant: 844 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

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	3.6E-05	3.6E-05	1.6E-03	4.1E-05	5.6E-05
Teen	3.5E-05	5.2E-05	1.1E-03	2.4E-05	4.8E-05
Adult	2.9E-04	4.5E-04	7.3E-03	1.4E-04	3.2E-04
TOTAL	3.6E-04	5.3E-04	9.9E-03	2.1E-04	4.3E-04

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	3.6E-04	3.6E-04	6.6E-04	3.6E-04	3.6E-04	4.0E-04
Child	4.2E-03	4.2E-03	8.5E-03	4.0E-03	4.2E-03	4.7E-03
Teen	3.0E-03	3.0E-03	4.8E-03	2.9E-03	3.0E-03	3.7E-03
Adult	1.8E-02	1.8E-02	2.5E-02	1.8E-02	1.8E-02	2.0E-02
TOTAL	2.6E-02	2.6E-02	3.9E-02	2.5E-02	2.6E-02	2.9E-02

Production/Consumption factors:

Produce: 1.3

Milk: <1

Meat: <1

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

Site: MILLSTONE POINT WATERFORD, CONNECTICUT

Location: N 41.30860 W 72.16750

POPULATION DATA

Total Population Within 20-to-80-km Region: 2.5E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Hartford SMSA	830,000	72 km NW
New Haven SMSA	760,000	64 km W
Warwick	86,000	80 km NE
Waterbury	110,000	70 km WNW

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

Veg: 3.2E7 kilogram
Milk: 4.4E8 liter
Meat: 2.0E7 kilogram

Regional Productivity Factor:
Animal Grazing Factor:

0.6
0.6

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Dilution Flow from
Plant: 135 ft³/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 AND 2

Dose Commitments (person-rem) from Liquid Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	1.2E-03	3.0E-03	1.5E-04	4.0E-04	8.8E-04
Teen	8.8E-04	6.3E-03	1.1E-04	2.4E-04	7.6E-04
Adult	6.0E-03	5.5E-02	7.0E-04	1.4E-03	4.6E-03
TOTAL	8.0E-03	6.5E-02	9.5E-04	2.0E-03	6.3E-03

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	2.9E+00	2.9E+00	7.4E+00	2.9E+00	2.9E+00	3.0E+00
Child	3.2E+01	3.2E+01	5.7E+01	3.2E+01	3.2E+01	3.3E+01
Teen	2.4E+01	2.4E+01	3.3E+01	2.4E+01	2.4E+01	2.5E+01
Adult	1.4E+02	1.4E+02	1.7E+02	1.4E+02	1.4E+02	1.5E+02
TOTAL	2.0E+02	2.0E+02	2.7E+02	2.0E+02	2.0E+02	2.1E+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: MONTICELLO

MONTICELLO, MINNESOTA

Location: N 45.33390

W 93.84860

POPULATION DATA

Total Population Within 20-to-80-km Region: 2.1E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Minneapolis-St. Paul SMSA	2,100,000	64 km SE
St. Cloud	42,000	37 km NW
Anoka	14,000	35 km ESE

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

Veg: 1.2E8 kilogram
Milk: 4.0E8 liter
Meat: 1.1E8 kilogram

Regional Productivity Factor:
Animal Grazing Factor:

1
0.5

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

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

Drinking Water:

Exposed Population: (a)

Fish:

Edible Harvest: (a) kg/yr

(a) No radionuclides released in liquid effluents reported (J. Tichler, et al., 1981).

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

Dose Commitments (person-rem) from Liquid Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Teen	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Adult	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TOTAL	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	2.7E-03	2.6E-03	6.0E-02	1.5E-03	2.9E-03	2.7E-03
Child	3.7E-02	3.6E-02	4.2E-01	2.1E-02	3.8E-02	3.7E-02
Teen	2.4E-02	2.4E-02	1.7E-01	1.3E-02	2.4E-02	2.5E-02
Adult	1.3E-01	1.3E-01	6.4E-01	6.9E-02	1.3E-01	1.4E-01
TOTAL	2.0E-01	2.0E-01	1.3E+00	1.0E-01	2.0E-01	2.0E-01

Production/Consumption factors:

Produce: <1

Milk: 1.4

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°

POPULATION DATA

Total Population Within 20-to-80-km Region: 8.2E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Syracuse SMSA	620,000	54 km SSE
Auburn	34,000	66 km SSW

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

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

Regional Productivity Factor:
Animal Grazing Factor:

0.7
0.5

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Drinking Water:

Average Dilution Flow from
Plant: (a)

Exposed Population: (a)
Dilution Factor: (a)

Fish:

Edible Harvest: 7.3E5 kg/yr
Dilution Factor: (a)

(a) No radionuclides released in liquid effluents reported (Tichler, et al., 1981).

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

Dose Commitments (person-rem) from Liquid Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Teen	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Adult	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TOTAL	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.1E-03	9.9E-04	6.2E-02	1.1E-03	1.2E-03	1.0E-03
Child	1.3E-02	1.2E-02	4.2E-01	1.6E-02	1.4E-02	1.2E-02
Teen	8.6E-03	8.5E-03	1.6E-01	8.7E-03	8.8E-03	8.8E-03
Adult	4.9E-02	4.9E-02	5.5E-01	4.6E-02	4.9E-02	4.9E-02
TOTAL	7.1E-02	7.1E-02	1.2E+00	7.2E-02	7.3E-02	7.2E-02

Production/Consumption factors:

Produce: <1

Milk: 4.6

Meat: <1

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

Site: NORTH ANNA

LOUISA COUNTY, VIRGINIA

Location: N 38.0631°

W 77.7867°

POPULATION DATA

Total Population Within 20-to-80-km Region: 9.5E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Charlottesville	43,000	64 km W
Richmond	276,000	48 km SE
Fredricksburg	15,000	40 km NE

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

Veg: 3.5E7 kilogram
Milk: 1.5E8 liter
Meat: 7.4E7 kilogram

Regional Productivity Factor:
Animal Grazing Factor:

0.9
0.7

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Dilution Flow from
Plant: 1,500 ft³/s

Drinking Water:

Exposed Population: None

Fish:

Edible Harvest: 7.3(a) kg/yr
Dilution Factor: 0.001(b)

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

(b) Ten percent of population obtains 1% of their fish diet from reservoir; reconcentration of radionuclides considered (FES, 1973).

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

Dose Commitments (person-rem) from Liquid Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	1.2E-02	2.1E-03	2.8E-03	6.2E-02	6.8E-02
Teen	2.2E-02	4.1E-03	2.1E-03	3.7E-02	5.7E-02
Adult	2.4E-01	3.6E-02	1.4E-02	2.1E-01	3.4E-01
TOTAL	2.7E-01	4.2E-02	1.9E-02	3.1E-01	4.7E-01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	3.1E-03	3.1E-03	2.4E-02	3.1E-03	3.2E-03	3.2E-03
Child	3.4E-02	3.4E-02	1.5E-01	3.4E-02	3.5E-02	3.6E-02
Teen	2.5E-02	2.5E-02	6.8E-02	2.5E-02	2.5E-02	2.8E-02
Adult	1.5E-01	1.5E-01	2.9E-01	1.5E-01	1.5E-01	1.6E-01
TOTAL	2.1E-01	2.1E-01	5.3E-01	2.1E-01	2.1E-01	2.3E-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: OCONEE

OCONEE COUNTY, SOUTH CAROLINA

Location: N 34.7500°

W 83.0458°

POPULATION DATA

Total Population Within 20-to-80-km Region: 7.5E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Anderson	31,000	39 km SE
Greenville	69,000	47 km E

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

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

Regional Productivity Factor:
Animal Grazing Factor:

1
0.7

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Keowee River
Flow at Site: 1,100 ft³/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
OCONEE 1, 2 AND 3

Dose Commitments (person-rem) from Liquid Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	5.5E-02	4.6E-02	1.4E+00	9.2E-02	1.2E-01
Child	9.9E-01	6.3E-01	1.0E+01	2.6E+00	2.9E+00
Teen	9.1E-01	4.0E-01	3.2E+00	1.2E+00	1.9E+00
Adult	9.4E+00	3.5E+00	2.3E+01	7.3E+00	1.2E+01
TOTAL	1.1E+01	4.6E+00	3.7E+01	1.1E+01	1.7E+01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.1E-02	1.1E-02	5.5E-02	1.0E-02	1.1E-02	1.1E-02
Child	1.2E-01	1.2E-01	3.7E-01	1.2E-01	1.2E-01	1.3E-01
Teen	8.6E-02	8.6E-02	2.0E-01	8.4E-02	8.6E-02	1.0E-01
Adult	5.2E-01	5.2E-01	9.2E-01	5.1E-01	5.2E-01	5.7E-01
TOTAL	7.3E-01	7.4E-01	1.5E+00	7.2E-01	7.4E-01	8.2E-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: OYSTER CREEK

OYSTER CREEK, NEW JERSEY

Location: N 39.81390 W 74.21140

POPULATION DATA

Total Population Within 20-to-80-km Region: 3.3E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Atlantic City	49,000	56 km SSW
Trenton	110,000	64 km NW

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

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

Regional Productivity Factor:
Animal Grazing Factor:

0.5
0.6

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Dilution Flow from
Plant: 1,800 ft³/s

Fish:

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

Invertebrates:

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

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

(b) 10% of seafood eaten assumed caught in bay waters diluted to 10% of that of discharge canal (FES, 1974).

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

Dose Commitments (person-rem) from Liquid Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	1.8E-03	6.0E-03	1.7E-04	1.2E-03	2.4E-03
Teen	1.4E-03	1.2E-02	1.3E-04	7.7E-04	2.1E-03
Adult	9.2E-03	1.1E-01	8.4E-04	4.7E-03	1.3E-02
TOTAL	1.2E-02	1.2E-01	1.1E-03	6.7E-03	1.8E-02

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.6E+00	1.6E+00	6.7E+00	1.6E+00	1.6E+00	1.7E+00
Child	1.7E+01	1.8E+01	5.3E+01	1.8E+01	1.7E+01	1.9E+01
Teen	1.3E+01	1.3E+01	2.9E+01	1.3E+01	1.3E+01	1.4E+01
Adult	7.7E+01	7.8E+01	1.4E+02	7.8E+01	7.7E+01	8.2E+01
TOTAL	1.1E+02	1.1E+02	2.3E+02	1.1E+02	1.1E+02	1.2E+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: PALISADES

COVERT TOWNSHIP, MICHIGAN

Location: N 42.3233°

W 86.3142°

POPULATION DATA

Total Population Within 20-to-80-km Region: 1.0E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Kalamazoo	88,000	56 km E
South Bend SMSA	290,000	72 km S
Michigan City	41,000	66 km SW

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

Veg: 6.8E7 kilogram

Milk: 2.9E8 liter

Meat: 4.5E7 kilogram

Regional Productivity Factor:

0.6

Animal Grazing Factor:

0.5

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

Recovery: 67%

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Dilution Flow from
Plant: 109 ft³/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

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	1.4E-04	1.4E-04	1.5E-04	2.2E-05	1.6E-04
Child	5.6E-03	5.0E-03	1.8E-03	2.4E-02	2.7E-02
Teen	8.3E-03	7.8E-03	7.2E-04	1.4E-02	2.1E-02
Adult	8.9E-02	6.8E-02	5.9E-03	8.2E-02	1.3E-01
TOTAL	1.0E-01	8.2E-02	8.6E-03	1.2E-01	1.8E-01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	8.0E-05	7.2E-05	6.1E-03	8.4E-05	1.0E-04	8.6E-05
Child	9.2E-04	8.7E-04	3.8E-02	8.5E-04	1.1E-03	1.1E-03
Teen	6.3E-04	6.3E-04	1.5E-02	5.3E-04	6.8E-04	8.1E-04
Adult	3.6E-03	3.7E-03	5.0E-02	3.0E-03	3.7E-03	4.3E-03
TOTAL	5.2E-03	5.3E-03	1.1E-01	4.4E-03	5.5E-03	6.2E-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°

POPULATION DATA

Total Population Within 20-to-80-km Region: 4.1E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Lancaster SMSA	320,000	31 km N
Baltimore SMSA	2,100,000	58 km SW
Wilmington SMSA	500,000	64 km E
Reading SMSA	290,000	72 km NNE

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

	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 AND 3

Dose Commitments (person-rem) from Liquid Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	4.7E-02	1.1E-02	5.4E-01	2.6E-01	4.1E-01
Child	8.6E-01	1.0E-01	3.8E+00	2.8E+00	3.9E+00
Teen	6.8E-01	6.8E-02	1.1E+00	7.6E-01	1.5E+00
Adult	7.7E+00	6.0E-01	8.0E+00	4.8E+00	9.7E+00
TOTAL	9.3E+00	7.8E-01	1.3E+01	8.6E+00	1.6E+01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	7.7E-02	7.7E-02	2.5E-01	7.7E-02	7.8E-02	8.2E-02
Child	8.5E-01	8.5E-01	1.9E+00	8.5E-01	8.6E-01	9.4E-01
Teen	6.2E-01	6.2E-01	1.1E+00	6.2E-01	6.2E-01	7.3E-01
Adult	3.8E+00	3.8E+00	5.6E+00	3.7E+00	3.8E+00	4.1E+00
TOTAL	5.3E+00	5.3E+00	8.9E+00	5.3E+00	5.3E+00	5.9E+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°

POPULATION DATA

Total Population Within 20-to-80-km Region: 4.3E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Boston SMSA	3,400,000	64 km NW
Providence SMSA	780,000	70 km WSW
Brockton	90,000	40 km WNW
New Bedford	100,000	45 km SW

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

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

Regional Productivity Factor:
Animal Grazing Factor:

0.3
0.6

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

Recovery: 93%

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Dilution Flow from
Plant: 14.8 ft³/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

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	7.9E-03	7.8E-03	6.9E-06	3.9E-03	9.9E-03
Teen	5.5E-03	1.6E-02	4.9E-06	2.7E-03	8.9E-03
Adult	3.4E-02	1.4E-01	3.2E-05	1.8E-02	5.5E-02
TOTAL	4.7E-02	1.7E-01	4.4E-05	2.4E-02	7.4E-02

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.0E-01	1.0E-01	1.6E-01	1.0E-01	1.0E-01	1.1E-01
Child	1.2E+00	1.2E+00	1.6E+00	1.2E+00	1.2E+00	1.2E+00
Teen	8.5E-01	8.5E-01	1.0E+00	8.5E-01	8.5E-01	9.0E-01
Adult	5.2E+00	5.2E+00	5.9E+00	5.1E+00	5.2E+00	5.3E+00
TOTAL	7.3E+00	7.3E+00	8.6E+00	7.2E+00	7.3E+00	7.5E+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: POINT BEACH

MANITOWOC COUNTY, WISCONSIN

Location: N 44.27640

W 87.51860

POPULATION DATA

Total Population Within 20-to-80-km Region: 6.DE5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Sheboygan	51,000	56 km SSW
Manitowoc	35,000	19 km SSW
Greenbay	93,000	48 km NW
Appleton	60,000	72 km W

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

	Average Dilution Flow from Plant: 573 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 AND 2

Dose Commitments (person-rem) from Liquid Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	9.7E-04	9.6E-04	2.5E-03	1.1E-04	1.1E-03
Child	1.2E-02	1.1E-02	2.2E-02	5.0E-03	1.6E-02
Teen	5.6E-03	4.3E-03	7.5E-03	2.6E-03	7.8E-03
Adult	5.1E-02	3.7E-02	5.8E-02	1.6E-02	5.7E-02
TOTAL	6.9E-02	5.3E-02	9.0E-02	2.3E-02	8.1E-02

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	6.9E-04	6.9E-04	2.7E-03	2.5E-04	7.0E-04	7.1E-04
Child	9.9E-03	9.9E-03	2.4E-02	2.8E-03	9.9E-03	1.0E-02
Teen	6.2E-03	6.3E-03	1.2E-02	2.0E-03	6.2E-03	6.6E-03
Adult	3.5E-02	3.6E-02	5.5E-02	1.2E-02	3.5E-02	3.6E-02
TOTAL	5.2E-02	5.3E-02	9.3E-02	1.7E-02	5.2E-02	5.4E-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°

POPULATION DATA

Total Population Within 20-to-80-km Region: 2.2E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Minneapolis-St. Paul SMSA	2.1E6	50 km NW
Rochester	57,000	64 km SSE
Hastings	13,000	19 km NW

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

Veg: 1.2E8 kilogram

Milk: 4.0E8 liter

Meat: 1.0E8 kilogram

Regional Productivity Factor:

1

Animal Grazing Factor:

0.5

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

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

Drinking Water:

Exposed Population: None

Fish:

Edible Harvest: 6.8E5 kg/yr

Dilution Factor: 1

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

Dose Commitments (person-rem) from Liquid Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	1.2E-02	1.1E-02	1.6E-03	4.0E-02	4.3E-02
Teen	1.8E-02	2.2E-02	1.2E-03	2.6E-02	3.8E-02
Adult	1.7E-01	1.9E-01	8.4E-03	1.6E-01	2.3E-01
TOTAL	2.0E-01	2.2E-01	1.1E-02	2.2E-01	3.1E-01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	3.6E-03	3.6E-03	4.9E-03	2.8E-03	3.6E-03	4.1E-03
Child	4.4E-02	4.4E-02	5.3E-02	3.1E-02	4.4E-02	5.2E-02
Teen	3.1E-02	3.1E-02	3.4E-02	2.3E-02	3.1E-02	4.1E-02
Adult	1.8E-01	1.8E-01	1.9E-01	1.4E-01	1.8E-01	2.1E-01
TOTAL	2.6E-01	2.6E-01	2.8E-01	1.9E-01	2.6E-01	3.1E-01

Production/Consumption factors:

Produce: <1

Milk: 1.4

Meat: <1

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

Site: QUAD CITIES

ROCK ISLAND, ILLINOIS

Location: N 41.72720

W 90.34170

POPULATION DATA

Total Population Within 20-to-80-km Region: 6.7E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Davenport SMSA	370,000	40 km SW

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

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

Regional Productivity Factor:
Animal Grazing Factor:

1
0.5

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Mississippi River
Flow at Site: 47,000 ft³/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 AND 2

Dose Commitments (person-rem) from Liquid Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	2.0E-03	4.2E-04	1.4E-03	1.4E-02	1.8E-02
Child	2.7E-01	1.5E-02	1.1E-02	1.3E+00	1.5E+00
Teen	4.8E-01	2.2E-02	3.6E-03	7.2E-01	1.2E+00
Adult	5.2E+00	1.8E-01	2.6E-02	4.2E+00	7.1E+00
TOTAL	6.0E+00	2.2E-01	4.2E-02	6.2E+00	9.8E+00

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.8E-02	1.6E-02	1.7E+00	2.3E-02	2.5E-02	1.8E-02
Child	2.2E-01	2.1E-01	1.8E+01	3.6E-01	2.8E-01	2.1E-01
Teen	1.5E-01	1.7E-01	9.4E+00	2.0E-01	1.9E-01	1.6E-01
Adult	8.8E-01	9.9E-01	4.0E+01	1.0E+00	1.0E+00	8.8E-01
TOTAL	1.3E+00	1.4E+00	7.0E+01	1.6E+00	1.5E+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°

POPULATION DATA

Total Population Within 20-to-80-km Region: 1.5E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Sacramento SMSA	900,000	35 km NNW
Stockton	120,000	45 km SW

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

	Average Dilution Flow from Plant: (a) ft ³ /s
Drinking Water:	Exposed Population: (a)
Fish:	Edible Harvest: (a) kg/yr

(a) No radionuclides released in liquid effluents reported (Tichler, et al., 1981).

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

Dose Commitments (person-rem) from Liquid Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Teen	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Adult	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TOTAL	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	2.2E-03	2.2E-03	5.6E-03	8.3E-04	2.2E-03	2.2E-03
Child	2.8E-02	2.8E-02	4.7E-02	1.0E-02	2.8E-02	2.8E-02
Teen	1.8E-02	1.8E-02	2.5E-02	7.0E-03	1.8E-02	1.9E-02
Adult	1.0E-01	1.0E-01	1.2E-01	4.1E-02	1.0E-01	1.0E-01
TOTAL	1.5E-01	1.5E-01	2.0E-01	5.9E-02	1.5E-01	1.5E-01

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 34.40140

W 80.15670

POPULATION DATA

Total Population Within 20-to-80-km Region: 6.4E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Florence	29,000	40 km SE
Sumter	27,000	53 km SSW

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

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

Regional Productivity Factor:
Animal Grazing Factor:

1
0.8

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Dilution Flow from
Plant: 801 ft³/s

Drinking Water:

Exposed Population: None

Fish:

Edible Harvest: 1.8(a) kg/yr
Dilution Factor: 0.02(b)

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

(b) Ten percent of population consumes fish taken from water diluted by a factor of 0.2 (FES, 1975).

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

Dose Commitments (person-rem) from Liquid Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	1.7E-02	1.0E-03	2.0E-03	7.6E-02	9.2E-02
Teen	3.2E-02	1.9E-03	1.4E-03	4.6E-02	7.9E-02
Adult	3.5E-01	1.6E-02	9.7E-03	2.7E-01	4.7E-01
TOTAL	4.0E-01	1.9E-02	1.3E-02	3.9E-01	6.4E-01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	6.8E-04	6.8E-04	1.0E-03	5.6E-04	6.8E-04	7.0E-04
Child	8.0E-03	8.0E-03	1.0E-02	6.2E-03	8.0E-03	8.3E-03
Teen	5.7E-03	5.7E-03	6.6E-03	4.5E-03	5.7E-03	6.2E-03
Adult	3.4E-02	3.4E-02	3.7E-02	2.7E-02	3.4E-02	3.6E-02
TOTAL	4.9E-02	4.9E-02	5.5E-02	3.9E-02	4.9E-02	5.1E-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: ST. LUCIE

FORT PIERCE, FLORIDA

Location: N 27.44660

W 80.32660

POPULATION DATA

Total Population Within 20-to-80-km Region: 2.9E5

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
West Palm Beach	72,000	80 km SSE
Ft. Pierce	37,000	13 km NW
Vero Beach	15,000	40 km NNW

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

Veg: 2.8E7 kilogram
Milk: 1.1E8 liter
Meat: 7.2E7 kilogram

Regional Productivity Factor:
Animal Grazing Factor:

0.5
1

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Dilution Flow from
Plant: 65 ft³/s

Fish:

Edible Harvest: 2.6E5 kg/yr
Dilution Factor: 0.005(a)

Invertebrates:

Edible Harvest: 2.7E4 kg/yr
Dilution Factor: 0.005(a)

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

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

Dose Commitments (person-rem) from Liquid Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	5.0E-03	1.2E-02	1.7E-02	9.3E-03	1.2E-02
Teen	5.3E-03	2.5E-02	1.2E-02	5.6E-03	1.1E-02
Adult	4.6E-02	2.2E-01	7.9E-01	3.3E-02	6.4E-02
TOTAL	5.6E-02	2.5E-01	1.1E-01	4.8E-02	8.7E-02

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.4E-02	1.4E-02	5.0E-02	1.3E-02	1.5E-02	1.5E-02
Child	1.7E-01	1.7E-01	4.1E-01	1.5E-01	1.7E-01	1.8E-01
Teen	1.2E-01	1.2E-01	2.3E-01	1.1E-01	1.2E-01	1.3E-01
Adult	7.3E-01	7.3E-01	1.1E+00	6.6E-01	7.3E-01	7.7E-01
TOTAL	1.0E+00	1.0E+00	1.8E+00	9.3E-01	1.0E+00	1.1E+00

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 39.46280 W 75.53560

POPULATION DATA

Total Population Within 20-to-80-km Region: 4.9E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Philadelphia SMSA	4,900,000	64 km NE
Wilmington SMSA	500,000	29 km N
Chester	57,000	45 km NNE

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

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

Regional Productivity Factor:
Animal Grazing Factor:

0.9
0.6

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Delaware River
Flow at Site: 16,000 ft³/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

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	2.7E-02	5.5E-02	2.4E-03	1.0E-02	2.6E-02
Teen	1.8E-02	1.1E-01	1.7E-03	6.3E-03	2.3E-02
Adult	1.1E-01	1.0E+00	1.2E-02	3.9E-02	1.4E-01
TOTAL	1.6E-01	1.2E+00	1.6E-02	5.5E-02	1.9E-01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	2.4E-03	1.8E-03	2.7E-03	3.8E-03	7.9E-03	2.5E-03
Child	3.4E-02	2.5E-02	3.0E-02	3.5E-02	7.1E-02	3.0E-02
Teen	2.7E-02	1.7E-02	1.9E-02	1.4E-02	3.8E-02	2.0E-02
Adult	1.5E-01	9.8E-02	1.0E-01	5.5E-02	1.6E-01	1.0E-01
TOTAL	2.1E-01	1.4E-01	1.6E-01	1.1E-01	2.8E-01	1.6E-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: SAN ONOFRE

CAMP PENDLETON, CALIFORNIA

Location: N 33.36860

W 117.55440

POPULATION DATA

Total Population Within 20-to-80-km Region: 3.9E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
San Diego SMSA	1,500,000	68 km SSE
Riverside	160,000	69 km NE
Anaheim	190,000	69 km NNW
Santa Ana	170,000	55 km NNW

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

Veg: 4.8E7 kilogram
Milk: 2.3E8 liter
Meat: 5.0E7 kilogram

Regional Productivity Factor:
Animal Grazing Factor:

0.6
1

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Dilution Flow from
Plant: 533 ft³/s

Fish:

Edible Harvest: 2.9E4(a)
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

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	8.3E-02	1.2E-01	2.7E-02	3.2E-01	3.9E-01
Teen	1.4E-01	2.5E-01	2.0E-02	1.9E-01	3.3E-01
Adult	1.5E+00	2.2E+00	1.3E-01	1.1E+00	2.0E+00
TOTAL	1.7E+00	2.6E+00	1.8E-01	1.6E+00	2.7E+00

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	6.7E-04	6.7E-04	9.3E-04	4.4E-04	7.2E-04	7.5E-04
Child	8.5E-03	8.6E-03	9.9E-03	4.8E-03	8.8E-03	9.6E-03
Teen	6.2E-03	6.3E-03	6.6E-03	3.4E-03	6.2E-03	7.4E-03
Adult	3.6E-02	3.7E-02	3.7E-02	2.0E-02	3.6E-02	4.0E-02
TOTAL	5.1E-02	5.3E-02	5.5E-02	2.9E-02	5.2E-02	5.8E-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: SURRY

SURRY COUNTY, VIRGINIA

Location: N 37.16640

W 76.69720

POPULATION DATA

Total Population Within 20-to-80-km Region: 1.8E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Newport News SMSA	370,000	16 km ESE
Norfolk SMSA	810,000	50 km SE
Richmond SMSA	600,000	78 km NW

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

	Average James River Flow at Site:(a) 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
SURREY 1 AND 2

Dose Commitments (person-rem) from Liquid Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	1.4E-01	2.7E-01	4.5E-01	9.1E-02	1.5E-01
Teen	1.2E-01	5.6E-01	3.1E-01	5.3E-02	1.2E-01
Adult	8.5E-01	5.0E+00	2.0E+00	3.1E-01	7.4E-01
TOTAL	1.1E+00	5.8E+00	2.8E+00	4.5E-01	1.0E+00

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	4.2E-03	4.0E-03	4.4E-02	4.2E-03	6.1E-03	4.5E-03
Child	5.4E-02	5.2E-02	3.0E-01	4.2E-02	6.6E-02	5.7E-02
Teen	3.9E-02	3.6E-02	1.4E-01	2.5E-02	4.3E-02	4.2E-02
Adult	2.3E-01	2.1E-01	5.9E-01	1.3E-01	2.3E-01	2.3E-01
TOTAL	3.2E-01	3.1E-01	1.1E+00	2.0E-01	3.5E-01	3.3E-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: THREE MILE ISLAND

THREE MILE ISLAND, PENNSYLVANIA

Location: N 40.15330

W 76.72690

POPULATION DATA

Total Population Within 20-to-80-km Region: 1.8E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Lancaster SMSA	320,000	40 km ESE
Harrisburg SMSA	410,000	16 km NW
Reading SMSA	290,000	71 km ENE
York SMSA	330,000	23 km S

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

Veg: 5.3E7 kilogram
Milk: 5.3E8 liter
Meat: 5.4E7 kilogram

Regional Productivity Factor:
Animal Grazing Factor:

1
0.5

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Susquehanna River
Flow at Site: 34,000 ft³/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 1 AND 2

Dose Commitments (person-rem) from Liquid Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	1.2E-03	8.8E-04	5.9E-03	2.6E-03	4.3E-03
Child	3.7E-02	1.3E-02	4.5E-02	1.3E-01	1.6E-01
Teen	5.0E-02	9.7E-03	1.5E-02	6.8E-02	1.2E-01
Adult	5.4E-01	8.5E-02	1.1E-01	4.0E-01	7.2E-01
TOTAL	6.3E-01	1.1E-01	1.7E-01	6.0E-01	1.0E+00

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	2.2E-02	2.1E-02	4.9E-02	2.6E-02	3.2E-02	2.4E-02
Child	2.6E-01	2.4E-01	4.3E-01	2.6E-01	3.3E-01	2.8E-01
Teen	1.9E-01	1.8E-01	2.6E-01	1.6E-01	2.1E-01	2.1E-01
Adult	1.1E+00	1.0E+00	1.3E+00	8.9E-01	1.1E+00	1.1E+00
TOTAL	1.6E+00	1.5E+00	2.1E+00	1.3E+00	1.7E+00	1.7E+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 46.03720

W 122.88470

POPULATION DATA

Total Population Within 20-to-80-km Region: 1.3E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Portland SMSA	1.2E6	63 km SSE
Longview	33,000	14 km NNW
Astoria	12,000	72 km WNW

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

Veg: 6.4E7 kilogram
Milk: 3.7E7 liter
Meat: 2.6E7 kilogram

Regional Productivity Factor:
Animal Grazing Factor:

0.9
0.75

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Columbia River
Flow at Site: 2.3E5 ft³/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

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	3.9E-07	3.6E-07	1.8E-06	2.8E-07	4.3E-07
Child	1.1E-03	1.4E-03	2.9E-04	5.1E-03	5.7E-03
Teen	2.0E-03	2.9E-03	2.1E-04	3.1E-03	4.8E-03
Adult	2.1E-02	2.5E-02	1.4E-03	1.8E-02	2.9E-02
TOTAL	2.4E-02	3.0E-02	1.9E-03	2.6E-02	3.9E-02

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.7E-04	1.6E-04	1.0E-03	2.5E-04	1.6E-04	2.0E-04
Child	3.0E-03	2.0E-03	1.1E-02	7.7E-03	2.0E-03	2.5E-03
Teen	1.9E-03	1.5E-03	5.5E-03	4.5E-03	1.4E-03	2.0E-03
Adult	1.1E-02	8.7E-03	2.5E-02	2.4E-02	8.4E-03	1.0E-02
TOTAL	1.6E-02	1.2E-02	4.2E-02	3.6E-02	1.2E-02	1.5E-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: TURKEY POINT

DADE COUNTY, FLORIDA

Location: N 25.43360

W 80.33170

POPULATION DATA

Total Population Within 20-to-80-km Region: 2.1E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Miami SMSA	1,600,000	48 km NNE

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

	Average Dilution Flow from Plant: 1,010 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 AND 4

Dose Commitments (person-rem) from Liquid Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	1.2E+00	2.8E+00	2.5E+00	6.9E-01	1.1E+00
Teen	9.3E-01	6.0E+00	1.8E+00	4.1E-01	9.8E-01
Adult	6.7E+00	5.3E+01	1.2E+01	2.4E+00	5.9E+00
TOTAL	8.8E+00	6.2E+01	1.6E+01	3.5E+00	8.0E+00

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	4.7E-03	4.5E-03	1.9E-01	5.0E-03	5.1E-03	5.0E-03
Child	5.2E-02	5.1E-02	1.1E+00	5.3E-02	5.3E-02	5.7E-02
Teen	3.7E-02	3.7E-02	4.4E-01	3.7E-02	3.8E-02	4.5E-02
Adult	2.2E-01	2.3E-01	1.6E+00	2.2E-01	2.3E-01	2.5E-01
TOTAL	3.2E-01	3.2E-01	3.3E+00	3.2E-01	3.2E-01	3.6E-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°

POPULATION DATA

Total Population Within 20-to-80-km Region: 1.4E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Pittsfield	62,000	70 km SW
Springfield SMSA	640,000	72 km S
Worcester SMSA	700,000	80 km SE

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

Veg: 4.4E6 kilogram
Milk: 7.3E8 liter
Meat: 2.7E7 kilogram

Regional Productivity Factor:
Animal Grazing Factor:

1
0.4

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Connecticut River
Flow at Site: 10,000 ft³/s

Drinking Water:

Exposed Population: None

Fish:

Edible Harvest: (a)
Dilution Factor: (a)

(a) No radionuclides released into liquid effluents reported (Tichler, et al., 1981).

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

Dose Commitments (person-rem) from Liquid Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Teen	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Adult	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
TOTAL	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	3.6E-03	3.5E-03	1.3E-01	3.6E-03	3.9E-03	3.7E-03
Child	4.0E-02	3.9E-02	8.8E-01	3.9E-02	4.2E-02	4.3E-02
Teen	2.9E-02	2.8E-02	4.4E-01	2.8E-02	3.0E-02	3.3E-02
Adult	1.7E-01	1.7E-01	1.9E+00	1.6E-01	1.7E-01	1.8E-01
TOTAL	2.4E-01	2.4E-01	3.3E+00	2.3E-01	2.5E-01	2.6E-01

Production/Consumption factors:

Produce: <1 Milk: 3.9 Meat: <1

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

Site: YANKEE ROWE

ROWE, MASSACHUSETTS

Location: N 42.72810

W 72.92470

POPULATION DATA

Total Population Within 20-to-80-km Region: 1.6E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Springfield SMSA	590,000	64 km SSE
Pittsfield	58,000	34 km SW
Albany SMSA	790,000	72 km W

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

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

Regional Productivity Factor:
Animal Grazing Factor:

1
0.5

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

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Deerfield River
Flow at Site: 570 ft³/s

Drinking Water:

Exposed Population: None

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

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Child	4.2E-02	8.6E-03	5.5E-02	1.9E-01	2.0E-01
Teen	7.1E-02	7.4E-03	3.9E-02	1.2E-01	1.7E-01
Adult	7.5E-01	5.1E-02	2.6E-01	6.8E-01	1.0E+00
TOTAL	8.6E-01	6.7E-02	3.5E-01	9.9E-01	1.4E+00

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	1.5E-01	2.6E-01	1.0E-02	9.9E-02	3.1E-01	3.3E-02
Child	1.4E+00	4.6E-01	1.1E-01	8.8E-01	2.1E+00	4.9E-01
Teen	5.3E-01	4.9E-01	7.6E-02	3.6E-01	1.1E+00	4.3E-01
Adult	1.7E+00	2.2E+00	4.5E-01	1.3E+00	3.2E+00	1.9E+00
TOTAL	3.7E+00	3.4E+00	6.5E-01	2.7E+00	6.7E+00	2.9E+00

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: ZION

ZION, ILLINOIS

Location:

N 42.45940

W 87.80610

POPULATION DATA

Total Population Within 20-to-80-km Region: 7.0E6

Major Metropolitan Centers Within Region:

<u>Center</u>	<u>Population</u>	<u>Location</u>
Chicago SMSA (2/3)	4,700,000	64 km SSE
Milwaukee SMSA	1,400,000	64 km N
Kenosha	80,000	14 km NNW

SITE SPECIFIC DATA - AIRBORNE PATHWAYS

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

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

Regional Productivity Factor:
Animal Grazing Factor:

0.5
0.5

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

Recovery: 88%

SITE SPECIFIC DATA - WATERBORNE PATHWAYS

Average Dilution Flow from
Plant: 1291 ft³/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 DDSE-COMMITMENT ESTIMATES AND
AVERAGE INDIVIDUAL DOSE-COMMITMENT HISTOGRAM FOR
ZION 1 AND 2

Dose Commitments (person-rem) from Liquid Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>
Infant	1.6E-01	1.2E-01	1.7E-01	2.2E-01	3.2E-01
Child	2.2E+00	1.4E+00	1.7E+00	3.6E+00	4.2E+00
Teen	1.3E+00	6.0E-01	6.2E-01	1.3E+00	2.1E+00
Adult	1.2E+01	5.2E+00	5.1E+00	8.8E+00	1.4E+01
TOTAL	1.6E+01	7.3E+00	7.7E+00	1.4E+01	2.1E+01

Dose Commitments (person-rem) from Airborne Pathways

	<u>Total Body</u>	<u>GI-LLI</u>	<u>Thyroid</u>	<u>Bone</u>	<u>Liver</u>	<u>Lung</u>
Infant	9.5E-02	9.5E-02	1.2E-01	9.6E-02	9.7E-02	1.0E-01
Child	1.1E+00	1.1E+00	1.2E+00	1.1E+00	1.1E+00	1.2E+00
Teen	7.8E-01	7.7E-01	8.7E-01	7.8E-01	7.8E-01	9.0E-01
Adult	4.7E+00	4.7E+00	5.1E+00	4.7E+00	4.7E+00	5.1E+00
TOTAL	6.6E+00	6.6E+00	7.3E+00	6.6E+00	6.7E+00	7.2E+00

Production/Consumption factors:

Produce: <1

Milk: <1

Meat: <1

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

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

Dose Commitments (person-rem) from liquid pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver
Infant	1.6E-01	1.2E-01	1.7E-01	2.2E-01	3.2E-01
Child	2.2E+00	1.4E+00	1.7E+00	3.6E+00	4.2E+00
Teen	1.3E+00	6.0E-01	6.2E-01	1.3E+00	2.1E+00
Adult	1.2E+01	8.2E+00	2.1E+00	8.8E+00	1.4E+01
TOTAL	1.6E+01	7.3E+00	2.7E+00	1.4E+01	2.1E+01

Dose Commitments (person-rem) from airborne pathways

	Total Body	GI-LLI	Thyroid	Bone	Liver	Lung
Infant	9.2E-02	9.2E-02	1.2E-01	9.2E-02	9.2E-02	1.0E-01
Child	1.1E+00	1.1E+00	1.2E+00	1.1E+00	1.1E+00	1.2E+00
Teen	7.8E-01	7.7E-01	8.7E-01	7.8E-01	7.8E-01	9.0E-01
Adult	4.7E+00	4.7E+00	2.1E+00	4.7E+00	4.7E+00	2.1E+00
TOTAL	6.8E+00	6.8E+00	7.3E+00	6.8E+00	6.7E+00	7.2E+00

Production/Consumption factors:

Producers: <1
Waste: <1
Meat: <1

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

AVERAGE INDIVIDUAL DOSE COMMITMENT - MILLIREM

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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%, teenager; and 70.9%, adult (Population Estimates and Projections, 1975). Where possible, the site-dependent parameters were taken from the environmental statements issued for each reactor (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)

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

(a) Regulatory Guide 1.109 (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)

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

(a) Regulatory Guide 1.109 (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 1978 (Tichler, et al., 1981).(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.

METEOROLOGY

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 XOQDOIQ (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+D	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)

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

The XOQDOQ program generates four sets of atmospheric transport factors:

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

- 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 Tichler, et al., (1981) 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 1978 were estimated using the "net increase" factors by state over the population values for 1970 as given in Statistical Abstract of the United States, 1979 (Table 11).

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 ÷ 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.

DRINKING 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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