



































































## REFERENCES

- Abee 1960a. Environmental Levels of Radioactivity for the Oak Ridge Area. Report for 1959. H.H. Abee, Oak Ridge National Laboratory, May 1960. 60-5-138.  
ChemRisk Doc 1884.
- Abee 1960b. Environmental Levels of Radioactivity for the Oak Ridge Area. Report for the First Quarter, 1960. H.H. Abee, Oak Ridge National Laboratory, May 1960. 60-5-139.  
ChemRisk Doc 1878
- Abee 1961. Environmental Levels of Radioactivity for the Oak Ridge Area. Report for the Fourth Quarter, 1960. H.H. Abee, Oak Ridge National Laboratory, March 1961. TID-13849.  
ChemRisk Doc 3182
- ChemRisk 1999. Uranium Releases from the Oak Ridge Reservation – A Review of the Quality of Historical Effluent Monitoring Data and a Screening Evaluation of Potential Exposures. Reports of the Oak Ridge Dose Reconstruction, Volume 5. The Report of the Project Task 6, 1999.
- DOE 1987a. Environmental Surveillance of the U.S. Department of Energy Oak Ridge Reservation and Surrounding Environs During 1986 – Volume 1. U.S. Department of Energy, April 1987. ES/ESH-1/V1.  
ChemRisk Doc 369
- DOE 1987b. Environmental Surveillance of the U.S. Department of Energy Oak Ridge Reservation and Surrounding Environs During 1986 – Volume 2. U.S. Department of Energy, April 1987. ES/ESH-1/V2.  
ChemRisk Doc 369
- DOE 1988a. Environmental Surveillance of the U.S. Department of Energy Oak Ridge Reservation and Surrounding Environs During 1987 – Volume 1. U.S. Department of Energy, April 1988. ES/ESH-4/V1.  
ChemRisk Doc 370
- DOE 1988b. Environmental Surveillance of the U.S. Department of Energy Oak Ridge Reservation and Surrounding Environs During 1987 – Volume 2. U.S. Department of Energy, April 1988. ES/ESH-4/V2.  
ChemRisk Doc 371
- DOE 1989. Oak Ridge Reservation Environmental Report for 1988 – Volume 1. U.S. Department of Energy, May 1989. ES/ESH-8/V1.  
ChemRisk Doc 254
- DOE 1990. Oak Ridge Reservation Environmental Report for 1989 – Volume 1. U.S. Department of Energy, October 1991. ES/ESH-13/V1.  
ChemRisk Doc 226
- DOE 1991. Oak Ridge Reservation Environmental Report for 1990 – Volume 1. U.S. Department of Energy, September 1991. ES/ESH-18/V1.  
ORAU Library

- DOE 1992a. Oak Ridge Reservation Environmental Report for 1991 – Volume 1. U.S. Department of Energy, October 1992. ES/ESH-22/V1.  
ChemRisk Doc 709
- DOE 1992b. Oak Ridge Reservation Environmental Report for 1992 – Volume 2. U.S. Department of Energy, September 1993. ES/ESH-22/V2.  
ChemRisk Doc 709
- DOE 1993a. Oak Ridge Reservation Environmental Report for 1992 – Volume 1. U.S. Department of Energy, September 1993. ES/ESH-31/V1.  
ChemRisk Doc 3281
- DOE 1993b. Oak Ridge Reservation Environmental Report for 1992 – Volume 2. U.S. Department of Energy, September 1993. ES/ESH-31/V2.  
ChemRisk Doc 3281
- DOE 1994. Oak Ridge Reservation Annual Site Environmental Report for 1993 – Volume 1. U.S. Department of Energy, November 1994. ES/ESH-47  
ChemRisk Doc 3281
- DOE 1995. Oak Ridge Reservation Annual Site Environmental Report for 1994. U.S. Department of Energy, October 1995. ES/ESH-57/V1.  
ChemRisk Doc 3281
- DOE 1996. Oak Ridge Reservation Annual Site Environmental Report for 1995. U.S. Department of Energy, September 1996. ES/ESH-69  
<http://www.ornl.gov.aser>
- DOE 1997. Oak Ridge Reservation Annual Site Environmental Report for 1996. U.S. Department of Energy, October 1997. ES/ESH-73  
<http://www.ornl.gov.aser>
- DOE 1998. Oak Ridge Reservation Annual Site Environmental Report for 1997. U.S. Department of Energy, October 1998. ES/ESH-78  
<http://www.ornl.gov.aser>
- DOE 1999. Oak Ridge Reservation Annual Site Environmental Report for 1998. U.S. Department of Energy, December 1999. DOE/ORO/2091  
<http://www.ornl.gov.aser>
- DOE 2000. Oak Ridge Reservation Annual Site Environmental Report for 1999. U.S. Department of Energy, September 2000. DOE/ORO/2100  
<http://www.ornl.gov.aser>
- DOE 2001. Oak Ridge Reservation Annual Site Environmental Report for 2000. U.S. Department of Energy, September 2001. DOE/ORO/2119  
<http://www.ornl.gov.aser>
- DOE 2002. Oak Ridge Reservation Annual Site Environmental Report for 2001. U.S. Department of Energy, September 2002. DOE/ORO/2133  
<http://www.ornl.gov.aser>



- EG&G 1976. Aerial Radiological Surveys of the ERDA's Oak Ridge Facilities and Vicinity (Survey Period: 1973-1974). EGG-1183-1682, February 1976.  
ChemRisk Doc 118
- EG&G 1984. An Aerial Radiological Survey of the Oak Ridge Reservation (Date of Survey: June 1980). EGG-10282-1001. January 1984.  
ChemRisk Doc 606
- EG&G 1992. An Aerial Radiological Survey of the Oak Ridge Reservation and Surrounding Area (Date of Survey: September 1989). EGG-10617-1123, April 1992.  
ChemRisk Doc 1189
- EG&G 1993. An Aerial Radiological Survey of the Oak Ridge Reservation (Date of Survey: April 1992). EGG-10617-1229. April 1993.
- Foley, R.D., and R.F. Carrier 1990. The Outdoor Radiological and Chemical Surface Scoping Survey of the Y-12 Plant Site: Part 2 – The 1985-1987 Data Base. Prepared by the Health and Safety Research Division, Oak Ridge National Laboratory. Final Report Issued March 1990. Y/TS-600 PART 2.
- Gilbert 1987. Statistical Methods for Environmental Pollution Monitoring. Van Nostrand Reinhold Publishers, 1987.
- MMES 1984. Environmental Monitoring Report, United States Department of Energy Oak Ridge Facilities, Calendar Year 1983. Martin Marietta Energy Systems, Inc., June 1984. Y/UB-19.
- MMES 1985. Environmental Monitoring Report, United States Department of Energy Oak Ridge Facilities, Calendar Year 1984. Martin Marietta Energy Systems, Inc., August 1985. ORNL-6209.
- MMES 1986. Environmental Surveillance of the Energy Oak Ridge Reservation and Surrounding Environs During 1985. Martin Marietta Energy Systems, Inc., April 1986. ORNL-6271.  
ChemRisk Doc 199
- ORNL 1961. Applied Health Physics Annual Report for 1960. Health Physics Division, Oak Ridge National Laboratory. July 1961. ORNL-3159  
ChemRisk Doc 542
- ORNL 1962. Applied Health Physics Annual Report for 1961. Oak Ridge National Laboratory. November 1962. ORNL-3284  
ChemRisk Doc 543
- ORNL 1963. Applied Health Physics Annual Report for 1962. Oak Ridge National Laboratory. September 1963. ORNL-3490  
ChemRisk Doc 544
- ORNL 1964a. Applied Health Physics Annual Report for 1963. Oak Ridge National Laboratory. August 1964. ORNL-3665  
ChemRisk Doc 545

- ORNL 1964b. Environmental Levels of Radioactivity for the Oak Ridge Area. Report for Period July – December, 1963. Applied Health Physics Section, Oak Ridge National Laboratory. 800830  
ChemRisk Doc 502
- ORNL 1965a. Applied Health Physics Annual Report for 1964. Oak Ridge National Laboratory. June 1965. ORNL-3820  
ChemRisk Doc 546
- ORNL 1965b. Environmental Levels of Radioactivity for the Oak Ridge Area. Report for Period July – December, 1964. Applied Health Physics and Safety Section, Oak Ridge National Laboratory. 800829  
ChemRisk Doc 501
- ORNL 1966a. Health Physics and Safety Annual Report for 1965. Oak Ridge National Laboratory. July 1966. ORNL-3969  
ChemRisk Doc 547
- ORNL 1966b. Environmental Levels of Radioactivity for the Oak Ridge Area. Report for Period January – June, 1965. Applied Health Physics and Safety Section, Oak Ridge National Laboratory. 800828  
ChemRisk Doc 500
- ORNL 1966c. Environmental Levels of Radioactivity for the Oak Ridge Area. Report for Period July – December, 1965. Health Physics and Safety Section, Oak Ridge National Laboratory. 800827  
ChemRisk Doc 1454
- ORNL 1967a. Health Physics and Safety Annual Report for 1966. Oak Ridge National Laboratory. August 1967. ORNL-4146  
ChemRisk Doc 548
- ORNL 1967b. Environmental Levels of Radioactivity for the Oak Ridge Area. Report for Period January – June, 1966. Health Physics and Safety Section, Oak Ridge National Laboratory. 800827  
ChemRisk Doc 1454
- ORNL 1967c. Environmental Levels of Radioactivity for the Oak Ridge Area. Report for Period July – December, 1966. Health Physics and Safety Section, Oak Ridge National Laboratory. 800827  
ChemRisk Doc 499
- ORNL 1968a. Health Physics and Safety Annual Report for 1967. Oak Ridge National Laboratory. August 1968. ORNL-4286  
ChemRisk Doc 549
- ORNL 1968b. Environmental Levels of Radioactivity for the Oak Ridge Area. Report for Period January – June, 1967. Health Physics and Safety Section, Oak Ridge National Laboratory. 800826  
ChemRisk Doc 1454
- ORNL 1968c. Environmental Levels of Radioactivity for the Oak Ridge Area. Report for Period July – December, 1967. Health Physics and Safety Section, Oak Ridge National Laboratory. 800826  
ChemRisk Doc 497

- ORNL 1969a. Applied Health Physics and Safety Annual Report for 1968. Oak Ridge National Laboratory. July 1969. ORNL-4423  
ChemRisk Doc 550
- ORNL 1969b. Environmental Levels of Radioactivity for the Oak Ridge Area. Report for Period January – June, 1968. Health Physics and Safety Section, Oak Ridge National Laboratory.  
ChemRisk Doc 1454
- ORNL 1969c. Environmental Levels of Radioactivity for the Oak Ridge Area. Report for Period July – December, 1968. Health Physics and Safety Section, Oak Ridge National Laboratory.  
ChemRisk Doc 1454
- ORNL 1969d. Environmental Levels of Radioactivity for the Oak Ridge Area. Report Period January – June, 1969. Health Physics and Safety Section, Oak Ridge National Laboratory.  
ChemRisk Doc 1454
- ORNL 1969e. Environmental Levels of Radioactivity for the Oak Ridge Area. Report Period July – December, 1969. Health Physics and Safety Section, Oak Ridge National Laboratory.  
ChemRisk Doc 1454
- ORNL 1970. Applied Health Physics and Safety Annual Report for 1969. Oak Ridge National Laboratory. August 1970. ORNL-4563  
ChemRisk Doc 551
- ORNL 1971. Applied Health Physics and Safety Annual Report for 1970. Oak Ridge National Laboratory. August 1971. ORNL-4690.  
Chemrisk Doc 552
- UCC 1972. Environmental Monitoring Report, United States Atomic Energy Commission, Oak Ridge Facilities, Calendar Year 1971. Union Carbide Corporation – Nuclear Division, June 1972.  
UCC-ND-221.
- UCC 1973. Environmental Monitoring Report, United States Atomic Energy Commission, Oak Ridge Facilities, Calendar Year 1972. Union Carbide Corporation – Nuclear Division, March 1973.  
UCC-ND-244.
- UCC 1974. Environmental Monitoring Report, United States Atomic Energy Commission, Oak Ridge Facilities, Calendar Year 1973. Union Carbide Corporation – Nuclear Division, May 1974.  
UCC-ND-280.
- UCC 1975. Environmental Monitoring Report, United States Energy Research and Development Administration, Oak Ridge Facilities, Calendar Year 1974. Union Carbide Corporation – Nuclear Division, May 1975. UCC-ND-302.
- UCC 1976. Environmental Monitoring Report, United States Energy Research and Development Administration, Oak Ridge Facilities, Calendar Year 1975. Union Carbide Corporation – Nuclear Division, May 1976. Y/UB-4.
- UCC 1977. Environmental Monitoring Report, United States Energy Research and Development Administration, Oak Ridge Facilities, Calendar Year 1976. Union Carbide Corporation – Nuclear Division, May 1977. Y/UB-6.

- UCC 1978. Environmental Monitoring Report, United States Department of Energy Oak Ridge Facilities, Calendar Year 1977. Union Carbide Corporation – Nuclear Division, June 1978. Y/UB-8.
- UCC 1979. Environmental Monitoring Report, United States Department of Energy Oak Ridge Facilities, Calendar Year 1978. Union Carbide Corporation – Nuclear Division, June 1979. Y/UB-10.
- UCC 1980. Environmental Monitoring Report, United States Department of Energy Oak Ridge Facilities, Calendar Year 1979. Union Carbide Corporation – Nuclear Division, June 1980. Y/UB-13.
- UCC 1981. Environmental Monitoring Report, United States Department of Energy Oak Ridge Facilities, Calendar Year 1980. Union Carbide Corporation – Nuclear Division, June 1981. Y/UB-15.
- UCC 1982. Environmental Monitoring Report, United States Department of Energy Oak Ridge Facilities, Calendar Year 1981. Union Carbide Corporation – Nuclear Division, May 1982. Y/UB-16.
- UCC 1983. Environmental Monitoring Report, United States Department of Energy Oak Ridge Facilities, Calendar Year 1982. Union Carbide Corporation – Nuclear Division, May 1983. Y/UB-18.

**GLOSSARY**

**BEING PREPARED**

## ATTACHMENT D OCCUPATIONAL ENVIRONMENTAL DOSE

### LIST OF TABLES

D-1	Calculated $^{234/235}\text{U}$ and $^{238}\text{U}$ air concentrations and intakes for Station 2.....	39
D-2	Calculated $^{234/235}\text{U}$ and $^{238}\text{U}$ air concentrations and intakes for Station 4.....	40
D-3	Calculated $^{234/235}\text{U}$ and $^{238}\text{U}$ air concentrations and intakes for Station 8.....	41
D-4	Calculated $^{234/235}\text{U}$ and $^{238}\text{U}$ air concentrations and intakes for Station 12.....	42
D-5	Site wide $^{234/235}\text{U}$ and $^{238}\text{U}$ air concentrations and Intakes based on average air concentrations for Stations 2, 4, 8 and 12.....	43
D-6	Maximum $^{234/235}\text{U}$ and $^{238}\text{U}$ air concentrations and intakes .....	44
D-7	Ambient external dose rates outside building on Y-12 site.....	44

#### D.1 Occupational Environmental Dose for Unmonitored Workers

The occupational environmental dose received by unmonitored workers is limited to exposures received while outside buildings and within the perimeter of the Y-12 Plant. Buildings and other operational units occupy the vast majority of the land area at Y-12. This assessment will quantify exposure for unmonitored workers who either work outdoors or otherwise spend time outside buildings. Based on the exposure assessment, the two exposure pathways are:

1. Inhalation of uranium in ambient air due to operational releases,
2. Direct external radiation exposure from radionuclides in soils and outdoor surfaces, as well as shine from buildings and operational units.

#### D.2 Intake of Radionuclides from On Site Releases of Radionuclides

Although other radionuclides have been present at Y-12, the primary source of airborne radioactive material is uranium from the various operations that have occurred over the years. Thus, intakes have been calculated only for  $^{234/235}\text{U}$  and  $^{238}\text{U}$ . Only four monitoring stations are located on Y-12, so intakes have been calculated only for these locations (Tables D-1 to D-4). In addition, site-wide average concentrations based on the four stations have been calculated and are in Table D-5. The maximum intake is shown in Table D-6.

The on site concentrations of  $^{234/235}\text{U}$  and  $^{238}\text{U}$  were estimated based on an empirical approach. The air concentrations and intakes were estimated using the 50<sup>th</sup> and 95<sup>th</sup> percentile values for the empirical dispersion coefficient (Chi/Q) for each station. Air concentrations (becquerel/cubic meter [ $\text{Bq m}^{-3}$ ]) for all years from 1944 to 2002 were estimated based on the quantities of uranium released. Intakes ( $\text{Bq y}^{-1}$ ) were estimated from the air concentrations based on an exposure assumption of 2000  $\text{h y}^{-1}$  and an inhalation rate of 1.2  $\text{m}^3 \text{h}^{-1}$ . Intakes were estimated for four locations within the boundary of the facility. A site-wide average was also calculated from these four locations. In addition, maximum air concentrations and intakes are presented.

Table D-1. Calculated <sup>234/235</sup>U and <sup>238</sup>U air concentrations and intakes for Station 2.

YEAR	Station 2 Air Concentrations (Bq m <sup>-3</sup> )				Station 2 Intake (Bq y <sup>-1</sup> )			
	<sup>234/235</sup> U		<sup>238</sup> U		<sup>234/235</sup> U		<sup>238</sup> U	
	50 <sup>th</sup> Percentile	95 <sup>th</sup> Percentile	50 <sup>th</sup> Percentile	95 <sup>th</sup> Percentile	50 <sup>th</sup> Percentile	95 <sup>th</sup> Percentile	50 <sup>th</sup> Percentile	95 <sup>th</sup> Percentile
1944	4.41E-05	1.17E-04	2.02E-05	5.35E-05	0.1058	0.2800	0.0485	0.1283
1945	7.53E-05	1.99E-04	4.04E-05	1.07E-04	0.1807	0.4783	0.0969	0.2566
1946	5.69E-05	1.51E-04	2.39E-05	6.32E-05	0.1366	0.3616	0.0573	0.1516
1947	4.77E-05	1.26E-04	1.47E-05	3.89E-05	0.1146	0.3033	0.0353	0.0933
1948	3.12E-05	8.26E-05	4.04E-05	1.07E-04	0.0749	0.1983	0.0969	0.2566
1949	3.12E-05	8.26E-05	4.04E-05	1.07E-04	0.0749	0.1983	0.0969	0.2566
1950	3.12E-05	8.26E-05	4.04E-05	1.07E-04	0.0749	0.1983	0.0969	0.2566
1951	3.12E-05	8.26E-05	4.04E-05	1.07E-04	0.0749	0.1983	0.0969	0.2566
1952	3.12E-05	8.26E-05	4.04E-05	1.07E-04	0.0749	0.1983	0.0969	0.2566
1953	1.23E-04	3.26E-04	2.50E-04	6.61E-04	0.2952	0.7816	0.5993	1.5865
1954	1.06E-04	2.82E-04	2.35E-04	6.22E-04	0.2556	0.6766	0.5640	1.4932
1955	1.08E-04	2.87E-04	2.35E-04	6.22E-04	0.2600	0.6883	0.5640	1.4932
1956	5.88E-04	1.56E-03	1.84E-04	4.86E-04	1.4101	3.7329	0.4407	1.1665
1957	1.06E-03	2.82E-03	1.47E-04	3.89E-04	2.5558	6.7659	0.3525	0.9332
1958	3.19E-03	8.46E-03	3.30E-04	8.75E-04	7.6674	20.2976	0.7932	2.0998
1959	2.18E-03	5.78E-03	3.67E-04	9.72E-04	5.2438	13.8817	0.8813	2.3331
1960	4.46E-04	1.18E-03	5.69E-05	1.51E-04	1.0708	2.8347	0.1366	0.3616
1961	7.16E-04	1.90E-03	7.90E-05	2.09E-04	1.7186	4.5495	0.1895	0.5016
1962	7.73E-04	2.05E-03	8.45E-05	2.24E-04	1.8552	4.9111	0.2027	0.5366
1963	3.86E-04	1.02E-03	1.29E-04	3.40E-04	0.9254	2.4497	0.3085	0.8166
1964	1.25E-04	3.31E-04	1.67E-04	4.42E-04	0.2996	0.7932	0.4010	1.0615
1965	6.26E-04	1.66E-03	3.67E-05	9.72E-05	1.5026	3.9779	0.0881	0.2333
1966	2.00E-04	5.30E-04	5.69E-05	1.51E-04	0.4803	1.2715	0.1366	0.3616
1967	9.18E-05	2.43E-04	2.02E-05	5.35E-05	0.2203	0.5833	0.0485	0.1283
1968	4.04E-05	1.07E-04	2.75E-05	7.29E-05	0.0969	0.2566	0.0661	0.1750
1969	1.78E-04	4.71E-04	1.47E-05	3.89E-05	0.4274	1.1315	0.0353	0.0933
1970	2.92E-04	7.73E-04	1.65E-05	4.37E-05	0.7006	1.8548	0.0397	0.1050
1971	3.80E-04	1.01E-03	3.49E-05	9.24E-05	0.9122	2.4147	0.0837	0.2216
1972	6.72E-04	1.78E-03	5.14E-05	1.36E-04	1.6128	4.2695	0.1234	0.3266
1973	5.93E-04	1.57E-03	2.39E-05	6.32E-05	1.4233	3.7679	0.0573	0.1516
1974	5.14E-05	1.36E-04	1.29E-05	3.40E-05	0.1234	0.3266	0.0308	0.0817
1975	9.55E-05	2.53E-04	1.29E-05	3.40E-05	0.2291	0.6066	0.0308	0.0817
1976	6.06E-05	1.60E-04	1.29E-05	3.40E-05	0.1454	0.3850	0.0308	0.0817
1977	2.94E-05	7.78E-05	1.29E-05	3.40E-05	0.0705	0.1866	0.0308	0.0817
1978	3.12E-05	8.26E-05	1.29E-05	3.40E-05	0.0749	0.1983	0.0308	0.0817
1979	4.41E-05	1.17E-04	1.29E-05	3.40E-05	0.1058	0.2800	0.0308	0.0817
1980	8.63E-05	2.28E-04	1.29E-05	3.40E-05	0.2071	0.5483	0.0308	0.0817
1981	5.32E-05	1.41E-04	1.29E-05	3.40E-05	0.1278	0.3383	0.0308	0.0817
1982	8.81E-05	2.33E-04	1.29E-05	3.40E-05	0.2115	0.5599	0.0308	0.0817
1983	7.53E-05	1.99E-04	1.29E-05	3.40E-05	0.1807	0.4783	0.0308	0.0817
1984	6.43E-05	1.70E-04	2.02E-05	5.35E-05	0.1542	0.4083	0.0485	0.1283
1985	5.14E-05	1.36E-04	1.29E-05	3.40E-05	0.1234	0.3266	0.0308	0.0817
1986	6.43E-05	1.70E-04	1.29E-05	3.40E-05	0.1542	0.4083	0.0308	0.0817
1987	1.08E-04	2.87E-04	9.18E-06	2.43E-05	0.2600	0.6883	0.0220	0.0583
1988	5.51E-05	1.46E-04	9.18E-06	2.43E-05	0.1322	0.3500	0.0220	0.0583
1989	2.75E-05	7.29E-05	2.57E-06	6.80E-06	0.0661	0.1750	0.0062	0.0163
1990	1.47E-05	3.89E-05	1.29E-06	3.40E-06	0.0353	0.0933	0.0031	0.0082
1991	7.34E-06	1.94E-05	1.84E-06	4.86E-06	0.0176	0.0467	0.0044	0.0117
1992	7.34E-06	1.94E-05	1.10E-06	2.92E-06	0.0176	0.0467	0.0026	0.0070
1993	5.51E-06	1.46E-05	5.51E-07	1.46E-06	0.0132	0.0350	0.0013	0.0035
1994	5.51E-06	1.46E-05	3.67E-07	9.72E-07	0.0132	0.0350	0.0009	0.0023
1995	3.67E-06	9.72E-06	3.86E-07	1.02E-06	0.0088	0.0233	0.0009	0.0024
1996	3.67E-06	9.72E-06	3.86E-07	1.02E-06	0.0088	0.0233	0.0009	0.0024
1997	3.67E-06	9.72E-06	3.86E-07	1.02E-06	0.0088	0.0233	0.0009	0.0024
1998	3.67E-06	9.72E-06	3.86E-07	1.02E-06	0.0088	0.0233	0.0009	0.0024
1999	3.67E-06	9.72E-06	3.86E-07	1.02E-06	0.0088	0.0233	0.0009	0.0024
2000	3.67E-06	9.72E-06	3.86E-07	1.02E-06	0.0088	0.0233	0.0009	0.0024
2001	3.67E-06	9.72E-06	3.86E-07	1.02E-06	0.0088	0.0233	0.0009	0.0024
2002	3.67E-06	9.72E-06	3.86E-07	1.02E-06	0.0088	0.0233	0.0009	0.0024

Table D-2. Calculated <sup>234/235</sup>U and <sup>238</sup>U air concentrations and intakes for Station 4.

YEAR	Station 4 Air Concentration (Bq m <sup>-3</sup> )				Station 4 Intake (Bq y <sup>-1</sup> )			
	<sup>234/235</sup> U		<sup>238</sup> U		<sup>234/235</sup> U		<sup>238</sup> U	
	50 <sup>th</sup> Percentile	95 <sup>th</sup> Percentile	50 <sup>th</sup> Percentile	95 <sup>th</sup> Percentile	50 <sup>th</sup> Percentile	95 <sup>th</sup> Percentile	50 <sup>th</sup> Percentile	95 <sup>th</sup> Percentile
1944	1.28E-04	7.75E-04	5.87E-05	3.55E-04	0.3072	1.8607	0.1408	0.8528
1945	2.19E-04	1.32E-03	1.17E-04	7.11E-04	0.5247	3.1788	0.2816	1.7057
1946	1.65E-04	1.00E-03	6.93E-05	4.20E-04	0.3967	2.4035	0.1664	1.0079
1947	1.39E-04	8.40E-04	4.27E-05	2.58E-04	0.3328	2.0158	0.1024	0.6202
1948	9.07E-05	5.49E-04	1.17E-04	7.11E-04	0.2176	1.3180	0.2816	1.7057
1949	9.07E-05	5.49E-04	1.17E-04	7.11E-04	0.2176	1.3180	0.2816	1.7057
1950	9.07E-05	5.49E-04	1.17E-04	7.11E-04	0.2176	1.3180	0.2816	1.7057
1951	9.07E-05	5.49E-04	1.17E-04	7.11E-04	0.2176	1.3180	0.2816	1.7057
1952	9.07E-05	5.49E-04	1.17E-04	7.11E-04	0.2176	1.3180	0.2816	1.7057
1953	3.57E-04	2.16E-03	7.25E-04	4.39E-03	0.8575	5.1946	1.7406	10.5442
1954	3.09E-04	1.87E-03	6.83E-04	4.13E-03	0.7423	4.4968	1.6382	9.9239
1955	3.15E-04	1.91E-03	6.83E-04	4.13E-03	0.7551	4.5743	1.6382	9.9239
1956	1.71E-03	1.03E-02	5.33E-04	3.23E-03	4.0955	24.8098	1.2798	7.7531
1957	3.09E-03	1.87E-02	4.27E-04	2.58E-03	7.4230	44.9678	1.0239	6.2025
1958	9.28E-03	5.62E-02	9.60E-04	5.81E-03	22.2691	134.9034	2.3037	13.9555
1959	6.35E-03	3.84E-02	1.07E-03	6.46E-03	15.2300	92.2615	2.5597	15.5061
1960	1.30E-03	7.85E-03	1.65E-04	1.00E-03	3.1100	18.8400	0.3967	2.4035
1961	2.08E-03	1.26E-02	2.29E-04	1.39E-03	4.9914	30.2370	0.5503	3.3338
1962	2.25E-03	1.36E-02	2.45E-04	1.49E-03	5.3881	32.6404	0.5887	3.5664
1963	1.12E-03	6.78E-03	3.73E-04	2.26E-03	2.6877	16.2814	0.8959	5.4271
1964	3.63E-04	2.20E-03	4.85E-04	2.94E-03	0.8703	5.2721	1.1646	7.0553
1965	1.82E-03	1.10E-02	1.07E-04	6.46E-04	4.3642	26.4380	0.2560	1.5506
1966	5.81E-04	3.52E-03	1.65E-04	1.00E-03	1.3950	8.4508	0.3967	2.4035
1967	2.67E-04	1.62E-03	5.87E-05	3.55E-04	0.6399	3.8765	0.1408	0.8528
1968	1.17E-04	7.11E-04	8.00E-05	4.85E-04	0.2816	1.7057	0.1920	1.1630
1969	5.17E-04	3.13E-03	4.27E-05	2.58E-04	1.2414	7.5205	0.1024	0.6202
1970	8.48E-04	5.14E-03	4.80E-05	2.91E-04	2.0349	12.3274	0.1152	0.6978
1971	1.10E-03	6.69E-03	1.01E-04	6.14E-04	2.6493	16.0489	0.2432	1.4731
1972	1.95E-03	1.18E-02	1.49E-04	9.05E-04	4.6842	28.3762	0.3584	2.1709
1973	1.72E-03	1.04E-02	6.93E-05	4.20E-04	4.1339	25.0424	0.1664	1.0079
1974	1.49E-04	9.05E-04	3.73E-05	2.26E-04	0.3584	2.1709	0.0896	0.5427
1975	2.77E-04	1.68E-03	3.73E-05	2.26E-04	0.6655	4.0316	0.0896	0.5427
1976	1.76E-04	1.07E-03	3.73E-05	2.26E-04	0.4223	2.5585	0.0896	0.5427
1977	8.53E-05	5.17E-04	3.73E-05	2.26E-04	0.2048	1.2405	0.0896	0.5427
1978	9.07E-05	5.49E-04	3.73E-05	2.26E-04	0.2176	1.3180	0.0896	0.5427
1979	1.28E-04	7.75E-04	3.73E-05	2.26E-04	0.3072	1.8607	0.0896	0.5427
1980	2.51E-04	1.52E-03	3.73E-05	2.26E-04	0.6015	3.6439	0.0896	0.5427
1981	1.55E-04	9.37E-04	3.73E-05	2.26E-04	0.3712	2.2484	0.0896	0.5427
1982	2.56E-04	1.55E-03	3.73E-05	2.26E-04	0.6143	3.7215	0.0896	0.5427
1983	2.19E-04	1.32E-03	3.73E-05	2.26E-04	0.5247	3.1788	0.0896	0.5427
1984	1.87E-04	1.13E-03	5.87E-05	3.55E-04	0.4479	2.7136	0.1408	0.8528
1985	1.49E-04	9.05E-04	3.73E-05	2.26E-04	0.3584	2.1709	0.0896	0.5427
1986	1.87E-04	1.13E-03	3.73E-05	2.26E-04	0.4479	2.7136	0.0896	0.5427
1987	3.15E-04	1.91E-03	2.67E-05	1.62E-04	0.7551	4.5743	0.0640	0.3877
1988	1.60E-04	9.69E-04	2.67E-05	1.62E-04	0.3840	2.3259	0.0640	0.3877
1989	8.00E-05	4.85E-04	7.47E-06	4.52E-05	0.1920	1.1630	0.0179	0.1085
1990	4.27E-05	2.58E-04	3.73E-06	2.26E-05	0.1024	0.6202	0.0090	0.0543
1991	2.13E-05	1.29E-04	5.33E-06	3.23E-05	0.0512	0.3101	0.0128	0.0775
1992	2.13E-05	1.29E-04	3.20E-06	1.94E-05	0.0512	0.3101	0.0077	0.0465
1993	1.60E-05	9.69E-05	1.60E-06	9.69E-06	0.0384	0.2326	0.0038	0.0233
1994	1.60E-05	9.69E-05	1.07E-06	6.46E-06	0.0384	0.2326	0.0026	0.0155
1995	1.07E-05	6.46E-05	1.12E-06	6.78E-06	0.0256	0.1551	0.0027	0.0163
1996	1.07E-05	6.46E-05	1.12E-06	6.78E-06	0.0256	0.1551	0.0027	0.0163
1997	1.07E-05	6.46E-05	1.12E-06	6.78E-06	0.0256	0.1551	0.0027	0.0163
1998	1.07E-05	6.46E-05	1.12E-06	6.78E-06	0.0256	0.1551	0.0027	0.0163
1999	1.07E-05	6.46E-05	1.12E-06	6.78E-06	0.0256	0.1551	0.0027	0.0163
2000	1.07E-05	6.46E-05	1.12E-06	6.78E-06	0.0256	0.1551	0.0027	0.0163
2001	1.07E-05	6.46E-05	1.12E-06	6.78E-06	0.0256	0.1551	0.0027	0.0163
2002	1.07E-05	6.46E-05	1.12E-06	6.78E-06	0.0256	0.1551	0.0027	0.0163



Table D-3. Calculated <sup>234/235</sup>U and <sup>238</sup>U air concentrations and intakes for Station 8.

YEAR	Station 8 Air Concentration (Bq m <sup>-3</sup> )				Station 8 Intake (Bq y <sup>-1</sup> )			
	<sup>234/235</sup> U		<sup>238</sup> U		<sup>234/235</sup> U		<sup>238</sup> U	
	50 <sup>th</sup> Percentile	95 <sup>th</sup> Percentile	50 <sup>th</sup> Percentile	95 <sup>th</sup> Percentile	50 <sup>th</sup> Percentile	95 <sup>th</sup> Percentile	50 <sup>th</sup> Percentile	95 <sup>th</sup> Percentile
1944	1.12E-04	6.69E-04	5.12E-05	3.06E-04	0.2680	1.6048	0.1228	0.7356
1945	1.91E-04	1.14E-03	1.02E-04	6.13E-04	0.4578	2.7416	0.2457	1.4711
1946	1.44E-04	8.64E-04	6.05E-05	3.62E-04	0.3462	2.0729	0.1452	0.8693
1947	1.21E-04	7.24E-04	3.72E-05	2.23E-04	0.2903	1.7386	0.0893	0.5349
1948	7.91E-05	4.74E-04	1.02E-04	6.13E-04	0.1898	1.1368	0.2457	1.4711
1949	7.91E-05	4.74E-04	1.02E-04	6.13E-04	0.1898	1.1368	0.2457	1.4711
1950	7.91E-05	4.74E-04	1.02E-04	6.13E-04	0.1898	1.1368	0.2457	1.4711
1951	7.91E-05	4.74E-04	1.02E-04	6.13E-04	0.1898	1.1368	0.2457	1.4711
1952	7.91E-05	4.74E-04	1.02E-04	6.13E-04	0.1898	1.1368	0.2457	1.4711
1953	3.12E-04	1.87E-03	6.33E-04	3.79E-03	0.7482	4.4802	1.5187	9.0941
1954	2.70E-04	1.62E-03	5.96E-04	3.57E-03	0.6477	3.8784	1.4293	8.5592
1955	2.75E-04	1.64E-03	5.96E-04	3.57E-03	0.6588	3.9452	1.4293	8.5592
1956	1.49E-03	8.92E-03	4.65E-04	2.79E-03	3.5733	21.3979	1.1167	6.6869
1957	2.70E-03	1.62E-02	3.72E-04	2.23E-03	6.4766	38.7837	0.8933	5.3495
1958	8.10E-03	4.85E-02	8.37E-04	5.02E-03	19.4298	116.3512	2.0100	12.0363
1959	5.54E-03	3.32E-02	9.31E-04	5.57E-03	13.2882	79.5735	2.2333	13.3737
1960	1.13E-03	6.77E-03	1.44E-04	8.64E-04	2.7135	16.2490	0.3462	2.0729
1961	1.81E-03	1.09E-02	2.00E-04	1.20E-03	4.3550	26.0787	0.4802	2.8753
1962	1.96E-03	1.17E-02	2.14E-04	1.28E-03	4.7011	28.1516	0.5137	3.0760
1963	9.77E-04	5.85E-03	3.26E-04	1.95E-03	2.3450	14.0424	0.7817	4.6808
1964	3.16E-04	1.89E-03	4.23E-04	2.54E-03	0.7593	4.5471	1.0162	6.0850
1965	1.59E-03	9.50E-03	9.31E-05	5.57E-04	3.8078	22.8022	0.2233	1.3374
1966	5.07E-04	3.04E-03	1.44E-04	8.64E-04	1.2172	7.2887	0.3462	2.0729
1967	2.33E-04	1.39E-03	5.12E-05	3.06E-04	0.5583	3.3434	0.1228	0.7356
1968	1.02E-04	6.13E-04	6.98E-05	4.18E-04	0.2457	1.4711	0.1675	1.0030
1969	4.51E-04	2.70E-03	3.72E-05	2.23E-04	1.0832	6.4862	0.0893	0.5349
1970	7.40E-04	4.43E-03	4.19E-05	2.51E-04	1.7755	10.6321	0.1005	0.6018
1971	9.63E-04	5.77E-03	8.84E-05	5.29E-04	2.3115	13.8418	0.2122	1.2705
1972	1.70E-03	1.02E-02	1.30E-04	7.80E-04	4.0870	24.4739	0.3127	1.8723
1973	1.50E-03	9.00E-03	6.05E-05	3.62E-04	3.6068	21.5985	0.1452	0.8693
1974	1.30E-04	7.80E-04	3.26E-05	1.95E-04	0.3127	1.8723	0.0782	0.4681
1975	2.42E-04	1.45E-03	3.26E-05	1.95E-04	0.5807	3.4772	0.0782	0.4681
1976	1.54E-04	9.19E-04	3.26E-05	1.95E-04	0.3685	2.2067	0.0782	0.4681
1977	7.44E-05	4.46E-04	3.26E-05	1.95E-04	0.1787	1.0699	0.0782	0.4681
1978	7.91E-05	4.74E-04	3.26E-05	1.95E-04	0.1898	1.1368	0.0782	0.4681
1979	1.12E-04	6.69E-04	3.26E-05	1.95E-04	0.2680	1.6048	0.0782	0.4681
1980	2.19E-04	1.31E-03	3.26E-05	1.95E-04	0.5248	3.1428	0.0782	0.4681
1981	1.35E-04	8.08E-04	3.26E-05	1.95E-04	0.3238	1.9392	0.0782	0.4681
1982	2.23E-04	1.34E-03	3.26E-05	1.95E-04	0.5360	3.2097	0.0782	0.4681
1983	1.91E-04	1.14E-03	3.26E-05	1.95E-04	0.4578	2.7416	0.0782	0.4681
1984	1.63E-04	9.75E-04	5.12E-05	3.06E-04	0.3908	2.3404	0.1228	0.7356
1985	1.30E-04	7.80E-04	3.26E-05	1.95E-04	0.3127	1.8723	0.0782	0.4681
1986	1.63E-04	9.75E-04	3.26E-05	1.95E-04	0.3908	2.3404	0.0782	0.4681
1987	2.75E-04	1.64E-03	2.33E-05	1.39E-04	0.6588	3.9452	0.0558	0.3343
1988	1.40E-04	8.36E-04	2.33E-05	1.39E-04	0.3350	2.0061	0.0558	0.3343
1989	6.98E-05	4.18E-04	6.51E-06	3.90E-05	0.1675	1.0030	0.0156	0.0936
1990	3.72E-05	2.23E-04	3.26E-06	1.95E-05	0.0893	0.5349	0.0078	0.0468
1991	1.86E-05	1.11E-04	4.65E-06	2.79E-05	0.0447	0.2675	0.0112	0.0669
1992	1.86E-05	1.11E-04	2.79E-06	1.67E-05	0.0447	0.2675	0.0067	0.0401
1993	1.40E-05	8.36E-05	1.40E-06	8.36E-06	0.0335	0.2006	0.0033	0.0201
1994	1.40E-05	8.36E-05	9.31E-07	5.57E-06	0.0335	0.2006	0.0022	0.0134
1995	9.31E-06	5.57E-05	9.77E-07	5.85E-06	0.0223	0.1337	0.0023	0.0140
1996	9.31E-06	5.57E-05	9.77E-07	5.85E-06	0.0223	0.1337	0.0023	0.0140
1997	9.31E-06	5.57E-05	9.77E-07	5.85E-06	0.0223	0.1337	0.0023	0.0140
1998	9.31E-06	5.57E-05	9.77E-07	5.85E-06	0.0223	0.1337	0.0023	0.0140
1999	9.31E-06	5.57E-05	9.77E-07	5.85E-06	0.0223	0.1337	0.0023	0.0140
2000	9.31E-06	5.57E-05	9.77E-07	5.85E-06	0.0223	0.1337	0.0023	0.0140
2001	9.31E-06	5.57E-05	9.77E-07	5.85E-06	0.0223	0.1337	0.0023	0.0140
2002	9.31E-06	5.57E-05	9.77E-07	5.85E-06	0.0223	0.1337	0.0023	0.0140

Table D-4. Calculated <sup>234/235</sup>U and <sup>238</sup>U air concentrations and intakes for Station 12.

YEAR	Station 12 Air Concentration (Bq m <sup>-3</sup> )				Station 12 Intake (Bq y <sup>-1</sup> )			
	<sup>234/235</sup> U		<sup>238</sup> U		<sup>234/235</sup> U		<sup>238</sup> U	
	50 <sup>th</sup> Percentile	95 <sup>th</sup> Percentile	50 <sup>th</sup> Percentile	95 <sup>th</sup> Percentile	50 <sup>th</sup> Percentile	95 <sup>th</sup> Percentile	50 <sup>th</sup> Percentile	95 <sup>th</sup> Percentile
1944	4.03E-05	1.70E-04	1.85E-05	7.81E-05	0.0967	0.4089	0.0443	0.1874
1945	6.88E-05	2.91E-04	3.69E-05	1.56E-04	0.1652	0.6986	0.0886	0.3748
1946	5.20E-05	2.20E-04	2.18E-05	9.23E-05	0.1249	0.5282	0.0524	0.2215
1947	4.36E-05	1.85E-04	1.34E-05	5.68E-05	0.1048	0.4430	0.0322	0.1363
1948	2.85E-05	1.21E-04	3.69E-05	1.56E-04	0.0685	0.2897	0.0886	0.3748
1949	2.85E-05	1.21E-04	3.69E-05	1.56E-04	0.0685	0.2897	0.0886	0.3748
1950	2.85E-05	1.21E-04	3.69E-05	1.56E-04	0.0685	0.2897	0.0886	0.3748
1951	2.85E-05	1.21E-04	3.69E-05	1.56E-04	0.0685	0.2897	0.0886	0.3748
1952	2.85E-05	1.21E-04	3.69E-05	1.56E-04	0.0685	0.2897	0.0886	0.3748
1953	1.12E-04	4.76E-04	2.28E-04	9.66E-04	0.2700	1.1416	0.5480	2.3172
1954	9.74E-05	4.12E-04	2.15E-04	9.09E-04	0.2337	0.9882	0.5157	2.1809
1955	9.90E-05	4.19E-04	2.15E-04	9.09E-04	0.2377	1.0053	0.5157	2.1809
1956	5.37E-04	2.27E-03	1.68E-04	7.10E-04	1.2893	5.4523	0.4029	1.7039
1957	9.74E-04	4.12E-03	1.34E-04	5.68E-04	2.3369	9.8824	0.3223	1.3631
1958	2.92E-03	1.24E-02	3.02E-04	1.28E-03	7.0107	29.6471	0.7252	3.0669
1959	2.00E-03	8.45E-03	3.36E-04	1.42E-03	4.7947	20.2759	0.8058	3.4077
1960	4.08E-04	1.73E-03	5.20E-05	2.20E-04	0.9791	4.1404	0.1249	0.5282
1961	6.55E-04	2.77E-03	7.22E-05	3.05E-04	1.5714	6.6450	0.1733	0.7327
1962	7.07E-04	2.99E-03	7.72E-05	3.27E-04	1.6963	7.1732	0.1853	0.7838
1963	3.53E-04	1.49E-03	1.18E-04	4.97E-04	0.8461	3.5781	0.2820	1.1927
1964	1.14E-04	4.83E-04	1.53E-04	6.46E-04	0.2740	1.1586	0.3667	1.5505
1965	5.72E-04	2.42E-03	3.36E-05	1.42E-04	1.3739	5.8102	0.0806	0.3408
1966	1.83E-04	7.74E-04	5.20E-05	2.20E-04	0.4392	1.8572	0.1249	0.5282
1967	8.39E-05	3.55E-04	1.85E-05	7.81E-05	0.2015	0.8519	0.0443	0.1874
1968	3.69E-05	1.56E-04	2.52E-05	1.06E-04	0.0886	0.3748	0.0604	0.2556
1969	1.63E-04	6.89E-04	1.34E-05	5.68E-05	0.3908	1.6527	0.0322	0.1363
1970	2.67E-04	1.13E-03	1.51E-05	6.39E-05	0.6406	2.7091	0.0363	0.1533
1971	3.48E-04	1.47E-03	3.19E-05	1.35E-04	0.8340	3.5270	0.0766	0.3237
1972	6.14E-04	2.60E-03	4.70E-05	1.99E-04	1.4747	6.2361	0.1128	0.4771
1973	5.42E-04	2.29E-03	2.18E-05	9.23E-05	1.3014	5.5035	0.0524	0.2215
1974	4.70E-05	1.99E-04	1.18E-05	4.97E-05	0.1128	0.4771	0.0282	0.1193
1975	8.73E-05	3.69E-04	1.18E-05	4.97E-05	0.2095	0.8860	0.0282	0.1193
1976	5.54E-05	2.34E-04	1.18E-05	4.97E-05	0.1330	0.5623	0.0282	0.1193
1977	2.69E-05	1.14E-04	1.18E-05	4.97E-05	0.0645	0.2726	0.0282	0.1193
1978	2.85E-05	1.21E-04	1.18E-05	4.97E-05	0.0685	0.2897	0.0282	0.1193
1979	4.03E-05	1.70E-04	1.18E-05	4.97E-05	0.0967	0.4089	0.0282	0.1193
1980	7.89E-05	3.34E-04	1.18E-05	4.97E-05	0.1894	0.8008	0.0282	0.1193
1981	4.87E-05	2.06E-04	1.18E-05	4.97E-05	0.1168	0.4941	0.0282	0.1193
1982	8.06E-05	3.41E-04	1.18E-05	4.97E-05	0.1934	0.8179	0.0282	0.1193
1983	6.88E-05	2.91E-04	1.18E-05	4.97E-05	0.1652	0.6986	0.0282	0.1193
1984	5.88E-05	2.48E-04	1.85E-05	7.81E-05	0.1410	0.5964	0.0443	0.1874
1985	4.70E-05	1.99E-04	1.18E-05	4.97E-05	0.1128	0.4771	0.0282	0.1193
1986	5.88E-05	2.48E-04	1.18E-05	4.97E-05	0.1410	0.5964	0.0282	0.1193
1987	9.90E-05	4.19E-04	8.39E-06	3.55E-05	0.2377	1.0053	0.0201	0.0852
1988	5.04E-05	2.13E-04	8.39E-06	3.55E-05	0.1209	0.5112	0.0201	0.0852
1989	2.52E-05	1.06E-04	2.35E-06	9.94E-06	0.0604	0.2556	0.0056	0.0239
1990	1.34E-05	5.68E-05	1.18E-06	4.97E-06	0.0322	0.1363	0.0028	0.0119
1991	6.72E-06	2.84E-05	1.68E-06	7.10E-06	0.0161	0.0682	0.0040	0.0170
1992	6.72E-06	2.84E-05	1.01E-06	4.26E-06	0.0161	0.0682	0.0024	0.0102
1993	5.04E-06	2.13E-05	5.04E-07	2.13E-06	0.0121	0.0511	0.0012	0.0051
1994	5.04E-06	2.13E-05	3.36E-07	1.42E-06	0.0121	0.0511	0.0008	0.0034
1995	3.36E-06	1.42E-05	3.53E-07	1.49E-06	0.0081	0.0341	0.0008	0.0036
1996	3.36E-06	1.42E-05	3.53E-07	1.49E-06	0.0081	0.0341	0.0008	0.0036
1997	3.36E-06	1.42E-05	3.53E-07	1.49E-06	0.0081	0.0341	0.0008	0.0036
1998	3.36E-06	1.42E-05	3.53E-07	1.49E-06	0.0081	0.0341	0.0008	0.0036
1999	3.36E-06	1.42E-05	3.53E-07	1.49E-06	0.0081	0.0341	0.0008	0.0036
2000	3.36E-06	1.42E-05	3.53E-07	1.49E-06	0.0081	0.0341	0.0008	0.0036
2001	3.36E-06	1.42E-05	3.53E-07	1.49E-06	0.0081	0.0341	0.0008	0.0036
2002	3.36E-06	1.42E-05	3.53E-07	1.49E-06	0.0081	0.0341	0.0008	0.0036

Table D-5. Site wide <sup>234/235</sup>U and <sup>238</sup>U air concentrations and intakes based on average air concentrations for Stations 2, 4, 8 and 12.

YEAR	Site Wide Average Air Concentration (Bq m <sup>-3</sup> )				Site Wide Average Intake (Bq y <sup>-1</sup> )			
	<sup>234/235</sup> U		<sup>238</sup> U		<sup>234/235</sup> U		<sup>238</sup> U	
	50 <sup>th</sup> Percentile	95 <sup>th</sup> Percentile	50 <sup>th</sup> Percentile	95 <sup>th</sup> Percentile	50 <sup>th</sup> Percentile	95 <sup>th</sup> Percentile	50 <sup>th</sup> Percentile	95 <sup>th</sup> Percentile
1944	8.10E-05	4.33E-04	3.71E-05	1.98E-04	0.1944	1.0386	0.0891	0.4760
1945	1.38E-04	7.39E-04	7.43E-05	3.97E-04	0.3321	1.7743	0.1782	0.9521
1946	1.05E-04	5.59E-04	4.39E-05	2.34E-04	0.2511	1.3415	0.1053	0.5626
1947	8.78E-05	4.69E-04	2.70E-05	1.44E-04	0.2106	1.1252	0.0648	0.3462
1948	5.74E-05	3.07E-04	7.43E-05	3.97E-04	0.1377	0.7357	0.1782	0.9521
1949	5.74E-05	3.07E-04	7.43E-05	3.97E-04	0.1377	0.7357	0.1782	0.9521
1950	5.74E-05	3.07E-04	7.43E-05	3.97E-04	0.1377	0.7357	0.1782	0.9521
1951	5.74E-05	3.07E-04	7.43E-05	3.97E-04	0.1377	0.7357	0.1782	0.9521
1952	5.74E-05	3.07E-04	7.43E-05	3.97E-04	0.1377	0.7357	0.1782	0.9521
1953	2.26E-04	1.21E-03	4.59E-04	2.45E-03	0.5427	2.8995	1.1016	5.8855
1954	1.96E-04	1.05E-03	4.32E-04	2.31E-03	0.4698	2.5100	1.0368	5.5393
1955	1.99E-04	1.06E-03	4.32E-04	2.31E-03	0.4779	2.5533	1.0368	5.5393
1956	1.08E-03	5.77E-03	3.38E-04	1.80E-03	2.5920	13.8482	0.8100	4.3276
1957	1.96E-03	1.05E-02	2.70E-04	1.44E-03	4.6981	25.0999	0.6480	3.4621
1958	5.87E-03	3.14E-02	6.08E-04	3.25E-03	14.0943	75.2998	1.4580	7.7896
1959	4.02E-03	2.15E-02	6.75E-04	3.61E-03	9.6392	51.4982	1.6200	8.6552
1960	8.20E-04	4.38E-03	1.05E-04	5.59E-04	1.9683	10.5160	0.2511	1.3415
1961	1.32E-03	7.03E-03	1.45E-04	7.75E-04	3.1591	16.8775	0.3483	1.8609
1962	1.42E-03	7.59E-03	1.55E-04	8.29E-04	3.4102	18.2191	0.3726	1.9907
1963	7.09E-04	3.79E-03	2.36E-04	1.26E-04	1.7010	9.0879	0.5670	3.0293
1964	2.30E-04	1.23E-03	3.07E-04	1.64E-03	0.5508	2.9428	0.7371	3.9381
1965	1.15E-03	6.15E-03	6.75E-05	3.61E-04	2.7621	14.7570	0.1620	0.8655
1966	3.68E-04	1.97E-03	1.05E-04	5.59E-04	0.8829	4.7171	0.2511	1.3415
1967	1.69E-04	9.02E-04	3.71E-05	1.98E-04	0.4050	2.1638	0.0891	0.4760
1968	7.43E-05	3.97E-04	5.06E-05	2.70E-04	0.1782	0.9521	0.1215	0.6491
1969	3.27E-04	1.75E-03	2.70E-05	1.44E-04	0.7857	4.1977	0.0648	0.3462
1970	5.37E-04	2.87E-03	3.04E-05	1.62E-04	1.2879	6.8808	0.0729	0.3895
1971	6.99E-04	3.73E-03	6.41E-05	3.43E-04	1.6767	8.9581	0.1539	0.8222
1972	1.24E-03	6.60E-03	9.45E-05	5.05E-04	2.9647	15.8389	0.2268	1.2117
1973	1.09E-03	5.82E-03	4.39E-05	2.34E-04	2.6163	13.9781	0.1053	0.5626
1974	9.45E-05	5.05E-04	2.36E-05	1.26E-04	0.2268	1.2117	0.0567	0.3029
1975	1.76E-04	9.38E-04	2.36E-05	1.26E-04	0.4212	2.2503	0.0567	0.3029
1976	1.11E-04	5.95E-04	2.36E-05	1.26E-04	0.2673	1.4281	0.0567	0.3029
1977	5.40E-05	2.89E-04	2.36E-05	1.26E-04	0.1296	0.6924	0.0567	0.3029
1978	5.74E-05	3.07E-04	2.36E-05	1.26E-04	0.1377	0.7357	0.0567	0.3029
1979	8.10E-05	4.33E-04	2.36E-05	1.26E-04	0.1944	1.0386	0.0567	0.3029
1980	1.59E-04	8.47E-04	2.36E-05	1.26E-04	0.3807	2.0340	0.0567	0.3029
1981	9.79E-05	5.23E-04	2.36E-05	1.26E-04	0.2349	1.2550	0.0567	0.3029
1982	1.62E-04	8.66E-04	2.36E-05	1.26E-04	0.3888	2.0772	0.0567	0.3029
1983	1.38E-04	7.39E-04	2.36E-05	1.26E-04	0.3321	1.7743	0.0567	0.3029
1984	1.18E-04	6.31E-04	3.71E-05	1.98E-04	0.2835	1.5147	0.0891	0.4760
1985	9.45E-05	5.05E-04	2.36E-05	1.26E-04	0.2268	1.2117	0.0567	0.3029
1986	1.18E-04	6.31E-04	2.36E-05	1.26E-04	0.2835	1.5147	0.0567	0.3029
1987	1.99E-04	1.06E-03	1.69E-05	9.02E-05	0.4779	2.5533	0.0405	0.2164
1988	1.01E-04	5.41E-04	1.69E-05	9.02E-05	0.2430	1.2983	0.0405	0.2164
1989	5.06E-05	2.70E-04	4.73E-06	2.52E-05	0.1215	0.6491	0.0113	0.0606
1990	2.70E-05	1.44E-04	2.36E-06	1.26E-05	0.0648	0.3462	0.0057	0.0303
1991	1.35E-05	7.21E-05	3.38E-06	1.80E-05	0.0324	0.1731	0.0081	0.0433
1992	1.35E-05	7.21E-05	2.03E-06	1.08E-05	0.0324	0.1731	0.0049	0.0260
1993	1.01E-05	5.41E-05	1.01E-06	5.41E-06	0.0243	0.1298	0.0024	0.0130
1994	1.01E-05	5.41E-05	6.75E-07	3.61E-06	0.0243	0.1298	0.0016	0.0087
1995	6.75E-06	3.61E-05	7.09E-07	3.79E-06	0.0162	0.0866	0.0017	0.0091
1996	6.75E-06	3.61E-05	7.09E-07	3.79E-06	0.0162	0.0866	0.0017	0.0091
1997	6.75E-06	3.61E-05	7.09E-07	3.79E-06	0.0162	0.0866	0.0017	0.0091
1998	6.75E-06	3.61E-05	7.09E-07	3.79E-06	0.0162	0.0866	0.0017	0.0091
1999	6.75E-06	3.61E-05	7.09E-07	3.79E-06	0.0162	0.0866	0.0017	0.0091
2000	6.75E-06	3.61E-05	7.09E-07	3.79E-06	0.0162	0.0866	0.0017	0.0091
2001	6.75E-06	3.61E-05	7.09E-07	3.79E-06	0.0162	0.0866	0.0017	0.0091
2002	6.75E-06	3.61E-05	7.09E-07	3.79E-06	0.0162	0.0866	0.0017	0.0091

Table D-6. Maximum <sup>234/235</sup>U and <sup>238</sup>U air concentrations and intakes.

YEAR	Station 4 Air Concentration (Bq m <sup>-3</sup> )				Station 4 Intake (Bq y <sup>-1</sup> )			
	<sup>234/235</sup> U		<sup>238</sup> U		<sup>234/235</sup> U		<sup>238</sup> U	
	50 <sup>th</sup> Percentile	95 <sup>th</sup> Percentile	50 <sup>th</sup> Percentile	95 <sup>th</sup> Percentile	50 <sup>th</sup> Percentile	95 <sup>th</sup> Percentile	50 <sup>th</sup> Percentile	95 <sup>th</sup> Percentile
1944	1.28E-04	7.75E-04	5.87E-05	3.55E-04	0.3072	1.8607	0.1408	0.8528
1945	2.19E-04	1.32E-03	1.17E-04	7.11E-04	0.5247	3.1788	0.2816	1.7057
1946	1.65E-04	1.00E-03	6.93E-05	4.20E-04	0.3967	2.4035	0.1664	1.0079
1947	1.39E-04	8.40E-04	4.27E-05	2.58E-04	0.3328	2.0158	0.1024	0.6202
1948	9.07E-05	5.49E-04	1.17E-04	7.11E-04	0.2176	1.3180	0.2816	1.7057
1949	9.07E-05	5.49E-04	1.17E-04	7.11E-04	0.2176	1.3180	0.2816	1.7057
1950	9.07E-05	5.49E-04	1.17E-04	7.11E-04	0.2176	1.3180	0.2816	1.7057
1951	9.07E-05	5.49E-04	1.17E-04	7.11E-04	0.2176	1.3180	0.2816	1.7057
1952	9.07E-05	5.49E-04	1.17E-04	7.11E-04	0.2176	1.3180	0.2816	1.7057
1953	3.57E-04	2.16E-03	7.25E-04	4.39E-03	0.8575	5.1946	1.7406	10.5442
1954	3.09E-04	1.87E-03	6.83E-04	4.13E-03	0.7423	4.4968	1.6382	9.9239
1955	3.15E-04	1.91E-03	6.83E-04	4.13E-03	0.7551	4.5743	1.6382	9.9239
1956	1.71E-03	1.03E-02	5.33E-04	3.23E-03	4.0955	24.8098	1.2798	7.7531
1957	3.09E-03	1.87E-02	4.27E-04	2.58E-03	7.4230	44.9678	1.0239	6.2025
1958	9.28E-03	5.62E-02	9.60E-04	5.81E-03	22.2691	134.9034	2.3037	13.9555
1959	6.35E-03	3.84E-02	1.07E-03	6.46E-03	15.2300	92.2615	2.5597	15.5061
1960	1.30E-03	7.85E-03	1.65E-04	1.00E-03	3.1100	18.8400	0.3967	2.4035
1961	2.08E-03	1.26E-02	2.29E-04	1.39E-03	4.9914	30.2370	0.5503	3.3338
1962	2.25E-03	1.36E-02	2.45E-04	1.49E-03	5.3881	32.6404	0.5887	3.5664
1963	1.12E-03	6.78E-03	3.73E-04	2.26E-03	2.6877	16.2814	0.8959	5.4271
1964	3.63E-04	2.20E-03	4.85E-04	2.94E-03	0.8703	5.2721	1.1646	7.0553
1965	1.82E-03	1.10E-02	1.07E-04	6.46E-04	4.3642	26.4380	0.2560	1.5506
1966	5.81E-04	3.52E-03	1.65E-04	1.00E-03	1.3950	8.4508	0.3967	2.4035
1967	2.67E-04	1.62E-03	5.87E-05	3.55E-04	0.6399	3.8765	0.1408	0.8528
1968	1.17E-04	7.11E-04	8.00E-05	4.85E-04	0.2816	1.7057	0.1920	1.1630
1969	5.17E-04	3.13E-03	4.27E-05	2.58E-04	1.2414	7.5205	0.1024	0.6202
1970	8.48E-04	5.14E-03	4.80E-05	2.91E-04	2.0349	12.3274	0.1152	0.6978
1971	1.10E-03	6.69E-03	1.01E-04	6.14E-04	2.6493	16.0489	0.2432	1.4731
1972	1.95E-03	1.18E-02	1.49E-04	9.05E-04	4.6842	28.3762	0.3584	2.1709
1973	1.72E-03	1.04E-02	6.93E-05	4.20E-04	4.1339	25.0424	0.1664	1.0079
1974	1.49E-04	9.05E-04	3.73E-05	2.26E-04	0.3584	2.1709	0.0896	0.5427
1975	2.77E-04	1.68E-03	3.73E-05	2.26E-04	0.6655	4.0316	0.0896	0.5427
1976	1.76E-04	1.07E-03	3.73E-05	2.26E-04	0.4223	2.5585	0.0896	0.5427
1977	8.53E-05	5.17E-04	3.73E-05	2.26E-04	0.2048	1.2405	0.0896	0.5427
1978	9.07E-05	5.49E-04	3.73E-05	2.26E-04	0.2176	1.3180	0.0896	0.5427
1979	1.28E-04	7.75E-04	3.73E-05	2.26E-04	0.3072	1.8607	0.0896	0.5427
1980	2.51E-04	1.52E-03	3.73E-05	2.26E-04	0.6015	3.6439	0.0896	0.5427
1981	1.55E-04	9.37E-04	3.73E-05	2.26E-04	0.3712	2.2484	0.0896	0.5427
1982	2.56E-04	1.55E-03	3.73E-05	2.26E-04	0.6143	3.7215	0.0896	0.5427
1983	2.19E-04	1.32E-03	3.73E-05	2.26E-04	0.5247	3.1788	0.0896	0.5427
1984	1.87E-04	1.13E-03	5.87E-05	3.55E-04	0.4479	2.7136	0.1408	0.8528
1985	1.49E-04	9.05E-04	3.73E-05	2.26E-04	0.3584	2.1709	0.0896	0.5427
1986	1.87E-04	1.13E-03	3.73E-05	2.26E-04	0.4479	2.7136	0.0896	0.5427
1987	3.15E-04	1.91E-03	2.67E-05	1.62E-04	0.7551	4.5743	0.0640	0.3877
1988	1.60E-04	9.69E-04	2.67E-05	1.62E-04	0.3840	2.3259	0.0640	0.3877
1989	8.00E-05	4.85E-04	7.47E-06	4.52E-05	0.1920	1.1630	0.0179	0.1085
1990	4.27E-05	2.58E-04	3.73E-06	2.26E-05	0.1024	0.6202	0.0090	0.0543
1991	2.13E-05	1.29E-04	5.33E-06	3.23E-05	0.0512	0.3101	0.0128	0.0775
1992	2.13E-05	1.29E-04	3.20E-06	1.94E-05	0.0512	0.3101	0.0077	0.0465
1993	1.60E-05	9.69E-05	1.60E-06	9.69E-06	0.0384	0.2326	0.0038	0.0233
1994	1.60E-05	9.69E-05	1.07E-06	6.46E-06	0.0384	0.2326	0.0026	0.0155
1995	1.07E-05	6.46E-05	1.12E-06	6.78E-06	0.0256	0.1551	0.0027	0.0163
1996	1.07E-05	6.46E-05	1.12E-06	6.78E-06	0.0256	0.1551	0.0027	0.0163
1997	1.07E-05	6.46E-05	1.12E-06	6.78E-06	0.0256	0.1551	0.0027	0.0163
1998	1.07E-05	6.46E-05	1.12E-06	6.78E-06	0.0256	0.1551	0.0027	0.0163
1999	1.07E-05	6.46E-05	1.12E-06	6.78E-06	0.0256	0.1551	0.0027	0.0163
2000	1.07E-05	6.46E-05	1.12E-06	6.78E-06	0.0256	0.1551	0.0027	0.0163
2001	1.07E-05	6.46E-05	1.12E-06	6.78E-06	0.0256	0.1551	0.0027	0.0163
2002	1.07E-05	6.46E-05	1.12E-06	6.78E-06	0.0256	0.1551	0.0027	0.0163

**D.3 Ambient External Dose**

Ambient radiation levels will be typically measured by the monitored worker's personal dosimeters. However, for the unmonitored worker, external radiation exposures were estimated from prior characterization efforts at Y-12.

There are two potential sources of external exposures received by workers at the Y-12 facility:

1. Exposures from the deposition of radionuclides released as a consequence of facility operations,
2. Exposures received from radiation levels emanating from buildings and storage areas.

The data from the scoping survey should be used to calculate an external dose for unmonitored workers (Foley and Carrier 1990). The dose rates shown in Table D-7 represent the external exposure rates measured site wide. The exposure rates were converted to dose equivalent rates assuming a quality factor of one (1).

**Table D-7. External dose rates outside buildings on Y-12 site.**

	<b>Measured exposure rate (<math>\mu\text{R h}^{-1}</math>)</b>	<b>Dose rate excluding background (<math>\text{mrem h}^{-1}</math>)</b>
Minimum	4	0
Maximum	1500	1492
Geometric Mean (GM)	21	13
Geometric Standard Deviation (GSD)	3.0	
50 <sup>th</sup> Percentile	21	13
95 <sup>th</sup> Percentile	129	121