

CHEVRON/PAWLING SITE DOSE ASSESSMENT

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CHEVRON/PAWLING SITE DOSE ASSESSMENT

INTRODUCTION

Dose assessments were performed to estimate the potential radiological exposure rates from the average concentrations of plutonium, cesium, and uranium in the soil at the Chevron Corporation's site near Pawling, NY. Even though the site is currently under the control of the National Park Service (NPS), it was assumed for purposes of this assessment that the site will be released for unrestricted use. The dose assessments were performed using the U.S. Department of Energy's (DOE's) computer code "RESRAD", Version 5.00 (Reference 1).

Figure 1 shows the location plan of the project site. Figure 2 shows the site with pre-existing (pre-remediation) conditions. Figure 3 shows the graded and seeded final site conditions after decommissioning.

METHOD OF DOSE ASSESSMENT

The DOE approach for implementing residual radioactive material guidelines (Reference 1) was used to perform this dose assessment. For dose assessment purposes, the U. S. Nuclear Regulatory Commission's unrestricted release concept assumes that at the termination of a license the site will be released for unrestricted use.

The total area of the Pawling (Nuclear Lake) site is approximately 460 hectares (1137 acres). The potentially contaminated (affected) area is assumed to be about 2000 m². It is also assumed that there is no soil cover over the contaminated material.

The site use is assumed to be equivalent to the family-farm scenario as described in the RESRAD manual (Reference 1). Under this scenario, it is assumed that a family moves onto the site, builds a home and raises crops and livestock for family consumption. Pathways through which the family could receive a radiological dose are: 1) direct radiation, 2) inhalation, 3) ingestion of plant foods grown on the contaminated soil, 4) ingestion of milk and meat from livestock raised and fed from the contaminated area, 5) ingestion of fish raised in a nearby pond, 6) ingestion of water from an onsite well. Appendix A is a summary of the site specific parameters used for the dose assessment of this site.

DESCRIPTION OF THE SOURCE TERM

The dose assessments were performed by using the data from the final project report prepared by Chevron's contractor (NES, Inc./IES) and by using the data from the confirmatory survey report prepared by NRC's contractor (the Oak Ridge Institute for Science and Education (ORISE)).

Chevron's Data:

The average concentrations of americium-241 (Am-241), cesium-137 (Cs-137) and plutonium (Pu) isotopes were obtained using the data from the Final Project Report for the Decontamination and Decommissioning of the Plutonium Facility and Multiple Failure Building, Nuclear Lake, Pawling, New York (Reference 3). The ratio of 7:1 for total Pu:Am concentrations and the approximate relative activity ratios for the specific plutonium isotopes were obtained from Reference 4. The activity ratios for plutonium are included in the following table.

PLUTONIUM ISOTOPES ACTIVITY RATIOS

Pu Isotopes	% Activity
Pu-238	0.06
Pu-239	90.00
Pu-240	8.60
Pu-241	1.20
Pu-242	0.10

The average concentrations for Am-241 and Cs-137 were obtained from Tables 18 through 24 of Reference 3. The calculations for determining relative concentrations of plutonium isotopes are included in Appendix A and the results are provided in the following table.

AVERAGE CONCENTRATIONS

Radionuclide	Concentration (pCi/gm)
Am-241	0.364
Cs-137	0.327
Pu-238	0.002
Pu-239	2.293
Pu-240	0.219
Pu-241	0.031
Pu-242	0.003

Confirmatory Survey Data:

In addition to using Chevron/NES survey data, a dose assessment was also performed using the average concentrations for americium, cesium, plutonium and uranium isotopes from the Confirmatory and Radiological Surveys of the Nuclear Lake Site, Pawling, New York (Reference 5). The average concentrations for Am-241, Cs-137, Pu-238, Pu-239/240, U-235 and U-238 were obtained from Tables 4, 5 and 6 of Reference 5. The value for Pu-239/240 was distributed based on the relative activity ratios of 90% and 8.6%, respectively, for Pu-239 and Pu-240, and the values for Pu-241 and Pu-242 were obtained using the proportions of 1.2% and 0.1%, respectively (Reference 4). The calculations are included in Appendix A and the results are provided in the following table.

AVERAGE CONCENTRATIONS

Radionuclide	Concentration (pCi/gm)
Am-241	0.107
Cs-137	0.3505
Pu-238	0.172
Pu-239	0.213
Pu-240	0.020
Pu-241	0.005
Pu-242	0.0004
U-235	0.100
U-238	0.842

DISTRIBUTION COEFFICIENTS (K_d)

The RESRAD code (Reference 1) provides default values for the distribution coefficients which are derived from a range of values (Reference 6). To be conservative, it was decided to use the lower values of the range of the distribution coefficients from Reference 6.

RESULTS

The RESRAD computer printouts and graphs for the dose assessments derived from Chevron's and Confirmatory Survey data sets are included in Appendices B and C, respectively. For both cases, the doses were estimated for a time period of 10,000 years, even though they attain values approximately equal to zero between 1,000 and 2,000 years.

The maximum total dose resulting from Chevron's data is estimated as 3.4 mrem/yr at time zero. The maximum total dose resulting from the ORISE confirmatory survey data is estimated as 1.8 mrem/yr, also, at time zero.

The following table illustrates these maximum total doses and time of occurrence along with the percentage breakdown for key water independent pathways.

DOSE ESTIMATES

Data Source	Max Total Dose (mrem/yr)	Time (yr)	Direct Exposure	Inhalation	Plant Consumption	Soil Ingestion
Chevron Survey	3.4	0	30%	30%	33%	6%
Confirmatory Survey	1.8	0	66%	14%	16%	2%

Appendices B and C include graphical representations of total dose over time for all isotopes and pathways summed (Figure B-1 and Figure C-1), as well as dose over time for all isotopes summed for water independent pathways (Figure B-2 and Figure C-2). Appendix C also includes a graph showing doses over time for all isotopes and pathways summed for water independent and dependent subtotals (Figure C-3). In addition, the appendices include summary of the inputs and outputs for both cases.

Using Chevron's data, the dose assessment indicates that at 1,000 years, the total dose reduces to about 1.3 mrem/yr from all pathways (Appendix B, Page 26 of Computer Printout). As can be seen from the computer outputs and graphs, all doses come from the water independent pathways. The water independent pathways graph (Figure B-2) indicates that the dose from direct exposure drops to almost zero at 200 years, whereas the doses from plant consumption and inhalation remain elevated up to 1,000 years and then start dropping.

Using ORISE confirmatory survey data, the dose assessment indicates at 1,000 years, total dose reduces to about 0.6 mrem/yr from all pathways (Appendix C, Page 26 of Computer Printout). The graph (Figure C-1) showing the total dose from all isotopes and pathways summed exhibits a peak (1.5 mrem/yr) around 800 years. This peak is indicated by the graph (Figure C-3) for the doses as being the contribution from the water dependent subtotal. Figure C-3 indicates that after about 300 years, the water dependent pathways start contributing radioactive dose, reaching a maximum value of about 1.3 mrem/yr around 800 years and reducing to approximately zero between 1,000 and 2,000 years. This dose component from the water dependent pathways is attributable to uranium, as indicated on Page 26 of Computer Printout (Appendix C). This page shows the total dose from all pathways at 1,000 years as equal to about 0.56 mrem/yr. The dose from uranium alone due to ingestion of water under water dependent pathways is approximately equal to 0.42 mrem/yr. As can be

seen in the water independent pathways graph (Figure C-2), the dose from direct exposure drops to almost 0.2 mrem/yr at 100 years from an initial value of about 1.2 mrem/yr.

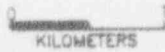
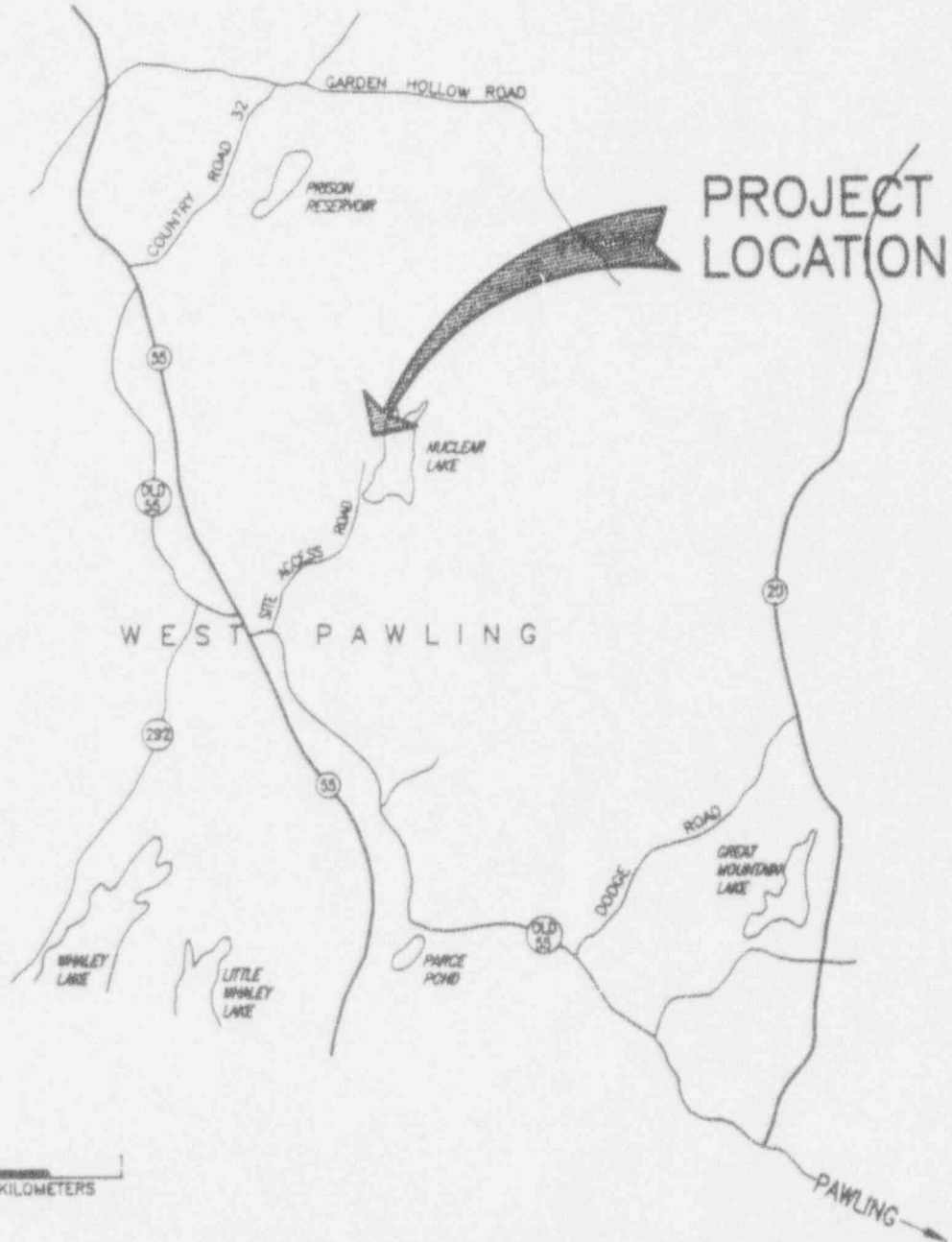
CONCLUSIONS

The total doses are estimated to be less than 4 mrem/yr using separately Chevron's survey data and ORISE's confirmatory survey data. We believe that any actual exposure rates would be significantly less than calculated because of the conservative approach to the analyses, e.g., depth of contamination, area of contamination, actual concentration levels, distribution coefficients, etc. For comparison purposes, the current 10 CFR Part 20 dose limit for individual members of the public is 100 mrem/yr. The total dose estimates using RESRAD confirms the conclusions in the Chevron's survey and ORISE's confirmatory survey reports that the Pawling site satisfies the unrestricted release requirements.

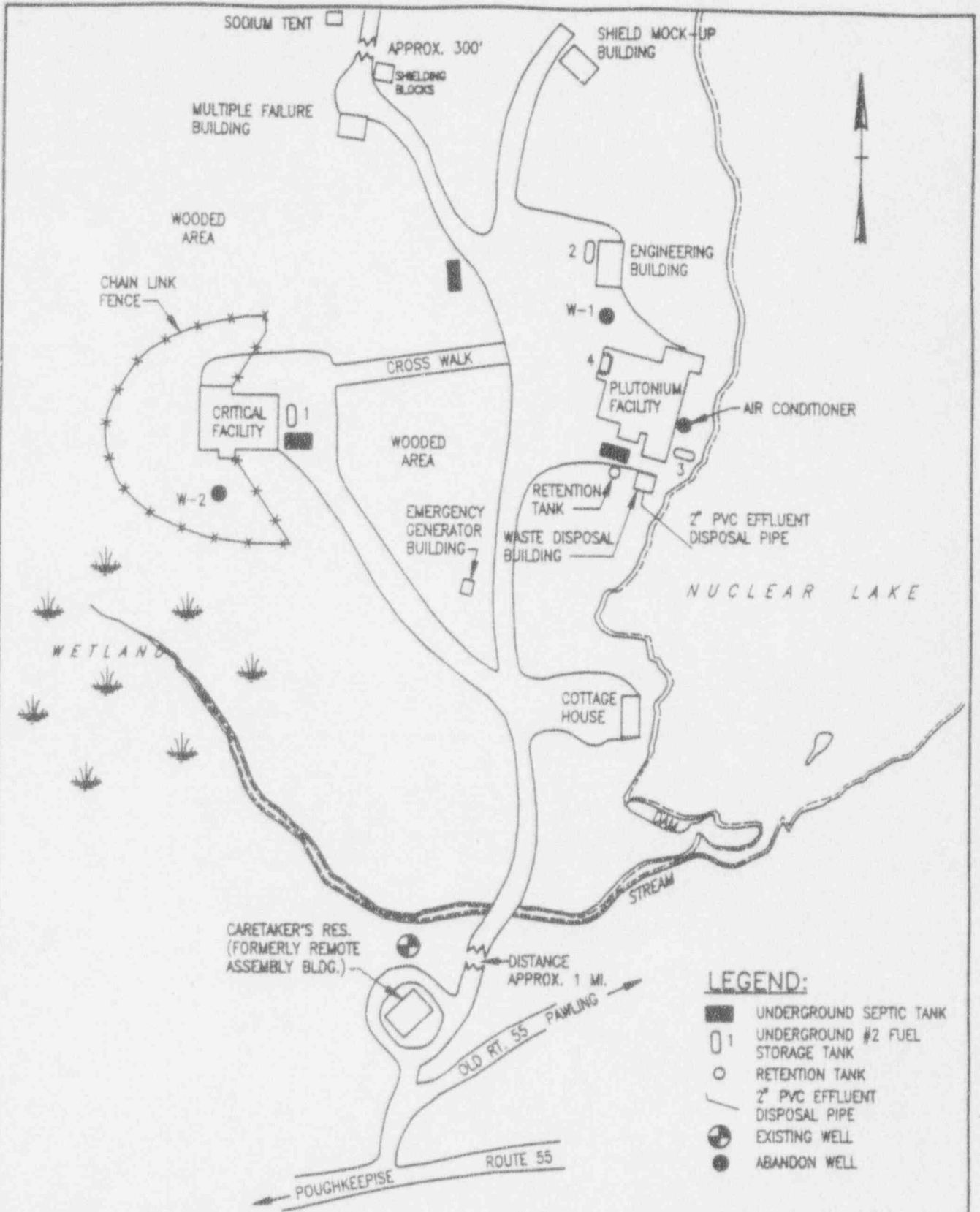
Prepared by: Mr. Clum
(Mr. SAM NALLUSWAMI) Date: 3-22-94
Checked by: Jack Payne Date: 3-22-94
Approved by: John C. [Signature] Date: 3-22-94

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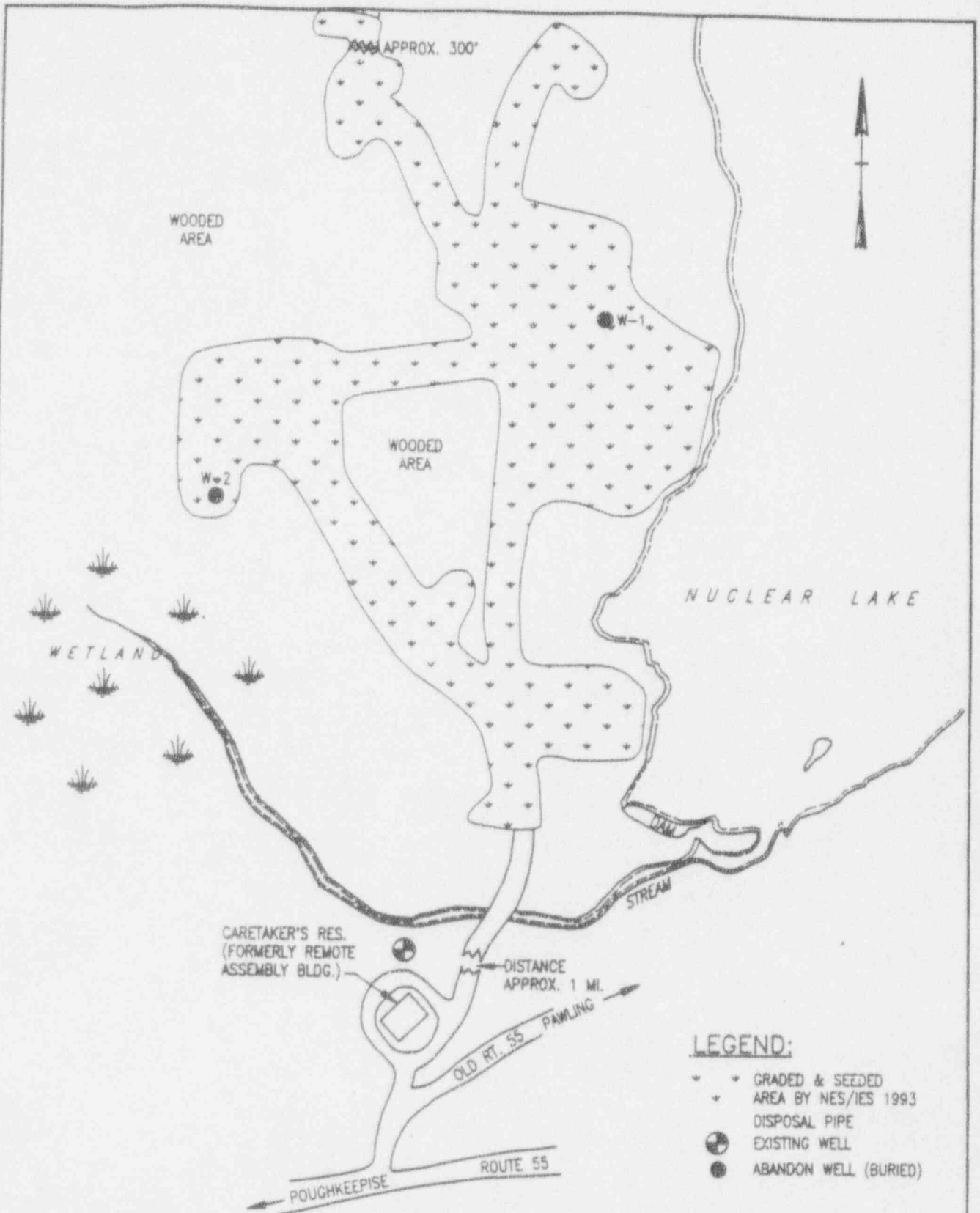
1. Manual for Implementing Residual Radioactive Material Guidelines, RESRAD, Version 5.0, Final Draft, Category UC-902, Argonne National Laboratory, Argonne, Illinois, September 1993.
2. Closure Report for the Nuclear Lake Site near Pawling, NY, Chevron U.S.A., Inc., Integrated Environmental Services/NES, February 1994.
3. Final Project Report for the Decontamination and Decommissioning of the Plutonium Facility and Multiple Failure Building, Nuclear Lake, Pawling, New York, Volume I - Book 1, NES, Inc./IES, November 1993.
4. "Total Plutonium to Americium-241 Ratio for 20 Year Decayed Plutonium", Memorandum for T. Johnson, US NRC, from J. Roth, Region I, US NRC, July 1993.
5. Confirmatory and Radiological Surveys of the Nuclear Lake Site, Pawling, New York, Revised Final Report, the Oak Ridge Institute for Science and Education (ORISE), February 1994.
6. Data Collection Handbook to Support Modeling the Impacts of Radioactive Material in Soil, ANL/EAIS-8, Argonne National Laboratory, Argonne, Illinois, April 1993.



REVISIONS		PROJECT	NATIONAL PARK SERVICE PROPERTY NUCLEAR LAKE PAWLING, NEW YORK	SOURCE: Reference
NO.	DATE			
DRAWING		LOCATION PLAN		FIGURE # 1



REVISIONS		PROJECT	NATIONAL PARK SERVICE PROPERTY NUCLEAR LAKE PAWLING, NEW YORK	SOURCE: Reference 2
NO.	DATE			
		DRAWING	SITE MAP PRE-EXISTING CONDITIONS	FIGURE # 2



REVISIONS		PROJECT	NATIONAL PARK SERVICE PROPERTY NUCLEAR LAKE PAWLING, NEW YORK	SOURCE: Reference 2
NO.	DATE			
		DRAWING	SITE MAP FINAL CONDITIONS	FIGURE # 3

APPENDIX A

APPENDIX A

Input Parameters for RESRAD

Site specific input parameters used for the dose assessment from the residual radioactive materials at the Chevron/Pawling site are described below.

Area of Contaminated Zone - From the sources referenced in this report and from other sources, the contaminated zone is approximately equal to 2,000 m².

Thickness of Contaminated Zone - From the information included in Reference 3, the assumed approximate thickness of contamination is 1 meter.

Length Parallel to Aquifer Flow - Because of lack of geohydrologic data, the length parallel to aquifer flow is assumed to be equal to the length of the contaminated area assuming the contaminated area to be square with an area equal to 2,000 m². The square root of 2,000 m² is approximately equal to 45 m.

Watershed Area - The site is approximately equal to 4,600,000 m² (1,137 acres). For RESRAD, the watershed area is assumed to be equal to the area of the site.

Contaminated Zone Erosion Rate - "Data Collection Handbook to Support Modeling the Impacts of Radioactive Material in Soil", (Reference 6) gives erosion rates for various categories. For this site, a typical value of 6×10^{-4} m/yr applicable for eastern U.S. is assumed.

Evapotranspiration Coefficient (C_e) - A value of 0.854 was calculated from the equation $C_e = E_t / [(1 - C_r)P_r + I_{rr}]$ found on Page 198 of the RESRAD manual (Reference 1). E_t = annual evapotranspiration = 0.61 m (24 inches) taken from Figure 12.1 of Reference 6. C_r = runoff coefficient (see below). P_r = precipitation rate (see below)

Precipitation - A value of 1.02 m/yr (40 inches/yr) was taken from Figure 9.1 of Reference 6.

Irrigation - A value of 0 (zero) was used because it was assumed that there would be no irrigation at a humid northeastern U.S. site.

Runoff Coefficient - A value of 0.3 for rolling, cultivated open sandy loam site was obtained from the equation $C_r = 1 - c_1 - c_2 - c_3$ found on Table E.1, Page 199, of the RESRAD Manual (Reference 1). The values for c₁, c₂, and c₃ for a rolling, cultivated open sandy loam site (0.2, 0.4 and 0.1) are given in Table E.1 of the RESRAD Manual (Reference 1).

Water Table Drop Rate - Assigned the same value as the erosion rate (6×10^{-4} m/yr) to keep the unsaturated zone at the same thickness throughout the modeling time frame. This is a reasonable assumption since the depth to the groundwater table generally remains uniform over time even though erosion processes are taking place.

Model: Nondispersion (ND) mode - The nondispersion (ND) mode is recommended in the RESRAD Manual for contaminated zones with an area greater than 1,000 m² (Reference 1).

Drinking Water Intake - A value of 730 L/yr was used. This is based on a daily intake of 2 liters.

Distribution Coefficients - The RESRAD code (Reference 1) provides default values for the distribution coefficients which are derived from a range of values (Reference 6). To be conservative, it was decided to use the lower values of the range of the distribution coefficients from Reference 6.

Initial Principal Radionuclides:

Chevron's Data: The average concentrations for Am-241, Cs-137 and Pu-Isotopes were obtained, using the measured concentrations for Cs-137 and assuming the ND (non-detect) values to be equal to the LLD (lower limit of detection) values for the three nuclides, from Tables 18 through 24 of Reference 3. LLD value is not included for Pu-Isotopes in Reference 3. Therefore, the average concentration for Pu-Isotopes was calculated to be equal to seven (7) times the average concentration of Am-241, and this is conservative because the ratio ranges between 1:5 to 1:7 (Reference 4). Based on these factors, the values for the concentrations are:

Cs-137 = 0.327 pCi/gm
Am-241 = 0.364 pCi/gm
Pu-Isotopes = 2.548 pCi/gm (0.364 x 7)

The Pu-Isotopes value was proportioned based on the relative activity ratios for the specific plutonium isotopes (Reference 4) and are provided in the following table.

PROPORTION OF PLUTONIUM ISOTOPES

Pu Isotopes	% Activity	pCi/gm
Pu-238	0.06	0.002
Pu-239	90.00	2.293
Pu-240	8.60	0.219
Pu-241	1.20	0.031
Pu-242	0.10	0.003

Confirmatory Survey/ORISE Data - The following average concentrations for Am-241, Cs-137, Pu-238, Pu-239/240, U-235 and U-238 were obtained from Tables 4,5 and 6 of Reference 5.

Am-241	= 0.107	pCi/gm
Cs-137	= 0.3505	pCi/gm
Pu-238	= 0.172	pCi/gm
Pu-239/240	= 0.233	pCi/gm (Pu-239 = 90%, and Pu-240 = 8.6%)
U-235	= 0.1	pCi/gm
U-238	= 0.842	pCi/gm

From these values and Reference 4:

$$\text{Pu-238 (0.06\%)} + \text{Pu-239/240 (98.6\%)} = 0.405 \text{ (98.66\%)} \text{ pCi/gm}$$

$$\text{Therefore: Pu-241 } ((0.405/98.66\%) \times 1.2\%) = 0.005 \text{ pCi/gm}$$

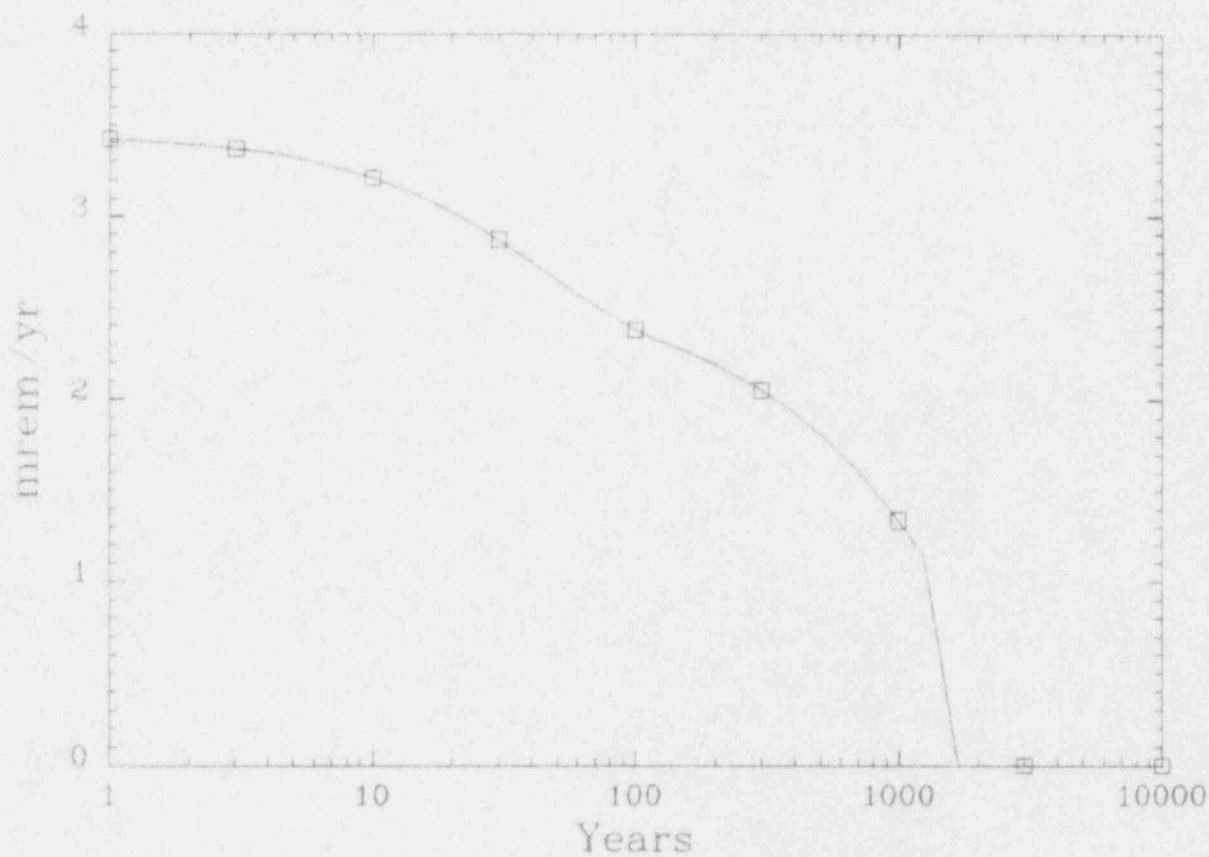
$$\text{Pu-242 } ((0.405/98.66\%) \times 0.1\%) = 0.0004 \text{ pCi/gm}$$

Other RESRAD Parameters - All other parameters are default values provided in the RESRAD manual (Reference 1). The default values are based on an example site in the eastern U.S. Therefore, it was assumed that the default values used were valid for modeling Pawling site.

APPENDIX B

Figure B-1

TOTAL DOSE: All Isotopes and Pathways Summed



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Figure B-2

DOSE: All Isotopes Summed
Water Independent Pathways

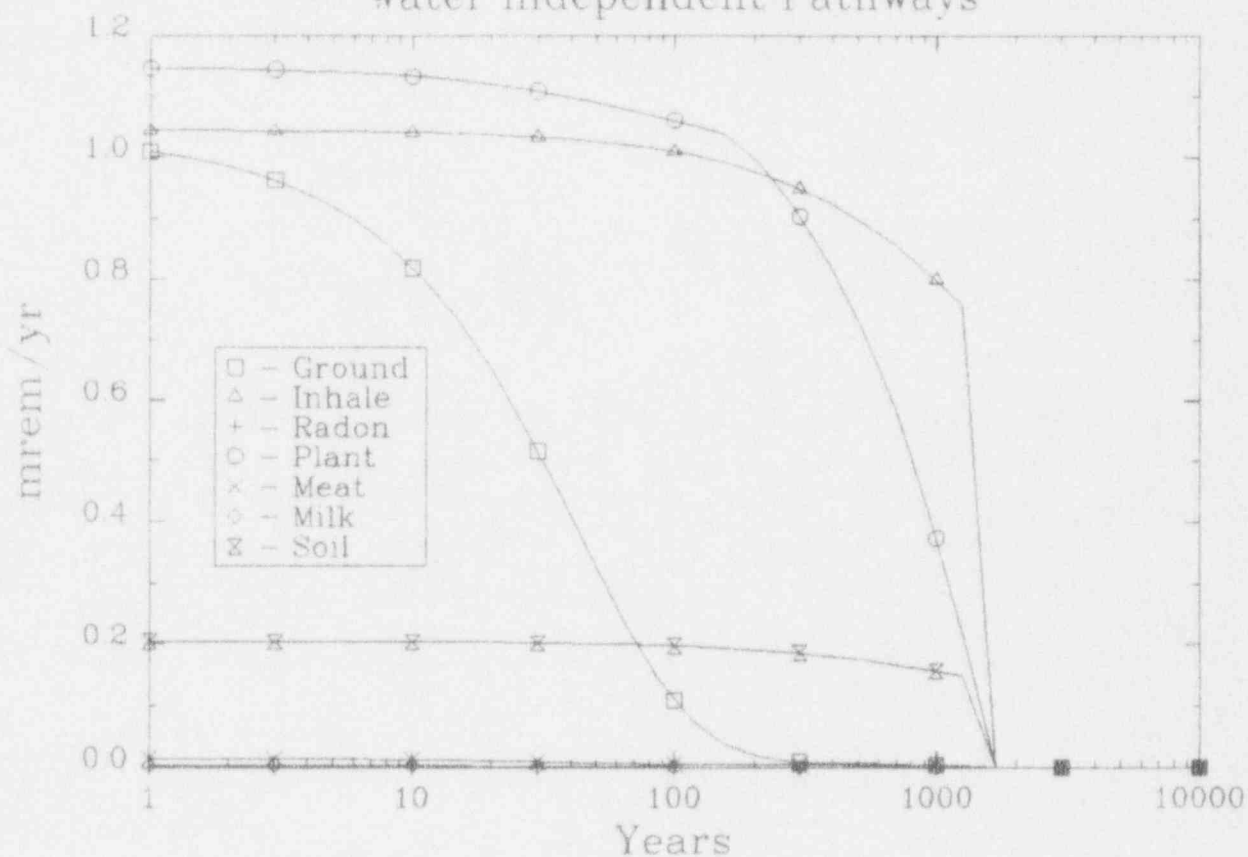


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Time = 1.000E+01	22
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Dose Conversion Factor (and Related) Parameter Summary

Menu	Parameter	Current Value	Default	Parameter Name
A-1	Ground external gamma, volume DCF's, (rem/yr)/(pCi/cm ³):			
A-1	Ac-227+D, soil density = 1.0 g/cm ³	2.760E+00	2.760E+00	DCF1(1,1)
A-1	Ac-227+D, soil density = 1.8 g/cm ³	1.520E+00	1.520E+00	DCF1(1,2)
A-1				
A-1	Am-241, soil density = 1.0 g/cm ³	4.790E-02	4.790E-02	DCF1(2,1)
A-1	Am-241, soil density = 1.8 g/cm ³	2.580E-02	2.580E-02	DCF1(2,2)
A-1				
A-1	Cs-137+D, soil density = 1.0 g/cm ³	5.030E+00	5.030E+00	DCF1(3,1)
A-1	Cs-137+D, soil density = 1.8 g/cm ³	2.770E+00	2.770E+00	DCF1(3,2)
A-1				
A-1	Np-237+D, soil density = 1.0 g/cm ³	1.610E+00	1.610E+00	DCF1(4,1)
A-1	Np-237+D, soil density = 1.8 g/cm ³	8.900E-01	8.900E-01	DCF1(4,2)
A-1				
A-1	Pu-231, soil density = 1.0 g/cm ³	2.210E-01	2.210E-01	DCF1(5,1)
A-1	Pu-231, soil density = 1.8 g/cm ³	1.210E-01	1.210E-01	DCF1(5,2)
A-1				
A-1	Pb-210+D, soil density = 1.0 g/cm ³	4.870E-03	4.870E-03	DCF1(6,1)
A-1	Pb-210+D, soil density = 1.8 g/cm ³	2.310E-03	2.310E-03	DCF1(6,2)
A-1				
A-1	Pu-238, soil density = 1.0 g/cm ³	1.560E-03	1.560E-03	DCF1(7,1)
A-1	Pu-238, soil density = 1.8 g/cm ³	6.650E-04	6.650E-04	DCF1(7,2)
A-1				
A-1	Pu-239, soil density = 1.0 g/cm ³	8.140E-04	8.140E-04	DCF1(8,1)
A-1	Pu-239, soil density = 1.8 g/cm ³	3.760E-04	3.760E-04	DCF1(8,2)
A-1				
A-1	Pu-240, soil density = 1.0 g/cm ³	1.480E-03	1.480E-03	DCF1(9,1)
A-1	Pu-240, soil density = 1.8 g/cm ³	6.350E-04	6.350E-04	DCF1(9,2)
A-1				
A-1	Pu-241+D, soil density = 1.0 g/cm ³	1.880E-05	1.880E-05	DCF1(10,1)
A-1	Pu-241+D, soil density = 1.8 g/cm ³	1.050E-05	1.050E-05	DCF1(10,2)
A-1				
A-1	Pu-242, soil density = 1.0 g/cm ³	1.240E-03	1.240E-03	DCF1(12,1)
A-1	Pu-242, soil density = 1.8 g/cm ³	5.290E-04	5.290E-04	DCF1(12,2)
A-1				
A-1	Ra-226+D, soil density = 1.0 g/cm ³	1.550E+01	1.550E+01	DCF1(13,1)
A-1	Ra-226+D, soil density = 1.8 g/cm ³	8.560E+00	8.560E+00	DCF1(13,2)
A-1				
A-1	Ra-228+D, soil density = 1.0 g/cm ³	8.180E+00	8.180E+00	DCF1(14,1)
A-1	Ra-228+D, soil density = 1.8 g/cm ³	4.510E+00	4.510E+00	DCF1(14,2)
A-1				
A-1	Th-228+D, soil density = 1.0 g/cm ³	1.330E+01	1.330E+01	DCF1(15,1)
A-1	Th-228+D, soil density = 1.8 g/cm ³	7.360E+00	7.360E+00	DCF1(15,2)
A-1				
A-1	Th-229+D, soil density = 1.0 g/cm ³	2.200E+00	2.200E+00	DCF1(16,1)
A-1	Th-229+D, soil density = 1.8 g/cm ³	1.210E+00	1.210E+00	DCF1(16,2)
A-1				
A-1	Th-230, soil density = 1.0 g/cm ³	2.110E-03	2.110E-03	DCF1(17,1)
A-1	Th-230, soil density = 1.8 g/cm ³	1.030E-03	1.030E-03	DCF1(17,2)
A-1				
A-1	Th-232, soil density = 1.0 g/cm ³	1.350E-03	1.350E-03	DCF1(18,1)
A-1	Th-232, soil density = 1.8 g/cm ³	6.040E-04	6.040E-04	DCF1(18,2)

Dose Conversion Factor (and Related) Parameter Summary (continued)

Menu	Parameter	Current Value	Default	Parameter Name
A-1	U-233 , soil density = 1.0 g/cm**3	1.400E-03	1.400E-03	DCF1(19,1)
A-1	U-233 , soil density = 1.8 g/cm**3	7.120E-04	7.120E-04	DCF1(19,2)
A-1				
A-1	U-234 , soil density = 1.0 g/cm**3	1.580E-03	1.580E-03	DCF1(20,1)
A-1	U-234 , soil density = 1.8 g/cm**3	6.970E-04	6.970E-04	DCF1(20,2)
A-1				
A-1	U-235+D , soil density = 1.0 g/cm**3	8.940E-01	8.940E-01	DCF1(21,1)
A-1	U-235+D , soil density = 1.8 g/cm**3	4.900E-01	4.900E-01	DCF1(21,2)
A-1				
A-1	U-236 , soil density = 1.0 g/cm**3	1.350E-03	1.350E-03	DCF1(22,1)
A-1	U-236 , soil density = 1.8 g/cm**3	5.800E-04	5.800E-04	DCF1(22,2)
A-1				
A-1	U-238+D , soil density = 1.0 g/cm**3	1.270E-01	1.270E-01	DCF1(23,1)
A-1	U-238+D , soil density = 1.8 g/cm**3	6.970E-02	6.970E-02	DCF1(23,2)
A-3	Depth factors, ground external gamma, dimensionless:			
A-3	Ac-227+D , soil density = 1.0 g/cm**3, thickness = .15 m	7.900E-01	7.900E-01	FD(1,1,1)
A-3	Ac-227+D , soil density = 1.0 g/cm**3, thickness = 0.5 m	9.700E-01	9.700E-01	FD(1,2,1)
A-3	Ac-227+D , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(1,3,1)
A-3	Ac-227+D , soil density = 1.8 g/cm**3, thickness = .15 m	9.100E-01	9.100E-01	FD(1,1,2)
A-3	Ac-227+D , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(1,2,2)
A-3	Ac-227+D , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(1,3,2)
A-3				
A-3	Am-241 , soil density = 1.0 g/cm**3, thickness = .15 m	9.400E-01	9.400E-01	FD(2,1,1)
A-3	Am-241 , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(2,2,1)
A-3	Am-241 , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(2,3,1)
A-3	Am-241 , soil density = 1.8 g/cm**3, thickness = .15 m	1.000E+00	1.000E+00	FD(2,1,2)
A-3	Am-241 , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(2,2,2)
A-3	Am-241 , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(2,3,2)
A-3				
A-3	Cs-137+D , soil density = 1.0 g/cm**3, thickness = .15 m	7.200E-01	7.200E-01	FD(3,1,1)
A-3	Cs-137+D , soil density = 1.0 g/cm**3, thickness = 0.5 m	9.800E-01	9.800E-01	FD(3,2,1)
A-3	Cs-137+D , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(3,3,1)
A-3	Cs-137+D , soil density = 1.8 g/cm**3, thickness = .15 m	9.100E-01	9.100E-01	FD(3,1,2)
A-3	Cs-137+D , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(3,2,2)
A-3	Cs-137+D , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(3,3,2)
A-3				
A-3	Np-237+D , soil density = 1.0 g/cm**3, thickness = .15 m	8.200E-01	8.200E-01	FD(4,1,1)
A-3	Np-237+D , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(4,2,1)
A-3	Np-237+D , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(4,3,1)
A-3	Np-237+D , soil density = 1.8 g/cm**3, thickness = .15 m	9.300E-01	9.300E-01	FD(4,1,2)
A-3	Np-237+D , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(4,2,2)
A-3	Np-237+D , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(4,3,2)
A-3				
A-3	Pa-231 , soil density = 1.0 g/cm**3, thickness = .15 m	7.900E-01	7.900E-01	FD(5,1,1)
A-3	Pa-231 , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(5,2,1)
A-3	Pa-231 , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(5,3,1)
A-3	Pa-231 , soil density = 1.8 g/cm**3, thickness = .15 m	9.200E-01	9.200E-01	FD(5,1,2)
A-3	Pa-231 , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(5,2,2)
A-3	Pa-231 , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(5,3,2)
A-3				

Dose Conversion Factor (and Related) Parameter Summary (continued)

Menu	Parameter	Current Value	Default	Parameter Name
A-3	Pb-210+0 , soil density = 1.0 g/cm**3, thickness = .15 m	8.800E-01	8.800E-01	FD(6,1,1)
A-3	Pb-210+0 , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(6,2,1)
A-3	Pb-210+0 , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(6,3,1)
A-3	Pb-210+0 , soil density = 1.8 g/cm**3, thickness = .15 m	9.700E-01	9.700E-01	FD(6,1,2)
A-3	Pb-210+0 , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(6,2,2)
A-3	Pb-210+0 , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(6,3,2)
A-3				
A-3	Pu-238 , soil density = 1.0 g/cm**3, thickness = .15 m	9.300E-01	9.300E-01	FD(7,1,1)
A-3	Pu-238 , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(7,2,1)
A-3	Pu-238 , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(7,3,1)
A-3	Pu-238 , soil density = 1.8 g/cm**3, thickness = .15 m	1.000E+00	1.000E+00	FD(7,1,2)
A-3	Pu-238 , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(7,2,2)
A-3	Pu-238 , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(7,3,2)
A-3				
A-3	Pu-239 , soil density = 1.0 g/cm**3, thickness = .15 m	9.200E-01	9.200E-01	FD(8,1,1)
A-3	Pu-239 , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(8,2,1)
A-3	Pu-239 , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(8,3,1)
A-3	Pu-239 , soil density = 1.8 g/cm**3, thickness = .15 m	1.000E+00	1.000E+00	FD(8,1,2)
A-3	Pu-239 , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(8,2,2)
A-3	Pu-239 , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(8,3,2)
A-3				
A-3	Pu-240 , soil density = 1.0 g/cm**3, thickness = .15 m	9.200E-01	9.200E-01	FD(9,1,1)
A-3	Pu-240 , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(9,2,1)
A-3	Pu-240 , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(9,3,1)
A-3	Pu-240 , soil density = 1.8 g/cm**3, thickness = .15 m	1.000E+00	1.000E+00	FD(9,1,2)
A-3	Pu-240 , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(9,2,2)
A-3	Pu-240 , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(9,3,2)
A-3				
A-3	Pu-241+0 , soil density = 1.0 g/cm**3, thickness = .15 m	9.010E-01	9.010E-01	FD(10,1,1)
A-3	Pu-241+0 , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(10,2,1)
A-3	Pu-241+0 , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(10,3,1)
A-3	Pu-241+0 , soil density = 1.8 g/cm**3, thickness = .15 m	9.830E-01	9.830E-01	FD(10,1,2)
A-3	Pu-241+0 , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(10,2,2)
A-3	Pu-241+0 , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(10,3,2)
A-3				
A-3	Pu-242 , soil density = 1.0 g/cm**3, thickness = .15 m	9.600E-01	9.600E-01	FD(12,1,1)
A-3	Pu-242 , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(12,2,1)
A-3	Pu-242 , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(12,3,1)
A-3	Pu-242 , soil density = 1.8 g/cm**3, thickness = .15 m	1.000E+00	1.000E+00	FD(12,1,2)
A-3	Pu-242 , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(12,2,2)
A-3	Pu-242 , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(12,3,2)
A-3				
A-3	Ra-226+0 , soil density = 1.0 g/cm**3, thickness = .15 m	6.300E-01	6.300E-01	FD(13,1,1)
A-3	Ra-226+0 , soil density = 1.0 g/cm**3, thickness = 0.5 m	9.200E-01	9.200E-01	FD(13,2,1)
A-3	Ra-226+0 , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(13,3,1)
A-3	Ra-226+0 , soil density = 1.8 g/cm**3, thickness = .15 m	8.500E-01	8.500E-01	FD(13,1,2)
A-3	Ra-226+0 , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(13,2,2)
A-3	Ra-226+0 , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(13,3,2)
A-3				

Summary: RESRAD: PAWLING-AVERAGE NES DATA & LOWER KD VALUES

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Dose Conversion Factor (and Related) Parameter Summary (continued)

Menu	Parameter	Current Value	Default	Parameter Name
A-3	Ra-228+D, soil density = 1.0 g/cm**3, thickness = .15 m	6.800E-01	6.800E-01	FD(14,1,1)
A-3	Ra-228+D, soil density = 1.0 g/cm**3, thickness = 0.5 m	9.700E-01	9.700E-01	FD(14,2,1)
A-3	Ra-228+D, soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(14,3,1)
A-3	Ra-228+D, soil density = 1.8 g/cm**3, thickness = .15 m	8.500E-01	8.500E-01	FD(14,1,2)
A-3	Ra-228+D, soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(14,2,2)
A-3	Ra-228+D, soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(14,3,2)
A-3				
A-3	Th-228+D, soil density = 1.0 g/cm**3, thickness = .15 m	6.100E-01	6.100E-01	FD(15,1,1)
A-3	Th-228+D, soil density = 1.0 g/cm**3, thickness = 0.5 m	9.400E-01	9.400E-01	FD(15,2,1)
A-3	Th-228+D, soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(15,3,1)
A-3	Th-228+D, soil density = 1.8 g/cm**3, thickness = .15 m	7.500E-01	7.500E-01	FD(15,1,2)
A-3	Th-228+D, soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(15,2,2)
A-3	Th-228+D, soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(15,3,2)
A-3				
A-3	Th-229+D, soil density = 1.0 g/cm**3, thickness = .15 m	6.500E-01	6.500E-01	FD(16,1,1)
A-3	Th-229+D, soil density = 1.0 g/cm**3, thickness = 0.5 m	9.500E-01	9.500E-01	FD(16,2,1)
A-3	Th-229+D, soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(16,3,1)
A-3	Th-229+D, soil density = 1.8 g/cm**3, thickness = .15 m	8.500E-01	8.500E-01	FD(16,1,2)
A-3	Th-229+D, soil density = 1.8 g/cm**3, thickness = 0.5 m	9.900E-01	9.900E-01	FD(16,2,2)
A-3	Th-229+D, soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(16,3,2)
A-3				
A-3	Th-230, soil density = 1.0 g/cm**3, thickness = .15 m	9.300E-01	9.300E-01	FD(17,1,1)
A-3	Th-230, soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(17,2,1)
A-3	Th-230, soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(17,3,1)
A-3	Th-230, soil density = 1.8 g/cm**3, thickness = .15 m	1.000E+00	1.000E+00	FD(17,1,2)
A-3	Th-230, soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(17,2,2)
A-3	Th-230, soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(17,3,2)
A-3				
A-3	Th-232, soil density = 1.0 g/cm**3, thickness = .15 m	9.500E-01	9.500E-01	FD(18,1,1)
A-3	Th-232, soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(18,2,1)
A-3	Th-232, soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(18,3,1)
A-3	Th-232, soil density = 1.8 g/cm**3, thickness = .15 m	1.000E+00	1.000E+00	FD(18,1,2)
A-3	Th-232, soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(18,2,2)
A-3	Th-232, soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(18,3,2)
A-3				
A-3	U-233, soil density = 1.0 g/cm**3, thickness = .15 m	9.600E-01	9.600E-01	FD(19,1,1)
A-3	U-233, soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(19,2,1)
A-3	U-233, soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(19,3,1)
A-3	U-233, soil density = 1.8 g/cm**3, thickness = .15 m	1.000E+00	1.000E+00	FD(19,1,2)
A-3	U-233, soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(19,2,2)
A-3	U-233, soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(19,3,2)
A-3				
A-3	U-234, soil density = 1.0 g/cm**3, thickness = .15 m	9.000E-01	9.000E-01	FD(20,1,1)
A-3	U-234, soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(20,2,1)
A-3	U-234, soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(20,3,1)
A-3	U-234, soil density = 1.8 g/cm**3, thickness = .15 m	1.000E+00	1.000E+00	FD(20,1,2)
A-3	U-234, soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(20,2,2)
A-3	U-234, soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(20,3,2)
A-3				

Dose Conversion Factor (and Related) Parameter Summary (continued)

Menu	Parameter	Current Value	Default	Parameter Name
A-3	U-235+D, soil density = 1.0 g/cm**3, thickness = .15 m	8.700E-01	8.700E-01	FD(21,1,1)
A-3	U-235+D, soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(21,2,1)
A-3	U-235+D, soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(21,3,1)
A-3	U-235+D, soil density = 1.8 g/cm**3, thickness = .15 m	1.000E+00	1.000E+00	FD(21,1,2)
A-3	U-235+D, soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(21,2,2)
A-3	U-235+D, soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(21,3,2)
A-3				
A-3	U-236, soil density = 1.0 g/cm**3, thickness = .15 m	9.400E-01	9.400E-01	FD(22,1,1)
A-3	U-236, soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(22,2,1)
A-3	U-236, soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(22,3,1)
A-3	U-236, soil density = 1.8 g/cm**3, thickness = .15 m	1.000E+00	1.000E+00	FD(22,1,2)
A-3	U-236, soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(22,2,2)
A-3	U-236, soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(22,3,2)
A-3				
A-3	U-238+D, soil density = 1.0 g/cm**3, thickness = .15 m	7.800E-01	7.800E-01	FD(23,1,1)
A-3	U-238+D, soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(23,2,1)
A-3	U-238+D, soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(23,3,1)
A-3	U-238+D, soil density = 1.8 g/cm**3, thickness = .15 m	8.800E-01	8.800E-01	FD(23,1,2)
A-3	U-238+D, soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(23,2,2)
A-3	U-238+D, soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(23,3,2)
B-1	Dose conversion factors for inhalation, wrem/pCi:			
B-1	Ac-227+D	6.700E+00	6.700E+00	DCF2(1)
B-1	Am-241	5.200E-01	5.200E-01	DCF2(2)
B-1	Cs-137+D	3.200E-05	3.200E-05	DCF2(3)
B-1	Np-237+D	4.900E-01	4.900E-01	DCF2(4)
B-1	Pa-231	1.300E+00	1.300E+00	DCF2(5)
B-1	Pb-210+D	2.100E-02	2.100E-02	DCF2(6)
B-1	Pu-238	4.600E-01	4.600E-01	DCF2(7)
B-1	Pu-239	5.100E-01	5.100E-01	DCF2(8)
B-1	Pu-240	5.100E-01	5.100E-01	DCF2(9)
B-1	Pu-241+D	1.000E-02	1.000E-02	DCF2(10)
B-1	Pu-242	4.800E-01	4.800E-01	DCF2(12)
B-1	Ra-226+D	7.900E-03	7.900E-03	DCF2(13)
B-1	Ra-228+D	4.500E-03	4.500E-03	DCF2(14)
B-1	Th-228+D	3.100E-01	3.100E-01	DCF2(15)
B-1	Th-229+D	2.000E+00	2.000E+00	DCF2(16)
B-1	Th-230	3.200E-01	3.200E-01	DCF2(17)
B-1	Th-232	1.600E+00	1.600E+00	DCF2(18)
B-1	U-233	1.300E-01	1.300E-01	DCF2(19)
B-1	U-234	1.300E-01	1.300E-01	DCF2(20)
B-1	U-235+D	1.200E-01	1.200E-01	DCF2(21)
B-1	U-236	1.200E-01	1.200E-01	DCF2(22)
B-1	U-238+D	1.200E-01	1.200E-01	DCF2(23)
D-1	Dose conversion factors for ingestion, arem/pCi:			
D-1	Ac-227+D	1.500E-02	1.500E-02	DCF3(1)
D-1	Am-241	4.500E-03	4.500E-03	DCF3(2)
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(3)
D-1	Np-237+D	3.900E-03	3.900E-03	DCF3(4)
D-1	Pa-231	1.100E-02	1.100E-02	DCF3(5)

Summary: RESRAD: PAWLING-AVERAGE NES DATA & LOWER KD VALUES

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Dose Conversion Factor (and Related) Parameter Summary (continued)

Menu	Parameter	Current Value	Default	Parameter Name
D-1	Pb-210+D	6.700E-03	6.700E-03	DCF3(6)
D-1	Pu-238	3.800E-03	3.800E-03	DCF3(7)
D-1	Pu-239	4.300E-03	4.300E-03	DCF3(8)
D-1	Pu-240	4.300E-03	4.300E-03	DCF3(9)
D-1	Pu-241+D	8.600E-05	8.600E-05	DCF3(10)
D-1	Pu-242	4.100E-03	4.100E-03	DCF3(12)
D-1	Ra-226+D	1.100E-03	1.100E-03	DCF3(13)
D-1	Ra-228+D	1.200E-03	1.200E-03	DCF3(14)
D-1	Th-228+D	7.500E-04	7.500E-04	DCF3(15)
D-1	Th-229+D	4.300E-03	4.300E-03	DCF3(16)
D-1	Th-230	5.300E-04	5.300E-04	DCF3(17)
D-1	Th-232	2.800E-03	2.800E-03	DCF3(18)
D-1	U-233	2.700E-04	2.700E-04	DCF3(19)
D-1	U-234	2.600E-04	2.600E-04	DCF3(20)
D-1	U-235+D	2.500E-04	2.500E-04	DCF3(21)
D-1	U-236	2.500E-04	2.500E-04	DCF3(22)
D-1	U-238+D	2.500E-04	2.500E-04	DCF3(23)
D-34	Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)
D-34				
D-34	Am-241 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(2,1)
D-34	Am-241 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-05	5.000E-05	RTF(2,2)
D-34	Am-241 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-06	2.000E-06	RTF(2,3)
D-34				
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(3,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(3,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(3,3)
D-34				
D-34	Np-237+D , plant/soil concentration ratio, dimensionless	2.000E-02	2.000E-02	RTF(4,1)
D-34	Np-237+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,2)
D-34	Np-237+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(4,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(5,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(5,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(5,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(6,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(6,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(6,3)
D-34				
D-34	Pu-238 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(7,1)
D-34	Pu-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(7,2)
D-34	Pu-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(7,3)
D-34				
D-34	Pu-239 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(8,1)
D-34	Pu-239 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(8,2)
D-34	Pu-239 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(8,3)
D-34				

Dose Conversion Factor (and Related) Parameter Summary (continued)

Menu	Parameter	Current Value	Default	Parameter Name
D-34	Pu-240 plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(9,1)
D-34	Pu-240 beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(9,2)
D-34	Pu-240 milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(9,3)
D-34	Pu-241+D plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(10,1)
D-34	Pu-241+D beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(10,2)
D-34	Pu-241+D milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(10,3)
D-34	Pu-242 plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(12,1)
D-34	Pu-242 beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(12,2)
D-34	Pu-242 milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(12,3)
D-34	Ra-226+D plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(13,1)
D-34	Ra-226+D beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(13,2)
D-34	Ra-226+D milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(13,3)
D-34	Ra-228+D plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(14,1)
D-34	Ra-228+D beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(14,2)
D-34	Ra-228+D milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(14,3)
D-34	Th-232+D plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(15,1)
D-34	Th-232+D beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(15,2)
D-34	Th-232+D milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(15,3)
D-34	Th-232+D plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(16,1)
D-34	Th-232+D beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(16,2)
D-34	Th-232+D milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(16,3)
D-34	Th-230 plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(17,1)
D-34	Th-230 beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(17,2)
D-34	Th-230 milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(17,3)
D-34	Th-232 plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(18,1)
D-34	Th-232 beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(18,2)
D-34	Th-232 milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(18,3)
D-34	U-233 plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(19,1)
D-34	U-233 beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(19,2)
D-34	U-233 milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(19,3)
D-34	U-234 plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(20,1)
D-34	U-234 beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(20,2)
D-34	U-234 milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(20,3)
D-34	U-235+D plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(21,1)
D-34	U-235+D beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(21,2)
D-34	U-235+D milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(21,3)
D-34	U-236 plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(22,1)
D-34	U-236 beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(22,2)
D-34	U-236 milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(22,3)

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Dose Conversion Factor (and Related) Parameter Summary (continued)

Menu	Parameter	Current Value	Default	Parameter Name
D-14	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(23,1)
D-14	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(23,2)
D-14	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(23,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5	Am-241 , fish	3.000E+01	3.000E+01	BIOFAC(2,1)
D-5	Am-241 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(2,2)
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(3,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(3,2)
D-5	Np-237+D , fish	3.000E+01	3.000E+01	BIOFAC(4,1)
D-5	Np-237+D , crustacea and mollusks	4.000E+02	4.000E+02	BIOFAC(4,2)
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(5,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(5,2)
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(6,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(6,2)
D-5	Pu-238 , fish	3.000E+01	3.000E+01	BIOFAC(7,1)
D-5	Pu-238 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(7,2)
D-5	Pu-239 , fish	3.000E+01	3.000E+01	BIOFAC(8,1)
D-5	Pu-239 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(8,2)
D-5	Pu-240 , fish	3.000E+01	3.000E+01	BIOFAC(9,1)
D-5	Pu-240 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(9,2)
D-5	Pu-241+D , fish	3.000E+01	3.000E+01	BIOFAC(10,1)
D-5	Pu-241+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(10,2)
D-5	Pu-242 , fish	3.000E+01	3.000E+01	BIOFAC(12,1)
D-5	Pu-242 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(12,2)
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(13,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(13,2)
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(14,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(14,2)
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(15,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(15,2)
D-5	Th-229+D , fish	1.000E+02	1.000E+02	BIOFAC(16,1)
D-5	Th-229+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(16,2)

Summary: RESRAD: PAWLING-AVERAGE NES DATA & LOWER KD VALUES

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Dose Conversion Factor (and Related) Parameter Summary (continued)

Menu	Parameter	Current Value	Default	Parameter Name
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(17,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(17,2)
D-5	Th-232 , fish	1.000E+02	1.000E+02	BIOFAC(18,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(18,2)
D-5	U-233 , fish	1.000E+01	1.000E+01	BIOFAC(19,1)
D-5	U-233 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(19,2)
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(20,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(20,2)
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(21,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(21,2)
D-5	U-236 , fish	1.000E+01	1.000E+01	BIOFAC(22,1)
D-5	U-236 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(22,2)
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(23,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(23,2)

Summary: RESRAD: PAWLING-AVERAGE NES DATA & LOWER KD VALUES

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Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.000E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.000E+00	2.000E+00	---	THICKO
R011	Length parallel to aquifer flow (m)	4.500E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	3.000E+01	3.000E+01	---	BRLD
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	3.000E+03	3.000E+03	---	T(9)
R011	Times for calculations (yr)	1.000E+04	1.000E+04	---	T(10)
R012	Initial principal radionuclide (pCi/g): Am-241	3.640E-01	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Cs-137	3.270E-01	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g): Pu-238	2.000E-03	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): Pu-239	2.293E+00	0.000E+00	---	S1(8)
R012	Initial principal radionuclide (pCi/g): Pu-240	2.190E-01	0.000E+00	---	S1(9)
R012	Initial principal radionuclide (pCi/g): Pu-241	3.100E-02	0.000E+00	---	S1(10)
R012	Initial principal radionuclide (pCi/g): Pu-242	3.000E-03	0.000E+00	---	S1(12)
R012	Concentration in groundwater (pCi/L): Am-241	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(3)
R012	Concentration in groundwater (pCi/L): Pu-238	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): Pu-239	not used	0.000E+00	---	W1(8)
R012	Concentration in groundwater (pCi/L): Pu-240	not used	0.000E+00	---	W1(9)
R012	Concentration in groundwater (pCi/L): Pu-241	not used	0.000E+00	---	W1(10)
R012	Concentration in groundwater (pCi/L): Pu-242	not used	0.000E+00	---	W1(12)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVERO
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	6.000E-04	1.000E-03	---	V CZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone effective porosity	2.000E-01	2.000E-01	---	EPCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00	---	BCZ
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	8.540E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.020E+00	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	0.000E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IOITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	4.600E+06	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ

Summary RESRAD: PAWLING-AVERAGE NES DATA & LOWER KD VALUES

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.000E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	6.000E-04	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	QWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Individual's use of groundwater (m ³ /yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS
R015	Unsat. zone 1, thickness (m)	4.000E+00	4.000E+00	---	R(1)
R015	Unsat. zone 1, soil density (g/cm ³)	1.500E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.000E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	5.300E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Am-241				
R016	Contaminated zone (cm ³ /g)	1.900E+03	2.000E+01	---	DCNUCC(2)
R016	Unsat. zone 1 (cm ³ /g)	1.900E+03	2.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm ³ /g)	1.900E+03	2.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.657E-05	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(2)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm ³ /g)	1.700E+02	1.000E+03	---	DCNUCC(3)
R016	Unsat. zone 1 (cm ³ /g)	1.700E+02	1.000E+03	---	DCNUCU(3,1)
R016	Saturated zone (cm ³ /g)	1.700E+02	1.000E+03	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.083E-04	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(3)
R016	Distribution coefficients for Pu-238				
R016	Contaminated zone (cm ³ /g)	5.500E+02	2.000E+03	---	DCNUCC(7)
R016	Unsat. zone 1 (cm ³ /g)	5.500E+02	2.000E+03	---	DCNUCU(7,1)
R016	Saturated zone (cm ³ /g)	5.500E+02	2.000E+03	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.263E-04	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(7)
R016	Distribution coefficients for Pu-239				
R016	Contaminated zone (cm ³ /g)	5.500E+02	2.000E+03	---	DCNUCC(8)
R016	Unsat. zone 1 (cm ³ /g)	5.500E+02	2.000E+03	---	DCNUCU(8,1)
R016	Saturated zone (cm ³ /g)	5.500E+02	2.000E+03	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.263E-04	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(8)
R016	Distribution coefficients for Pu-240				
R016	Contaminated zone (cm ³ /g)	5.500E+02	2.000E+03	---	DCNUCC(9)
R016	Unsat. zone 1 (cm ³ /g)	5.500E+02	2.000E+03	---	DCNUCU(9,1)
R016	Saturated zone (cm ³ /g)	5.500E+02	2.000E+03	---	DCNUCS(9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.263E-04	ALEACH(9)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(9)

Summary RESPAD: PAWLING-AVERAGE NES DATA & LOWER KD VALUES

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Pu-241				
R016	Contaminated zone 1 (cm**3/g)	5.500E+02	2.000E+03	---	DCNUCC(10)
R016	Unsaturated zone 1 (cm**3/g)	5.500E+02	2.000E+03	---	DCNUCU(10,1)
R016	Saturated zone (cm**3/g)	5.500E+02	2.000E+03	---	DCNUCS(10)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.263E-04	ALEACH(10)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(10)
R016	Distribution coefficients for Pu-242				
R016	Contaminated zone 1 (cm**3/g)	5.500E+02	2.000E+03	---	DCNUCC(12)
R016	Unsaturated zone 1 (cm**3/g)	5.500E+02	2.000E+03	---	DCNUCU(12,1)
R016	Saturated zone (cm**3/g)	5.500E+02	2.000E+03	---	DCNUCS(12)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.263E-04	ALEACH(12)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(12)
R016	Distribution coefficients for daughter Ac-227				
R016	Contaminated zone (cm**3/g)	4.500E+02	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	4.500E+02	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	4.500E+02	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.544E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(1)
R016	Distribution coefficients for daughter Np-237				
R016	Contaminated zone (cm**3/g)	-1.000E+00	-1.000E+00	2.036E+02	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	-1.000E+00	-1.000E+00	2.036E+02	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	-1.000E+00	-1.000E+00	2.036E+02	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.411E-04	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(4)
R016	Distribution coefficients for daughter Pa-231				
R016	Contaminated zone (cm**3/g)	5.500E+02	5.000E+01	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	5.500E+02	5.000E+01	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	5.500E+02	5.000E+01	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.263E-04	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(5)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	2.700E+02	1.000E+02	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	2.700E+02	1.000E+02	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	2.700E+02	1.000E+02	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.572E-04	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(6)
R016	Distribution coefficients for daughter Ra-226				
R016	Contaminated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCC(13)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCU(13,1)
R016	Saturated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCS(13)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.389E-04	ALEACH(13)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(13)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Ra-228				
R016	Contaminated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCC(14)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCU(14,1)
R016	Saturated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCS(14)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.389E-04	ALEACH(14)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(14)
R016	Distribution coefficients for daughter Th-228				
R016	Contaminated zone (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCC(15)
R016	Unsaturated zone 1 (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCU(15,1)
R016	Saturated zone (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCS(15)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.172E-05	ALEACH(15)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(15)
R016	Distribution coefficients for daughter Th-229				
R016	Contaminated zone (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCC(16)
R016	Unsaturated zone 1 (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCU(16,1)
R016	Saturated zone (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCS(16)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.172E-05	ALEACH(16)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(16)
R016	Distribution coefficients for daughter Th-230				
R016	Contaminated zone (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCC(17)
R016	Unsaturated zone 1 (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCU(17,1)
R016	Saturated zone (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCS(17)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.172E-05	ALEACH(17)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(17)
R016	Distribution coefficients for daughter Th-232				
R016	Contaminated zone (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCC(18)
R016	Unsaturated zone 1 (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCU(18,1)
R016	Saturated zone (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCS(18)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.172E-05	ALEACH(18)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(18)
R016	Distribution coefficients for daughter U-233				
R016	Contaminated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCC(19)
R016	Unsaturated zone 1 (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCU(19,1)
R016	Saturated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCS(19)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.575E-03	ALEACH(19)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(19)
R016	Distribution coefficients for daughter U-234				
R016	Contaminated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCC(20)
R016	Unsaturated zone 1 (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCU(20,1)
R016	Saturated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCS(20)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.575E-03	ALEACH(20)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(20)

Summary: RESRAD: PAWLING-AVERAGE NES DATA & LOWER KD VALUES

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter U-235				
R016	Contaminated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCC(21)
R016	Unsaturated zone 1 (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCU(21,1)
R016	Saturated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCS(21)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.575E-03	ALEACH(21)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(21)
R016	Distribution coefficients for daughter U-236				
R016	Contaminated zone (cm**3/g)	1.500E+01	5E+01	---	DCNUCC(22)
R016	Unsaturated zone 1 (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCU(22,1)
R016	Saturated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCS(22)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.575E-03	ALEACH(22)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(22)
R016	Distribution coefficients for daughter U-238				
R016	Contaminated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCC(23)
R016	Unsaturated zone 1 (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCU(23,1)
R016	Saturated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCS(23)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.575E-03	ALEACH(23)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(23)
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	2.000E-04	2.000E-04	---	MLINH
R017	Dilution length for airborne dust, inhalation (m)	3.000E+00	3.000E+00	---	LM
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.500E-01	2.500E-01	---	FOTD
R017	Shape factor, external gamma	1.000E+00	1.000E+00	---	FS1
R017	Fractions of annular areas within AREA:				
R017	Outer annular radius (m) = ((1/c)	not used	1.000E+00	---	FRACA(1)
R017	Outer annular radius (m) = ((10/c)	not used	1.000E+00	---	FRACA(2)
R017	Outer annular radius (m) = ((20/c)	not used	1.000E+00	---	FRACA(3)
R017	Outer annular radius (m) = ((50/c)	not used	1.000E+00	---	FRACA(4)
R017	Outer annular radius (m) = ((100/c)	not used	1.000E+00	---	FRACA(5)
R017	Outer annular radius (m) = ((200/c)	not used	1.000E+00	---	FRACA(6)
R017	Outer annular radius (m) = ((500/c)	not used	1.000E+00	---	FRACA(7)
R017	Outer annular radius (m) = ((1000/c)	not used	1.000E+00	---	FRACA(8)
R017	Outer annular radius (m) = ((5000/c)	not used	1.000E+00	---	FRACA(9)
R017	Outer annular radius (m) = ((1.E+04/c)	not used	1.000E+00	---	FRACA(10)
R017	Outer annular radius (m) = ((1.E+05/c)	not used	0.000E+00	---	FRACA(11)
R017	Outer annular radius (m) = ((1.E+06/c)	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.600E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	9.200E+01	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.300E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	5.400E+00	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	DIET(6)

Summary: RESRAD: PAWLING-AVERAGE NES DATA & LOWER KD VALUES

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (if different from user input)	Parameter Name
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	7.300E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	1.000E+00	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	5.000E-01	5.000E-01	---	FRF
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	-1	-1	0.100E+00	FMEAT
R018	Contamination fraction of milk	-1	-1	0.100E+00	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LF15
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LF16
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LW15
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LW16
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWOW
R019	Household water fraction from ground water	1.000E+00	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CI
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DHC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
R021	Thickness of building foundation (m)	1.500E-01	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	2.400E+00	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	1.000E-01	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH20CV
R021	Volumetric water content of the foundation	3.000E-02	3.000E-02	---	PH20FL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	D1FCV
R021	in foundation material	3.000E-07	3.000E-07	---	D1FFL
R021	in contaminated zone soil	2.000E-06	2.000E-06	---	D1FCZ
R021	Radon vertical dimension of mixing (m)	2.000E+00	2.000E+00	---	HMTX
R021	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R021	Average building air exchange rate (1/hr)	5.000E-01	5.000E-01	---	REX6
R021	Height of the building (room) (m)	2.500E+00	2.500E+00	---	HRM
R021	Building interior area factor	0.000E+00	0.000E+00	code computed (time dependent)	FAI
R021	Building depth below ground surface (m)	1.000E+00	1.000E+00	---	DMFL
R021	Emanating power of Rn-222 gas	2.500E-01	2.500E-01	---	EMANA(1)

Summary : RESRAD: PAWLING-AVERAGE NES DATA & LOWER KD VALUES

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (if different from user input)	Parameter Name
R021	Emanating power of Rn-220 gas	1.500E-01	1.500E-01	---	EMANA(2)

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	active

Summary: RESRAD: PAWLING-AVERAGE NES DATA & LOWER KD VALUES

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Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	2000.00 square meters	Am-241	2.640E-01
Thickness:	1.00 meters	Cs-137	3.270E-01
Cover Depth:	0.00 meters	Pu-238	2.000E-03
		Pu-239	2.293E+00
		Pu-240	2.190E-01
		Pu-241	3.100E-02
		Pu-242	3.000E-03

Total Dose TD0SE(t), mrem/yr

Basic Radiation Dose Limit = 30 mrem/yr

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	3.000E+03	1.000E+04
TD0SE(t):	3.446E+00	3.420E+00	3.370E+00	3.210E+00	2.871E+00	2.380E+00	2.049E+00	1.336E+00	5.659E-06	3.904E-06
M(t):	1.149E-01	1.140E-01	1.123E-01	1.070E-01	9.571E-02	7.934E-02	6.831E-02	4.453E-02	1.886E-07	1.301E-07

Maximum TD0SE(t): 3.446E+00 mrem/yr at t = 0.000E+00 years

Summary: RESRAD: PAWLING-AVERAGE NES DATA & LOWER KD VALUES

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.066E-02	0.0031	1.341E-01	0.0389	0.000E+00	0.0000	1.435E-01	0.0416	2.940E-04	0.0001	1.677E-05	0.0000	2.690E-02	0.0078
Cs-137	1.020E+00	0.2959	7.412E-06	0.0000	0.000E+00	0.0000	5.691E-02	0.0165	9.956E-03	0.0029	3.251E-03	0.0009	2.685E-04	0.0001
Pu-238	1.648E-06	0.0000	6.518E-04	0.0002	0.000E+00	0.0000	6.656E-04	0.0002	2.728E-06	0.0000	3.891E-08	0.0000	1.248E-04	0.0000
Pu-239	1.037E-03	0.0003	8.285E-01	0.2404	0.000E+00	0.0000	8.635E-01	0.2506	3.540E-03	0.0010	5.048E-05	0.0000	1.619E-01	0.0470
Pu-240	1.719E-04	0.0000	7.913E-02	0.0230	0.000E+00	0.0000	8.247E-02	0.0239	3.381E-04	0.0001	4.821E-06	0.0000	1.547E-02	0.0045
Pu-241	3.645E-07	0.0000	2.196E-04	0.0001	0.000E+00	0.0000	2.335E-04	0.0001	9.571E-07	0.0000	1.365E-08	0.0000	4.379E-05	0.0000
Pu-242	1.966E-06	0.0000	1.020E-03	0.0003	0.000E+00	0.0000	1.077E-03	0.0003	4.416E-06	0.0000	6.297E-08	0.0000	2.020E-04	0.0001
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Total	1.031E+00	0.2993	1.044E+00	0.3029	0.000E+00	0.0000	1.148E+00	0.3333	1.414E-02	0.0041	3.323E-03	0.0010	2.050E-01	0.0595

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.154E-01	0.0915
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.090E+00	0.3163
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.447E-03	0.0004
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.859E+00	0.5394
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.776E-01	0.0515
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.982E-04	0.0001
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.306E-03	0.0007
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Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.446E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
 As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.064E-02	0.0031	1.339E-01	0.0391	0.000E+00	0.0000	1.432E-01	0.0419	2.935E-04	0.0001	1.674E-05	0.0000	1.686E-02	0.0079
Cs-137	9.960E-01	0.2912	7.242E-06	0.0000	0.000E+00	0.0000	5.559E-02	0.0160	9.726E-03	0.0028	3.176E-03	0.0009	2.623E-04	0.0001
Pu-238	1.635E-06	0.0000	6.466E-04	0.0002	1.595E-18	0.0000	6.603E-04	0.0002	2.707E-06	0.0000	3.860E-08	0.0000	1.238E-04	0.0000
Pu-239	1.036E-03	0.0003	8.084E-01	0.2422	0.000E+00	0.0000	8.634E-01	0.2525	3.539E-03	0.0010	5.047E-05	0.0000	1.619E-01	0.0473
Pu-240	1.719E-04	0.0001	7.911E-02	0.0231	6.827E-22	0.0000	8.246E-02	0.0241	3.380E-04	0.0001	4.820E-06	0.0000	1.546E-02	0.0045
Pu-241	1.765E-06	0.0000	2.271E-04	0.0001	0.000E+00	0.0000	2.416E-04	0.0001	9.511E-07	0.0000	1.524E-08	0.0000	4.530E-05	0.0000
Pu-242	1.966E-06	0.0000	1.020E-03	0.0003	9.101E-29	0.0000	1.077E-03	0.0003	4.415E-06	0.0000	6.296E-08	0.0000	2.020E-04	0.0001
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Total	1.008E+00	0.2947	1.043E+00	0.3051	1.595E-18	0.0000	1.147E+00	0.3353	1.390E-02	0.0041	3.248E-03	0.0009	2.049E-01	0.0599

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
 As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.149E-01	0.0921
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.065E+00	0.3114
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.435E-03	0.0004
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.858E+00	0.5434
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.775E-01	0.0519
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.167E-04	0.0002
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.306E-03	0.0007
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Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.420E+00	1.0000

*Sum of all water independent and dependent pathways

Summary RESRAD: PAWLING-AVERAGE NES DATA & LOWER KD VALUES

File B:PAWLIN.NE4

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.061E-02	0.0001	1.334E-01	0.0396	0.000E+00	0.0000	1.428E-01	0.0424	2.926E-04	0.0001	1.669E-05	0.0000	2.677E-02	0.0079
Cs-137	9.509E-01	0.2821	6.911E-06	0.0000	0.000E+00	0.0000	5.305E-02	0.0157	9.281E-03	0.0028	3.031E-03	0.0009	2.504E-04	0.0001
Pu-238	1.609E-06	0.0000	6.363E-04	0.0002	4.274E-17	0.0000	6.498E-04	0.0002	2.663E-06	0.0000	3.800E-08	0.0000	1.219E-04	0.0000
Pu-239	1.036E-03	0.0003	8.281E-01	0.2458	0.000E+00	0.0000	8.631E-01	0.2562	3.538E-03	0.0010	5.046E-05	0.0000	1.619E-01	0.0480
Pu-240	1.718E-04	0.0001	7.907E-02	0.0235	4.607E-20	0.0000	8.242E-02	0.0245	3.378E-04	0.0001	4.818E-06	0.0000	1.546E-02	0.0046
Pu-241	4.364E-06	0.0000	2.410E-04	0.0001	0.000E+00	0.0000	2.565E-04	0.0001	9.397E-07	0.0000	1.818E-08	0.0000	4.810E-05	0.0000
Pu-242	1.963E-05	0.0000	1.020E-03	0.0003	7.488E-27	0.0000	1.077E-03	0.0003	4.414E-06	0.0000	6.295E-08	0.0000	2.019E-04	0.0001
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
Total	9.623E-01	0.2856	1.043E+00	0.3094	4.279E-17	0.0000	1.143E+00	0.3393	1.346E-02	0.0040	3.103E-03	0.0009	2.047E-01	0.0608

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.139E-01	0.0932
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.9000	0.000E+00	0.0000	1.016E+00	0.3016
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.412E-03	0.0004
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.858E+00	0.5513
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.775E-01	0.0527
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.509E-04	0.0002
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.305E-03	0.0007
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.370E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDose(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.049E-02	0.0003	1.319E-01	0.0411	0.000E+00	0.0000	1.411E-01	0.0440	2.993E-04	0.0001	1.650E-05	0.0000	2.447E-02	0.0080
Cs-137	8.070E-01	0.2514	5.868E-06	0.0000	0.000E+00	0.0000	4.504E-02	0.0140	7.880E-03	0.0025	2.573E-03	0.0008	2.126E-04	0.0001
Pu-238	1.521E-06	0.0000	6.015E-04	0.0002	1.544E-15	0.0000	6.143E-04	0.0002	2.518E-06	0.0000	3.596E-08	0.0000	1.152E-04	0.0000
Pu-239	1.005E-03	0.0003	8.272E-01	0.2577	0.000E+00	0.0000	8.622E-01	0.2686	3.504E-03	0.0011	5.040E-05	0.0000	1.617E-01	0.0504
Pu-240	1.715E-04	0.0001	7.895E-02	0.0246	3.261E-18	0.0000	8.228E-02	0.0256	3.373E-04	0.0001	4.811E-06	0.0000	1.543E-02	0.0046
Pu-241	1.165E-05	0.0000	2.793E-04	0.0001	0.000E+00	0.0000	2.979E-04	0.0001	9.059E-07	0.0000	2.640E-08	0.0000	5.586E-05	0.0000
Pu-242	1.963E-06	0.0000	1.019E-03	0.0003	9.099E-25	0.0000	1.076E-03	0.0003	4.410E-06	0.0000	6.289E-08	0.0000	2.018E-04	0.0001
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
Total	8.187E-01	0.2550	1.040E+00	0.3240	1.547E-15	0.0000	1.133E+00	0.3528	1.205E-02	0.0038	2.645E-03	0.0008	2.042E-01	0.0636

Total Dose Contributions TDose(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.103E-01	0.0967
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.627E-01	0.2687
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.335E-03	0.0004
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.856E+00	0.5781
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.772E-01	0.0552
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.456E-04	0.0002
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.303E-03	0.0007
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.210E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As wrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radionuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	wrem/yr	fract.	wrem/yr	fract.	wrem/yr	fract.	wrem/yr	fract.	wrem/yr	fract.	wrem/yr	fract.	wrem/yr	fract.
Am-241	1.019E-02	0.0035	1.277E-01	0.0445	0.000E+00	0.0000	1.366E-01	0.0476	2.801E-04	0.0001	1.597E-05	0.0000	2.561E-02	0.0089
Cs-137	5.056E-01	0.1761	3.676E-06	0.0000	0.000E+00	0.0000	2.822E-02	0.0098	4.937E-03	0.0017	1.612E-03	0.0006	1.332E-04	0.0000
Pu-238	1.295E-06	0.0000	5.123E-04	0.0002	3.879E-14	0.0000	5.232E-04	0.0002	2.145E-06	0.0000	3.071E-08	0.0000	9.812E-05	0.0000
Pu-239	1.032E-03	0.0004	8.247E-01	0.2872	0.000E+00	0.0000	8.595E-01	0.2993	3.523E-03	0.0012	5.024E-05	0.0000	1.612E-01	0.0561
Pu-240	1.707E-04	0.0001	7.858E-02	0.0274	8.548E-17	0.0000	8.190E-02	0.0285	3.357E-04	0.0001	4.789E-06	0.0000	1.536E-02	0.0053
Pu-241	2.244E-05	0.0000	3.328E-04	0.0001	0.000E+00	0.0000	3.557E-04	0.0001	8.416E-07	0.0000	3.837E-08	0.0000	6.670E-05	0.0000
Pu-242	1.958E-06	0.0000	1.016E-03	0.0004	7.040E-23	0.0000	1.073E-03	0.0004	4.399E-06	0.0000	6.273E-08	0.0000	2.013E-04	0.0001
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
Total	5.169E-01	0.1800	1.033E+00	0.3597	3.889E-14	0.0000	1.108E+00	0.3860	9.083E-03	0.0032	1.683E-03	0.0006	2.027E-01	0.0706

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As wrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Dependent Pathways

Radionuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	wrem/yr	fract.	wrem/yr	fract.	wrem/yr	fract.	wrem/yr	fract.	wrem/yr	fract.	wrem/yr	fract.	wrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.003E-01	0.1046
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.405E-01	0.1882
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.137E-03	0.0004
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.850E+00	0.6443
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.764E-01	0.0614
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.785E-04	0.0003
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.297E-03	0.0008
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.871E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
 As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	9.060E-03	0.0038	1.138E-01	0.0478	0.000E+00	0.0000	1.219E-01	0.0512	2.501E-04	0.0001	1.424E-05	0.0000	2.284E-02	0.0096
Cs-137	9.838E-02	0.0413	7.153E-07	0.0000	0.000E+00	0.0000	5.491E-03	0.0023	9.607E-04	0.0004	3.137E-04	0.0001	2.591E-05	0.0000
Pu-238	7.388E-07	0.0000	0.921E-04	0.0001	1.123E-12	0.0000	2.983E-04	0.0001	1.223E-06	0.0000	1.771E-08	0.0000	5.594E-05	0.0000
Pu-239	1.021E-03	0.0004	8.158E-01	0.3427	0.000E+00	0.0000	8.502E-01	0.3572	3.485E-03	0.0015	4.970E-05	0.0000	1.595E-01	0.0670
Pu-240	1.680E-04	0.0001	7.732E-02	0.0325	1.433E-15	0.0000	8.058E-02	0.0339	3.303E-04	0.0001	4.715E-06	0.0000	1.511E-02	0.0063
Pu-241	2.624E-05	0.0000	3.315E-04	0.0001	0.000E+00	0.0000	3.548E-04	0.0001	7.317E-07	0.0000	4.136E-08	0.0000	6.651E-05	0.0000
Pu-242	1.941E-06	0.0000	1.007E-03	0.0004	7.412E-21	0.0000	1.064E-03	0.0004	4.359E-06	0.0000	6.217E-08	0.0000	1.995E-04	0.0001
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Total	1.087E-01	0.0456	1.009E+00	0.4237	1.125E-12	0.0000	1.060E+00	0.4453	5.033E-03	0.0021	3.825E-04	0.0002	1.978E-01	0.0831

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
 As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.679E-01	0.1125
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.052E-01	0.0442
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.484E-04	0.0003
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.830E+00	0.7688
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.735E-01	0.0729
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.798E-04	0.0003
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.277E-03	0.0010
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Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.380E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	6.544E-03	0.0032	8.306E-02	0.0400	0.000E+00	0.0000	8.019E-02	0.0391	1.791E-04	0.0001	1.018E-05	0.0000	1.646E-02	0.0080
Cs-137	1.159E-04	0.0004	6.660E-09	0.0000	0.000E+00	0.0000	4.658E-05	0.0000	8.273E-06	0.0000	2.709E-06	0.0000	2.413E-07	0.0000
Pu-238	1.484E-07	0.0000	5.869E-05	0.0000	1.562E-11	0.0000	5.463E-05	0.0000	2.431E-07	0.0000	3.714E-09	0.0000	1.124E-05	0.0000
Pu-239	9.897E-04	0.0005	7.908E-01	0.3859	0.000E+00	0.0000	7.515E-01	0.3667	3.343E-03	0.0016	4.776E-05	0.0000	1.546E-01	0.0754
Pu-240	1.604E-04	0.0001	7.381E-02	0.0360	1.131E-14	0.0000	7.014E-02	0.0342	3.120E-04	0.0002	4.466E-06	0.0000	1.443E-02	0.0070
Pu-241	1.914E-05	0.0000	2.399E-04	0.0001	0.000E+00	0.0000	2.344E-04	0.0001	5.235E-07	0.0000	2.977E-08	0.0000	4.814E-05	0.0000
Pu-242	1.892E-06	0.0000	9.817E-04	0.0005	3.831E-19	0.0000	9.451E-04	0.0005	4.204E-06	0.0000	6.006E-08	0.0000	1.944E-04	0.0001
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
Total	8.636E-03	0.0042	9.480E-01	0.4626	1.563E-11	0.0000	9.031E-01	0.4407	3.847E-03	0.0019	6.521E-05	0.0000	1.857E-01	0.0906

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.855E-01	0.0905
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.738E-04	0.0005
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.250E-04	0.0001
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.701E+00	0.8302
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.589E-01	0.0775
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.422E-04	0.0003
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.127E-03	0.0010
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.049E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions (DOSE(i,p,t)) for Individual Radionuclides (i) and Pathways (p)
 As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	2.130E-03	0.0016	2.610E-02	0.0195	0.000E+00	0.0000	1.245E-02	0.0095	5.457E-05	0.0000	3.094E-06	0.0000	5.236E-03	0.0039
Cs-137	7.078E-11	0.0000	5.187E-16	0.0000	0.000E+00	0.0000	1.770E-12	0.0000	3.698E-13	0.0000	1.245E-13	0.0000	1.879E-14	0.0000
Pu-238	3.576E-09	0.0000	2.148E-07	0.0000	7.025E-11	0.0000	8.924E-08	0.0000	8.499E-10	0.0000	3.422E-11	0.0000	4.091E-08	0.0000
Pu-239	8.879E-04	0.0007	7.095E-01	0.5311	0.000E+00	0.0000	3.314E-01	0.2481	2.830E-03	0.0021	4.085E-05	0.0000	1.387E-01	0.1038
Pu-240	1.363E-04	0.0001	6.276E-02	0.0470	6.291E-14	0.0000	2.931E-02	0.0219	2.503E-04	0.0002	3.623E-06	0.0000	1.227E-02	0.0092
Pu-241	6.194E-06	0.0000	7.631E-05	0.0001	0.000E+00	0.0000	3.696E-05	0.0000	1.597E-07	0.0000	9.047E-09	0.0000	1.521E-05	0.0000
Pu-242	1.739E-06	0.0000	8.975E-04	0.0007	9.112E-18	0.0000	4.247E-04	0.0003	3.627E-06	0.0000	5.235E-08	0.0000	1.777E-04	0.0001
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
Total	7.152E-03	0.0024	7.993E-01	0.5984	7.032E-11	0.0000	3.738E-01	0.2798	3.139E-03	0.0023	4.763E-05	0.0000	1.564E-01	0.1171

Total Dose Contributions (DOSE(i,p,t)) for Individual Radionuclides (i) and Pathways (p)
 As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	3.293E-06	0.0000	4.624E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.822E-10	0.0000	3.973E-09	0.0000	4.616E-02	0.0346
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.307E-11	0.0000
Pu-238	5.173E-07	0.0000	7.163E-11	0.0000	4.787E-12	0.0000	0.000E+00	0.0000	7.596E-11	0.0000	6.257E-10	0.0000	8.775E-07	0.0000
Pu-239	9.083E-07	0.0000	1.352E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.445E-10	0.0000	1.081E-09	0.0000	1.183E+00	0.8858
Pu-240	2.514E-05	0.0000	3.448E-09	0.0000	1.421E-17	0.0000	0.000E+00	0.0000	3.689E-09	0.0000	3.042E-08	0.0000	1.048E-01	0.0784
Pu-241	8.613E-09	0.0000	1.214E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.261E-12	0.0000	1.039E-11	0.0000	1.349E-04	0.0001
Pu-242	1.856E-10	0.0000	2.546E-14	0.0000	2.326E-17	0.0000	0.000E+00	0.0000	2.723E-14	0.0000	2.246E-13	0.0000	1.505E-03	0.0011
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
Total	2.967E-05	0.0000	4.118E-09	0.0000	4.787E-12	0.0000	0.000E+00	0.0000	4.393E-09	0.0000	3.611E-08	0.0000	1.336E+00	1.0000

*Sum of all water independent and dependent pathways.

Summary : RESRAD: PAWLING-AVERAGE NES DATA & LOWER KD VALUES

File : B:PAWLIN.NEA

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
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Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+03 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	2.258E-06	0.3991	3.695E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	3.258E-10	0.0001	3.668E-09	0.0005	3.262E-06	0.3997
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	3.003E-09	0.0005	6.117E-12	0.0000	4.019E-11	0.0000	0.000E+00	0.0000	1.048E-12	0.0000	2.140E-12	0.0000	3.052E-09	0.0005
Pu-239	2.041E-07	0.0361	7.938E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.819E-11	0.0000	1.618E-10	0.0000	2.044E-07	0.0361
Pu-240	3.179E-06	0.5617	4.359E-10	0.0001	3.197E-17	0.0000	0.000E+00	0.0000	4.664E-10	0.0001	3.846E-09	0.0007	3.184E-06	0.5626
Pu-241	6.207E-09	0.0011	1.018E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.952E-13	0.0000	7.330E-12	0.0000	6.216E-09	0.0011
Pu-242	2.900E-11	0.0000	3.991E-15	0.0000	9.853E-17	0.0000	0.000E+00	0.0000	4.257E-15	0.0000	3.509E-14	0.0000	2.905E-11	0.0000
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Total	5.651E-06	0.9985	8.919E-10	0.0002	4.019E-11	0.0000	0.000E+00	0.0000	8.723E-10	0.0002	6.686E-09	0.0012	5.659E-06	1.0000

*Sum of all water independent and dependent pathways.

Summary: RESRAD: PAWLING-AVERAGE NES DATA & LOWER KD VALUES

File: B PAWLIN.NE4

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+04 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+04 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	2.171E-06	0.5562	3.808E-10	0.0001	0.000E+00	0.0000	0.000E+00	0.0000	3.109E-10	0.0001	2.538E-09	0.0007	2.175E-06	0.5571
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	4.715E-09	0.0012	9.621E-12	0.0000	6.333E-11	0.0000	0.000E+00	0.0000	1.652E-12	0.0000	3.374E-12	0.0000	4.793E-09	0.0012
Pu-239	2.076E-07	0.0532	1.017E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.910E-11	0.0000	1.300E-10	0.0000	2.079E-07	0.0533
Pu-240	1.508E-06	0.3863	2.068E-10	0.0001	3.460E-17	0.0000	0.000E+00	0.0000	2.213E-10	0.0001	1.825E-09	0.0005	1.510E-06	0.3869
Pu-241	6.038E-09	0.0015	1.064E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.640E-13	0.0000	7.052E-12	0.0000	6.047E-09	0.0015
Pu-242	2.767E-11	0.0000	3.821E-15	0.0000	1.875E-16	0.0000	0.000E+00	0.0000	4.063E-15	0.0000	3.347E-14	0.0000	2.771E-11	0.0000
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
Total	2.898E-06	0.9985	7.000E-10	0.0002	6.333E-11	0.0000	0.000E+00	0.0000	6.337E-10	0.0002	4.503E-09	0.0012	3.904E-06	1.0000

*sum of all water independent and dependent pathways.

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent [i]	Product [j]	Branch Fraction	DSR [i,j] (arew/yr)/(pCi/g)									
			0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	3.000E+03	1.000E+04
Am-241	Am-241	1.000E+00	8.666E-01	8.652E-01	8.623E-01	8.525E-01	8.250E-01	7.357E-01	5.089E-01	1.262E-01	0.000E+00	0.000E+00
Am-241	Np-237	1.000E+00	0.000E+00	2.668E-06	7.989E-06	2.645E-05	7.779E-05	2.421E-04	5.552E-04	5.748E-04	0.000E+00	0.000E+00
Am-241	U-233	1.000E+00	0.000E+00	1.109E-11	9.431E-11	1.086E-09	9.329E-09	8.849E-08	5.011E-07	1.033E-05	6.066E-06	5.770E-06
Am-241	Th-229	1.000E+00	0.000E+00	7.192E-15	1.935E-13	7.078E-12	1.845E-10	6.055E-09	1.167E-07	1.573E-06	1.470E-07	2.041E-07
Am-241	DSR(j)		8.666E-01	8.652E-01	8.623E-01	8.525E-01	8.251E-01	7.359E-01	5.095E-01	1.268E-01	6.213E-06	5.974E-06
Cs-137	Cs-137	1.000E+00	3.333E+00	3.256E+00	3.107E+00	2.638E+00	1.653E+00	3.216E-01	2.978E-03	2.234E-10	0.000E+00	0.000E+00
Pu-238	Pu-238	1.000E+00	7.233E-01	7.175E-01	7.061E-01	6.675E-01	5.685E-01	3.242E-01	6.246E-02	1.763E-04	0.000E+00	0.000E+00
Pu-238	U-234	1.000E+00	0.000E+00	4.364E-07	1.293E-06	4.123E-06	1.091E-05	2.350E-05	2.011E-05	2.599E-04	3.153E-12	0.000E+00
Pu-238	Th-230	1.000E+00	0.000E+00	3.532E-12	3.206E-11	3.459E-10	2.864E-09	2.399E-08	1.021E-07	1.819E-07	1.570E-08	1.480E-08
Pu-238	Ra-226	1.000E+00	0.000E+00	2.559E-14	6.863E-13	2.484E-11	6.282E-10	1.863E-08	6.738E-07	1.843E-06	1.416E-07	2.232E-07
Pu-238	Pb-210	1.000E+00	0.000E+00	8.526E-17	6.785E-15	7.877E-13	5.385E-11	3.890E-09	8.716E-08	5.846E-07	1.369E-06	2.159E-06
Pu-238	DSR(j)		7.233E-01	7.175E-01	7.061E-01	6.675E-01	5.686E-01	3.242E-01	6.248E-02	4.388E-04	1.526E-06	2.396E-06
Pu-239	Pu-239	1.000E+00	8.106E-01	8.104E-01	8.102E-01	8.093E-01	8.068E-01	7.981E-01	7.420E-01	5.161E-01	0.000E+00	0.000E+00
Pu-239	U-235	1.000E+00	0.000E+00	6.853E-10	2.046E-09	6.709E-09	1.921E-08	5.466E-08	1.082E-07	5.157E-07	5.766E-08	4.585E-08
Pu-239	Pa-231	1.000E+00	0.000E+00	1.166E-13	1.046E-12	1.149E-11	1.002E-10	9.981E-10	6.233E-09	2.086E-08	1.184E-08	1.685E-08
Pu-239	At-227	1.000E+00	0.000E+00	1.094E-15	2.900E-14	1.008E-12	2.294E-11	5.093E-10	4.887E-09	2.864E-08	1.964E-08	2.797E-08
Pu-239	DSR(j)		8.106E-01	8.104E-01	8.102E-01	8.093E-01	8.068E-01	7.981E-01	7.420E-01	5.161E-01	8.914E-08	9.066E-08
Pu-240	Pu-240	1.000E+00	8.109E-01	8.107E-01	8.103E-01	8.090E-01	8.053E-01	7.923E-01	7.254E-01	4.782E-01	0.000E+00	0.000E+00
Pu-240	U-236	1.000E+00	0.000E+00	4.299E-09	1.284E-07	4.207E-07	1.204E-06	3.415E-06	8.515E-06	1.211E-04	1.454E-05	6.896E-06
Pu-240	Th-232	1.000E+00	0.000E+00	1.036E-17	9.295E-17	1.021E-15	8.904E-15	8.883E-14	8.945E-13	2.978E-12	3.481E-13	4.956E-13
Pu-240	Pa-230	1.000E+00	0.000E+00	2.639E-18	6.706E-17	2.040E-15	3.489E-14	4.970E-13	3.618E-12	1.553E-11	9.531E-13	1.358E-12
Pu-240	Th-228	1.000E+00	0.000E+00	2.088E-19	1.409E-17	9.972E-16	2.614E-14	4.380E-13	3.454E-12	1.847E-11	1.286E-13	1.391E-13
Pu-240	DSR(j)		8.109E-01	8.107E-01	8.103E-01	8.090E-01	8.053E-01	7.923E-01	7.254E-01	4.783E-01	1.454E-05	6.896E-06
Pu-241	Pu-241	1.000E+00	1.607E-02	1.531E-02	1.391E-02	9.919E-03	3.778E-03	1.289E-04	7.939E-09	1.307E-23	0.000E+00	0.000E+00
Pu-241	Am-241	1.000E+00	0.000E+00	1.353E-03	3.865E-03	1.091E-02	2.133E-02	2.502E-02	1.747E-02	4.334E-03	0.000E+00	0.000E+00
Pu-241	Np-237	1.000E+00	0.000E+00	2.102E-09	1.831E-08	1.819E-07	1.224E-06	6.478E-06	1.746E-05	1.900E-05	0.000E+00	0.000E+00
Pu-241	U-233	1.000E+00	0.000E+00	5.848E-15	1.536E-13	5.184E-12	1.093E-10	2.027E-09	1.504E-08	3.197E-07	1.957E-07	1.862E-07
Pu-241	Th-229	1.000E+00	0.000E+00	2.852E-18	2.260E-16	2.588E-14	1.716E-12	1.194E-10	3.258E-09	5.035E-08	4.825E-09	6.798E-09
Pu-241	DSR(j)		1.607E-02	1.667E-02	1.777E-02	2.083E-02	2.511E-02	2.516E-02	1.749E-02	4.353E-03	2.005E-07	1.950E-07
Pu-241	Pu-241	2.450E-05	3.938E-07	3.752E-07	3.407E-07	2.430E-07	9.257E-08	3.157E-09	1.945E-13	3.203E-28	0.000E+00	0.000E+00
Pu-241	Np-237	2.450E-05	0.000E+00	6.387E-11	1.827E-10	5.181E-10	1.031E-09	1.309E-09	1.142E-09	5.243E-10	0.000E+00	0.000E+00
Pu-241	U-233	2.450E-05	0.000E+00	2.674E-16	2.323E-15	2.290E-14	1.505E-13	7.203E-13	1.544E-12	2.456E-11	8.795E-12	8.514E-12
Pu-241	Th-229	2.450E-05	0.000E+00	1.742E-19	4.580E-18	1.550E-16	3.296E-15	6.313E-14	5.342E-13	2.675E-12	1.987E-13	2.508E-13
Pu-241	DSR(j)		3.938E-07	3.753E-07	3.409E-07	2.435E-07	9.360E-08	4.467E-09	1.144E-09	5.515E-10	8.994E-12	8.765E-12

Summary: RESRAD PAWLING-AVERAGE NES DATA & LOWER KD VALUES

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Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction	t = 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	3.000E+03	1.000E+04
Pu-242	Pu-242	1.000E+00	7.686E-01	7.686E-01	7.686E-01	7.677E-01	7.657E-01	7.589E-01	7.091E-01	5.018E-01	0.000E+00	0.000E+00
Pu-242	U-238	1.000E+00	0.000E+00	3.458E-11	1.033E-10	3.386E-10	9.698E-10	2.767E-09	5.405E-09	6.767E-08	9.659E-09	9.206E-09
Pu-242	U-234	1.000E+00	0.000E+00	7.396E-17	3.037E-16	3.303E-15	2.795E-14	2.514E-13	1.235E-12	1.394E-10	2.035E-11	2.733E-11
Pu-242	Th-230	1.000E+00	0.000E+00	1.861E-22	5.301E-21	1.822E-19	4.698E-18	1.485E-16	2.583E-15	1.135E-14	1.889E-14	3.167E-14
Pu-242	Ra-226	1.000E+00	0.000E+00	9.736E-25	8.014E-23	9.762E-21	7.601E-19	8.193E-17	4.477E-15	2.126E-13	2.315E-13	4.405E-13
Pu-242	Pb-210	1.000E+00	0.000E+00	0.000E+00	6.238E-25	2.494E-22	5.318E-20	1.449E-17	1.280E-15	5.601E-13	2.229E-12	4.250E-12
Pu-242	DSR(j)		7.686E-01	7.686E-01	7.686E-01	7.677E-01	7.657E-01	7.589E-01	7.091E-01	5.018E-01	9.682E-09	9.238E-09

Branch Fraction is the cumulative factor for the j'th principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
The DSR includes contributions from associated (half-life < 0.5 yr) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 30 mrem/yr

Nuclide (i)	t = 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	3.000E+03	1.000E+04
Am-241	2.462E+01	3.468E+01	3.479E+01	3.519E+01	3.636E+01	4.076E+01	5.888E+01	2.366E+02	4.828E+06	5.022E+06
Cs-137	9.000E+00	9.313E+00	9.654E+00	1.137E+01	1.815E+01	9.328E+01	1.007E+04	1.343E+11	*8.652E+13	*8.652E+13
Pu-238	4.148E+01	4.181E+01	4.249E+01	4.494E+01	5.277E+01	9.254E+01	4.802E+02	6.837E+04	1.966E+07	1.252E+07
Pu-239	3.701E+01	3.702E+01	3.703E+01	3.707E+01	3.718E+01	3.759E+01	4.043E+01	5.813E+01	3.365E+08	3.309E+08
Pu-240	3.700E+01	3.700E+01	3.702E+01	3.708E+01	3.725E+01	3.786E+01	4.136E+01	6.272E+01	2.064E+06	4.350E+06
Pu-241	1.867E+01	1.800E+01	1.688E+01	1.440E+01	1.195E+01	1.193E+01	1.715E+01	6.892E+01	1.496E+08	1.538E+08
Pu-242	3.903E+01	3.904E+01	3.905E+01	3.908E+01	3.918E+01	3.953E+01	4.231E+01	5.979E+01	3.098E+09	3.247E+09

1M specific activity limit

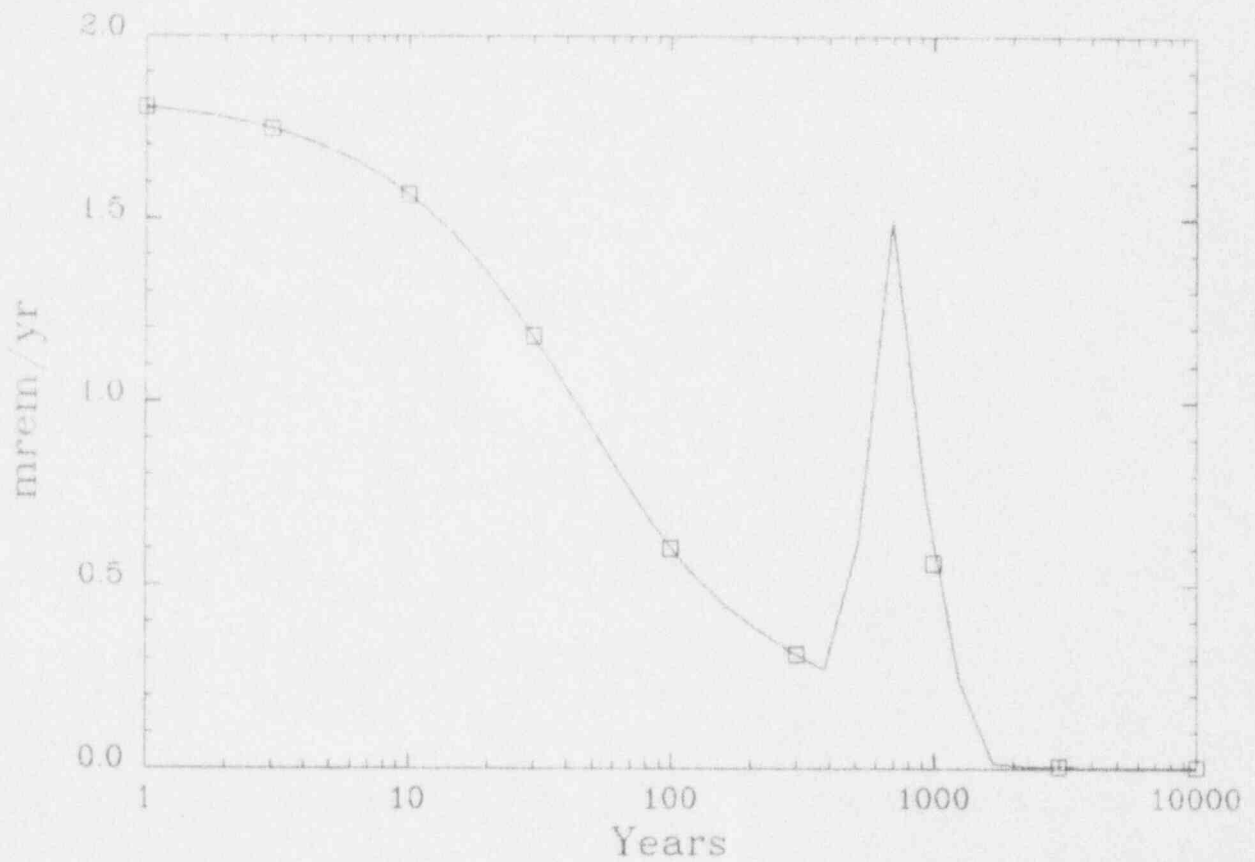
Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 0.000E+00 years

Nuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
Am-241	0.640E-01	0.000E+00	8.666E-01	3.462E+01	8.666E-01	3.462E+01
Cs-137	0.270E-01	0.000E+00	3.333E+00	9.000E+00	3.333E+00	9.000E+00
Pu-238	2.900E-09	0.000E+00	7.233E-01	4.148E+01	7.233E-01	4.148E+01
Pu-239	2.293E+00	0.000E+00	8.106E-01	3.701E+01	8.106E-01	3.701E+01
Pu-240	3.190E-01	0.000E+00	8.109E-01	3.700E+01	8.109E-01	3.700E+01
Pu-241	3.100E-02	55.94 g 0.06	2.623E-02	1.144E+03	1.607E-02	1.867E+03
Pu-242	3.000E-03	0.000E+00	7.686E-01	3.903E+01	7.686E-01	3.903E+01

APPENDIX C

Figure C-1

TOTAL DOSE: All Isotopes and Pathways Summed



B:PAWLIN OR3

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Figure C-2

DOSE: All Isotopes Summed
Water Independent Pathways

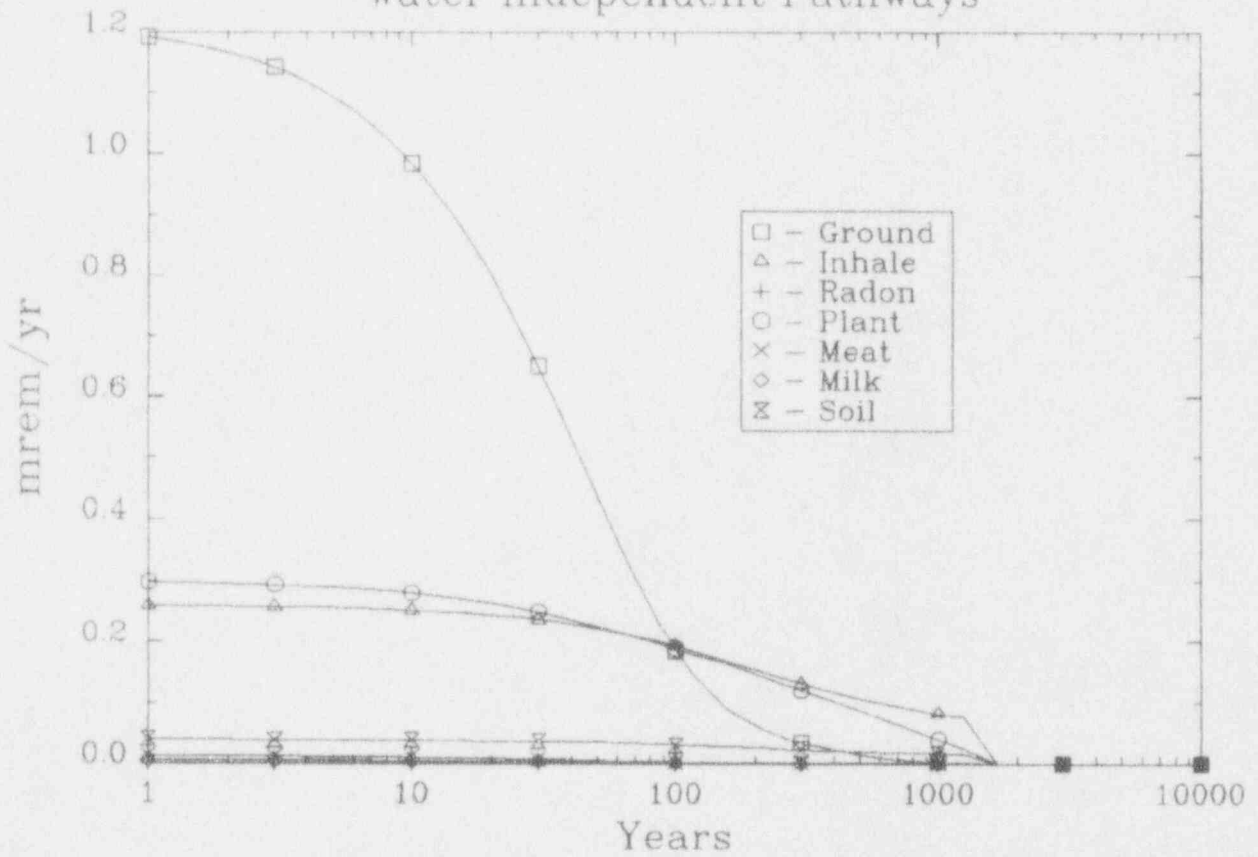
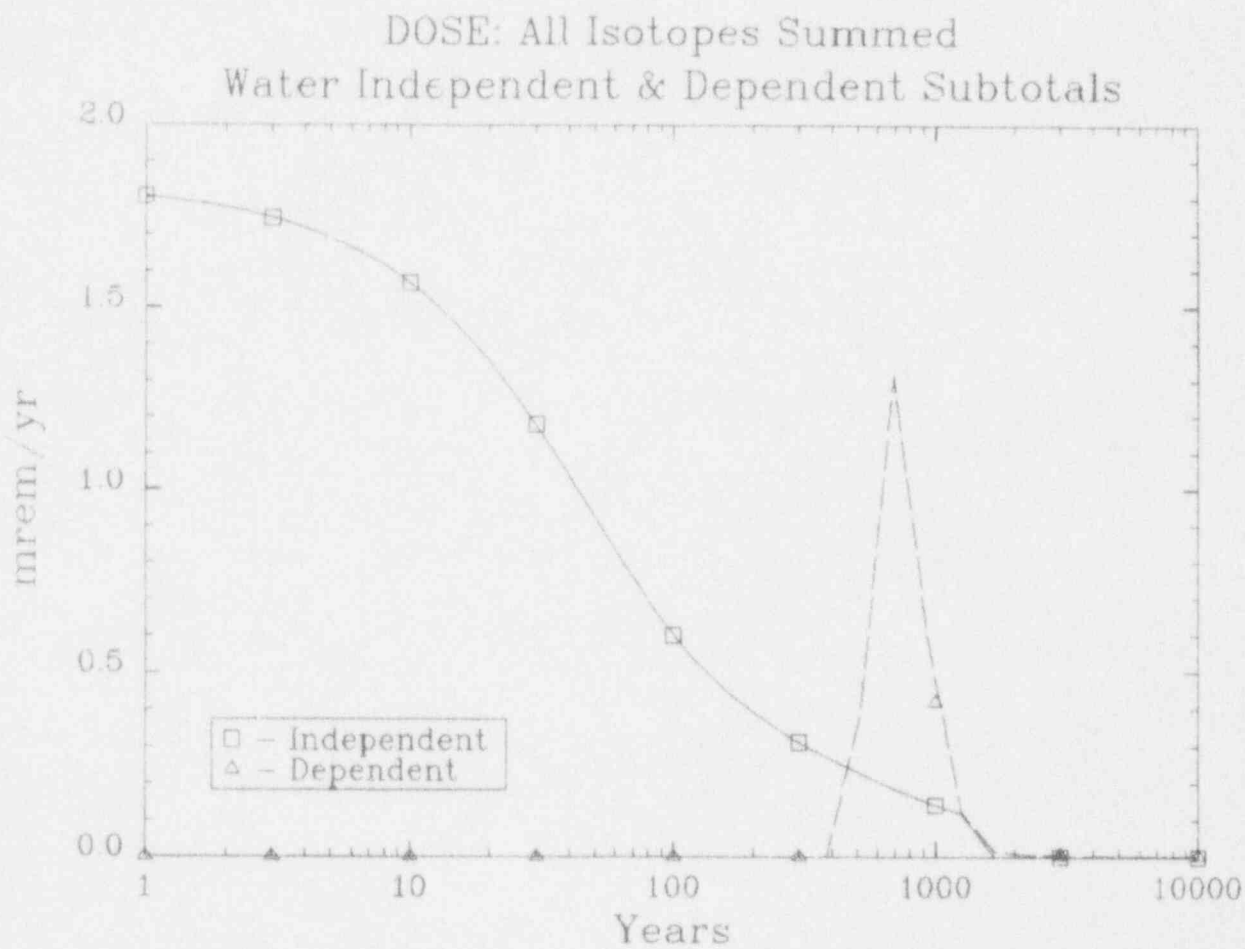


Figure C-3



B:PAWLIN OR3

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Time = 3.000E+00	21
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Dose Conversion Factor (and Related) Parameter Summary

Menu	Parameter	Current Value	Default	Parameter Name
A-1	Ground external gamma, volume DCF's, (mrem/yr)/(pCi/cm**3):			
A-1	Ac-227+D , soil density = 1.0 g/cm**3	2.760E+00	2.760E+00	DCF1(1,1)
A-1	Ac-227+D , soil density = 1.8 g/cm**3	1.520E+00	1.520E+00	DCF1(1,2)
A-1				
A-1	Am-241 , soil density = 1.0 g/cm**3	4.790E-02	4.790E-02	DCF1(2,1)
A-1	Am-241 , soil density = 1.8 g/cm**3	2.580E-02	2.580E-02	DCF1(2,2)
A-1				
A-1	Cs-137+D , soil density = 1.0 g/cm**3	5.030E+00	5.030E+00	DCF1(3,1)
A-1	Cs-137+D , soil density = 1.8 g/cm**3	2.770E+00	2.770E+00	DCF1(3,2)
A-1				
A-1	Np-237+D , soil density = 1.0 g/cm**3	1.610E+00	1.610E+00	DCF1(4,1)
A-1	Np-237+D , soil density = 1.8 g/cm**3	8.900E-01	8.900E-01	DCF1(4,2)
A-1				
A-1	Pa-231 , soil density = 1.0 g/cm**3	2.210E-01	2.210E-01	DCF1(5,1)
A-1	Pa-231 , soil density = 1.8 g/cm**3	1.210E-01	1.210E-01	DCF1(5,2)
A-1				
A-1	Pb-210+D , soil density = 1.0 g/cm**3	4.870E-03	4.870E-03	DCF1(6,1)
A-1	Pb-210+D , soil density = 1.8 g/cm**3	2.310E-03	2.310E-03	DCF1(6,2)
A-1				
A-1	Pu-238 , soil density = 1.0 g/cm**3	1.560E-03	1.560E-03	DCF1(7,1)
A-1	Pu-238 , soil density = 1.8 g/cm**3	6.650E-04	6.650E-04	DCF1(7,2)
A-1				
A-1	Pu-239 , soil density = 1.0 g/cm**3	8.140E-04	8.140E-04	DCF1(8,1)
A-1	Pu-239 , soil density = 1.8 g/cm**3	3.760E-04	3.760E-04	DCF1(8,2)
A-1				
A-1	Pu-240 , soil density = 1.0 g/cm**3	1.480E-03	1.480E-03	DCF1(9,1)
A-1	Pu-240 , soil density = 1.8 g/cm**3	6.350E-04	6.350E-04	DCF1(9,2)
A-1				
A-1	Pu-241+D , soil density = 1.0 g/cm**3	1.880E-05	1.880E-05	DCF1(10,1)
A-1	Pu-241+D , soil density = 1.8 g/cm**3	1.050E-05	1.050E-05	DCF1(10,2)
A-1				
A-1	Pu-242 , soil density = 1.0 g/cm**3	1.240E-03	1.240E-03	DCF1(12,1)
A-1	Pu-242 , soil density = 1.8 g/cm**3	5.290E-04	5.290E-04	DCF1(12,2)
A-1				
A-1	Ra-226+D , soil density = 1.0 g/cm**3	1.550E+01	1.550E+01	DCF1(13,1)
A-1	Ra-226+D , soil density = 1.8 g/cm**3	8.560E+00	8.560E+00	DCF1(13,2)
A-1				
A-1	Ra-228+D , soil density = 1.0 g/cm**3	8.180E+00	8.180E+00	DCF1(14,1)
A-1	Ra-228+D , soil density = 1.8 g/cm**3	4.510E+00	4.510E+00	DCF1(14,2)
A-1				
A-1	Th-228+D , soil density = 1.0 g/cm**3	1.330E+01	1.330E+01	DCF1(15,1)
A-1	Th-228+D , soil density = 1.8 g/cm**3	7.360E+00	7.360E+00	DCF1(15,2)
A-1				
A-1	Th-229+D , soil density = 1.0 g/cm**3	2.200E+00	2.200E+00	DCF1(16,1)
A-1	Th-229+D , soil density = 1.8 g/cm**3	1.210E+00	1.210E+00	DCF1(16,2)
A-1				
A-1	Th-230 , soil density = 1.0 g/cm**3	2.110E-03	2.110E-03	DCF1(17,1)
A-1	Th-230 , soil density = 1.8 g/cm**3	1.030E-03	1.030E-03	DCF1(17,2)
A-1				
A-1	Th-232 , soil density = 1.0 g/cm**3	1.350E-03	1.350E-03	DCF1(18,1)
A-1	Th-232 , soil density = 1.8 g/cm**3	6.040E-04	6.040E-04	DCF1(18,2)

Dose Conversion Factor (and Related) Parameter Summary (continued)

Menu	Parameter	Current Value	Default	Parameter Name
A-1	U-233 , soil density = 1.0 g/cm**3	1.400E-03	1.400E-03	DCF1(19,1)
A-1	U-233 , soil density = 1.8 g/cm**3	7.120E-04	7.120E-04	DCF1(19,2)
A-1				
A-1	U-234 , soil density = 1.0 g/cm**3	1.580E-03	1.580E-03	DCF1(20,1)
A-1	U-234 , soil density = 1.8 g/cm**3	6.970E-04	6.970E-04	DCF1(20,2)
A-1				
A-1	U-235+D , soil density = 1.0 g/cm**3	8.940E-01	8.940E-01	DCF1(21,1)
A-1	U-235+D , soil density = 1.8 g/cm**3	4.900E-01	4.900E-01	DCF1(21,2)
A-1				
A-1	U-236 , soil density = 1.0 g/cm**3	1.350E-03	1.350E-03	DCF1(22,1)
A-1	U-236 , soil density = 1.8 g/cm**3	5.800E-04	5.800E-04	DCF1(22,2)
A-1				
A-1	U-238+D , soil density = 1.0 g/cm**3	1.270E-01	1.270E-01	DCF1(23,1)
A-1	U-238+D , soil density = 1.8 g/cm**3	6.970E-02	6.970E-02	DCF1(23,2)
A-3	Depth factors, ground external gamma dimensionless:			
A-3	Ac-227+D , soil density = 1.0 g/cm**3, thickness = .15 m	7.900E-01	7.900E-01	FD(1,1,1)
A-3	Ac-227+D , soil density = 1.0 g/cm**3, thickness = 0.5 m	9.700E-01	9.700E-01	FD(1,2,1)
A-3	Ac-227+D , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(1,3,1)
A-3	Ac-227+D , soil density = 1.8 g/cm**3, thickness = .15 m	9.100E-01	9.100E-01	FD(1,1,2)
A-3	Ac-227+D , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(1,2,2)
A-3	Ac-227+D , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(1,3,2)
A-3				
A-3	Am-241 , soil density = 1.0 g/cm**3, thickness = .15 m	9.400E-01	9.400E-01	FD(2,1,1)
A-3	Am-241 , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(2,2,1)
A-3	Am-241 , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(2,3,1)
A-3	Am-241 , soil density = 1.8 g/cm**3, thickness = .15 m	1.000E+00	1.000E+00	FD(2,1,2)
A-3	Am-241 , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(2,2,2)
A-3	Am-241 , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(2,3,2)
A-3				
A-3	Cs-137+D , soil density = 1.0 g/cm**3, thickness = .15 m	7.200E-01	7.200E-01	FD(3,1,1)
A-3	Cs-137+D , soil density = 1.0 g/cm**3, thickness = 0.5 m	9.800E-01	9.800E-01	FD(3,2,1)
A-3	Cs-137+D , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(3,3,1)
A-3	Cs-137+D , soil density = 1.8 g/cm**3, thickness = .15 m	9.100E-01	9.100E-01	FD(3,1,2)
A-3	Cs-137+D , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(3,2,2)
A-3	Cs-137+D , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(3,3,2)
A-3				
A-3	Np-237+D , soil density = 1.0 g/cm**3, thickness = .15 m	8.200E-01	8.200E-01	FD(4,1,1)
A-3	Np-237+D , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(4,2,1)
A-3	Np-237+D , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(4,3,1)
A-3	Np-237+D , soil density = 1.8 g/cm**3, thickness = .15 m	9.300E-01	9.300E-01	FD(4,1,2)
A-3	Np-237+D , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(4,2,2)
A-3	Np-237+D , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(4,3,2)
A-3				
A-3	Pa-231 , soil density = 1.0 g/cm**3, thickness = .15 m	7.900E-01	7.900E-01	FD(5,1,1)
A-3	Pa-231 , soil density = 1.0 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(5,2,1)
A-3	Pa-231 , soil density = 1.0 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(5,3,1)
A-3	Pa-231 , soil density = 1.8 g/cm**3, thickness = .15 m	9.200E-01	9.200E-01	FD(5,1,2)
A-3	Pa-231 , soil density = 1.8 g/cm**3, thickness = 0.5 m	1.000E+00	1.000E+00	FD(5,2,2)
A-3	Pa-231 , soil density = 1.8 g/cm**3, thickness = 1.0 m	1.000E+00	1.000E+00	FD(5,3,2)
A-3				

Dose Conversion Factor (and Related) Parameter Summary (continued)

Menu	Parameter	Current Value	Default	Parameter Name
A-3	Pb-210D , soil density = 1.0 g/cm ³ , thickness = .15 m	8.800E-01	8.800E-01	FD(6,1,1)
A-3	Pb-210D , soil density = 1.0 g/cm ³ , thickness = 0.5 m	1.000E+00	1.000E+00	FD(6,2,1)
A-3	Pb-210D , soil density = 1.0 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(6,3,1)
A-3	Pb-210D , soil density = 1.8 g/cm ³ , thickness = .15 m	9.700E-01	9.700E-01	FD(6,1,2)
A-3	Pb-210D , soil density = 1.8 g/cm ³ , thickness = 0.5 m	1.000E+00	1.000E+00	FD(6,2,2)
A-3	Pb-210D , soil density = 1.8 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(6,3,2)
A-3				
A-3	Pu-238 , soil density = 1.0 g/cm ³ , thickness = .15 m	9.300E-01	9.300E-01	FD(7,1,1)
A-3	Pu-238 , soil density = 1.0 g/cm ³ , thickness = 0.5 m	1.000E+00	1.000E+00	FD(7,2,1)
A-3	Pu-238 , soil density = 1.0 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(7,3,1)
A-3	Pu-238 , soil density = 1.8 g/cm ³ , thickness = .15 m	1.000E+00	1.000E+00	FD(7,1,2)
A-3	Pu-238 , soil density = 1.8 g/cm ³ , thickness = 0.5 m	1.000E+00	1.000E+00	FD(7,2,2)
A-3	Pu-238 , soil density = 1.8 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(7,3,2)
A-3				
A-3	Pu-239 , soil density = 1.0 g/cm ³ , thickness = .15 m	9.200E-01	9.200E-01	FD(8,1,1)
A-3	Pu-239 , soil density = 1.0 g/cm ³ , thickness = 0.5 m	1.000E+00	1.000E+00	FD(8,2,1)
A-3	Pu-239 , soil density = 1.0 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(8,3,1)
A-3	Pu-239 , soil density = 1.8 g/cm ³ , thickness = .15 m	1.000E+00	1.000E+00	FD(8,1,2)
A-3	Pu-239 , soil density = 1.8 g/cm ³ , thickness = 0.5 m	1.000E+00	1.000E+00	FD(8,2,2)
A-3	Pu-239 , soil density = 1.8 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(8,3,2)
A-3				
A-3	Pu-240 , soil density = 1.0 g/cm ³ , thickness = .15 m	9.200E-01	9.200E-01	FD(9,1,1)
A-3	Pu-240 , soil density = 1.0 g/cm ³ , thickness = 0.5 m	1.000E+00	1.000E+00	FD(9,2,1)
A-3	Pu-240 , soil density = 1.0 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(9,3,1)
A-3	Pu-240 , soil density = 1.8 g/cm ³ , thickness = .15 m	1.000E+00	1.000E+00	FD(9,1,2)
A-3	Pu-240 , soil density = 1.8 g/cm ³ , thickness = 0.5 m	1.000E+00	1.000E+00	FD(9,2,2)
A-3	Pu-240 , soil density = 1.8 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(9,3,2)
A-3				
A-3	Pu-241D , soil density = 1.0 g/cm ³ , thickness = .15 m	9.010E-01	9.010E-01	FD(10,1,1)
A-3	Pu-241D , soil density = 1.0 g/cm ³ , thickness = 0.5 m	1.000E+00	1.000E+00	FD(10,2,1)
A-3	Pu-241D , soil density = 1.0 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(10,3,1)
A-3	Pu-241D , soil density = 1.8 g/cm ³ , thickness = .15 m	9.830E-01	9.830E-01	FD(10,1,2)
A-3	Pu-241D , soil density = 1.8 g/cm ³ , thickness = 0.5 m	1.000E+00	1.000E+00	FD(10,2,2)
A-3	Pu-241D , soil density = 1.8 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(10,3,2)
A-3				
A-3	Pu-242 , soil density = 1.0 g/cm ³ , thickness = .15 m	9.600E-01	9.600E-01	FD(12,1,1)
A-3	Pu-242 , soil density = 1.0 g/cm ³ , thickness = 0.5 m	1.000E+00	1.000E+00	FD(12,2,1)
A-3	Pu-242 , soil density = 1.0 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(12,3,1)
A-3	Pu-242 , soil density = 1.8 g/cm ³ , thickness = .15 m	1.000E+00	1.000E+00	FD(12,1,2)
A-3	Pu-242 , soil density = 1.8 g/cm ³ , thickness = 0.5 m	1.000E+00	1.000E+00	FD(12,2,2)
A-3	Pu-242 , soil density = 1.8 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(12,3,2)
A-3				
A-3	Ra-226D , soil density = 1.0 g/cm ³ , thickness = .15 m	6.300E-01	6.300E-01	FD(13,1,1)
A-3	Ra-226D , soil density = 1.0 g/cm ³ , thickness = 0.5 m	9.200E-01	9.200E-01	FD(13,2,1)
A-3	Ra-226D , soil density = 1.0 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(13,3,1)
A-3	Ra-226D , soil density = 1.8 g/cm ³ , thickness = .15 m	8.500E-01	8.500E-01	FD(13,1,2)
A-3	Ra-226D , soil density = 1.8 g/cm ³ , thickness = 0.5 m	1.000E+00	1.000E+00	FD(13,2,2)
A-3	Ra-226D , soil density = 1.8 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(13,3,2)
A-3				

Dose Conversion Factor (and Related) Parameter Summary (continued)

Menu	Parameter	Current Value	Default	Parameter Name
A-3	Ra-228+D, soil density = 1.0 g/cm ³ , thickness = .15 m	6.800E-01	6.800E-01	FD(14,1,1)
A-3	Ra-228+D, soil density = 1.0 g/cm ³ , thickness = 0.5 m	9.700E-01	9.700E-01	FD(14,2,1)
A-3	Ra-228+D, soil density = 1.0 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(14,3,1)
A-3	Ra-228+D, soil density = 1.8 g/cm ³ , thickness = .15 m	8.500E-01	8.500E-01	FD(14,1,2)
A-3	Ra-228+D, soil density = 1.8 g/cm ³ , thickness = 0.5 m	1.000E+00	1.000E+00	FD(14,2,2)
A-3	Ra-228+D, soil density = 1.8 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(14,3,2)
A-3				
A-3	Th-228+D, soil density = 1.0 g/cm ³ , thickness = .15 m	6.100E-01	6.100E-01	FD(15,1,1)
A-3	Th-228+D, soil density = 1.0 g/cm ³ , thickness = 0.5 m	9.400E-01	9.400E-01	FD(15,2,1)
A-3	Th-228+D, soil density = 1.0 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(15,3,1)
A-3	Th-228+D, soil density = 1.8 g/cm ³ , thickness = .15 m	7.500E-01	7.500E-01	FD(15,1,2)
A-3	Th-228+D, soil density = 1.8 g/cm ³ , thickness = 0.5 m	1.000E+00	1.000E+00	FD(15,2,2)
A-3	Th-228+D, soil density = 1.8 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(15,3,2)
A-3				
A-3	Th-229+D, soil density = 1.0 g/cm ³ , thickness = .15 m	6.500E-01	6.500E-01	FD(16,1,1)
A-3	Th-229+D, soil density = 1.0 g/cm ³ , thickness = 0.5 m	9.500E-01	9.500E-01	FD(16,2,1)
A-3	Th-229+D, soil density = 1.0 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(16,3,1)
A-3	Th-229+D, soil density = 1.8 g/cm ³ , thickness = .15 m	8.500E-01	8.500E-01	FD(16,1,2)
A-3	Th-229+D, soil density = 1.8 g/cm ³ , thickness = 0.5 m	9.900E-01	9.900E-01	FD(16,2,2)
A-3	Th-229+D, soil density = 1.8 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(16,3,2)
A-3				
A-3	Th-230, soil density = 1.0 g/cm ³ , thickness = .15 m	9.300E-01	9.300E-01	FD(17,1,1)
A-3	Th-230, soil density = 1.0 g/cm ³ , thickness = 0.5 m	1.000E+00	1.000E+00	FD(17,2,1)
A-3	Th-230, soil density = 1.0 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(17,3,1)
A-3	Th-230, soil density = 1.8 g/cm ³ , thickness = .15 m	1.000E+00	1.000E+00	FD(17,1,2)
A-3	Th-230, soil density = 1.8 g/cm ³ , thickness = 0.5 m	1.000E+00	1.000E+00	FD(17,2,2)
A-3	Th-230, soil density = 1.8 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(17,3,2)
A-3				
A-3	Th-232, soil density = 1.0 g/cm ³ , thickness = .15 m	9.500E-01	9.500E-01	FD(18,1,1)
A-3	Th-232, soil density = 1.0 g/cm ³ , thickness = 0.5 m	1.000E+00	1.000E+00	FD(18,2,1)
A-3	Th-232, soil density = 1.0 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(18,3,1)
A-3	Th-232, soil density = 1.8 g/cm ³ , thickness = .15 m	1.000E+00	1.000E+00	FD(18,1,2)
A-3	Th-232, soil density = 1.8 g/cm ³ , thickness = 0.5 m	1.000E+00	1.000E+00	FD(18,2,2)
A-3	Th-232, soil density = 1.8 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(18,3,2)
A-3				
A-3	U-233, soil density = 1.0 g/cm ³ , thickness = .15 m	9.600E-01	9.600E-01	FD(19,1,1)
A-3	U-233, soil density = 1.0 g/cm ³ , thickness = 0.5 m	1.000E+00	1.000E+00	FD(19,2,1)
A-3	U-233, soil density = 1.0 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(19,3,1)
A-3	U-233, soil density = 1.8 g/cm ³ , thickness = .15 m	1.000E+00	1.000E+00	FD(19,1,2)
A-3	U-233, soil density = 1.8 g/cm ³ , thickness = 0.5 m	1.000E+00	1.000E+00	FD(19,2,2)
A-3	U-233, soil density = 1.8 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(19,3,2)
A-3				
A-3	U-234, soil density = 1.0 g/cm ³ , thickness = .15 m	9.000E-01	9.000E-01	FD(20,1,1)
A-3	U-234, soil density = 1.0 g/cm ³ , thickness = 0.5 m	1.000E+00	1.000E+00	FD(20,2,1)
A-3	U-234, soil density = 1.0 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(20,3,1)
A-3	U-234, soil density = 1.8 g/cm ³ , thickness = .15 m	1.000E+00	1.000E+00	FD(20,1,2)
A-3	U-234, soil density = 1.8 g/cm ³ , thickness = 0.5 m	1.000E+00	1.000E+00	FD(20,2,2)
A-3	U-234, soil density = 1.8 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(20,3,2)
A-3				

Dose Conversion Factor (and Related) Parameter Summary (continued)

Menu	Parameter	Current Value	Default	Parameter Name
A-3	U-235+D , soil density = 1.0 g/cm ³ , thickness = .15 m	8.700E-01	8.700E-01	FD(21,1,1)
A-3	U-235+D , soil density = 1.0 g/cm ³ , thickness = 0.5 m	1.000E+00	1.000E+00	FD(21,2,1)
A-3	U-235+D , soil density = 1.0 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(21,3,1)
A-3	U-235+D , soil density = 1.8 g/cm ³ , thickness = .15 m	1.000E+00	1.000E+00	FD(21,1,2)
A-3	U-235+D , soil density = 1.8 g/cm ³ , thickness = 0.5 m	1.000E+00	1.000E+00	FD(21,2,2)
A-3	U-235+D , soil density = 1.8 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(21,3,2)
A-3				
A-3	U-236 , soil density = 1.0 g/cm ³ , thickness = .15 m	9.400E-01	9.400E-01	FD(22,1,1)
A-3	U-236 , soil density = 1.0 g/cm ³ , thickness = 0.5 m	1.000E+00	1.000E+00	FD(22,2,1)
A-3	U-236 , soil density = 1.0 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(22,3,1)
A-3	U-236 , soil density = 1.8 g/cm ³ , thickness = .15 m	1.000E+00	1.000E+00	FD(22,1,2)
A-3	U-236 , soil density = 1.8 g/cm ³ , thickness = 0.5 m	1.000E+00	1.000E+00	FD(22,2,2)
A-3	U-236 , soil density = 1.8 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(22,3,2)
A-3				
A-3	U-238+D , soil density = 1.0 g/cm ³ , thickness = .15 m	7.800E-01	7.800E-01	FD(23,1,1)
A-3	U-238+D , soil density = 1.0 g/cm ³ , thickness = 0.5 m	1.000E+00	1.000E+00	FD(23,2,1)
A-3	U-238+D , soil density = 1.0 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(23,3,1)
A-3	U-238+D , soil density = 1.8 g/cm ³ , thickness = .15 m	8.800E-01	8.800E-01	FD(23,1,2)
A-3	U-238+D , soil density = 1.8 g/cm ³ , thickness = 0.5 m	1.000E+00	1.000E+00	FD(23,2,2)
A-3	U-238+D , soil density = 1.8 g/cm ³ , thickness = 1.0 m	1.000E+00	1.000E+00	FD(23,3,2)
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	6.700E+00	6.700E+00	DCF2(1)
B-1	Am-241	5.200E-01	5.200E-01	DCF2(2)
B-1	Cs-137+D	3.200E-05	3.200E-05	DCF2(3)
B-1	Np-237+D	4.900E-01	4.900E-01	DCF2(4)
B-1	Pa-231	1.300E+00	1.300E+00	DCF2(5)
B-1	Pb-210+D	2.100E-02	2.100E-02	DCF2(6)
B-1	Pu-238	4.600E-01	4.600E-01	DCF2(7)
B-1	Pu-239	5.100E-01	5.100E-01	DCF2(8)
B-1	Pu-240	5.100E-01	5.100E-01	DCF2(9)
B-1	Pu-241+D	1.000E-02	1.000E-02	DCF2(10)
B-1	Pu-242	4.800E-01	4.800E-01	DCF2(12)
B-1	Ra-226+D	7.900E-03	7.900E-03	DCF2(13)
B-1	Ra-228+D	4.500E-03	4.500E-03	DCF2(14)
B-1	Th-228+D	3.100E-01	3.100E-01	DCF2(15)
B-1	Th-229+D	2.000E+00	2.000E+00	DCF2(16)
B-1	Th-230	3.200E-01	3.200E-01	DCF2(17)
B-1	Th-232	1.600E+00	1.600E+00	DCF2(18)
B-1	U-233	1.300E-01	1.300E-01	DCF2(19)
B-1	U-234	1.300E-01	1.300E-01	DCF2(20)
B-1	U-235+D	1.200E-01	1.200E-01	DCF2(21)
B-1	U-236	1.200E-01	1.200E-01	DCF2(22)
B-1	U-238+D	1.200E-01	1.200E-01	DCF2(23)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.500E-02	1.500E-02	DCF3(1)
D-1	Am-241	4.500E-03	4.500E-03	DCF3(2)
D-1	Cs-137+D	5.000E-05	5.000E-05	DCF3(3)
D-1	Np-237+D	3.900E-03	3.900E-03	DCF3(4)
D-1	Pa-231	1.100E-02	1.100E-02	DCF3(5)

Dose Conversion Factor (and Related) Parameter Summary (continued)

Menu	Parameter	Current Value	Default	Parameter Name
D-1	Pb-210+D	6.700E-03	6.700E-03	DCF3(6)
D-1	Pu-238	3.800E-03	3.800E-03	DCF3(7)
D-1	Pu-239	4.300E-03	4.300E-03	DCF3(8)
D-1	Pu-240	4.300E-03	4.300E-03	DCF3(9)
D-1	Pu-241+D	8.600E-05	8.600E-05	DCF3(10)
D-1	Pu-242	4.100E-03	4.100E-03	DCF3(12)
D-1	Ra-226+D	1.100E-03	1.100E-03	DCF3(13)
D-1	Ra-228+D	1.200E-03	1.200E-03	DCF3(14)
D-1	Th-228+D	7.500E-04	7.500E-04	DCF3(15)
D-1	Th-229+D	4.300E-03	4.300E-03	DCF3(16)
D-1	Th-230	5.300E-04	5.300E-04	DCF3(17)
D-1	Th-232	2.800E-03	2.800E-03	DCF3(18)
D-1	U-233	2.700E-04	2.700E-04	DCF3(19)
D-1	U-234	2.600E-04	2.600E-04	DCF3(20)
D-1	U-235+D	2.500E-04	2.500E-04	DCF3(21)
D-1	U-236	2.500E-04	2.500E-04	DCF3(22)
D-1	U-238+D	2.500E-04	2.500E-04	DCF3(23)
D-34	Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)
D-34				
D-34	Am-241 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(2,1)
D-34	Am-241 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-05	5.000E-05	RTF(2,2)
D-34	Am-241 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-06	2.000E-06	RTF(2,3)
D-34				
D-34	Cs-137+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(3,1)
D-34	Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.000E-02	3.000E-02	RTF(3,2)
D-34	Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	8.000E-03	8.000E-03	RTF(3,3)
D-34				
D-34	Np-237+D , plant/soil concentration ratio, dimensionless	2.000E-02	2.000E-02	RTF(4,1)
D-34	Np-237+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,2)
D-34	Np-237+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(4,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(5,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(5,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(5,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(6,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(6,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(6,3)
D-34				
D-34	Pu-238 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(7,1)
D-34	Pu-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(7,2)
D-34	Pu-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(7,3)
D-34				
D-34	Pu-239 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(8,1)
D-34	Pu-239 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(8,2)
D-34	Pu-239 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(8,3)
D-34				

Dose Conversion Factor (and Related) Parameter Summary (continued)

Menu	Parameter	Current Value	Default	Parameter Name
D-34	Pu-240 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(9,1)
D-34	Pu-240 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(9,2)
D-34	Pu-240 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(9,3)
D-34				
D-34	Pu-241+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(10,1)
D-34	Pu-241+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(10,2)
D-34	Pu-241+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(10,3)
D-34				
D-34	Pu-242 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(12,1)
D-34	Pu-242 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(12,2)
D-34	Pu-242 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-06	1.000E-06	RTF(12,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(13,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(13,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(13,3)
D-34				
D-34	Ra-228+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(14,1)
D-34	Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(14,2)
D-34	Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(14,3)
D-34				
D-34	Th-228+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(15,1)
D-34	Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(15,2)
D-34	Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(15,3)
D-34				
D-34	Th-229+D , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(16,1)
D-34	Th-229+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(16,2)
D-34	Th-229+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(16,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(17,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(17,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(17,3)
D-34				
D-34	Th-232 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(18,1)
D-34	Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(18,2)
D-34	Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(18,3)
D-34				
D-34	U-233 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(19,1)
D-34	U-233 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(19,2)
D-34	U-233 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(19,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(20,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(20,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(20,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(21,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(21,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(21,3)
D-34				
D-34	U-236 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(22,1)
D-34	U-236 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(22,2)
D-34	U-236 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(22,3)

Dose Conversion Factor (and Related) Parameter Summary (continued)

Menu	Parameter	Current Value	Default	Parameter Name
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(23,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(23,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(23,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5	Am-241 , fish	3.000E+01	3.000E+01	BIOFAC(2,1)
D-5	Am-241 , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(2,2)
D-5	Cs-137+D , fish	2.000E+03	2.000E+03	BIOFAC(3,1)
D-5	Cs-137+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(3,2)
D-5	Np-237+D , fish	3.000E+01	3.000E+01	BIOFAC(4,1)
D-5	Np-237+D , crustacea and mollusks	4.000E+02	4.000E+02	BIOFAC(4,2)
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(5,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(5,2)
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(6,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(6,2)
D-5	Pu-238 , fish	3.000E+01	3.000E+01	BIOFAC(7,1)
D-5	Pu-238 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(7,2)
D-5	Pu-239 , fish	3.000E+01	3.000E+01	BIOFAC(8,1)
D-5	Pu-239 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(8,2)
D-5	Pu-240 , fish	3.000E+01	3.000E+01	BIOFAC(9,1)
D-5	Pu-240 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(9,2)
D-5	Pu-241+D , fish	3.000E+01	3.000E+01	BIOFAC(10,1)
D-5	Pu-241+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(10,2)
D-5	Pu-242 , fish	3.000E+01	3.000E+01	BIOFAC(12,1)
D-5	Pu-242 , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(12,2)
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(13,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(13,2)
D-5	Ra-228+D , fish	5.000E+01	5.000E+01	BIOFAC(14,1)
D-5	Ra-228+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(14,2)
D-5	Th-228+D , fish	1.000E+02	1.000E+02	BIOFAC(15,1)
D-5	Th-228+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(15,2)
D-5	Th-229+D , fish	1.000E+02	1.000E+02	BIOFAC(16,1)
D-5	Th-229+D , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(16,2)

Summary : RESRAD: PAWLING-AVERAGE ORISE DATA & LOWER KD VALUES

File : B:PAWLIN.ORG

Dose Conversion Factor (and Related) Parameter Summary (continued)

Menu	Parameter	Current Value	Default	Parameter Name
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(17,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(17,2)
D-5				
D-5	Th-232 , fish	1.000E+02	1.000E+02	BIOFAC(18,1)
D-5	Th-232 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(18,2)
D-5				
D-5	U-233 , fish	1.000E+01	1.000E+01	BIOFAC(19,1)
D-5	U-233 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(19,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(20,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(20,2)
D-5				
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(21,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(21,2)
D-5				
D-5	U-236 , fish	1.000E+01	1.000E+01	BIOFAC(22,1)
D-5	U-236 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(22,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(23,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(23,2)

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	2.000E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	1.000E+00	2.000E+00	---	THICKO
R011	Length parallel to aquifer flow (m)	4.500E+01	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	3.000E+01	3.000E+01	---	BRLO
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	3.000E+03	3.000E+03	---	T(9)
R011	Times for calculations (yr)	1.000E+04	1.000E+04	---	T(10)
R012	Initial principal radionuclide (pCi/g): Am-241	1.070E-01	0.000E+00	---	S1(2)
R012	Initial principal radionuclide (pCi/g): Cs-137	3.505E-01	0.000E+00	---	S1(3)
R012	Initial principal radionuclide (pCi/g): Pu-238	1.720E-01	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): Pu-239	2.130E-01	0.000E+00	---	S1(8)
R012	Initial principal radionuclide (pCi/g): Pu-240	2.000E-02	0.000E+00	---	S1(9)
R012	Initial principal radionuclide (pCi/g): Pu-241	5.000E-03	0.000E+00	---	S1(10)
R012	Initial principal radionuclide (pCi/g): Pu-242	4.000E-04	0.000E+00	---	S1(12)
R012	Initial principal radionuclide (pCi/g): U-235	1.000E-01	0.000E+00	---	S1(21)
R012	Initial principal radionuclide (pCi/g): U-238	8.420E-01	0.000E+00	---	S1(23)
R012	Concentration in groundwater (pCi/L): Am-241	not used	0.000E+00	---	W1(2)
R012	Concentration in groundwater (pCi/L): Cs-137	not used	0.000E+00	---	W1(3)
R012	Concentration in groundwater (pCi/L): Pu-238	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): Pu-239	not used	0.000E+00	---	W1(8)
R012	Concentration in groundwater (pCi/L): Pu-240	not used	0.000E+00	---	W1(9)
R012	Concentration in groundwater (pCi/L): Pu-241	not used	0.000E+00	---	W1(10)
R012	Concentration in groundwater (pCi/L): Pu-242	not used	0.000E+00	---	W1(12)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(21)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(23)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVERO
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	6.000E-04	1.000E-03	---	V CZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone effective porosity	2.000E-01	2.000E-01	---	EPCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	5.300E+00	5.300E+00	---	BCZ
R013	Humidity in air (g/m**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	8.540E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	1.020E+00	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	0.000E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	3.000E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	4.600E+06	1.000E+06	---	WAREA

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	Romberg failures occurred	EPS
R014	Density of saturated zone (g/cm**3)	1.500E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	4.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	2.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.000E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	5.300E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	6.000E-04	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Individual's use of groundwater (m**3/yr)	not used	2.500E+02	---	UW
R015	Number of unsaturated zone strata	1	1	---	NS
R015	Unsat. zone 1, thickness (m)	4.000E+00	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	1.500E+00	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	4.000E-01	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	2.000E-01	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	5.300E+00	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	1.000E+01	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for Am-241				
R016	Contaminated zone (cm**3/g)	1.900E+03	2.000E+01	---	DCNUCC(2)
R016	Unsat. zone 1 (cm**3/g)	1.900E+03	2.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	1.900E+03	2.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.657E-05	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(2)
R016	Distribution coefficients for Cs-137				
R016	Contaminated zone (cm**3/g)	1.700E+02	1.000E+03	---	DCNUCC(3)
R016	Unsat. zone 1 (cm**3/g)	1.700E+02	1.000E+03	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	1.700E+02	1.000E+03	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.083E-04	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(3)
R016	Distribution coefficients for Pu-238				
R016	Contaminated zone (cm**3/g)	5.500E+02	2.000E+03	---	DCNUCC(7)
R016	Unsat. zone 1 (cm**3/g)	5.500E+02	2.000E+03	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	5.500E+02	2.000E+03	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.263E-04	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(7)
R016	Distribution coefficients for Pu-239				
R016	Contaminated zone (cm**3/g)	5.500E+02	2.000E+03	---	DCNUCC(8)
R016	Unsat. zone 1 (cm**3/g)	5.500E+02	2.000E+03	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	5.500E+02	2.000E+03	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.263E-04	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(8)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for Pu-240				
R016	Contaminated zone (cm**3/g)	5.500E+02	2.000E+03	---	DCNUCC(9)
R016	Unsaturated zone 1 (cm**3/g)	5.500E+02	2.000E+03	---	DCNUCU(9,1)
R016	Saturated zone (cm**3/g)	5.500E+02	2.000E+03	---	DCNUCS(9)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.263E-04	ALEACH(9)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(9)
R016	Distribution coefficients for Pu-241				
R016	Contaminated zone (cm**3/g)	5.500E+02	2.000E+03	---	DCNUCC(10)
R016	Unsaturated zone 1 (cm**3/g)	5.500E+02	2.000E+03	---	DCNUCU(10,1)
R016	Saturated zone (cm**3/g)	5.500E+02	2.000E+03	---	DCNUCS(10)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.263E-04	ALEACH(10)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(10)
R016	Distribution coefficients for Pu-242				
R016	Contaminated zone (cm**3/g)	5.500E+02	2.000E+03	---	DCNUCC(12)
R016	Unsaturated zone 1 (cm**3/g)	5.500E+02	2.000E+03	---	DCNUCU(12,1)
R016	Saturated zone (cm**3/g)	5.500E+02	2.000E+03	---	DCNUCS(12)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.263E-04	ALEACH(12)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(12)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCC(21)
R016	Unsaturated zone 1 (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCU(21,1)
R016	Saturated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCS(21)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.575E-03	ALEACH(21)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(21)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCC(23)
R016	Unsaturated zone 1 (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCU(23,1)
R016	Saturated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCS(23)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.575E-03	ALEACH(23)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(23)
R016	Distribution coefficients for daughter Ac-227				
R016	Contaminated zone (cm**3/g)	4.500E+02	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	4.500E+02	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	4.500E+02	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.544E-04	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(1)
R016	Distribution coefficients for daughter Np-237				
R016	Contaminated zone (cm**3/g)	-1.000E+00	-1.000E+00	2.036E+02	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	-1.000E+00	-1.000E+00	2.036E+02	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	-1.000E+00	-1.000E+00	2.036E+02	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	3.411E-04	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(4)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Pa-231				
R016	Contaminated zone (cm**3/g)	5.500E+02	5.000E+01	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	5.500E+02	5.000E+01	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	5.500E+02	5.000E+01	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.263E-04	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(5)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	2.700E+02	1.000E+02	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	2.700E+02	1.000E+02	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	2.700E+02	1.000E+02	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.572E-04	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(6)
R016	Distribution coefficients for daughter Ra-226				
R016	Contaminated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCC(13)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCU(13,1)
R016	Saturated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCS(13)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.389E-04	ALEACH(13)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(13)
R016	Distribution coefficients for daughter Ra-228				
R016	Contaminated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCC(14)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCU(14,1)
R016	Saturated zone (cm**3/g)	5.000E+02	7.000E+01	---	DCNUCS(14)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	1.389E-04	ALEACH(14)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(14)
R016	Distribution coefficients for daughter Th-228				
R016	Contaminated zone (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCC(15)
R016	Unsaturated zone 1 (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCU(15,1)
R016	Saturated zone (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCS(15)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.172E-05	ALEACH(15)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(15)
R016	Distribution coefficients for daughter Th-229				
R016	Contaminated zone (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCC(16)
R016	Unsaturated zone 1 (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCU(16,1)
R016	Saturated zone (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCS(16)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.172E-05	ALEACH(16)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(16)
R016	Distribution coefficients for daughter Th-230				
R016	Contaminated zone (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCC(17)
R016	Unsaturated zone 1 (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCU(17,1)
R016	Saturated zone (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCS(17)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.172E-05	ALEACH(17)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(17)

Summary : RESRAD: PAWLING-AVERAGE DRISE DATA & LOWER KD VALUES

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Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Th-232				
R016	Contaminated zone (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCC(18)
R016	Unsaturated zone 1 (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCU(18,1)
R016	Saturated zone (cm**3/g)	3.200E+03	6.000E+04	---	DCNUCS(18)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.172E-05	ALEACH(18)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(18)
R016	Distribution coefficients for daughter U-233				
R016	Contaminated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCC(19)
R016	Unsaturated zone 1 (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCU(19,1)
R016	Saturated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCS(19)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.575E-03	ALEACH(19)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(19)
R016	Distribution coefficients for daughter U-234				
R016	Contaminated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCC(20)
R016	Unsaturated zone 1 (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCU(20,1)
R016	Saturated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCS(20)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.575E-03	ALEACH(20)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(20)
R016	Distribution coefficients for daughter U-236				
R016	Contaminated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCC(22)
R016	Unsaturated zone 1 (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCU(22,1)
R016	Saturated zone (cm**3/g)	1.500E+01	5.000E+01	---	DCNUCS(22)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.575E-03	ALEACH(22)
R016	Solubility constant	0.000E+00	0.000E+00	---	SOLUBK(22)
R017	Inhalation rate (m**3/yr)	8.400E+03	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	2.000E-04	2.000E-04	---	MLINH
R017	Dilution length for airborne dust, inhalation (m)	3.000E+00	3.000E+00	---	LM
R017	Exposure duration	3.000E+01	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	5.000E-01	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	2.500E-01	2.500E-01	---	FOTD
R017	Shape factor, external gamma	1.000E+00	1.000E+00	---	FS1

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R017	Fractions of annular areas within AREA:				
R017	Outer annular radius (m) = ((1/c)	not used	1.000E+00	---	FRACA(1)
R017	Outer annular radius (m) = ((10/c)	not used	1.000E+00	---	FRACA(2)
R017	Outer annular radius (m) = ((20/c)	not used	1.000E+00	---	FRACA(3)
R017	Outer annular radius (m) = ((50/c)	not used	1.000E+00	---	FRACA(4)
R017	Outer annular radius (m) = ((100/c)	not used	1.000E+00	---	FRACA(5)
R017	Outer annular radius (m) = ((200/c)	not used	1.000E+00	---	FRACA(6)
R017	Outer annular radius (m) = ((500/c)	not used	1.000E+00	---	FRACA(7)
R017	Outer annular radius (m) = ((1000/c)	not used	1.000E+00	---	FRACA(8)
R017	Outer annular radius (m) = ((5000/c)	not used	1.000E+00	---	FRACA(9)
R017	Outer annular radius (m) = ((1.E+04/c)	not used	1.000E+00	---	FRACA(10)
R017	Outer annular radius (m) = ((1.E+05/c)	not used	0.000E+00	---	FRACA(11)
R017	Outer annular radius (m) = ((1.E+06/c)	not used	0.000E+00	---	FRACA(12)
R018	Fruits, vegetables and grain consumption (kg/yr)	1.600E+02	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	1.400E+01	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	9.200E+01	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	6.300E+01	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	5.400E+00	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	9.000E-01	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	3.650E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	7.300E+02	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	1.000E+00	1.000E+00	---	FDW
R018	Contamination fraction of household water	1.000E+00	1.000E+00	---	FHW
R018	Contamination fraction of livestock water	1.000E+00	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	1.000E+00	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	5.000E-01	5.000E-01	---	FR9
R018	Contamination fraction of plant food	-1	-1	0.500E+00	FPLANT
R018	Contamination fraction of meat	-1	-1	0.100E+00	FMEAT
R018	Contamination fraction of milk	-1	-1	0.100E+00	FMILK
R019	Livestock fodder intake for meat (kg/day)	6.800E+01	6.800E+01	---	LFIS
R019	Livestock fodder intake for milk (kg/day)	5.500E+01	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	5.000E+01	5.000E+01	---	LWIS
R019	Livestock water intake for milk (L/day)	1.600E+02	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	5.000E-01	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	1.000E-04	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	9.000E-01	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWOW
R019	Household water fraction from ground water	1.000E+00	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	1.000E+00	1.000E+00	---	FGWIR
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REYSM
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
R021	Thickness of building foundation (m)	1.500E-01	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	2.400E+00	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	1.000E-01	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH20CV
R021	Volumetric water content of the foundation	3.000E-02	3.000E-02	---	PH20FL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	3.000E-07	3.000E-07	---	DIFFL
R021	in contaminated zone soil	2.000E-06	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	2.000E+00	2.000E+00	---	HMIX
R021	Average annual wind speed (m/sec)	2.000E+00	2.000E+00	---	WIND
R021	Average building air exchange rate (1/hr)	5.000E-01	5.000E-01	---	REXG
R021	Height of the building (room) (m)	2.500E+00	2.500E+00	---	HRM
R021	Building interior area factor	0.000E+00	0.000E+00	code computed (time dependent)	FAI
R021	Building depth below ground surface (m)	1.000E+00	1.000E+00	---	DNFL
R021	Emanating power of Rn-222 gas	2.500E-01	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	1.500E-01	1.500E-01	---	EMANA(2)

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	active
4 -- meat ingestion	active
5 -- milk ingestion	active
6 -- aquatic foods	active
7 -- drinking water	active
8 -- soil ingestion	active
9 -- radon	active

Summary : RESRAD: PAWLING-AVERAGE DRISE DATA & LOWER KD VALUES

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Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	2050.00 square meters	Am-241	1.070E-01
Thickness:	1.00 meters	Cs-137	3.505E-01
Cover Depth:	0.00 meters	Pu-238	1.720E-01
		Pu-239	2.130E-01
		Pu-240	2.000E-02
		Pu-241	5.000E-03
		Pu-242	4.000E-04
		U-235	1.000E-01
		U-238	8.420E-01

Total Dose TD0SE(t), mrem/yr

Basic Radiation Dose Limit = 30 mrem/yr

Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	3.000E+03	1.000E+04
TD0SE(t):	1.833E+00	1.803E+00	1.747E+00	1.566E+00	1.179E+00	5.998E-01	3.100E-01	5.595E-01	3.635E-03	3.178E-03
M(t):	6.109E-02	6.011E-02	5.822E-02	5.221E-02	3.932E-02	1.999E-02	1.033E-02	1.865E-02	1.212E-04	1.059E-04

Maximum TD0SE(t): 1.833E+00 mrem/yr at t = 0.000E+00 years

Summary : RESRAD: PAWLING-AVERAGE DRISE DATA & LOWER KD VALUES

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As $\mu\text{rem}/\text{yr}$ and Fraction of Total Dose At $t = 0.000\text{E}+00$ years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.
Am-241	3.133E-03	0.0017	3.942E-02	0.0215	0.000E+00	0.0000	4.217E-02	0.0230	8.643E-05	0.0000	4.930E-06	0.0000	7.909E-03	0.0043
Cs-137	1.093E+00	0.5964	7.946E-06	0.0000	0.000E+00	0.0000	6.100E-02	0.0333	1.067E-02	0.0058	3.484E-03	0.0019	2.878E-04	0.0002
Pu-238	1.417E-04	0.0001	5.605E-02	0.0306	0.000E+00	0.0000	5.724E-02	0.0312	2.346E-04	0.0001	3.346E-06	0.0000	1.074E-02	0.0059
Pu-239	9.629E-05	0.0001	7.696E-02	0.0420	0.000E+00	0.0000	8.022E-02	0.0438	3.288E-04	0.0002	4.689E-06	0.0000	1.504E-02	0.0082
Pu-240	1.570E-05	0.0000	7.226E-03	0.0039	0.000E+00	0.0000	7.532E-03	0.0041	3.087E-05	0.0000	4.403E-07	0.0000	1.413E-03	0.0008
Pu-241	5.878E-08	0.0000	3.542E-05	0.0000	0.000E+00	0.0000	3.766E-05	0.0000	1.544E-07	0.0000	2.201E-09	0.0000	7.063E-06	0.0000
Pu-242	2.621E-07	0.0000	1.360E-04	0.0001	0.000E+00	0.0000	1.436E-04	0.0001	5.887E-07	0.0000	8.396E-09	0.0000	2.694E-05	0.0000
U-235	5.525E-02	0.0302	8.502E-03	0.0046	0.000E+00	0.0000	5.452E-03	0.0030	3.598E-05	0.0000	8.818E-05	0.0000	4.106E-04	0.0002
U-238	6.615E-02	0.0361	7.158E-02	0.0371	0.000E+00	0.0000	4.591E-02	0.0250	3.029E-04	0.0002	7.425E-04	0.0004	3.457E-03	0.0019
===== Total	1.218E+00	0.6644	2.599E-01	0.1418	0.000E+00	0.0000	2.997E-01	0.1635	1.169E-02	0.0064	4.329E-03	0.0024	3.929E-02	0.0214

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As $\mu\text{rem}/\text{yr}$ and Fraction of Total Dose At $t = 0.000\text{E}+00$ years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.272E-02	0.0506
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.168E+00	0.6375
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.244E-01	0.0679
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.726E-01	0.0942
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.622E-02	0.0088
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.036E-05	0.0000
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.075E-04	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.974E-02	0.0381
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.881E-01	0.1027
===== Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.833E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
 As $\mu\text{rem}/\text{yr}$ and Fraction of Total Dose At $t = 1.000\text{E}+00$ years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.
Am-241	3.128E-03	0.0017	3.936E-02	0.0218	0.000E+00	0.0000	4.210E-02	0.0233	8.629E-05	0.0000	4.922E-06	0.0000	7.896E-03	0.0044
Cs-137	1.068E+00	0.5920	7.763E-06	0.0000	0.000E+00	0.0000	5.959E-02	0.0330	1.042E-02	0.0058	3.404E-03	0.0019	2.812E-04	0.0002
Pu-238	1.406E-04	0.0001	5.561E-02	0.0308	1.371E-16	0.0000	5.679E-02	0.0315	2.328E-04	0.0001	3.320E-06	0.0000	1.065E-02	0.0059
Pu-239	9.628E-05	0.0001	7.695E-02	0.0427	0.000E+00	0.0000	8.020E-02	0.0445	3.287E-04	0.0002	4.688E-06	0.0000	1.504E-02	0.0083
Pu-240	1.569E-05	0.0000	7.225E-03	0.0040	6.234E-23	0.0000	7.530E-03	0.0042	3.087E-05	0.0000	4.402E-07	0.0000	1.412E-03	0.0008
Pu-241	2.846E-07	0.0000	3.663E-05	0.0000	0.000E+00	0.0000	3.896E-05	0.0000	1.534E-07	0.0000	2.457E-09	0.0000	7.307E-06	0.0000
Pu-242	2.621E-07	0.0000	1.360E-04	0.0001	1.213E-29	0.0000	1.436E-04	0.0001	5.887E-07	0.0000	8.395E-09	0.0000	2.693E-05	0.0000
U-235	5.500E-02	0.0305	8.465E-03	0.0047	0.000E+00	0.0000	5.447E-03	0.0030	3.668E-05	0.0000	8.778E-05	0.0000	4.091E-04	0.0002
U-238	6.584E-02	0.0365	7.126E-02	0.0395	6.719E-16	0.0000	4.570E-02	0.0253	5.015E-04	0.0002	7.391E-04	0.0004	3.442E-03	0.0019
===== Total	1.192E+00	0.6609	2.590E-01	0.1437	8.091E-16	0.0000	2.975E-01	0.1650	1.144E-02	0.0063	4.244E-03	0.0024	3.917E-02	0.0217

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
 As $\mu\text{rem}/\text{yr}$ and Fraction of Total Dose At $t = 1.000\text{E}+00$ years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.257E-02	0.0513
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.141E+00	0.6329
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.234E-01	0.0684
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.726E-01	0.0957
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.621E-02	0.0090
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.334E-05	0.0000
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.074E-04	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.945E-02	0.0385
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.873E-01	0.1039
===== Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.803E+00	1.0000

*Sum of all water independent and dependent pathways.

Summary : RESRAD: PAWLING-AVERAGE ORISE DATA & LOWER KD VALUES

File : B:PAWLIN.ORG

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	3.118E-03	0.0018	3.923E-02	0.0225	0.000E+00	0.0000	4.196E-02	0.0240	8.601E-05	0.0000	4.906E-06	0.0000	7.870E-03	0.0045
Cs-137	1.019E+00	0.5834	7.408E-06	0.0000	0.000E+00	0.0000	5.686E-02	0.0326	9.948E-03	0.0057	3.248E-03	0.0019	2.683E-04	0.0002
Pu-238	1.384E-04	0.0001	5.472E-02	0.0313	3.676E-15	0.0000	5.588E-02	0.0320	2.291E-04	0.0001	3.268E-06	0.0000	1.048E-02	0.0060
Pu-239	9.625E-05	0.0001	7.693E-02	0.0440	0.000E+00	0.0000	8.018E-02	0.0459	3.286E-04	0.0002	4.687E-06	0.0000	1.504E-02	0.0086
Pu-240	1.569E-05	0.0000	7.221E-03	0.0041	4.207E-21	0.0000	7.527E-03	0.0043	3.085E-05	0.0000	4.400E-07	0.0000	1.412E-03	0.0008
Pu-241	7.038E-07	0.0000	3.886E-05	0.0000	0.000E+00	0.0000	4.137E-05	0.0000	1.516E-07	0.0000	2.932E-09	0.0000	7.759E-06	0.0000
Pu-242	2.620E-07	0.0000	1.360E-04	0.0001	9.984E-28	0.0000	1.436E-04	0.0001	5.885E-07	0.0000	8.393E-09	0.0000	2.693E-05	0.0000
U-235	5.450E-02	0.0312	8.393E-03	0.0048	0.000E+00	0.0000	5.439E-03	0.0031	3.806E-05	0.0000	8.698E-05	0.0000	4.062E-04	0.0002
U-238	6.524E-02	0.0374	7.061E-02	0.0404	1.804E-14	0.0000	4.528E-02	0.0259	2.988E-04	0.0002	7.324E-04	0.0004	3.410E-03	0.0020
===== Total	1.142E+00	0.6538	2.573E-01	0.1473	2.172E-14	0.0000	2.933E-01	0.1679	1.096E-02	0.0063	4.081E-03	0.0023	3.892E-02	0.0223

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.227E-02	0.0528
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.089E+00	0.6236
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.215E-01	0.0695
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.726E-01	0.0988
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.621E-02	0.0093
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.885E-05	0.0001
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.073E-04	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.887E-02	0.0394
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.856E-01	0.1063
===== Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.747E+00	1.0000

*Sum of all water independent and dependent pathways.

Summary : RESRAD: PAWLING-AVERAGE ORISE DATA & LOWER KD VALUES

File : B-PAWLIN.ORG

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As $\mu\text{rem}/\text{yr}$ and Fraction of Total Dose At $t = 1.000\text{E}+01$ years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.
Am-241	3.083E-03	0.0020	3.878E-02	0.0248	0.000E+00	0.0000	4.149E-02	0.0265	8.504E-05	0.0001	4.850E-06	0.0000	7.780E-03	0.0050
Cs-137	8.650E-01	0.5522	6.289E-06	0.0000	0.000E+00	0.0000	4.828E-02	0.0308	8.446E-03	0.0054	2.758E-03	0.0018	2.278E-04	0.0001
Pu-238	1.308E-04	0.0001	5.173E-02	0.0330	1.328E-13	0.0000	5.283E-02	0.0337	2.165E-04	0.0001	3.092E-06	0.0000	9.907E-03	0.0063
Pu-239	9.615E-05	0.0001	7.684E-02	0.0491	0.000E+00	0.0000	8.009E-02	0.0511	3.283E-04	0.0002	4.682E-06	0.0000	1.502E-02	0.0096
Pu-240	1.566E-05	0.0000	7.210E-03	0.0046	2.978E-19	0.0000	7.514E-03	0.0048	3.080E-05	0.0000	4.393E-07	0.0000	1.409E-03	0.0009
Pu-241	1.879E-06	0.0000	4.505E-05	0.0000	0.000E+00	0.0000	4.805E-05	0.0000	1.461E-07	0.0000	4.258E-09	0.0000	9.010E-06	0.0000
Pu-242	2.618E-07	0.0000	1.359E-04	0.0001	1.213E-25	0.0000	1.434E-04	0.0001	5.880E-07	0.0000	8.385E-09	0.0000	2.690E-05	0.0000
U-235	5.279E-02	0.0337	8.155E-03	0.0052	0.000E+00	0.0000	5.416E-03	0.0035	4.282E-05	0.0000	8.425E-05	0.0001	3.967E-04	0.0003
U-238	6.319E-02	0.0403	6.839E-02	0.0437	6.555E-13	0.0000	4.385E-02	0.0280	2.894E-04	0.0002	7.093E-04	0.0005	3.303E-03	0.0021
===== Total	9.843E-01	0.6284	2.513E-01	0.1604	7.882E-13	0.0000	2.797E-01	0.1785	9.440E-03	0.0060	3.565E-03	0.0023	3.808E-02	0.0243

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As $\mu\text{rem}/\text{yr}$ and Fraction of Total Dose At $t = 1.000\text{E}+01$ years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.122E-02	0.0582
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.247E-01	0.5904
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.148E-01	0.0733
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.724E-01	0.1101
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.618E-02	0.0103
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.041E-04	0.0001
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.071E-04	0.0002
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.689E-02	0.0427
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.797E-01	0.1147
===== Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.566E+00	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
 As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	2.984E-03	0.0025	3.753E-02	0.0318	0.000E+00	0.0000	4.016E-02	0.0340	8.233E-05	0.0001	4.694E-06	0.0000	7.530E-03	0.0064
Cs-137	5.419E-01	0.4594	3.940E-06	0.0000	0.000E+00	0.0000	3.025E-02	0.0256	5.291E-03	0.0045	1.728E-03	0.0015	1.427E-04	0.0001
Pu-238	1.114E-04	0.0001	4.406E-02	0.0374	3.336E-12	0.0000	4.499E-02	0.0381	1.844E-04	0.0002	2.641E-06	0.0000	8.438E-03	0.0072
Pu-239	9.585E-05	0.0001	7.660E-02	0.0649	0.000E+00	0.0000	7.984E-02	0.0677	3.273E-04	0.0003	4.667E-06	0.0000	1.497E-02	0.0127
Pu-240	1.559E-05	0.0000	7.176E-03	0.0061	7.807E-18	0.0000	7.480E-03	0.0063	3.066E-05	0.0000	4.374E-07	0.0000	1.403E-03	0.0012
Pu-241	3.619E-06	0.0000	5.367E-05	0.0000	0.000E+00	0.0000	5.737E-05	0.0000	1.357E-07	0.0000	6.189E-09	0.0000	1.076E-05	0.0000
Pu-242	2.611E-07	0.0000	1.355E-04	0.0001	9.387E-24	0.0000	1.431E-04	0.0001	5.865E-07	0.0000	8.364E-09	0.0000	2.683E-05	0.0000
U-235	4.821E-02	0.0409	7.568E-03	0.0064	0.000E+00	0.0000	5.389E-03	0.0046	5.559E-05	0.0000	7.694E-05	0.0001	3.739E-04	0.0003
U-238	5.766E-02	0.0489	6.241E-02	0.0529	1.675E-11	0.0000	4.002E-02	0.0339	2.641E-04	0.0002	6.473E-04	0.0005	3.014E-03	0.0026
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
Total	6.510E-01	0.5519	2.355E-01	0.1997	2.009E-11	0.0000	2.483E-01	0.2105	6.236E-03	0.0053	2.464E-03	0.0021	3.591E-02	0.0304

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
 As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.829E-02	0.0749
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.793E-01	0.4912
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.779E-02	0.0829
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.718E-01	0.1457
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.611E-02	0.0137
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.256E-04	0.0001
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.063E-04	0.0003
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.168E-02	0.0523
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.640E-01	0.1391
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.179E+00	1.0000

*Sum of all water independent and dependent pathways.

Summary : RESRAD: PAWLING-AVERAGE ORISE DATA & LOWER KD VALUES

File : B:PAWLIN.ORG

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	2.663E-03	0.0044	3.347E-02	0.0558	0.000E+00	0.0000	3.582E-02	0.0597	7.352E-05	0.0001	4.186E-06	0.0000	6.714E-03	0.0112
Cs-137	1.055E-01	0.1758	7.667E-07	0.0000	0.000E+00	0.0000	5.886E-03	0.0098	1.030E-03	0.0017	3.362E-04	0.0006	2.777E-05	0.0000
Pu-238	6.354E-05	0.0001	2.512E-02	0.0419	9.660E-11	0.0000	2.565E-02	0.0428	1.052E-04	0.0002	1.523E-06	0.0000	4.811E-03	0.0080
Pu-239	9.482E-05	0.0002	7.578E-02	0.1263	0.000E+00	0.0000	7.898E-02	0.1317	3.237E-04	0.0005	4.617E-06	0.0000	1.481E-02	0.0247
Pu-240	1.534E-05	0.0000	7.061E-03	0.0118	1.308E-16	0.0000	7.359E-03	0.0123	3.017E-05	0.0001	4.306E-07	0.0000	1.380E-03	0.0023
Pu-241	4.232E-06	0.0000	5.347E-05	0.0001	0.000E+00	0.0000	5.722E-05	0.0001	1.180E-07	0.0000	6.671E-09	0.0000	1.073E-05	0.0000
Pu-242	2.588E-07	0.0000	1.343E-04	0.0002	9.882E-22	0.0000	1.418E-04	0.0002	5.812E-07	0.0000	8.289E-09	0.0000	2.659E-05	0.0000
U-235	3.520E-02	0.0587	6.118E-03	0.0102	0.000E+00	0.0000	5.463E-03	0.0091	9.182E-05	0.0002	5.611E-05	0.0001	3.205E-04	0.0005
U-238	4.186E-02	0.0698	4.532E-02	0.0755	5.126E-10	0.0000	2.906E-02	0.0484	1.918E-04	0.0003	4.700E-04	0.0008	2.189E-03	0.0036
===== Total	1.854E-01	0.3090	1.931E-01	0.3218	6.092E-10	0.0000	1.884E-01	0.3141	1.847E-03	0.0031	8.731E-04	0.0015	3.029E-02	0.0505

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.874E-02	0.1313
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.127E-01	0.1879
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.576E-02	0.0930
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.700E-01	0.2834
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.585E-02	0.0264
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.258E-04	0.0002
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.035E-04	0.0005
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.725E-02	0.0788
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.191E-01	0.1985
===== Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.998E-01	1.0000

*Sum of all water independent and dependent pathways.

Summary : RESRAD: PAWLING-AVERAGE ORISE DATA & LOWER KD VALUES

File : 8:PAWLIN.ORG

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	1.925E-03	0.0062	2.412E-02	0.0778	0.000E+00	0.0000	2.357E-02	0.0760	5.266E-05	0.0002	2.993E-06	0.0000	4.840E-03	0.0156
Cs-137	9.818E-04	0.0032	7.139E-09	0.0000	0.000E+00	0.0000	4.993E-05	0.0002	8.868E-06	0.0000	2.904E-06	0.0000	2.586E-07	0.0000
Pu-238	1.281E-05	0.0000	5.047E-03	0.0163	1.343E-09	0.0000	4.698E-03	0.0152	2.090E-05	0.0001	3.194E-07	0.0000	9.663E-04	0.0031
Pu-239	9.194E-05	0.0003	7.346E-02	0.2370	0.000E+00	0.0000	6.981E-02	0.2252	3.105E-04	0.0010	4.437E-06	0.0000	1.436E-02	0.0463
Pu-240	1.464E-05	0.0000	6.741E-03	0.0217	1.033E-15	0.0000	6.406E-03	0.0207	2.849E-05	0.0001	4.079E-07	0.0000	1.318E-03	0.0043
Pu-241	3.087E-06	0.0000	3.870E-05	0.0001	0.000E+00	0.0000	3.781E-05	0.0001	8.443E-08	0.0000	4.801E-09	0.0000	7.765E-06	0.0000
Pu-242	2.522E-07	0.0000	1.309E-04	0.0004	5.108E-20	0.0000	1.260E-04	0.0004	5.605E-07	0.0000	8.008E-09	0.0000	2.592E-05	0.0001
U-235	1.459E-02	0.0471	3.965E-03	0.0128	0.000E+00	0.0000	5.131E-03	0.0166	1.397E-04	0.0005	2.264E-05	0.0001	2.426E-04	0.0008
U-238	1.677E-02	0.0541	1.816E-02	0.0586	8.111E-09	0.0000	1.061E-02	0.0342	7.512E-05	0.0002	1.848E-04	0.0006	8.772E-04	0.0028
Total	3.439E-02	0.1109	1.317E-01	0.4248	9.454E-09	0.0000	1.204E-01	0.3885	6.369E-04	0.0021	2.187E-04	0.0007	2.264E-02	0.0730

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.452E-02	0.1759
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.044E-03	0.0034
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.075E-02	0.0347
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.580E-01	0.5098
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.451E-02	0.0468
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.746E-05	0.0003
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.836E-04	0.0009
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.409E-02	0.0777
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.668E-02	0.1506
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.100E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
 As $\mu\text{rem}/\text{yr}$ and Fraction of Total Dose At $t = 1.000\text{E}+03$ years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.
Am-241	6.232E-04	0.0011	7.672E-03	0.0137	0.000E+00	0.0000	3.717E-03	0.0066	1.607E-05	0.0000	9.096E-07	0.0000	1.539E-03	0.0028
Cs-137	7.587E-11	0.0000	5.559E-16	0.0000	0.000E+00	0.0000	1.897E-12	0.0000	3.964E-13	0.0000	1.335E-13	0.0000	2.014E-14	0.0000
Pu-238	3.075E-07	0.0000	1.847E-05	0.0000	6.042E-09	0.0000	8.535E-06	0.0000	7.309E-08	0.0000	2.943E-09	0.0000	3.518E-06	0.0000
Pu-239	8.248E-05	0.0001	6.591E-02	0.1178	0.000E+00	0.0000	3.078E-02	0.0550	2.629E-04	0.0005	3.795E-06	0.0000	1.288E-02	0.0230
Pu-240	1.245E-05	0.0000	5.731E-03	0.0102	5.745E-15	0.0000	2.677E-03	0.0048	2.286E-05	0.0000	3.308E-07	0.0000	1.120E-03	0.0020
Pu-241	9.991E-07	0.0000	1.231E-05	0.0000	0.000E+00	0.0000	5.961E-06	0.0000	2.576E-08	0.0000	1.459E-09	0.0000	2.469E-06	0.0000
Pu-242	2.306E-07	0.0000	1.197E-04	0.0002	1.215E-18	0.0000	5.662E-05	0.0001	4.836E-07	0.0000	6.981E-09	0.0000	2.370E-05	0.0000
U-235	1.316E-03	0.0024	2.390E-03	0.0043	0.000E+00	0.0000	2.351E-03	0.0042	1.141E-04	0.0002	1.584E-07	0.0000	1.778E-04	0.0003
U-238	6.788E-04	0.0012	7.403E-04	0.0013	4.585E-08	0.0000	2.125E-04	0.0004	2.699E-06	0.0000	6.763E-06	0.0000	3.578E-05	0.0001
Total	2.715E-03	0.0049	8.259E-02	0.1476	5.189E-08	0.0000	3.981E-02	0.0712	4.193E-04	0.0007	1.339E-05	0.0000	1.579E-02	0.0282

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
 As $\mu\text{rem}/\text{yr}$ and Fraction of Total Dose At $t = 1.000\text{E}+03$ years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.
Am-241	9.681E-07	0.0000	1.359E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.417E-10	0.0000	1.168E-09	0.0000	1.357E-02	0.0243
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.832E-11	0.0000
Pu-238	4.449E-05	0.0001	6.160E-09	0.0000	4.117E-10	0.0000	0.000E+00	0.0000	6.533E-09	0.0000	5.381E-08	0.0000	7.547E-05	0.0001
Pu-239	8.437E-08	0.0000	1.255E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.342E-11	0.0000	1.004E-10	0.0000	1.099E-01	0.1965
Pu-240	2.296E-06	0.0000	3.149E-10	0.0000	1.298E-18	0.0000	0.000E+00	0.0000	3.369E-10	0.0000	2.778E-09	0.0000	9.566E-03	0.0171
Pu-241	1.389E-09	0.0000	1.957E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.033E-13	0.0000	1.675E-12	0.0000	2.177E-05	0.0000
Pu-242	2.475E-11	0.0000	3.394E-15	0.0000	3.102E-18	0.0000	0.000E+00	0.0000	3.631E-15	0.0000	2.994E-14	0.0000	2.007E-04	0.0004
U-235	4.699E-02	0.0840	8.646E-06	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.042E-06	0.0000	5.316E-05	0.0001	5.341E-02	0.0955
U-238	3.705E-01	0.6622	5.082E-05	0.0001	1.147E-07	0.0000	0.000E+00	0.0000	5.435E-05	0.0001	4.482E-04	0.0008	3.727E-01	0.6662
Total	4.175E-01	0.7463	5.947E-05	0.0001	1.151E-07	0.0000	0.000E+00	0.0000	6.340E-05	0.0001	5.014E-04	0.0009	5.595E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
 As $\mu\text{rem}/\text{yr}$ and Fraction of Total Dose At $t = 3.000\text{E}+03$ years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
===== Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
 As $\mu\text{rem}/\text{yr}$ and Fraction of Total Dose At $t = 3.000\text{E}+03$ years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.	$\mu\text{rem}/\text{yr}$	fract.
Am-241	6.638E-07	0.0002	1.086E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.577E-11	0.0000	7.843E-10	0.0000	6.648E-07	0.0002
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	2.582E-07	0.0001	5.261E-10	0.0000	3.457E-09	0.0000	0.000E+00	0.0000	9.013E-11	0.0000	1.840E-10	0.0000	2.625E-07	0.0001
Pu-239	1.896E-08	0.0000	7.374E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.263E-12	0.0000	1.503E-11	0.0000	1.899E-08	0.0000
Pu-240	2.903E-07	0.0001	3.981E-11	0.0000	2.919E-18	0.0000	0.000E+00	0.0000	4.259E-11	0.0000	3.512E-10	0.0000	2.908E-07	0.0001
Pu-241	1.001E-09	0.0000	1.643E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.444E-13	0.0000	1.182E-12	0.0000	1.003E-09	0.0000
Pu-242	3.867E-12	0.0000	5.321E-16	0.0000	1.314E-17	0.0000	0.000E+00	0.0000	5.676E-16	0.0000	4.678E-15	0.0000	3.873E-12	0.0000
U-235	3.613E-03	0.9940	3.072E-06	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	2.950E-06	0.0008	1.046E-07	0.0000	3.619E-03	0.9957
U-238	1.417E-05	0.0039	2.889E-08	0.0000	1.906E-07	0.0001	0.000E+00	0.0000	4.957E-09	0.0000	1.013E-08	0.0000	1.440E-05	0.0040
===== Total	3.628E-03	0.9982	3.102E-06	0.0009	1.941E-07	0.0001	0.000E+00	0.0000	2.955E-06	0.0008	1.161E-07	0.0000	3.635E-03	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
 As mrem/yr and Fraction of Total Dose At t = 1.000E+04 years

Water Independent Pathways (Inhalation excludes radon)

Radio- Nuclide	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-239	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-240	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-241	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-242	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
===== Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
 As mrem/yr and Fraction of Total Dose At t = 1.000E+04 years

Water Dependent Pathways

Radio- Nuclide	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
Am-241	6.383E-07	0.0002	1.119E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.138E-11	0.0000	7.460E-10	0.0000	6.392E-07	0.0002
Cs-137	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000
Pu-238	4.055E-07	0.0001	8.274E-10	0.0000	5.446E-09	0.0000	0.000E+00	0.0000	1.420E-10	0.0000	2.901E-10	0.0000	4.122E-07	0.0001
Pu-239	1.928E-08	0.0000	9.443E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	9.205E-12	0.0000	1.207E-11	0.0000	1.931E-08	0.0000
Pu-240	1.377E-07	0.0000	1.888E-11	0.0000	3.160E-18	0.0000	0.000E+00	0.0000	2.021E-11	0.0000	1.666E-10	0.0000	1.379E-07	0.0000
Pu-241	9.738E-10	0.0000	1.715E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.394E-13	0.0000	1.137E-12	0.0000	9.753E-10	0.0000
Pu-242	3.690E-12	0.0000	5.095E-16	0.0000	2.500E-17	0.0000	0.000E+00	0.0000	5.417E-16	0.0000	4.463E-15	0.0000	3.695E-12	0.0000
U-235	3.148E-03	0.9908	2.676E-06	0.0008	0.000E+00	0.0000	0.000E+00	0.0000	2.572E-06	0.0008	9.115E-08	0.0000	3.154E-03	0.9925
U-238	2.227E-05	0.0070	4.542E-08	0.0000	2.994E-07	0.0001	0.000E+00	0.0000	7.798E-09	0.0000	1.593E-08	0.0000	2.264E-05	0.0071
===== Total	3.172E-03	0.9982	2.723E-06	0.0009	3.048E-07	0.0001	0.000E+00	0.0000	2.580E-06	0.0008	1.083E-07	0.0000	3.178E-03	1.0000

*Sum of all water independent and dependent pathways.

Dose/Source Ratios Summed Over All Pathways
 Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction	DSR(j,t) (mrem/yr)/(pCi/g)									
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	3.000E+03	1.000E+04
Am-241	Am-241	1.000E+00	8.666E-01	8.652E-01	8.623E-01	8.525E-01	8.250E-01	7.357E-01	5.089E-01	1.262E-01	0.000E+00	0.000E+00
Am-241	Np-237	1.000E+00	0.000E+00	2.668E-06	7.989E-06	2.645E-05	7.779E-05	2.421E-04	5.552E-04	5.748E-04	0.000E+00	0.000E+00
Am-241	U-233	1.000E+00	0.000E+00	1.109E-11	9.931E-11	1.086E-09	9.329E-09	8.845E-08	5.011E-07	1.033E-05	6.066E-06	5.770E-06
Am-241	Th-229	1.000E+00	0.000E+00	7.192E-15	1.935E-13	7.078E-12	1.845E-10	6.055E-09	1.167E-07	1.573E-06	1.470E-07	2.041E-07
Am-241	dDSR(j)		8.666E-01	8.652E-01	8.623E-01	8.525E-01	8.251E-01	7.359E-01	5.095E-01	1.268E-01	6.213E-06	5.974E-06
Cs-137	Cs-137	1.000E+00	3.333E+00	3.256E+00	3.107E+00	2.638E+00	1.653E+00	3.216E-01	2.978E-03	2.234E-10	0.000E+00	0.000E+00
Pu-238	Pu-238	1.000E+00	7.233E-01	7.175E-01	7.061E-01	6.675E-01	5.685E-01	3.242E-01	6.246E-02	1.763E-04	0.000E+00	0.000E+00
Pu-238	U-234	1.000E+00	0.000E+00	4.364E-07	1.293E-06	4.123E-06	1.091E-05	2.350E-05	2.011E-05	2.599E-04	3.153E-12	0.000E+00
Pu-238	Th-230	1.000E+00	0.000E+00	3.592E-12	3.206E-11	3.459E-10	2.864E-09	2.399E-08	1.021E-07	1.819E-07	1.570E-08	1.480E-08
Pu-238	Ra-226	1.000E+00	0.000E+00	2.559E-14	6.863E-13	2.484E-11	6.282E-10	1.863E-08	2.738E-07	1.843E-06	1.416E-07	2.232E-07
Pu-238	Pb-210	1.000E+00	0.000E+00	8.526E-17	6.785E-15	7.877E-13	5.385E-11	3.890E-09	8.716E-08	5.846E-07	1.369E-06	2.159E-06
Pu-238	dDSR(j)		7.233E-01	7.175E-01	7.061E-01	6.675E-01	5.686E-01	3.242E-01	6.248E-02	4.388E-04	1.526E-06	2.396E-06
Pu-239	Pu-239	1.000E+00	8.106E-01	8.104E-01	8.102E-01	8.093E-01	8.068E-01	7.981E-01	7.420E-01	5.161E-01	0.000E+00	0.000E+00
Pu-239	U-235	1.000E+00	0.000E+00	6.853E-10	2.046E-09	6.709E-09	1.921E-08	5.466E-08	1.082E-07	5.157E-07	5.766E-08	4.585E-08
Pu-239	Pa-231	1.000E+00	0.000E+00	1.166E-13	1.046E-12	1.149E-11	1.002E-10	9.981E-10	6.233E-09	2.086E-08	1.184E-08	1.685E-08
Pu-239	Ac-227	1.000E+00	0.000E+00	1.094E-15	2.900E-14	1.008E-12	2.294E-11	5.093E-10	4.887E-09	2.864E-08	1.964E-08	2.797E-08
Pu-239	dDSR(j)		8.106E-01	8.104E-01	8.102E-01	8.093E-01	8.068E-01	7.981E-01	7.420E-01	5.161E-01	8.914E-08	9.066E-08
Pu-240	Pu-240	1.000E+00	8.109E-01	8.107E-01	8.103E-01	8.090E-01	8.053E-01	7.923E-01	7.254E-01	4.782E-01	0.000E+00	0.000E+00
Pu-240	U-236	1.000E+00	0.000E+00	4.299E-08	1.284E-07	4.207E-07	1.204E-06	3.415E-06	6.515E-06	1.211E-04	1.454E-05	6.896E-06
Pu-240	Th-232	1.000E+00	0.000E+00	1.036E-17	9.295E-17	1.021E-15	8.904E-15	8.883E-14	5.945E-13	2.978E-12	3.481E-13	4.956E-13
Pu-240	Ra-228	1.000E+00	0.000E+00	2.639E-18	6.706E-17	2.040E-15	3.489E-14	4.970E-13	3.618E-12	1.553E-11	9.531E-13	1.358E-12
Pu-240	Th-228	1.000E+00	0.000E+00	2.088E-19	1.409E-17	9.972E-16	2.614E-14	4.380E-13	3.454E-12	1.847E-11	1.286E-13	1.391E-13
Pu-240	dDSR(j)		8.109E-01	8.107E-01	8.103E-01	8.090E-01	8.053E-01	7.923E-01	7.254E-01	4.783E-01	1.454E-05	6.896E-06
Pu-241	Pu-241	1.000E+00	1.607E-02	1.531E-02	1.391E-02	9.919E-03	3.778E-03	1.289E-04	7.939E-09	1.307E-23	0.000E+00	0.000E+00
Pu-241	Am-241	1.000E+00	0.000E+00	1.353E-03	3.865E-03	1.091E-02	2.133E-02	2.502E-02	1.747E-02	4.334E-03	0.000E+00	0.000E+00
Pu-241	Np-237	1.000E+00	0.000E+00	2.102E-09	1.831E-08	1.819E-07	1.226E-06	6.478E-06	1.746E-05	1.900E-05	0.000E+00	0.000E+00
Pu-241	U-233	1.000E+00	0.000E+00	5.848E-15	1.536E-13	5.184E-12	1.093E-10	2.027E-09	1.504E-08	3.197E-07	1.957E-07	1.882E-07
Pu-241	Th-229	1.000E+00	0.000E+00	2.852E-18	2.260E-16	2.588E-14	1.716E-12	1.194E-10	3.258E-09	5.035E-08	4.825E-09	6.798E-09
Pu-241	dDSR(j)		1.607E-02	1.667E-02	1.777E-02	2.083E-02	2.511E-02	2.516E-02	1.749E-02	4.353E-03	2.005E-07	1.950E-07
Pu-241	Pu-241	2.450E-05	3.938E-07	3.752E-07	3.407E-07	2.430E-07	9.257E-08	3.157E-09	1.945E-13	3.203E-28	0.000E+00	0.000E+00
Pu-241	Np-237	2.450E-05	0.000E+00	6.387E-11	1.827E-10	5.181E-10	1.031E-09	1.309E-09	1.142E-09	5.243E-10	0.000E+00	0.000E+00
Pu-241	U-233	2.450E-05	0.000E+00	2.674E-16	2.323E-15	2.290E-14	1.505E-13	7.203E-13	1.544E-12	2.456E-11	8.795E-12	8.514E-12
Pu-241	Th-229	2.450E-05	0.000E+00	1.742E-19	4.580E-18	1.550E-16	3.296E-15	6.313E-14	5.342E-13	2.675E-12	1.987E-13	2.508E-13
Pu-241	dDSR(j)		3.938E-07	3.753E-07	3.409E-07	2.435E-07	9.360E-08	4.467E-09	1.144E-09	5.515E-10	8.994E-12	8.765E-12

Summary : RESRAD: PAWLING-AVERAGE ORTIF DATA & LOWER KD VALUES

File : B:PAWLIN.ORT

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction	DSR(j,t) (mrem/yr)/(pCi/g)									
			t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	3.000E+03	1.000E+04
Pu-242	Pu-242	1.000E+00	7.686E-01	7.685E-01	7.683E-01	7.677E-01	7.657E-01	7.589E-01	7.091E-01	5.018E-01	0.000E+00	0.000E+00
Pu-242	U-238	1.000E+00	0.000E+00	3.458E-11	1.033E-10	3.386E-10	9.698E-10	2.763E-09	5.405E-09	6.767E-08	9.659E-09	9.206E-09
Pu-242	U-234	1.000E+00	0.000E+00	3.396E-17	3.037E-16	3.303E-15	2.795E-14	2.514E-13	1.235E-12	1.394E-10	2.035E-11	2.733E-11
Pu-242	Th-230	1.000E+00	0.000E+00	1.861E-22	5.001E-21	1.822E-19	4.698E-18	1.485E-16	2.583E-15	3.135E-14	1.889E-14	3.167E-14
Pu-242	Ra-226	1.000E+00	0.000E+00	9.736E-25	8.016E-23	9.762E-21	7.601E-19	8.193E-17	4.477E-15	2.126E-13	2.315E-13	4.405E-13
Pu-242	Pb-210	1.000E+00	0.000E+00	0.000E+00	6.236E-25	2.494E-22	5.318E-20	1.449E-17	1.280E-15	5.601E-13	2.229E-12	4.250E-12
Pu-242	dDSR(j)		7.686E-01	7.685E-01	7.683E-01	7.677E-01	7.657E-01	7.589E-01	7.091E-01	5.018E-01	9.682E-09	9.238E-09
U-235	U-235	1.000E+00	6.974E-01	6.942E-01	6.879E-01	6.662E-01	6.080E-01	4.414E-01	1.756E-01	4.462E-01	0.000E+00	0.000E+00
U-235	Pa-231	1.000E+00	0.000E+00	2.366E-04	7.066E-04	2.317E-03	6.634E-03	1.889E-02	3.475E-02	3.554E-02	1.361E-02	1.187E-02
U-235	Ac-227	1.000E+00	0.000E+00	3.322E-06	2.918E-05	2.982E-04	2.141E-03	1.224E-02	3.062E-02	5.240E-02	2.258E-02	1.967E-02
U-235	dDSR(j)		6.974E-01	6.945E-01	6.887E-01	6.689E-01	6.168E-01	4.725E-01	2.409E-01	5.341E-01	3.619E-02	3.154E-02
U-238	U-238	1.000E+00	2.234E-01	2.224E-01	2.204E-01	2.135E-01	1.948E-01	1.414E-01	5.541E-02	4.413E-01	0.000E+00	0.000E+00
U-238	U-234	1.000E+00	0.000E+00	4.371E-07	1.299E-06	4.195E-06	1.148E-05	2.779E-05	3.229E-05	1.294E-03	0.000E+00	0.000E+00
U-238	Th-230	1.000E+00	0.000E+00	3.596E-12	3.217E-11	3.498E-10	2.963E-09	2.671E-08	1.349E-07	3.783E-07	1.286E-07	1.749E-07
U-238	Ra-226	1.000E+00	0.000E+00	2.561E-14	6.881E-13	2.505E-11	6.444E-10	2.019E-08	3.377E-07	3.792E-06	1.596E-06	2.506E-06
U-238	Pb-210	1.000E+00	0.000E+00	8.517E-17	6.799E-15	7.932E-13	5.499E-11	4.171E-09	1.060E-07	9.894E-06	1.538E-05	2.420E-05
U-238	dDSR(j)		2.234E-01	2.224E-01	2.204E-01	2.135E-01	1.948E-01	1.414E-01	5.544E-02	4.426E-01	1.711E-05	2.688E-05

Branch Fraction is the cumulative factor for the j'th principal radionuclide daughter: CUMBRF(j) = BRF(1)+BRF(2)* ... BRF(j).
The DSR includes contributions from associated (half-life < 0.5 yr) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 30 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03	3.000E+03	1.000E+04
Am-241	3.462E+01	3.468E+01	3.479E+01	3.519E+01	3.636E+01	4.076E+01	5.888E+01	2.366E+02	4.828E+06	5.022E+06
Cs-137	9.000E+00	9.213E+00	9.654E+00	1.137E+01	1.815E+01	9.328E+01	1.007E+04	1.343E+11	*8.652E+13	*8.652E+13
Pu-238	4.148E+01	4.181E+01	4.249E+01	4.494E+01	5.277E+01	9.254E+01	4.802E+02	6.837E+04	1.966E+07	1.252E+07
Pu-239	3.701E+01	3.702E+01	3.703E+01	3.707E+01	3.718E+01	3.759E+01	4.043E+01	5.813E+01	3.365E+08	3.309E+08
Pu-240	3.700E+01	3.700E+01	3.702E+01	3.708E+01	3.725E+01	3.786E+01	4.136E+01	6.272E+01	2.064E+06	4.350E+06
Pu-241	1.867E+03	1.800E+03	1.688E+03	1.440E+03	1.195E+03	1.193E+03	1.715E+03	6.892E+03	1.496E+08	1.538E+08
Pu-242	3.903E+01	3.904E+01	3.905E+01	3.908E+01	3.918E+01	3.953E+01	4.231E+01	5.979E+01	3.098E+09	3.247E+09
U-235	4.302E+01	4.320E+01	4.356E+01	4.485E+01	4.864E+01	6.349E+01	1.245E+02	5.616E+01	8.290E+02	9.513E+02
U-238	1.343E+02	1.349E+02	1.361E+02	1.405E+02	1.540E+02	2.121E+02	5.411E+02	6.778E+01	*3.360E+05	*3.360E+05

*At specific activity limit

CONFIRMATORY AND RADIOLOGICAL SURVEYS OF THE NUCLEAR LAKE SITE PAWLING, NEW YORK

[DOCKET NO. 070-00903]

T. J. VITKUS

Prepared for the
Division of Low-Level Waste Management and Decommissioning
U.S. Nuclear Regulatory Commission



Dupe

ORISE

OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

Environmental Survey and Site Assessment Program
Energy/Environment Systems Division

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CONFIRMATORY AND RADIOLOGICAL SURVEYS
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PAWLING, NEW YORK

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REVISED FINAL REPORT

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CONFIRMATORY AND RADIOLOGICAL SURVEYS
OF THE
NUCLEAR LAKE SITE
PAWLING, NEW YORK

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ABBREVIATIONS AND ACRONYMS

ac	acre
ANST	Appalachian National Scenic Trail
ASME	American Society of Mechanical Engineers
cm	centimeter
cm ²	square centimeter
cpm	counts per minute
dpm/100 cm ²	disintegrations per minute per 100 square centimeters
EML	Environmental Measurements Laboratory
EPA	Environmental Protection Agency
ESSAP	Environmental Survey and Site Assessment Program
f ²	square feet
ha	hectare
GM	Geiger-Mueller
km	kilometer
m	meter
m ²	square meter
MDA	minimum detectable activity
mi	mile
NaI	sodium iodide
NES	Nuclear Energy Services
NIST	National Institute of Standards and Technology
NPS	National Park Service
NRC	Nuclear Regulatory Commission
ORISE	Oak Ridge Institute for Science and Education
PIC	pressurized ionization chamber
QA	quality assurance

CONFIRMATORY AND RADIOLOGICAL SURVEYS
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INTRODUCTION AND SITE HISTORY

Nuclear fuels processing and research began in 1958 at a site near Pawling, New York, known as Nuclear Lake. Initial operations were performed by Nuclear Development Corporation; subsequently, the site was owned and operated by United Nuclear Corporation and Gulf United Corporation. Uranium oxide fuels of various U-235 enrichments were fabricated and tested at the site. Fuels utilizing thorium and plutonium were also fabricated and tested. The testing facilities at the site included several small experimental reactors. In 1972, activities at the site were discontinued and the site was decontaminated and surveyed. A report, indicating that the facilities satisfied the criteria for decommissioning, was prepared by ATCOR.¹ The U.S. Nuclear Regulatory Commission (NRC) license for the site was then terminated in 1975. The property was acquired in 1979 by the National Park Service (NPS) for the purpose of relocation of the Appalachian National Scenic Trail (ANST).

The NPS contracted Nuclear Energy Services (NES) to conduct additional surveys of portions of the property. Results of that survey, presented in a July 1984 report, identified a small area of residual contamination in the former Waste Disposal Building.² No other evidence of contamination in excess of the limits for unrestricted use was noted.

However, studies and reviews by the Nuclear Lake Management Committee, a local citizens group, raised concerns regarding possible residual contamination in building drains, septic tank and drain field systems, sediment in Nuclear Lake, and building interior paint.³ The possibility that containers of radioactive or other hazardous wastes had been discarded into Nuclear Lake was also indicated by the Management Committee.³ As a result of these concerns, the NPS requested that the Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education (ORISE), then known as the Radiological Site Assessment Program of Oak Ridge Associated Universities, conduct investigations and

radiological surveys of the site that would address these concerns. A survey was conducted during September 1986 and the results provided in a July 1988 report.⁴

The survey identified alpha and/or beta surface activity levels in four buildings which exceeded the NRC surface contamination guidelines. In addition, several soil samples contained elevated levels of plutonium and Cs-137. Electromagnetometry and ground penetrating radar studies, which were conducted concurrently with the 1986 survey, identified a number of anomalies in Nuclear Lake. Radiation Technical Services performed an underwater investigation of these anomalies, during November 1992. The investigation was unable to substantiate that any of the anomalies were associated with metal drums as originally suspected.⁵

The site has remained in caretaker status pending decontamination and demolition of site buildings and excavation of contaminated soils. Chevron USA, Inc., under a consent agreement with the NRC, contracted NES to characterize and perform remediation of contaminated building surfaces and soils at the Nuclear Lake Site. Structural decontamination was limited to the Plutonium Facility, Multiple Failure Building, and the Waste Disposal Building. Remediation of site soils was performed within the vicinities of the Plutonium Facility, Waste Disposal Building, and Shield Mock-Up Building. NES then performed final status surveys of the remediated buildings and soil areas.

At the request of the NRC's Division of Low-Level Waste Management, ESSAP performed a confirmatory survey of the remediated portions of the Nuclear Lake Site. In addition, ESSAP performed radiological surveys of those unaffected buildings and open land areas where previous surveys had not identified contamination. This report describes the procedures and results of these surveys.

SITE DESCRIPTION

The Nuclear Lake Site is located off of Old State Route 55 between the towns of Pawling and Beekman in the eastern portion of New York State (Figure 1). The 460 ha (1136 ac) site is heavily wooded with the exception of the 20 ha lake; clearings in the vicinity of the recently

reconstructed dam, which impounds the lake at its southern end; the central portion of the site, where eight of the nine original site buildings are located; and near the entrance to the site, where the ninth building is located (Figure 2).

The site history indicates that of the nine buildings, only four may have been potentially used for the processing or storage of radioactive materials. These buildings are the 700 m² (7500 ft²), Plutonium Facility, the Waste Disposal Building (39 m²), the Shield Mock-Up Building (60 m²), and the Critical Facility (510 m²) (Figures 3 through 6). The 1986 radiological survey identified residual contamination above the NRC guidelines in the eastern portion of the Plutonium Facility, a small area in the Multiple Failure Building (45 m²) and Waste Disposal Building (54 m²), and one measurement location, remediated at the time of the survey, in the Critical Facility. The other buildings located on the site include the Engineering Building (410 m²), the Lodge (66 m²), and a house currently occupied by the site caretaker that was previously known as the Remote Assembly Building (106 m²) (Figures 7 through 10).

OBJECTIVES

The objectives of the confirmatory process were to validate the results of the NES final surveys by providing independent document reviews and radiological data for use by the NRC in evaluating the adequacy and accuracy of the NES radiological status report for the buildings and surrounding soil areas. The radiological survey was performed to supplement previous survey results and gather additional data, to confirm that no contamination in excess of the unrestricted use limits exists on the remainder of the property.

DOCUMENT REVIEW

ESSAP reviewed the NES work plan for soil remediation, the decommissioning plan for the Plutonium Facility and Multiple Failure Building, final release survey plan, and final survey report and supporting documentation concerning site characterization and remediation activities.⁶⁻⁹ Information was evaluated for accuracy, completeness, and compliance with guidelines.

PROCEDURES

A survey team from ESSAP visited the Nuclear Lake Site from September 20 through 28, 1993, and performed visual inspections, measurements, and sampling. The surveys were in accordance with a plan dated September 17, 1993, submitted to and approved by the NRC Headquarters Division of Low-Level Waste Management and Decommissioning.¹⁰ The surveys performed for the various portions of the site were objective dependent. Confirmatory survey procedures were implemented for remediated site buildings and outdoor soil areas and radiological survey procedures, designed to meet draft NUREG/CR-5849 requirements, were used for the remaining unaffected buildings and outdoor areas. Confirmatory and radiological survey procedures are described below. Additional information regarding instrumentation and procedures may be found in Appendices A and B.

CONFIRMATORY SURVEY PROCEDURES: INTERIOR

The following procedures were used for interior surveys of the Plutonium Facility, the Waste Disposal Building, and the Multiple Failure Building.

Reference Grid

ESSAP used the 1 m x 1 m survey grid system, established by NES, for referencing measurement and sampling locations. This grid system had been installed on the floor and lower walls (up to 2 m) of the rooms within each building. The upper walls and ceilings in rooms 3 and 5 of the Plutonium Facility were also gridded.

Measurements and samples collected from ungridded surfaces were referenced to the floor and/or lower wall grid or to prominent building features.

Surface Scans

Surface scans for alpha, beta, and gamma activity were performed over 100% of floor and lower wall surfaces and 5 to 10% of the upper wall and ceiling surfaces of the Waste Disposal Building, the eastern portion of the Plutonium Facility (Rooms 2-5, 14, and 15), and the Multiple Failure Building. Scans of non-remediated portions of the Plutonium Facility (Rooms 1, 6-13, 16-18) covered 50% of floor and lower wall surfaces. The floors of Rooms 12 and 13, both restrooms, could not be scanned due to standing water. Scans were performed using gas proportional, GM, and/or NaI detectors coupled to ratemeters or ratemeter-scalers with audible indicators. Locations of elevated direct radiation, detected by scans, were marked for further investigation.

Surface Activity Measurements

Three hundred and sixteen direct measurements for total and removable alpha and beta activity levels were performed in the Plutonium Facility, 20 were performed in the Waste Disposal Building, and 17 in the Multiple Failure Building. Most direct measurement locations were selected randomly; however, 21 sets of measurements (17 in the Plutonium Facility, 3 in the Waste Disposal Building, and 1 in the Multiple Failure Building) were performed in areas based on the surface scan results. The measurements were made in floor and lower wall grid blocks and at a frequency of 1 measurement for every 20 m² of upper wall and ceiling surfaces (scans identified elevated direct radiation at 11 of the 124 upper wall and ceiling measurement locations). Figures 11 through 21 show measurement locations. Locations with alpha or beta surface activity levels, which exceeded the NRC average surface activity guideline, were investigated to determine the size of the contaminated area, a direct measurement made within each contaminated region, and 4 to 6 additional grid block measurements performed to determine the average surface activity levels in the contiguous 1 m² area. A weighted 1 m² average was then determined in accordance with NUREG/CR-5849. At representative locations where NES

performed additional remediation, ESSAP performed pre- and post-remediation measurements. Direct measurements were made using gas proportional detectors coupled to ratemeter-scalers.

A smear sample for determining removable gross alpha and gross beta activity levels was collected from each direct measurement location or, when more than one measurements was performed in a grid block, from the direct measurement location with the highest total activity.

Exposure Rate Measurements

Exposure rate measurements were performed within each room of the Plutonium Facility and in the center of the Multiple Failure Building and the Waste Disposal Building (Figures 19 through 22). Exposure rates were measured at 1 m above the floor using a pressurized ionization chamber (PIC).

Subfloor Soil Sampling

Soil samples were collected from 25, 2, and 1 subfloor locations within the Plutonium Facility, Waste Disposal Building, and the Multiple Failure Building, respectively (Figures 19 through 22). Soil sample locations were placed adjacent to expansion joints or floor cracks, when present.

CONFIRMATORY SURVEY: EXTERIOR

The following procedures were applicable to the perimeter affected soil areas associated with the Plutonium Facility, the Waste Disposal Building, and the Shield Mock-Up Building.

Reference System

ESSAP used prominent building features to reference measurement and sampling locations.

Surface Scans

Surface scans for gamma activity were conducted over the exterior grounds of the affected buildings extending out to a distance of 10 m. Surface scans were performed using NaI detectors coupled to ratemeters with audible indicators. Locations of elevated direct radiation detected by scans were marked for further investigation.

Soil Sampling

Soil samples were collected from 21 locations within excavated areas, or adjacent to the excavations, that were associated with the Plutonium Facility, Waste Disposal Building, and the Shield Mock-Up Building (Figures 23 and 30).

Exposure Rate Measurements

Exposure rate measurements were made at 16 of the soil sampling locations. Measurements were made at 1 m above the surface using a PIC (Figures 23 and 30).

RADIOLOGICAL SURVEY PROCEDURES: INTERIOR

The procedures described below are applicable to the interior of the following unaffected buildings: Engineering Building, Shield Mock-Up, Critical Facility, the Lodge, and the Remote Assembly Building.

Reference System

ESSAP used prominent building features to reference measurement and sampling locations.

Surface Scans

Surface scans for alpha, beta, and gamma activity were performed over a minimum of 10% of the accessible floors and lower walls (up to 2 m) of each building with the exception of the Lodge. Because of the extent of debris on the floors and the wet surfaces, only gamma and minimal beta scans could be performed in the Lodge. Scans were performed using gas proportional, GM, and/or NaI detectors coupled to ratemeters or ratemeter-scalers with audible indicators.

Surface Activity Measurements

Direct measurements for total alpha and/or beta surface activity were performed at a minimum of 30 locations within each building (Figures 24 through 28). Direct measurements were performed using gas proportional and/or GM detectors coupled to ratemeter-scalers. Smear samples for determining removable activity levels were collected from each direct measurement location. Only beta direct measurements were performed in the Lodge, due to the extensive debris and wet surfaces.

Exposure Rate Measurements

Exposure rate measurements were made in each building (Figures 24 through 28). NUREG/CR-5849 recommends that an exposure rate measurement be performed at each direct measurement location; however, the small size of most of the site buildings did not necessitate this measurement frequency. Therefore, one measurement was made per building or room, whichever was applicable. Measurements were made at 1 m above the surface using a PIC.

Subfloor Soil Sampling

Subfloor soil samples were collected from 2, locations within each building (Figures 24 through 28).

RADIOLOGICAL SURVEY PROCEDURES: EXTERIOR

The following procedures were used for unaffected portions of the site associated with buildings, roads, walkways, and the dam area.

Reference System

The unaffected outdoor areas were subdivided into 4 survey units (Figure 29). ESSAP then established a grid system consisting of 50 m x 50 m grid blocks to reference measurement and sampling locations within survey unit areas located north of the dam. Prominent site features or structures were used for reference measurement and sampling locations which were south of the dam area.

Surface Scans

Surface scans for gamma activity were conducted over approximately 100% of the cleared portions of the site, which included those areas associated with the buildings, roads, walkways, clearings, and the remnants of the emergency generator building, sodium tent, and shield blocks. Additional scans were performed over approximately 10% of the remaining portions of each survey unit. Scans were performed using NaI detectors coupled to ratemeters with audible indicators. Locations of elevated direct radiation detected by scans were marked for further investigation.

Soil Sampling

Surface (0 to 15 cm or less in depth) soil samples were collected from 127 locations within the 4 survey units. Subsurface samples could not be collected due to the proximity of bedrock to the surface, where, at many locations, refusal was reached at 5 cm in depth. The surface soil samples collected from each survey unit also incorporated the land areas located outside of the buildings' perimeter. Soil sample locations were systematically selected throughout the site or were located at suspect locations that were identified during surface scans. Sample locations

were typically clustered around each building and spaced further apart, within the heavily forested portions of each survey unit (Figures 30 through 35).

Exposure Rate Measurements

Exposure rates were measured at 1 m above the surface at 33 soil sampling locations using a PIC (Figures 30, 31, 32, and 35). For all remaining soil sampling locations, a gamma radiation measurement was performed at contact and at 1 m above the surface using a NaI detector coupled to a ratemeter, and compared with the ambient background level.

SAMPLE ANALYSIS AND DATA INTERPRETATION

Samples and data were returned to ESSAP's Oak Ridge, Tennessee facility for analysis and interpretation. Smears were analyzed for gross alpha and gross beta activity with a low background proportional counter. Soil samples were individually analyzed by gamma spectrometry. The spectra were reviewed for uranium, thorium, americium, cesium and any other identifiable photopeaks. Nine composite samples were also analyzed for isotopic plutonium by alpha spectrometry. Subfloor samples from Rooms 2, 3, and 4 and samples from the exterior of the Plutonium Facility and samples where Am-241 levels exceeded the gamma spectrometry minimum detectable activity levels were selected for the alpha spectrometry analysis.

The background was subtracted from the smear analytical results and direct measurement data and the results were converted to units of dpm/100 cm². Exposure rates were reported in μ R/h and included background. Soil results were reported in pCi/g. The data were compared to the final survey results provided by NES and the NRC generic and site specific guidelines.^{9,11} The background exposure rates and radionuclide concentrations in soil previously collected were also used for data comparison.⁴

FINDINGS AND RESULTS

DOCUMENT REVIEW

ESSAP's review of the characterization, decontamination and decommissioning, and the final survey with addendum reports identified several deficiencies in the documents. These deficiencies, which included concerns regarding the affected outdoor area characterization methods, were provided to the NRC in several correspondences.¹²⁻¹⁴

CONFIRMATORY SURVEY: INTERIOR

Provided below are the results of the confirmatory surveys of the Plutonium Facility, Waste Disposal Building, and the Multiple Failure Building.

Surface Scans

Surface scans of the interior of the Plutonium Facility identified elevated direct alpha radiation levels on the floor, walls, and ceiling of Rooms 3, 4, and 5 on north wall of Room 1, and on the floor of Rooms 14 and 15. Elevated beta radiation levels were also detected on the floors of Rooms 3 and 15. Alpha, beta, and gamma scans of the remaining rooms in the Plutonium Facility did not identify any locations of elevated direct radiation.

Surface scans in the Waste Disposal Building identified three locations of elevated direct beta radiation on the upper level floor. All other alpha, beta, and gamma scans of the floors and walls did not identify any locations of elevated direct radiation.

Surface scans of the Multiple Failure Building identified one location of elevated direct beta radiation levels on the floor immediately north of the contaminated area that had been previously remediated. In addition, a small trough that was formed by the wall sheet metal immediately adjacent to the remediated area was also determined to have elevated beta radiation. There were no other areas of elevated direct radiation detected on floor and wall surfaces.

Each specific location and/or general areas of contamination were brought to the attention of the NES site representative. ESSAP characterized the small areas of elevated alpha and beta direct radiation which surface scans identified in Rooms 1, 3, 5, 14, and 15 of the Plutonium Facility and in the Waste Disposal and Multiple Failure Buildings. The distributed areas of alpha contamination which ESSAP identified in the rooms 3, 4, and 5 of the Plutonium Facility were re-surveyed and recharacterized by NES. NES personnel then remediated the areas and performed post-remedial action surveys as necessary. ESSAP personnel then performed additional surface scans and direct measurements to confirm that remedial actions had been effective in reducing contamination to acceptable levels.

Surface Activity Levels

Surface activity levels for representative locations of elevated direct radiation identified in the affected buildings are summarized in Table 1. Prior to additional remediation, the surface activity ranges for locations of elevated direct radiation for the Plutonium Facility were: 11 to 2,300 dpm/100 cm² for total alpha activity, with 20 to 310 dpm/100 cm² being the range of alpha activity in 1 m² areas; for locations with elevated beta activity, the total activity range was -420 to 100,000 dpm/100 cm² with a 1 m² average activity range of -5 to 47,000 dpm/100 cm². For the three locations in the Waste Disposal building total beta activity levels ranged from 420 to 260,000 dpm/100 cm² and the 1 m² average activity levels ranged from 2,000 to 7,800 dpm/100 cm². In the Multiple Failure Building, elevated beta activity was 50,000 dpm/100 cm² and the 1 m² average was 9,800 dpm/100 cm².

Removable activity levels ranged from -1 to 25 dpm/100 cm², for alpha, and from -3 to 10 dpm/100 cm², for beta.

Final confirmatory survey surface activity levels are provided in Table 2. For the affected portions of the Plutonium Facility (Rooms 2-5, 14, and 15), total activity levels ranged from -5 to 200 dpm/100 cm², for alpha, and from -1,800 to 2,500 dpm/100 cm² for beta. The 1 m² averages were determined for direct measurement locations with total surface activity in excess

of 100 dpm/100 cm² for alpha and 5,000 dpm/100 cm² for beta. These 1 m² averages ranged from 0 to 93 dpm/100 cm² and -110 to 1,300 dpm/100 cm² for alpha and beta, respectively.

Total activity levels in the unaffected rooms of the Plutonium Facility (Rooms 1, 6-13, and 16-18) were -7 to 180 dpm/100 cm² for alpha and -590 to 2,600 dpm/100 cm² for beta. The 1 m² average ranges were 14 dpm/100 cm² and 370 dpm/100 cm² for alpha and beta, respectively.

Removable activity levels for the Plutonium Facility ranged from -4 to 12 dpm/100 cm² for gross alpha and -5 to 21 dpm/100 cm² for gross beta.

Total surface activity levels in the Waste Disposal Building ranged from -2 to 27 dpm/100 cm² and -660 to 950 dpm/100 cm² for alpha and beta, respectively. The 1 m² averages were 9 dpm/100 cm² for alpha and 1,400 to 1,700 dpm/100 cm², for beta. Removable activity levels were -1 to 4 dpm/100 cm² and -4 to 8 dpm/100 cm² for gross alpha and gross beta, respectively.

The activity levels in the Multiple Failure Building were -7 to 27 dpm/100 cm² for alpha and -500 to 1,300 dpm/100 cm² for beta. The 1 m² average was 14 dpm/100 cm² for alpha and 770 dpm/100 cm² for beta. Removable activity levels were -1 to 4 dpm/100 cm² for gross alpha and -5 to 5 dpm/100 cm² for gross beta.

Exposure Rates

Exposure rates for the affected buildings are summarized in Table 3. The exposure rates, including background, in the Plutonium Facility ranged from 9 to 12 μR/h and averaged 10 μR/h. Background inclusive exposure rates in the Waste Disposal Building and Multiple Failure Building were 10 μR/h and 8 μR/h, respectively.

Radionuclide Concentrations in Subfloor Soils

Table 4 provides a summary of the radionuclide concentrations in subfloor soils within the affected buildings. The samples collected from beneath the Plutonium Facility, Waste Disposal

Building, and Multiple Failure Building contained the following concentration ranges: Cs-137, less than 0.1 to 0.7 pCi/g; Am-241, less than 0.1 pCi/g; Th-232, 0.3 to 1.0 pCi/g; U-235, less than 0.1 to 0.1 pCi/g; U-238, less than 1.1 to 1.1 pCi/g. Plutonium concentrations in composite samples are summarized in Table 5 and subfloor samples were less than 0.09 to 0.12 pCi/g for Pu-238 and less than 0.07 pCi/g for Pu-239/240. Due to the low levels of plutonium and americium present in samples as indicated here and elsewhere in this report (most sample concentration levels were below the minimum detectable activity level) ESSAP was unable to confirm the plutonium to Am-241 ratio of 7:1.

CONFIRMATORY SURVEY: EXTERIOR

The confirmatory survey results for the affected soil areas are discussed below.

Surface Scans

The gamma surface scans did not identify any locations of elevated direct radiation.

Radionuclide Concentrations in Soil

The radionuclide concentrations in soil samples collected from the affected soil areas are summarized in Table 6. Concentration ranges were less than 0.1 to 5.5 pCi/g for Cs-137, less than 0.2 pCi/g for Am-241, 0.4 to 1.1 pCi/g for Th-232, less than 0.1 to 0.1 for U-235, and 0.2 to 1.6 pCi/g for U-238. Plutonium concentrations in composite samples summarized in Table 5, were less than 0.24 pCi/g for Pu-238 and less than 0.24 pCi/g for Pu-239/240.

Exposure Rates

Exposure rates for the affected outdoor soil areas are provided in Table 6. Exposure rates, including background, ranged from 8 to 12 μ R/h.

RADIOLOGICAL SURVEY: INTERIOR

The results of the interior surveys of the Engineering Building, the Critical Facility Building, the Shield Mock-Up Building, the Remote Assembly Building, and the Lodge are provided below.

Surface Scans

Alpha, beta, and gamma surface scans of the interiors of each building did not identify any locations of elevated direct radiation.

Surface Activity Levels

Surface activity levels for each building are summarized in Table 7. The total activity levels within the Critical Facility were -7 to 37 dpm/100 cm² for alpha and -290 to 1,100 dpm/100 cm² for beta; removable activity levels were -1 to 4 dpm/100 cm² and -7 to 8 dpm/100 cm² for gross alpha and gross beta, respectively. For the Engineering Building, total activity levels were -2 to 23 dpm/100 cm² for alpha and -320 to 850 dpm/100 cm² for beta. Removable activity levels were -1 to 6 dpm/100 cm² for gross alpha and -5 to 16 dpm/100 cm² for gross beta. The Remote Assembly Building total activity levels were -620 to 54 dpm/100 cm² for alpha and -620 to 730 dpm/100 cm² for beta; removable activity levels were -1 to 4 dpm/100 cm² for gross alpha and -7 to 6 dpm/100 cm² for gross beta. The total alpha activity levels in the Shield Mock-Up Building were -2 to 39 dpm/100 cm² and beta activity levels were -580 to 820 dpm/100 cm²; removable activity levels were -1 to 10 dpm/100 cm² for gross alpha and -7 to 14 dpm/100 cm² for gross beta. The beta activity levels within the Lodge were -650 to 1,200 dpm/100 cm² and removable activity levels were -1 to 6 dpm/100 cm² for gross alpha and -7 to 8 dpm/100 cm² for gross beta.

There were four alpha measurement locations in unaffected buildings which were in excess of 25% (25 dpm/100 cm²) of the alpha guideline, one each in the Critical Facility and Shield Mock-Up Building and two in the Remote Assembly Building. One location within the Remote

Assembly Building was attributed to the rock and masonry construction material of the fireplace and the second location, also a result of natural background radioactivity, was on a rock outcropping found in the basement of the structure. For the locations in the other buildings, there were no indications, based on additional measurements from the localized areas (1 m²) and surface scans, that there was contamination present. There were no beta measurements which exceeded 25% (1,250 dpm/100 cm²) of the beta guidelines.

Exposure Rates

Area background exposure rates ranged from 9 to 11 μ R/h and averaged 10 μ R/h.⁴ Exposure rates, including background, for each unaffected building are summarized in Table 8 and were as follows: Critical Facility, a range of 11 to 12 μ R/h and averaged 12 μ R/h; Engineering Building, a range of 9 to 10 μ R/h and averaged 9 μ R/h; Remote Assembly Building, a range of 7 to 11 μ R/h and averaged 9 μ R/h; Shield Mock-Up Building the exposure rate was 10 μ R/h; and for the Lodge exposure rates ranged from 9 to 10 μ R/h and averaged 10 μ R/h.

Radionuclide Concentrations in Subfloor Soils

Radionuclide concentrations in subfloor soil samples are provided in Table 9. Concentration ranges for all the subfloor samples were less than 0.1 to 0.2 pCi/g of Cs-137; less than 0.1 to 0.1 pCi/g of Am-241, 0.1 to 0.7 pCi/g of Th-232, 0.1 to 0.2 to U-235, and 0.2 to 0.8 pCi/g of U-238.

RADIOLOGICAL SURVEY: EXTERIOR

The results of the radiological survey of unaffected outdoor survey units 1 through 4 are provided below.

Surface Scans

Surface scans for gamma radiation of the exterior unaffected survey units identified one area of elevated direct radiation south of the Lodge (Figure 31). The anomaly, which was approximately 2 m × 2 m in size, was centered at grid coordinate 168 N, 29 E. A 30 cm deep borehole, at which point bedrock was encountered, was excavated at the anomaly center and scanned for gamma activity. Gamma levels were 4 times background at the surface and decreased to 2.5 times background at 30 cm, indicating the elevated activity was present primarily in the upper layers of soil. Exposure rates and analytical results of the samples collected from this area are included below and indicated the area required no additional investigation. All other gamma scans were within ambient background levels.

Exposure Rates

Exposure rate measurements are summarized in Table 10. Exposure rates, including background, for the unaffected outdoor area ranged from 8 to 12 $\mu\text{R/h}$ and averaged 9 $\mu\text{R/h}$.

Radionuclide Concentrations in Soil

Background concentrations ranges for each radionuclide of concern are as follows: Cs-137 0.1 to 1.6 pCi/g; Pu-238, less than 0.2 to 0.10 pCi/g; Pu-239/240, 0.10 to 0.21 pCi/g; Th-232, 0.2 to 1.3 pCi/g; U-235, less than 0.3 pCi/g; U-238, less than 1.7 pCi/g.⁴ Radionuclide concentrations in soil for each of the survey units are summarized in Table 10. Concentration ranges for each survey unit were as follows: Survey Unit 1, less than 0.1 to 5.9 pCi/g Cs-137; less than 0.3 pCi/g Am-241; 0.2 to 1.4 pCi/g Th-232; less than 0.1 to 0.3 pCi/g U-235; 0.1 to 2.5 pCi/g U-238. Survey Unit 2, less than 0.1 to 6.1 pCi/g Cs-137; less than 0.4 pCi/g Am-241; less than 0.5 to 1.4 pCi/g Th-232; less than 0.3 to 0.4 pCi/g U-235; 0.2 to 3.7 pCi/g U-238. Survey Unit 3, less than 0.1 to 3.0 pCi/g Cs-137; less than 0.3 to 0.5 pCi/g Am-241; less than 0.4 to 1.1 pCi/g Th-232; less than 0.2 to 0.3 pCi/g U-235; less than 1.7 to 4.3 pCi/g U-238. Survey Unit 4 ranges were 0.1 to 3.6 pCi/g Cs-137; less than 0.2 pCi/g Am-241; 0.3 to 1.3 pCi/g Th-232; less than 0.1 to 0.2 pCi/g U-235; and less than 2.7 to 2.9 pCi/g U-238.

Plutonium concentrations in composite samples, summarized in Table 5; were less than 0.07 pCi/g for Pu-238 and 0.05 to 1.2 pCi/g for Pu-239/240.

The maximum Cs-137 concentration of 6.1 pCi/g coincided with the location of elevated gamma radiation identified in Survey Unit 2. The average Cs-137 concentration in the four samples collected from the contiguous 100 m² area was 1.3 pCi/g.

DISCUSSION

ESSAP initiated instrumentation cross-comparison at the time of the confirmatory survey. These cross-comparisons were initiated because of the significant areas of residual alpha contamination being identified while performing surface scans and investigative direct measurements in Rooms 3, 4, and 5 of the Plutonium Facility. A review of NES alpha instrumentation calibration records, a comparison of ESSAP and NES instrument responses to a known activity plutonium calibration source, and subsequent conversions from counts per minute to dpm/100 cm², indicated that the efficiency factor provided to NES for their ZnS detectors was in error. The efficiency provided (39%) appeared to be a 2π rather than the appropriate 4π efficiency, which is typically 15 to 20%. As a result, NES underestimated residual alpha activity, where present, by 50 to 60% during the initial termination survey.

After consultation with the NRC, ESSAP discontinued the confirmatory survey for Rooms 3, 4, and 5, where the most wide spread residual contamination had been identified, and NES then performed the additional characterization surveys, remediation, and post-remedial surveys in these areas. For these surveys, NES obtained large area detectors which were better suited for conducting surface scans and identifying gross contamination at the plutonium guideline levels. In addition, NES acquired recalibrated instrumentation to be used for quantitative surface activity measurements during characterization and post-remedial action surveys. The results of these surveys were provided in the October 1993 addendum to the NES final project report.⁹ At the completion of the secondary remedial actions and NES surveys, ESSAP concluded the confirmatory survey of these areas.

COMPARISON OF RESULTS WITH GUIDELINES

The confirmatory survey results were compared with both the data provided by NES and the generic and site-specific NRC guidelines for release to unrestricted use. The radiological data for the building and unaffected outdoor soil areas, were also compared with the guidelines.

The applicable surface contamination guidelines, presented in Appendix C, are those for plutonium and Cs-137.

The plutonium guidelines are:

Total

100 dpm/100 cm², average in a 1 m² area
300 dpm/100 cm², maximum in a 100 cm² area

Removable

20 dpm/100 cm²

The Cs-137 guidelines are those for the beta-gamma emitters which are:

Total

5,000 dpm/100 cm², average in a 1 m² area
15,000 dpm/100 cm², maximum in a 100 cm² area

Removable

1,000 dpm/100 cm²

Exposure rates, at 1 m, were compared with the 5 μ R/h above background guideline, currently being used by the NRC.¹⁵

Soil concentration levels of Cs-137 were compared with the 15 pCi/g site-specific guideline. The site-specific guideline for total plutonium is 25 pCi/g. Americium-241 concentrations, together with the results of plutonium analyses, were used to determine the plutonium concentrations relative to the guideline. An Am-241 to plutonium ratio of 1:7 developed by NES and approved by the NRC, was used to estimate total plutonium levels in samples that were

not analyzed for plutonium.⁹ Other radionuclide concentrations were compared to background concentrations.

All surface activity levels were below the NRC's residual surface contamination guidelines. ESSAP's surface activity data for both the affected and unaffected buildings were tested in accordance with Draft NUREG/CR-5849; the results of which are provided in Tables 11 and 12. The tests support that, with the exception of Room 5 in the Plutonium Building, the surface activity levels within each building satisfy the guidelines at the 95% confidence level.

All exposure rates at 1 m were within the 5 μ R/h above background guideline. Soil concentration levels for all areas were below the guidelines and/or comparable to background.

SUMMARY

ESSAP performed confirmatory and radiological surveys of the Nuclear Lake Site in Pawling, New York during the period September 20 through 28, 1993. Confirmatory activities included document reviews, surface scans, direct measurements, exposure rate measurements, and soil sampling.

The confirmatory survey identified residual surface contamination inside each of the three affected buildings. Contaminated areas were remediated and resurveyed by NES and post-remedial action surveys by ESSAP confirmed that surface contamination had been reduced to acceptable levels. The radiological survey did not identify any locations of residual contamination in excess of NRC guideline levels. One room in the Plutonium Facility (Room 5) did not satisfy the plutonium total activity guidelines at the 95% confidence level.

The final confirmatory survey results support those of NES and together with radiological survey results indicate the site structures and soil areas satisfy the guidelines for release to unrestricted use.

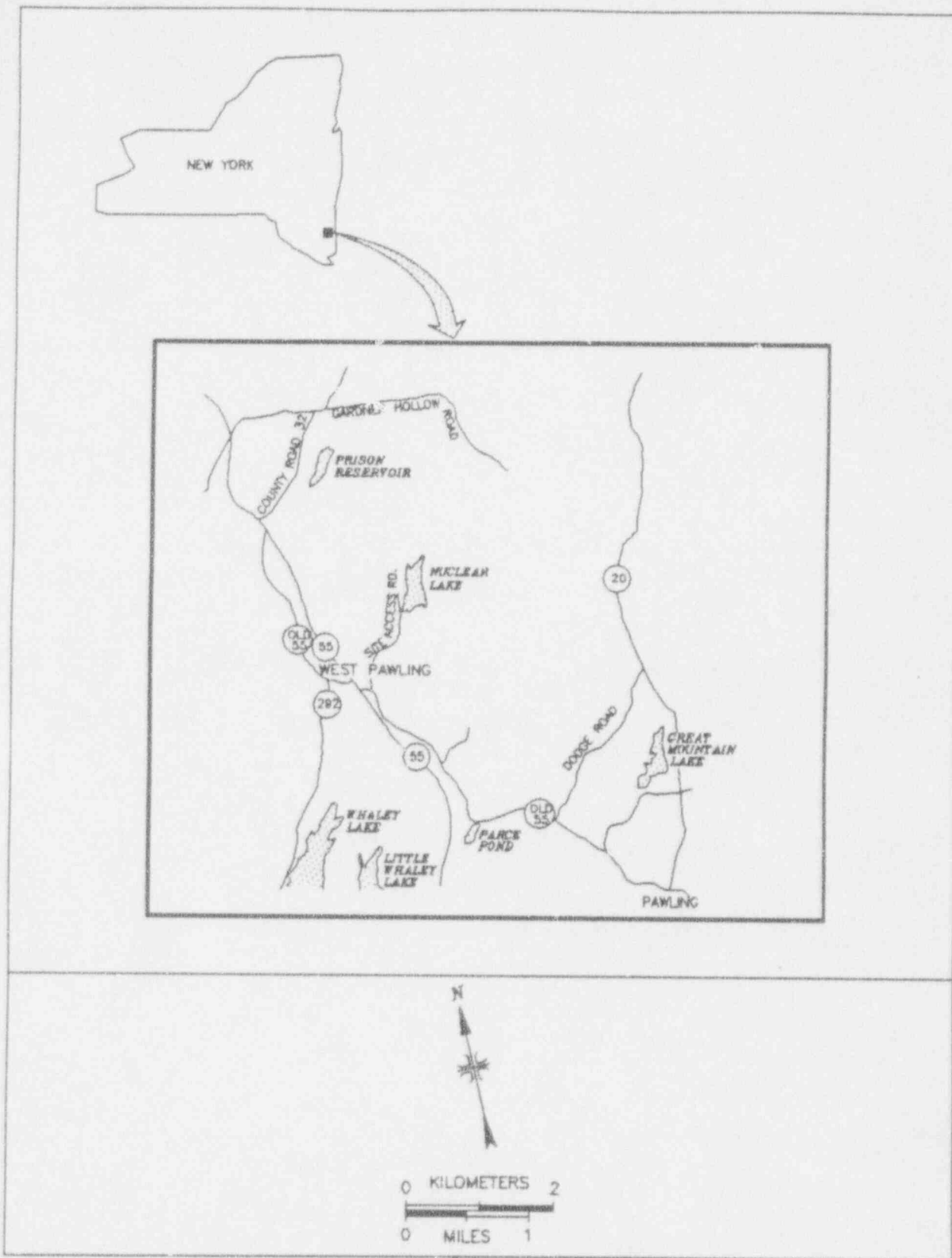


FIGURE 1: Map of the Pawling, New York Area
Showing the Location of the Nuclear Lake Site

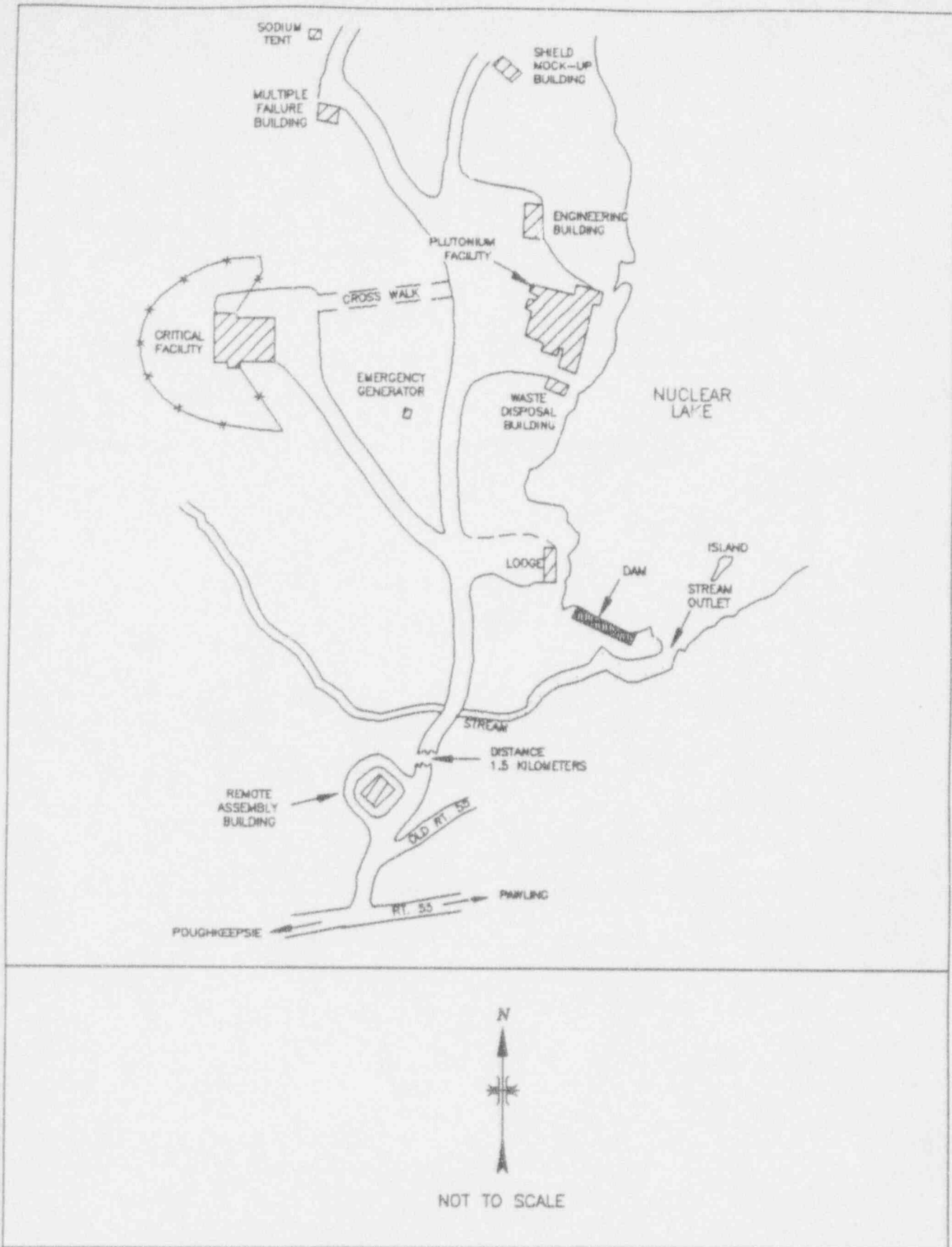


FIGURE 2: Plot Plan of the Nuclear Lake Site

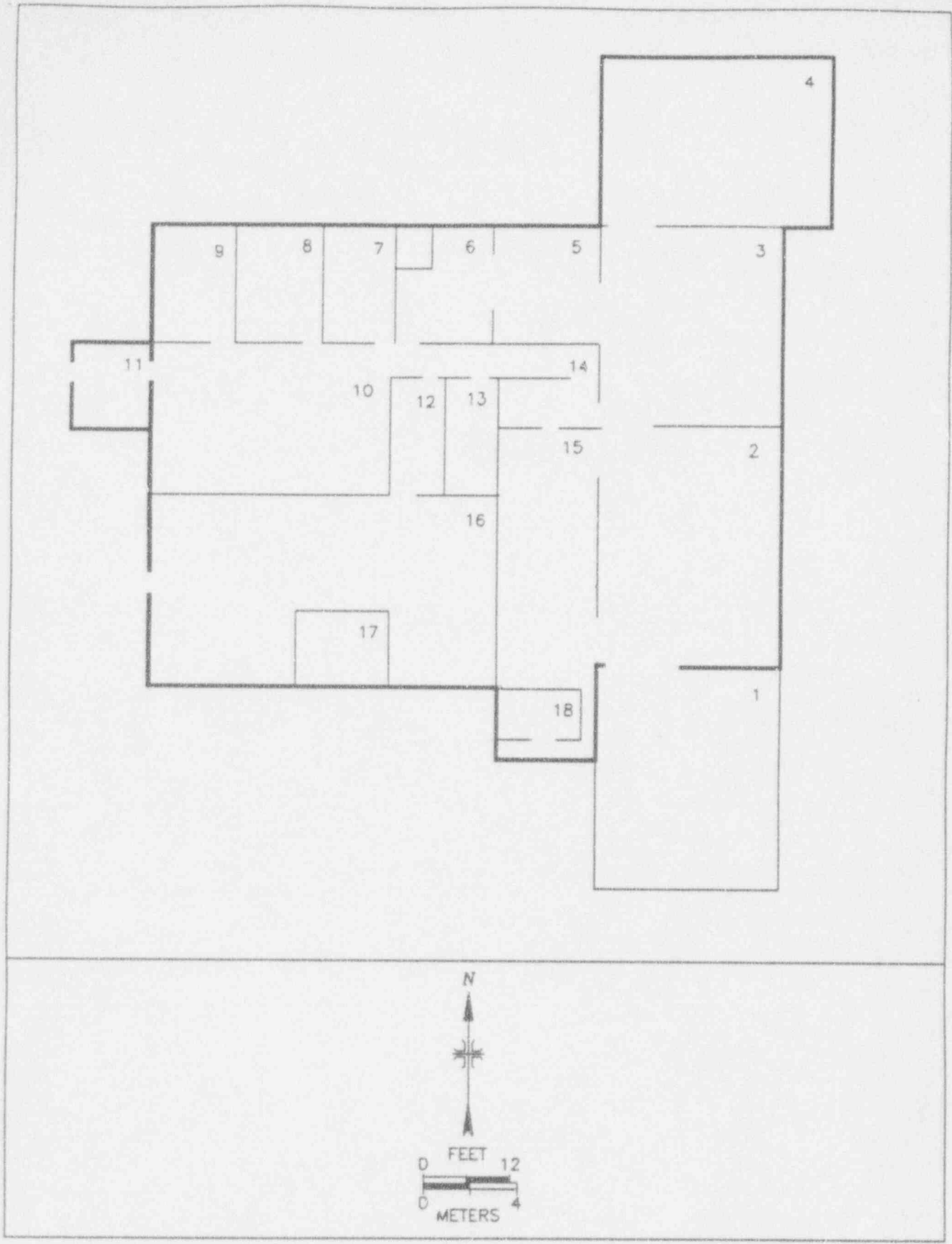


FIGURE 3: Plutonium Facility -- Floor Plan

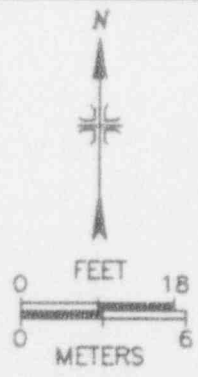
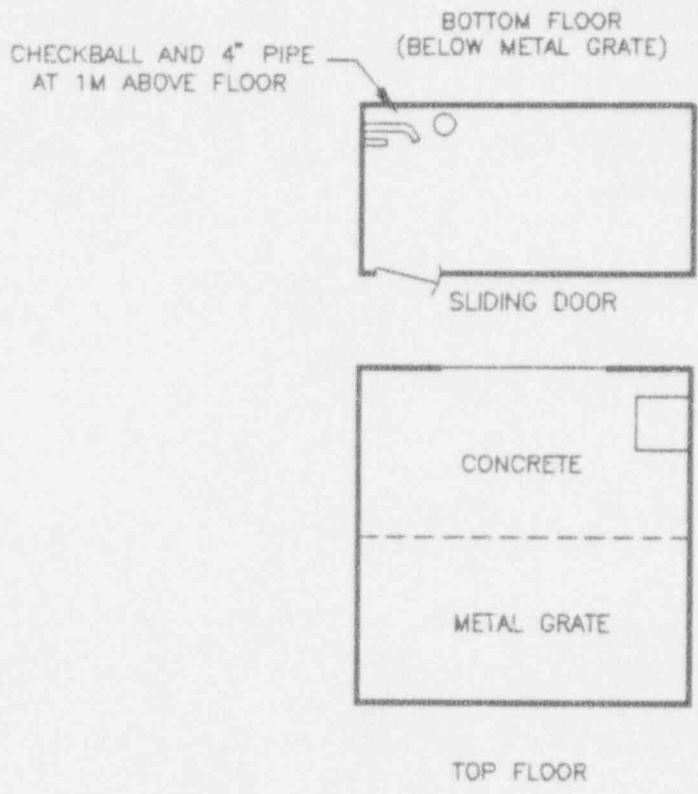


FIGURE 4: Waste Disposal Building - Floor Plan

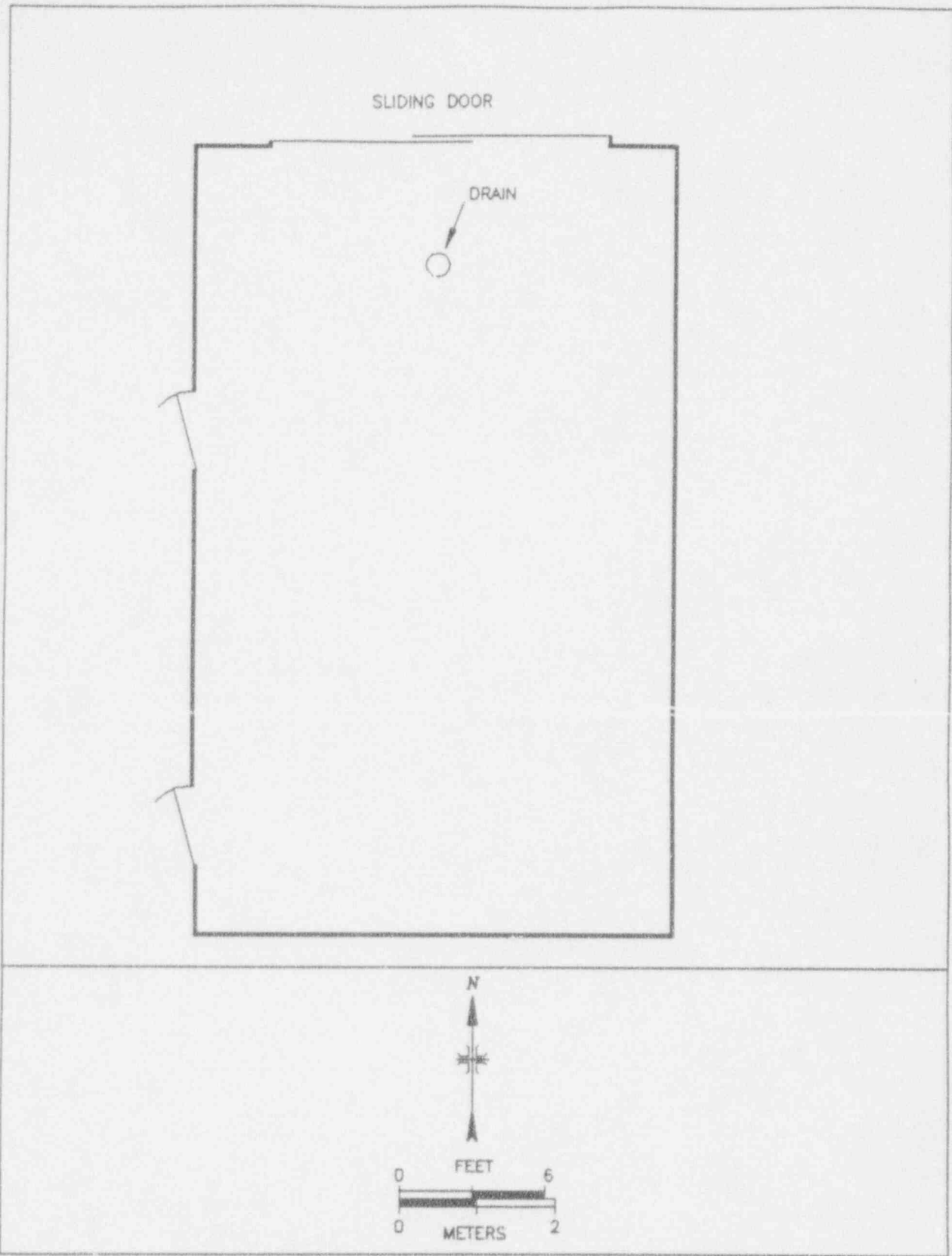


FIGURE 5: Shield Mock-Up Building - Floor Plan

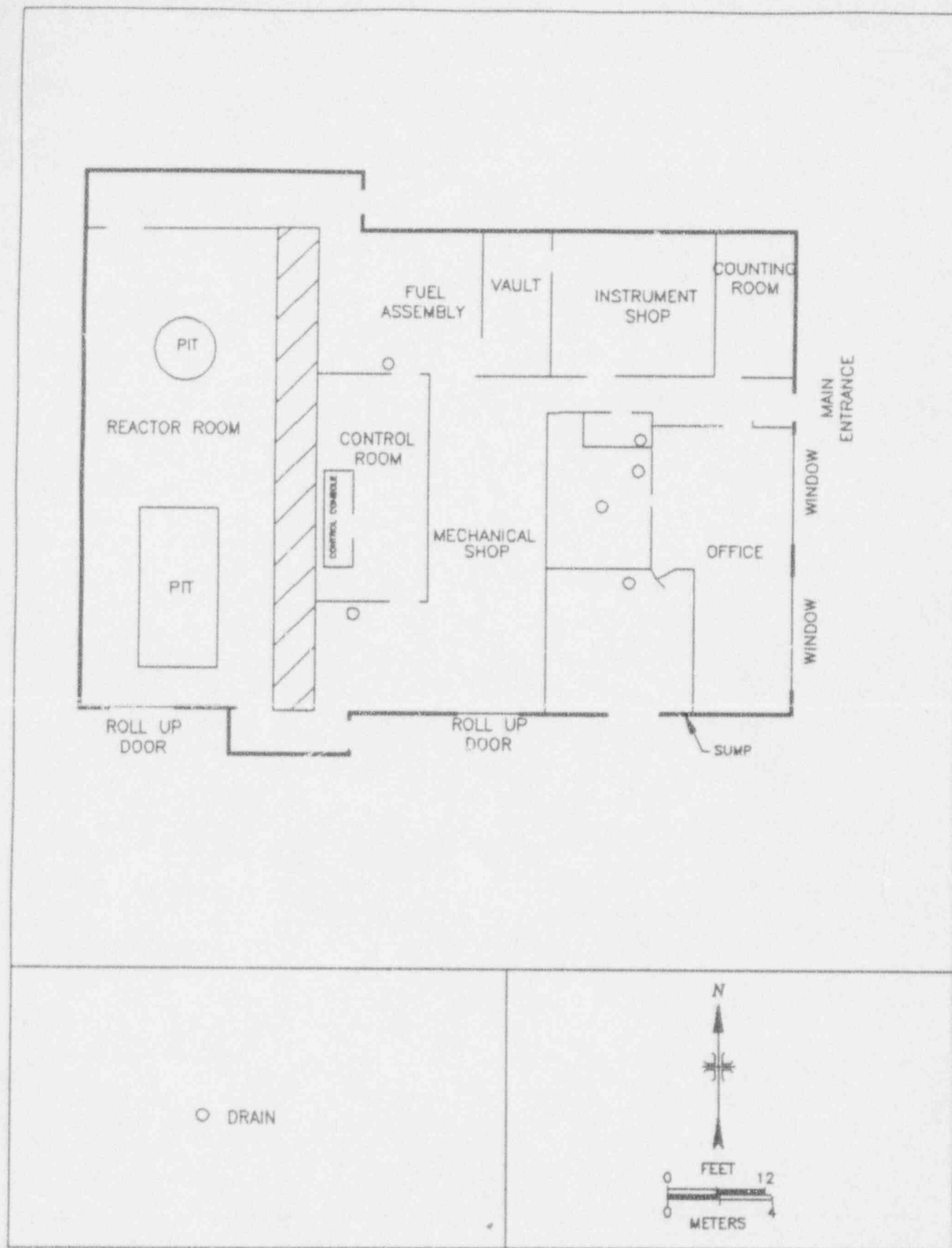


FIGURE 6: Critical Facility - Floor Plan

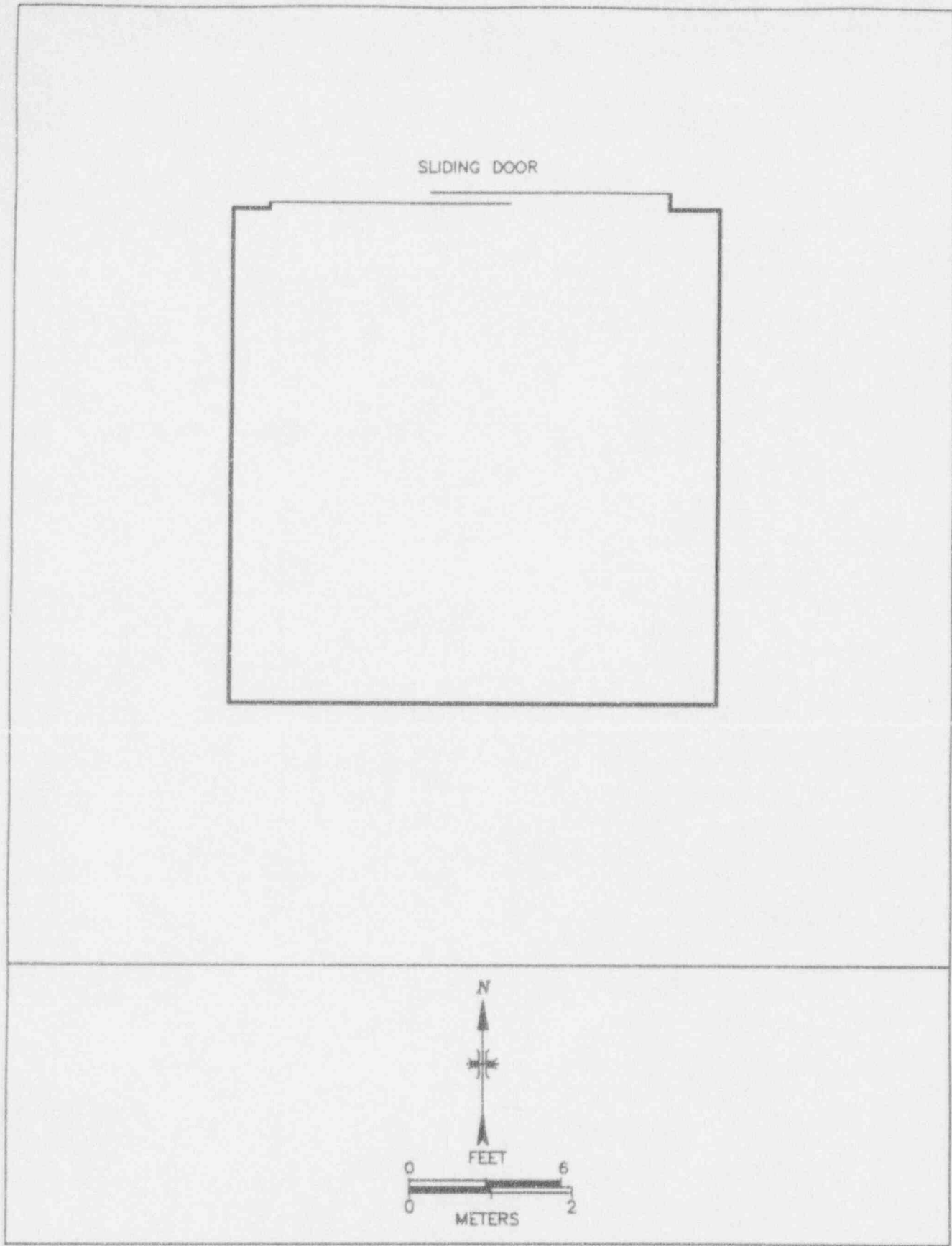


FIGURE 27: Multiple Failure Building – Floor Plan

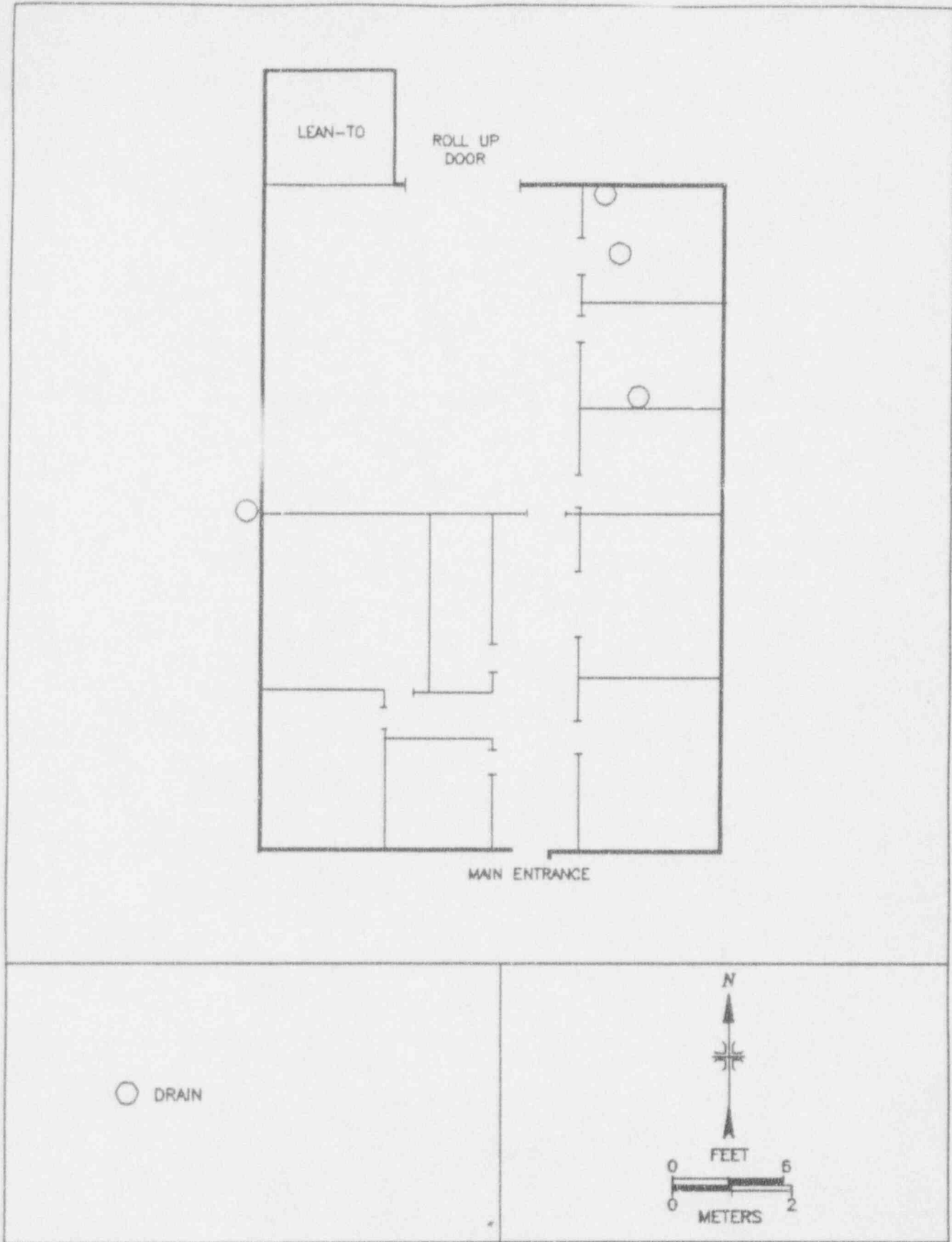


FIGURE 8: Engineering Building - Floor Plan

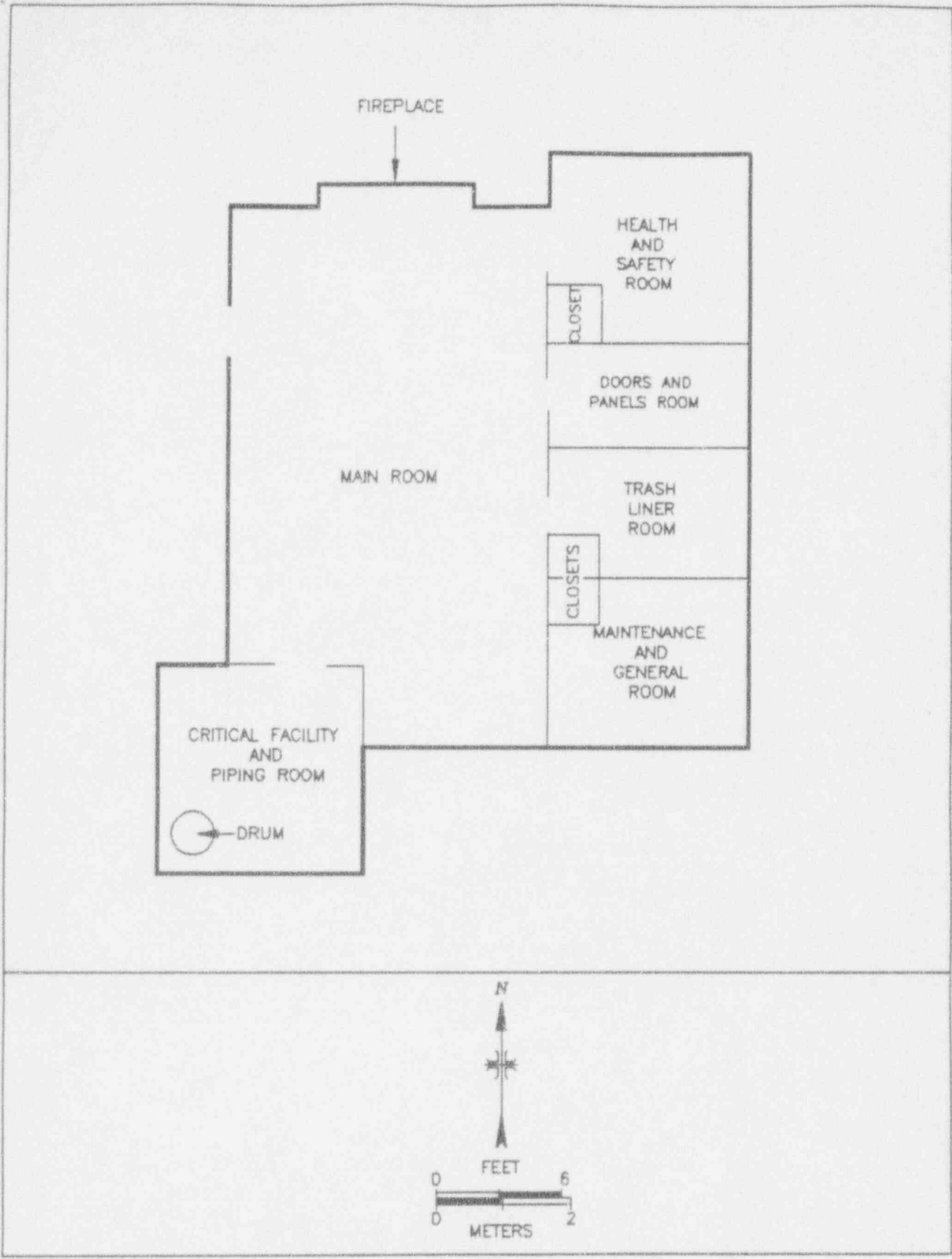


FIGURE 9: Lodge - Floor Plan

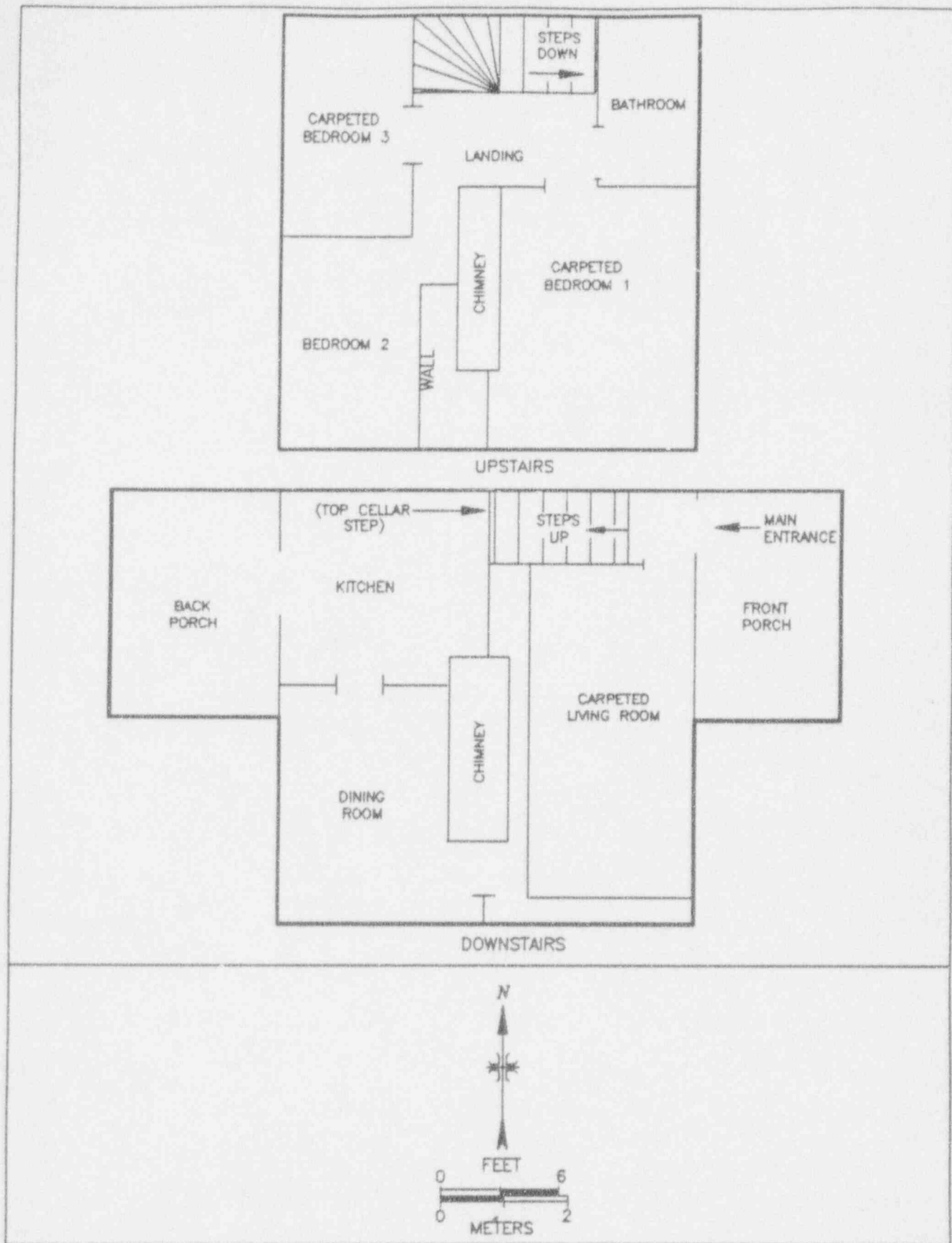


FIGURE 10: Remote Assembly Building - Floor Plan

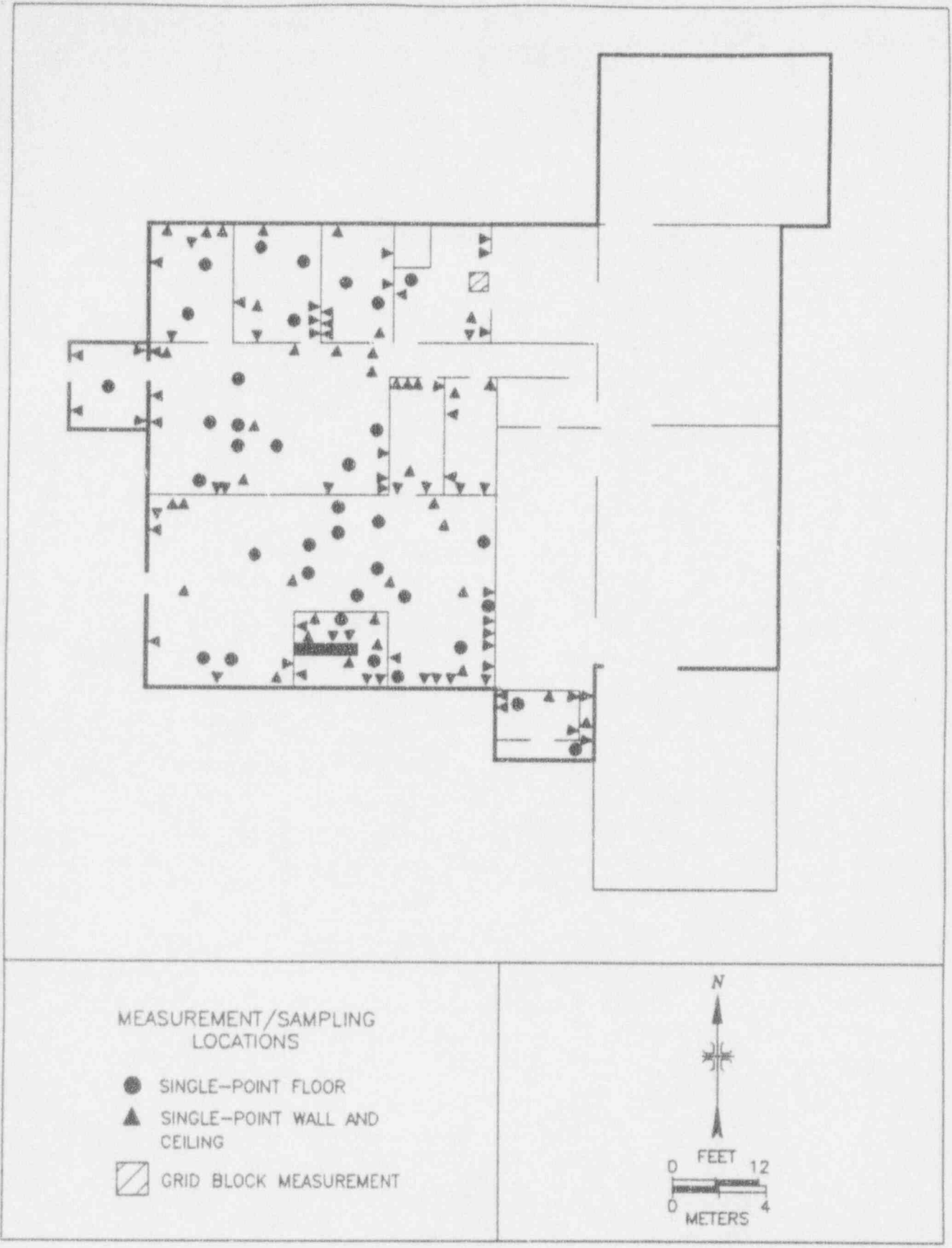


FIGURE 11: Plutonium Facility, Unaffected Areas - Measurement and Sampling Locations

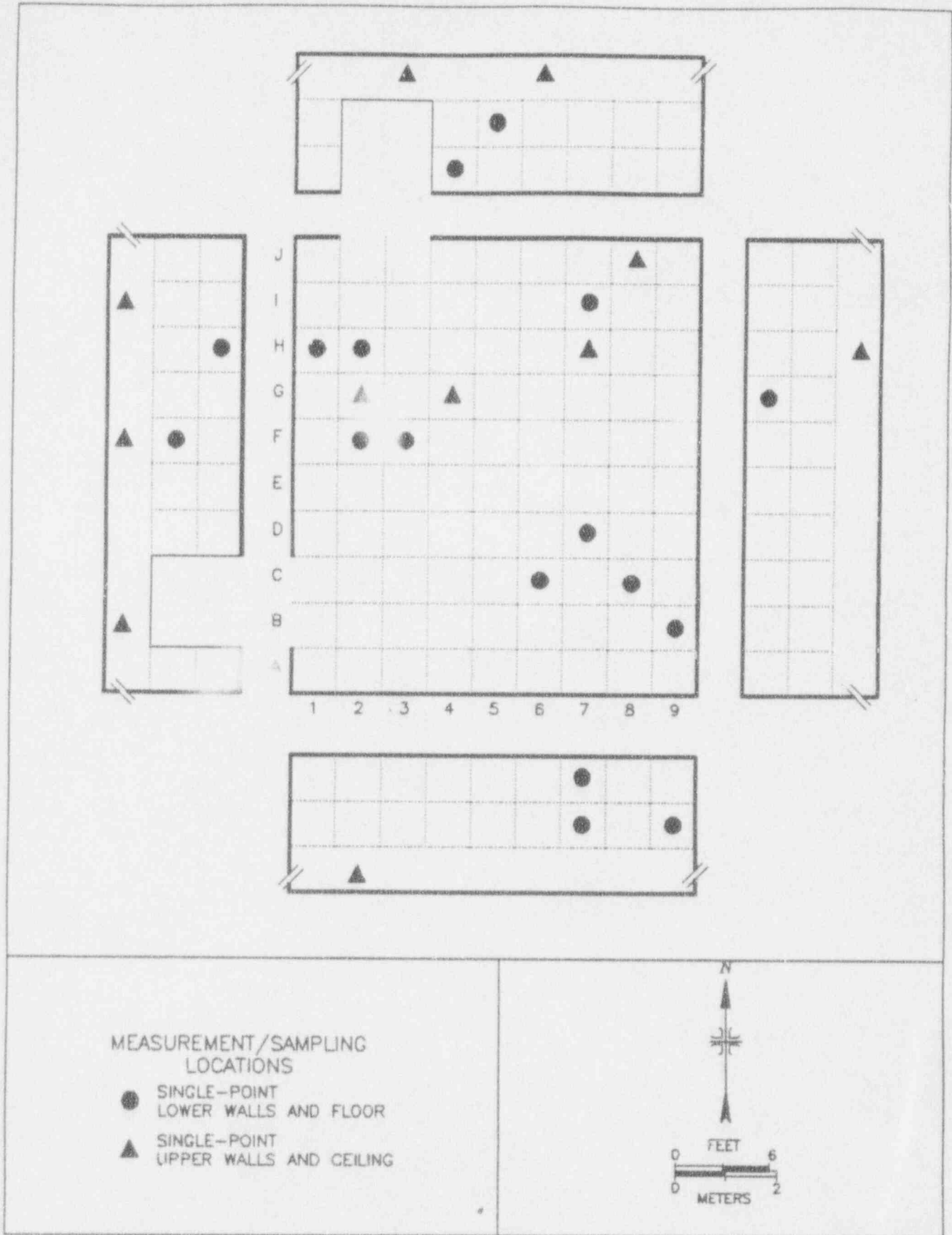


FIGURE 12: Plutonium Facility, Room 1 – Measurement and Sampling Locations

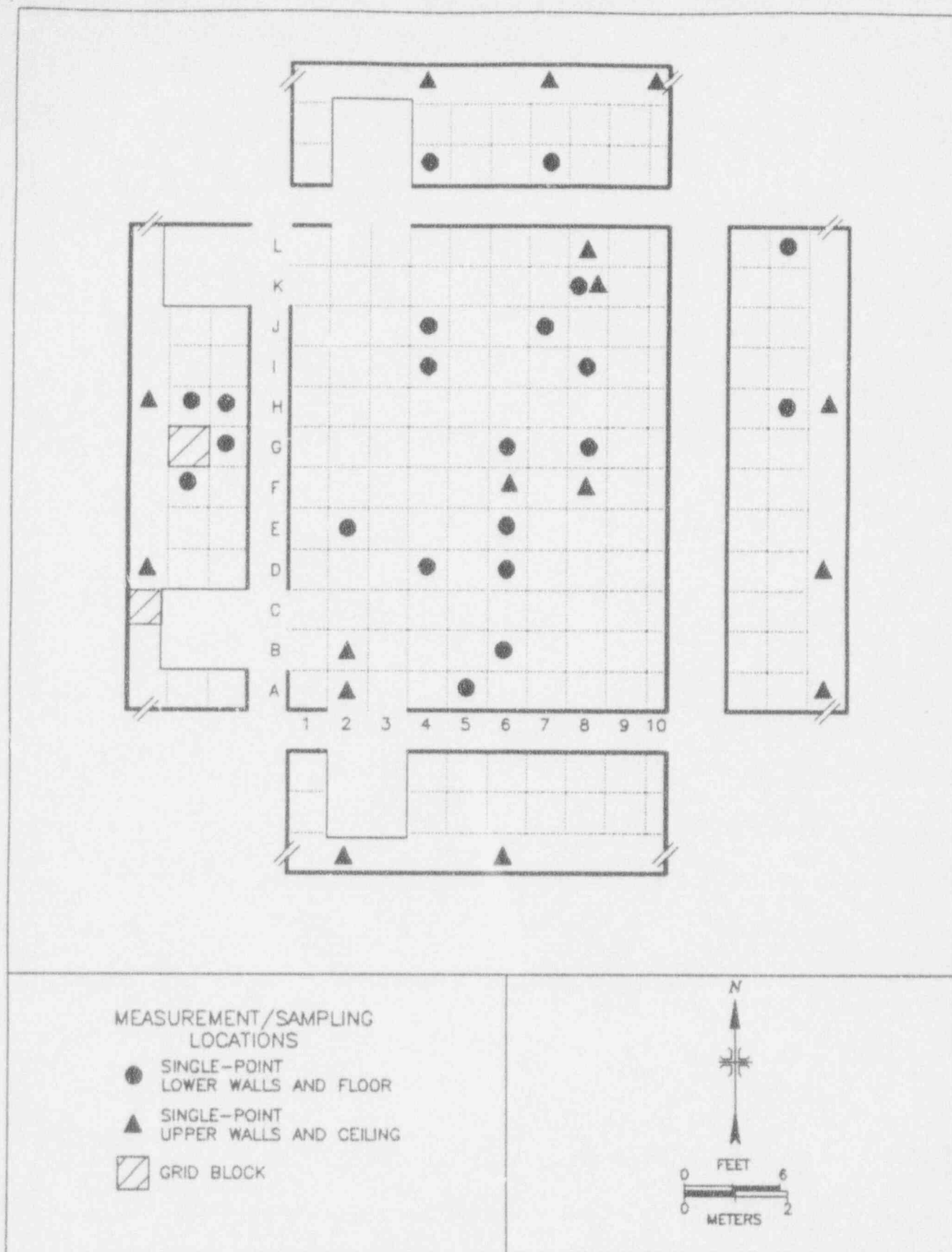


FIGURE 13: Plutonium Facility, Room 2 - Measurement and Sampling Locations

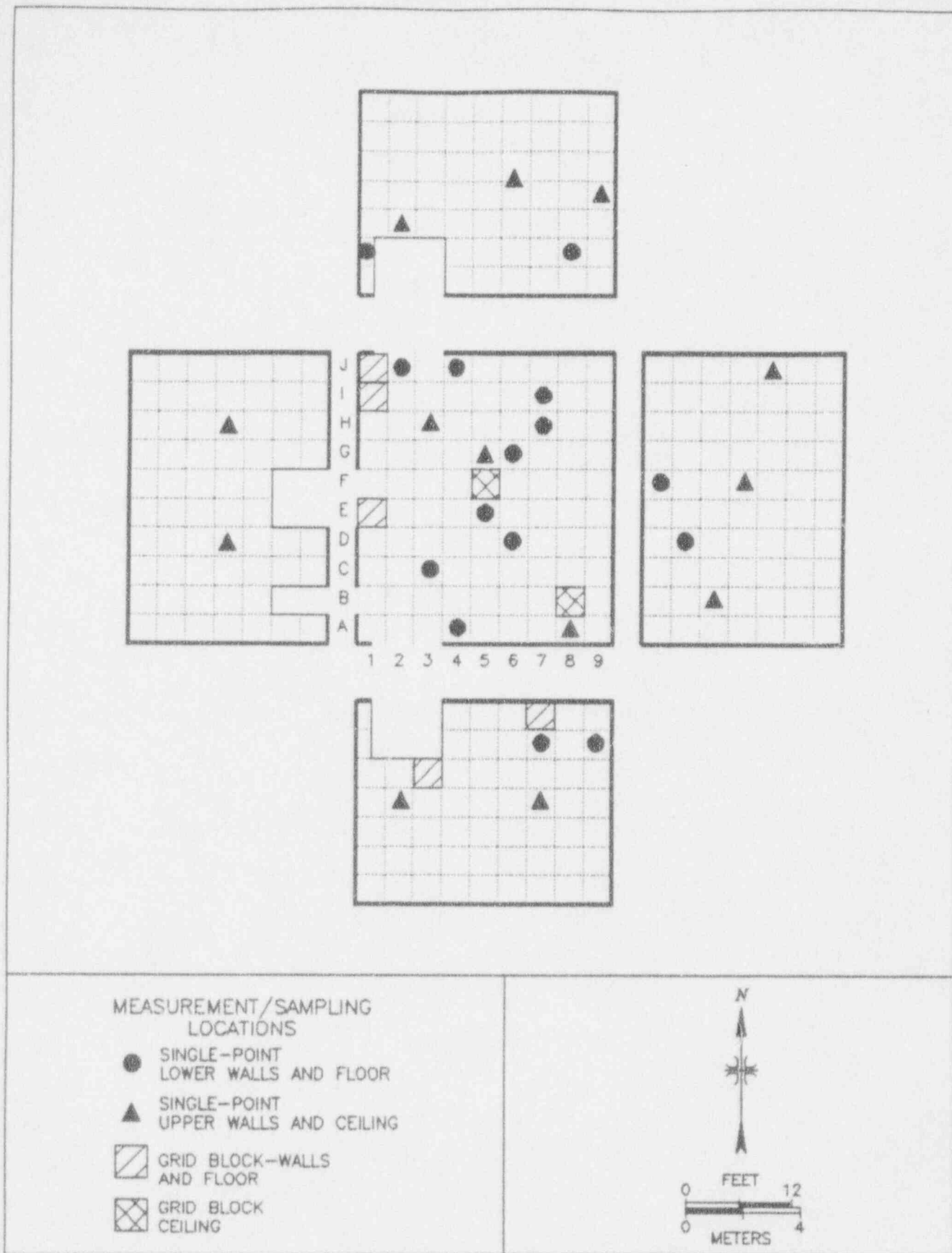


FIGURE 14: Plutonium Facility, Room 3 – Measurement and Sampling Locations

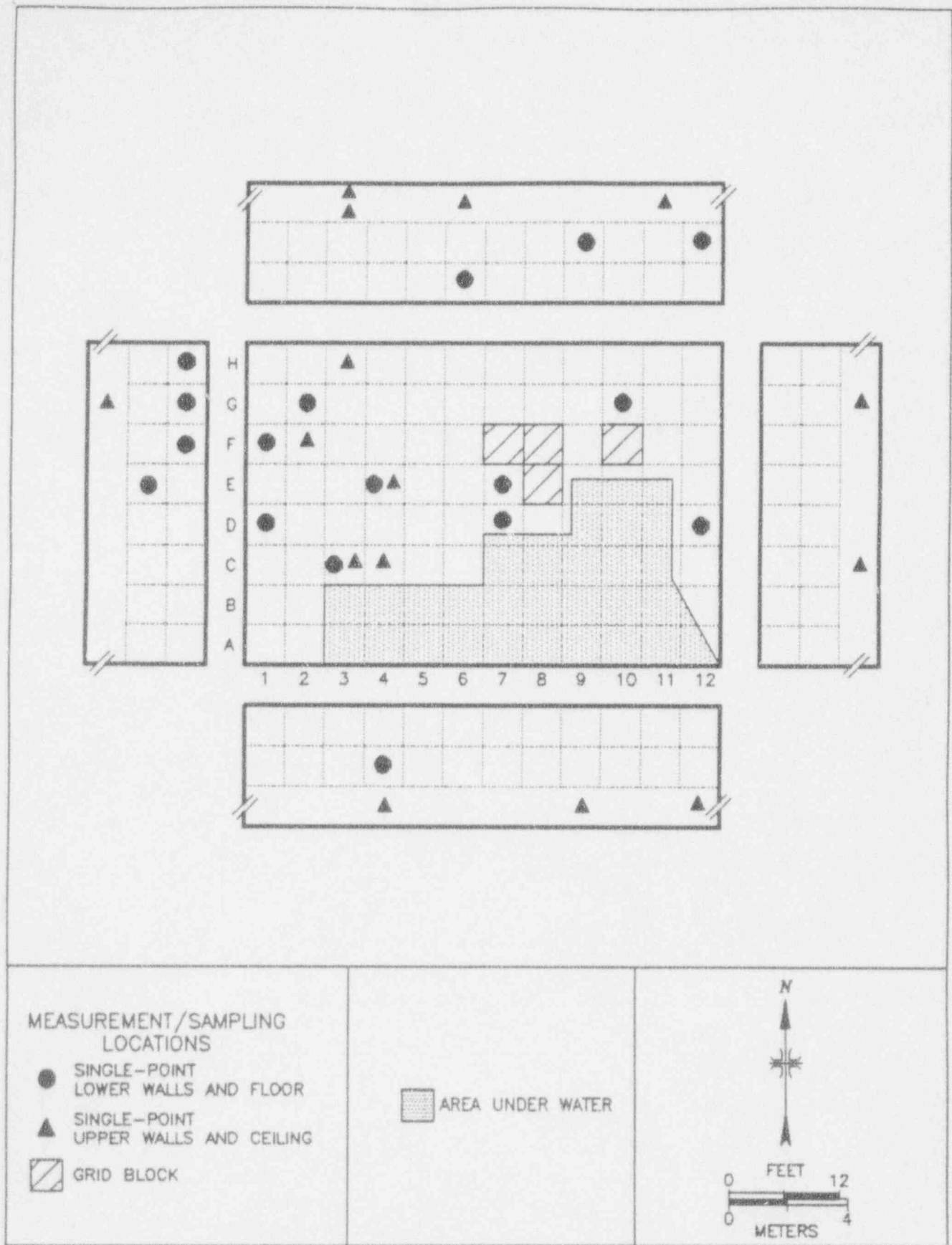


FIGURE 15: Plutonium Facility, Room 4 - Measurement and Sampling Locations

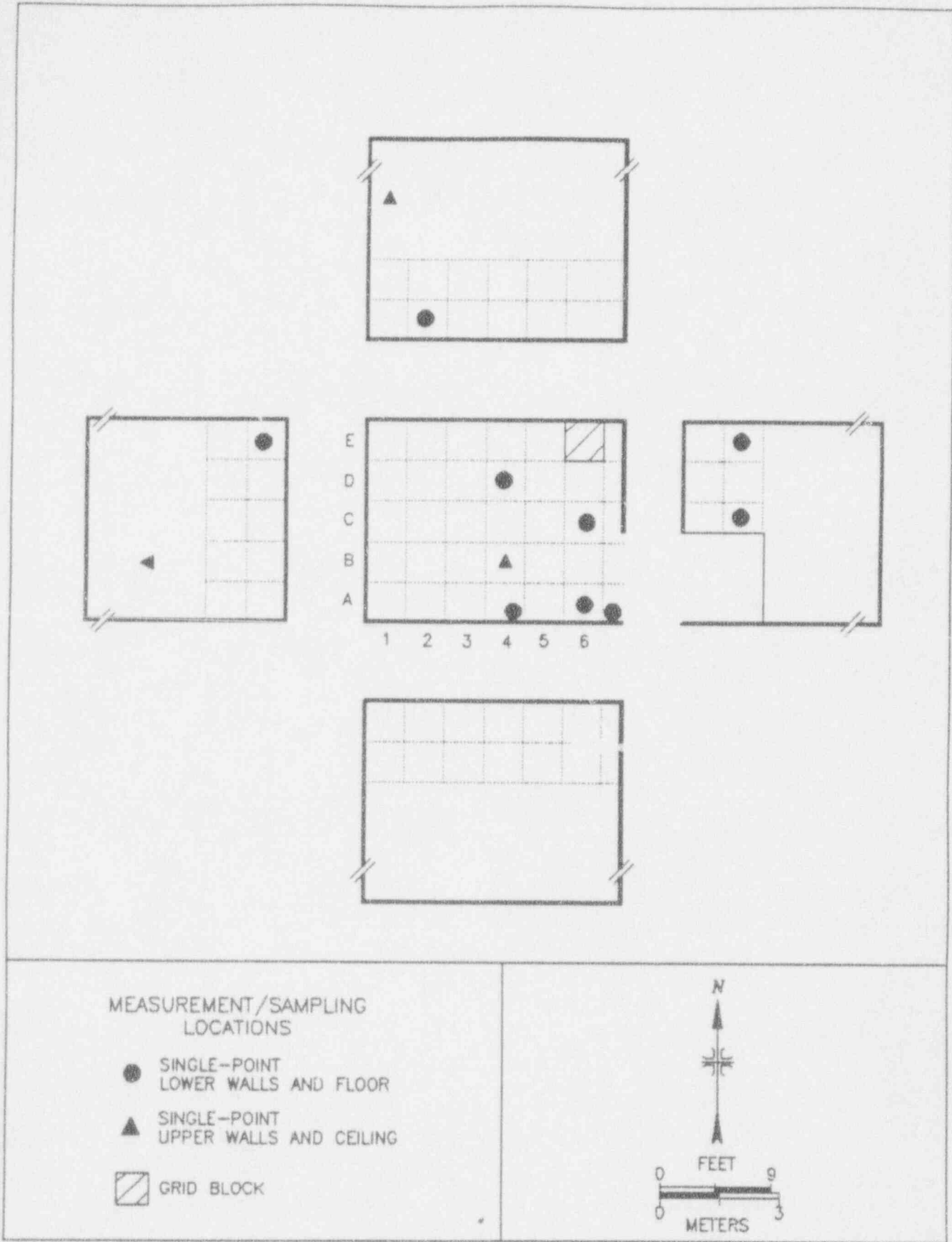


FIGURE 16: Plutonium Facility, Room 5 - Measurement and Sampling Locations

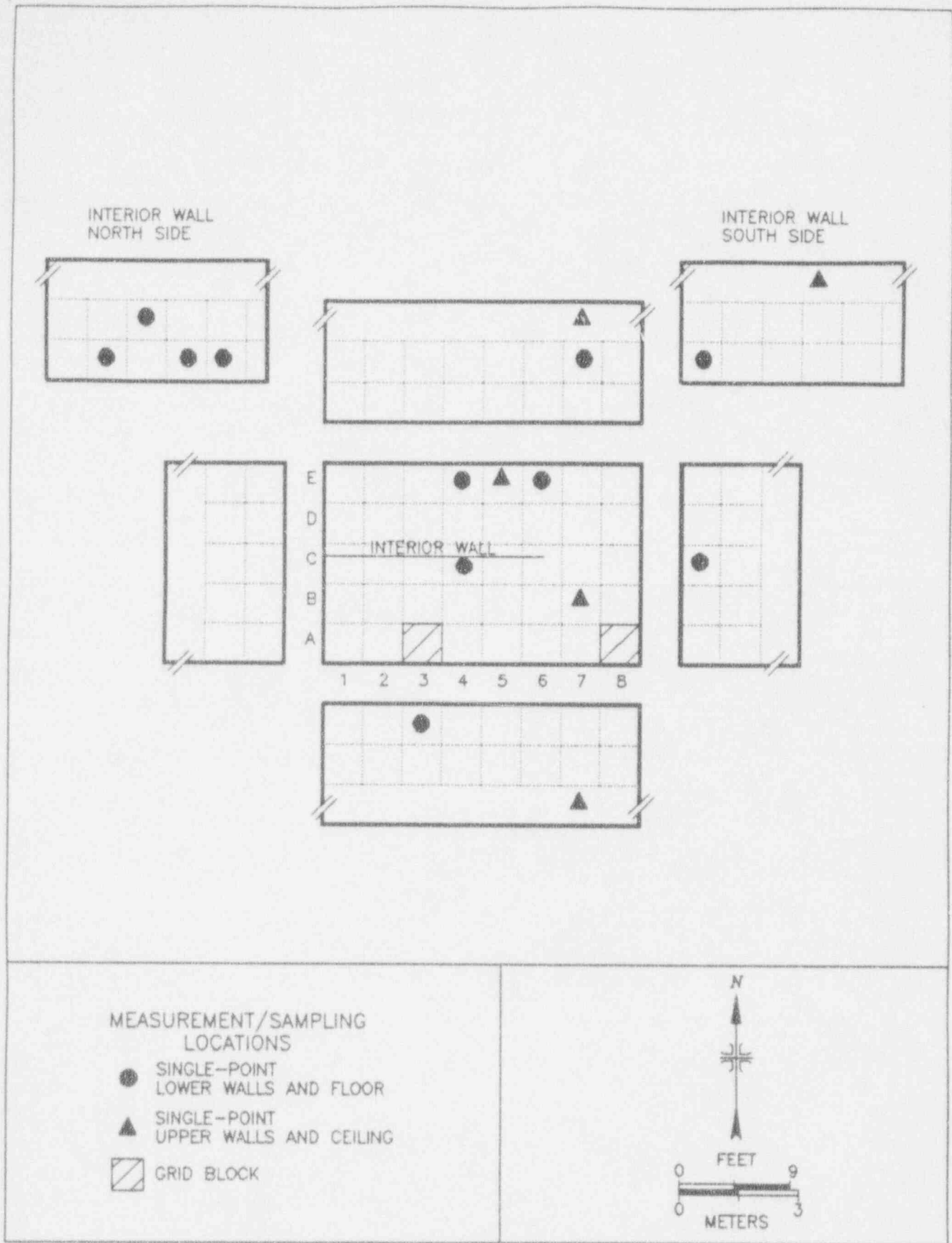


FIGURE 17: Plutonium Facility, Room 14 - Measurement and Sampling Locations

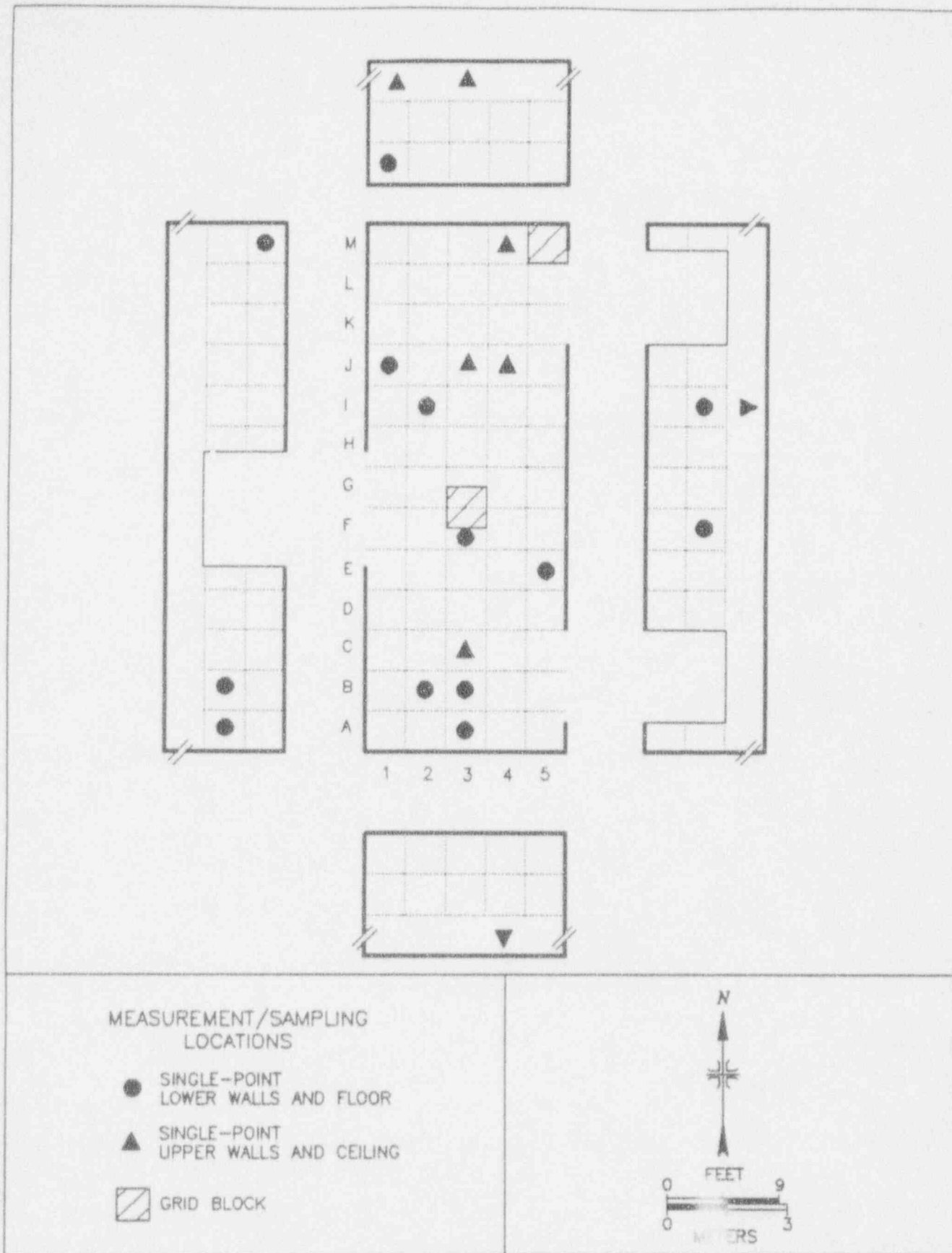


FIGURE 18: Plutonium Facility, Room 15 - Measurement and Sampling Locations

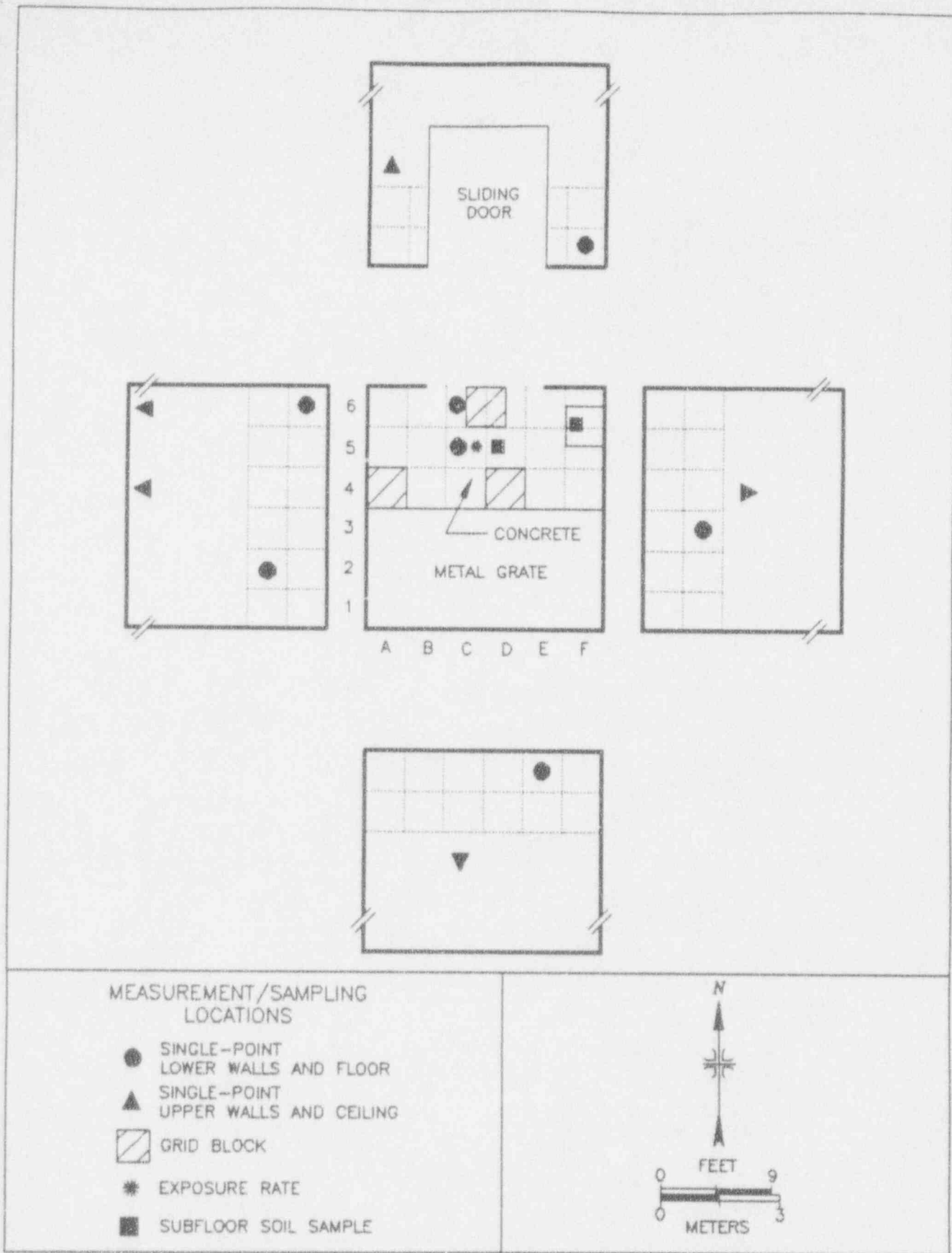


FIGURE 19: Waste Disposal Building, Upper Level - Measurement and Sampling Locations

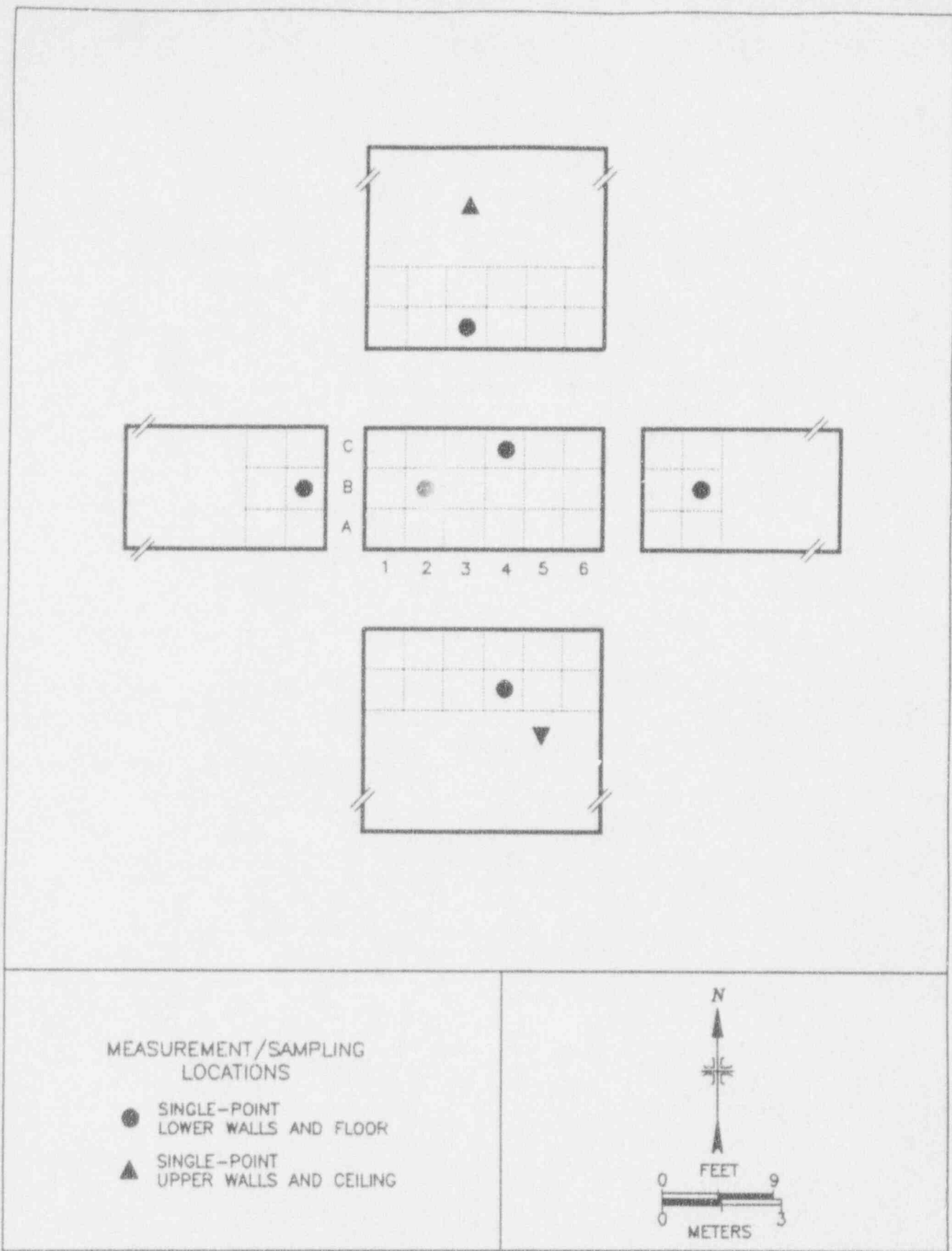


FIGURE 20: Waste Disposal Building, Lower Level – Measurement and Sampling Locations

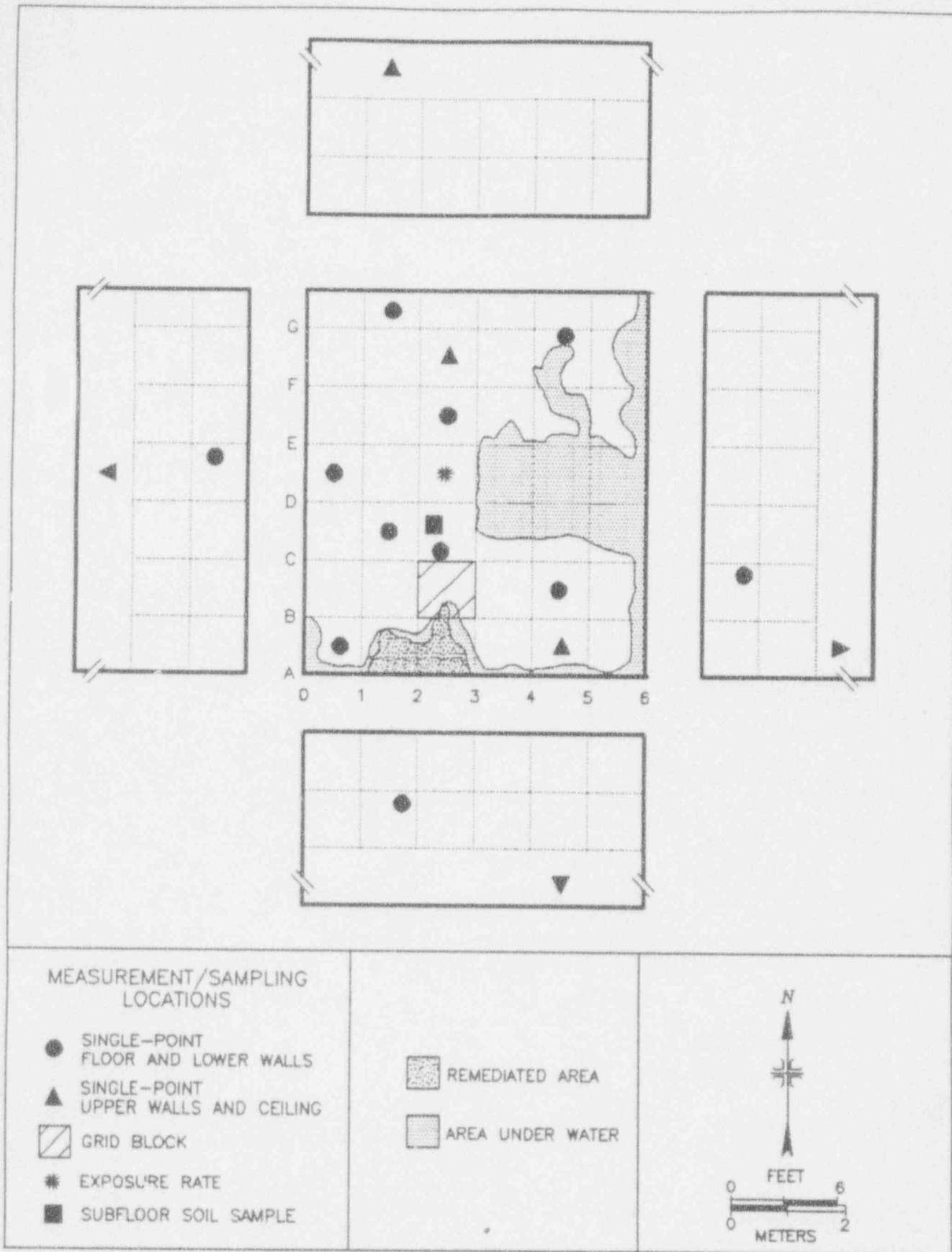


FIGURE 21: Multiple Failure Building - Measurement and Sampling Locations

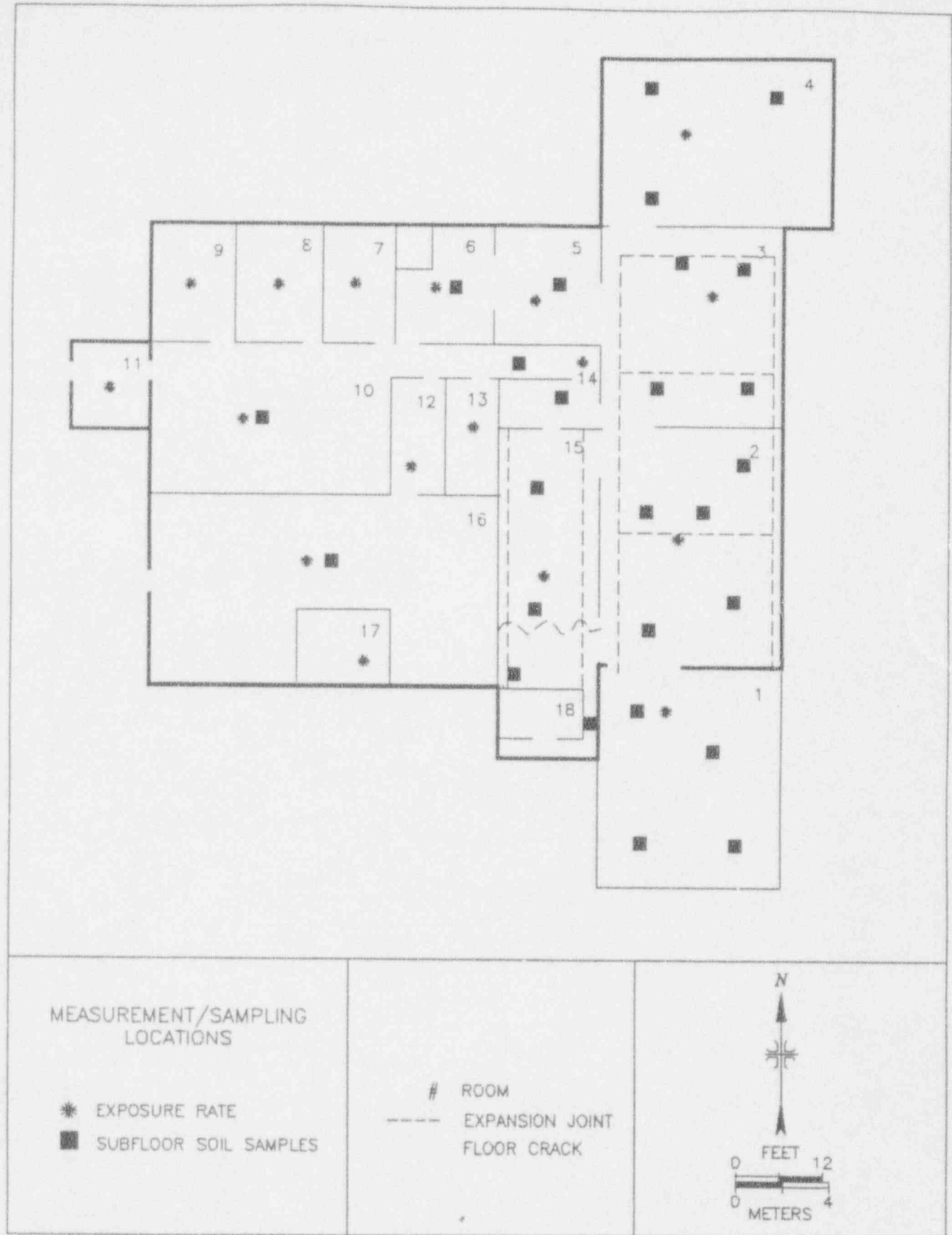


FIGURE 22: Plutonium Facility – Exposure Rate Measurement and Subfloor Sampling Locations

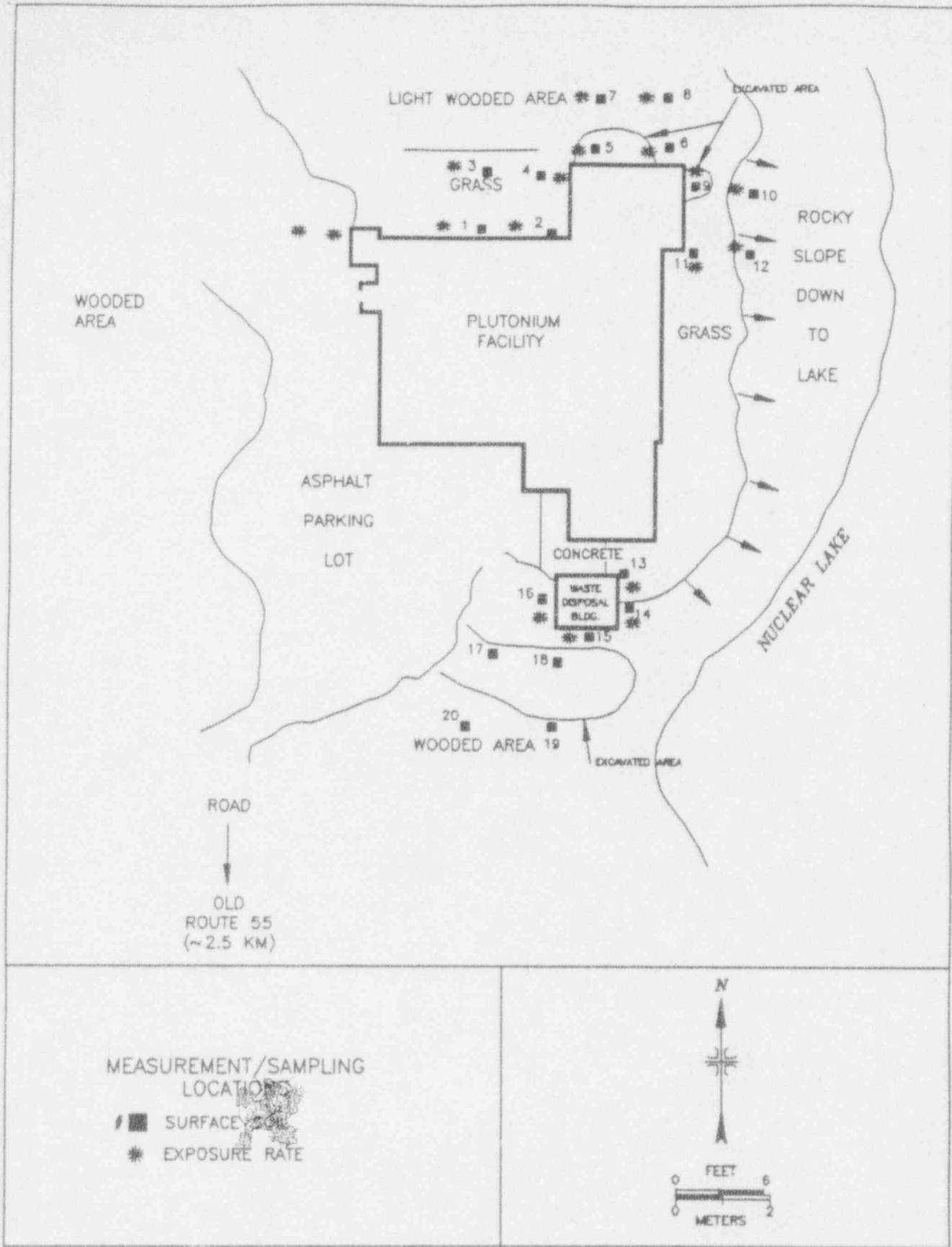


FIGURE 23: Affected Outdoor Soil Areas – Measurement and Sampling Locations

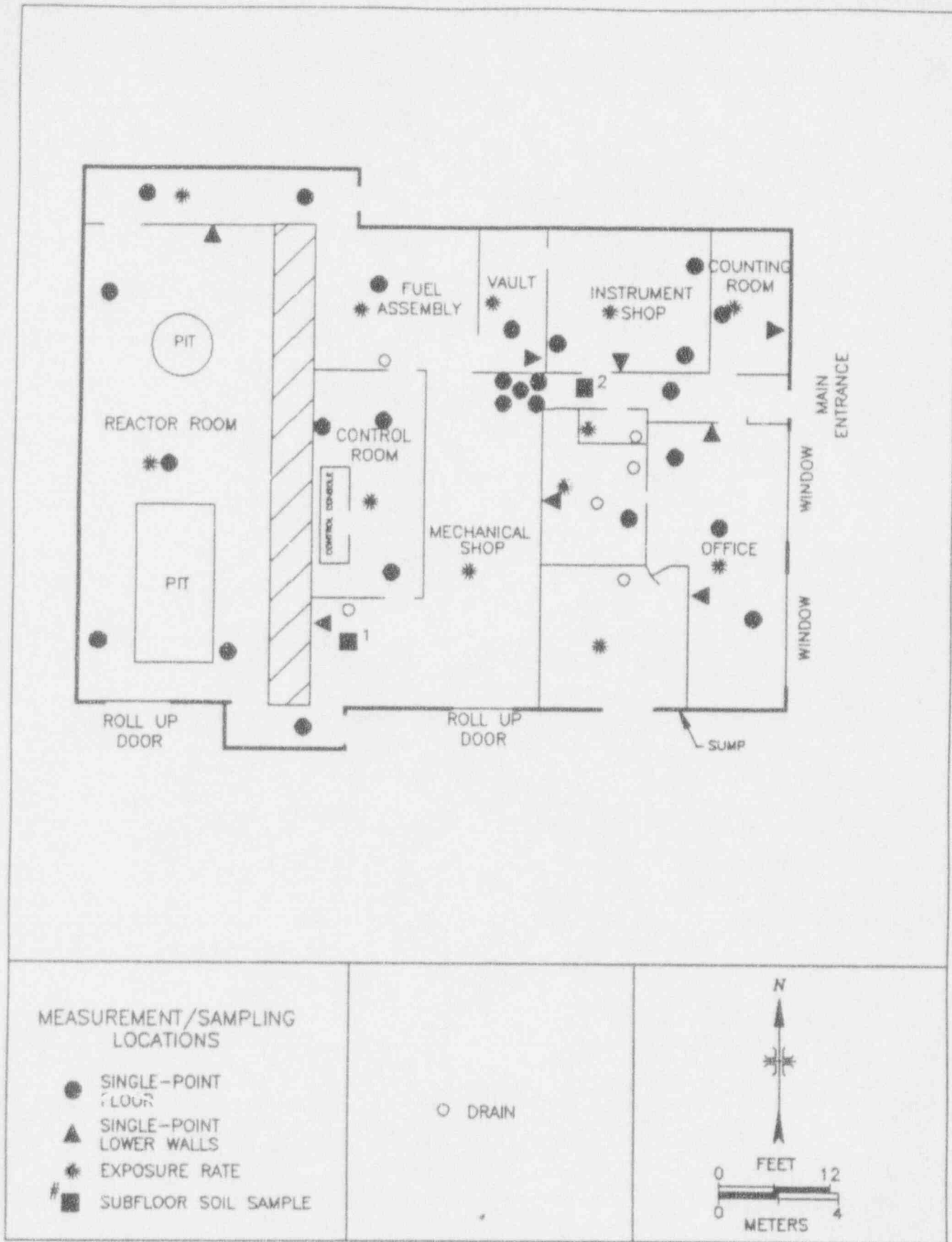


FIGURE 24: Critical Facility Building - Measurement and Sampling Locations

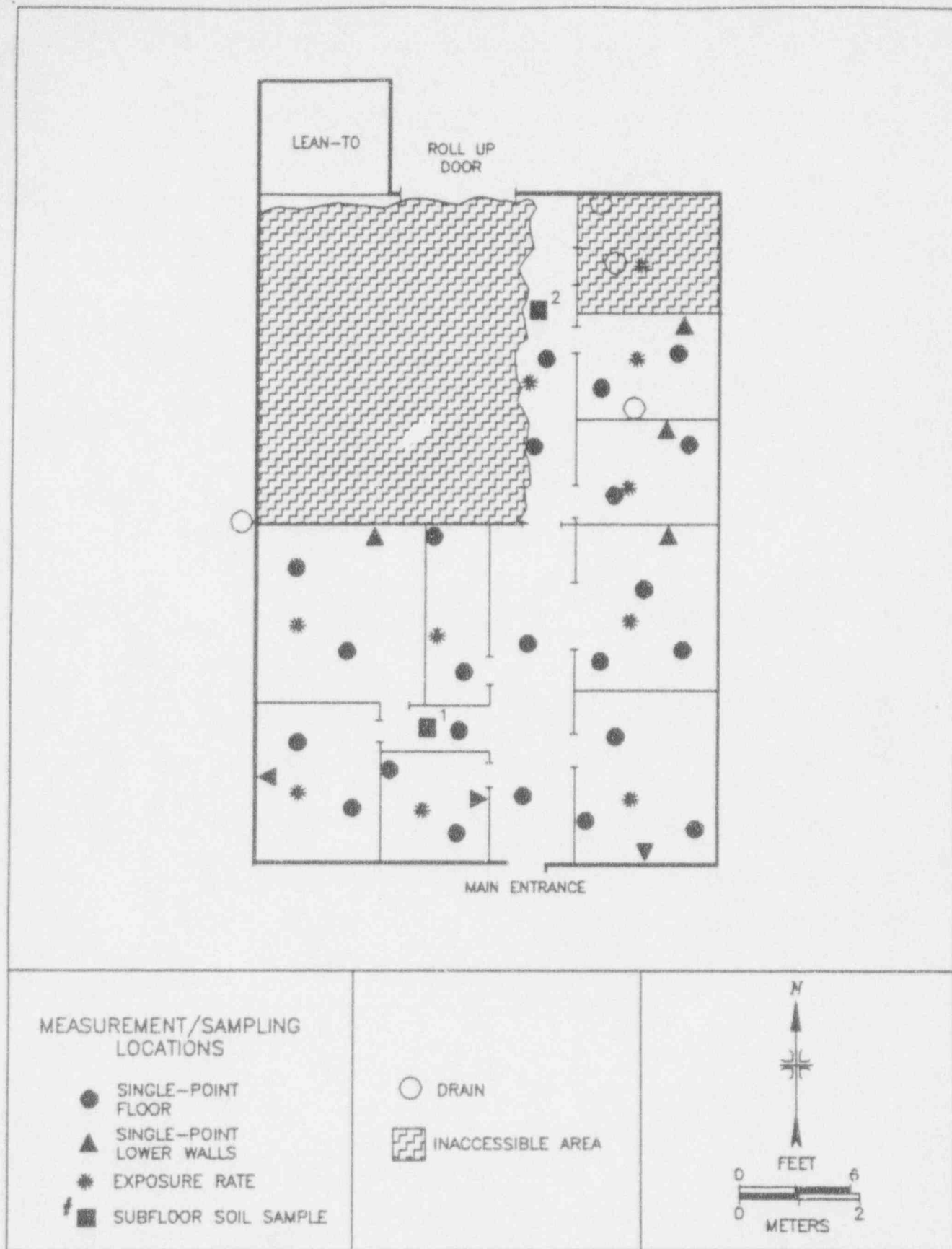


FIGURE 25: Engineering Building - Measurement and Sampling Locations

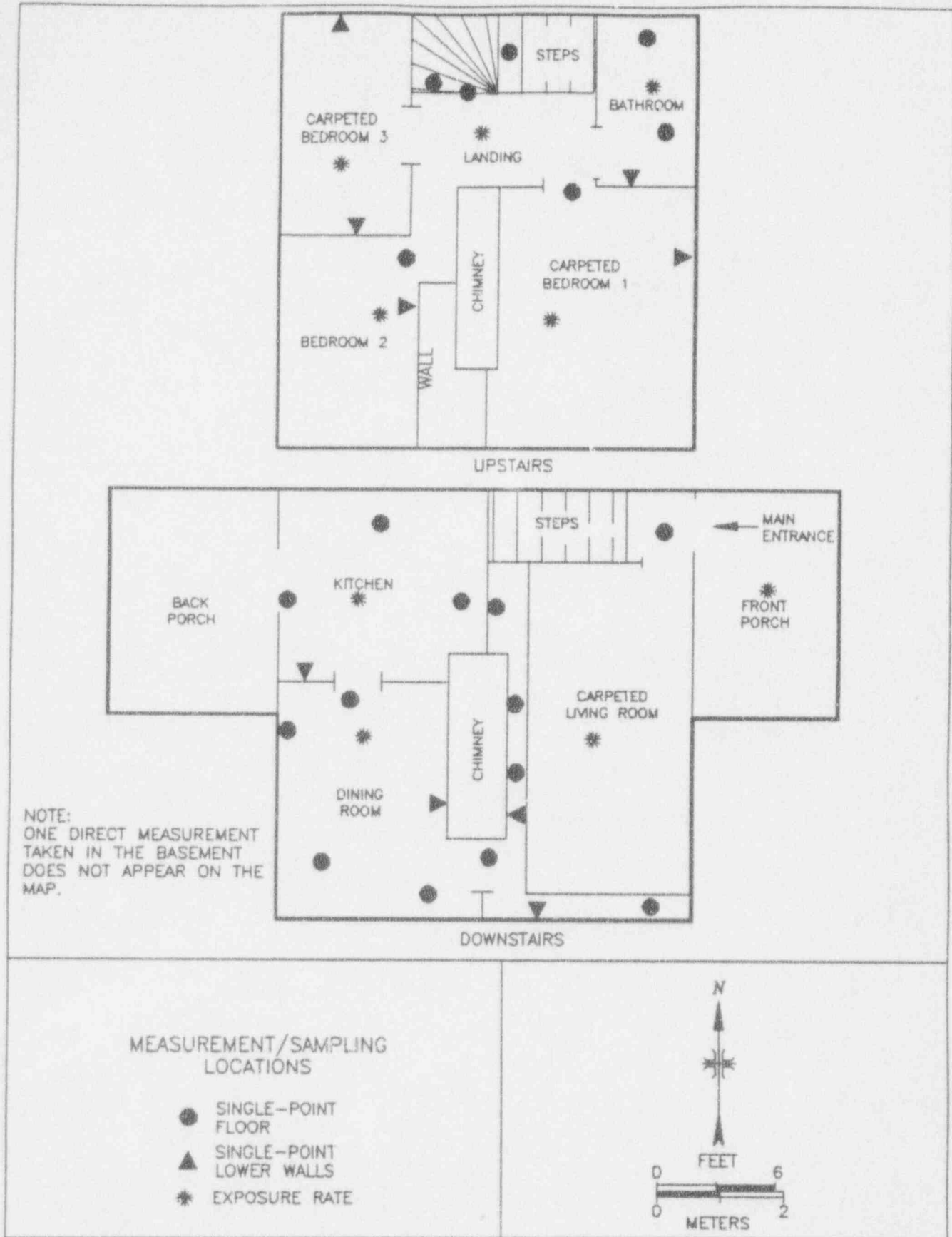
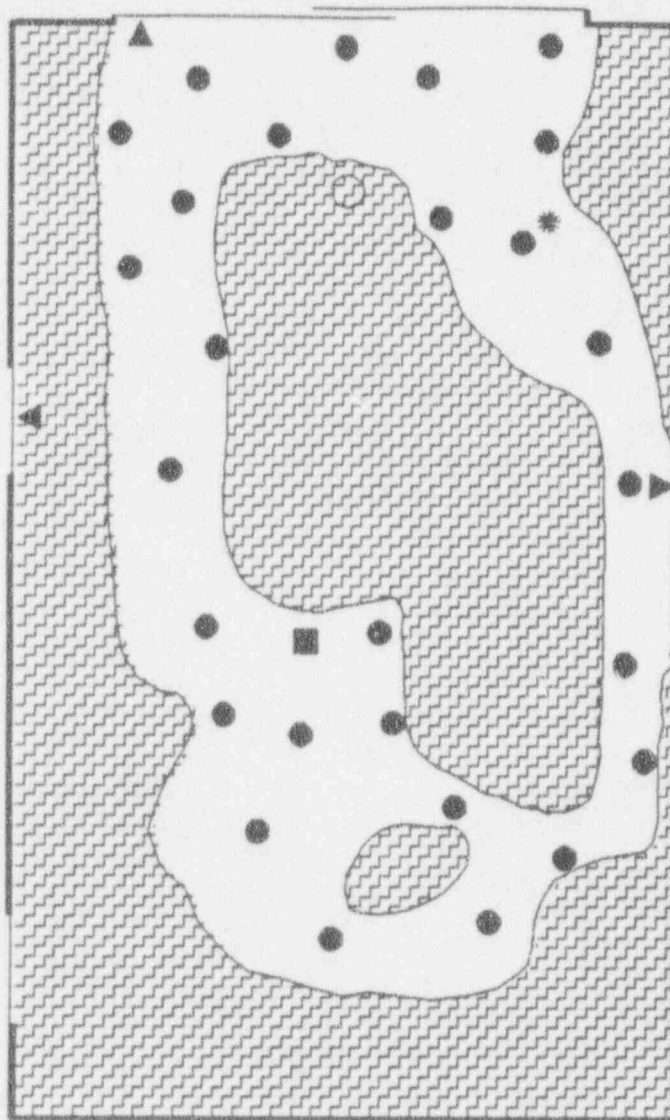


FIGURE 26: Remote Assembly Building – Measurement and Sampling Locations

SLIDING DOOR



MEASUREMENT/SAMPLING LOCATIONS

- SINGLE-POINT FLOOR
- ▲ SINGLE-POINT LOWER WALLS
- * EXPOSURE RATE
- SUBFLOOR SOIL SAMPLE

- DRAIN
- ▨ INACCESSIBLE AREA

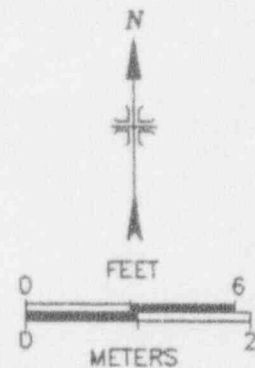


FIGURE 27: Shield Mock-Up Building - Measurement and Sampling Locations

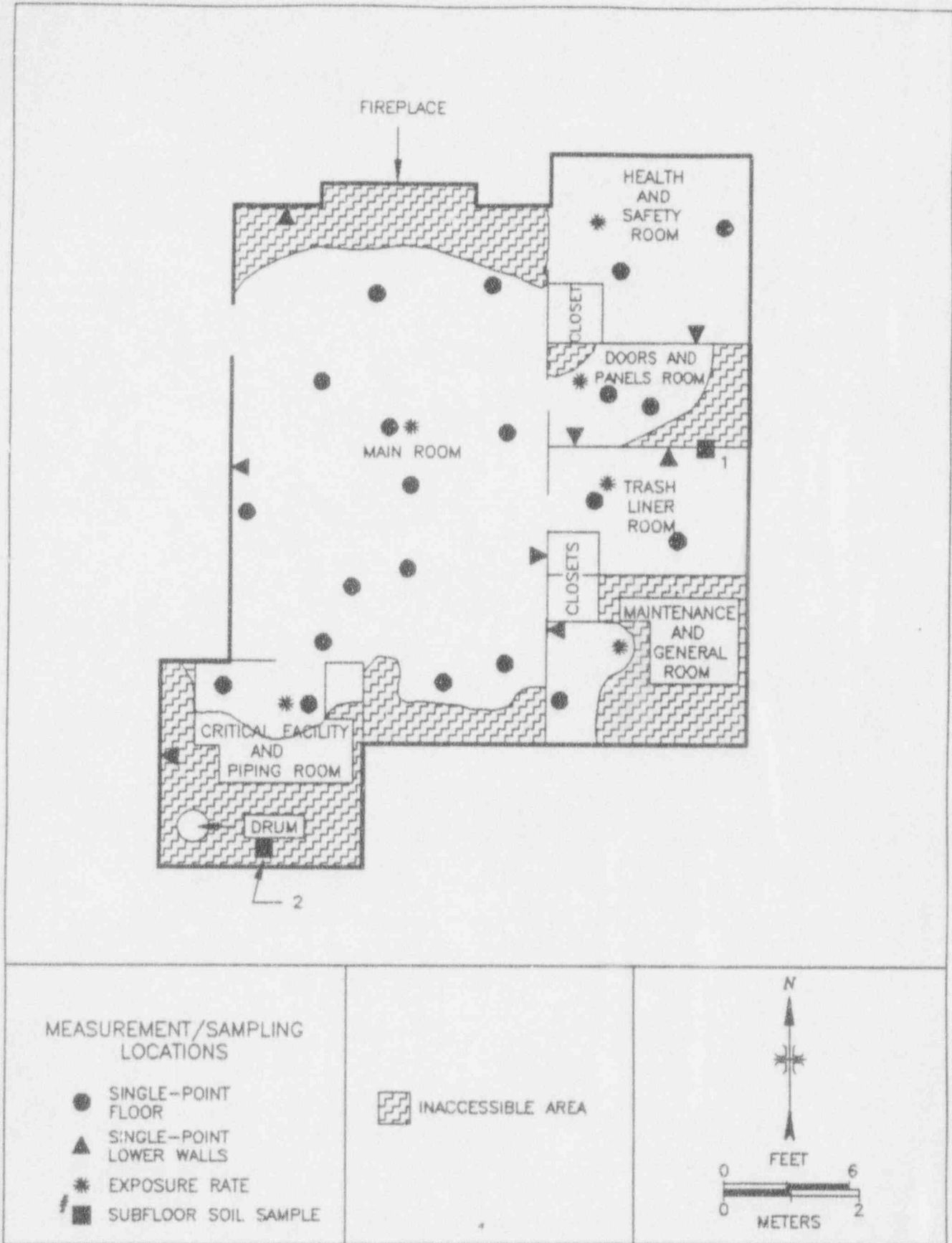


FIGURE 28: Lodge - Measurement and Sampling Locations

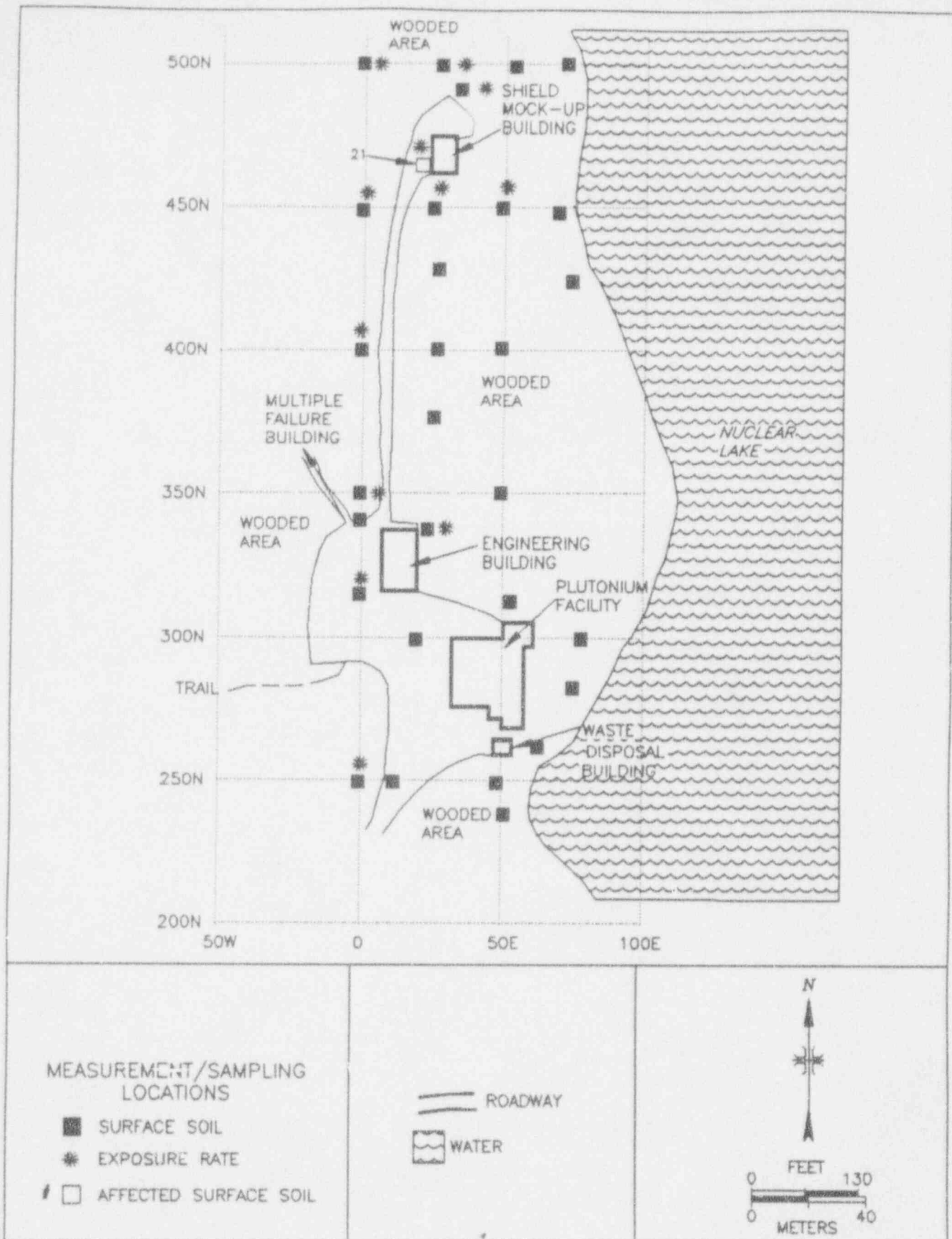


FIGURE 30: Survey Unit 1 - Measurement and Sampling Locations

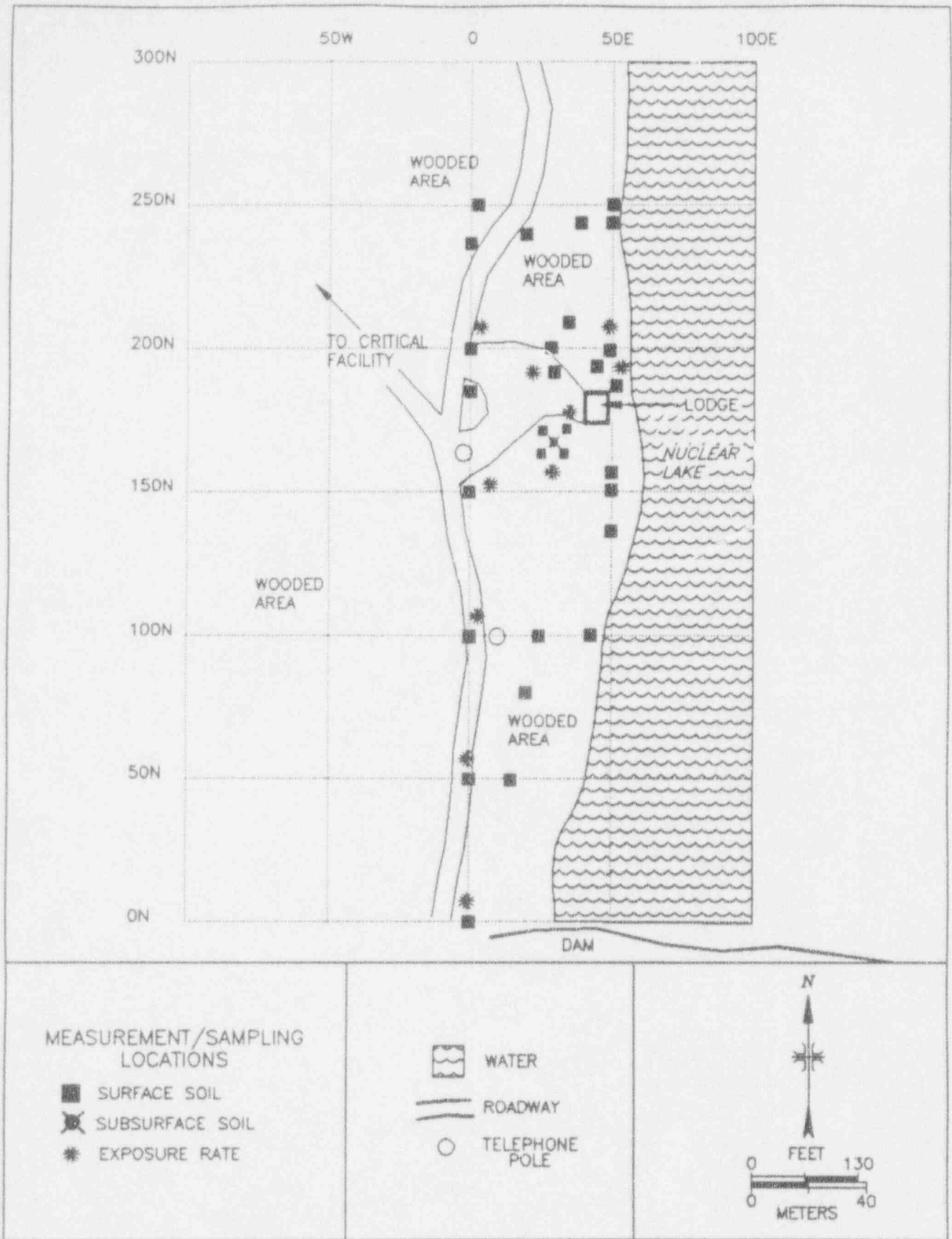


FIGURE 31: Survey Unit 2 (North Portion) – Measurement and Sampling Locations

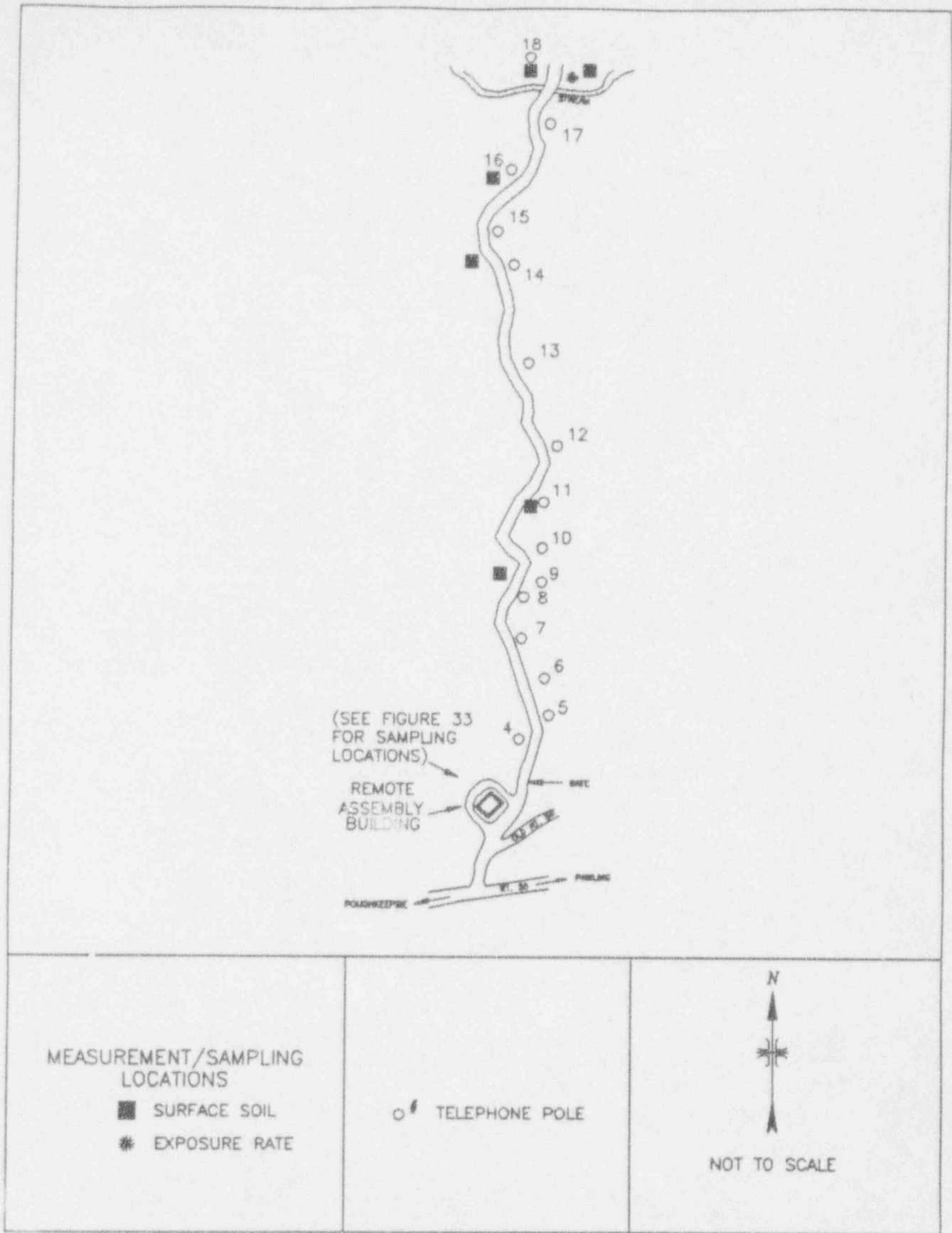


FIGURE 32: Survey Unit 2 (Central Portion, Access Road) - Measurement and Sampling Locations

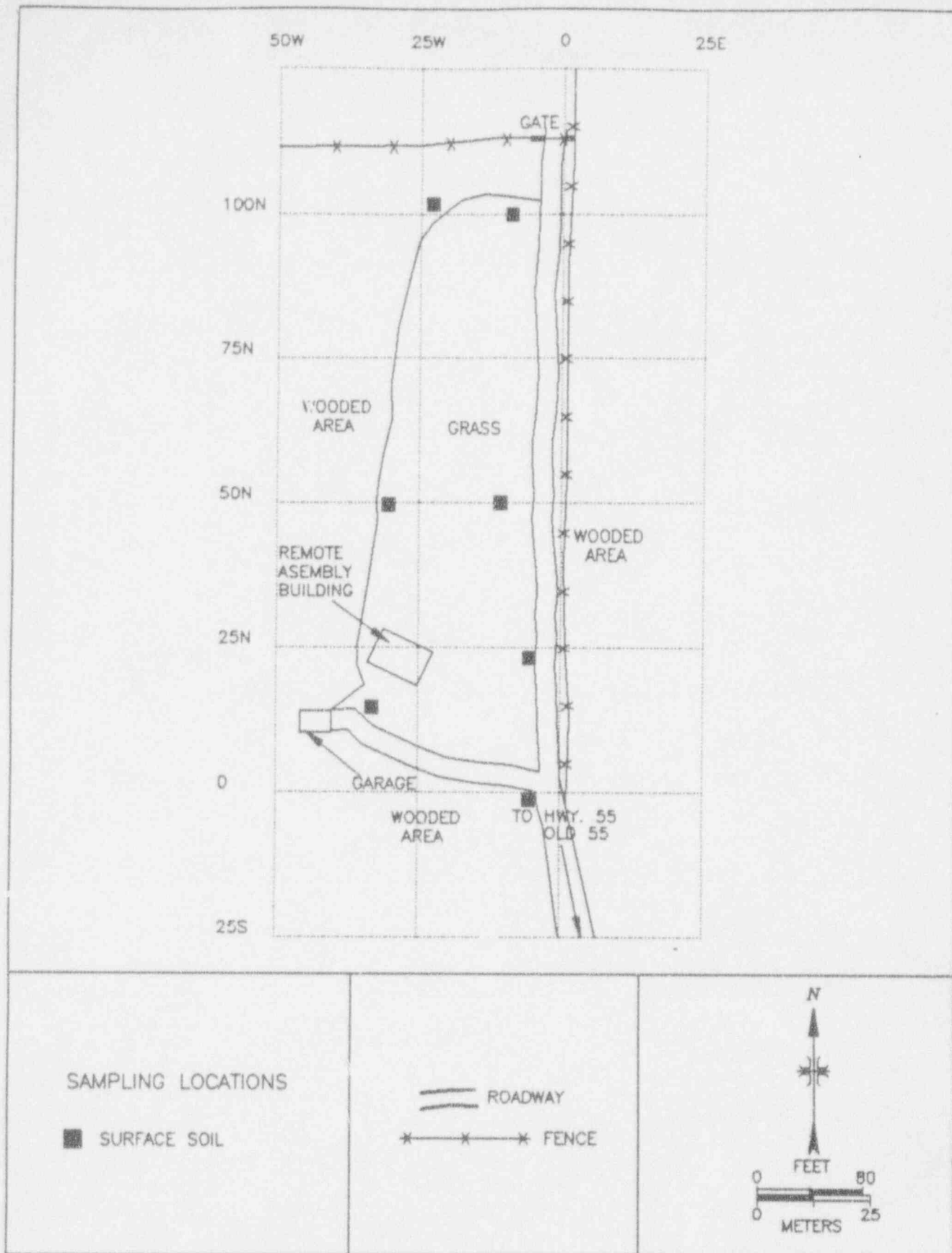


FIGURE 33: Survey Unit 2 (South Portion) - Measurement and Sampling Locations

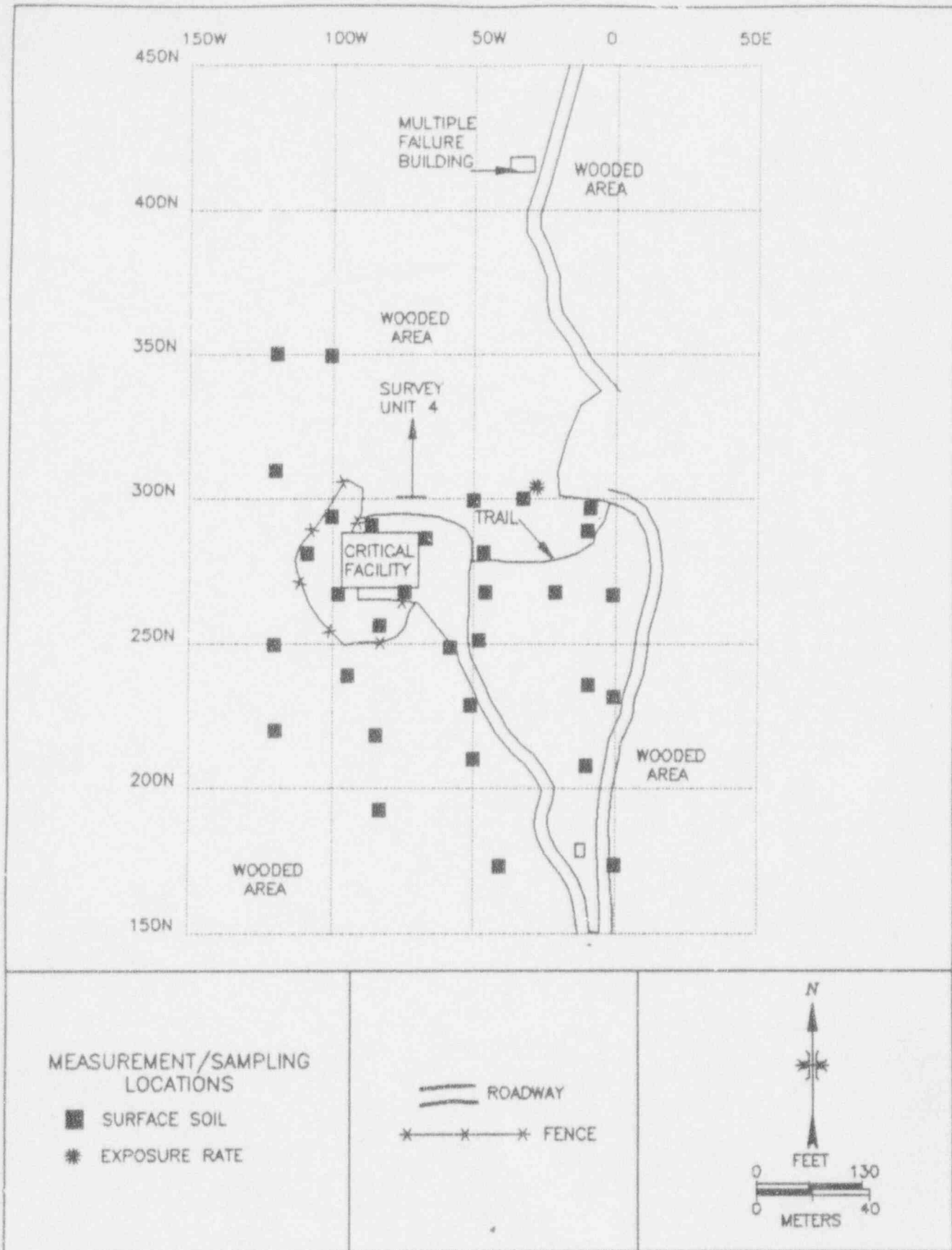


FIGURE 34: Survey Unit 3 and Southwest Survey Unit 4 – Measurement and Sampling Locations

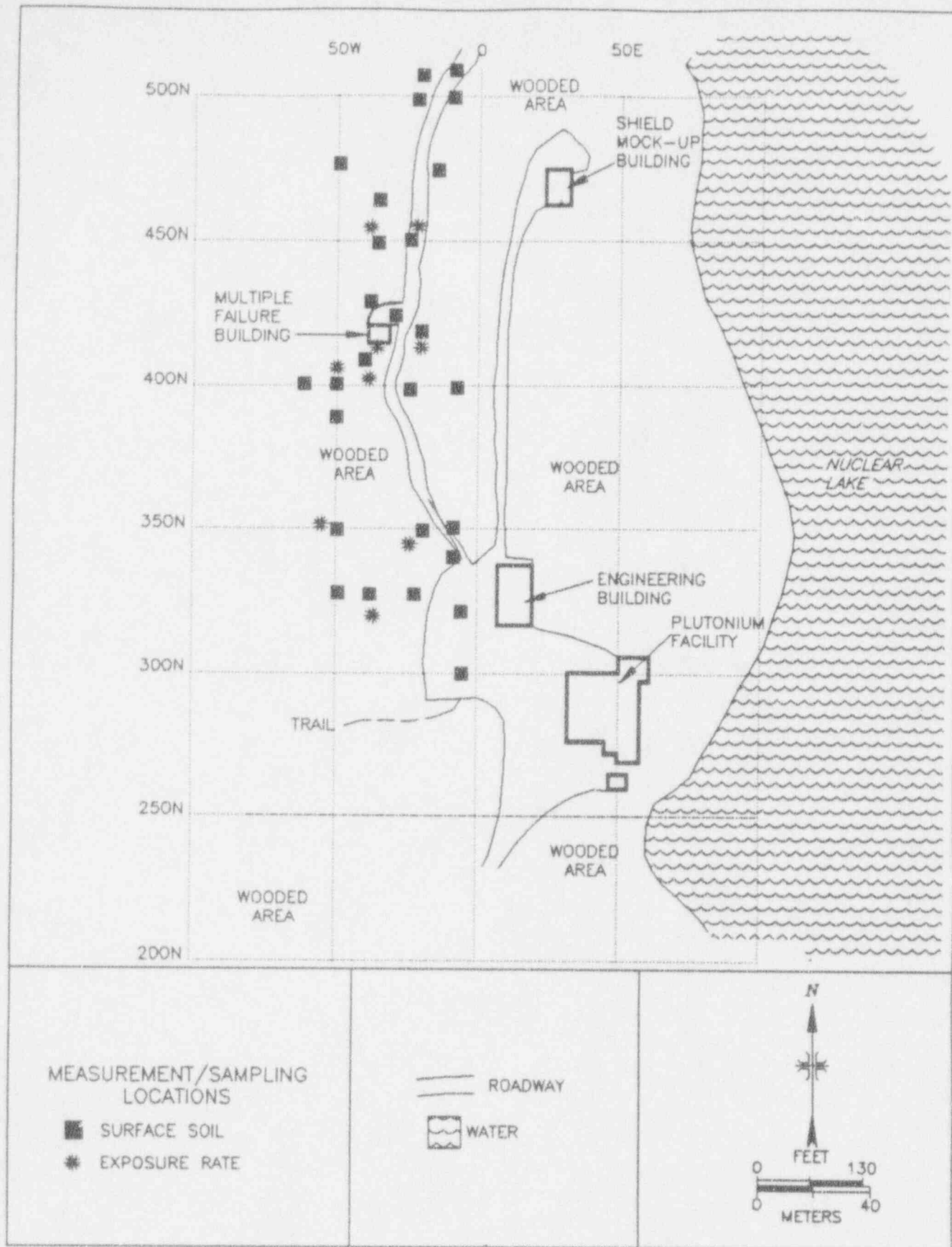


FIGURE 35: Survey Unit 4 - Measurement and Sampling locations

TABLE 1
SUMMARY OF PRE-REMEDATION SURFACE ACTIVITY MEASUREMENTS
AFFECTED BUILDINGS
NUCLEAR LAKE SITE
PAWLING, NEW YORK

Location*	Number of Measurement Locations		Total Activity Range (dpm/100 cm ²)				Removable Activity Range (dpm/100 cm ²)	
			Single Measurements		Grid Block Average			
	Single-pt.	Grid Blocks	Alpha	Beta	Alpha	Beta	Alpha	Beta
Plutonium Facility								
Room 3								
Floor	---	3	11 to 800	710 to 47,000	30 to 280	860 to 47,000	-1 to 6	-3 to 1
Lower Walls	---	1	59 to 230	230 to 650	310	360	-1	0
U. Walls and Ceiling	---	3	20 to 440	-420 to 270	80 to 240	-5 to -95	-1 to 1	-3 to 1
Room 4								
Floor	---	4	40 to 420	270 to 880	75 to 200	500 to 580	-1 to 12	-1 to 5
U. Walls and Ceiling	2	---	33 to 2,300	6 to 4,900	---	---	-1 to 25	2 to 3
Room 5								
Floor	2	1	41 to 420	970 to 1,300	120	1,200	1 to 4	-5 to 0
Room 14								
Floor	---	1	57 to 230	500 to 1,100	120	820	1	4
Room 15								
Floor	---	2	11 to 700	950 to 100,000	20 to 270	1,100 to 21,000	-1 to 4	-4 to 10
Waste Disposal Building								
Floor	---	3	-2 to 260	420 to 260,000	5 to 34	2,000 to 7,800	-1 to 6	-1 to 3
Multiple Failure Building								
Floor	---	1	2 to 14	720 to 50,000	11	9,800	-1	4

*Refer to Figures 14 through 16, 17 through 19, 21.

TABLE 2

SUMMARY OF SURFACE ACTIVITY MEASUREMENTS
NUCLEAR LAKE SITE—AFFECTED BUILDINGS
PAWLING, NEW YORK

Location ^a	Number of Measurement Locations		Total Activity Range (dpm/100 cm ²)				Removable Activity Range (dpm/100 cm ²)	
			Single Measurements		Grid Block Average			
	Single-pt.	Grid Blocks	Alpha	Beta	Alpha	Beta	Alpha	Beta
Plutonium Facility								
Room 1								
Floor	9	--- ^b	20 to 59	640 to 970	---	---	-1 to 4	-5 to 3
Lower Walls	8	---	-5 to 84	-570 to 360	---	---	-1 to 6	-4 to 1
U. Walls and Ceiling	11	---	-3 to 58	-590 to 490	---	---	-1 to 4	-3 to 4
Room 2								
Floor	12	---	9 to 52	810 to 1,200	---	---	-1 to 4	-3 to 2
Lower Walls	9	1	7 to 200	-520 to 500	72	26	-1 to 1	-4 to 1
U. Walls and Ceiling	17	1	0 to 110	-850 to 380	73	---	-1 to 6	-3 to 8
Room 3								
Floor	9	3	0 to 70	560 to 1,000	16 to 23	650 to 680	-1 to 4	-4 to 8
Lower Walls	6	1	-5 to 25	190 to 350	20	84	-1 to 4	-1 to 1
U. Walls and Ceiling	13	3	-2 to 200	-640 to 730	0 to 80	-100 to 310	-4 to 12	-5 to 8
Room 4								
Floor	9	4	0 to 140	-140 to 400	9 to 41	5 to 400	1 to 6	-1 to 7
Lower Walls	8	---	-2 to 20	-560 to -110	---	---	-1 to 4	-5 to 6
U. Wall and Ceiling	15	---	8 to 60	-1,800 to 6	---	---	-1 to 4	-4 to 8

TABLE 2 (Continued)

SUMMARY OF SURFACE ACTIVITY MEASUREMENTS
NUCLEAR LAKE SITE—AFFECTED BUILDING
PAWLING, NEW YORK

Location ^a	Number of Measurement Locations		Total Activity Range (dpm/100 cm ²)				Removable Activity Range (dpm/100 cm ²)	
			Single Measurements		Grid Block Average			
	Single-pt.	Grid Blocks	Alpha	Beta	Alpha	Beta	Alpha	Beta
Room 5								
Floor	5	1	7 to 70	850 to 1,200	23	480	-1 to 4	-5 to 4
Lower Walls	4	---	5 to 80	120 to 550	---	---	-1 to 4	-4 to 1
U. Walls and Ceiling	3	---	8 to 93	-20 to 260	---	---	-1 to 4	-4 to 1
Room 6								
Floor	1	1	5 to 180	210 to 1,500	14	370	-1 to 4	-3 to 0
Lower Walls	3	---	9 to 36	250 to 410	---	---	-4 to 4	-3 to 5
U. Walls and Ceiling	3	---	-2 to 32	19 to 230	---	---	-1 to 4	-4 to 3
Room 7								
Floor	2	---	16 to 34	880 to 960	---	---	-1 to 1	-1 to 3
Lower Walls	4	---	5 to 36	250 to 570	---	---	-1 to 1	-5 to 1
U. Walls and Ceiling	3	---	2 to 11	24 to 240	---	---	-1 to 1	-1 to 3
Room 8								
Floor	3	---	14 to 27	960 to 1,100	---	---	1 to 4	-1 to 8
Lower walls	4	---	-2 to 16	-240 to 410	---	---	-1 to 1	-3 to 0
U. Walls and Ceiling	3	---	2 to 20	38 to 330	---	---	-1 to 1	-3 to 9

TABLE 2 (Continued)

SUMMARY OF SURFACE ACTIVITY MEASUREMENTS
NUCLEAR LAKE SITE—AFFECTED BUILDING
PAWLING, NEW YORK

Location ^a	Number of Measurement Locations		Total Activity Range (dpm/100 cm ²)				Removable Activity Range (dpm/100 cm ²)	
			Single Measurements		Grid Block Average			
	Single-pt.	Grid Blocks	Alpha	Beta	Alpha	Beta	Alpha	Beta
Room 9								
Floor	2	---	0 to 7	790 to 880	---	---	-1 to 4	-3 to -1
Lower Walls	3	---	-7 to 14	-340 to 230	---	---	-1 to 1	-4 to 0
U. Walls and Ceiling	3	---	-2 to 27	-80 to 130	---	---	-1 to 1	-5 to 1
Room 10								
Floor	8	---	23 to 82	890 to 1,200	---	---	-1 to 6	-5 to 0
Lower Walls	9	---	-2 to 55	-480 to 360	---	---	-1 to 4	-4 to 21
U. Walls and Ceiling	8	---	-2 to 16	-120 to 450	---	---	-1 to 4	-3 to 17
Room 11								
Floor	1	---	14	630	---	---	6	-4
Lower Walls	3	---	0 to 18	-26 to 210	---	---	-1 to 1	-1 to 3
U. Walls and Ceiling	1	---	18	290	---	---	-1	0
Room 12								
Lower Walls	4	---	2 to 18	-210 to 360	---	---	-1	-3 to 3
U. Walls and Ceiling	3	---	5 to 11	340 to 2,300	---	---	-1 to 4	0 to -4

TABLE 2 (Continued)

SUMMARY OF SURFACE ACTIVITY MEASUREMENTS
NUCLEAR LAKE SITE—AFFECTED BUILDING
PAWLING, NEW YORK

Location ^a	Number of Measurement Locations		Total Activity Range (dpm/100 cm ²)				Removable Activity Range (dpm/100 cm ²)	
			Single Measurements		Grid Block Average			
	Single-pt.	Grid Blocks	Alpha	Beta	Alpha	Beta	Alpha	Beta
Room 13								
Floors	4	---	18 to 25	-430 to 2,100	---	---	1	-4 to 3
Lower Walls	3	---	9 to 16	200 to 280	---	---	-1 to 4	-3 to 9
Room 14								
Floor	3	2	0 to 150	450 to 510	50 to 93	-110 to 1,100	-1 to 6	-4 to 1
Lower Walls	8	---	2 to 48	-260 to 570	---	---	-1 to 1	-4 to 1
U. Walls and Ceiling	5	---	0 to 66	-76 to 320	---	---	-1 to 4	-4 to 1
Room 15								
Floor	7	2	-5 to 43	560 to 2,500	9 to 18	780 to 1,300	-1 to 4	-4 to 1
Lower Walls	6	---	5 to 64	18 to 730	---	---	-1 to 1	-3 to 3
U. Walls and Ceiling	8	---	11 to 89	58 to 610	---	---	-1 to 4	-5 to 4
Room 16								
Floor	15	---	18 to 68	640 to 1,200	---	---	-1 to 8	-5 to 7
Lower Walls	13	---	-5 to 50	-230 to 1,000	---	---	-1 to 4	-5 to 6
U. Walls and Ceiling	12	---	-5 to 43	-76 to 310	---	---	-4 to 6	-3 to 6

TABLE 2 (Continued)

SUMMARY OF SURFACE ACTIVITY MEASUREMENTS
NUCLEAR LAKE SITE—AFFECTED BUILDING
PAWLING, NEW YORK

Location ^a	Number of Measurement Locations		Total Activity Range (dpm/100 cm ²)				Removable Activity Range (dpm/100 cm ²)	
			Single Measurements		Grid Block Average			
	Single-pt.	Grid Blocks	Alpha	Beta	Alpha	Beta	Alpha	Beta
Room 17								
Floor	2	---	34 to 86	310 to 500	---	---	1	-4 to 1
Lower Walls	6	---	30 to 73	240 to 870	---	---	1 to 1	-5 to 6
U. Walls and Ceiling	5	---	16 to 55	250 to 940	---	---	-1 to 8	-3 to 3
Room 18								
Floor	2	---	41 to 89	-11 to 860	---	---	1	-3 to 1
Lower Walls	5	---	-7 to 20	5 to 2,600	---	---	-1 to 1	-5 to -3
U. Walls and Ceiling	3	---	11 to 64	-10 to 490	---	---	-1 to 1	-5 to 0
Waste Disposal Building								
Floor	4	3	2 to 27	400 to 950	9	1,400 to 1,700	-1 to 1	-3 to -1
Lower Walls	9	---	-2 to 25	-660 to 390	---	---	-1 to 4	-4 to 3
U. Walls and Ceiling	7	---	0 to 9	180 to 350	---	---	-1 to 4	-1 to 8
Multiple Failure Buildings								
Floor	8	1	5 to 27	500 to 1,300	14	770	-1 to 4	-3 to 4
Lower Walls	3	---	-2 to 5	-500 to -460	---	---	-1 to 4	-3 to 0
U. Walls and Ceiling	6	---	-7 to 5	-460 to 120	---	---	-1 to 1	-5 to 5

^aRefer to Figures 11 through 21.

TABLE 3

EXPOSURE RATES
AFFECTED BUILDINGS
NUCLEAR LAKE SITE
PAWLING, NEW YORK

Location ^a	Exposure Rate Range at 1 m ($\mu\text{R}/\text{h}$) ^b	Average
Plutonium Facility	9 to 12	10
Waste Disposal Building	10	10
Multiple Failure Building	8	8

^aRefer to Figures 19 through 22.

^bIncludes background.

TABLE 4

RADIONUCLIDE CONCENTRATIONS IN SUBFLOOR SOIL
AFFECTED BUILDINGS
NUCLEAR LAKE SITE
PAWLING, NEW YORK

Location ^a	Radionuclide Concentration (pCi/g)				
	Cs-137	Am-241	Th-232	U-235	U-238
Plutonium Facility					
Room 1					
B,3	0.2 ± 0.1 ^b	<0.1	0.7 ± 0.3	0.1 ± 0.1	0.3 ± 0.4
B,8	0.1 ± 0.1	<0.1	0.8 ± 0.3	0.1 ± 0.1	1.0 ± 0.9
G,6	0.7 ± 0.1	<0.1	1.0 ± 0.2	0.1 ± 0.1	0.9 ± 0.8
H,1	0.1 ± 0.1	<0.1	0.9 ± 0.3	0.1 ± 0.1	0.9 ± 1.2
Room 2					
C,3 ^c	<0.1	<0.1	0.7 ± 0.3	0.1 ± 0.1	0.8 ± 1.0
D,7 ^c	<0.1	<0.1	0.8 ± 0.4	0.1 ± 0.1	1.1 ± 1.0
H,4 ^c	<0.1	<0.1	1.0 ± 0.3	0.1 ± 0.1	1.0 ± 1.0
H,7 ^c	<0.1	<0.1	0.9 ± 0.3	0.1 ± 0.1	0.6 ± 0.7
K,8 ^c	<0.1	<0.1	0.9 ± 0.4	0.1 ± 0.1	0.3 ± 0.8
Room 3					
B,3 ^d	<0.1	<0.1	0.9 ± 0.2	0.1 ± 0.1	0.8 ± 1.1
B,8 ^d	<0.1	<0.1	0.8 ± 0.3	0.1 ± 0.1	1.2 ± 0.7
J,4 ^d	<0.1	<0.1	<0.4	0.1 ± 0.1	<1.1
J,8 ^d	<0.1	<0.1	0.8 ± 0.3	0.1 ± 0.1	0.1 ± 0.1
Room 4					
B,4 ^e	0.1 ± 0.1	<0.1	0.7 ± 0.2	0.1 ± 0.1	0.6 ± 0.7
G,3 ^e	0.2 ± 0.1	<0.1	0.5 ± 0.2	0.1 ± 0.1	<1.1
Room 5					
C,5	<0.1	<0.1	0.3 ± 0.2	0.1 ± 0.1	0.3 ± 0.6
Room 6					
C,3	<0.1	<0.1	0.5 ± 0.2	0.1 ± 0.1	0.5 ± 0.8

TABLE 4 (Continued)

RADIONUCLIDE CONCENTRATIONS IN SUBFLOOR SOIL
AFFECTED BUILDINGS
NUCLEAR LAKE SITE
PAWLING, NEW YORK

Location ^a	Radionuclide Concentration (pCi/g)				
	Cs-137	Am-241	Th-232	U-235	U-238
Plutonium Facility (Continued)					
Room 10					
D,5	0.1 ± 0.1	<0.1	0.4 ± 0.2	0.1 ± 0.1	0.7 ± 0.9
Room 14					
B,5	<0.1	<0.1	0.5 ± 0.2	0.1 ± 0.1	0.8 ± 0.9
D,5	<0.1	<0.1	0.6 ± 0.2	0.1 ± 0.1	0.6 ± 0.8
Room 15					
A,1	0.1 ± 0.1	<0.1	0.6 ± 0.2	0.1 ± 0.1	0.9 ± 0.6
G,3	<0.1	<0.1	0.5 ± 0.3	0.1 ± 0.1	0.9 ± 0.8
K,3	<0.1	<0.1	0.4 ± 0.2	0.1 ± 0.1	0.5 ± 0.9
Room 16					
G,10	<0.1	<0.1	0.6 ± 0.4	<0.1	0.6 ± 0.9
Room 18					
B,4	<0.1	<0.1	0.7 ± 0.2	0.1 ± 0.1	0.2 ± 1.0
Waste Disposal Building					
D,4	0.1 ± 0.1	<0.1	0.7 ± 0.3	0.1 ± 0.1	0.9 ± 0.6
F,5	0.4 ± 0.1	<0.1	0.6 ± 0.2	0.1 ± 0.1	1.1 ± 0.9
Multiple Failure Building					
C,3	<0.1	<0.1	0.5 ± 0.2	0.1 ± 0.1	0.8 ± 0.9

^aRefer to Figures 19 through 22.

^bUncertainties represent the 95% confidence level, based only on counting statistics.

^{c-c}Sample composite groups analyzed by alpha spectrometry for plutonium.

TABLE 5

PLUTONIUM CONCENTRATIONS IN COMPOSITE SOILS
NUCLEAR LAKE SITE
PAWLING, NEW YORK

Location ^a	Plutonium Concentration (pCi/g)	
	Pu-239/240	Pu-238
Plutonium Facility Subfloor Room 2	<0.03	<0.12
Plutonium Facility Subfloor Room 3	<0.03	0.12 ± 0.08 ^b
Plutonium Facility Subfloor Room 4	<0.07	<0.09
Plutonium Facility Exterior Sample Locations 1-4	<0.03	<0.8
Plutonium Facility Exterior Sample Locations 5-8	<0.07	0.04 ± 0.04
Plutonium Facility Exterior Sample Locations 9-12	<0.24	<0.24
Survey Unit 3 270N,20W; 270N,0	0.38 ± 0.12	<0.02
Survey Unit 3 286N,9W; 283N,46W	1.20 ± 0.21	<0.07
Survey Unit 4 400N,60W; 425N,30W; 465N, 40W	0.05 ± 0.05	0.05 ± 0.04

^aRefer to Figures 22, 23, and 34.

^bUncertainties represent the 95% confidence level, based only on counting statistics.

TABLE 6
EXPOSURE RATES AND
RADIONUCLIDE CONCENTRATIONS IN SOIL
AFFECTED OUTDOOR SOIL AREAS
NUCLEAR LAKE SITE
PAWLING, NEW YORK

Location ^a	Exposure Rate at 1 m (μ R/h)	Radionuclide Concentration (pCi/g)				
		Cs-137	Am-241	Th-232	U-235	U-238
Plutonium Facility						
1 ^c	12	0.1 ± 0.1 ^b	<0.1	0.8 ± 0.6	0.1 ± 0.1	0.8 ± 0.8
2 ^c	11	0.4 ± 0.1	<0.1	0.8 ± 0.3	<0.1	0.7 ± 1.0
3 ^c	10	<0.1	<0.1	1.0 ± 0.2	0.1 ± 0.1	0.8 ± 1.1
4 ^c	10	0.1 ± 0.1	<0.1	0.8 ± 0.3	0.1 ± 0.1	0.8 ± 0.3
5 ^d	10	0.1 ± 0.1	<0.1	0.7 ± 0.2	0.1 ± 0.1	0.8 ± 1.0
6 ^d	11	0.1 ± 0.1	<0.1	1.1 ± 0.3	0.1 ± 0.1	1.6 ± 1.5
7 ^d	9	0.6 ± 0.1	<0.1	1.0 ± 0.3	0.1 ± 0.1	1.3 ± 1.0
8 ^d	10	0.2 ± 0.1	0.1 ± 0.1	0.9 ± 0.4	<0.1	1.2 ± 1.1
9 ^e	10	0.1 ± 0.1	0.1 ± 0.1	0.6 ± 0.3	0.1 ± 0.1	1.6 ± 1.1
10 ^e	11	0.6 ± 0.1	<0.2	1.1 ± 0.5	0.1 ± 0.1	1.0 ± 1.0
11 ^e	10	0.2 ± 0.1	<0.1	0.8 ± 0.3	0.1 ± 0.1	0.5 ± 0.6
12 ^e	12	1.1 ± 0.2	<0.2	0.4 ± 0.3	0.1 ± 0.1	0.4 ± 0.9
Waste Disposal Building						
13	10	0.6 ± 0.1	0.1 ± 0.1	0.5 ± 0.2	0.1 ± 0.1	0.9 ± 0.6
14	10	0.3 ± 0.1	<0.1	0.7 ± 0.2	0.1 ± 0.1	0.8 ± 0.8
15	11	0.1 ± 0.1	<0.1	0.5 ± 0.3	0.1 ± 0.1	0.5 ± 0.7
16	11	0.1 ± 0.1	<0.1	0.6 ± 0.3	0.1 ± 0.1	1.2 ± 1.2
17	--	0.5 ± 0.1	<0.2	0.9 ± 0.4	0.1 ± 0.1	1.5 ± 1.2
18	--	0.5 ± 0.1	<0.1	0.6 ± 0.2	0.1 ± 0.1	0.7 ± 0.6
19	--	5.5 ± 0.3	<0.1	0.7 ± 0.3	0.1 ± 0.1	1.6 ± 1.5
20	--	0.4 ± 0.1	<0.1	0.8 ± 0.3	0.1 ± 0.1	1.0 ± 1.0
Shield Mock-Up Building						
21	8	0.1 ± 0.1	<0.1	0.7 ± 0.2	0.1 ± 0.1	0.2 ± 0.6

^aRefer to Figures 23 and 30.

^bUncertainties represent the 95% confidence level, based only on counting statistics.

^c*Sample composite groups analyzed by alpha spectrometry for plutonium.

TABLE 7
SUMMARY OF SURFACE ACTIVITY LEVELS
UNAFFECTED BUILDINGS
NUCLEAR LAKE SITE
PAWLING, NEW YORK

Location*	Number of Measurement Locations	Total Activity Range (dpm/100 cm ²) Single Measurements		Removable Activity Range (dpm/100 cm ²)	
		Alpha	Beta	Alpha ^e	Beta ^f
Critical Facility					
Floor	26	0 to 37 ^b	660 to 1,100 ^c	-1 to 4	-7 to 8
Lower Walls	8	-7 to 18 ^b	-290 to 510 ^c	-1 to 4	-3 to 8
Engineering Building					
Floor	23	-2 to 16 ^b	420 to 850 ^c	-1 to 4	-5 to 3
Lower Walls	7	0 to 23 ^b	-320 to 230 ^c	-1 to 6	-1 to 16
Remote Assembly Building					
Floor	21	-270 to 54 ^b	-270 to 610 ^c	-1 to 1	-7 to 6
Lower Walls	9	-620 to 32 ^b	-620 to 730 ^c	-1 to 4	-4 to 1
Shield Mock-up Building					
Floor	27	0 to 39 ^b	420 to 820 ^c	-1 to 6	-7 to 14
Lower Walls	3	-2 to 2 ^b	-580 to -400 ^c	-1 to 10	-4 to 3
Lodge					
Floor	22	NA	-580 to 1,200 ^d	-1 to 6	-7 to 8
Lower Walls	8	NA	-650 to -240 ^d	-1 to 1	-7 to 6

*Refer to Figures 24 through 28.

^bMinimum detectable activity is 25 dpm/100 cm² for alpha instrumentation.

^cMinimum detectable activity is 390 dpm/100 cm² for beta instrumentation.

^dMinimum detectable activity is 990 dpm/100 cm² for beta instrumentation.

^eMinimum detectable activity is 12 dpm/100 cm².

^fMinimum detectable activity is 16 dpm/100 cm².

TABLE 8

EXPOSURE RATES
UNAFFECTED BUILDINGS
NUCLEAR LAKE SITE
PAWLING, NEW YORK

Location ^a	Exposure Rate Range at 1 m (μ R/h) ^b	Average
Critical Facility	11 - 12	12
Engineering Building	9 - 10	9
Remote Assembly Building	7 - 11	9
Shield Mock-Up Building	10	10
Lodge	9 - 10	10

^aRefer to Figures 24 through 28.

^bIncludes background.

TABLE 9

RADIONUCLIDE CONCENTRATIONS IN SUBFLOOR SOIL
UNAFFFECTED BUILDINGS
NUCLEAR LAKE SITE
PAWLING, NEW YORK

Location ^a	Radionuclide Concentration (pCi/g)				
	Cs-137	Am-241	Th-232	U-235	U-238
Critical Facility					
#1	<0.1	<0.1	0.7 ± 0.2 ^b	0.1 ± 0.1	0.8 ± 0.5
#2	<0.1	<0.1	0.6 ± 0.2	0.1 ± 0.1	0.3 ± 0.7
Engineering Building					
#1	<0.1	0.1 ± 0.1	0.5 ± 0.3	0.1 ± 0.1	0.6 ± 0.4
#2	<0.1	<0.1	0.6 ± 0.3	0.1 ± 0.1	0.2 ± 0.5
Shield Mock-Up Building					
#1	<0.1	<0.1	0.6 ± 0.2	0.1 ± 0.1	0.7 ± 0.8
Lodge					
#1	<0.1	<0.1	0.1 ± 0.1	0.2 ± 0.1	0.6 ± 1.3
#2	0.2 ± 0.1	<0.1	0.4 ± 0.3	0.1 ± 0.1	0.6 ± 1.1

^aRefer to Figures 24 through 28.

^bUncertainties represent the 95% confidence level, based only on counting statistics.

TABLE 10

EXPOSURE RATES AND
RADIONUCLIDE CONCENTRATIONS IN SOIL
UNAFFECTED OUTDOOR AREAS
NUCLEAR LAKE SITE
PAWLING, NEW YORK

Location ^a	Exposure Rate at 1 m ($\mu\text{R/h}$) ^b	Radionuclide Concentration (pCi/g)				
		Cs-137	Am-241	Th-232	U-235	U-238
Survey Unit 1						
260N, 60E	-- ^c	1.5 ± 0.2^d	<0.2	0.6 ± 0.3	0.2 ± 0.1	0.7 ± 0.8
280N, 70E	--	0.5 ± 0.1	<0.2	1.0 ± 0.4	0.1 ± 0.1	2.0 ± 1.8
300N, 20E	--	0.2 ± 0.1	<0.1	0.9 ± 0.2	0.1 ± 0.1	0.1 ± 0.8
300N, 80E	--	0.9 ± 0.1	<0.1	0.7 ± 0.3	0.1 ± 0.1	1.1 ± 0.7
310N, 50E	--	2.4 ± 0.3	<0.3	0.2 ± 0.4	0.2 ± 0.1	2.5 ± 1.9
314N, 0	10	<0.1	<0.1	0.6 ± 0.2	0.1 ± 0.1	1.2 ± 0.9
332N, 18E	9	0.4 ± 0.1	<0.1	0.6 ± 0.2	0.1 ± 0.1	1.0 ± 0.8
342N, 0	--	0.4 ± 0.1	<0.1	0.8 ± 0.2	0.1 ± 0.1	0.4 ± 0.9
350N, 0	9	0.3 ± 0.1	<0.1	1.0 ± 0.3	0.1 ± 0.1	0.6 ± 1.2
350N, 50E	--	1.4 ± 0.2	<0.2	0.5 ± 0.4	0.1 ± 0.1	1.4 ± 2.5
375N, 25E	--	1.0 ± 0.2	<0.2	1.2 ± 0.5	0.1 ± 0.1	1.5 ± 0.8
400N, 0	10	0.9 ± 0.2	<0.2	1.0 ± 0.4	0.1 ± 0.1	1.5 ± 1.0
400N, 25E	--	0.5 ± 0.1	<0.2	0.8 ± 0.4	<0.1	1.1 ± 0.7
400N, 50E	--	0.8 ± 0.1	<0.1	1.4 ± 0.4	0.1 ± 0.1	1.9 ± 1.5
425N, 25E	--	0.9 ± 0.2	0.1 ± 0.1	0.9 ± 0.3	0.1 ± 0.1	0.5 ± 0.9
425N, 70E	--	1.5 ± 0.2	<0.3	0.5 ± 0.6	0.2 ± 0.1	1.8 ± 1.6
450N, 0	9	1.3 ± 0.2	<0.2	1.3 ± 0.5	0.2 ± 0.1	0.8 ± 1.9
450N, 25E	8	0.1 ± 0.1	<0.1	0.6 ± 0.2	0.1 ± 0.1	0.2 ± 0.6
450N, 50E	8	0.4 ± 0.1	<0.2	0.8 ± 0.4	0.1 ± 0.1	0.9 ± 0.7
450N, 65E	--	1.1 ± 0.2	<0.2	0.7 ± 0.6	0.1 ± 0.1	0.5 ± 1.5
480N, 40E	8	1.1 ± 0.2	<0.1	0.6 ± 0.3	0.1 ± 0.1	0.7 ± 1.2
500N, 0	8	5.9 ± 0.8	0.2 ± 0.2	0.9 ± 0.6	0.1 ± 0.2	1.1 ± 2.0
500N, 25E	9	0.7 ± 0.2	<0.2	0.9 ± 0.3	0.1 ± 0.1	1.4 ± 1.7
500N, 50E	--	2.0 ± 0.2	<0.2	0.9 ± 0.3	0.1 ± 0.1	2.3 ± 1.8
500N, 65E	--	3.3 ± 0.5	<0.3	0.9 ± 0.5	0.3 ± 0.1	1.4 ± 2.5

TABLE 10 (Continued)

EXPOSURE RATES AND
RADIONUCLIDE CONCENTRATIONS IN SOIL
UNAFFECTED OUTDOOR AREAS
NUCLEAR LAKE SITE
PAWLING, NEW YORK

Location ^a	Exposure Rate at 1 m ($\mu\text{R/h}$) ^b	Radionuclide Concentration (pCi/g)				
		Cs-137	Am-241	Th-232	U-235	U-238
Survey Unit 2						
0, 0	12	0.1 ± 0.1	<0.2	0.8 ± 0.3	0.1 ± 0.1	0.4 ± 0.9
50N, 0	10	0.2 ± 0.1	<0.1	0.7 ± 0.3	0.1 ± 0.1	0.6 ± 0.4
50N, 20E	--	0.4 ± 0.1	<0.1	0.9 ± 0.3	0.2 ± 0.1	1.4 ± 1.1
80N, 20E	--	1.0 ± 0.2	<0.3	0.5 ± 0.3	0.1 ± 0.1	1.1 ± 1.7
100N, 0	11	0.2 ± 0.1	<0.1	0.8 ± 0.3	0.1 ± 0.1	0.7 ± 0.8
100N, 25E	--	1.7 ± 0.2	<0.1	0.7 ± 0.3	0.1 ± 0.1	0.9 ± 1.1
100N, 45E	--	0.4 ± 0.1	<0.2	1.0 ± 0.3	0.2 ± 0.1	0.9 ± 1.0
140N, 50E	--	2.0 ± 0.3	<0.4	0.6 ± 0.4	0.2 ± 0.1	3.7 ± 2.6
150N, 0	11	0.9 ± 0.1	<0.1	0.7 ± 0.2	0.1 ± 0.1	1.0 ± 0.6
150N, 50E	--	1.1 ± 0.2	<0.2	1.0 ± 0.4	0.2 ± 0.1	1.2 ± 1.4
155N, 50E	--	1.0 ± 0.1	<0.1	0.9 ± 0.3	0.1 ± 0.1	0.6 ± 1.6
163N, 24E	--	0.7 ± 0.1	<0.1	0.5 ± 0.4	0.1 ± 0.1	0.8 ± 1.0
163N, 34E	--	3.6 ± 0.4	<0.2	0.6 ± 0.5	<0.2	0.6 ± 2.1
168N, 29E	12	3.4 ± 0.7	<0.3	<0.5	<0.3	1.1 ± 1.1
168N, 29E (15-30 cm)	--	6.1 ± 0.3	<0.1	0.8 ± 0.2	0.1 ± 0.1	0.8 ± 0.2
173N, 24E	12	0.3 ± 0.1	<0.1	0.7 ± 0.3	0.1 ± 0.1	0.6 ± 0.7
173N, 34E	9	0.5 ± 0.1	<0.1	0.7 ± 0.2	0.1 ± 0.1	0.6 ± 1.3
188N, 50E	9	0.1 ± 0.1	<0.2	1.3 ± 0.4	0.1 ± 0.4	0.6 ± 1.1
194N, 0	--	0.3 ± 0.1	<0.1	0.7 ± 0.2	0.1 ± 0.1	0.5 ± 0.8
195N, 30E	--	0.1 ± 0.1	<0.1	0.6 ± 0.3	0.1 ± 0.1	0.8 ± 0.6
195N, 45E	9	0.4 ± 0.1	<0.1	0.8 ± 0.2	0.1 ± 0.1	1.0 ± 0.8
200N, 0	10	<0.1	<0.1	0.7 ± 0.3	0.1 ± 0.1	0.4 ± 0.6
200N, 30E	--	0.1 ± 0.1	<0.1	0.7 ± 0.3	0.1 ± 0.1	0.6 ± 0.8
200N, 50E	9	1.1 ± 0.1	<0.2	0.7 ± 0.3	<0.1	0.9 ± 1.1

TABLE 10 (Continued)

EXPOSURE RATES AND
RADIONUCLIDE CONCENTRATIONS IN SOIL
UNAFFECTED OUTDOOR AREAS
NUCLEAR LAKE SITE
PAWLING, NEW YORK

Location ^a	Exposure Rate at 1 m (μ R/h) ^b	Radionuclide Concentration (pCi/g)				
		Cs-137	Am-241	Th-232	U-235	U-238
Survey Unit 2 (Continued)						
210N, 35E	--	1.2 \pm 0.1	<0.1	0.6 \pm 0.4	0.1 \pm 0.2	1.5 \pm 0.8
240N, 20E	--	0.2 \pm 0.1	<0.1	0.8 \pm 0.3	0.1 \pm 0.1	0.2 \pm 0.7
240N, 40E	--	2.4 \pm 0.3	<0.2	0.3 \pm 0.4	0.1 \pm 0.1	2.1 \pm 1.8
240N, 50E	--	5.7 \pm 0.5	<0.3	1.1 \pm 0.6	0.3 \pm 0.1	1.8 \pm 1.2
240N, 0	11	0.8 \pm 0.1	<0.1	0.8 \pm 0.3	0.1 \pm 0.1	0.5 \pm 0.6
250N, 5E	--	0.2 \pm 0.1	<0.1	0.8 \pm 0.2	0.1 \pm 0.1	0.7 \pm 0.6
250N, 50E	--	2.2 \pm 0.5	<0.4	1.0 \pm 1.2	0.4 \pm 0.3	1.9 \pm 5.7
Access Rd. Pole #18	12	0.3 \pm 0.1	<0.1	0.7 \pm 0.2	0.1 \pm 0.1	0.6 \pm 0.7
Access Rd. Stream Culvert	--	0.5 \pm 0.1	<0.1	0.8 \pm 0.3	0.1 \pm 0.1	0.8 \pm 0.8
Access Rd. Pole #16	--	1.6 \pm 0.3	<0.2	0.8 \pm 0.5	0.2 \pm 0.1	2.7 \pm 1.5
Access Rd. Pole #14	--	0.3 \pm 0.1	<0.1	0.7 \pm 0.2	0.1 \pm 0.1	0.6 \pm 0.7
Access Rd. Pole #11	--	1.2 \pm 0.2	<0.2	1.4 \pm 0.6	0.1 \pm 0.1	1.0 \pm 1.6
Access Rd. Pole #9	--	0.2 \pm 0.1	<0.1	0.5 \pm 0.2	0.1 \pm 0.1	0.4 \pm 0.7
0,5W ^c	--	0.4 \pm 0.1	<0.1	0.7 \pm 0.2	0.1 \pm 0.1	0.6 \pm 0.8
14N, 34W ^c	--	0.3 \pm 0.1	<0.1	1.0 \pm 0.4	0.1 \pm 0.1	1.1 \pm 1.5
23N, 7W ^c	--	0.6 \pm 0.1	<0.1	0.9 \pm 0.3	0.1 \pm 0.1	1.1 \pm 1.0
50N, 10W ^c	--	0.9 \pm 0.1	<0.2	0.7 \pm 0.3	0.1 \pm 0.1	0.3 \pm 0.9
50N, 31W ^c	--	0.2 \pm 0.1	<0.1	0.8 \pm 0.2	0.1 \pm 0.1	0.8 \pm 1.1
100N, 9W ^c	--	0.4 \pm 0.1	<0.2	0.9 \pm 0.5	0.2 \pm 0.1	1.9 \pm 1.1
100N, 24W ^c	--	0.4 \pm 0.1	<0.1	1.3 \pm 0.4	0.2 \pm 0.1	1.6 \pm 1.2

TABLE 10 (Continued)

EXPOSURE RATES AND
RADIONUCLIDE CONCENTRATIONS IN SOIL
UNAFFECTED OUTDOOR AREAS
NUCLEAR LAKE SITE
PAWLING, NEW YORK

Location ^a	Exposure Rate at 1 m (μ R/h) ^b	Radionuclide Concentration (pCi/g)				
		Cs-137	Am-241	Th-232	U-235	U-238
Survey Unit 3						
173N, 0	--	0.2 ± 0.1	<0.1	0.6 ± 0.2	0.1 ± 0.1	0.2 ± 0.7
173N, 40W	--	1.2 ± 0.2	<0.2	0.7 ± 0.4	0.2 ± 0.1	0.1 ± 1.3
193N, 82W	--	2.5 ± 0.3	<0.1	0.3 ± 0.3	0.1 ± 0.1	1.4 ± 1.2
205N, 6W	--	0.4 ± 0.1	<0.1	0.7 ± 0.3	0.1 ± 0.1	0.2 ± 0.7
210N, 50W	--	3.0 ± 0.2	<0.2	1.0 ± 0.4	0.1 ± 0.1	0.1 ± 1.2
220N, 82W	--	1.4 ± 0.2	<0.2	0.4 ± 0.3	0.1 ± 0.1	1.3 ± 0.8
220N, 120W	--	2.5 ± 0.4	<0.4	0.5 ± 0.6	0.1 ± 0.2	1.8 ± 4.2
230N, 0	--	0.1 ± 0.1	<0.1	0.6 ± 0.3	0.1 ± 0.1	0.9 ± 0.6
230, 50W	--	1.7 ± 0.2	<0.3	0.8 ± 0.4	0.1 ± 0.1	2.8 ± 1.8
233N, 7W	--	1.7 ± 0.2	<0.3	1.1 ± 0.5	0.3 ± 0.1	4.3 ± 3.3
240N, 94W	--	0.8 ± 0.2	0.1 ± 0.1	<0.4	<0.2	<1.7
249N, 58W	--	2.6 ± 0.3	0.1 ± 0.1	0.5 ± 0.3	0.1 ± 0.1	0.6 ± 1.1
250N, 50W	--	0.5 ± 0.1	<0.1	0.2 ± 0.3	0.1 ± 0.1	0.7 ± 0.8
250N, 120W	--	1.4 ± 0.2	<0.1	0.7 ± 0.4	0.1 ± 0.9	1.2 ± 1.1
256N, 83W	--	0.4 ± 0.1	<0.1	0.6 ± 0.3	0.1 ± 0.1	1.1 ± 1.2
268N, 98W	--	0.7 ± 0.1	<0.1	0.8 ± 0.3	<0.1	0.2 ± 0.9
269N, 77W	--	0.2 ± 0.1	<0.1	0.9 ± 0.3	0.1 ± 0.1	0.5 ± 0.9
270N, 0 ^f	--	2.5 ± 0.2	0.5 ± 0.1	0.2 ± 0.3	0.1 ± 0.1	0.7 ± 1.0
270N, 20W ^f	--	0.9 ± 0.2	0.1 ± 0.1	0.8 ± 0.4	0.1 ± 0.1	1.3 ± 0.8
270N, 43W	--	0.5 ± 0.1	<0.1	0.8 ± 0.3	0.1 ± 0.1	2.0 ± 1.0
282N, 110W	--	1.0 ± 0.1	<0.1	0.7 ± 0.3	0.1 ± 0.1	1.5 ± 1.2
283N, 46W ^g	--	1.8 ± 0.2	0.3 ± 0.2	1.0 ± 0.4	0.3 ± 0.1	1.0 ± 1.1
286N, 9W ^g	--	1.6 ± 0.2	0.4 ± 0.2	0.7 ± 0.3	0.1 ± 0.1	0.5 ± 1.1
286N, 68W	--	0.2 ± 0.1	<0.1	1.1 ± 0.3	0.1 ± 0.1	1.1 ± 1.1

TABLE 10 (Continued)

EXPOSURE RATES AND
RADIONUCLIDE CONCENTRATIONS IN SOIL
UNAFFECTED OUTDOOR AREAS
NUCLEAR LAKE SITE
PAWLING, NEW YORK

Location ^a	Exposure Rate at 1 m ($\mu\text{R/h}$) ^b	Radionuclide Concentration (pCi/g)				
		Cs-137	Am-241	Th-232	U-235	U-238
Survey Unit 3 (Continued)						
290N, 10W	--	<0.1	0.1 ± 0.1	0.6 ± 0.3	0.1 ± 0.1	1.3 ± 0.6
292N, 88W	--	0.1 ± 0.1	<0.1	0.7 ± 0.3	0.1 ± 0.1	0.7 ± 0.6
295N, 101W	--	1.0 ± 0.2	<0.3	0.9 ± 0.3	0.1 ± 0.1	1.4 ± 1.3
300N, 25W	--	0.1 ± 0.1	<0.1	0.6 ± 0.3	0.1 ± 0.1	0.3 ± 0.5
300N, 50W	--	2.1 ± 0.2	<0.2	0.9 ± 0.5	0.1 ± 0.1	1.8 ± 1.9
310N, 120W	--	0.5 ± 0.1	<0.2	0.5 ± 0.3	0.1 ± 0.1	0.7 ± 0.7
Survey Unit 4						
300N, 10W	10	0.1 ± 0.1	<0.1	0.7 ± 0.2	0.1 ± 0.1	0.4 ± 0.8
325N, 10W	--	0.2 ± 0.1	<0.2	0.9 ± 0.3	0.1 ± 0.1	0.9 ± 0.8
325N, 25W	--	1.1 ± 0.2	<0.1	1.0 ± 0.3	0.1 ± 0.1	0.6 ± 1.1
325N, 40W	--	2.4 ± 0.3	<0.2	0.8 ± 0.5	0.2 ± 0.1	2.3 ± 2.2
325N, 50W	9	3.6 ± 0.4	<0.2	0.3 ± 0.3	0.2 ± 0.1	0.4 ± 1.3
340N, 5W	--	0.1 ± 0.1	<0.1	0.5 ± 0.2	0.1 ± 0.1	0.6 ± 0.9
350N, 10W	--	0.3 ± 0.1	<0.1	0.6 ± 0.3	0.1 ± 0.1	0.9 ± 0.9
350N, 25W	9	1.8 ± 0.3	<0.2	1.1 ± 0.6	0.2 ± 0.1	<2.7
350N, 50W	9	1.3 ± 0.2	<0.2	0.9 ± 0.3	0.1 ± 0.8	1.1 ± 0.7
350N, 100W	--	1.7 ± 0.3	<0.2	1.1 ± 0.5	0.1 ± 0.1	1.5 ± 1.6
350N, 125W	--	1.0 ± 0.2	<0.2	1.3 ± 0.5	0.1 ± 0.1	2.3 ± 1.8
390N, 50W	--	0.8 ± 0.1	<0.1	0.8 ± 0.3	0.2 ± 0.1	2.1 ± 1.5
400N, 10W	--	0.5 ± 0.2	<0.2	0.3 ± 0.3	0.1 ± 0.1	0.9 ± 0.8
400N, 30W	--	0.3 ± 0.1	<0.1	0.6 ± 0.2	0.1 ± 0.1	0.2 ± 0.7
400N, 50W	9	0.5 ± 0.1	<0.1	0.6 ± 0.2	0.1 ± 0.1	1.5 ± 1.1
400N, 60W ^h	--	1.0 ± 0.2	0.1 ± 0.1	1.0 ± 0.4	0.2 ± 0.1	1.0 ± 1.2
406N, 35W	9	0.1 ± 0.1	<0.1	0.7 ± 0.3	0.1 ± 0.1	0.8 ± 0.6

TABLE 10 (Continued)

EXPOSURE RATES AND
RADIONUCLIDE CONCENTRATIONS IN SOIL
UNAFFECTED OUTDOOR AREAS
NUCLEAR LAKE SITE
PAWLING, NEW YORK

Location ^a	Exposure Rate at 1 m ($\mu\text{R}/\text{h}$) ^b	Radionuclide Concentration (pCi/g)				
		Cs-137	Am-241	Th-232	U-235	U-238
Survey Unit 4 (Continued)						
410N, 25W	9	0.1 \pm 0.1	<0.1	0.6 \pm 0.2	0.1 \pm 0.1	0.7 \pm 0.7
420N, 35W	9	0.2 \pm 0.1	<0.1	0.8 \pm 0.3	0.1 \pm 0.1	0.9 \pm 0.9
425N, 30W ^h	9	0.2 \pm 0.1	0.1 \pm 0.1	0.6 \pm 0.3	0.1 \pm 0.1	0.9 \pm 0.7
450N, 25W	9	0.6 \pm 0.1	<0.1	0.6 \pm 0.2	0.1 \pm 0.1	1.2 \pm 0.8
450N, 35W	9	0.6 \pm 0.1	<0.2	0.7 \pm 0.5	0.1 \pm 0.1	1.2 \pm 1.1
465N, 40W ^h	--	1.4 \pm 0.2	0.1 \pm 0.1	0.8 \pm 0.5	<0.1	2.3 \pm 1.3
475N, 10W	--	0.8 \pm 0.1	<0.1	0.4 \pm 0.3	0.1 \pm 0.1	0.8 \pm 0.5
475N, 50W	--	0.8 \pm 0.1	<0.2	1.0 \pm 0.4	0.1 \pm 0.1	1.4 \pm 1.4
500N, 10W	--	0.3 \pm 0.1	<0.1	1.3 \pm 0.4	0.1 \pm 0.1	1.2 \pm 1.2
500N, 20W	--	1.0 \pm 0.2	0.1 \pm 0.1	0.6 \pm 0.4	0.1 \pm 0.1	2.9 \pm 1.9
510N, 10W	--	1.5 \pm 0.2	<0.2	0.5 \pm 0.5	0.1 \pm 0.1	1.1 \pm 1.0
510N, 20W	--	0.3 \pm 0.1	<0.1	1.0 \pm 0.2	0.1 \pm 0.1	0.4 \pm 0.6

^aRefer to Figures 30 through 35.

^bIncludes background.

^c--No measurement made.

^dUncertainties represent the 95% confidence level, based only on counting statistics.

^eRemote Assembly Building grid coordinates.

^{f-h}Sample composite groups analyzed by alpha spectrometry for plutonium.

TABLE 11
GUIDELINE COMPARISON OF SURFACE ACTIVITY LEVELS
AFFECTED BUILDINGS
NUCLEAR LAKE SITE
PAWLING, NEW YORK

Building	Survey Unit Area (m ²)	Averaged Total Activity (dpm/100 cm ²)								Guidelines/ Conditions Satisfied
		Alpha ^a				Beta ^b				
		Number of Meas.	Mean	Std. Deviation	μ_{α}	Number of Meas.	Mean	Std. Deviation	μ_{β}	
Plutonium Building										
Affected Area										
Room 1	90	28	25	24	33	28	120	540	290	Yes/Yes
Room 2	114	48	41	42	51	43	290	530	420	Yes/Yes
Room 3	90	71	46	74	56	71	200	490	290	Yes/Yes
Room 4	96	52	36	49	47	52	43	420	140	Yes/Yes
Room 5	32	24	77	100	110	24	760	400	900	Yes/No
Room 14	40	22	29	36	42	22	430	390	570	Yes/Yes
Room 15	65	32	21	19	27	32	790	550	960	Yes/Yes
Unaffected Area										
Rooms 6-13, 16-18	360	146	24	25	27	146	440	490	510	Yes/Yes
Waste Disposal Bldg.	54	41	20	52	33	41	650	1000	910	Yes/Yes
Multiple Failure Bldg.	45	21	8	9	12	21	250	590	470	Yes/Yes

^aAlpha surface contamination guidelines:

100 dpm/100 cm², average in a 1 m² area

300 dpm/100 cm², maximum in a 100 cm²

^bBeta-gamma surface contamination guidelines:

5,000 dpm/100 cm², average in a 1 m² area

15,000 dpm/100 cm², maximum in a 100 cm² area

^cCalculated value for statistically testing site data in accordance with Draft NUREG/CR-5849.

TABLE 12
 GUIDELINE COMPARISON OF SURFACE ACTIVITY LEVELS
 UNAFFECTED BUILDINGS
 NUCLEAR LAKE SITE
 PAWLING, NEW YORK

Building	Survey Unit Area (m ²)	Averaged Total Activity (dpm/100 cm ²)								Guidelines/Conditions Satisfied
		Alpha ^a				Beta ^b				
		Number of Meas.	Mean	Std. Deviation	μ_{α}	Number of Meas.	Mean	Std. Deviation	μ_{β}	
Critical Facility	510 m ²	34	14	8	16	34	660	290	750	Yes/Yes
Engineering Bldg.	410 m ²	30	6	6	8	30	500	280	590	Yes/Yes
Remote Assembly Bldg.	106 m ²	30	5	12	9	30	-26	300	67	Yes/Yes
Shield Mock-Up Bldg.	60 m ²	30	11	9	14	30	490	350	600	Yes/Yes
Lodge	56 m ²	0	NA	NA	NA	30	-160	340	-61	Yes/Yes

^aAlpha surface contamination guidelines:

100 dpm/100 cm², average in a 1 m² area

300 dpm/100 cm², maximum in a 100 cm²

^bBeta-gamma surface contamination guidelines:

5,000 dpm/100 cm², average in a 1 m² area

15,000 dpm/100 cm², maximum in a 100 cm² area

^cCalculated value for statistically testing site data in accordance with Draft NUREG/CR-5849.

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12. Letter from T. J. Vitkus, ORISE to M. Nalluswami, U.S. Nuclear Regulatory Commission, "Comments on the Work Plan for Soil Remediation of the National Park Service Property, Located Near Pawling, New York for the Chevron USA, Incorporated", December 9, 1992.

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13. Letter from M. R. Landis, ORISE to M. Nalluswami, U.S. Nuclear Regulatory Commission, "Comments of the Decommissioning Plan for the Plutonium Facility and Multiple Failure Building of the National Park Service Property Located Near Pawling, New York for Chevron USA, Incorporated", March 18, 1993.
14. Letter from M. R. Landis, ORISE to M. Nalluswami, U.S. Nuclear Regulatory Commission, "Comments on Final Release Survey Plan, National Park Service Property, Pawling, New York", March 30, 1993.
15. U.S. Nuclear Regulatory Commission, "Guidance and Discussion of Requirement for an Application to Terminate a Non-power Reactor Facility Operating License," Revision 1, September 1984.

APPENDIX A
MAJOR INSTRUMENTATION

APPENDIX A

MAJOR INSTRUMENTATION

The display of a specific product is not to be construed as an endorsement of the product or its manufacturer by the authors or their employers.

DIRECT RADIATION MEASUREMENT

Instruments

Eberline Pulse Ratemeter
Model PRM-6
(Eberline, Santa Fe, NM)

Eberline "Rascal" Ratemeter-Scaler
Model PRS-1
(Eberline, Santa Fe, NM)

Ludlum Floor Monitor
Model 239-1
(Ludlum Measurements, Inc.,
Sweetwater, TX)

Ludlum Ratemeter-Scaler
Model 2221
(Ludlum Measurements, Inc.,
Sweetwater, TX)

Detectors

Eberline GM Detector
Model HP-260
Effective Area, 15.5 cm²
(Eberline, Santa Fe, NM)

Ludlum Gas Proportional Detector
Model 43-37
Effective Area, 550 cm²
(Ludlum Measurements, Inc.,
Sweetwater, TX)

Ludlum Gas Proportional Detector
Model 43-68
Effective Area, 100 cm²
(Ludlum Measurements, Inc.,
Sweetwater, TX)

Reuter-Stokes Pressurized Ion Chamber
Model RSS-111
(Reuter-Stokes, Cleveland, OH)

Victoreen NaI Scintillation Detector
Model 489-55
3.2 cm x 3.8 cm Crystal
(Victoreen, Cleveland, OH)

LABORATORY ANALYTICAL INSTRUMENTATION

Alpha Spectrometry System
(Canberra, Meriden, CT)
Used in conjunction with:
Multichannel Analyzer
3100 Vax Workstations
(Canberra, Meriden, CT)
(Canberra, Meriden, CT)

High Purity Extended Range Intrinsic Detectors
Model No: ERVDS30-25195
(Tennelec, Oak Ridge, TN)
Used in conjunction with:
Lead Shield Model G-11
(Nuclear Lead, Oak Ridge, TN) and
Multichannel Analyzer
3100 Vax Workstation
(Canberra, Meriden, CT)

High-Purity Germanium Detector
Model GMX-23195-S, 23% Eff.
(EG&G ORTEC, Oak Ridge, TN)
Used in conjunction with:
Lead Shield Model G-16
(Gamma Products, Palos Hills, IL) and
Multichannel Analyzer
3100 Vax Workstation
(Canberra, Meriden, CT)

Low Background Gas Proportional Counter
Model LB-5110
(Tennelec, Oak Ridge, TN)

APPENDIX B
SURVEY AND ANALYTICAL PROCEDURES

APPENDIX B

SURVEY AND ANALYTICAL PROCEDURES

SURVEY PROCEDURES

Surface Scans

Surface scans were performed by passing the probes slowly over the surface; the distance between the probe and the surface was maintained at a minimum - nominally about 1 cm. A large surface area, gas proportional floor monitor was used to scan the floors of the surveyed areas. Other surfaces were scanned using small area (15.5 cm² or 100 cm²) hand-held detectors. Identification of elevated levels was based on increases in the audible signal from the recording and/or indicating instrument. Combinations of detectors and instruments used for the scans were:

- | | | |
|-------|---|---|
| Alpha | - | gas proportional detector with ratemeter-scaler |
| Beta | - | gas proportional detector with ratemeter-scaler |
| | - | pancake GM detector with ratemeter-scaler |
| Gamma | - | NaI detector with ratemeter |

Surface Activity Measurements

Measurements of total alpha and total beta activity levels were primarily performed using gas proportional and/or GM detectors with portable ratemeter-scalers.

Count rates which were integrated over a 1 or 2 minute period in a static position, were converted to activity levels (dpm/100 cm²) by dividing the net rate by the 4π efficiency and correcting for the sample count time and active area of the detector. The alpha activity background countrates for the gas proportional detectors averaged approximately 1 cpm for each detector. Alpha efficiency factors ranged from 0.20 to 0.22 for the gas proportional detectors. The beta activity

background count rates for the proportional detectors and the GM detectors averaged 290 and 44 cpm, respectively. Beta efficiency factors ranged from 0.19 to 0.21 for the gas proportional detectors and 0.15 to 0.16 for the GM detectors. The effective window for the gas proportional, and GM detectors were 100 cm², and 15.5 cm² respectively.

Removable Activity Measurements

Removable activity levels were determined using numbered filter paper disks, 47 mm in diameter. Moderate pressure was applied to the smear, and approximately 100 cm² of the surface was wiped. Smears were placed in labeled envelopes with the location and other pertinent information recorded.

Exposure Rate Measurements

Measurements of gamma exposure rates were performed using a pressurized ionization chamber (PIC).

Soil Sampling

Approximately 1 kg of soil was collected at each sample location. Collected samples were placed in a plastic bag, sealed, and labeled in accordance with ESSAP survey procedures.

ANALYTICAL PROCEDURES

Removable Activity

Smears were counted on a low background gas proportional system for gross alpha and gross beta activity.

Gamma Spectrometry

Soil samples were dried, mixed, crushed, and/or homogenized as necessary, and a portion sealed in 0.5-liter Marinelli beaker or other appropriate container. The quantity placed in the beaker was chosen to reproduce the calibrated counting geometry and ranged from 130 to 1100 g of material. Net material weights were determined and the samples counted using intrinsic germanium detectors coupled to a pulse height analyzer system. Background and Compton stripping, peak search, peak identification, and concentration calculations were performed using the computer capabilities inherent in the analyzer system. Energy peaks used for determination of radionuclides of concern were:

Am-241	0.059 MeV
Th-232	0.911 MeV from Ac-228*
U-235	0.186 MeV
U-238	0.063 MeV from Th-234* (or 0.093 MeV)

*Secular equilibrium assumed.

Spectra were also reviewed for other identifiable photopeaks.

Alpha Spectrometry

Soil samples were crushed, homogenized and analyzed for isotopic plutonium. Samples were dissolved by potassium fluoride and pyrosulfate fusion and the elements of interest were precipitated with barium sulfate. Barium sulfate precipitate was redissolved and the specific elements of interest were individually separated by liquid-liquid extraction and re-precipitated with a cerium fluoride carrier. The precipitate was then counted using surface barrier and ion implanted detectors (ORTEC), alpha spectrometers (Canberra), and a multichannel analyzer (Nuclear Data).

UNCERTAINTIES AND DETECTION LIMITS

The uncertainties associated with the analytical data presented in the tables of this report represents the 95% confidence level for that data. These uncertainties were calculated based on both the gross sample count levels and the associated background count levels. When the net sample count was less than $2.71 + 4.66$ times the statistical deviation of the background count, the sample concentration was reported as less than the detection limit of the measurement procedure. Because of variations in background levels, measurement efficiencies, and contributions from other radionuclides in sample, the detection limits differ from sample to sample and instrument to instrument. Additional uncertainties, associated with sampling and measurement procedures, have not been propagated into the data presented in this report.

CALIBRATION AND QUALITY ASSURANCE

Analytical and field survey activities were conducted in accordance with procedures from the following documents:

- Survey Procedures Manual Revision 7.1 (September 1993)
- Laboratory Procedures Manual Revision 8 (August 1993)
- Quality Assurance Manual Revision 6 (July 1993)

The procedures contained in these manuals were developed to meet the requirements of DOE Order 5700.6C for Quality Assurance and contain measures to assess processes during their performance.

Calibration of all field and laboratory instrumentation was based on standards/sources, traceable to NIST, when such standards/sources were available. In cases where they were not available, standards of an industry recognized organization were used. Calibration of pressurized ionization chambers was performed by the manufacturer.

Quality control procedures include:

- Daily instrument background and check-source measurements to confirm that equipment operation is within acceptable statistical fluctuations.
- Participation in EPA and EML laboratory Quality Assurance Programs.
- Training and certification of all individuals performing procedures.
- Periodic internal and external audits.

APPENDIX C

GUIDELINES FOR DECONTAMINATION OF FACILITIES AND
EQUIPMENT PRIOR TO RELEASE FOR UNRESTRICTED USE OR
TERMINATION OF LICENSES FOR BYPRODUCT, SOURCE OR
SPECIAL NUCLEAR MATERIAL

GUIDELINES FOR DECONTAMINATION OF FACILITIES AND EQUIPMENT
PRIOR TO RELEASE FOR UNRESTRICTED USE
OR TERMINATION OF LICENSES FOR BYPRODUCT, SOURCE,
OR SPECIAL NUCLEAR MATERIAL

U.S. Nuclear Regulatory Commission
Division of Fuel Cycle & Material Safety
Washington, D.C. 20555

August 1987

The instructions in this guide, in conjunction with Table 1, specify the radionuclides and radiation exposure rate limits which should be used in decontamination and survey of surfaces or premises and equipment prior to abandonment or release for unrestricted use. The limits in Table 1 do not apply to premises, equipment, or scrap containing induced radioactivity for which the radiological considerations pertinent to their use may be different. The release of such facilities or items from regulatory control is considered on a case-by-case basis.

1. The licensee shall make a reasonable effort to eliminate residual contamination.
2. Radioactivity on equipment or surfaces shall not be covered by paint, plating, or other covering material unless contamination levels, as determined by a survey and documented, are below the limits specified in Table 1 prior to the application of the covering. A reasonable effort must be made to minimize the contamination prior to use of any covering.
3. The radioactivity on the interior surfaces of pipes, drain lines, or ductwork shall be determined by making measurements at all traps, and other appropriate access points, provided that contamination at these locations is likely to be representative of contamination on the interior of the pipes, drain lines, or ductwork. Surfaces or premises, equipment, or scrap which are likely to be contaminated, but are such size, construction, or location as to make the surface inaccessible for purposes of measurement, shall be presumed to be contaminated in excess of the limits.
4. Upon request, the Commission may authorize a licensee to relinquish possession or control of premises, equipment, or scrap having surfaces contaminated with materials in excess of the limits specified. This may include, but would not be limited to special circumstances such as razing of buildings, transfer from premises to another organization continuing work with radioactive materials, or conversion of facilities to a long-term storage or standby status. Such requests must:
 - a. Provide detailed, specific information describing the premises, equipment or scrap, radioactive contaminants, and the nature, extent, and degree of residual surface contamination.
 - b. Provide a detailed health and safety analysis which reflects that the residual amounts of materials on surface areas, together with other considerations such as prospective use of the premises, equipment, or scrap, are unlikely to result in an unreasonable risk to the health and safety of the public.

5. Prior to release of premises for unrestricted use, the licensee shall make a comprehensive radiation survey which establishes that contamination is within the limits specified in Table 1. A copy of the survey report shall be filed with the Division of Fuel Cycle, Medical, Academic, and Commercial Use Safety, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, and also the Administrator of the NRC Regional Office having jurisdiction. The report should be filed at least 30 days prior to the planned date of abandonment. The survey report shall:
 - a. Identify the premises.
 - b. Show that reasonable effort has been made to eliminate residual contamination.
 - c. Describe the scope of the survey and general procedures followed.
 - d. State the findings of the survey in units specified in the instruction.

Following review of the report, the NRC will consider visiting the facilities to confirm the survey.

TABLE 1
ACCEPTABLE SURFACE CONTAMINATION LEVELS

Nuclides ^a	Average ^{b,c,f}	Maximum ^{b,d,f}	Removable ^{b,e,f}
U-nat, U-235, U-238, and associated decay products	5,000 dpm α /100 cm ²	15,000 dpm α /100 cm ²	1,000 dpm α /100 cm ²
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100 dpm/100 cm ²	300 dpm/100 cm ²	20 dpm/100 cm ²
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1,000 dpm/100 cm ²	3,000 dpm/100 cm ²	200 dpm/100 cm ²
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above.	5,000 dpm $\beta\gamma$ /100 cm ²	15,000 dpm $\beta\gamma$ /100 cm ²	1,000 dpm $\beta\gamma$ /100 cm ²

^aWhere surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

^bAs used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

^cMeasurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

^dThe maximum contamination level applies to an area of not more than 100 cm².

^eThe amount of removable radioactive material per 100 cm² of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.

^fThe average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/h at 1 cm and 1.0 mrad/h at 1 cm, respectively, measured through not more than 7 milligrams per square centimeter of total absorber.