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APPENDIX A
Dose Conversion Factor Tables

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TABLE A.1-1*
BIOACCUMULATION FACTORS TO BE USED IN
THE ABSENCE OF SITE-SPECIFIED DATA
(pCi/kg per pCi/liter)

| ELEMENT | FRESHWATER FISH |
|---------|-----------------|
| H | 9.0E-01 |
| C | 4.6E 03 |
| Na | 1.0E 02 |
| P | 1.0E 05 |
| Cr | 2.0E 02 |
| Mn | 4.0E 02 |
| Fe | 1.0E 02 |
| Co | 5.0E 01 |
| Ni | 1.0E 02 |
| Cu | 5.0E 01 |
| Zn | 2.0E 03 |
| Br | 4.2E 02 |
| Rb | 2.0E 03 |
| Sr | 3.0E 01 |
| Y | 2.5E 01 |
| Zr | 3.3E 00 |
| Nb | 3.0E 04 |
| Mo | 1.0E 01 |
| Tc | 1.5E 01 |
| Ru | 1.0E 01 |
| Rh | 1.0E 01 |
| Te | 4.0E 02 |
| I | 1.5E 01 |
| Cs | 2.0E 03 |
| Ba | 4.0E 00 |
| La | 2.5E 01 |
| Ce | 1.0E 00 |
| Pr | 2.5E 01 |
| Nd | 2.5E 01 |
| W | 1.2E 03 |
| Np | 1.0E 01 |
| **Ag | 2.3E 00 |
| **Sb | 1.0E 00 |

* Taken from Regulatory Guide 1.109 (Rev.1)

** Taken from Regulatory Guide 1.109 (Rev.0)

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TABLE A.1-2

| Radionuclide | DOSE FACTORS FOR NOBLE GASES AND DAUGHTERS* | | | |
|--------------|--|--|--|--|
| | Total Body | Skin Dose Factor | Gamma Air | Beta Air |
| | Dose Factor | | Dose Factor | Dose Factor |
| | $\frac{K_i}{(\text{mrem/yr per } \mu\text{Ci/m}^3)}$ | $\frac{L_i}{(\text{mrem/yr per } \mu\text{Ci/m}^3)}$ | $\frac{M_i}{(\text{mrad/yr per } \mu\text{Ci/m}^3)}$ | $\frac{N_i}{(\text{mrad/yr per } \mu\text{Ci/m}^3)}$ |
| Kr-83M | 7.56E-02** | --- | 1.93E+01 | 2.88E+02 |
| Kr-85M | 1.17E+03 | 1.46E+03 | 1.23E+03 | 1.97E+03 |
| Kr-85 | 1.61E+01 | 1.34E+03 | 1.72E+01 | 1.95E+03 |
| Kr-87 | 5.92E+03 | 9.73E+03 | 6.17E+03 | 1.03E+04 |
| Kr-88 | 1.47E+04 | 2.37E+03 | 1.52E+04 | 2.93E+03 |
| Kr-89 | 1.66E+04 | 1.01E+04 | 1.73E+04 | 1.06E+04 |
| Kr-90 | 1.56E+04 | 7.29E+03 | 1.63E+04 | 7.83E+03 |
| Xe-131M | 9.15E+01 | 4.76E+02 | 1.56E+02 | 1.11E+03 |
| Xe-133 | 2.94E+02 | 3.06E+02 | 3.53E+02 | 1.05E+03 |
| Xe-133M | 2.51E+02 | 9.94E+02 | 3.27E+02 | 1.48E+03 |
| Xe-135M | 3.12E+03 | 7.11E+02 | 3.36E+03 | 7.39E+02 |
| Xe-135 | 1.81E+03 | 1.86E+03 | 1.92E+03 | 2.46E+03 |
| Xe-137 | 1.42E+03 | 1.22E+04 | 1.51E+03 | 1.27E+04 |
| Xe-138 | 8.83E+03 | 4.13E+03 | 9.21E+03 | 4.75E+03 |
| Ar-41 | 8.84E+03 | 2.69E+03 | 9.30E+03 | 3.28E+03 |

*Based on Regulatory Guide 1.109 (Rev.1)

**7.56E-02 = 7.56×10^{-2}

11/05/2001 14:56:11

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TABLE A.2-1*
INHALATION DOSE FACTORS FOR ADULTS
(MREM PER PCI INHALED)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| H | 3 | NO DATA | 1.58E-07 | 1.58E-07 | 1.58E-07 | 1.58E-07 | 1.58E-07 | 1.58E-07 |
| C | 14 | 2.27E-06 | 4.26E-07 | 4.26E-07 | 4.26E-07 | 4.26E-07 | 4.26E-07 | 4.26E-07 |
| NA | 24 | 1.28E-06 | 1.28E-06 | 1.28E-06 | 1.28E-06 | 1.28E-06 | 1.28E-06 | 1.28E-06 |
| P | 32 | 1.65E-04 | 9.64E-06 | 6.26E-06 | NO DATA | NO DATA | NO DATA | 1.08E-05 |
| CR | 51 | NO DATA | NO DATA | 1.25E-08 | 7.44E-09 | 2.85E-09 | 1.80E-06 | 4.15E-07 |
| MN | 54 | NO DATA | 4.95E-06 | 7.87E-07 | NO DATA | 1.23E-06 | 1.75E-04 | 9.67E-06 |
| MN | 56 | NO DATA | 1.55E-10 | 2.29E-11 | NO DATA | 1.63E-10 | 1.18E-06 | 2.53E-06 |
| FE | 55 | 3.07E-06 | 2.12E-06 | 4.93E-07 | NO DATA | NO DATA | 9.01E-06 | 7.54E-07 |
| FE | 59 | 1.47E-06 | 3.47E-06 | 1.32E-06 | NO DATA | NO DATA | 1.27E-04 | 2.35E-05 |
| CO | 58 | NO DATA | 1.98E-07 | 2.59E-07 | NO DATA | NO DATA | 1.16E-04 | 1.33E-05 |
| CO | 60 | NO DATA | 1.44E-06 | 1.85E-06 | NO DATA | NO DATA | 7.46E-04 | 3.56E-05 |
| NI | 63 | 5.40E-05 | 3.93E-06 | 1.81E-06 | NO DATA | NO DATA | 2.23E-05 | 1.67E-06 |
| NI | 65 | 1.92E-10 | 2.62E-11 | 1.14E-11 | NO DATA | NO DATA | 7.00E-07 | 1.54E-06 |
| CU | 64 | NO DATA | 1.83E-10 | 7.69E-11 | NO DATA | 5.78E-10 | 8.48E-07 | 6.12E-06 |
| ZN | 65 | 4.05E-06 | 1.29E-05 | 5.82E-06 | NO DATA | 8.62E-06 | 1.08E-04 | 6.68E-06 |
| ZN | 69 | 4.23E-12 | 8.14E-12 | 5.65E-13 | NO DATA | 5.27E-12 | 1.15E-07 | 2.04E-09 |
| BR | 83 | NO DATA | NO DATA | 3.01E-08 | NO DATA | NO DATA | NO DATA | 2.90E-08 |
| BR | 84 | NO DATA | NO DATA | 3.91E-08 | NO DATA | NO DATA | NO DATA | 2.05E-13 |
| BR | 85 | NO DATA | NO DATA | 1.60E-09 | NO DATA | NO DATA | NO DATA | LT E-24 |
| RB | 86 | NO DATA | 1.69E-05 | 7.37E-06 | NO DATA | NO DATA | NO DATA | 2.08E-06 |
| RB | 88 | NO DATA | 4.84E-08 | 2.41E-08 | NO DATA | NO DATA | NO DATA | 4.18E-19 |
| RB | 89 | NO DATA | 3.20E-08 | 2.12E-08 | NO DATA | NO DATA | NO DATA | 1.16E-21 |
| SR | 89 | 3.80E-05 | NO DATA | 1.09E-06 | NO DATA | NO DATA | 1.75E-04 | 4.37E-05 |
| SR | 90 | 1.24E-02 | NO DATA | 7.62E-04 | NO DATA | NO DATA | 1.20E-03 | 9.02E-05 |
| SR | 91 | 7.74E-09 | NO DATA | 3.13E-10 | NO DATA | NO DATA | 4.56E-06 | 2.39E-05 |
| SR | 92 | 8.43E-10 | NO DATA | 3.64E-11 | NO DATA | NO DATA | 2.06E-06 | 5.38E-06 |
| Y | 90 | 2.61E-07 | NO DATA | 7.01E-09 | NO DATA | NO DATA | 2.12E-05 | 6.32E-05 |
| Y | 91M | 3.26E-11 | NO DATA | 1.27E-12 | NO DATA | NO DATA | 2.40E-07 | 1.66E-10 |
| Y | 91 | 5.78E-05 | NO DATA | 1.55E-06 | NO DATA | NO DATA | 2.13E-04 | 4.81E-05 |
| Y | 92 | 1.29E-09 | NO DATA | 3.77E-11 | NO DATA | NO DATA | 1.96E-06 | 9.19E-06 |
| Y | 93 | 1.18E-08 | NO DATA | 3.26E-10 | NO DATA | NO DATA | 6.06E-06 | 5.27E-05 |
| ZR | 95 | 1.34E-05 | 4.30E-06 | 2.91E-06 | NO DATA | 6.77E-06 | 2.21E-04 | 1.88E-05 |
| ZR | 97 | 1.21E-08 | 2.45E-09 | 1.13E-09 | NO DATA | 3.71E-09 | 9.84E-06 | 6.54E-05 |
| NB | 95 | 1.76E-06 | 9.77E-07 | 5.26E-07 | NO DATA | 9.67E-07 | 6.31E-05 | 1.30E-05 |
| MO | 99 | NO DATA | 1.51E-08 | 2.87E-09 | NO DATA | 3.64E-08 | 1.14E-05 | 3.10E-05 |
| TC | 99M | 1.29E-13 | 3.64E-13 | 4.63E-12 | NO DATA | 5.52E-12 | 9.55E-08 | 5.20E-07 |

*Taken from Regulatory Guide 1.109 (Rev. 1)

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TABLE A.2-1*(cont'd)
INHALATION DOSE FACTORS FOR ADULTS
(MREM PER PCI INHALED)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|------|----------|----------|----------|----------|----------|----------|----------|
| TC | 101 | 5.22E-15 | 7.52E-15 | 7.38E-14 | NO DATA | 1.35E-13 | 4.99E-08 | 1.36E-21 |
| RU | 103 | 1.91E-07 | NO DATA | 8.23E-08 | NO DATA | 7.29E-07 | 6.31E-05 | 1.38E-05 |
| RU | 105 | 9.88E-11 | NO DATA | 3.89E-11 | NO DATA | 1.27E-10 | 1.37E-06 | 6.02E-06 |
| RU | 106 | 8.64E-06 | NO DATA | 1.09E-06 | NO DATA | 1.67E-05 | 1.17E-03 | 1.14E-04 |
| AG | 110M | 1.35E-06 | 1.25E-06 | 7.43E-07 | NO DATA | 2.46E-06 | 5.79E-04 | 3.78E-05 |
| TE | 125M | 4.27E-07 | 1.98E-07 | 5.84E-08 | 1.31E-07 | 1.55E-06 | 3.92E-05 | 8.83E-06 |
| TE | 127M | 1.58E-06 | 7.21E-07 | 1.96E-07 | 4.11E-07 | 5.72E-06 | 1.20E-04 | 1.87E-05 |
| TE | 127 | 1.75E-10 | 8.03E-11 | 3.87E-11 | 1.32E-10 | 6.37E-10 | 8.14E-07 | 7.17E-06 |
| TE | 129M | 1.22E-06 | 5.84E-07 | 1.98E-07 | 4.30E-07 | 4.57E-06 | 1.45E-04 | 4.79E-05 |
| TE | 129 | 6.22E-12 | 2.99E-12 | 1.55E-12 | 4.87E-12 | 2.34E-11 | 2.42E-07 | 1.96E-08 |
| TE | 131M | 8.74E-09 | 5.45E-09 | 3.63E-09 | 6.88E-09 | 3.86E-08 | 1.82E-05 | 6.95E-05 |
| TE | 131 | 1.39E-12 | 7.44E-13 | 4.49E-13 | 1.17E-12 | 5.46E-12 | 1.74E-07 | 2.30E-09 |
| TE | 132 | 3.25E-08 | 2.69E-08 | 2.02E-08 | 2.37E-08 | 1.82E-07 | 3.60E-05 | 6.37E-05 |
| I | 130 | 5.72E-07 | 1.68E-06 | 6.60E-07 | 1.42E-04 | 2.61E-06 | NO DATA | 9.61E-07 |
| I | 131 | 3.15E-06 | 4.47E-06 | 2.56E-06 | 1.49E-03 | 7.66E-06 | NO DATA | 7.85E-07 |
| I | 132 | 1.45E-07 | 4.07E-07 | 1.45E-07 | 1.43E-05 | 6.48E-07 | NO DATA | 5.08E-08 |
| I | 133 | 1.08E-06 | 1.85E-06 | 5.65E-07 | 2.69E-04 | 3.23E-06 | NO DATA | 1.11E-06 |
| I | 134 | 8.05E-08 | 2.16E-07 | 7.69E-08 | 3.73E-06 | 3.44E-07 | NO DATA | 1.26E-10 |
| I | 135 | 3.35E-07 | 8.73E-07 | 3.21E-07 | 5.60E-05 | 1.39E-06 | NO DATA | 6.56E-07 |
| CS | 134 | 4.66E-05 | 1.06E-04 | 9.10E-05 | NO DATA | 3.59E-05 | 1.22E-05 | 1.30E-06 |
| CS | 136 | 4.88E-06 | 1.83E-05 | 1.38E-05 | NO DATA | 1.07E-05 | 1.50E-06 | 1.46E-06 |
| CS | 137 | 5.98E-05 | 7.76E-05 | 5.35E-05 | NO DATA | 2.78E-05 | 9.40E-06 | 1.05E-06 |
| CS | 138 | 4.14E-08 | 7.76E-08 | 4.05E-08 | NO DATA | 6.00E-08 | 6.07E-09 | 2.33E-13 |
| BA | 139 | 1.17E-10 | 8.32E-14 | 3.42E-12 | NO DATA | 7.78E-14 | 4.70E-07 | 1.12E-07 |
| BA | 140 | 4.88E-06 | 6.13E-09 | 3.21E-07 | NO DATA | 2.09E-09 | 1.59E-04 | 2.73E-05 |
| BA | 141 | 1.25E-11 | 9.41E-15 | 4.20E-13 | NO DATA | 8.75E-15 | 2.42E-07 | 1.45E-17 |
| BA | 142 | 3.29E-12 | 3.38E-15 | 2.07E-13 | NO DATA | 2.86E-15 | 1.49E-07 | 1.96E-26 |
| LA | 140 | 4.30E-08 | 2.17E-08 | 5.73E-09 | NO DATA | NO DATA | 1.70E-05 | 5.73E-05 |
| LA | 142 | 8.54E-11 | 3.88E-11 | 9.65E-12 | NO DATA | NO DATA | 7.91E-07 | 2.64E-07 |
| CE | 141 | 2.49E-06 | 1.69E-06 | 1.91E-07 | NO DATA | 7.83E-07 | 4.52E-05 | 1.50E-05 |
| CE | 143 | 2.33E-08 | 1.72E-08 | 1.91E-09 | NO DATA | 7.60E-09 | 9.97E-06 | 2.83E-05 |
| CE | 144 | 4.29E-04 | 1.79E-04 | 2.30E-05 | NO DATA | 1.06E-04 | 9.72E-04 | 1.02E-04 |
| PR | 143 | 1.17E-06 | 4.69E-07 | 5.80E-08 | NO DATA | 2.70E-07 | 3.51E-05 | 2.50E-05 |
| PR | 144 | 3.76E-12 | 1.56E-12 | 1.91E-13 | NO DATA | 8.81E-13 | 1.27E-07 | 2.69E-18 |
| ND | 147 | 6.59E-07 | 7.62E-07 | 4.56E-08 | NO DATA | 4.45E-07 | 2.76E-05 | 2.16E-05 |
| W | 187 | 1.06E-09 | 8.85E-10 | 3.10E-10 | NO DATA | NO DATA | 3.63E-06 | 1.94E-05 |
| NP | 239 | 2.87E-08 | 2.82E-09 | 1.55E-09 | NO DATA | 8.75E-09 | 4.70E-06 | 1.49E-05 |

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TABLE A.2-2*
INHALATION DOSE FACTORS FOR TEENAGER
(MREM PER PCI INHALED)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| H | 3 | NO DATA | 1.59E-07 | 1.59E-07 | 1.59E-07 | 1.59E-07 | 1.59E-07 | 1.59E-07 |
| C | 14 | 3.25E-06 | 6.09E-07 | 6.09E-07 | 6.09E-07 | 6.09E-07 | 6.09E-07 | 6.09E-07 |
| NA | 24 | 1.72E-06 | 1.72E-06 | 1.72E-06 | 1.72E-06 | 1.72E-06 | 1.72E-06 | 1.72E-06 |
| P | 32 | 2.36E-04 | 1.37E-05 | 8.95E-06 | NO DATA | NO DATA | NO DATA | 1.16E-05 |
| CR | 51 | NO DATA | NO DATA | 1.69E-08 | 9.37E-09 | 3.84E-09 | 2.62E-06 | 3.75E-07 |
| MN | 54 | NO DATA | 6.39E-06 | 1.05E-06 | NO DATA | 1.59E-06 | 2.48E-04 | 8.35E-06 |
| MN | 56 | NO DATA | 2.12E-10 | 3.15E-11 | NO DATA | 2.24E-10 | 1.90E-06 | 7.18E-06 |
| FE | 55 | 4.18E-06 | 2.98E-06 | 6.93E-07 | NO DATA | NO DATA | 1.55E-05 | 7.99E-07 |
| FE | 59 | 1.99E-06 | 4.62E-06 | 1.79E-06 | NO DATA | NO DATA | 1.91E-04 | 2.23E-05 |
| CO | 58 | NO DATA | 2.59E-07 | 3.47E-07 | NO DATA | NO DATA | 1.68E-04 | 1.19E-05 |
| CO | 60 | NO DATA | 1.89E-06 | 2.48E-06 | NO DATA | NO DATA | 1.09E-03 | 3.24E-05 |
| NI | 63 | 7.25E-05 | 5.43E-06 | 2.47E-06 | NO DATA | NO DATA | 3.84E-05 | 1.77E-06 |
| NI | 65 | 2.73E-10 | 3.66E-11 | 1.59E-11 | NO DATA | NO DATA | 1.17E-06 | 4.59E-06 |
| CU | 64 | NO DATA | 2.54E-10 | 1.06E-10 | NO DATA | 8.01E-10 | 1.39E-06 | 7.68E-06 |
| ZN | 65 | 4.82E-06 | 1.67E-05 | 7.80E-06 | NO DATA | 1.08E-05 | 1.55E-04 | 5.83E-06 |
| ZN | 69 | 6.04E-12 | 1.15E-11 | 8.07E-13 | NO DATA | 7.53E-12 | 1.98E-07 | 3.56E-08 |
| BR | 83 | NO DATA | NO DATA | 4.30E-08 | NO DATA | NO DATA | NO DATA | LT E-24 |
| BR | 84 | NO DATA | NO DATA | 5.41E-08 | NO DATA | NO DATA | NO DATA | LT E-24 |
| BR | 85 | NO DATA | NO DATA | 2.29E-09 | NO DATA | NO DATA | NO DATA | LT E-24 |
| RB | 86 | NO DATA | 2.38E-05 | 1.05E-05 | NO DATA | NO DATA | NO DATA | 2.21E-06 |
| RB | 88 | NO DATA | 6.82E-08 | 3.40E-08 | NO DATA | NO DATA | NO DATA | 3.65E-15 |
| RB | 89 | NO DATA | 4.40E-08 | 2.91E-08 | NO DATA | NO DATA | NO DATA | 4.22E-17 |
| SR | 89 | 5.43E-05 | NO DATA | 1.56E-06 | NO DATA | NO DATA | 3.02E-04 | 4.64E-05 |
| SR | 90 | 1.35E-02 | NO DATA | 8.35E-04 | NO DATA | NO DATA | 2.06E-03 | 9.56E-05 |
| SR | 91 | 1.10E-08 | NO DATA | 4.39E-10 | NO DATA | NO DATA | 7.59E-06 | 3.24E-05 |
| SR | 92 | 1.19E-09 | NO DATA | 5.08E-11 | NO DATA | NO DATA | 3.43E-06 | 1.49E-05 |
| Y | 90 | 3.73E-07 | NO DATA | 1.00E-08 | NO DATA | NO DATA | 3.66E-05 | 6.99E-05 |
| Y | 91M | 4.63E-11 | NO DATA | 1.77E-12 | NO DATA | NO DATA | 4.00E-07 | 3.77E-09 |
| Y | 91 | 8.26E-05 | NO DATA | 2.21E-06 | NO DATA | NO DATA | 3.67E-04 | 5.11E-05 |
| Y | 92 | 1.84E-09 | NO DATA | 5.36E-11 | NO DATA | NO DATA | 3.35E-06 | 2.06E-05 |
| Y | 93 | 1.69E-08 | NO DATA | 4.65E-10 | NO DATA | NO DATA | 1.04E-05 | 7.24E-05 |
| ZR | 95 | 1.82E-05 | 5.73E-06 | 3.94E-06 | NO DATA | 8.42E-06 | 3.36E-04 | 1.86E-05 |
| ZR | 97 | 1.72E-08 | 3.40E-09 | 1.57E-09 | NO DATA | 5.15E-09 | 1.62E-05 | 7.88E-05 |
| NB | 95 | 2.32E-06 | 1.29E-06 | 7.08E-07 | NO DATA | 1.25E-06 | 9.39E-05 | 1.21E-05 |
| MO | 99 | NO DATA | 2.11E-08 | 4.03E-09 | NO DATA | 5.14E-08 | 1.92E-05 | 3.36E-05 |
| TC | 99M | 1.73E-13 | 4.83E-13 | 6.24E-12 | NO DATA | 7.20E-12 | 1.44E-07 | 7.66E-07 |

*Taken from Regulatory Guide 1.109 (Rev. 1)

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TABLE A.2-2* (cont'd)
INHALATION DOSE FACTORS FOR TEENAGER
(MREM PER PCI INHALED)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|------|----------|----------|----------|----------|----------|----------|----------|
| TC | 101 | 7.40E-15 | 1.05E-14 | 1.03E-13 | NO DATA | 1.90E-13 | 8.34E-08 | 1.09E-16 |
| RU | 103 | 2.63E-07 | NO DATA | 1.12E-07 | NO DATA | 9.29E-07 | 9.79E-05 | 1.36E-05 |
| RU | 105 | 1.40E-10 | NO DATA | 5.42E-11 | NO DATA | 1.76E-10 | 2.27E-06 | 1.13E-05 |
| RU | 106 | 1.23E-05 | NO DATA | 1.55E-06 | NO DATA | 2.38E-05 | 2.01E-03 | 1.20E-04 |
| AG | 110M | 1.73E-06 | 1.64E-06 | 9.99E-07 | NO DATA | 3.13E-06 | 8.44E-04 | 3.41E-05 |
| TE | 125M | 6.10E-07 | 2.80E-07 | 8.34E-08 | 1.75E-07 | NO DATA | 6.70E-05 | 9.38E-06 |
| TE | 127M | 2.25E-06 | 1.02E-06 | 2.73E-07 | 5.48E-07 | 8.17E-06 | 2.07E-04 | 1.99E-05 |
| TE | 127 | 2.51E-10 | 1.14E-10 | 5.52E-11 | 1.77E-10 | 9.10E-10 | 1.40E-06 | 1.01E-05 |
| TE | 129M | 1.74E-06 | 8.23E-07 | 2.81E-07 | 5.72E-07 | 6.49E-06 | 2.47E-04 | 5.06E-05 |
| TE | 129 | 8.87E-12 | 4.22E-12 | 2.20E-12 | 6.48E-12 | 3.32E-11 | 4.12E-07 | 2.02E-07 |
| TE | 131M | 1.23E-08 | 7.51E-09 | 5.03E-09 | 9.06E-09 | 5.49E-08 | 2.97E-05 | 7.76E-05 |
| TE | 131 | 1.97E-12 | 1.04E-12 | 6.30E-13 | 1.55E-12 | 7.72E-12 | 2.92E-07 | 1.89E-09 |
| TE | 132 | 4.50E-08 | 3.63E-08 | 2.74E-08 | 3.07E-08 | 2.44E-07 | 5.61E-05 | 5.79E-05 |
| I | 130 | 7.80E-07 | 2.24E-06 | 8.96E-07 | 1.86E-04 | 3.44E-06 | NO DATA | 1.14E-06 |
| I | 131 | 4.43E-06 | 6.14E-06 | 3.30E-06 | 1.83E-03 | 1.05E-05 | NO DATA | 8.11E-07 |
| I | 132 | 1.99E-07 | 5.47E-07 | 1.97E-07 | 1.89E-05 | 8.65E-07 | NO DATA | 1.59E-07 |
| I | 133 | 1.52E-06 | 2.56E-06 | 7.78E-07 | 3.65E-04 | 4.49E-06 | NO DATA | 1.29E-06 |
| I | 134 | 1.11E-07 | 2.90E-07 | 1.05E-07 | 4.94E-06 | 4.58E-07 | NO DATA | 2.55E-09 |
| I | 135 | 4.62E-07 | 1.18E-06 | 4.36E-07 | 7.76E-05 | 1.86E-06 | NO DATA | 8.69E-07 |
| CS | 134 | 6.28E-05 | 1.41E-04 | 6.86E-05 | NO DATA | 4.69E-05 | 1.83E-05 | 1.22E-06 |
| CS | 136 | 6.44E-06 | 2.42E-05 | 1.71E-05 | NO DATA | 1.38E-05 | 2.22E-06 | 1.36E-06 |
| CS | 137 | 8.38E-05 | 1.06E-04 | 3.89E-05 | NO DATA | 3.80E-05 | 1.51E-05 | 1.06E-06 |
| CS | 138 | 5.82E-08 | 1.07E-07 | 5.58E-08 | NO DATA | 8.28E-08 | 9.84E-09 | 3.38E-11 |
| BA | 139 | 1.67E-10 | 1.18E-13 | 4.87E-12 | NO DATA | 1.11E-13 | 8.08E-07 | 8.06E-07 |
| BA | 140 | 6.84E-06 | 8.38E-09 | 4.40E-07 | NO DATA | 2.85E-09 | 2.54E-04 | 2.86E-05 |
| BA | 141 | 1.78E-11 | 1.32E-14 | 5.93E-13 | NO DATA | 1.23E-14 | 4.11E-07 | 9.33E-14 |
| BA | 142 | 4.62E-12 | 4.63E-15 | 2.84E-13 | NO DATA | 3.92E-15 | 2.39E-07 | 5.99E-20 |
| LA | 140 | 5.99E-08 | 2.95E-08 | 7.82E-09 | NO DATA | NO DATA | 2.68E-05 | 6.09E-05 |
| LA | 142 | 1.20E-10 | 5.31E-11 | 1.32E-11 | NO DATA | NO DATA | 1.27E-06 | 1.50E-06 |
| CE | 141 | 3.55E-06 | 2.37E-06 | 2.71E-07 | NO DATA | 1.11E-06 | 7.67E-05 | 1.58E-05 |
| CE | 143 | 3.32E-08 | 2.42E-08 | 2.70E-09 | NO DATA | 1.08E-08 | 1.63E-05 | 3.19E-05 |
| CE | 144 | 6.11E-04 | 2.53E-04 | 3.28E-05 | NO DATA | 1.51E-04 | 1.67E-03 | 1.08E-04 |
| PR | 143 | 1.67E-06 | 6.64E-07 | 8.28E-08 | NO DATA | 3.86E-07 | 6.04E-05 | 2.67E-05 |
| PR | 144 | 5.37E-12 | 2.20E-12 | 2.72E-13 | NO DATA | 1.26E-12 | 2.19E-07 | 2.94E-14 |
| ND | 147 | 9.83E-07 | 1.07E-06 | 6.41E-08 | NO DATA | 6.28E-07 | 4.65E-05 | 2.28E-05 |
| W | 187 | 1.50E-09 | 1.22E-09 | 4.29E-10 | NO DATA | NO DATA | 5.92E-06 | 2.21E-05 |
| NP | 239 | 4.23E-08 | 3.99E-09 | 2.21E-09 | NO DATA | 1.25E-08 | 8.11E-06 | 1.65E-05 |

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TABLE A.2-3*
INHALATION DOSE FACTORS FOR CHILD
(MREM PER PCI INHALED)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| H | 3 | NO DATA | 3.04E-07 | 3.04E-07 | 3.04E-07 | 3.04E-07 | 3.04E-07 | 3.04E-07 |
| C | 14 | 9.70E-06 | 1.82E-06 | 1.82E-06 | 1.82E-06 | 1.82E-06 | 1.82E-06 | 1.82E-06 |
| NA | 24 | 4.35E-06 | 4.35E-06 | 4.35E-06 | 4.35E-06 | 4.35E-06 | 4.35E-06 | 4.35E-06 |
| P | 32 | 7.04E-04 | 3.09E-05 | 2.67E-05 | NO DATA | NO DATA | NO DATA | 1.14E-05 |
| CR | 51 | NO DATA | NO DATA | 4.17E-08 | 2.31E-08 | 6.57E-09 | 4.59E-06 | 2.93E-07 |
| MN | 54 | NO DATA | 1.16E-05 | 2.57E-06 | NO DATA | 2.71E-06 | 4.26E-04 | 6.19E-06 |
| MN | 56 | NO DATA | 4.48E-10 | 8.43E-11 | NO DATA | 4.52E-10 | 3.55E-06 | 3.33E-05 |
| FE | 55 | 1.28E-05 | 6.80E-06 | 2.10E-06 | NO DATA | NO DATA | 3.00E-05 | 7.75E-07 |
| FE | 59 | 5.59E-06 | 9.04E-06 | 4.51E-06 | NO DATA | NO DATA | 3.43E-04 | 1.91E-05 |
| CO | 58 | NO DATA | 4.79E-07 | 8.55E-07 | NO DATA | NO DATA | 2.99E-04 | 9.29E-06 |
| CO | 60 | NO DATA | 3.55E-06 | 6.12E-06 | NO DATA | NO DATA | 1.91E-03 | 2.60E-05 |
| NI | 63 | 2.22E-04 | 1.25E-05 | 7.56E-06 | NO DATA | NO DATA | 7.43E-05 | 1.71E-06 |
| NI | 65 | 8.08E-10 | 7.99E-11 | 4.44E-11 | NO DATA | NO DATA | 2.21E-06 | 2.27E-05 |
| CU | 64 | NO DATA | 5.39E-10 | 2.90E-10 | NO DATA | 1.63E-09 | 2.59E-06 | 9.92E-06 |
| ZN | 65 | 1.15E-05 | 3.06E-05 | 1.90E-05 | NO DATA | 1.93E-05 | 2.69E-04 | 4.41E-06 |
| ZN | 69 | 1.81E-11 | 2.61E-11 | 2.41E-12 | NO DATA | 1.58E-11 | 3.84E-07 | 2.75E-06 |
| BR | 83 | NO DATA | NO DATA | 1.28E-07 | NO DATA | NO DATA | NO DATA | LT E-24 |
| BR | 84 | NO DATA | NO DATA | 1.48E-07 | NO DATA | NO DATA | NO DATA | LT E-24 |
| BR | 85 | NO DATA | NO DATA | 6.84E-09 | NO DATA | NO DATA | NO DATA | LT E-24 |
| RB | 86 | NO DATA | 5.36E-05 | 3.09E-05 | NO DATA | NO DATA | NO DATA | 2.16E-06 |
| RB | 88 | NO DATA | 1.52E-07 | 9.90E-08 | NO DATA | NO DATA | NO DATA | 4.66E-09 |
| RB | 89 | NO DATA | 9.33E-08 | 7.83E-08 | NO DATA | NO DATA | NO DATA | 5.11E-10 |
| SR | 89 | 1.62E-04 | NO DATA | 4.66E-06 | NO DATA | NO DATA | 5.83E-04 | 4.52E-05 |
| SR | 90 | 2.73E-02 | NO DATA | 1.74E-03 | NO DATA | NO DATA | 3.99E-03 | 9.28E-05 |
| SR | 91 | 3.28E-08 | NO DATA | 1.24E-09 | NO DATA | NO DATA | 1.44E-05 | 4.70E-05 |
| SR | 92 | 3.54E-09 | NO DATA | 1.42E-10 | NO DATA | NO DATA | 6.49E-06 | 6.55E-05 |
| Y | 90 | 1.11E-06 | NO DATA | 2.99E-08 | NO DATA | NO DATA | 7.07E-05 | 7.24E-05 |
| Y | 91M | 1.37E-10 | NO DATA | 4.98E-12 | NO DATA | NO DATA | 7.60E-07 | 4.64E-07 |
| Y | 91 | 2.47E-04 | NO DATA | 6.59E-06 | NO DATA | NO DATA | 7.10E-04 | 4.97E-05 |
| Y | 92 | 5.50E-09 | NO DATA | 1.57E-10 | NO DATA | NO DATA | 6.46E-06 | 6.46E-05 |
| Y | 93 | 5.04E-08 | NO DATA | 1.38E-09 | NO DATA | NO DATA | 2.01E-05 | 1.05E-04 |
| ZR | 95 | 5.13E-05 | 1.13E-05 | 1.00E-05 | NO DATA | 1.61E-05 | 6.03E-04 | 1.65E-05 |
| ZR | 97 | 5.07E-08 | 7.34E-09 | 4.32E-09 | NO DATA | 1.05E-08 | 3.06E-05 | 9.49E-05 |
| NB | 95 | 6.35E-06 | 2.48E-06 | 1.77E-06 | NO DATA | 2.33E-06 | 1.66E-04 | 1.00E-05 |
| MO | 99 | NO DATA | 4.66E-08 | 1.15E-08 | NO DATA | 1.06E-07 | 3.66E-05 | 3.42E-05 |
| TC | 99M | 4.81E-13 | 9.41E-13 | 1.56E-11 | NO DATA | 1.37E-11 | 2.57E-07 | 1.30E-06 |

*Taken from Regulatory Guide 1.109 (Rev. 1)

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TABLE A.2-3* (cont'd)
INHALATION DOSE FACTORS FOR CHILD
(MREM PER PCI INHALED)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|------|----------|----------|----------|----------|----------|----------|----------|
| TC | 101 | 2.19E-14 | 2.30E-14 | 2.91E-13 | NO DATA | 3.92E-13 | 1.58E-07 | 4.41E-09 |
| RU | 103 | 7.55E-07 | NO DATA | 2.90E-07 | NO DATA | 1.90E-06 | 1.79E-04 | 1.21E-05 |
| RU | 105 | 4.13E-10 | NO DATA | 1.50E-10 | NO DATA | 3.63E-10 | 4.30E-06 | 2.69E-05 |
| RU | 106 | 3.68E-05 | NO DATA | 4.57E-06 | NO DATA | 4.97E-05 | 3.87E-03 | 1.16E-04 |
| AG | 110M | 4.56E-06 | 3.08E-06 | 2.47E-06 | NO DATA | 5.74E-06 | 1.48E-03 | 2.71E-05 |
| TE | 125M | 1.82E-06 | 6.29E-07 | 2.47E-07 | 5.20E-07 | NO DATA | 1.29E-04 | 9.13E-06 |
| TE | 127M | 6.72E-06 | 2.31E-06 | 8.16E-07 | 1.64E-06 | 1.72E-05 | 4.00E-04 | 1.93E-05 |
| TE | 127 | 7.49E-10 | 2.57E-10 | 1.65E-10 | 5.30E-10 | 1.91E-09 | 2.71E-06 | 1.52E-05 |
| TE | 129M | 5.19E-06 | 1.85E-06 | 8.22E-07 | 1.71E-06 | 1.36E-05 | 4.76E-04 | 4.91E-05 |
| TE | 129 | 2.64E-11 | 9.45E-12 | 6.44E-12 | 1.93E-11 | 6.94E-11 | 7.93E-07 | 6.89E-06 |
| TE | 131M | 3.63E-08 | 1.60E-08 | 1.37E-08 | 2.64E-08 | 1.08E-07 | 5.56E-05 | 8.32E-05 |
| TE | 131 | 5.87E-12 | 2.28E-12 | 1.78E-12 | 4.59E-12 | 1.59E-11 | 5.55E-07 | 3.60E-07 |
| TE | 132 | 1.30E-07 | 7.36E-08 | 7.12E-08 | 8.58E-08 | 4.79E-07 | 1.02E-04 | 3.72E-05 |
| I | 130 | 2.21E-06 | 4.43E-06 | 2.28E-06 | 4.99E-04 | 6.61E-06 | NO DATA | 1.38E-06 |
| I | 131 | 1.30E-05 | 1.30E-05 | 7.37E-06 | 4.39E-03 | 2.13E-05 | NO DATA | 7.68E-07 |
| I | 132 | 5.72E-07 | 1.10E-06 | 5.07E-07 | 5.23E-05 | 1.69E-06 | NO DATA | 8.65E-07 |
| I | 133 | 4.48E-06 | 5.49E-06 | 2.08E-06 | 1.04E-03 | 9.13E-06 | NO DATA | 1.48E-06 |
| I | 134 | 3.17E-07 | 5.84E-07 | 2.69E-07 | 1.37E-05 | 8.92E-07 | NO DATA | 2.58E-07 |
| I | 135 | 1.33E-06 | 2.36E-06 | 1.12E-06 | 2.14E-04 | 3.62E-06 | NO DATA | 1.20E-06 |
| CS | 134 | 1.76E-04 | 2.74E-04 | 6.07E-05 | NO DATA | 8.93E-05 | 3.27E-05 | 1.04E-06 |
| CS | 136 | 1.76E-05 | 4.62E-05 | 3.14E-05 | NO DATA | 2.58E-05 | 3.93E-06 | 1.13E-06 |
| CS | 137 | 2.45E-04 | 2.23E-04 | 3.47E-05 | NO DATA | 7.63E-05 | 2.81E-05 | 9.78E-07 |
| CS | 138 | 1.71E-07 | 2.27E-07 | 1.50E-07 | NO DATA | 1.68E-07 | 1.84E-08 | 7.29E-08 |
| BA | 139 | 4.98E-10 | 2.66E-13 | 1.45E-11 | NO DATA | 2.33E-13 | 1.56E-06 | 1.56E-05 |
| BA | 140 | 2.00E-05 | 1.75E-08 | 1.17E-06 | NO DATA | 5.71E-09 | 4.71E-04 | 2.75E-05 |
| BA | 141 | 5.29E-11 | 2.95E-14 | 1.72E-12 | NO DATA | 2.56E-14 | 7.89E-07 | 7.44E-08 |
| BA | 142 | 1.35E-11 | 9.73E-15 | 7.54E-13 | NO DATA | 7.87E-15 | 4.44E-07 | 7.41E-10 |
| LA | 140 | 1.74E-07 | 6.08E-08 | 2.04E-08 | NO DATA | NO DATA | 4.94E-05 | 6.10E-05 |
| LA | 142 | 3.50E-10 | 1.11E-10 | 3.49E-11 | NO DATA | NO DATA | 2.35E-06 | 2.05E-05 |
| CE | 141 | 1.06E-05 | 5.28E-06 | 7.83E-07 | NO DATA | 2.31E-06 | 1.47E-04 | 1.53E-05 |
| CE | 143 | 9.89E-08 | 5.37E-08 | 7.77E-09 | NO DATA | 2.26E-08 | 3.12E-05 | 3.44E-05 |
| CE | 144 | 1.83E-03 | 5.72E-04 | 9.77E-05 | NO DATA | 3.17E-04 | 3.23E-03 | 1.05E-04 |
| PR | 143 | 4.99E-06 | 1.50E-06 | 2.47E-07 | NO DATA | 8.11E-07 | 1.17E-04 | 2.63E-05 |
| PR | 144 | 1.61E-11 | 4.99E-12 | 8.10E-13 | NO DATA | 2.64E-12 | 4.23E-07 | 5.32E-08 |
| ND | 147 | 2.92E-06 | 2.36E-06 | 1.84E-07 | NO DATA | 1.30E-06 | 8.87E-05 | 2.22E-05 |
| W | 187 | 4.41E-09 | 2.61E-09 | 1.17E-09 | NO DATA | NO DATA | 1.11E-05 | 2.46E-05 |
| NP | 239 | 1.26E-07 | 9.04E-09 | 6.35E-09 | NO DATA | 2.63E-08 | 1.57E-05 | 1.73E-05 |

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TABLE A.2-4*
INHALATION DOSE FACTORS FOR INFANT
(MREM PER PCI INHALED)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| H | 3 | NO DATA | 4.62E-07 | 4.62E-07 | 4.62E-07 | 4.62E-07 | 4.62E-07 | 4.62E-07 |
| C | 14 | 1.89E-05 | 3.79E-06 | 3.79E-06 | 3.79E-06 | 3.79E-06 | 3.79E-06 | 3.79E-06 |
| NA | 24 | 7.54E-06 | 7.54E-06 | 7.54E-06 | 7.54E-06 | 7.54E-06 | 7.54E-06 | 7.54E-06 |
| P | 32 | 1.45E-03 | 8.03E-05 | 5.53E-05 | NO DATA | NO DATA | NO DATA | 1.15E-05 |
| CR | 51 | NO DATA | NO DATA | 6.39E-08 | 4.11E-08 | 9.45E-09 | 9.17E-06 | 2.55E-07 |
| MN | 54 | NO DATA | 1.81E-05 | 3.56E-06 | NO DATA | 3.56E-06 | 7.14E-04 | 5.04E-06 |
| MN | 56 | NO DATA | 1.10E-09 | 1.58E-10 | NO DATA | 7.86E-10 | 8.95E-06 | 5.12E-05 |
| FE | 55 | 1.41E-05 | 8.39E-06 | 2.38E-06 | NO DATA | NO DATA | 6.21E-05 | 7.82E-07 |
| FE | 59 | 9.69E-06 | 1.68E-05 | 6.77E-06 | NO DATA | NO DATA | 7.25E-04 | 1.77E-05 |
| CO | 58 | NO DATA | 8.71E-07 | 1.30E-06 | NO DATA | NO DATA | 5.55E-04 | 7.95E-06 |
| CO | 60 | NO DATA | 5.73E-06 | 8.41E-06 | NO DATA | NO DATA | 3.22E-03 | 2.28E-05 |
| NI | 63 | 2.42E-04 | 1.46E-05 | 8.29E-06 | NO DATA | NO DATA | 1.49E-04 | 1.73E-06 |
| NI | 65 | 1.71E-09 | 2.03E-10 | 8.79E-11 | NO DATA | NO DATA | 5.80E-06 | 3.58E-05 |
| CU | 64 | NO DATA | 1.34E-09 | 5.53E-10 | NO DATA | 2.84E-09 | 6.64E-06 | 1.07E-05 |
| ZN | 65 | 1.38E-05 | 4.47E-05 | 2.22E-05 | NO DATA | 2.32E-05 | 4.62E-04 | 3.67E-05 |
| ZN | 69 | 3.85E-11 | 6.91E-11 | 5.13E-12 | NO DATA | 2.87E-11 | 1.05E-06 | 9.44E-06 |
| BR | 83 | NO DATA | NO DATA | 2.72E-07 | NO DATA | NO DATA | NO DATA | LT E-24 |
| BR | 84 | NO DATA | NO DATA | 2.86E-07 | NO DATA | NO DATA | NO DATA | LT E-24 |
| BR | 85 | NO DATA | NO DATA | 1.46E-08 | NO DATA | NO DATA | NO DATA | LT E-24 |
| RB | 86 | NO DATA | 1.36E-04 | 6.30E-05 | NO DATA | NO DATA | NO DATA | 2.17E-06 |
| RB | 88 | NO DATA | 3.98E-07 | 2.05E-07 | NO DATA | NO DATA | NO DATA | 2.42E-07 |
| RB | 89 | NO DATA | 2.29E-07 | 1.47E-07 | NO DATA | NO DATA | NO DATA | 4.87E-08 |
| SR | 89 | 2.84E-04 | NO DATA | 8.15E-06 | NO DATA | NO DATA | 1.45E-03 | 4.57E-05 |
| SR | 90 | 2.92E-02 | NO DATA | 1.85E-03 | NO DATA | NO DATA | 8.03E-03 | 9.36E-05 |
| SR | 91 | 6.83E-08 | NO DATA | 2.47E-09 | NO DATA | NO DATA | 3.76E-05 | 5.24E-05 |
| SR | 92 | 7.50E-09 | NO DATA | 2.79E-10 | NO DATA | NO DATA | 1.70E-05 | 1.00E-04 |
| Y | 90 | 2.35E-06 | NO DATA | 6.30E-08 | NO DATA | NO DATA | 1.92E-04 | 7.43E-05 |
| Y | 91M | 2.91E-10 | NO DATA | 9.90E-12 | NO DATA | NO DATA | 1.99E-06 | 1.68E-06 |
| Y | 91 | 4.20E-04 | NO DATA | 1.12E-05 | NO DATA | NO DATA | 1.75E-03 | 5.02E-05 |
| Y | 92 | 1.17E-08 | NO DATA | 3.29E-10 | NO DATA | NO DATA | 1.75E-05 | 9.04E-05 |
| Y | 93 | 1.07E-07 | NO DATA | 2.91E-09 | NO DATA | NO DATA | 5.46E-05 | 1.19E-04 |
| ZR | 95 | 8.24E-05 | 1.99E-05 | 1.45E-05 | NO DATA | 2.22E-05 | 1.25E-03 | 1.55E-05 |
| ZR | 97 | 1.07E-07 | 1.83E-08 | 8.36E-09 | NO DATA | 1.85E-08 | 7.88E-05 | 1.00E-04 |
| NB | 95 | 1.12E-05 | 4.59E-06 | 2.70E-06 | NO DATA | 3.37E-06 | 3.42E-04 | 9.05E-06 |
| MO | 99 | NO DATA | 1.18E-07 | 2.31E-08 | NO DATA | 1.89E-07 | 9.63E-05 | 3.48E-05 |
| TC | 99M | 9.98E-13 | 2.06E-12 | 2.66E-11 | NO DATA | 2.22E-11 | 5.79E-07 | 1.45E-06 |

*Taken from Regulatory Guide 1.109 (Rev. 1)

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TABLE A.2-4* (cont'd)
INHALATION DOSE FACTORS FOR INFANT
(MREM PER PCI INHALED)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|------|----------|----------|----------|----------|----------|----------|----------|
| TC | 101 | 4.65E-14 | 5.88E-14 | 5.80E-13 | NO DATA | 6.99E-13 | 4.17E-07 | 6.03E-07 |
| RU | 103 | 1.44E-06 | NO DATA | 4.85E-07 | NO DATA | 3.03E-06 | 3.94E-04 | 1.15E-05 |
| RU | 105 | 8.74E-10 | NO DATA | 2.93E-10 | NO DATA | 6.42E-10 | 1.12E-05 | 3.46E-05 |
| RU | 106 | 6.20E-05 | NO DATA | 7.77E-06 | NO DATA | 7.61E-05 | 8.26E-03 | 1.17E-04 |
| AG | 110M | 7.13E-06 | 5.16E-06 | 3.57E-06 | NO DATA | 7.80E-06 | 2.62E-03 | 2.36E-05 |
| TE | 125M | 3.40E-06 | 1.42E-06 | 4.70E-07 | 1.16E-06 | NO DATA | 3.19E-04 | 9.22E-06 |
| TE | 127M | 1.19E-05 | 4.93E-06 | 1.48E-06 | 3.48E-06 | 2.68E-05 | 9.37E-04 | 1.95E-05 |
| TE | 127 | 1.59E-09 | 6.81E-10 | 3.49E-10 | 1.32E-09 | 3.47E-09 | 7.39E-06 | 1.74E-05 |
| TE | 129M | 1.01E-05 | 4.35E-06 | 1.59E-06 | 3.91E-06 | 2.27E-05 | 1.20E-03 | 4.93E-05 |
| TE | 129 | 5.63E-11 | 2.48E-11 | 1.34E-11 | 4.82E-11 | 1.25E-10 | 2.14E-06 | 1.88E-05 |
| TE | 131M | 7.62E-08 | 3.93E-08 | 2.59E-08 | 6.38E-08 | 1.89E-07 | 1.42E-04 | 8.51E-05 |
| TE | 131 | 1.24E-11 | 5.87E-12 | 3.57E-12 | 1.13E-11 | 2.85E-11 | 1.47E-06 | 5.87E-06 |
| TE | 132 | 2.66E-07 | 1.69E-07 | 1.26E-07 | 1.99E-07 | 7.39E-07 | 2.43E-04 | 3.15E-05 |
| I | 130 | 4.54E-06 | 9.91E-06 | 3.98E-06 | 1.14E-03 | 1.09E-05 | NO DATA | 1.42E-06 |
| I | 131 | 2.71E-05 | 3.17E-05 | 1.40E-05 | 1.06E-02 | 3.70E-05 | NO DATA | 7.56E-07 |
| I | 132 | 1.21E-06 | 2.53E-06 | 8.99E-07 | 1.21E-04 | 2.82E-06 | NO DATA | 1.36E-06 |
| I | 133 | 9.46E-06 | 1.37E-05 | 4.00E-06 | 2.54E-03 | 1.60E-05 | NO DATA | 1.54E-06 |
| I | 134 | 6.58E-07 | 1.34E-06 | 4.75E-07 | 3.18E-05 | 1.49E-06 | NO DATA | 9.21E-07 |
| I | 135 | 2.76E-06 | 5.43E-06 | 1.98E-06 | 4.97E-04 | 6.05E-06 | NO DATA | 1.31E-06 |
| CS | 134 | 2.83E-04 | 5.02E-04 | 5.32E-05 | NO DATA | 1.36E-04 | 5.69E-05 | 9.53E-07 |
| CS | 136 | 3.45E-05 | 9.61E-05 | 3.78E-05 | NO DATA | 4.03E-05 | 8.40E-06 | 1.02E-06 |
| CS | 137 | 3.92E-04 | 4.37E-04 | 3.25E-05 | NO DATA | 1.23E-04 | 5.09E-05 | 9.53E-07 |
| CS | 138 | 3.61E-07 | 5.58E-07 | 2.84E-07 | NO DATA | 2.93E-07 | 4.67E-08 | 6.26E-07 |
| BA | 139 | 1.06E-09 | 7.03E-13 | 3.07E-11 | NO DATA | 4.23E-13 | 4.25E-06 | 3.64E-05 |
| BA | 140 | 4.00E-05 | 4.00E-08 | 2.07E-06 | NO DATA | 9.59E-09 | 1.14E-03 | 2.74E-05 |
| BA | 141 | 1.12E-10 | 7.70E-14 | 3.55E-12 | NO DATA | 4.64E-14 | 2.12E-06 | 3.39E-06 |
| BA | 142 | 2.84E-11 | 2.36E-14 | 1.40E-12 | NO DATA | 1.36E-14 | 1.11E-06 | 4.95E-07 |
| LA | 140 | 3.61E-07 | 1.43E-07 | 3.68E-08 | NO DATA | NO DATA | 1.20E-04 | 6.06E-05 |
| LA | 142 | 7.36E-10 | 2.69E-10 | 6.46E-11 | NO DATA | NO DATA | 5.87E-06 | 4.25E-05 |
| CE | 141 | 1.98E-05 | 1.19E-05 | 1.42E-06 | NO DATA | 3.75E-06 | 3.69E-04 | 1.54E-05 |
| CE | 143 | 2.09E-07 | 1.38E-07 | 1.58E-08 | NO DATA | 4.03E-08 | 8.30E-05 | 3.55E-05 |
| CE | 144 | 2.28E-03 | 8.65E-04 | 1.26E-04 | NO DATA | 3.84E-04 | 7.03E-03 | 1.06E-04 |
| PR | 143 | 1.00E-05 | 3.74E-06 | 4.99E-07 | NO DATA | 1.41E-06 | 3.09E-04 | 2.66E-05 |
| PR | 144 | 3.42E-11 | 1.32E-11 | 1.72E-12 | NO DATA | 4.80E-12 | 1.15E-06 | 3.06E-06 |
| ND | 147 | 5.67E-06 | 5.81E-06 | 3.57E-07 | NO DATA | 2.25E-06 | 2.30E-04 | 2.23E-05 |
| W | 187 | 9.26E-09 | 6.44E-09 | 2.23E-09 | NO DATA | NO DATA | 2.83E-05 | 2.54E-05 |
| NP | 239 | 2.65E-07 | 2.37E-08 | 1.34E-08 | NO DATA | 4.73E-08 | 4.25E-05 | 1.78E-05 |

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TABLE A.2-5*
EXTERNAL DOSE FACTORS FOR STANDING ON CONTAMINATED GROUND
(mrem/hr per pCi/m²)

| ELEMENT | TOTAL BODY | SKIN |
|---------|------------|----------|
| H-3 | 0.0 | 0.0 |
| C-14 | 0.0 | 0.0 |
| Na-24 | 2.50E-08 | 2.90E-08 |
| P-32 | 0.0 | 0.0 |
| Cr-51 | 2.20E-10 | 2.60E-10 |
| Mn-54 | 5.80E-09 | 6.80E-09 |
| Mn-56 | 1.10E-08 | 1.30E-08 |
| Fe-55 | 0.0 | 0.0 |
| Fe-59 | 8.00E-09 | 9.40E-09 |
| Co-58 | 7.00E-09 | 8.20E-09 |
| Co-60 | 1.70E-08 | 2.00E-08 |
| Ni-63 | 0.0 | 0.0 |
| Ni-65 | 3.70E-09 | 4.30E-09 |
| Cu-64 | 1.50E-09 | 1.70E-09 |
| Zn-65 | 4.00E-09 | 4.60E-09 |
| Zn-69 | 0.0 | 0.0 |
| Br-83 | 6.40E-11 | 9.30E-11 |
| Br-84 | 1.20E-08 | 1.40E-08 |
| Br-85 | 0.0 | 0.0 |
| Rb-86 | 6.30E-10 | 7.20E-10 |
| Rb-88 | 3.50E-09 | 4.00E-09 |
| Rb-89 | 1.50E-08 | 1.80E-08 |
| Sr-89 | 5.60E-13 | 6.50E-13 |
| Sr-91 | 7.10E-09 | 8.30E-09 |
| Sr-92 | 9.00E-09 | 1.00E-08 |
| Y-90 | 2.20E-12 | 2.60E-12 |
| Y-91M | 3.80E-09 | 4.40E-09 |
| Y-91 | 2.40E-11 | 2.70E-11 |
| Y-92 | 1.60E-09 | 1.90E-09 |
| Y-93 | 5.70E-10 | 7.80E-10 |
| Zr-95 | 5.00E-09 | 5.80E-09 |
| Zr-97 | 5.50E-09 | 6.40E-09 |
| Nb-95 | 5.10E-09 | 6.00E-09 |
| Mo-99 | 1.90E-09 | 2.20E-09 |
| Tc-99M | 9.60E-10 | 1.10E-09 |
| Tc-101 | 2.70E-09 | 3.00E-09 |
| Ru-103 | 3.60E-09 | 4.20E-09 |
| Ru-105 | 4.50E-09 | 5.10E-09 |
| Ru-106 | 1.50E-09 | 1.80E-09 |
| Ag-110M | 1.80E-08 | 2.10E-08 |
| Te-125M | 3.50E-11 | 4.80E-11 |
| Te-127M | 1.10E-12 | 1.30E-12 |
| Te-127 | 1.00E-11 | 1.10E-11 |
| Te-129M | 7.70E-10 | 9.00E-10 |
| Te-129 | 7.10E-10 | 8.40E-10 |

*Taken from Regulatory Guide 1.109 (Rev. 1)

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TABLE A.2-5* (cont'd)
EXTERNAL DOSE FACTORS FOR STANDING ON CONTAMINATED GROUND
(mrem/hr per pCi/m²)

| <u>ELEMENT</u> | <u>TOTAL BODY</u> | <u>SKIN</u> |
|----------------|-------------------|-------------|
| Te-131M | 8.40E-09 | 9.90E-09 |
| Te-131 | 2.20E-09 | 2.60E-06 |
| Te-132 | 1.70E-09 | 2.00E-09 |
| I-130 | 1.40E-08 | 1.70E-08 |
| I-131 | 2.80E-09 | 3.40E-09 |
| I-132 | 1.70E-08 | 2.00E-08 |
| I-133 | 3.70E-09 | 4.50E-09 |
| I-134 | 1.60E-08 | 1.90E-08 |
| I-135 | 1.20E-08 | 1.40E-08 |
| Cs-134 | 1.20E-08 | 1.40E-08 |
| Cs-136 | 1.50E-08 | 1.70E-08 |
| Cs-137 | 4.20E-09 | 4.90E-09 |
| Cs-138 | 2.10E-08 | 2.40E-08 |
| Ba-139 | 2.40E-09 | 2.70E-09 |
| Ba-140 | 2.10E-09 | 2.40E-09 |
| Ba-141 | 4.30E-09 | 4.90E-09 |
| Ba-142 | 7.90E-09 | 9.00E-09 |
| La-140 | 1.50E-08 | 1.70E-08 |
| La-142 | 1.50E-08 | 1.80E-08 |
| Ce-141 | 5.50E-10 | 6.20E-10 |
| Ce-143 | 2.20E-09 | 2.50E-09 |
| Ce-144 | 3.20E-10 | 3.70E-10 |
| Pr-143 | 0.0 | 0.0 |
| Pr-144 | 2.00E-10 | 2.30E-10 |
| Nd-147 | 1.00E-09 | 1.20E-09 |
| W-187 | 3.10E-09 | 3.60E-09 |
| Np-239 | 9.50E-10 | 1.10E-09 |

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TABLE A.3-1*
INGESTION DOSE FACTORS FOR ADULTS
(MREM PER PCI INGESTED)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| H | 3 | NO DATA | 1.05E-07 | 1.05E-07 | 1.05E-07 | 1.05E-07 | 1.05E-07 | 1.05E-07 |
| C | 14 | 2.84E-06 | 5.68E-07 | 5.68E-07 | 5.68E-07 | 5.68E-07 | 5.68E-07 | 5.68E-07 |
| NA | 24 | 1.70E-06 | 1.70E-06 | 1.70E-06 | 1.70E-06 | 1.70E-06 | 1.70E-06 | 1.70E-06 |
| P | 32 | 1.93E-04 | 1.20E-05 | 7.46E-06 | NO DATA | NO DATA | NO DATA | 2.17E-05 |
| CR | 51 | NO DATA | NO DATA | 2.66E-09 | 1.59E-09 | 5.86E-10 | 3.53E-09 | 6.69E-07 |
| MN | 54 | NO DATA | 4.57E-06 | 8.72E-07 | NO DATA | 1.36E-06 | NO DATA | 1.40E-05 |
| MN | 56 | NO DATA | 1.15E-07 | 2.04E-08 | NO DATA | 1.46E-07 | NO DATA | 3.67E-06 |
| FE | 55 | 2.75E-06 | 1.90E-06 | 4.43E-07 | NO DATA | NO DATA | 1.06E-06 | 1.09E-06 |
| FE | 59 | 4.34E-06 | 1.02E-05 | 3.91E-06 | NO DATA | NO DATA | 2.85E-06 | 3.40E-05 |
| CO | 58 | NO DATA | 7.45E-07 | 1.67E-06 | NO DATA | NO DATA | NO DATA | 1.51E-05 |
| CO | 60 | NO DATA | 2.14E-06 | 4.72E-06 | NO DATA | NO DATA | NO DATA | 4.02E-05 |
| NI | 63 | 1.30E-04 | 9.01E-06 | 4.36E-06 | NO DATA | NO DATA | NO DATA | 1.88E-06 |
| NI | 65 | 5.28E-07 | 6.86E-08 | 3.13E-08 | NO DATA | NO DATA | NO DATA | 1.74E-06 |
| CU | 64 | NO DATA | 8.33E-08 | 3.91E-08 | NO DATA | 2.10E-07 | NO DATA | 7.10E-06 |
| ZN | 65 | 4.84E-06 | 1.54E-05 | 6.96E-06 | NO DATA | 1.03E-05 | NO DATA | 9.70E-06 |
| ZN | 69 | 1.03E-08 | 1.97E-08 | 1.37E-09 | NO DATA | 1.28E-08 | NO DATA | 2.96E-09 |
| BR | 83 | NO DATA | NO DATA | 4.02E-08 | NO DATA | NO DATA | NO DATA | 5.79E-08 |
| BR | 84 | NO DATA | NO DATA | 5.21E-08 | NO DATA | NO DATA | NO DATA | 4.09E-13 |
| BR | 85 | NO DATA | NO DATA | 2.14E-09 | NO DATA | NO DATA | NO DATA | LT E-24 |
| RB | 86 | NO DATA | 2.11E-05 | 9.83E-06 | NO DATA | NO DATA | NO DATA | 4.16E-06 |
| RB | 88 | NO DATA | 6.05E-08 | 3.21E-08 | NO DATA | NO DATA | NO DATA | 8.36E-19 |
| RB | 89 | NO DATA | 4.01E-08 | 2.82E-08 | NO DATA | NO DATA | NO DATA | 2.33E-21 |
| SR | 89 | 3.08E-04 | NO DATA | 8.84E-06 | NO DATA | NO DATA | NO DATA | 4.94E-05 |
| SR | 90 | 7.58E-03 | NO DATA | 1.86E-03 | NO DATA | NO DATA | NO DATA | 2.19E-04 |
| SR | 91 | 5.67E-06 | NO DATA | 2.29E-07 | NO DATA | NO DATA | NO DATA | 2.70E-05 |
| SR | 92 | 2.15E-06 | NO DATA | 9.30E-08 | NO DATA | NO DATA | NO DATA | 4.26E-05 |
| Y | 90 | 9.62E-09 | NO DATA | 2.58E-10 | NO DATA | NO DATA | NO DATA | 1.02E-04 |
| Y | 91M | 9.09E-11 | NO DATA | 3.52E-12 | NO DATA | NO DATA | NO DATA | 2.67E-10 |
| Y | 91 | 1.41E-07 | NO DATA | 3.77E-09 | NO DATA | NO DATA | NO DATA | 7.76E-05 |
| Y | 92 | 8.45E-10 | NO DATA | 2.47E-11 | NO DATA | NO DATA | NO DATA | 1.48E-05 |
| Y | 93 | 2.68E-09 | NO DATA | 7.40E-11 | NO DATA | NO DATA | NO DATA | 8.50E-05 |
| ZR | 95 | 3.04E-08 | 9.75E-09 | 6.60E-09 | NO DATA | 1.53E-08 | NO DATA | 3.09E-05 |
| ZR | 97 | 1.68E-09 | 3.39E-10 | 1.55E-10 | NO DATA | 5.12E-10 | NO DATA | 1.05E-04 |
| NB | 95 | 6.22E-09 | 3.46E-09 | 1.86E-09 | NO DATA | 3.42E-09 | NO DATA | 2.10E-05 |
| MO | 99 | NO DATA | 4.31E-06 | 8.20E-07 | NO DATA | 9.76E-06 | NO DATA | 9.99E-06 |
| TC | 99M | 2.47E-10 | 6.98E-10 | 8.89E-09 | NO DATA | 1.06E-08 | 3.42E-10 | 4.13E-07 |

*Taken from Regulatory Guide 1.109 (Rev. 1)

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TABLE A.3-1* (cont'd)
INGESTION DOSE FACTORS FOR ADULTS
(MREM PER PCI INGESTED)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|------|----------|----------|----------|----------|----------|----------|----------|
| TC | 101 | 2.54E-10 | 3.66E-10 | 3.59E-09 | NO DATA | 6.59E-09 | 1.87E-10 | 1.10E-21 |
| RU | 103 | 1.85E-07 | NO DATA | 7.97E-08 | NO DATA | 7.06E-07 | NO DATA | 2.16E-05 |
| RU | 105 | 1.54E-08 | NO DATA | 6.08E-09 | NO DATA | 1.99E-07 | NO DATA | 9.42E-06 |
| RU | 106 | 2.75E-06 | NO DATA | 3.48E-07 | NO DATA | 5.31E-06 | NO DATA | 1.78E-04 |
| AG | 110M | 1.60E-07 | 1.48E-07 | 8.79E-08 | NO DATA | 2.91E-07 | NO DATA | 6.04E-05 |
| TE | 125M | 2.68E-06 | 9.71E-07 | 3.59E-07 | 8.06E-07 | 1.09E-05 | NO DATA | 1.07E-05 |
| TE | 127M | 6.77E-06 | 2.42E-06 | 8.25E-07 | 1.73E-06 | 2.75E-05 | NO DATA | 2.27E-05 |
| TE | 127 | 1.10E-07 | 3.95E-08 | 2.38E-08 | 8.15E-08 | 4.48E-07 | NO DATA | 8.68E-06 |
| TE | 129M | 1.15E-05 | 4.29E-06 | 1.82E-06 | 3.95E-06 | 4.80E-05 | NO DATA | 5.79E-05 |
| TE | 129 | 3.14E-08 | 1.18E-08 | 7.65E-09 | 2.41E-08 | 1.32E-07 | NO DATA | 2.37E-08 |
| TE | 131M | 1.73E-06 | 8.46E-07 | 7.05E-07 | 1.34E-06 | 8.57E-06 | NO DATA | 8.40E-05 |
| TE | 131 | 1.97E-08 | 8.23E-09 | 6.22E-09 | 1.62E-08 | 8.63E-08 | NO DATA | 2.79E-09 |
| TE | 132 | 2.52E-06 | 1.63E-06 | 1.53E-06 | 1.80E-06 | 1.57E-05 | NO DATA | 7.71E-05 |
| I | 130 | 7.56E-07 | 2.23E-06 | 8.80E-07 | 1.89E-04 | 3.48E-06 | NO DATA | 1.92E-06 |
| I | 131 | 4.16E-06 | 5.95E-06 | 3.41E-06 | 1.95E-03 | 1.02E-05 | NO DATA | 1.57E-06 |
| I | 132 | 2.03E-07 | 5.43E-07 | 1.90E-07 | 1.90E-05 | 8.65E-07 | NO DATA | 1.02E-07 |
| I | 133 | 1.42E-06 | 2.47E-06 | 7.53E-07 | 3.63E-04 | 4.31E-06 | NO DATA | 2.22E-06 |
| I | 134 | 1.06E-07 | 2.88E-07 | 1.03E-07 | 4.99E-06 | 4.58E-07 | NO DATA | 2.51E-10 |
| I | 135 | 4.43E-07 | 1.16E-06 | 4.28E-07 | 7.65E-05 | 1.86E-06 | NO DATA | 1.31E-06 |
| CS | 134 | 6.22E-05 | 1.48E-04 | 1.21E-04 | NO DATA | 4.79E-05 | 1.59E-05 | 2.59E-06 |
| CS | 136 | 6.51E-06 | 2.57E-05 | 1.85E-05 | NO DATA | 1.43E-05 | 1.96E-06 | 2.92E-06 |
| CS | 137 | 7.97E-05 | 1.09E-04 | 7.14E-05 | NO DATA | 3.70E-05 | 1.23E-05 | 2.11E-06 |
| CS | 138 | 5.52E-08 | 1.09E-07 | 5.40E-08 | NO DATA | 8.01E-08 | 7.91E-09 | 4.65E-13 |
| BA | 139 | 9.70E-08 | 6.91E-11 | 2.84E-09 | NO DATA | 6.46E-11 | 3.92E-11 | 1.72E-07 |
| BA | 140 | 2.03E-05 | 2.55E-08 | 1.33E-06 | NO DATA | 8.67E-09 | 1.46E-08 | 4.18E-05 |
| BA | 141 | 4.71E-08 | 3.56E-11 | 1.59E-09 | NO DATA | 3.31E-11 | 2.02E-11 | 2.22E-17 |
| BA | 142 | 2.13E-08 | 2.19E-11 | 1.34E-09 | NO DATA | 1.85E-11 | 1.24E-11 | 3.00E-26 |
| LA | 140 | 2.50E-09 | 1.26E-09 | 3.33E-10 | NO DATA | NO DATA | NO DATA | 9.25E-05 |
| LA | 142 | 1.28E-10 | 5.82E-11 | 1.45E-11 | NO DATA | NO DATA | NO DATA | 4.25E-07 |
| CE | 141 | 9.36E-09 | 6.33E-09 | 7.18E-10 | NO DATA | 2.94E-09 | NO DATA | 2.42E-05 |
| CE | 143 | 1.65E-09 | 1.22E-06 | 1.35E-10 | NO DATA | 5.37E-10 | NO DATA | 4.56E-05 |
| CE | 144 | 4.88E-07 | 2.04E-07 | 2.62E-08 | NO DATA | 1.21E-07 | NO DATA | 1.65E-04 |
| PR | 143 | 9.20E-09 | 3.69E-09 | 4.56E-10 | NO DATA | 2.13E-09 | NO DATA | 4.03E-05 |
| PR | 144 | 3.01E-11 | 1.25E-11 | 1.53E-12 | NO DATA | 7.05E-12 | NO DATA | 4.33E-18 |
| ND | 147 | 6.29E-09 | 7.27E-09 | 4.35E-10 | NO DATA | 4.25E-09 | NO DATA | 3.49E-05 |
| W | 187 | 1.03E-07 | 8.61E-08 | 3.01E-08 | NO DATA | NO DATA | NO DATA | 2.82E-05 |

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TABLE A.3-1* (cont'd)
INGESTION DOSE FACTORS FOR ADULTS
(MREM PER PCI INGESTED)

| NUCLIDE | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|----------|----------|----------|----------|----------|----------|----------|----------|
| Np 239 | 1.19E-09 | 1.17E-10 | 6.45E-11 | NO DATA | 3.65E-10 | NO DATA | 2.40E-05 |
| Sb 124** | 2.80E-06 | 5.29E-08 | 1.11E-06 | 6.79E-09 | NO DATA | 2.18E-06 | 7.95E-05 |
| Sb 125** | 1.79E-06 | 2.00E-08 | 4.26E-07 | 1.82E-09 | NO DATA | 1.38E-06 | 1.97E-05 |
| Sb 126** | 1.15E-06 | 2.34E-08 | 4.15E-07 | 7.04E-09 | NO DATA | 7.05E-07 | 9.40E-05 |
| Co 57** | NO DATA | 1.75E-07 | 2.91E-07 | NO DATA | NO DATA | NO DATA | 4.44E-06 |

**Taken from Regulatory Guide 1.109 (Rev. 0)

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TABLE A-3.2
INGESTION DOSE FACTORS FOR TEENAGERS
(MREM PER PCI INGESTED)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| H | 3 | NO DATA | 1.06E-07 | 1.06E-07 | 1.06E-07 | 1.06E-07 | 1.06E-07 | 1.06E-07 |
| C | 14 | 4.06E-06 | 8.12E-07 | 8.12E-07 | 8.12E-07 | 8.12E-07 | 8.12E-07 | 8.12E-07 |
| NA | 24 | 2.30E-06 | 2.30E-06 | 2.30E-06 | 2.30E-06 | 2.30E-06 | 2.30E-06 | 2.30E-06 |
| P | 32 | 2.76E-04 | 1.71E-05 | 1.07E-05 | NO DATA | NO DATA | NO DATA | 2.32E-05 |
| CR | 51 | NO DATA | NO DATA | 3.60E-09 | 2.00E-09 | 7.89E-10 | 5.14E-09 | 6.05E-07 |
| MN | 54 | NO DATA | 5.90E-06 | 1.17E-06 | NO DATA | 1.76E-06 | NO DATA | 1.21E-05 |
| MN | 56 | NO DATA | 1.58E-07 | 2.81E-08 | NO DATA | 2.00E-07 | NO DATA | 1.04E-05 |
| FE | 55 | 3.78E-06 | 2.68E-06 | 6.25E-07 | NO DATA | NO DATA | 1.70E-06 | 1.16E-06 |
| FE | 59 | 5.87E-06 | 1.37E-05 | 5.29E-06 | NO DATA | NO DATA | 4.32E-06 | 3.24E-05 |
| CO | 58 | NO DATA | 9.72E-07 | 2.24E-06 | NO DATA | NO DATA | NO DATA | 1.34E-05 |
| CO | 60 | NO DATA | 2.81E-06 | 6.33E-06 | NO DATA | NO DATA | NO DATA | 3.66E-05 |
| NI | 63 | 1.77E-04 | 1.25E-05 | 6.00E-06 | NO DATA | NO DATA | NO DATA | 1.99E-06 |
| NI | 65 | 7.49E-07 | 9.57E-08 | 4.36E-08 | NO DATA | NO DATA | NO DATA | 5.19E-06 |
| CU | 64 | NO DATA | 1.15E-07 | 5.41E-08 | NO DATA | 2.91E-07 | NO DATA | 8.92E-06 |
| ZN | 65 | 5.76E-06 | 2.00E-05 | 9.33E-06 | NO DATA | 1.28E-05 | NO DATA | 8.47E-06 |
| ZN | 69 | 1.47E-08 | 2.80E-08 | 1.96E-09 | NO DATA | 1.83E-08 | NO DATA | 5.16E-08 |
| BR | 83 | NO DATA | NO DATA | 5.74E-08 | NO DATA | NO DATA | NO DATA | LT E-24 |
| BR | 84 | NO DATA | NO DATA | 7.22E-08 | NO DATA | NO DATA | NO DATA | LT E-24 |
| BR | 85 | NO DATA | NO DATA | 3.05E-09 | NO DATA | NO DATA | NO DATA | LT E-24 |
| RB | 86 | NO DATA | 2.98E-05 | 1.40E-05 | NO DATA | NO DATA | NO DATA | 4.41E-06 |
| RB | 88 | NO DATA | 8.52E-08 | 4.54E-08 | NO DATA | NO DATA | NO DATA | 7.30E-15 |
| RB | 89 | NO DATA | 5.50E-08 | 3.89E-08 | NO DATA | NO DATA | NO DATA | 8.43E-17 |
| SR | 89 | 4.40E-04 | NO DATA | 1.26E-05 | NO DATA | NO DATA | NO DATA | 5.24E-05 |
| SR | 90 | 8.30E-03 | NO DATA | 2.05E-03 | NO DATA | NO DATA | NO DATA | 2.33E-04 |
| SR | 91 | 8.07E-06 | NO DATA | 3.21E-07 | NO DATA | NO DATA | NO DATA | 3.66E-05 |
| SR | 92 | 3.05E-06 | NO DATA | 1.30E-07 | NO DATA | NO DATA | NO DATA | 7.77E-05 |
| Y | 90 | 1.37E-08 | NO DATA | 3.69E-10 | NO DATA | NO DATA | NO DATA | 1.13E-04 |
| Y | 91M | 1.29E-10 | NO DATA | 4.93E-12 | NO DATA | NO DATA | NO DATA | 6.09E-09 |
| Y | 91 | 2.01E-07 | NO DATA | 5.39E-09 | NO DATA | NO DATA | NO DATA | 8.24E-05 |
| Y | 92 | 1.21E-09 | NO DATA | 3.50E-11 | NO DATA | NO DATA | NO DATA | 3.32E-05 |
| Y | 93 | 3.83E-09 | NO DATA | 1.05E-10 | NO DATA | NO DATA | NO DATA | 1.17E-04 |
| ZR | 95 | 4.12E-08 | 1.30E-08 | 8.94E-09 | NO DATA | 1.91E-08 | NO DATA | 3.00E-05 |
| ZR | 97 | 2.37E-09 | 4.69E-10 | 2.16E-10 | NO DATA | 7.11E-10 | NO DATA | 1.27E-04 |
| NB | 95 | 8.22E-09 | 4.56E-09 | 2.51E-09 | NO DATA | 4.42E-09 | NO DATA | 1.95E-05 |
| MO | 99 | NO DATA | 6.03E-06 | 1.15E-06 | NO DATA | 1.38E-05 | NO DATA | 1.08E-05 |
| TC | 99M | 3.32E-10 | 9.26E-10 | 1.20E-08 | NO DATA | 1.38E-08 | 5.14E-10 | 6.08E-07 |

*Taken from Regulatory Guide 1.109 (Rev. 1)

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TABLE A-3.2 (cont'd)
INGESTION DOSE FACTORS FOR TEENAGERS
(MREM PER PCI INGESTED)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|------|----------|----------|----------|----------|----------|----------|----------|
| TC | 101 | 3.60E-10 | 5.12E-10 | 5.03E-09 | NO DATA | 9.26E-09 | 3.12E-10 | 8.75E-17 |
| RU | 103 | 2.55E-07 | NO DATA | 1.09E-07 | NO DATA | 8.99E-07 | NO DATA | 2.13E-05 |
| RU | 105 | 2.18E-08 | NO DATA | 8.46E-09 | NO DATA | 2.75E-07 | NO DATA | 1.76E-05 |
| RU | 106 | 3.92E-06 | NO DATA | 4.94E-07 | NO DATA | 7.56E-06 | NO DATA | 1.88E-04 |
| AG | 110M | 2.05E-07 | 1.94E-07 | 1.18E-07 | NO DATA | 3.70E-07 | NO DATA | 5.45E-05 |
| TE | 125M | 3.83E-06 | 1.38E-06 | 5.12E-07 | 1.07E-06 | NO DATA | NO DATA | 1.13E-05 |
| TE | 127M | 9.67E-06 | 3.43E-06 | 1.15E-06 | 2.30E-06 | 3.92E-05 | NO DATA | 2.41E-05 |
| TE | 127 | 1.58E-07 | 5.60E-08 | 3.40E-08 | 1.09E-07 | 6.40E-07 | NO DATA | 1.22E-05 |
| TE | 129M | 1.63E-05 | 6.05E-06 | 2.58E-06 | 5.26E-06 | 6.82E-05 | NO DATA | 6.12E-05 |
| TE | 129 | 4.48E-08 | 1.67E-08 | 1.09E-08 | 3.20E-08 | 1.88E-07 | NO DATA | 2.45E-07 |
| TE | 131M | 2.44E-06 | 1.17E-06 | 9.76E-07 | 1.76E-06 | 1.22E-05 | NO DATA | 9.39E-05 |
| TE | 131 | 2.79E-08 | 1.15E-08 | 8.72E-09 | 2.15E-08 | 1.22E-07 | NO DATA | 2.29E-09 |
| TE | 132 | 3.49E-06 | 2.21E-06 | 2.08E-06 | 2.33E-06 | 2.12E-05 | NO DATA | 7.00E-05 |
| I | 130 | 1.03E-06 | 2.98E-06 | 1.19E-06 | 2.43E-04 | 4.59E-06 | NO DATA | 2.29E-06 |
| I | 131 | 5.85E-06 | 8.19E-06 | 4.40E-06 | 2.39E-03 | 1.41E-05 | NO DATA | 1.62E-06 |
| I | 132 | 2.79E-07 | 7.30E-07 | 2.62E-07 | 2.46E-05 | 1.15E-06 | NO DATA | 3.18E-07 |
| I | 133 | 2.01E-06 | 3.41E-06 | 1.04E-06 | 4.76E-04 | 5.98E-06 | NO DATA | 2.58E-06 |
| I | 134 | 1.46E-07 | 3.87E-07 | 1.39E-07 | 6.45E-06 | 6.10E-07 | NO DATA | 5.10E-09 |
| I | 135 | 6.10E-07 | 1.57E-06 | 5.82E-07 | 1.01E-04 | 2.48E-06 | NO DATA | 1.74E-06 |
| CS | 134 | 8.37E-05 | 1.97E-04 | 9.14E-05 | NO DATA | 6.26E-05 | 2.39E-05 | 2.45E-06 |
| CS | 136 | 8.59E-06 | 3.38E-05 | 2.27E-05 | NO DATA | 1.84E-05 | 2.90E-06 | 2.72E-06 |
| CS | 137 | 1.12E-04 | 1.49E-04 | 5.19E-05 | NO DATA | 5.07E-05 | 1.97E-05 | 2.12E-06 |
| CS | 138 | 7.76E-08 | 1.49E-07 | 7.45E-08 | NO DATA | 1.10E-07 | 1.28E-08 | 6.76E-11 |
| BA | 139 | 1.39E-07 | 9.78E-11 | 4.05E-09 | NO DATA | 9.22E-11 | 6.74E-11 | 1.24E-06 |
| BA | 140 | 2.84E-05 | 3.48E-08 | 1.83E-06 | NO DATA | 1.18E-08 | 2.34E-08 | 4.38E-05 |
| BA | 141 | 6.71E-08 | 5.01E-11 | 2.24E-09 | NO DATA | 4.65E-11 | 3.43E-11 | 1.43E-13 |
| BA | 142 | 2.99E-08 | 2.99E-11 | 1.84E-09 | NO DATA | 2.53E-11 | 1.99E-11 | 9.18E-20 |
| LA | 140 | 3.48E-09 | 1.71E-09 | 4.55E-10 | NO DATA | NO DATA | NO DATA | 9.82E-05 |
| LA | 142 | 1.79E-10 | 7.95E-11 | 1.98E-11 | NO DATA | NO DATA | NO DATA | 2.42E-06 |
| CE | 141 | 1.33E-08 | 8.88E-09 | 1.02E-09 | NO DATA | 4.18E-09 | NO DATA | 2.54E-05 |
| CE | 143 | 2.35E-09 | 1.71E-06 | 1.91E-10 | NO DATA | 7.67E-10 | NO DATA | 5.14E-05 |
| CE | 144 | 6.96E-07 | 2.88E-07 | 3.74E-08 | NO DATA | 1.72E-07 | NO DATA | 1.75E-04 |
| PR | 143 | 1.31E-08 | 5.23E-09 | 6.52E-10 | NO DATA | 3.04E-09 | NO DATA | 4.31E-05 |
| PR | 144 | 4.30E-11 | 1.76E-11 | 2.18E-12 | NO DATA | 1.01E-11 | NO DATA | 4.74E-14 |
| ND | 147 | 9.38E-09 | 1.02E-08 | 6.11E-10 | NO DATA | 5.99E-09 | NO DATA | 3.68E-05 |
| W | 187 | 1.46E-07 | 1.19E-07 | 4.17E-08 | NO DATA | NO DATA | NO DATA | 3.22E-05 |

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TABLE A-3.2 (cont'd)
INGESTION DOSE FACTORS FOR TEENAGERS
(MREM PER PCI INGESTED)

| NUCLIDE | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|----------|----------|----------|----------|----------|----------|----------|----------|
| NP 239 | 1.76E-09 | 1.66E-10 | 9.22E-11 | NO DATA | 5.21E-10 | NO DATA | 2.67E-05 |
| Sb 124** | 3.87E-06 | 7.13E-08 | 1.51E-06 | 8.78E-09 | NO DATA | 3.38E-06 | 7.80E-05 |
| Sb 125** | 2.48E-06 | 2.71E-08 | 5.80E-07 | 2.37E-09 | NO DATA | 2.18E-06 | 1.93E-05 |
| Sb 126** | 1.59E-06 | 3.25E-08 | 5.71E-07 | 8.99E-09 | NO DATA | 1.14E-06 | 9.41E-05 |
| Co 57** | NO DATA | 2.38E-07 | 3.99E-07 | NO DATA | NO DATA | NO DATA | 4.44E-06 |

**Taken from Regulatory Guide 1.109 (Rev. 0)

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TABLE A.3-3
INGESTION DOSE FACTORS FOR CHILD
(MREM PER PCI INGESTED)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| H | 3 | NO DATA | 2.03E-07 | 2.03E-07 | 2.03E-07 | 2.03E-07 | 2.03E-07 | 2.03E-07 |
| C | 14 | 1.21E-05 | 2.42E-06 | 2.42E-06 | 2.42E-06 | 2.42E-06 | 2.42E-06 | 2.42E-06 |
| NA | 24 | 5.80E-06 | 5.80E-06 | 5.80E-06 | 5.80E-06 | 5.80E-06 | 5.80E-06 | 5.80E-06 |
| P | 32 | 8.25E-04 | 3.86E-05 | 3.18E-05 | NO DATA | NO DATA | NO DATA | 2.28E-05 |
| CR | 51 | NO DATA | NO DATA | 8.90E-09 | 4.94E-09 | 1.35E-09 | 9.02E-09 | 4.72E-07 |
| MN | 54 | NO DATA | 1.07E-05 | 2.85E-06 | NO DATA | 3.00E-06 | NO DATA | 8.98E-06 |
| MN | 56 | NO DATA | 3.34E-07 | 7.54E-08 | NO DATA | 4.04E-07 | NO DATA | 4.84E-05 |
| FE | 55 | 1.15E-05 | 6.10E-06 | 1.89E-06 | NO DATA | NO DATA | 3.45E-06 | 1.13E-06 |
| FE | 59 | 1.65E-05 | 2.67E-05 | 1.33E-05 | NO DATA | NO DATA | 7.74E-06 | 2.78E-05 |
| CO | 58 | NO DATA | 1.80E-06 | 5.51E-06 | NO DATA | NO DATA | NO DATA | 1.05E-05 |
| CO | 60 | NO DATA | 5.29E-06 | 1.56E-05 | NO DATA | NO DATA | NO DATA | 2.93E-05 |
| NI | 63 | 5.38E-04 | 2.88E-05 | 1.83E-05 | NO DATA | NO DATA | NO DATA | 1.94E-06 |
| NI | 65 | 2.22E-06 | 2.09E-07 | 1.22E-07 | NO DATA | NO DATA | NO DATA | 2.56E-05 |
| CU | 64 | NO DATA | 2.45E-07 | 1.48E-07 | NO DATA | 5.92E-07 | NO DATA | 1.15E-05 |
| ZN | 65 | 1.37E-05 | 3.65E-05 | 2.27E-05 | NO DATA | 2.30E-05 | NO DATA | 6.41E-06 |
| ZN | 69 | 4.38E-08 | 6.33E-08 | 5.85E-09 | NO DATA | 3.84E-08 | NO DATA | 3.99E-06 |
| BR | 83 | NO DATA | NO DATA | 1.71E-07 | NO DATA | NO DATA | NO DATA | LT E-24 |
| BR | 84 | NO DATA | NO DATA | 1.98E-07 | NO DATA | NO DATA | NO DATA | LT E-24 |
| BR | 85 | NO DATA | NO DATA | 9.12E-09 | NO DATA | NO DATA | NO DATA | LT E-24 |
| RB | 86 | NO DATA | 6.70E-05 | 4.12E-05 | NO DATA | NO DATA | NO DATA | 4.31E-06 |
| RB | 88 | NO DATA | 1.90E-07 | 1.32E-07 | NO DATA | NO DATA | NO DATA | 9.32E-09 |
| RB | 89 | NO DATA | 1.17E-07 | 1.04E-07 | NO DATA | NO DATA | NO DATA | 1.02E-09 |
| SR | 89 | 1.32E-03 | NO DATA | 3.77E-05 | NO DATA | NO DATA | NO DATA | 5.11E-05 |
| SR | 90 | 1.70E-02 | NO DATA | 4.31E-03 | NO DATA | NO DATA | NO DATA | 2.29E-04 |
| SR | 91 | 2.40E-05 | NO DATA | 9.06E-07 | NO DATA | NO DATA | NO DATA | 5.30E-05 |
| SR | 92 | 9.03E-06 | NO DATA | 3.62E-07 | NO DATA | NO DATA | NO DATA | 1.71E-04 |
| Y | 90 | 4.11E-08 | NO DATA | 1.10E-09 | NO DATA | NO DATA | NO DATA | 1.17E-04 |
| Y | 91M | 3.82E-10 | NO DATA | 1.39E-11 | NO DATA | NO DATA | NO DATA | 7.48E-07 |
| Y | 91 | 6.02E-07 | NO DATA | 1.61E-08 | NO DATA | NO DATA | NO DATA | 8.02E-05 |
| Y | 92 | 3.60E-09 | NO DATA | 1.03E-10 | NO DATA | NO DATA | NO DATA | 1.04E-04 |
| Y | 93 | 1.14E-08 | NO DATA | 3.13E-10 | NO DATA | NO DATA | NO DATA | 1.70E-04 |
| ZR | 95 | 1.16E-07 | 2.55E-08 | 2.27E-08 | NO DATA | 3.65E-08 | NO DATA | 2.66E-05 |
| ZR | 97 | 6.99E-09 | 1.01E-09 | 5.96E-10 | NO DATA | 1.45E-09 | NO DATA | 1.53E-04 |
| NB | 95 | 2.25E-08 | 8.76E-09 | 6.26E-09 | NO DATA | 8.23E-09 | NO DATA | 1.62E-05 |
| MO | 99 | NO DATA | 1.33E-05 | 3.29E-06 | NO DATA | 2.84E-05 | NO DATA | 1.10E-05 |
| TC | 99M | 9.23E-10 | 1.81E-09 | 3.00E-08 | NO DATA | 2.63E-08 | 9.19E-10 | 1.03E-06 |

*Taken from Regulatory Guide 1.109 (Rev. 1)

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TABLE A.3-3 (cont'd)
INGESTION DOSE FACTORS FOR CHILD
(MREM PER PCI INGESTED)

| NUCLIDE | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|----------|----------|----------|----------|----------|----------|----------|
| TC 101 | 1.07E-09 | 1.12E-09 | 1.42E-08 | NO DATA | 1.91E-08 | 5.92E-10 | 3.56E-09 |
| RU 103 | 7.31E-07 | NO DATA | 2.81E-07 | NO DATA | 1.84E-06 | NO DATA | 1.89E-05 |
| RU 105 | 6.45E-08 | NO DATA | 2.34E-08 | NO DATA | 5.67E-07 | NO DATA | 4.21E-05 |
| RU 106 | 1.17E-05 | NO DATA | 1.46E-06 | NO DATA | 1.58E-05 | NO DATA | 1.82E-04 |
| AG 110M | 5.39E-07 | 3.64E-07 | 2.91E-07 | NO DATA | 6.78E-07 | NO DATA | 4.33E-05 |
| TE 125M | 1.14E-05 | 3.09E-06 | 1.52E-06 | 3.20E-06 | NO DATA | NO DATA | 1.10E-05 |
| TE 127M | 2.89E-05 | 7.78E-06 | 3.43E-06 | 6.91E-06 | 8.24E-05 | NO DATA | 2.34E-05 |
| TE 127 | 4.71E-07 | 1.27E-07 | 1.01E-07 | 3.26E-07 | 1.34E-06 | NO DATA | 1.84E-05 |
| TE 129M | 4.87E-05 | 1.36E-05 | 7.56E-06 | 1.57E-05 | 1.43E-04 | NO DATA | 5.94E-05 |
| TE 129 | 1.34E-07 | 3.74E-08 | 3.18E-08 | 9.56E-08 | 3.92E-07 | NO DATA | 8.34E-06 |
| TE 131M | 7.20E-06 | 2.49E-06 | 2.65E-06 | 5.12E-06 | 2.41E-05 | NO DATA | 1.01E-04 |
| TE 131 | 8.30E-08 | 2.53E-08 | 2.47E-08 | 6.35E-08 | 2.51E-07 | NO DATA | 4.36E-07 |
| TE 132 | 1.01E-05 | 4.47E-06 | 5.40E-06 | 6.51E-06 | 4.15E-05 | NO DATA | 4.50E-05 |
| I 130 | 2.92E-06 | 5.90E-06 | 3.04E-06 | 6.50E-04 | 8.82E-06 | NO DATA | 2.76E-06 |
| I 131 | 1.72E-05 | 1.73E-05 | 9.83E-06 | 5.72E-03 | 2.84E-05 | NO DATA | 1.54E-06 |
| I 132 | 8.00E-07 | 1.47E-06 | 6.76E-07 | 6.82E-05 | 2.25E-06 | NO DATA | 1.73E-06 |
| I 133 | 5.92E-06 | 7.32E-06 | 2.77E-06 | 1.36E-03 | 1.22E-05 | NO DATA | 2.95E-06 |
| I 134 | 4.19E-07 | 7.78E-07 | 3.58E-07 | 1.79E-05 | 1.19E-06 | NO DATA | 5.16E-07 |
| I 135 | 1.75E-06 | 3.15E-06 | 1.49E-06 | 2.79E-04 | 4.83E-06 | NO DATA | 2.40E-06 |
| CS 134 | 2.34E-04 | 3.84E-04 | 8.10E-05 | NO DATA | 1.19E-04 | 4.27E-05 | 2.07E-06 |
| CS 136 | 2.35E-05 | 6.46E-05 | 4.18E-05 | NO DATA | 3.44E-05 | 5.13E-06 | 2.27E-06 |
| CS 137 | 3.27E-04 | 3.13E-04 | 4.62E-05 | NO DATA | 1.02E-04 | 3.67E-05 | 1.96E-06 |
| CS 138 | 2.28E-07 | 3.17E-07 | 2.01E-07 | NO DATA | 2.23E-07 | 2.40E-08 | 1.46E-07 |
| BA 139 | 4.14E-07 | 2.21E-10 | 1.20E-08 | NO DATA | 1.93E-10 | 1.30E-10 | 2.39E-05 |
| BA 140 | 8.31E-05 | 7.28E-08 | 4.85E-06 | NO DATA | 2.37E-08 | 4.34E-08 | 4.21E-05 |
| BA 141 | 2.00E-07 | 1.12E-10 | 6.51E-09 | NO DATA | 9.69E-11 | 6.58E-10 | 1.14E-07 |
| BA 142 | 8.74E-08 | 6.29E-11 | 4.88E-09 | NO DATA | 5.09E-11 | 3.70E-11 | 1.14E-09 |
| LA 140 | 1.01E-08 | 3.53E-09 | 1.19E-09 | NO DATA | NO DATA | NO DATA | 9.84E-05 |
| LA 142 | 5.24E-10 | 1.67E-10 | 5.23E-11 | NO DATA | NO DATA | NO DATA | 3.31E-05 |
| CE 141 | 3.97E-08 | 1.98E-08 | 2.94E-09 | NO DATA | 8.68E-09 | NO DATA | 2.47E-05 |
| CE 143 | 6.99E-09 | 3.79E-06 | 5.49E-10 | NO DATA | 1.59E-09 | NO DATA | 5.55E-05 |
| CE 144 | 2.08E-06 | 6.52E-07 | 1.11E-07 | NO DATA | 3.61E-07 | NO DATA | 1.70E-04 |
| PR 143 | 3.93E-08 | 1.18E-08 | 1.95E-09 | NO DATA | 6.39E-09 | NO DATA | 4.24E-05 |
| PR 144 | 1.29E-10 | 3.99E-11 | 6.49E-12 | NO DATA | 2.11E-11 | NO DATA | 8.59E-08 |
| ND 147 | 2.79E-08 | 2.26E-08 | 1.75E-09 | NO DATA | 1.24E-08 | NO DATA | 3.58E-05 |
| W 187 | 4.29E-07 | 2.54E-07 | 1.14E-07 | NO DATA | NO DATA | NO DATA | 3.57E-05 |

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TABLE A.3-3 (cont'd)
INGESTION DOSE FACTORS FOR CHILD
(MREM PER PCI INGESTED)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-------|----------|----------|----------|----------|----------|----------|----------|
| Np | 239 | 5.25E-09 | 3.77E-10 | 2.65E-10 | NO DATA | 1.09E-09 | NO DATA | 2.79E-05 |
| Sb | 124** | 1.11E-05 | 1.44E-07 | 3.89E-06 | 2.45E-08 | NO DATA | 6.16E-06 | 6.94E-05 |
| Sb | 125** | 7.16E-06 | 5.52E-08 | 1.50E-06 | 6.63E-09 | NO DATA | 3.99E-06 | 1.71E-05 |
| Sb | 126** | 4.40E-06 | 6.73E-08 | 1.58E-06 | 2.58E-08 | NO DATA | 2.10E-06 | 8.87E-05 |
| Co | 57** | NO DATA | 4.93E-07 | 9.98E-07 | NO DATA | NO DATA | NO DATA | 4.04E-06 |

**Taken from Regulatory Guide 1.109 (Rev. 0)

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TABLE A.3-4*
INGESTION DOSE FACTORS FOR INFANT
(MREM PER PCI INGESTED)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| H | 3 | NO DATA | 3.08E-07 | 3.08E-07 | 3.08E-07 | 3.08E-07 | 3.08E-07 | 3.08E-07 |
| C | 14 | 2.37E-05 | 5.06E-06 | 5.06E-06 | 5.06E-06 | 5.06E-06 | 5.06E-06 | 5.06E-06 |
| NA | 24 | 1.01E-05 | 1.01E-05 | 1.01E-05 | 1.01E-05 | 1.01E-05 | 1.01E-05 | 1.01E-05 |
| P | 32 | 1.70E-03 | 1.00E-04 | 6.59E-05 | NO DATA | NO DATA | NO DATA | 2.30E-05 |
| CR | 51 | NO DATA | NO DATA | 1.41E-08 | 9.20E-09 | 2.01E-09 | 1.79E-08 | 4.11E-07 |
| MN | 54 | NO DATA | 1.99E-05 | 4.51E-06 | NO DATA | 4.41E-06 | NO DATA | 7.31E-06 |
| MN | 56 | NO DATA | 8.18E-07 | 1.41E-07 | NO DATA | 7.03E-07 | NO DATA | 7.43E-05 |
| FE | 55 | 1.39E-05 | 8.98E-06 | 2.40E-06 | NO DATA | NO DATA | 4.39E-06 | 1.14E-06 |
| FE | 59 | 3.08E-05 | 5.38E-05 | 2.12E-05 | NO DATA | NO DATA | 1.59E-05 | 2.57E-05 |
| CO | 58 | NO DATA | 3.60E-06 | 8.98E-06 | NO DATA | NO DATA | NO DATA | 8.97E-06 |
| CO | 60 | NO DATA | 1.08E-05 | 2.55E-05 | NO DATA | NO DATA | NO DATA | 2.57E-05 |
| NI | 63 | 6.34E-04 | 3.92E-05 | 2.20E-05 | NO DATA | NO DATA | NO DATA | 1.95E-06 |
| NI | 65 | 4.70E-06 | 5.32E-07 | 2.42E-07 | NO DATA | NO DATA | NO DATA | 4.05E-05 |
| CU | 64 | NO DATA | 6.09E-07 | 2.82E-07 | NO DATA | 1.03E-06 | NO DATA | 1.25E-05 |
| ZN | 65 | 1.84E-05 | 6.31E-05 | 2.91E-05 | NO DATA | 3.06E-05 | NO DATA | 5.33E-05 |
| ZN | 69 | 9.33E-08 | 1.68E-07 | 1.25E-08 | NO DATA | 6.98E-08 | NO DATA | 1.37E-05 |
| BR | 83 | NO DATA | NO DATA | 3.63E-07 | NO DATA | NO DATA | NO DATA | LT E-24 |
| BR | 84 | NO DATA | NO DATA | 3.82E-07 | NO DATA | NO DATA | NO DATA | LT E-24 |
| BR | 85 | NO DATA | NO DATA | 1.94E-08 | NO DATA | NO DATA | NO DATA | LT E-24 |
| RB | 86 | NO DATA | 1.70E-04 | 8.40E-05 | NO DATA | NO DATA | NO DATA | 4.35E-06 |
| RE | 88 | NO DATA | 4.98E-07 | 2.73E-07 | NO DATA | NO DATA | NO DATA | 4.85E-07 |
| RB | 89 | NO DATA | 2.86E-07 | 1.97E-07 | NO DATA | NO DATA | NO DATA | 9.74E-08 |
| SR | 89 | 2.51E-03 | NO DATA | 7.20E-05 | NO DATA | NO DATA | NO DATA | 5.16E-05 |
| SR | 90 | 1.85E-02 | NO DATA | 4.71E-03 | NO DATA | NO DATA | NO DATA | 2.31E-04 |
| SR | 91 | 5.00E-05 | NO DATA | 1.81E-06 | NO DATA | NO DATA | NO DATA | 5.92E-05 |
| SR | 92 | 1.92E-05 | NO DATA | 7.13E-07 | NO DATA | NO DATA | NO DATA | 2.07E-04 |
| Y | 90 | 8.69E-08 | NO DATA | 2.33E-09 | NO DATA | NO DATA | NO DATA | 1.20E-04 |
| Y | 91M | 8.10E-10 | NO DATA | 2.76E-11 | NO DATA | NO DATA | NO DATA | 2.70E-06 |
| Y | 91 | 1.13E-06 | NO DATA | 3.01E-08 | NO DATA | NO DATA | NO DATA | 8.10E-05 |
| Y | 92 | 7.65E-09 | NO DATA | 2.15E-10 | NO DATA | NO DATA | NO DATA | 1.46E-04 |
| Y | 93 | 2.43E-08 | NO DATA | 6.62E-10 | NO DATA | NO DATA | NO DATA | 1.92E-04 |
| ZR | 95 | 2.06E-07 | 5.02E-08 | 3.56E-08 | NO DATA | 5.41E-08 | NO DATA | 2.50E-05 |
| ZR | 97 | 1.48E-08 | 2.54E-09 | 1.16E-09 | NO DATA | 2.56E-09 | NO DATA | 1.62E-04 |
| NB | 95 | 4.20E-08 | 1.73E-08 | 1.00E-08 | NO DATA | 1.24E-08 | NO DATA | 1.46E-05 |
| MO | 99 | NO DATA | 3.40E-05 | 6.63E-06 | NO DATA | 5.08E-05 | NO DATA | 1.12E-05 |
| TC | 99M | 1.92E-09 | 3.96E-09 | 5.10E-08 | NO DATA | 4.26E-08 | 2.07E-09 | 1.15E-06 |

*Taken from Regulatory Guide 1.109 (Rev. 1)

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TABLE A.3-4* (cont'd)
INGESTION DOSE FACTORS FOR INFANT
(MREM PER PCI INGESTED)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|------|----------|----------|----------|----------|----------|----------|----------|
| TC | 101 | 2.27E-09 | 2.86E-09 | 2.83E-08 | NO DATA | 3.40E-08 | 1.56E-09 | 4.86E-07 |
| RU | 103 | 1.48E-06 | NO DATA | 4.95E-07 | NO DATA | 3.08E-06 | NO DATA | 1.80E-05 |
| RU | 105 | 1.36E-07 | NO DATA | 4.58E-08 | NO DATA | 1.00E-06 | NO DATA | 5.41E-05 |
| RU | 106 | 2.41E-05 | NO DATA | 3.01E-06 | NO DATA | 2.85E-05 | NO DATA | 1.83E-04 |
| AG | 110M | 9.96E-07 | 7.27E-07 | 4.81E-07 | NO DATA | 1.04E-06 | NO DATA | 3.77E-05 |
| TE | 125M | 2.33E-05 | 7.79E-06 | 3.15E-06 | 7.84E-06 | NO DATA | NO DATA | 1.11E-05 |
| TE | 127M | 5.85E-05 | 1.94E-05 | 7.08E-06 | 1.69E-05 | 1.44E-04 | NO DATA | 2.36E-05 |
| TE | 127 | 1.00E-06 | 3.35E-07 | 2.15E-07 | 8.14E-07 | 2.44E-06 | NO DATA | 2.10E-05 |
| TE | 129M | 1.00E-04 | 3.43E-05 | 1.54E-05 | 3.84E-05 | 2.50E-04 | NO DATA | 5.97E-05 |
| TE | 129 | 2.84E-07 | 9.79E-08 | 6.63E-08 | 2.38E-07 | 7.07E-07 | NO DATA | 2.27E-05 |
| TE | 131M | 1.52E-05 | 6.12E-06 | 5.05E-06 | 1.24E-05 | 4.21E-05 | NO DATA | 1.03E-04 |
| TE | 131 | 1.76E-07 | 6.50E-08 | 4.94E-08 | 1.57E-07 | 4.50E-07 | NO DATA | 7.11E-06 |
| TE | 132 | 2.08E-05 | 1.03E-05 | 9.61E-06 | 1.52E-05 | 6.44E-05 | NO DATA | 3.81E-05 |
| I | 130 | 6.00E-06 | 1.32E-05 | 5.30E-06 | 1.48E-03 | 1.45E-05 | NO DATA | 2.83E-06 |
| I | 131 | 3.59E-05 | 4.23E-05 | 1.86E-05 | 1.39E-02 | 4.94E-05 | NO DATA | 1.51E-06 |
| I | 132 | 1.66E-06 | 3.37E-06 | 1.20E-06 | 1.58E-04 | 3.76E-06 | NO DATA | 2.73E-06 |
| I | 133 | 1.25E-05 | 1.82E-05 | 5.33E-06 | 3.31E-03 | 2.14E-05 | NO DATA | 3.08E-06 |
| I | 134 | 8.69E-07 | 1.78E-06 | 6.33E-07 | 4.15E-05 | 1.99E-06 | NO DATA | 1.84E-06 |
| I | 135 | 3.64E-06 | 7.24E-06 | 2.64E-06 | 6.49E-04 | 8.07E-06 | NO DATA | 2.62E-06 |
| CS | 134 | 3.77E-04 | 7.03E-04 | 7.10E-05 | NO DATA | 1.81E-04 | 7.42E-05 | 1.91E-06 |
| CS | 136 | 4.59E-05 | 1.35E-04 | 5.04E-05 | NO DATA | 5.38E-05 | 1.10E-05 | 2.05E-06 |
| CS | 137 | 5.22E-04 | 6.11E-04 | 4.33E-05 | NO DATA | 1.64E-04 | 6.64E-05 | 1.91E-06 |
| CS | 138 | 4.81E-07 | 7.82E-07 | 3.79E-07 | NO DATA | 3.90E-07 | 6.09E-08 | 1.25E-06 |
| BA | 139 | 8.81E-07 | 5.84E-10 | 2.55E-08 | NO DATA | 3.51E-10 | 3.54E-10 | 5.58E-05 |
| BA | 140 | 1.71E-04 | 1.71E-07 | 8.81E-06 | NO DATA | 4.06E-08 | 1.05E-07 | 4.20E-05 |
| BA | 141 | 4.25E-07 | 2.91E-10 | 1.34E-08 | NO DATA | 1.75E-10 | 1.77E-10 | 5.19E-06 |
| BA | 142 | 1.84E-07 | 1.53E-10 | 9.06E-09 | NO DATA | 8.81E-11 | 9.26E-11 | 7.59E-07 |
| LA | 140 | 2.11E-08 | 8.32E-09 | 2.14E-09 | NO DATA | NO DATA | NO DATA | 9.77E-05 |
| LA | 142 | 1.10E-09 | 4.04E-10 | 9.67E-11 | NO DATA | NO DATA | NO DATA | 6.86E-05 |
| CE | 141 | 7.87E-08 | 4.80E-08 | 5.65E-09 | NO DATA | 1.48E-08 | NO DATA | 2.48E-05 |
| CE | 143 | 1.48E-08 | 9.82E-06 | 1.12E-09 | NO DATA | 2.86E-09 | NO DATA | 5.73E-05 |
| CE | 144 | 2.98E-06 | 1.22E-06 | 1.67E-07 | NO DATA | 4.93E-07 | NO DATA | 1.71E-04 |
| PR | 143 | 8.13E-08 | 3.04E-08 | 4.03E-09 | NO DATA | 1.13E-08 | NO DATA | 4.29E-05 |
| PR | 144 | 2.74E-10 | 1.06E-10 | 1.38E-11 | NO DATA | 3.84E-11 | NO DATA | 4.93E-06 |
| ND | 147 | 5.53E-08 | 5.68E-08 | 3.48E-09 | NO DATA | 2.19E-08 | NO DATA | 3.60E-05 |
| W | 187 | 9.03E-07 | 6.28E-07 | 2.17E-07 | NO DATA | NO DATA | NO DATA | 3.69E-05 |

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TABLE A.3-4* (cont'd)
INGESTION DOSE FACTORS FOR INFANT
(MREM PER PCI INGESTED)

| NUCLIDE | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|----------|----------|----------|----------|----------|----------|----------|----------|
| NP 239 | 1.11E-03 | 9.93E-10 | 5.61E-10 | NO DATA | 1.98E-09 | NO DATA | 2.87E-05 |
| Sb 124** | 2.14E-05 | 3.15E-07 | 6.63E-06 | 5.68E-08 | NO DATA | 1.34E-05 | 6.60E-05 |
| Sb 125** | 1.23E-05 | 1.19E-07 | 2.53E-06 | 1.54E-08 | NO DATA | 7.72E-06 | 1.64E-05 |
| Sb 126** | 8.06E-06 | 1.58E-07 | 2.91E-06 | 6.19E-08 | NO DATA | 5.07E-06 | 8.35E-06 |
| Co 57** | NO DATA | 1.15E-06 | 1.87E-06 | NO DATA | NO DATA | NO DATA | 3.92E-06 |

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TABLE A.3-5*

STABLE ELEMENT TRANSFER DATA

| Element | B_{iv} Veg/soil | F_m (Cow) Milk (d/l) | F_t Meat (d/kg) |
|---------|----------------------|---------------------------|----------------------|
| H | 4.8E 00 | 1.0E-02 + | 1.20E-02 |
| C | 5.5E 00 | 1.2E-02 + | 3.1E-02 |
| Na | 5.2E-02 | 4.0E-02 | 3.0E-02 |
| P | 1.1E 00 | 2.5E-02 | 4.6E-02 |
| Cr | 2.5E-04 | 2.2E-03 | 2.4E-03 |
| Mn | 2.9E-02 | 2.5E-04 | 8.0E-04 |
| Fe | 6.6E-04 | 1.2E-03 + | 4.0E-02 |
| Co | 9.4E-03 | 1.0E-03 | 1.3E-02 |
| Ni | 1.9E-02 | 6.7E-03 | 5.3E-02 |
| Cu | 1.2E-01 | 1.4E-02 + | 8.0E-03 |
| Zn | 4.0E-01 | 3.9E-02 | 3.0E-02 |
| Rb | 1.3E-01 | 3.0E-02 | 3.1E-02 |
| Sr | 1.7E-02 | 8.0E-04 + | 6.0E-04 |
| Y | 2.6E-03 | 1.0E-05 | 4.6E-03 |
| Zr | 1.7E-04 | 5.0E-06 | 3.4E-02 |
| Nb | 9.4E-03 | 2.5E-03 | 2.8E-01 |
| Mo | 1.2E-01 | 7.5E-03 | 8.0E-03 |
| Tc | 2.5E-01 | 2.5E-02 | 4.0E-01 |
| Ru | 5.0E-02 | 1.0E-06 | 4.0E-01 |
| Rh | 1.3E 01 | 1.0E-02 | 1.5E-03 |
| Ag | 1.5E-01 | 5.0E-02 | 1.7E-02 |
| Te | 1.3E 00 | 1.0E-03 | 7.7E-02 |
| I | 2.0E-02 | 6.0E-03 + | 2.9E-03 |
| Cs | 1.0E-02 | 1.2E-02 + | 4.0E-03 |
| Ba | 5.0E-03 | 4.0E-04 | 3.2E-03 |
| La | 2.5E-03 | 5.0E-06 | 2.0E-04 |
| Ce | 2.5E-03 | 1.0E-04 | 1.2E-03 |
| Pr | 2.5E-03 | 5.0E-06 | 4.7E-03 |
| Nd | 2.4E-03 | 5.0E-06 | 3.3E-03 |
| W | 1.8E-02 | 5.0E-04 | 1.3E-03 |
| Np | 2.5E-03 | 5.0E-06 | 2.0E-04 |

+ F_m (Goat) values for milk (d/l)

| Element | Milk (d/l) |
|---------|------------|
| H | 1.7E-01 |
| C | 1.0E-01 |
| P | 2.5E-01 |
| Fe | 1.3E-04 |
| Cu | 1.3E-02 |
| Sr | 1.4E-02 |
| I | 6.0E-02 |
| Cs | 3.0E-01 |

*Taken from Regulatory Guide 1.109 (Rev. 1)

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TABLE A.4-1
SITE RELATED DOSE COMMITMENT FACTOR AIT
MREM/HR PER μ CI/ML
ADULT

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| H | 3 | 0.00E-01 | 8.96E 00 | 8.96E 00 | 8.96E 00 | 8.96E 00 | 8.96E 00 | 8.96E 00 |
| C | 14 | 3.15E 04 | 6.30E 03 | 6.30E 03 | 6.30E 03 | 6.30E 03 | 6.30E 03 | 6.30E 03 |
| NA | 24 | 5.48E 02 | 5.48E 02 | 5.48E 02 | 5.48E 02 | 5.48E 02 | 5.48E 02 | 5.48E 02 |
| P | 32 | 4.62E 07 | 2.87E 06 | 1.79E 06 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 5.20E 06 |
| CR | 51 | 0.00E-01 | 0.00E-01 | 1.49E 00 | 8.94E-01 | 3.29E-01 | 1.98E 00 | 3.76E 02 |
| MN | 54 | 0.00E-01 | 4.76E 03 | 9.08E 02 | 0.00E-01 | 1.42E 03 | 0.00E-01 | 1.46E 04 |
| MN | 56 | 0.00E-01 | 1.20E 02 | 2.12E 01 | 0.00E-01 | 1.52E 02 | 0.00E-01 | 3.82E 03 |
| FE | 55 | 8.87E 02 | 6.13E 02 | 1.43E 02 | 0.00E-01 | 0.00E-01 | 3.42E 02 | 3.52E 02 |
| FE | 59 | 1.40E 03 | 3.29E 03 | 1.26E 03 | 0.00E-01 | 0.00E-01 | 9.19E 02 | 1.10E 04 |
| CO | 58 | 0.00E-01 | 1.51E 02 | 3.39E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.06E 03 |
| CO | 60 | 0.00E-01 | 4.34E 02 | 9.58E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 8.16E 03 |
| NI | 63 | 4.19E 04 | 2.94E 03 | 1.41E 03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 6.07E 02 |
| NI | 65 | 1.70E 02 | 2.21E 01 | 1.01E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 5.61E 02 |
| CU | 64 | 0.00E-01 | 1.69E 01 | 7.93E 00 | 0.00E-01 | 4.26E-01 | 0.00E-01 | 1.44E 03 |
| ZN | 65 | 2.36E 04 | 7.50E 04 | 3.39E 04 | 0.00E-01 | 5.02E 04 | 0.00E-01 | 4.73E 04 |
| ZN | 69 | 5.02E 01 | 9.60E 01 | 6.67E 00 | 0.00E-01 | 6.24E-01 | 0.00E-01 | 1.44E 01 |
| BR | 83 | 0.00E-01 | 0.00E-01 | 4.38E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 6.30E 01 |
| BR | 84 | 0.00E-01 | 0.00E-01 | 5.67E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 4.45E-04 |
| BR | 85 | 0.00E-01 | 0.00E-01 | 2.33E 00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.09E-15 |
| RB | 86 | 0.00E-01 | 1.03E 05 | 4.79E 04 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.03E 04 |
| RB | 88 | 0.00E-01 | 2.95E 02 | 1.56E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 4.07E-09 |
| RB | 89 | 0.00E-01 | 1.95E 02 | 1.37E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.13E-11 |
| SR | 89 | 4.78E 04 | 0.00E-01 | 1.37E 03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 7.66E 03 |
| SR | 90 | 1.18E 06 | 0.00E-01 | 2.88E 05 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.40E 04 |
| SR | 91 | 8.79E 02 | 0.00E-01 | 3.55E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 4.19E 03 |
| SR | 92 | 3.33E 02 | 0.00E-01 | 1.44E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 6.60E 03 |
| Y | 90 | 1.38E 00 | 0.00E-01 | 3.69E-02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.46E 04 |
| Y | 91M | 1.30E-02 | 0.00E-01 | 5.04E-04 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.82E-02 |
| Y | 91 | 2.02E 01 | 0.00E-01 | 5.39E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.11E 04 |
| Y | 92 | 1.21E-01 | 0.00E-01 | 3.53E-03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.12E 03 |
| Y | 93 | 3.83E-01 | 0.00E-01 | 1.06E-02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.22E 04 |
| ZR | 95 | 2.77E 00 | 8.88E-01 | 6.01E-01 | 0.00E-01 | 1.39E 00 | 0.00E-01 | 2.82E 03 |
| ZR | 97 | 1.53E-01 | 3.09E-02 | 1.41E-02 | 0.00E-01 | 4.67E-02 | 0.00E-01 | 9.57E 03 |
| NB | 95 | 4.47E 02 | 2.49E 02 | 1.34E 02 | 0.00E-01 | 2.46E 02 | 0.00E-01 | 1.51E 06 |
| MO | 99 | 0.00E-01 | 4.62E 02 | 8.79E 01 | 0.00E-01 | 1.05E 03 | 0.00E-01 | 1.07E 03 |
| TC | 99M | 2.94E-02 | 8.32E-02 | 1.06E 00 | 0.00E-01 | 1.26E 00 | 4.07E-02 | 4.92E 01 |

TABLE A.4-1

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TABLE A.4-1 (cont'd)
SITE RELATED DOSE COMMITMENT FACTOR AIT
MREM/HR PER μ CI/ML
ADULT

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|------|----------|----------|----------|----------|----------|----------|----------|
| TC | 101 | 3.03E-02 | 4.36E-02 | 4.28E-01 | 0.00E-01 | 7.85E-01 | 2.23E-02 | 1.31E-13 |
| RU | 103 | 1.98E 01 | 0.00E-01 | 8.54E 00 | 0.00E-01 | 7.57E 01 | 0.00E-01 | 2.31E 03 |
| RU | 105 | 1.65E 00 | 0.00E-01 | 6.52E-01 | 0.00E-01 | 2.13E 01 | 0.00E-01 | 1.01E 03 |
| RU | 106 | 2.95E 02 | 0.00E-01 | 3.73E 01 | 0.00E-01 | 5.69E 02 | 0.00E-01 | 1.91E 04 |
| AG | 110M | 1.42E 01 | 1.31E 01 | 7.80E 00 | 0.00E-01 | 2.58E 01 | 0.00E-01 | 5.36E 03 |
| TE | 125M | 2.79E 03 | 1.01E 03 | 3.74E 02 | 8.39E 02 | 1.13E 04 | 0.00E-01 | 1.11E 04 |
| TE | 127M | 7.05E 03 | 2.52E 03 | 8.59E 02 | 1.80E 03 | 2.86E 04 | 0.00E-01 | 2.36E 04 |
| TE | 127 | 1.14E 02 | 4.11E 01 | 2.48E 01 | 8.48E 01 | 4.66E 02 | 0.00E-01 | 9.03E 03 |
| TE | 129M | 1.20E 04 | 4.47E 03 | 1.89E 03 | 4.11E 03 | 5.00E 04 | 0.00E-01 | 6.03E 04 |
| TE | 129 | 3.27E 01 | 1.23E 01 | 7.96E 00 | 2.51E 01 | 1.37E 02 | 0.00E-01 | 2.47E 01 |
| TE | 131M | 1.80E 03 | 8.81E 02 | 7.34E 02 | 1.39E 03 | 8.92E 03 | 0.00E-01 | 8.74E 04 |
| TE | 131 | 2.05E 01 | 8.57E 00 | 6.47E 00 | 1.69E 01 | 8.98E 01 | 0.00E-01 | 2.90E 00 |
| TE | 132 | 2.62E 03 | 1.70E 03 | 1.59E 03 | 1.87E 03 | 1.63E 04 | 0.00E-01 | 8.02E 04 |
| I | 130 | 9.01E 01 | 2.66E 02 | 1.05E 02 | 2.25E 04 | 4.15E 02 | 0.00E-01 | 2.29E 02 |
| I | 131 | 4.96E 02 | 7.09E 02 | 4.06E 02 | 2.32E 05 | 1.22E 03 | 0.00E-01 | 1.87E 02 |
| I | 132 | 2.42E 01 | 6.47E 01 | 2.26E 01 | 2.26E 03 | 1.03E 02 | 0.00E-01 | 1.22E 01 |
| I | 133 | 1.69E 02 | 2.94E 02 | 8.97E 01 | 4.32E 04 | 5.13E 02 | 0.00E-01 | 2.64E 02 |
| I | 134 | 1.26E 01 | 3.43E 01 | 1.23E 01 | 5.94E 02 | 5.46E 01 | 0.00E-01 | 2.99E-02 |
| I | 135 | 5.28E 01 | 1.38E 02 | 5.10E 01 | 9.11E 03 | 2.22E 02 | 0.00E-01 | 1.56E 02 |
| CS | 134 | 3.03E 05 | 7.21E 05 | 5.89E 05 | 0.00E-01 | 2.33E 05 | 7.75E 04 | 1.26E 04 |
| CS | 136 | 3.17E 04 | 1.25E 05 | 9.01E 04 | 0.00E-01 | 6.97E 04 | 9.55E 03 | 1.42E 04 |
| CS | 137 | 3.88E 05 | 5.31E 05 | 3.48E 05 | 0.00E-01 | 1.80E 05 | 5.99E 04 | 1.03E 04 |
| CS | 138 | 2.69E 02 | 5.31E 02 | 2.63E 02 | 0.00E-01 | 3.90E 02 | 3.85E 01 | 2.27E-03 |
| BA | 139 | 9.00E 00 | 6.41E-03 | 2.64E-01 | 0.00E-01 | 5.99E-03 | 3.64E-03 | 1.60E 01 |
| BA | 140 | 1.88E 03 | 2.37E 00 | 1.23E 02 | 0.00E-01 | 8.05E-01 | 1.35E 00 | 3.88E 03 |
| BA | 141 | 4.37E 00 | 3.30E-03 | 1.48E-01 | 0.00E-01 | 3.07E-03 | 1.87E-03 | 2.06E-09 |
| BA | 142 | 1.98E 00 | 2.03E-03 | 1.24E-01 | 0.00E-01 | 1.72E-03 | 1.15E-03 | 2.78E-18 |
| LA | 140 | 3.58E-01 | 1.80E-01 | 4.76E-02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.32E 04 |
| LA | 142 | 1.83E-02 | 8.33E-03 | 2.07E-03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 6.08E 01 |
| CE | 141 | 8.01E-01 | 5.42E-01 | 6.15E-02 | 0.00E-01 | 2.52E-01 | 0.00E-01 | 2.07E 03 |
| CE | 143 | 1.41E-01 | 1.04E 02 | 1.16E-02 | 0.00E-01 | 4.60E-02 | 0.00E-01 | 3.90E 03 |
| CE | 144 | 4.18E 01 | 1.75E 01 | 2.24E 00 | 0.00E-01 | 1.04E 01 | 0.00E-01 | 1.41E 04 |
| PR | 143 | 1.32E 00 | 5.28E-01 | 6.52E-02 | 0.00E-01 | 3.05E-01 | 0.00E-01 | 5.77E 03 |
| PR | 144 | 4.31E-03 | 1.79E-03 | 2.19E-04 | 0.00E-01 | 1.01E-03 | 0.00E-01 | 6.19E-10 |
| ND | 147 | 9.00E-01 | 1.04E 00 | 6.22E-02 | 0.00E-01 | 6.08E-01 | 0.00E-01 | 4.99E 03 |
| W | 187 | 3.04E 02 | 2.55E 02 | 8.90E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 8.34E 04 |

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TABLE A.4-1 (cont'd)
SITE RELATED DOSE COMMITMENT FACTOR AIT
MREM/HR PER μ CI/ML
ADULT

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| NP | 239 | 1.28E-01 | 1.25E-02 | 6.91E-03 | 0.00E-01 | 3.91E-02 | 0.00E-01 | 2.57E 03 |
| Sb | 124 | 2.40E 02 | 4.53E 00 | 9.50E 01 | 5.81E-01 | 0.00E-01 | 1.87E 02 | 6.81E 03 |
| Sb | 125 | 1.53E 02 | 1.71E 00 | 3.65E 01 | 1.56E-01 | 0.00E-01 | 1.18E 02 | 1.69E 03 |
| Sb | 126 | 9.85E 01 | 2.00E 00 | 3.55E 01 | 6.03E-01 | 0.00E-01 | 6.04E 01 | 8.05E 03 |
| Co | 57 | 0.00E-01 | 3.55E 01 | 5.90E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 9.01E 02 |

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TABLE A.4-2
SITE RELATED DOSE COMMITMENT FACTOR AIT
MREM/HR PER μ CI/ML
TEEN

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| H | 3 | 0.00E-01 | 6.34E 00 | 6.34E 00 | 6.34E 00 | 6.34E 00 | 6.34E 00 | 6.34E 00 |
| C | 14 | 3.43E 04 | 6.86E 03 | 6.86E 03 | 6.86E 03 | 6.86E 03 | 6.86E 03 | 6.86E 03 |
| NA | 24 | 5.53E 02 | 5.53E 02 | 5.53E 02 | 5.53E 02 | 5.53E 02 | 5.53E 02 | 5.53E 02 |
| P | 32 | 5.04E 07 | 3.12E 06 | 1.95E 06 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 4.23E 06 |
| CR | 51 | 0.00E-01 | 0.00E-01 | 1.52E 00 | 8.46E-00 | 3.34E-00 | 2.17E 00 | 2.56E 02 |
| MN | 54 | 0.00E-01 | 4.65E 03 | 9.22E 02 | 0.00E-01 | 1.39E 03 | 0.00E-01 | 9.53E 03 |
| MN | 56 | 0.00E-01 | 1.24E 02 | 2.21E 01 | 0.00E-01 | 1.58E 02 | 0.00E-01 | 8.19E 03 |
| FE | 55 | 9.09E 02 | 6.45E 02 | 1.50E 02 | 0.00E-01 | 0.00E-01 | 4.09E 02 | 2.79E 02 |
| FE | 59 | 1.41E 03 | 3.30E 03 | 1.27E 03 | 0.00E-01 | 0.00E-01 | 1.04E 03 | 7.79E 03 |
| CO | 58 | 0.00E-01 | 1.45E 02 | 3.35E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.00E 03 |
| CO | 60 | 0.00E-01 | 4.20E 02 | 9.45E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 5.47E 03 |
| NI | 63 | 4.26E 04 | 3.01E 03 | 1.44E 03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 4.79E 02 |
| NI | 65 | 1.80E 02 | 2.30E 01 | 1.05E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.25E 03 |
| CU | 64 | 0.00E-01 | 1.72E 01 | 8.08E 00 | 0.00E-01 | 4.35E 01 | 0.00E-01 | 1.33E 03 |
| ZN | 65 | 2.13E 04 | 7.41E 04 | 3.46E 04 | 0.00E-01 | 4.74E 04 | 0.00E-01 | 3.14E 04 |
| ZN | 69 | 5.45E 01 | 1.04E 02 | 7.26E 00 | 0.00E-01 | 6.78E 01 | 0.00E-01 | 1.91E 02 |
| BR | 83 | 0.00E-01 | 0.00E-01 | 4.73E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 8.24E-16 |
| BR | 84 | 0.00E-01 | 0.00E-01 | 5.95E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 8.24E-16 |
| BR | 85 | 0.00E-01 | 0.00E-01 | 2.51E 00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 8.24E-16 |
| RB | 86 | 0.00E-01 | 1.10E 05 | 5.19E 04 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.63E 04 |
| RB | 88 | 0.00E-01 | 3.16E 02 | 1.68E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.71E-05 |
| RB | 89 | 0.00E-01 | 2.04E 02 | 1.44E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.12E-07 |
| SR | 89 | 4.97E 04 | 0.00E-01 | 1.42E 03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 5.91E 03 |
| SR | 90 | 9.37E 05 | 0.00E-01 | 2.31E 05 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.63E 04 |
| SR | 91 | 9.11E 02 | 0.00E-01 | 3.62E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 4.13E 03 |
| SR | 92 | 3.44E 02 | 0.00E-01 | 1.47E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 8.77E 03 |
| Y | 90 | 1.42E 00 | 0.00E-01 | 3.83E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.17E 04 |
| Y | 91M | 1.34E-01 | 0.00E-01 | 5.11E-03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 6.32E-01 |
| Y | 91 | 2.09E 01 | 0.00E-01 | 5.59E-00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 8.55E 03 |
| Y | 92 | 1.26E-00 | 0.00E-01 | 3.63E-02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.44E 03 |
| Y | 93 | 3.97E-00 | 0.00E-01 | 1.09E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.21E 04 |
| ZR | 95 | 2.64E 00 | 8.34E-01 | 5.74E-00 | 0.00E-01 | 1.23E 00 | 0.00E-01 | 1.92E 03 |
| ZR | 97 | 1.52E-00 | 3.01E-02 | 1.39E-01 | 0.00E-01 | 4.56E-01 | 0.00E-01 | 8.15E 03 |
| NB | 95 | 4.50E 02 | 2.50E 02 | 1.37E 02 | 0.00E-01 | 2.42E 02 | 0.00E-01 | 1.07E 06 |
| MO | 99 | 0.00E-01 | 4.61E 02 | 8.78E 01 | 0.00E-01 | 1.05E 03 | 0.00E-01 | 8.25E 02 |
| TC | 99M | 2.84E-01 | 7.92E-02 | 1.03E 00 | 0.00E-01 | 1.18E 00 | 4.39E-01 | 5.20E 01 |

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TABLE A.4-2 (cont'd)
SITE RELATED DOSE COMMITMENT FACTOR AIT
MREM/HR PER μ CI/ML
TEEN

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|------|----------|----------|----------|----------|----------|----------|----------|
| TC | 101 | 3.08E-01 | 4.38E-02 | 4.30E-00 | 0.00E-01 | 7.92E-00 | 2.67E-01 | 7.48E-09 |
| RU | 103 | 1.95E 01 | 0.00E-01 | 8.33E 00 | 0.00E-01 | 6.87E 01 | 0.00E-01 | 1.63E 03 |
| RU | 105 | 1.67E 00 | 0.00E-01 | 6.46E-00 | 0.00E-01 | 2.10E 01 | 0.00E-01 | 1.34E 03 |
| RU | 106 | 2.99E 02 | 0.00E-01 | 3.77E 01 | 0.00E-01 | 5.77E 02 | 0.00E-01 | 1.44E 04 |
| AG | 110M | 1.28E 01 | 1.21E 01 | 7.36E 00 | 0.00E-01 | 2.31E 01 | 0.00E-01 | 3.40E 03 |
| TE | 125M | 3.02E 03 | 1.09E 03 | 4.03E 02 | 8.43E 02 | 0.00E-01 | 0.00E-01 | 8.90E 03 |
| TE | 127M | 7.62E 03 | 2.70E 03 | 9.06E 02 | 1.81E 03 | 3.09E 04 | 0.00E-01 | 1.90E 04 |
| TE | 127 | 1.24E 02 | 4.41E 01 | 2.68E 01 | 8.59E 01 | 5.04E 02 | 0.00E-01 | 9.61E 03 |
| TE | 129M | 1.28E 04 | 4.77E 03 | 2.03E 03 | 4.14E 03 | 5.37E 04 | 0.00E-01 | 4.82E 04 |
| TE | 129 | 3.53E 01 | 1.32E 01 | 8.59E 00 | 2.52E 01 | 1.48E 02 | 0.00E-01 | 1.93E 02 |
| TE | 131M | 1.92E 03 | 9.22E 02 | 7.69E 02 | 1.39E 03 | 9.61E 03 | 0.00E-01 | 7.40E 04 |
| TE | 131 | 2.20E 01 | 9.06E 00 | 6.87E 00 | 1.69E 01 | 9.61E 01 | 0.00E-01 | 1.80E 00 |
| TE | 132 | 2.75E 03 | 1.74E 03 | 1.64E 03 | 1.84E 03 | 1.67E 04 | 0.00E-01 | 5.51E 04 |
| I | 130 | 8.81E 01 | 2.55E 02 | 1.02E 02 | 2.08E 04 | 3.92E 02 | 0.00E-01 | 1.96E 02 |
| I | 131 | 5.00E 02 | 7.00E 02 | 3.76E 02 | 2.04E 05 | 1.21E 03 | 0.00E-01 | 1.39E 02 |
| I | 132 | 2.39E 01 | 6.24E 01 | 2.24E 01 | 2.10E 03 | 9.83E 01 | 0.00E-01 | 2.72E 01 |
| I | 133 | 1.72E 02 | 2.92E 02 | 8.89E 01 | 4.07E 04 | 5.11E 02 | 0.00E-01 | 2.21E 02 |
| I | 134 | 1.25E 01 | 3.31E 01 | 1.19E 01 | 5.51E 02 | 5.22E 01 | 0.00E-01 | 4.36E-01 |
| I | 135 | 5.22E 01 | 1.34E 02 | 4.98E 01 | 8.64E 03 | 2.12E 02 | 0.00E-01 | 1.49E 02 |
| CS | 134 | 3.10E 05 | 7.30E 05 | 3.39E 05 | 0.00E-01 | 2.32E 05 | 8.86E 04 | 9.08E 03 |
| CS | 136 | 3.18E 04 | 1.25E 05 | 8.41E 04 | 0.00E-01 | 6.82E 04 | 1.07E 04 | 1.01E 04 |
| CS | 137 | 4.15E 05 | 5.52E 05 | 1.92E 05 | 0.00E-01 | 1.88E 05 | 7.30E 04 | 7.86E 03 |
| CS | 138 | 2.88E 02 | 5.52E 02 | 2.76E 02 | 0.00E-01 | 4.08E 02 | 4.74E 01 | 2.51E-01 |
| BA | 139 | 9.10E 00 | 6.40E-03 | 2.65E-00 | 0.00E-01 | 6.03E-02 | 4.41E-02 | 8.11E 01 |
| BA | 140 | 1.86E 03 | 2.28E 00 | 1.20E 02 | 0.00E-01 | 7.72E-00 | 1.53E 00 | 2.87E 03 |
| BA | 141 | 4.39E 00 | 3.28E-03 | 1.47E-00 | 0.00E-01 | 3.04E-02 | 2.24E-02 | 9.36E-06 |
| BA | 142 | 1.96E 00 | 1.96E-03 | 1.20E-00 | 0.00E-01 | 1.66E-02 | 1.30E-02 | 6.01E-12 |
| LA | 140 | 3.61E-00 | 1.77E-01 | 4.72E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.02E 04 |
| LA | 142 | 1.86E-01 | 8.25E-03 | 2.05E-02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.51E 02 |
| CE | 141 | 7.98E-00 | 5.32E-01 | 6.12E-01 | 0.00E-01 | 2.51E-00 | 0.00E-01 | 1.52E 03 |
| CE | 143 | 1.41E-00 | 1.03E 02 | 1.15E-01 | 0.00E-01 | 4.60E-01 | 0.00E-01 | 3.08E 03 |
| CE | 144 | 4.17E 01 | 1.73E 01 | 2.24E 00 | 0.00E-01 | 1.03E 01 | 0.00E-01 | 1.05E 04 |
| PR | 143 | 1.36E 00 | 5.43E-01 | 6.76E-01 | 0.00E-01 | 3.15E-00 | 0.00E-01 | 4.47E 03 |
| PR | 144 | 4.46E-02 | 1.83E-03 | 2.26E-03 | 0.00E-01 | 1.05E-02 | 0.00E-01 | 4.92E-06 |
| ND | 147 | 9.73E-00 | 1.06E 00 | 6.34E-01 | 0.00E-01 | 6.21E-00 | 0.00E-01 | 3.82E 03 |
| W | 187 | 3.28E 02 | 2.67E 02 | 9.37E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 7.24E 04 |

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TABLE A.4-2 (cont'd)
SITE RELATED DOSE COMMITMENT FACTOR AIT
MREM/HR PER μ CI/ML
TEEN

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| NP | 239 | 1.34E-00 | 1.27E-02 | 7.04E-02 | 0.00E-01 | 3.98E-01 | 0.00E-01 | 2.04E 03 |
| Sb | 124 | 2.32E 02 | 4.28E 00 | 9.05E 01 | 5.26E-00 | 0.00E-01 | 2.03E 02 | 4.68E 03 |
| Sb | 125 | 1.49E 02 | 1.63E 00 | 3.48E 01 | 1.42E-00 | 0.00E-01 | 1.31E 02 | 1.16E 03 |
| Sb | 126 | 9.53E 01 | 1.95E 00 | 3.42E 01 | 5.39E-00 | 0.00E-01 | 6.84E 01 | 5.64E 03 |
| Co | 57 | 0.00E-01 | 3.55E 01 | 5.96E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 6.63E 02 |

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TABLE A.4-3
SITE RELATED DOSE COMMITMENT FACTOR AIT
MREM/HR PER μ Ci/ML
CHILD

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| H | 3 | 0.00E-01 | 1.19E 01 | 1.19E 01 | 1.19E 01 | 1.19E 01 | 1.19E 01 | 1.19E 01 |
| C | 14 | 4.45E 04 | 8.90E 03 | 8.90E 03 | 8.90E 03 | 8.90E 03 | 8.90E 03 | 8.90E 03 |
| NA | 24 | 7.93E 02 | 7.93E 02 | 7.93E 02 | 7.93E 02 | 7.93E 02 | 7.93E 02 | 7.93E 02 |
| P | 32 | 6.49E 07 | 3.04E 06 | 2.50E 06 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.79E 06 |
| CR | 51 | 0.00E-01 | 0.00E-01 | 1.92E 00 | 1.06E 00 | 2.91E-00 | 1.94E 00 | 1.02E 02 |
| MN | 54 | 0.00E-01 | 3.99E 03 | 1.06E 03 | 0.00E-01 | 1.12E 03 | 0.00E-01 | 3.35E 03 |
| MN | 56 | 0.00E-01 | 1.25E 02 | 2.81E 01 | 0.00E-01 | 1.51E 02 | 0.00E-01 | 1.80E 04 |
| FE | 55 | 1.57E 03 | 8.34E 02 | 2.59E 02 | 0.00E-01 | 0.00E-01 | 4.72E 02 | 1.55E 02 |
| FE | 59 | 2.26E 03 | 3.65E 03 | 1.82E 03 | 0.00E-01 | 0.00E-01 | 1.06E 03 | 3.80E 03 |
| CO | 58 | 0.00E-01 | 1.75E 02 | 5.37E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.02E 03 |
| CO | 60 | 0.00E-01 | 5.16E 02 | 1.52E 03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.86E 03 |
| NI | 63 | 7.36E 04 | 3.94E 03 | 2.50E 03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.65E 02 |
| NI | 65 | 3.04E 02 | 2.86E 01 | 1.67E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.50E 03 |
| CU | 64 | 0.00E-01 | 2.39E 01 | 1.44E 01 | 0.00E-01 | 5.77E 01 | 0.00E-01 | 1.12E 03 |
| ZN | 65 | 2.23E 04 | 5.95E 04 | 3.70E 04 | 0.00E-01 | 3.75E 04 | 0.00E-01 | 1.05E 04 |
| ZN | 69 | 7.15E 01 | 1.03E 02 | 9.54E 00 | 0.00E-01 | 6.26E 01 | 0.00E-01 | 6.51E 03 |
| BR | 83 | 0.00E-01 | 0.00E-01 | 6.64E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.89E-16 |
| BR | 84 | 0.00E-01 | 0.00E-01 | 7.69E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.89E-16 |
| BR | 85 | 0.00E-01 | 0.00E-01 | 3.54E 00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.89E-16 |
| RB | 86 | 0.00E-01 | 1.09E 05 | 6.72E 04 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 7.03E 03 |
| RB | 88 | 0.00E-01 | 3.10E 02 | 2.15E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.52E 01 |
| RB | 89 | 0.00E-01 | 1.91E 02 | 1.70E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.66E 00 |
| SR | 89 | 1.08E 05 | 0.00E-01 | 3.08E 03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 4.18E 03 |
| SR | 90 | 1.39E 06 | 0.00E-01 | 3.52E 05 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.87E 04 |
| SR | 91 | 1.96E 03 | 0.00E-01 | 7.41E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 4.33E 03 |
| SR | 92 | 7.38E 02 | 0.00E-01 | 2.96E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.40E 04 |
| Y | 90 | 3.20E 00 | 0.00E-01 | 8.56E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 9.10E 03 |
| Y | 91M | 2.97E-01 | 0.00E-01 | 1.08E-02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 5.82E 01 |
| Y | 91 | 4.68E 01 | 0.00E-01 | 1.25E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 6.24E 03 |
| Y | 92 | 2.80E-00 | 0.00E-01 | 8.01E-02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 8.09E 03 |
| Y | 93 | 8.87E-00 | 0.00E-01 | 2.44E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.32E 04 |
| ZR | 95 | 7.05E 00 | 1.55E 00 | 1.38E 00 | 0.00E-01 | 2.22E 00 | 0.00E-01 | 1.62E 03 |
| ZR | 97 | 4.25E-00 | 6.13E-02 | 3.62E-01 | 0.00E-01 | 8.81E-01 | 0.00E-01 | 9.29E 03 |
| NB | 95 | 5.32E 02 | 2.07E 02 | 1.48E 02 | 0.00E-01 | 1.95E 02 | 0.00E-01 | 3.83E 05 |
| MO | 99 | 0.00E-01 | 8.78E 02 | 2.17E 02 | 0.00E-01 | 1.87E 03 | 0.00E-01 | 7.26E 02 |
| TC | 99M | 6.46E-01 | 1.27E-01 | 2.10E 00 | 0.00E-01 | 1.84E 00 | 6.43E-01 | 7.20E 01 |

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TABLE A.4-3 (cont'd)
SITE RELATED DOSE COMMITMENT FACTOR AIT
MREM/HR PER μ Ci/ML
CHILD

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|------|----------|----------|----------|----------|----------|----------|----------|
| TC | 101 | 7.48E-01 | 7.83E-02 | 9.93E-00 | 0.00E-01 | 1.34E 00 | 4.14E-01 | 2.49E-01 |
| RU | 103 | 4.83E 01 | 0.00E-01 | 1.85E 01 | 0.00E-01 | 1.21E 02 | 0.00E-01 | 1.25E 03 |
| RU | 105 | 4.26E 00 | 0.00E-01 | 1.54E 00 | 0.00E-01 | 3.74E 01 | 0.00E-01 | 2.78E 03 |
| RU | 106 | 7.72E 02 | 0.00E-01 | 9.64E 01 | 0.00E-01 | 1.04E 03 | 0.00E-01 | 1.20E 04 |
| AG | 110M | 3.23E 01 | 2.18E 01 | 1.74E 01 | 0.00E-01 | 4.06E 01 | 0.00E-01 | 2.60E 03 |
| TE | 125M | 4.25E 03 | 1.15E 03 | 5.67E 02 | 1.19E 03 | 0.00E-01 | 0.00E-01 | 4.10E 03 |
| TE | 127M | 1.08E 04 | 2.90E 03 | 1.28E 03 | 2.58E 03 | 3.07E 04 | 0.00E-01 | 8.72E 03 |
| TE | 127 | 1.76E 02 | 4.73E 01 | 3.77E 01 | 1.22E 02 | 5.00E 02 | 0.00E-01 | 6.86E 03 |
| TE | 129M | 1.82E 04 | 5.07E 03 | 1.70E 03 | 5.85E 03 | 5.33E 04 | 0.00E-01 | 2.21E 04 |
| TE | 129 | 5.00E 01 | 1.39E 01 | 1.19E 01 | 3.56E 01 | 1.46E 02 | 0.00E-01 | 3.11E 03 |
| TE | 131M | 2.68E 03 | 9.28E 02 | 9.88E 02 | 1.91E 03 | 8.98E 03 | 0.00E-01 | 3.77E 04 |
| TE | 131 | 3.09E 01 | 9.43E 00 | 9.21E 00 | 2.37E 01 | 9.36E 01 | 0.00E-01 | 1.63E 02 |
| TE | 132 | 3.77E 03 | 1.67E 03 | 2.01E 03 | 2.43E 03 | 1.55E 04 | 0.00E-01 | 1.68E 04 |
| I | 130 | 2.04E 02 | 4.13E 02 | 2.13E 02 | 4.55E 04 | 6.17E 02 | 0.00E-01 | 1.93E 02 |
| I | 131 | 1.20E 03 | 1.21E 03 | 6.88E 02 | 4.00E 05 | 1.99E 03 | 0.00E-01 | 1.08E 02 |
| I | 132 | 5.60E 01 | 1.03E 02 | 4.73E 01 | 4.77E 03 | 1.57E 02 | 0.00E-01 | 1.21E 02 |
| I | 133 | 4.14E 02 | 5.12E 02 | 1.94E 02 | 9.51E 04 | 8.53E 02 | 0.00E-01 | 2.06E 02 |
| I | 134 | 2.93E 01 | 5.44E 01 | 2.50E 01 | 1.25E 03 | 8.32E 01 | 0.00E-01 | 3.61E 01 |
| I | 135 | 1.22E 02 | 2.20E 02 | 1.04E 02 | 1.95E 04 | 3.38E 02 | 0.00E-01 | 1.68E 02 |
| CS | 134 | 3.82E 05 | 6.26E 05 | 1.32E 05 | 0.00E-01 | 1.94E 05 | 6.97E 04 | 3.38E 03 |
| CS | 136 | 3.83E 04 | 1.05E 05 | 6.82E 04 | 0.00E-01 | 5.61E 04 | 8.37E 03 | 3.70E 03 |
| CS | 137 | 5.33E 05 | 5.11E 05 | 7.54E 04 | 0.00E-01 | 1.66E 05 | 5.99E 04 | 3.20E 03 |
| CS | 138 | 3.72E 02 | 5.17E 02 | 3.28E 02 | 0.00E-01 | 3.64E 02 | 3.92E 01 | 2.38E 02 |
| BA | 139 | 2.54E 01 | 1.35E-02 | 7.35E-00 | 0.00E-01 | 1.18E-01 | 7.97E-02 | 1.47E 03 |
| BA | 140 | 5.09E 03 | 4.46E 00 | 2.97E 02 | 0.00E-01 | 1.45E 00 | 2.66E 00 | 2.58E 03 |
| BA | 141 | 1.23E 01 | 6.86E-03 | 3.99E-00 | 0.00E-01 | 5.94E-02 | 4.03E-01 | 6.99E 00 |
| BA | 142 | 5.36E 00 | 3.85E-03 | 2.99E-00 | 0.00E-01 | 3.12E-02 | 2.27E-02 | 6.99E-02 |
| LA | 140 | 7.86E-00 | 2.75E-01 | 9.26E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 7.66E 03 |
| LA | 142 | 4.08E-01 | 1.30E-02 | 4.07E-02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.58E 03 |
| CE | 141 | 2.34E 00 | 1.17E 00 | 1.73E-00 | 0.00E-01 | 5.11E-00 | 0.00E-01 | 1.46E 03 |
| CE | 143 | 4.12E-00 | 2.23E 02 | 3.24E-01 | 0.00E-01 | 9.37E-01 | 0.00E-01 | 3.27E 03 |
| CE | 144 | 1.23E 02 | 3.84E 01 | 6.54E 00 | 0.00E-01 | 2.13E 01 | 0.00E-01 | 1.00E 04 |
| PR | 143 | 3.06E 00 | 9.18E-01 | 1.52E-00 | 0.00E-01 | 4.97E-00 | 0.00E-01 | 3.30E 03 |
| PR | 144 | 1.00E-01 | 3.10E-03 | 5.05E-03 | 0.00E-01 | 1.64E-02 | 0.00E-01 | 6.68E 00 |
| ND | 147 | 2.17E 00 | 1.76E 00 | 1.36E-00 | 0.00E-01 | 9.65E-00 | 0.00E-01 | 2.79E 03 |
| W | 187 | 4.30E 02 | 2.55E 02 | 1.14E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.58E 04 |

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TABLE A.4-3 (cont'd)
SITE RELATED DOSE COMMITMENT FACTOR AIT
MREM/HR PER μ Ci/ML
CHILD

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| NP | 239 | 3.47E-00 | 2.49E-02 | 1.75E-01 | 0.00E-01 | 7.19E-01 | 0.00E-01 | 1.84E 03 |
| Sb | 124 | 6.54E 02 | 8.49E 00 | 2.29E 02 | 1.44E 00 | 0.00E-01 | 3.63E 02 | 4.09E 03 |
| Sb | 125 | 4.22E 02 | 3.25E 00 | 8.84E 01 | 3.91E-00 | 0.00E-01 | 2.35E 02 | 1.01E 03 |
| Sb | 126 | 2.59E 02 | 3.97E 00 | 9.31E 01 | 1.52E 00 | 0.00E-01 | 1.24E 02 | 5.23E 03 |
| Co | 57 | 0.00E-01 | 4.81E 01 | 9.73E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.94E 02 |

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TABLE A.4-4
SITE RELATED DOSE COMMITMENT FACTOR AIT
MREM/HR PER μ CI/ML
INFANT

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| H | 3 | 0.00E-01 | 1.16E 01 | 1.16E 01 | 1.16E 01 | 1.16E 01 | 1.16E 01 | 1.16E 01 |
| C | 14 | 8.92E 02 | 1.90E 02 | 1.90E 02 | 1.90E 02 | 1.90E 02 | 1.90E 02 | 1.90E 02 |
| NA | 24 | 3.80E 02 | 3.80E 02 | 3.80E 02 | 3.80E 02 | 3.80E 02 | 3.80E 02 | 3.80E 02 |
| P | 32 | 6.40E 04 | 3.76E 03 | 2.48E 03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 8.65E 02 |
| CR | 51 | 0.00E-01 | 0.00E-01 | 5.30E-01 | 3.46E-01 | 7.56E-02 | 6.73E-01 | 1.55E 01 |
| MN | 54 | 0.00E-01 | 7.49E 02 | 1.70E 02 | 0.00E-01 | 1.66E 02 | 0.00E-01 | 2.75E 02 |
| MN | 56 | 0.00E-01 | 3.08E 01 | 5.30E 00 | 0.00E-01 | 2.64E 01 | 0.00E-01 | 2.80E 03 |
| FE | 55 | 5.23E 02 | 3.38E 02 | 9.03E 01 | 0.00E-01 | 0.00E-01 | 1.65E 02 | 4.29E 01 |
| FE | 59 | 1.16E 03 | 2.02E 03 | 7.98E 02 | 0.00E-01 | 0.00E-01 | 5.98E 02 | 9.67E 02 |
| CO | 58 | 0.00E-01 | 1.35E 02 | 3.38E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.37E 02 |
| CO | 60 | 0.00E-01 | 4.06E 02 | 9.59E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 9.67E 02 |
| NI | 63 | 2.39E 04 | 1.47E 03 | 8.28E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 7.34E 01 |
| NI | 65 | 1.77E 02 | 2.00E 01 | 9.10E 00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.52E 03 |
| CU | 64 | 0.00E-01 | 2.29E 01 | 1.06E 01 | 0.00E-01 | 3.87E 01 | 0.00E-01 | 4.70E 02 |
| ZN | 65 | 6.92E 02 | 2.37E 03 | 1.09E 03 | 0.00E-01 | 1.15E 03 | 0.00E-01 | 2.01E 03 |
| ZN | 69 | 3.51E 00 | 6.32E 00 | 4.70E-01 | 0.00E-01 | 2.63E 00 | 0.00E-01 | 5.15E 02 |
| BR | 83 | 0.00E-01 | 0.00E-01 | 1.37E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.76E-17 |
| BR | 84 | 0.00E-01 | 0.00E-01 | 1.44E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.76E-17 |
| BR | 85 | 0.00E-01 | 0.00E-01 | 7.30E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.76E-17 |
| RB | 86 | 0.00E-01 | 6.40E 03 | 3.16E 03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.64E 02 |
| RB | 88 | 0.00E-01 | 1.87E 01 | 1.03E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.82E 01 |
| RB | 89 | 0.00E-01 | 1.08E 01 | 7.41E 00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.66E 00 |
| SR | 89 | 9.44E 04 | 0.00E-01 | 2.71E 03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.94E 03 |
| SR | 90 | 6.96E 05 | 0.00E-01 | 1.77E 05 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 8.69E 03 |
| SR | 91 | 1.88E 03 | 0.00E-01 | 6.81E 00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.23E 03 |
| SR | 92 | 7.22E 02 | 0.00E-01 | 2.68E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 7.79E 03 |
| Y | 90 | 3.27E 00 | 0.00E-01 | 8.77E-02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 4.51E 03 |
| Y | 91M | 3.05E-02 | 0.00E-01 | 1.04E-03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.02E 02 |
| Y | 91 | 4.25E 01 | 0.00E-01 | 1.13E 00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.05E 03 |
| Y | 92 | 2.88E-01 | 0.00E-01 | 8.09E-03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 5.49E 03 |
| Y | 93 | 9.14E-01 | 0.00E-01 | 2.49E-02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 7.22E 03 |
| ZR | 95 | 7.75E 00 | 1.89E 00 | 1.34E 00 | 0.00E-01 | 2.04E 00 | 0.00E-01 | 9.41E 02 |
| ZR | 97 | 5.57E-01 | 9.56E-02 | 4.36E-02 | 0.00E-01 | 9.63E-02 | 0.00E-01 | 6.09E 03 |
| NB | 95 | 1.58E 00 | 6.51E-01 | 3.76E-01 | 0.00E-01 | 4.66E-01 | 0.00E-01 | 5.49E 02 |
| MO | 99 | 0.00E-01 | 1.28E 03 | 2.49E 02 | 0.00E-01 | 1.91E 03 | 0.00E-01 | 4.21E 02 |
| TC | 99M | 7.22E-02 | 1.49E-01 | 1.92E 00 | 0.00E-01 | 1.60E 00 | 7.79E-02 | 4.33E 01 |

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TABLE A.4-4 (cont'd)
SITE RELATED DOSE COMMITMENT FACTOR AIT
MREM/HR PER μ CI/ML
INFANT

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|------|----------|----------|----------|----------|----------|----------|----------|
| TC | 101 | 8.54E-02 | 1.08E-01 | 1.06E 00 | 0.00E-01 | 1.28E 00 | 5.87E-02 | 1.83E 01 |
| RU | 103 | 5.57E 01 | 0.00E-01 | 1.86E 01 | 0.00E-01 | 1.16E 02 | 0.00E-01 | 6.77E 02 |
| RU | 105 | 5.12E 00 | 0.00E-01 | 1.72E 00 | 0.00E-01 | 3.76E 01 | 0.00E-01 | 2.04E 03 |
| RU | 106 | 9.07E 02 | 0.00E-01 | 1.13E 02 | 0.00E-01 | 1.07E 03 | 0.00E-01 | 6.88E 03 |
| AG | 110M | 3.75E 01 | 2.73E 01 | 1.81E 01 | 0.00E-01 | 3.91E 01 | 0.00E-01 | 1.42E 03 |
| TE | 125M | 8.77E 02 | 2.93E 02 | 1.19E 02 | 2.95E 02 | 0.00E-01 | 0.00E-01 | 4.18E 02 |
| TE | 127M | 2.20E 03 | 7.30E 02 | 2.66E 02 | 6.36E 02 | 5.42E 03 | 0.00E-01 | 8.88E 02 |
| TE | 127 | 3.76E 01 | 1.26E 01 | 8.09E 00 | 3.06E 01 | 9.18E 01 | 0.00E-01 | 7.90E 02 |
| TE | 129M | 3.76E 03 | 1.29E 03 | 5.79E 02 | 1.44E 03 | 9.41E 03 | 0.00E-01 | 2.25E 03 |
| TE | 129 | 1.07E 01 | 3.68E 00 | 2.49E 00 | 8.95E 00 | 2.66E 01 | 0.00E-01 | 8.54E 02 |
| TE | 131M | 5.72E 02 | 2.30E 02 | 1.90E 02 | 4.66E 02 | 1.58E 03 | 0.00E-01 | 3.87E 03 |
| TE | 131 | 6.62E 00 | 2.45E 00 | 1.86E 00 | 5.91E 00 | 1.69E 01 | 0.00E-01 | 2.67E 02 |
| TE | 132 | 7.82E 02 | 3.87E 02 | 3.62E 02 | 5.72E 02 | 2.42E 03 | 0.00E-01 | 1.43E 03 |
| I | 130 | 2.26E 02 | 4.97E 02 | 1.99E 02 | 5.57E 04 | 5.45E 02 | 0.00E-01 | 1.06E 02 |
| I | 131 | 1.35E 03 | 1.59E 03 | 7.00E 02 | 5.23E 05 | 1.86E 03 | 0.00E-01 | 5.68E 01 |
| I | 132 | 6.24E 01 | 1.27E 02 | 4.51E 01 | 5.94E 03 | 1.41E 02 | 0.00E-01 | 1.03E 02 |
| I | 133 | 4.70E 02 | 6.85E 02 | 2.01E 02 | 1.25E 05 | 8.05E 02 | 0.00E-01 | 1.16E 02 |
| I | 134 | 3.27E 01 | 6.70E 01 | 2.38E 01 | 1.56E 03 | 7.49E 01 | 0.00E-01 | 6.92E 01 |
| I | 135 | 1.37E 02 | 2.72E 02 | 9.93E 01 | 2.44E 04 | 3.04E 02 | 0.00E-01 | 9.86E 01 |
| CS | 134 | 1.42E 04 | 2.64E 04 | 2.67E 03 | 0.00E-01 | 6.81E 03 | 2.42E 03 | 7.19E 01 |
| CS | 136 | 1.73E 03 | 5.08E 03 | 1.90E 03 | 0.00E-01 | 2.02E 03 | 4.14E 02 | 7.71E 01 |
| CS | 137 | 1.96E 04 | 2.30E 04 | 1.63E 03 | 0.00E-01 | 6.17E 03 | 2.50E 03 | 7.19E 01 |
| CS | 138 | 1.81E 01 | 2.94E 01 | 1.43E 01 | 0.00E-01 | 1.47E 01 | 2.29E 00 | 4.70E 01 |
| BA | 139 | 3.31E 01 | 2.20E-02 | 9.59E-01 | 0.00E-01 | 1.32E-02 | 1.33E-02 | 2.10E 03 |
| BA | 140 | 6.43E 03 | 6.43E 00 | 3.31E 02 | 0.00E-01 | 1.53E 00 | 3.95E 00 | 1.58E 03 |
| BA | 141 | 1.60E 01 | 1.09E-02 | 5.04E-01 | 0.00E-01 | 6.58E-03 | 6.66E-03 | 1.95E 02 |
| BA | 142 | 6.92E 00 | 5.76E-03 | 3.41E-01 | 0.00E-01 | 3.31E-03 | 3.48E-03 | 2.86E 01 |
| LA | 140 | 7.94E-01 | 3.13E-01 | 8.05E-02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.68E 03 |
| LA | 142 | 4.14E-02 | 1.52E-02 | 3.64E-03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.58E 03 |
| CE | 141 | 2.96E 00 | 1.81E 00 | 2.13E-01 | 0.00E-01 | 5.57E-01 | 0.00E-01 | 9.33E 02 |
| CE | 143 | 5.57E-01 | 3.69E 02 | 4.21E-02 | 0.00E-01 | 1.08E-01 | 0.00E-01 | 2.16E 03 |
| CE | 144 | 1.12E 02 | 4.59E 01 | 6.28E 00 | 0.00E-01 | 1.85E 01 | 0.00E-01 | 6.43E 03 |
| PR | 143 | 3.06E 00 | 1.14E 00 | 1.52E-01 | 0.00E-01 | 4.25E-01 | 0.00E-01 | 1.61E 03 |
| PR | 144 | 1.03E-02 | 3.99E-03 | 5.19E-04 | 0.00E-01 | 1.44E-03 | 0.00E-01 | 1.85E 02 |
| ND | 147 | 2.08E 00 | 2.14E 00 | 1.31E-01 | 0.00E-01 | 8.24E-01 | 0.00E-01 | 1.35E 03 |
| W | 187 | 3.40E 01 | 2.36E 01 | 8.16E 00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.39E 03 |

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TABLE A.4-4 (cont'd)
SITE RELATED DOSE COMMITMENT FACTOR AIT
MREM/HR PER μ CI/ML
INFANT

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| Np | 239 | 4.18E-01 | 3.74E-02 | 2.11E-02 | 0.00E-01 | 7.45E-02 | 0.00E-01 | 1.08E 03 |
| Sb | 124 | 8.05E 02 | 1.19E 01 | 2.49E 02 | 2.14E 00 | 0.00E-01 | 5.04E 02 | 2.48E 03 |
| Sb | 125 | 4.63E 02 | 4.48E 00 | 9.52E 01 | 5.79E-00 | 0.00E-01 | 2.90E 02 | 6.17E 02 |
| Sb | 126 | 3.03E 02 | 5.94E 00 | 1.09E 02 | 2.33E 00 | 0.00E-01 | 1.91E 02 | 3.14E 03 |
| Co | 57 | 0.00E-01 | 4.33E 01 | 7.03E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.47E 02 |

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TABLE A.5-1
INHALATION DOSE PARAMETER FOR THE CHILD, PI
MREM/YR per $\mu\text{Ci}/\text{M}^3$

| | | | |
|--------|----------|---------|----------|
| H-3 | 1.12E 03 | RU-103 | 6.62E 05 |
| C-14 | 3.59E 04 | RU-105 | 9.95E 04 |
| NA-24 | 1.61E 04 | RU-106 | 1.43E 07 |
| P-32 | 2.60E 06 | AG-110M | 5.48E 06 |
| CR-51 | 1.70E 04 | TE-125M | 4.77E 05 |
| MN-54 | 1.58E 06 | TE-127M | 1.48E 06 |
| MN-56 | 1.23E 05 | TE-127 | 5.62E 04 |
| FE-55 | 1.11E 05 | TE-129M | 1.76E 06 |
| FE-59 | 1.27E 06 | TE-129 | 2.55E 04 |
| CO-58 | 1.11E 06 | TE-131M | 3.08E 05 |
| CO-60 | 7.07E 06 | TE-131 | 2.05E 03 |
| NI-63 | 8.21E 05 | TE-132 | 3.77E 05 |
| NI-65 | 8.40E 04 | I-130 | 1.85E 06 |
| CU-64 | 3.67E 04 | I-131 | 1.62E 07 |
| ZN-65 | 9.95E 05 | I-132 | 1.94E 05 |
| ZN-69 | 1.02E 04 | I-133 | 3.85E 06 |
| BR-83 | 4.74E 02 | I-134 | 5.07E 04 |
| BR-84 | 5.48E 02 | I-135 | 7.92E 05 |
| BR-85 | 2.53E 01 | CS-134 | 1.01E 06 |
| RB-86 | 1.98E 05 | CS-136 | 1.71E 05 |
| RB-88 | 5.62E 02 | CS-137 | 9.07E 05 |
| RB-89 | 3.45E 02 | CS-138 | 8.40E 02 |
| SR-89 | 2.16E 06 | BA-139 | 5.77E 04 |
| SR-90 | 1.01E 08 | BA-140 | 1.74E 06 |
| SR-91 | 1.74E 05 | BA-141 | 2.92E 03 |
| SR-92 | 2.42E 05 | BA-142 | 1.64E 03 |
| Y-90 | 2.68E 05 | LA-140 | 2.26E 05 |
| Y-91M | 2.81E 03 | LA-142 | 7.59E 04 |
| Y-92 | 2.39E 05 | CE-141 | 5.44E 05 |
| Y-93 | 3.89E 05 | CE-143 | 1.27E 05 |
| ZR-95 | 2.23E 06 | PR-143 | 4.33E 05 |
| ZR-97 | 3.51E 05 | PR-144 | 1.57E 03 |
| NB-95 | 6.14E 05 | ND-147 | 3.28E 05 |
| MO-99 | 1.35E 05 | W-187 | 9.10E 04 |
| TC-99M | 4.81E 03 | NP-239 | 6.40E 04 |
| TC-101 | 5.85E 02 | | |

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TABLE A.5-2
INHALATION PATHWAY FACTOR
MREM/YR PER $\mu\text{Ci}/\text{M}^3$
ADULT (RI FACTORS)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| H | 3 | 0.00E 01 | 1.26E 03 | 1.26E 03 | 1.26E 03 | 1.26E 03 | 1.26E 03 | 1.26E 03 |
| C | 14 | 1.82E 04 | 3.41E 03 | 3.41E 03 | 3.41E 03 | 3.41E 03 | 3.41E 03 | 3.41E 03 |
| NA | 24 | 1.02E 04 | 1.02E 04 | 1.02E 04 | 1.02E 04 | 1.02E 04 | 1.02E 04 | 1.02E 04 |
| P | 32 | 1.32E 06 | 7.71E 04 | 5.01E 04 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 8.64E 04 |
| CR | 51 | 0.00E 01 | 0.00E 01 | 1.00E 02 | 5.95E 01 | 2.28E 01 | 1.44E 04 | 3.32E 03 |
| MN | 54 | 0.00E 01 | 3.96E 04 | 6.30E 03 | 0.00E-01 | 9.84E 03 | 1.40E 06 | 7.74E 04 |
| MN | 56 | 0.00E 01 | 1.24E 00 | 1.83E-00 | 0.00E-01 | 1.30E 00 | 9.44E 03 | 2.02E 04 |
| FE | 55 | 2.46E 04 | 1.70E 04 | 3.94E 03 | 0.00E-01 | 0.00E-01 | 7.21E 04 | 6.03E 03 |
| FE | 59 | 1.18E 04 | 2.78E 04 | 1.06E 04 | 0.00E-01 | 0.00E-01 | 1.02E 06 | 1.88E 05 |
| CO | 58 | 0.00E 01 | 1.58E 03 | 2.07E 03 | 0.00E-01 | 0.00E-01 | 9.28E 05 | 1.06E 05 |
| CO | 60 | 0.00E 01 | 1.15E 04 | 1.48E 04 | 0.00E-01 | 0.00E-01 | 5.97E 06 | 2.85E 05 |
| NI | 63 | 4.32E 05 | 3.14E 04 | 1.45E 04 | 0.00E-01 | 0.00E-01 | 1.78E 05 | 1.34E 04 |
| NI | 65 | 1.54E 00 | 2.10E-01 | 9.12E-02 | 0.00E-01 | 0.00E-01 | 5.60E 03 | 1.23E 04 |
| CU | 64 | 0.00E 01 | 1.46E 00 | 6.15E-01 | 0.00E-01 | 4.62E 00 | 6.78E 03 | 4.90E 04 |
| ZN | 65 | 3.24E 04 | 1.03E 05 | 4.66E 04 | 0.00E-01 | 6.90E 04 | 8.64E 05 | 5.34E 04 |
| ZN | 69 | 3.38E-02 | 6.51E-02 | 4.52E-03 | 0.00E-01 | 4.22E-02 | 9.20E 02 | 1.63E 01 |
| BR | 83 | 0.00E-01 | 0.00E-01 | 2.41E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.32E 02 |
| BR | 84 | 0.00E-01 | 0.00E-01 | 3.13E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.64E-03 |
| BR | 85 | 0.00E-01 | 0.00E-01 | 1.28E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 8.00E-15 |
| RB | 86 | 0.00E-01 | 1.35E 05 | 5.90E 04 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.66E 04 |
| RB | 88 | 0.00E-01 | 3.87E 02 | 1.93E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.34E-09 |
| RB | 89 | 0.00E-01 | 2.56E 02 | 1.70E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 9.28E-12 |
| SR | 89 | 3.04E 05 | 0.00E-01 | 8.72E 03 | 0.00E-01 | 0.00E-01 | 1.40E 06 | 3.50E 05 |
| SR | 90 | 9.92E 07 | 0.00E-01 | 6.10E 06 | 0.00E-01 | 0.00E-01 | 9.60E 06 | 7.22E 05 |
| SR | 91 | 6.19E 01 | 0.00E-01 | 2.50E 00 | 0.00E-01 | 0.00E-01 | 3.65E 04 | 1.91E 05 |
| SR | 92 | 6.74E 00 | 0.00E-01 | 2.91E-01 | 0.00E-01 | 0.00E-01 | 1.65E 04 | 4.30E 04 |
| Y | 90 | 2.09E 03 | 0.00E-01 | 5.61E 01 | 0.00E-01 | 0.00E-01 | 1.70E 05 | 5.06E 05 |
| Y | 91M | 2.61E-01 | 0.00E-01 | 1.02E-02 | 0.00E-01 | 0.00E-01 | 1.92E 03 | 1.33E 00 |
| Y | 91 | 4.62E 05 | 0.00E-01 | 1.24E 04 | 0.00E-01 | 0.00E-01 | 1.70E 06 | 3.85E 05 |
| Y | 92 | 1.03E 01 | 0.00E-01 | 3.02E-01 | 0.00E-01 | 0.00E-01 | 1.57E 04 | 7.35E 04 |
| Y | 93 | 9.44E 01 | 0.00E-01 | 2.61E 00 | 0.00E-01 | 0.00E-01 | 4.85E 04 | 4.22E 05 |
| ZR | 95 | 1.07E 05 | 3.44E 04 | 2.33E 04 | 0.00E-01 | 5.42E 04 | 1.77E 06 | 1.50E 05 |
| ZR | 97 | 9.68E 01 | 1.96E 01 | 9.04E 00 | 0.00E-01 | 2.97E 01 | 7.87E 04 | 5.23E 05 |
| NB | 95 | 1.41E 04 | 7.82E 03 | 4.21E 03 | 0.00E-01 | 7.74E 03 | 5.05E 05 | 1.04E 05 |
| MO | 99 | 0.00E-01 | 1.21E 02 | 2.30E 01 | 0.00E-01 | 2.91E 02 | 9.12E 04 | 2.48E 05 |
| TC | 99M | 1.03E-03 | 2.91E-03 | 3.70E-02 | 0.00E-01 | 4.42E-02 | 7.64E 02 | 4.16E 03 |

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TABLE A.5-2 (cont'd)
INHALATION PATHWAY FACTOR
MREM/YR PER $\mu\text{Ci}/\text{M}^3$
ADULT (RI FACTORS)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|------|----------|----------|----------|----------|----------|----------|----------|
| TC | 101 | 4.18E-05 | 6.02E-05 | 5.90E-04 | 0.00E-01 | 1.08E-03 | 3.99E 02 | 1.09E-11 |
| RU | 103 | 1.53E 03 | 0.00E-01 | 6.58E 02 | 0.00E-01 | 5.83E 03 | 5.05E 05 | 1.10E 05 |
| RU | 105 | 7.90E-01 | 0.00E-01 | 3.11E-01 | 0.00E-01 | 1.02E 00 | 1.10E 04 | 4.82E 04 |
| RU | 106 | 6.91E 04 | 0.00E-01 | 8.72E 03 | 0.00E-01 | 1.34E 05 | 9.36E 06 | 9.12E 05 |
| AG | 110M | 1.08E 04 | 1.00E 04 | 5.94E 03 | 0.00E-01 | 1.97E 04 | 4.63E 06 | 3.02E 05 |
| TE | 125M | 3.42E 03 | 1.58E 03 | 4.67E 02 | 1.05E 03 | 1.24E 04 | 3.14E 05 | 7.06E 04 |
| TE | 127M | 1.26E 04 | 5.77E 03 | 1.57E 03 | 3.29E 03 | 4.58E 04 | 9.60E 05 | 1.50E 05 |
| TE | 127 | 1.40E 00 | 6.42E-01 | 3.10E-01 | 1.06E 00 | 5.10E 00 | 6.51E 03 | 5.74E 04 |
| TE | 129M | 9.76E 03 | 4.67E 03 | 1.58E 03 | 3.44E 03 | 3.66E 04 | 1.16E 06 | 3.83E 05 |
| TE | 129 | 4.98E-02 | 2.39E-02 | 1.24E-02 | 3.90E-02 | 1.87E-01 | 1.94E 03 | 1.57E 02 |
| TE | 131M | 6.99E 01 | 4.36E 01 | 2.90E 01 | 5.50E 01 | 3.09E 02 | 1.46E 05 | 5.56E 05 |
| TE | 131 | 1.11E-02 | 5.95E-03 | 3.59E-03 | 9.36E-02 | 4.37E-02 | 1.39E-03 | 1.84E 01 |
| TE | 132 | 2.60E 02 | 2.15E 02 | 1.62E 02 | 1.90E 02 | 1.46E 03 | 2.88E 05 | 5.10E 05 |
| I | 130 | 4.58E 03 | 1.34E 04 | 5.28E 03 | 1.14E 06 | 2.09E 04 | 0.00E-01 | 7.69E 05 |
| I | 131 | 2.52E 04 | 3.58E 04 | 2.05E 04 | 1.19E 07 | 6.13E 04 | 0.00E-01 | 6.28E 03 |
| I | 132 | 1.16E 03 | 3.26E 03 | 1.16E 03 | 1.14E 05 | 5.18E 03 | 0.00E-01 | 4.06E 02 |
| I | 133 | 8.64E 03 | 1.48E 04 | 4.52E 03 | 2.15E 06 | 2.58E 04 | 0.00E-01 | 8.88E 03 |
| I | 134 | 6.44E 02 | 1.73E 03 | 6.15E 02 | 2.98E 04 | 2.75E 03 | 0.00E-01 | 1.01E 00 |
| I | 135 | 2.68E 03 | 6.98E 03 | 2.57E 03 | 4.48E 05 | 1.11E 04 | 0.00E-01 | 5.25E 03 |
| CS | 134 | 3.73E 05 | 8.48E 05 | 7.28E 05 | 0.00E-01 | 2.87E 05 | 9.76E 04 | 1.04E 04 |
| CS | 136 | 3.90E 04 | 1.46E 05 | 1.10E 05 | 0.00E-01 | 8.56E 04 | 1.20E 04 | 1.17E 04 |
| CS | 137 | 4.78E 05 | 6.21E 05 | 4.28E 05 | 0.00E-01 | 2.22E 05 | 7.52E 04 | 8.40E 03 |
| CS | 138 | 3.31E 02 | 6.21E 02 | 3.24E 02 | 0.00E-01 | 4.80E 02 | 4.86E 01 | 1.86E-03 |
| BA | 139 | 9.36E-01 | 6.66E-04 | 2.74E-02 | 0.00E-01 | 6.22E-04 | 3.76E 03 | 8.96E 02 |
| BA | 140 | 3.90E 04 | 4.90E 01 | 2.57E 03 | 0.00E-01 | 1.67E 01 | 1.27E 06 | 2.18E 05 |
| BA | 141 | 1.00E-01 | 7.53E-05 | 3.36E-03 | 0.00E-01 | 7.00E-05 | 1.94E 03 | 1.16E-07 |
| BA | 142 | 2.63E-02 | 2.70E-05 | 1.66E-03 | 0.00E-01 | 2.29E-05 | 1.19E 03 | 1.57E-16 |
| LA | 140 | 3.44E 02 | 1.74E 02 | 4.58E 01 | 0.00E-01 | 0.00E-01 | 1.36E 05 | 4.58E 05 |
| LA | 142 | 6.83E-01 | 3.10E-01 | 7.72E-02 | 0.00E-01 | 0.00E-01 | 6.33E 03 | 2.11E 03 |
| CE | 141 | 1.99E 04 | 1.35E 04 | 1.53E 03 | 0.00E-01 | 6.26E 03 | 3.62E 05 | 1.20E 05 |
| CE | 143 | 1.86E 02 | 1.38E 02 | 1.53E 01 | 0.00E-01 | 6.08E 01 | 7.98E 04 | 2.26E 05 |
| CE | 144 | 3.43E 06 | 1.43E 06 | 1.84E 05 | 0.00E-01 | 8.48E 05 | 7.78E 06 | 8.16E 05 |
| PR | 143 | 9.36E 03 | 3.75E 03 | 4.64E 02 | 0.00E-01 | 2.16E 03 | 2.81E 05 | 2.00E 05 |
| PR | 144 | 3.10E-02 | 1.25E-02 | 1.53E-03 | 0.00E-01 | 7.05E-03 | 1.02E 03 | 2.15E-08 |
| ND | 147 | 5.27E 03 | 6.10E 03 | 3.65E 02 | 0.00E-01 | 3.56E 03 | 2.21E 05 | 1.73E 05 |
| W | 187 | 8.48E 00 | 7.08E 00 | 2.48E 00 | 0.00E-01 | 0.00E-01 | 2.90E 04 | 1.55E 05 |
| NP | 239 | 2.30E 02 | 2.26E 01 | 1.24E 01 | 0.00E-01 | 7.00E 01 | 3.76E 04 | 1.19E 05 |

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INHALATION PATHWAY FACTOR
MREM/YR PER $\mu\text{Ci}/\text{M}^3$
TEEN (RI FACTORS)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| H | 3 | 0.00E-01 | 1.27E 03 | 1.27E 03 | 1.27E 03 | 1.27E 03 | 1.27E 03 | 1.27E 03 |
| C | 14 | 2.60E 04 | 4.87E 03 | 4.87E 03 | 4.87E 03 | 4.87E 03 | 4.87E 03 | 4.87E 03 |
| NA | 24 | 1.38E 04 | 1.38E 04 | 1.38E 04 | 1.38E 04 | 1.38E 04 | 1.38E 04 | 1.38E 04 |
| P | 32 | 1.89E 06 | 1.10E 05 | 7.16E 04 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 9.28E 04 |
| CR | 51 | 0.00E-01 | 0.00E-01 | 1.35E 02 | 7.50E 01 | 3.07E 01 | 2.10E 04 | 3.00E 03 |
| MN | 54 | 0.00E-01 | 5.11E 04 | 8.40E 03 | 0.00E-01 | 1.27E 04 | 1.98E 06 | 6.68E 04 |
| MN | 56 | 0.00E-01 | 1.70E 00 | 2.52E-01 | 0.00E-01 | 1.79E 00 | 1.53E 04 | 5.74E 04 |
| FE | 55 | 3.34E 04 | 2.38E 04 | 5.54E 03 | 0.00E-01 | 0.00E-01 | 1.24E 05 | 6.39E 03 |
| FE | 59 | 1.59E 04 | 3.70E 04 | 1.43E 04 | 0.00E-01 | 0.00E-01 | 1.53E 06 | 1.78E 05 |
| CO | 58 | 0.00E-01 | 2.07E 03 | 2.78E 03 | 0.00E-01 | 0.00E-01 | 1.34E 06 | 9.52E 04 |
| CO | 60 | 0.00E-01 | 1.51E 04 | 1.98E 04 | 0.00E-01 | 0.00E-01 | 8.72E 06 | 2.59E 05 |
| NI | 63 | 5.80E 05 | 4.34E 04 | 1.98E 04 | 0.00E-01 | 0.00E-01 | 3.07E 05 | 1.42E 04 |
| NI | 65 | 2.18E 00 | 2.93E-01 | 1.27E-01 | 0.00E-01 | 0.00E-01 | 9.36E 03 | 3.67E 04 |
| CU | 64 | 0.00E-01 | 2.03E 00 | 8.48E-01 | 0.00E-01 | 6.41E 00 | 1.11E 04 | 6.14E 04 |
| ZN | 65 | 3.86E 04 | 1.34E 05 | 6.24E 04 | 0.00E-01 | 8.64E 04 | 1.24E 06 | 4.66E 04 |
| ZN | 69 | 4.83E-02 | 9.20E-02 | 6.46E-03 | 0.00E-01 | 6.02E-02 | 1.58E 03 | 2.85E 02 |
| BR | 83 | 0.00E-01 | 0.00E-01 | 3.44E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 8.00E-15 |
| BR | 84 | 0.00E-01 | 0.00E-01 | 4.33E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 8.00E-15 |
| BR | 85 | 0.00E-01 | 0.00E-01 | 1.83E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 8.00E-15 |
| RB | 86 | 0.00E-01 | 1.90E 05 | 8.40E 04 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.77E 04 |
| RB | 88 | 0.00E-01 | 5.46E 02 | 2.72E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.92E-05 |
| RB | 89 | 0.00E-01 | 3.52E 02 | 2.33E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.38E-07 |
| SR | 89 | 4.34E 05 | 0.00E-01 | 1.25E 04 | 0.00E-01 | 0.00E-01 | 2.42E 06 | 3.71E 05 |
| SR | 90 | 1.08E 08 | 0.00E-01 | 6.68E 06 | 0.00E-01 | 0.00E-01 | 1.65E 07 | 7.65E 05 |
| SR | 91 | 8.80E 01 | 0.00E-01 | 3.51E 00 | 0.00E-01 | 0.00E-01 | 6.07E 04 | 2.59E 05 |
| SR | 92 | 9.52E 00 | 0.00E-01 | 4.06E-01 | 0.00E-01 | 0.00E-01 | 2.74E 04 | 1.19E 05 |
| Y | 90 | 2.98E 03 | 0.00E-01 | 8.00E 01 | 0.00E-01 | 0.00E-01 | 2.93E 05 | 5.59E 05 |
| Y | 91M | 3.70E-01 | 0.00E-01 | 1.42E-02 | 0.00E-01 | 0.00E-01 | 3.20E 03 | 3.02E 01 |
| Y | 91 | 6.61E 05 | 0.00E-01 | 1.77E 04 | 0.00E-01 | 0.00E-01 | 2.94E 06 | 4.09E 05 |
| Y | 92 | 1.47E 01 | 0.00E-01 | 4.29E-01 | 0.00E-01 | 0.00E-01 | 2.68E 04 | 1.65E 05 |
| Y | 93 | 1.35E 02 | 0.00E-01 | 3.72E 00 | 0.00E-01 | 0.00E-01 | 8.32E 04 | 5.79E 05 |
| ZR | 95 | 1.46E 05 | 4.58E 04 | 3.15E 04 | 0.00E-01 | 6.74E 04 | 2.69E 06 | 1.49E 05 |
| ZR | 97 | 1.38E 02 | 2.72E 01 | 1.26E 01 | 0.00E-01 | 4.12E 01 | 1.30E 05 | 6.30E 05 |
| NB | 95 | 1.86E 04 | 1.03E 04 | 5.66E 03 | 0.00E-01 | 1.00E 04 | 7.51E 05 | 9.68E 04 |
| MO | 99 | 0.00E-01 | 1.69E 02 | 3.22E 01 | 0.00E-01 | 4.11E 02 | 1.54E 05 | 2.69E 05 |
| TC | 99M | 1.38E-03 | 3.86E-03 | 4.99E-02 | 0.00E-01 | 5.76E-02 | 1.15E 03 | 6.13E 03 |

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TABLE A.5-3 (cont'd)
INHALATION PATHWAY FACTOR
MREM/YR PER $\mu\text{Ci}/\text{M}^3$
TEEN (RI FACTORS)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|------|----------|----------|----------|----------|----------|----------|----------|
| TC | 101 | 5.92E-05 | 8.40E-05 | 8.24E-04 | 0.00E-01 | 1.52E-03 | 6.67E 02 | 8.72E-07 |
| RU | 103 | 2.10E 03 | 0.00E-01 | 8.96E 02 | 0.00E-01 | 7.43E 03 | 7.83E 05 | 1.09E 05 |
| RU | 105 | 1.12E 00 | 0.00E-01 | 4.34E-01 | 0.00E-01 | 1.41E 00 | 1.82E 04 | 9.04E 04 |
| RU | 106 | 9.84E 04 | 0.00E-01 | 1.24E 04 | 0.00E-01 | 1.90E 05 | 1.61E 07 | 9.60E 05 |
| AG | 110M | 1.38E 04 | 1.31E 04 | 7.99E 03 | 0.00E-01 | 2.50E 04 | 6.75E 06 | 2.73E 05 |
| TE | 125M | 4.88E 03 | 2.24E 03 | 6.74E 02 | 1.40E 03 | 0.00E-01 | 5.36E 05 | 7.50E 04 |
| TE | 127M | 1.80E 04 | 8.16E 03 | 2.18E 03 | 4.38E 03 | 6.54E 04 | 1.66E 06 | 1.59E 05 |
| TE | 127 | 2.01E 00 | 9.12E-01 | 4.42E-01 | 1.42E 00 | 7.28E 00 | 1.12E 04 | 8.08E 01 |
| TE | 129M | 1.39E 04 | 6.58E 03 | 2.25E 03 | 4.58E 03 | 5.19E 04 | 1.98E 06 | 4.05E 05 |
| TE | 129 | 7.10E-02 | 3.38E-02 | 1.76E-02 | 5.18E-02 | 2.66E-01 | 3.30E 03 | 1.62E 03 |
| TE | 131M | 9.84E 01 | 6.01E 01 | 4.20E 01 | 7.25E 01 | 4.39E 02 | 2.38E 05 | 6.21E 05 |
| TE | 131 | 1.58E-02 | 8.32E-03 | 5.04E-03 | 1.24E-02 | 6.18E-02 | 2.34E 03 | 1.51E 01 |
| TE | 132 | 3.60E 02 | 2.90E 02 | 2.19E 02 | 2.46E 02 | 1.95E 03 | 4.49E 05 | 4.63E 05 |
| I | 130 | 6.24E 03 | 1.79E 04 | 7.17E 03 | 1.49E 06 | 2.75E 04 | 0.00E-01 | 9.12E 03 |
| I | 131 | 3.54E 04 | 4.91E 04 | 2.64E 04 | 1.46E 07 | 8.40E 04 | 0.00E-01 | 6.49E 03 |
| I | 132 | 1.59E 03 | 4.38E 03 | 1.58E 03 | 1.51E 05 | 6.92E 03 | 0.00E-01 | 1.27E 03 |
| I | 133 | 1.22E 04 | 2.05E 04 | 6.22E 03 | 2.92E 06 | 3.59E 04 | 0.00E-01 | 1.03E 04 |
| I | 134 | 8.88E 02 | 2.32E 03 | 8.40E 02 | 3.95E 04 | 3.66E 03 | 0.00E-01 | 2.04E 01 |
| I | 135 | 3.70E 03 | 9.44E 03 | 3.49E 03 | 6.21E 05 | 1.49E 04 | 0.00E-01 | 6.95E 03 |
| CS | 134 | 5.02E 05 | 1.13E 06 | 5.49E 05 | 0.00E-01 | 3.75E 05 | 1.46E 05 | 9.76E 03 |
| CS | 136 | 5.15E 04 | 1.94E 05 | 1.37E 05 | 0.00E-01 | 1.10E 05 | 1.78E 04 | 1.09E 04 |
| CS | 137 | 6.70E 05 | 8.48E 05 | 3.11E 05 | 0.00E-01 | 3.04E 05 | 1.21E 05 | 8.48E 03 |
| CS | 138 | 4.66E 02 | 8.56E 02 | 4.46E 02 | 0.00E-01 | 6.62E 02 | 7.87E 01 | 2.70E-01 |
| BA | 139 | 1.34E 00 | 9.44E-04 | 3.90E-02 | 0.00E-01 | 8.88E-04 | 6.46E 03 | 6.45E 03 |
| BA | 140 | 5.47E 04 | 6.70E 01 | 3.52E 03 | 0.00E-01 | 2.28E 01 | 2.03E 06 | 2.29E 05 |
| BA | 141 | 1.42E-01 | 1.06E-04 | 4.74E-03 | 0.00E-01 | 9.84E-05 | 3.29E 03 | 7.46E-04 |
| BA | 142 | 3.70E-02 | 3.70E-05 | 2.27E-03 | 0.00E-01 | 3.14E-05 | 1.91E 03 | 4.79E-10 |
| LA | 140 | 4.79E 02 | 2.36E 02 | 6.26E 01 | 0.00E-01 | 0.00E-01 | 2.14E 05 | 4.87E 05 |
| LA | 142 | 9.60E-01 | 4.25E-01 | 1.06E-01 | 0.00E-01 | 0.00E-01 | 1.02E 04 | 1.20E 04 |
| CE | 141 | 2.84E 04 | 1.90E 04 | 2.17E 03 | 0.00E-01 | 8.88E 03 | 6.14E 05 | 1.26E 05 |
| CE | 143 | 2.66E 02 | 1.94E 02 | 2.16E 01 | 0.00E-01 | 8.64E 01 | 1.30E 05 | 2.55E 05 |
| CE | 144 | 4.89E 06 | 2.02E 06 | 2.62E 05 | 0.00E-01 | 1.21E 06 | 1.34E 07 | 8.64E 05 |
| PR | 143 | 1.34E 04 | 5.31E 03 | 6.62E 02 | 0.00E-01 | 3.09E 03 | 4.83E 05 | 2.14E 05 |
| PR | 144 | 4.30E-02 | 1.76E-02 | 2.18E-03 | 0.00E-01 | 1.01E-02 | 1.75E 03 | 2.35E-04 |
| ND | 147 | 7.86E 03 | 8.56E 03 | 5.13E 02 | 0.00E-01 | 5.02E 03 | 3.72E 05 | 1.82E 05 |
| W | 187 | 1.20E 01 | 9.76E 00 | 3.43E 00 | 0.00E-01 | 0.00E-01 | 4.74E 04 | 1.77E 05 |
| NP | 239 | 3.38E 02 | 3.19E 01 | 1.77E 01 | 0.00E-01 | 1.00E 02 | 6.49E 04 | 1.32E 05 |

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OFFSITE DOSE CALCULATION MANUAL

TABLE A.5-4
INHALATION PATHWAY FACTOR
MREM/YR PER $\mu\text{Ci}/\text{M}^3$
CHILD (RI FACTORS)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| H | 3 | 0.00E-01 | 1.12E 03 | 1.12E 03 | 1.12E 03 | 1.12E 03 | 1.12E 03 | 1.12E 03 |
| C | 14 | 3.59E 04 | 6.73E 03 | 6.73E 03 | 6.73E 03 | 6.73E 03 | 6.73E 03 | 6.73E 03 |
| NA | 24 | 1.61E 04 | 1.61E 04 | 1.61E 04 | 1.61E 04 | 1.61E 04 | 1.61E 04 | 1.61E 04 |
| P | 32 | 2.60E 06 | 1.14E 05 | 9.88E 04 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 4.22E 04 |
| CR | 51 | 0.00E-01 | 0.00E-01 | 1.54E 02 | 8.55E 01 | 2.43E 01 | 1.70E 04 | 1.08E 03 |
| MN | 54 | 0.00E-01 | 4.29E 04 | 9.51E 03 | 0.00E-01 | 1.00E 04 | 1.58E 06 | 2.29E 04 |
| MN | 56 | 0.00E-01 | 1.66E 00 | 3.12E-01 | 0.00E-01 | 1.67E 00 | 1.31E 04 | 1.23E 05 |
| FE | 55 | 4.74E 04 | 2.52E 04 | 7.77E 03 | 0.00E-01 | 0.00E-01 | 1.11E 05 | 2.87E 03 |
| FE | 59 | 2.07E 04 | 3.34E 04 | 1.67E 04 | 0.00E-01 | 0.00E-01 | 1.27E 06 | 7.07E 04 |
| CO | 58 | 0.00E-01 | 1.77E 03 | 3.16E 03 | 0.00E-01 | 0.00E-01 | 1.11E 06 | 3.44E 04 |
| CO | 60 | 0.00E-01 | 1.31E 04 | 2.26E 04 | 0.00E-01 | 0.00E-01 | 7.07E 06 | 9.62E 04 |
| NI | 63 | 8.21E 05 | 4.63E 04 | 2.80E 04 | 0.00E-01 | 0.00E-01 | 2.75E 05 | 6.33E 03 |
| NI | 65 | 2.99E 00 | 2.96E-01 | 1.64E-01 | 0.00E-01 | 0.00E-01 | 8.18E 03 | 8.40E 04 |
| CU | 64 | 0.00E-01 | 1.99E 00 | 1.07E 00 | 0.00E-01 | 6.03E 00 | 9.58E 03 | 3.67E 04 |
| ZN | 65 | 4.26E 04 | 1.13E 05 | 7.03E 04 | 0.00E-01 | 7.14E 04 | 9.95E 05 | 1.63E 04 |
| ZN | 69 | 6.70E-02 | 9.66E-02 | 8.92E-03 | 0.00E-01 | 5.85E-02 | 1.42E 03 | 1.02E 04 |
| BR | 83 | 0.00E-01 | 0.00E-01 | 4.74E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.70E-15 |
| BR | 84 | 0.00E-01 | 0.00E-01 | 5.48E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.70E-15 |
| BR | 85 | 0.00E-01 | 0.00E-01 | 2.53E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.70E-15 |
| RB | 86 | 0.00E-01 | 1.98E 05 | 1.14E 05 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 7.99E 03 |
| RB | 88 | 0.00E-01 | 5.62E 02 | 3.66E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.72E 01 |
| RB | 89 | 0.00E-01 | 3.45E 02 | 2.90E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.89E 00 |
| SR | 89 | 5.99E 05 | 0.00E-01 | 1.72E 04 | 0.00E-01 | 0.00E-01 | 2.16E 06 | 1.67E 05 |
| SR | 90 | 1.01E 08 | 0.00E-01 | 6.44E 06 | 0.00E-01 | 0.00E-01 | 1.48E 07 | 3.43E 05 |
| SR | 91 | 1.21E 02 | 0.00E-01 | 4.59E 00 | 0.00E-01 | 0.00E-01 | 5.33E 04 | 1.74E 05 |
| SR | 92 | 1.31E 01 | 0.00E-01 | 5.25E-01 | 0.00E-01 | 0.00E-01 | 2.40E 04 | 2.42E 05 |
| Y | 90 | 4.11E 03 | 0.00E-01 | 1.11E 02 | 0.00E-01 | 0.00E-01 | 2.62E 05 | 2.68E 05 |
| Y | 91M | 5.07E-01 | 0.00E-01 | 1.84E-02 | 0.00E-01 | 0.00E-01 | 2.81E 03 | 1.72E 03 |
| Y | 91 | 9.14E 05 | 0.00E-01 | 2.44E 04 | 0.00E-01 | 0.00E-01 | 2.63E 06 | 1.84E 05 |
| Y | 92 | 2.04E 01 | 0.00E-01 | 5.81E-01 | 0.00E-01 | 0.00E-01 | 2.39E 04 | 2.39E 05 |
| Y | 93 | 1.86E 02 | 0.00E-01 | 5.11E 00 | 0.00E-01 | 0.00E-01 | 7.44E 04 | 3.89E 05 |
| ZR | 95 | 1.90E 05 | 4.18E 04 | 3.70E 04 | 0.00E-01 | 5.96E 04 | 2.23E 06 | 6.11E 04 |
| ZR | 97 | 1.88E 02 | 2.72E 01 | 1.60E 01 | 0.00E-01 | 3.88E 01 | 1.13E 05 | 3.51E 05 |
| NB | 95 | 2.35E 04 | 9.18E 03 | 6.55E 03 | 0.00E-01 | 8.62E 03 | 6.14E 05 | 3.70E 04 |
| MO | 99 | 0.00E-01 | 1.72E 02 | 4.25E 01 | 0.00E-01 | 3.92E 02 | 1.35E 05 | 1.27E 05 |
| TC | 99M | 1.78E-03 | 3.48E-03 | 5.77E-02 | 0.00E-01 | 5.07E-02 | 9.51E 02 | 4.81E 03 |

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TABLE A.5-4 (cont'd)
INHALATION PATHWAY FACTOR
MREM/YR PER $\mu\text{Ci}/\text{M}^3$
CHILD (RI FACTORS)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|------|----------|----------|----------|----------|----------|----------|----------|
| TC | 101 | 8.10E-05 | 8.51E-05 | 1.08E-03 | 0.00E-01 | 1.45E-03 | 5.85E 02 | 1.63E 01 |
| RU | 103 | 2.79E 03 | 0.00E-01 | 1.07E 03 | 0.00E-01 | 7.03E 03 | 6.62E 05 | 4.48E 04 |
| RU | 105 | 1.53E 00 | 0.00E-01 | 5.55E-01 | 0.00E-01 | 1.34E 00 | 1.59E 04 | 9.95E 04 |
| RU | 106 | 1.36E 05 | 0.00E-01 | 1.69E 04 | 0.00E-01 | 1.84E 05 | 1.43E 07 | 4.29E 05 |
| AG | 110M | 1.69E 04 | 1.14E 04 | 9.14E 03 | 0.00E-01 | 2.12E 04 | 5.48E 06 | 1.00E 05 |
| TE | 125M | 6.73E 03 | 2.33E 03 | 9.14E 02 | 1.92E 03 | 0.00E-01 | 4.77E 05 | 3.38E 04 |
| TE | 127M | 2.49E 04 | 8.55E 03 | 3.02E 03 | 6.07E 03 | 6.36E 04 | 1.48E 06 | 7.14E 04 |
| TE | 127 | 2.77E 00 | 9.51E-01 | 6.10E-01 | 1.96E 00 | 7.07E 00 | 1.00E 04 | 5.62E 04 |
| TE | 129M | 1.92E 04 | 6.85E 03 | 3.04E 03 | 6.33E 03 | 5.03E 04 | 1.76E 06 | 1.82E 05 |
| TE | 129 | 9.77E-02 | 3.50E-02 | 2.38E-02 | 7.14E-02 | 2.57E-01 | 2.93E 03 | 2.55E 04 |
| TE | 131M | 1.34E 02 | 5.92E 01 | 5.07E 01 | 9.77E 01 | 4.00E 02 | 2.06E 05 | 3.08E 05 |
| TE | 131 | 2.17E-02 | 8.44E-03 | 6.59E-03 | 1.70E-02 | 5.88E-02 | 2.05E 03 | 1.33E 03 |
| TE | 132 | 4.81E 02 | 2.72E 02 | 2.63E 02 | 3.17E 02 | 1.77E 03 | 3.77E 05 | 1.38E 05 |
| I | 130 | 8.18E 03 | 1.64E 04 | 8.44E 03 | 1.85E 06 | 2.45E 04 | 0.00E-01 | 5.11E 03 |
| I | 131 | 4.81E 04 | 4.81E 04 | 2.73E 04 | 1.62E 07 | 7.88E 04 | 0.00E-01 | 2.84E 03 |
| I | 132 | 2.12E 03 | 4.07E 03 | 1.88E 03 | 1.94E 05 | 6.25E 03 | 0.00E-01 | 3.20E 03 |
| I | 133 | 1.66E 04 | 2.03E 04 | 7.70E 03 | 3.85E 06 | 3.38E 04 | 0.00E-01 | 5.48E 03 |
| I | 134 | 1.17E 03 | 2.16E 03 | 9.95E 02 | 5.07E 04 | 3.30E 03 | 0.00E-01 | 9.55E 02 |
| I | 135 | 4.92E 03 | 8.73E 03 | 4.14E 03 | 7.92E 05 | 1.34E 04 | 0.00E-01 | 4.44E 03 |
| CS | 134 | 6.51E 05 | 1.01E 06 | 2.25E 05 | 0.00E-01 | 3.30E 05 | 1.21E 05 | 3.85E 03 |
| CS | 136 | 6.51E 04 | 1.71E 05 | 1.16E 05 | 0.00E-01 | 9.55E 04 | 1.45E 04 | 4.18E 03 |
| CS | 137 | 9.07E 05 | 8.25E 05 | 1.28E 05 | 0.00E-01 | 2.82E 05 | 1.04E 05 | 3.62E 03 |
| CS | 138 | 6.33E 02 | 8.40E 02 | 5.55E 02 | 0.00E-01 | 6.22E 02 | 6.81E 01 | 2.70E 02 |
| BA | 139 | 1.84E 00 | 9.84E-04 | 5.36E-02 | 0.00E-01 | 8.62E-04 | 5.77E 03 | 5.77E 04 |
| BA | 140 | 7.40E 04 | 6.48E 01 | 4.33E 03 | 0.00E-01 | 2.11E 01 | 1.74E 06 | 1.02E 05 |
| BA | 141 | 1.96E-01 | 1.09E-04 | 6.36E-03 | 0.00E-01 | 9.47E-05 | 2.92E 03 | 2.75E 02 |
| BA | 142 | 4.99E-02 | 3.60E-05 | 2.79E-03 | 0.00E-01 | 2.91E-05 | 1.64E 03 | 2.74E 00 |
| LA | 140 | 6.44E 02 | 2.25E 02 | 7.55E 01 | 0.00E-01 | 0.00E-01 | 1.83E 05 | 2.26E 05 |
| LA | 142 | 1.29E 00 | 4.11E-01 | 1.29E-01 | 0.00E-01 | 0.00E-01 | 8.70E 03 | 7.59E 04 |
| CE | 141 | 3.92E 04 | 1.95E 04 | 2.90E 03 | 0.00E-01 | 8.55E 03 | 5.44E 05 | 5.66E 04 |
| CE | 143 | 3.66E 02 | 1.99E 02 | 2.87E 01 | 0.00E-01 | 8.36E 01 | 1.15E 05 | 1.27E 05 |
| CE | 144 | 6.77E 06 | 2.12E 06 | 3.61E 05 | 0.00E-01 | 1.17E 06 | 1.20E 07 | 3.89E 05 |
| PR | 143 | 1.85E 04 | 5.55E 03 | 9.14E 02 | 0.00E-01 | 3.00E 03 | 4.33E 05 | 9.73E 04 |
| PR | 144 | 5.96E-02 | 1.85E-02 | 3.00E-03 | 0.00E-01 | 9.77E-03 | 1.57E 03 | 1.97E 02 |
| ND | 147 | 1.08E 04 | 8.73E 03 | 6.81E 02 | 0.00E-01 | 4.81E 03 | 3.28E 05 | 8.21E 04 |
| W | 187 | 1.63E 01 | 9.66E 00 | 4.33E 00 | 0.00E-01 | 0.00E-01 | 4.11E 04 | 9.10E 04 |
| NP | 239 | 4.66E 02 | 3.34E 01 | 2.35E 01 | 0.00E-01 | 9.73E 01 | 5.81E 04 | 6.40E 04 |

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TABLE A.5-5
INHALATION PATHWAY FACTOR
MREM/YR PER $\mu\text{Ci}/\text{M}^3$
INFANT (RI FACTORS)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| H | 3 | 0.00E-01 | 6.47E 02 | 6.47E 02 | 6.47E 02 | 6.47E 02 | 6.47E 02 | 6.47E 02 |
| C | 14 | 2.65E 04 | 5.31E 03 | 5.31E 03 | 5.31E 03 | 5.31E 03 | 5.31E 03 | 5.31E 03 |
| NA | 24 | 1.06E 04 | 1.06E 04 | 1.06E 04 | 1.06E 04 | 1.06E 04 | 1.06E 04 | 1.06E 04 |
| P | 32 | 2.03E 06 | 1.12E 05 | 7.74E 04 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.61E 04 |
| CR | 51 | 0.00E-01 | 0.00E-01 | 8.95E 01 | 5.75E 01 | 1.32E 01 | 1.28E 04 | 3.57E 02 |
| MN | 54 | 0.00E-01 | 2.53E 04 | 4.98E 03 | 0.00E-01 | 4.98E 03 | 1.00E 06 | 7.06E 03 |
| MN | 56 | 0.00E-01 | 1.54E 00 | 2.21E-01 | 0.00E-01 | 1.10E 00 | 1.25E 04 | 7.17E 04 |
| FE | 55 | 1.97E 04 | 1.17E 04 | 3.33E 03 | 0.00E-01 | 0.00E-01 | 8.69E 04 | 1.09E 03 |
| FE | 59 | 1.36E 04 | 2.35E 04 | 9.48E 03 | 0.00E-01 | 0.00E-01 | 1.02E 06 | 2.48E 04 |
| CO | 58 | 0.00E-01 | 1.22E 03 | 1.82E 03 | 0.00E-01 | 0.00E-01 | 7.77E 05 | 1.11E 04 |
| CO | 60 | 0.00E-01 | 8.02E 03 | 1.18E 04 | 0.00E-01 | 0.00E-01 | 4.51E 06 | 3.19E 04 |
| NI | 63 | 3.39E 05 | 2.04E 04 | 1.16E 04 | 0.00E-01 | 0.00E-01 | 2.09E 05 | 2.42E 03 |
| NI | 65 | 2.39E 00 | 2.84E-01 | 1.23E-01 | 0.00E-01 | 0.00E-01 | 8.12E 03 | 5.01E 04 |
| CU | 64 | 0.00E-01 | 1.88E 00 | 7.74E-01 | 0.00E-01 | 3.98E 00 | 9.30E 03 | 1.50E 04 |
| ZN | 65 | 1.93E 04 | 6.26E 04 | 3.11E 04 | 0.00E-01 | 3.25E 04 | 6.47E 05 | 5.14E 04 |
| ZN | 69 | 5.39E-02 | 9.67E-02 | 7.18E-03 | 0.00E-01 | 4.02E-02 | 1.47E 03 | 1.32E 04 |
| BR | 83 | 0.00E-01 | 0.00E-01 | 3.81E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.40E-15 |
| BR | 84 | 0.00E-01 | 0.00E-01 | 4.00E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.40E-15 |
| BR | 85 | 0.00E-01 | 0.00E-01 | 2.04E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.40E-15 |
| RB | 86 | 0.00E-01 | 1.90E 05 | 8.82E 04 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.04E 03 |
| RB | 88 | 0.00E-01 | 5.57E 02 | 2.87E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.39E 02 |
| RB | 89 | 0.00E-01 | 3.21E 02 | 2.06E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 6.82E 01 |
| SR | 89 | 3.98E 05 | 0.00E-01 | 1.14E 04 | 0.00E-01 | 0.00E-01 | 2.03E 06 | 6.40E 04 |
| SR | 90 | 4.09E 07 | 0.00E-01 | 2.59E 06 | 0.00E-01 | 0.00E-01 | 1.12E 07 | 1.31E 05 |
| SR | 91 | 9.56E 01 | 0.00E-01 | 3.46E 00 | 0.00E-01 | 0.00E-01 | 5.26E 04 | 7.34E 04 |
| SR | 92 | 1.05E 01 | 0.00E-01 | 3.91E-01 | 0.00E-01 | 0.00E-01 | 2.38E 04 | 1.40E 05 |
| Y | 90 | 3.29E 03 | 0.00E-01 | 8.82E 01 | 0.00E-01 | 0.00E-01 | 2.69E 05 | 1.04E 05 |
| Y | 91M | 4.07E-01 | 0.00E-01 | 1.39E-02 | 0.00E-01 | 0.00E-01 | 2.79E 03 | 2.35E 03 |
| Y | 91 | 5.88E 05 | 0.00E-01 | 1.57E 04 | 0.00E-01 | 0.00E-01 | 2.45E 06 | 7.03E 04 |
| Y | 92 | 1.64E 01 | 0.00E-01 | 4.61E-01 | 0.00E-01 | 0.00E-01 | 2.45E 04 | 1.27E-05 |
| Y | 93 | 1.50E 02 | 0.00E-01 | 4.07E 00 | 0.00E-01 | 0.00E-01 | 7.64E 04 | 1.67E 05 |
| ZR | 95 | 1.15E 05 | 2.79E 04 | 2.03E 04 | 0.00E-01 | 3.11E 04 | 1.75E 06 | 2.17E 04 |
| ZR | 97 | 1.50E 02 | 2.56E 01 | 1.17E 01 | 0.00E-01 | 2.59E 01 | 1.10E 05 | 1.40E 05 |
| NB | 95 | 1.57E 04 | 6.43E 03 | 3.78E 03 | 0.00E-01 | 4.72E 03 | 4.79E 05 | 1.27E 04 |
| MO | 99 | 0.00E-01 | 1.65E 02 | 3.23E 01 | 0.00E-01 | 2.65E 02 | 1.35E 05 | 4.87E 04 |
| TC | 99M | 1.40E-04 | 2.88E-03 | 3.72E-02 | 0.00E-01 | 3.11E-02 | 8.11E 02 | 2.03E 03 |

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TABLE A.5-5 (cont'd)
INHALATION PATHWAY FACTOR
MREM/YR PER $\mu\text{Ci}/\text{M}^3$
INFANT (RI FACTORS)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|------|----------|----------|----------|----------|----------|----------|----------|
| TC | 101 | 6.51E-05 | 8.23E-05 | 8.12E-04 | 0.00E-01 | 9.79E-04 | 5.84E 02 | 8.44E 02 |
| RU | 103 | 2.02E 03 | 0.00E-01 | 6.79E 02 | 0.00E-01 | 4.24E 03 | 5.52E 05 | 1.61E 04 |
| RU | 105 | 1.22E 00 | 0.00E-01 | 4.10E-01 | 0.00E-01 | 8.99E-01 | 1.57E 04 | 4.84E 04 |
| RU | 106 | 8.68E 04 | 0.00E-01 | 1.09E 04 | 0.00E-01 | 1.07E 05 | 1.16E 07 | 1.64E 05 |
| AG | 110M | 9.98E 03 | 7.22E 03 | 5.00E 03 | 0.00E-01 | 1.09E 04 | 3.67E 06 | 3.30E 04 |
| TE | 125M | 4.76E 03 | 1.99E 03 | 6.58E 02 | 1.62E 03 | 0.00E-01 | 4.47E 05 | 1.29E 04 |
| TE | 127M | 1.67E 04 | 6.90E 03 | 2.07E 03 | 4.87E 03 | 3.75E 04 | 1.31E 06 | 2.73E 04 |
| TE | 127 | 2.23E 00 | 9.53E-01 | 4.89E-01 | 1.85E 00 | 4.86E 00 | 1.03E 04 | 2.44E 04 |
| TE | 129M | 1.41E 04 | 6.09E 03 | 2.23E 03 | 5.47E 03 | 3.18E 04 | 1.68E 06 | 6.90E 04 |
| TE | 129 | 7.88E-02 | 3.47E-02 | 1.88E-02 | 6.75E-02 | 1.75E-01 | 3.00E 03 | 2.63E 04 |
| TE | 131M | 1.07E 02 | 5.50E 01 | 3.63E 01 | 8.93E 01 | 2.65E 02 | 1.99E 05 | 1.19E 05 |
| TE | 131 | 1.74E-02 | 8.22E-03 | 5.00E-03 | 1.58E-02 | 3.99E-02 | 2.06E 03 | 8.22E 03 |
| TE | 132 | 3.72E 02 | 2.37E 02 | 1.76E 02 | 2.79E 02 | 1.03E 03 | 3.40E 05 | 4.41E 04 |
| I | 130 | 6.36E 03 | 1.39E 04 | 5.57E 03 | 1.60E 06 | 1.53E 04 | 0.00E-01 | 1.99E 03 |
| I | 131 | 3.79E 04 | 4.44E 04 | 1.96E 04 | 1.48E 07 | 5.18E 04 | 0.00E-01 | 1.06E 03 |
| I | 132 | 1.69E 03 | 3.54E 03 | 1.26E 03 | 1.69E 05 | 3.95E 03 | 0.00E-01 | 1.90E 03 |
| I | 133 | 1.32E 04 | 1.92E 04 | 5.60E 03 | 3.56E 06 | 2.24E 04 | 0.00E-01 | 2.16E 03 |
| I | 134 | 9.21E 02 | 1.88E 03 | 6.65E 02 | 4.45E 04 | 2.09E 03 | 0.00E-01 | 1.29E 03 |
| I | 135 | 3.86E 03 | 7.60E 03 | 2.77E 03 | 6.96E 05 | 8.47E 03 | 0.00E-01 | 1.83E 03 |
| CS | 134 | 3.96E 05 | 7.03E 05 | 7.45E 04 | 0.00E-01 | 1.90E 05 | 7.97E 04 | 1.33E 03 |
| CS | 136 | 4.83E 04 | 1.35E 05 | 5.29E 04 | 0.00E-01 | 5.64E 04 | 1.18E 04 | 1.43E 03 |
| CS | 137 | 5.49E 05 | 6.12E 05 | 4.55E 04 | 0.00E-01 | 1.72E 05 | 7.13E 04 | 1.33E 03 |
| CS | 138 | 5.05E 02 | 7.81E 02 | 3.98E 02 | 0.00E-01 | 4.10E 02 | 6.54E 01 | 8.76E 02 |
| BA | 139 | 1.48E 00 | 9.84E-04 | 4.30E-02 | 0.00E-01 | 5.92E-04 | 5.95E 03 | 5.10E 04 |
| BA | 140 | 5.60E 04 | 5.60E 01 | 2.90E 03 | 0.00E-01 | 1.34E 01 | 1.60E 06 | 3.84E 04 |
| BA | 141 | 1.57E-01 | 1.08E-04 | 4.97E-03 | 0.00E-01 | 6.50E-05 | 2.97E 03 | 4.75E 03 |
| BA | 142 | 3.98E-02 | 3.30E-05 | 1.96E-03 | 0.00E-01 | 1.90E-05 | 1.55E 03 | 6.93E 02 |
| LA | 140 | 5.05E 02 | 2.00E 02 | 5.15E 01 | 0.00E-01 | 0.00E-01 | 1.68E 05 | 8.48E 04 |
| LA | 142 | 1.03E 00 | 3.77E-01 | 9.04E-02 | 0.00E-01 | 0.00E-01 | 8.22E 03 | 5.95E 04 |
| CE | 141 | 2.77E 04 | 1.67E 04 | 1.99E 03 | 0.00E-01 | 5.25E 03 | 5.17E 05 | 2.16E 04 |
| CE | 143 | 2.93E 02 | 1.93E 02 | 2.21E 01 | 0.00E-01 | 5.64E 01 | 1.16E 05 | 4.97E 04 |
| CE | 144 | 3.19E 06 | 1.21E 06 | 1.76E 05 | 0.00E-01 | 5.38E 05 | 9.84E 06 | 1.48E 05 |
| PR | 143 | 1.40E 04 | 5.24E 03 | 6.99E 02 | 0.00E-01 | 1.97E 03 | 4.33E 05 | 3.72E 04 |
| PR | 144 | 4.79E-02 | 1.85E-02 | 2.41E-03 | 0.00E-01 | 6.72E-03 | 1.61E 03 | 4.28E 03 |
| ND | 147 | 7.94E 03 | 8.13E 03 | 5.00E 02 | 0.00E-01 | 3.15E 03 | 3.22E 05 | 3.12E 04 |
| W | 187 | 1.30E 01 | 9.02E 00 | 3.12E 00 | 0.00E-01 | 0.00E-01 | 3.96E 05 | 3.56E 04 |
| NP | 239 | 3.71E 02 | 3.32E 01 | 1.88E 01 | 0.00E-01 | 6.62E 01 | 5.95E 04 | 2.49E 04 |

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TABLE A.5-6
GRASS-COW-MILK PATHWAY FACTOR
M² MREM/YR PER μ CI/SEC
ADULT (RI FACTORS)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| H | 3 | 0.00E-01 | 7.63E 02 | 7.63E 02 | 7.63E 02 | 7.63E 02 | 7.63E 02 | 7.63E 02 |
| C | 14 | 2.63E 08 | 5.27E 07 | 5.27E 07 | 5.27E 07 | 5.27E 07 | 5.27E 07 | 5.27E 07 |
| NA | 24 | 2.44E 06 | 2.44E 06 | 2.44E 06 | 2.44E 06 | 2.44E 06 | 2.44E 06 | 2.44E 06 |
| P | 32 | 1.71E 10 | 1.06E 09 | 6.60E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.92E 09 |
| CR | 51 | 0.00E-01 | 0.00E-01 | 2.86E 04 | 0.00E-01 | 6.30E 03 | 3.79E 04 | 7.19E 06 |
| MN | 54 | 0.00E-01 | 8.41E 06 | 1.61E 06 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.58E 07 |
| MN | 56 | 0.00E-01 | 4.16E-03 | 7.38E-04 | 0.00E-01 | 5.28E-03 | 0.00E-01 | 1.33E-01 |
| FE | 55 | 2.51E 07 | 1.73E 07 | 4.04E 06 | 0.00E-01 | 0.00E-01 | 9.67E 06 | 9.95E 06 |
| FE | 59 | 2.97E 07 | 6.98E 07 | 2.68E 07 | 0.00E-01 | 0.00E-01 | 1.95E 07 | 2.33E 08 |
| CO | 58 | 0.00E-01 | 4.71E 06 | 1.06E 07 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 9.56E 07 |
| CO | 60 | 0.00E-01 | 1.64E 07 | 3.62E 07 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.08E 08 |
| NI | 63 | 6.73E 09 | 4.71E 08 | 2.26E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 9.73E 07 |
| NI | 65 | 4.63E-01 | 6.02E-02 | 2.75E-02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.53E 00 |
| CU | 64 | 0.00E-01 | 2.39E 04 | 1.12E 04 | 0.00E-01 | 6.02E 04 | 0.00E-01 | 2.03E 06 |
| ZN | 65 | 1.37E 09 | 4.37E 09 | 1.97E 09 | 0.00E-01 | 2.92E 09 | 0.00E-01 | 2.75E 09 |
| ZN | 69 | 5.22E-12 | 9.99E-12 | 6.95E-13 | 0.00E-01 | 6.49E-12 | 0.00E-01 | 1.50E-12 |
| BR | 83 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BR | 84 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BR | 85 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RB | 86 | 0.00E-01 | 2.59E 09 | 1.21E 09 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 5.12E 08 |
| RB | 88 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RB | 89 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| SR | 89 | 1.45E 09 | 0.00E-01 | 4.16E 07 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.33E 08 |
| SR | 90 | 4.68E 10 | 0.00E-01 | 1.15E 10 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.35E 09 |
| SR | 91 | 2.87E 04 | 0.00E-01 | 1.16E 03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.37E 05 |
| SR | 92 | 4.90E-01 | 0.00E-01 | 2.12E-02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 9.70E 00 |
| Y | 90 | 7.07E 01 | 0.00E-01 | 1.90E 00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 7.50E 05 |
| Y | 91M | 6.03E-20 | 0.00E-01 | 2.34E-21 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.77E-19 |
| Y | 91 | 8.59E 03 | 0.00E-01 | 2.30E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 4.73E 06 |
| Y | 92 | 5.59E-05 | 0.00E-01 | 1.63E-06 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 9.79E-01 |
| Y | 93 | 2.33E-01 | 0.00E-01 | 6.44E-03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 7.39E 03 |
| ZR | 95 | 9.44E 02 | 3.03E 02 | 2.05E 02 | 0.00E-01 | 4.75E 02 | 0.00E-01 | 9.59E 05 |
| ZR | 97 | 4.33E-01 | 8.75E-05 | 4.00E-02 | 0.00E-01 | 1.32E-00 | 0.00E-01 | 2.71E 04 |
| NB | 95 | 8.26E 04 | 4.59E 04 | 2.47E 04 | 0.00E-01 | 4.54E 04 | 0.00E-01 | 2.79E 08 |
| MO | 99 | 0.00E-01 | 2.48E 07 | 4.71E 06 | 0.00E-01 | 5.61E 07 | 0.00E-01 | 5.74E 07 |
| TC | 99M | 3.33E 00 | 9.40E 00 | 1.20E 02 | 0.00E-01 | 1.43E 02 | 4.60E 00 | 5.56E 03 |

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TABLE A.5-6 (cont'd)
GRASS-COW-MILK PATHWAY FACTOR
M² MREM/YR PER μ CI/SEC
ADULT (RI FACTORS)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|------|----------|----------|----------|----------|----------|----------|----------|
| TC | 101 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RU | 103 | 1.02E 03 | 0.00E-01 | 4.38E 02 | 0.00E-01 | 3.88E 03 | 0.00E-01 | 1.19E 05 |
| RU | 105 | 8.58E-04 | 0.00E-01 | 3.39E-04 | 0.00E-01 | 1.11E-02 | 0.00E-01 | 5.25E-01 |
| RU | 106 | 2.04E 04 | 0.00E-01 | 2.58E 03 | 0.00E-01 | 3.94E 04 | 0.00E-01 | 1.32E 06 |
| AG | 110M | 5.82E 07 | 5.39E 07 | 3.20E 07 | 0.00E-01 | 1.06E 08 | 0.00E-01 | 2.20E 10 |
| TE | 125M | 1.63E 07 | 5.90E 06 | 2.18E 06 | 4.90E 06 | 6.63E 07 | 0.00E-01 | 6.50E 07 |
| TE | 127M | 4.58E 07 | 1.64E 07 | 5.58E 06 | 1.17E 07 | 1.86E 08 | 0.00E-01 | 1.54E 08 |
| TE | 127 | 6.54E 02 | 2.35E 02 | 1.41E 02 | 4.84E 02 | 2.66E 03 | 0.00E-01 | 5.16E 04 |
| TE | 129M | 6.02E 07 | 2.25E 07 | 9.53E 06 | 2.07E 07 | 2.51E 08 | 0.00E-01 | 3.03E 08 |
| TE | 129 | 2.84E-10 | 1.07E-10 | 6.29E-11 | 2.18E-10 | 1.19E-09 | 0.00E-01 | 2.14E-10 |
| TE | 131M | 3.61E 05 | 1.77E 05 | 1.47E 05 | 2.80E 05 | 1.79E 06 | 0.00E-01 | 1.73E 07 |
| TE | 131 | 3.67E-33 | 1.53E-33 | 1.16E-33 | 3.01E-33 | 1.61E-32 | 0.00E-01 | 0.00E-01 |
| TE | 132 | 2.40E 06 | 1.55E 06 | 1.46E 06 | 1.72E 06 | 1.50E 07 | 0.00E-01 | 7.35E 07 |
| I | 130 | 4.20E 05 | 1.24E 06 | 4.89E 05 | 1.05E 08 | 1.94E 06 | 0.00E-01 | 1.07E 06 |
| I | 131 | 2.96E 08 | 4.24E 08 | 2.43E 08 | 1.39E 11 | 7.26E 08 | 0.00E-01 | 1.12E 08 |
| I | 132 | 1.65E-01 | 4.41E-01 | 1.54E-01 | 1.54E 01 | 7.02E-01 | 0.00E-01 | 8.28E-02 |
| I | 133 | 3.87E 06 | 6.73E 06 | 2.05E 06 | 9.90E 08 | 1.18E 07 | 0.00E-01 | 6.05E 06 |
| I | 134 | 2.03E-12 | 5.52E-12 | 1.98E-12 | 9.57E-11 | 8.78E-12 | 0.00E-01 | 4.81E-15 |
| I | 135 | 1.29E 04 | 3.37E 04 | 1.24E 04 | 2.22E 06 | 5.40E 04 | 0.00E-01 | 3.80E 04 |
| CS | 134 | 5.65E 09 | 1.35E 10 | 1.10E 10 | 0.00E-01 | 4.35E 09 | 1.45E 09 | 2.35E 08 |
| CS | 136 | 2.61E 08 | 1.03E 09 | 7.42E 08 | 0.00E-01 | 5.73E 08 | 7.86E 07 | 1.17E 08 |
| CS | 137 | 7.38E 09 | 1.01E 10 | 6.61E 09 | 0.00E-01 | 3.43E 09 | 1.14E 09 | 1.95E 08 |
| CS | 138 | 9.16E-24 | 1.81E-23 | 8.97E-24 | 0.00E-01 | 1.33E-23 | 1.31E-24 | 7.72E-29 |
| BA | 139 | 4.56E-08 | 3.25E-11 | 1.34E-09 | 0.00E-01 | 3.04E-11 | 1.84E-11 | 8.09E-08 |
| BA | 140 | 2.69E 07 | 3.38E 04 | 1.76E 06 | 0.00E-01 | 1.15E 04 | 1.93E 04 | 5.54E 07 |
| BA | 141 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BA | 142 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| LA | 140 | 4.52E 00 | 2.28E 00 | 6.02E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.67E 05 |
| LA | 142 | 9.39E-12 | 4.27E-12 | 1.06E-12 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.12E-08 |
| CE | 141 | 4.84E 03 | 3.28E 03 | 3.72E 02 | 0.00E-01 | 1.52E 03 | 0.00E-01 | 1.25E 07 |
| CE | 143 | 4.16E 01 | 3.07E 04 | 3.40E 00 | 0.00E-01 | 1.35E 01 | 0.00E-01 | 1.15E 06 |
| CE | 144 | 3.58E 05 | 1.50E 05 | 1.92E 04 | 0.00E-01 | 8.87E 04 | 0.00E-01 | 1.21E 08 |
| PR | 143 | 1.58E 02 | 6.33E 01 | 7.83E 00 | 0.00E-01 | 3.66E 01 | 0.00E-01 | 6.92E 05 |
| PR | 144 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| ND | 147 | 9.46E 01 | 1.09E 02 | 6.55E 00 | 0.00E-01 | 6.40E 01 | 0.00E-01 | 5.25E 05 |
| W | 187 | 6.56E 03 | 5.49E 03 | 1.92E 03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.80E 06 |
| NP | 239 | 3.67E 00 | 3.61E-01 | 1.99E-01 | 0.00E-01 | 1.13E 00 | 0.00E-01 | 7.41E 04 |

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TABLE A.5-7
GRASS-COW-MILK PATHWAY FACTOR
M² MREM/YR PER μ CI/SEC
TEEN (RI FACTORS)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| H | 3 | 0.00E-01 | 9.94E 02 | 9.94E 02 | 9.94E 02 | 9.94E 02 | 9.94E 02 | 9.94E 02 |
| C | 14 | 4.86E 08 | 9.72E 07 | 9.72E 07 | 9.72E 07 | 9.72E 07 | 9.72E 07 | 9.72E 07 |
| NA | 24 | 4.26E 06 | 4.26E 06 | 4.26E 06 | 4.26E 06 | 4.26E 06 | 4.26E 06 | 4.26E 06 |
| P | 32 | 3.15E 10 | 1.95E 09 | 1.22E 09 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.65E 09 |
| CR | 51 | 0.00E-01 | 0.00E-01 | 4.99E 04 | 2.77E 04 | 1.09E 04 | 7.13E 04 | 8.39E 06 |
| MN | 54 | 0.00E-01 | 1.40E 07 | 2.78E 06 | 0.00E-01 | 4.18E 06 | 0.00E-01 | 2.87E 07 |
| MN | 56 | 0.00E-01 | 7.37E-03 | 1.31E-03 | 0.00E-01 | 9.33E-03 | 0.00E-01 | 4.85E-01 |
| FE | 55 | 4.45E 07 | 3.16E 07 | 7.36E 06 | 0.00E-01 | 0.00E-01 | 2.00E 07 | 1.37E 07 |
| FE | 59 | 5.18E 07 | 1.21E 08 | 4.67E 07 | 0.00E-01 | 0.00E-01 | 3.81E 07 | 2.86E 08 |
| CO | 58 | 0.00E-01 | 7.94E 06 | 1.83E 07 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.09E 08 |
| CO | 60 | 0.00E-01 | 2.78E 07 | 6.26E 07 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.62E 08 |
| NI | 63 | 1.18E 10 | 8.35E 08 | 4.01E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.33E 08 |
| NI | 65 | 8.48E-01 | 1.08E-01 | 4.94E-02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 5.88E 00 |
| CU | 64 | 0.00E-01 | 4.25E 04 | 2.00E 04 | 0.00E-01 | 1.08E 05 | 0.00E-01 | 3.30E 06 |
| ZN | 65 | 2.11E 09 | 7.31E 09 | 3.41E 09 | 0.00E-01 | 4.68E 09 | 0.00E-01 | 3.10E 09 |
| ZN | 69 | 9.62E-12 | 1.83E-11 | 1.28E-12 | 0.00E-01 | 1.20E-11 | 0.00E-01 | 3.38E-11 |
| BR | 83 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BR | 84 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BR | 85 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RB | 86 | 0.00E-01 | 4.73E 09 | 2.22E 09 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 7.00E 08 |
| RB | 88 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RB | 89 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| SR | 89 | 2.67E 09 | 0.00E-01 | 7.66E 07 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.19E 08 |
| SR | 90 | 6.61E 10 | 0.00E-01 | 1.63E 10 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.86E 09 |
| SR | 91 | 5.27E 04 | 0.00E-01 | 2.10E 03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.39E 05 |
| SR | 92 | 8.96E-01 | 0.00E-01 | 3.82E-02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.28E 01 |
| Y | 90 | 1.30E 02 | 0.00E-01 | 3.50E 00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.07E 06 |
| Y | 91M | 1.11E-19 | 0.00E-01 | 4.22E-21 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 5.22E-18 |
| Y | 91 | 1.58E 04 | 0.00E-01 | 4.24E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 6.48E 06 |
| Y | 92 | 1.03E-04 | 0.00E-01 | 2.99E-06 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.83E 00 |
| Y | 93 | 4.30E-01 | 0.00E-01 | 1.18E-02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.31E 04 |
| ZR | 95 | 1.65E 03 | 5.21E 02 | 3.58E 02 | 0.00E-01 | 7.65E 02 | 0.00E-01 | 1.20E 06 |
| ZR | 97 | 7.89E-01 | 1.56E-01 | 7.19E-02 | 0.00E-01 | 2.37E-01 | 0.00E-01 | 4.23E 04 |
| NB | 95 | 1.41E 05 | 7.81E 04 | 4.30E 04 | 0.00E-01 | 7.57E 04 | 0.00E-01 | 3.34E 08 |
| MO | 99 | 0.00E-01 | 4.47E 07 | 8.53E 06 | 0.00E-01 | 1.02E 08 | 0.00E-01 | 8.01E 07 |
| TC | 99M | 5.77E 00 | 1.61E 01 | 2.08E 02 | 0.00E-01 | 2.40E 02 | 8.93E 00 | 1.06E 04 |

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TABLE A.5-7 (cont'd)
GRASS-COW-MILK PATHWAY FACTOR
M² MREM/YR PER μ CI/SEC
TEEN (RI FACTORS)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|------|----------|----------|----------|----------|----------|----------|----------|
| TC | 101 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RU | 103 | 1.81E 03 | 0.00E-01 | 7.74E 02 | 0.00E-01 | 6.38E 03 | 0.00E-01 | 1.51E 05 |
| RU | 105 | 1.57E-03 | 0.00E-01 | 6.08E-04 | 0.00E-01 | 1.98E-02 | 0.00E-01 | 1.27E 00 |
| RU | 106 | 3.75E 04 | 0.00E-01 | 4.73E 03 | 0.00E-01 | 7.23E 04 | 0.00E-01 | 1.80E 06 |
| AG | 110M | 9.63E 07 | 9.11E 07 | 5.54E 07 | 0.00E-01 | 1.74E 08 | 0.00E-01 | 2.56E 10 |
| TE | 125M | 3.00E 07 | 1.08E 07 | 4.02E 06 | 8.39E 06 | 0.00E-01 | 0.00E-01 | 8.86E 07 |
| TE | 127M | 8.44E 07 | 2.99E 07 | 1.00E 07 | 2.01E 07 | 3.42E 08 | 0.00E-01 | 2.10E 08 |
| TE | 127 | 1.21E 03 | 4.29E 02 | 2.61E 02 | 8.36E 02 | 4.91E 03 | 0.00E-01 | 9.35E 04 |
| TE | 129M | 1.10E 08 | 4.09E 07 | 1.74E 07 | 3.55E 07 | 4.61E 08 | 0.00E-01 | 4.13E 08 |
| TE | 129 | 5.23E-10 | 1.95E-10 | 1.27E-10 | 3.74E-10 | 2.20E-09 | 0.00E-01 | 2.86E-09 |
| TE | 131M | 6.57E 05 | 3.15E 05 | 2.63E 05 | 4.74E 05 | 3.29E 06 | 0.00E-01 | 2.53E 07 |
| TE | 131 | 6.70E-33 | 2.76E-33 | 2.09E-33 | 5.16E-33 | 2.93E-32 | 0.00E-01 | 5.50E-34 |
| TE | 132 | 4.29E 06 | 2.72E 06 | 2.56E 06 | 2.87E 06 | 2.61E 07 | 0.00E-01 | 8.61E 07 |
| I | 130 | 7.39E 05 | 2.14E 06 | 8.54E 05 | 1.74E 08 | 3.26E 06 | 0.00E-01 | 1.64E 06 |
| I | 131 | 5.37E 08 | 7.52E 08 | 4.04E 08 | 2.20E 11 | 1.30E 09 | 0.00E-01 | 1.49E 08 |
| I | 132 | 2.92E-01 | 7.65E-01 | 2.74E-01 | 2.58E 01 | 1.20E 00 | 0.00E-01 | 3.33E-01 |
| I | 133 | 7.07E 06 | 1.20E 07 | 3.66E 06 | 1.67E 09 | 2.10E 07 | 0.00E-01 | 9.08E 06 |
| I | 134 | 3.61E-12 | 9.58E-12 | 3.44E-12 | 1.60E-10 | 1.51E-11 | 0.00E-01 | 1.26E-13 |
| I | 135 | 2.28E 04 | 5.88E 04 | 2.18E 04 | 3.78E 06 | 9.28E 04 | 0.00E-01 | 6.51E 04 |
| CS | 134 | 9.82E 09 | 2.31E 10 | 1.07E 10 | 0.00E-01 | 7.34E 09 | 2.80E 09 | 2.87E 08 |
| CS | 136 | 4.44E 08 | 1.75E 09 | 1.17E 09 | 0.00E-01 | 9.52E 08 | 1.50E 08 | 1.41E 08 |
| CS | 137 | 1.34E 10 | 1.78E 10 | 6.20E 09 | 0.00E-01 | 6.06E 09 | 2.35E 09 | 2.53E 08 |
| CS | 138 | 1.66E-23 | 3.19E-23 | 1.60E-23 | 0.00E-01 | 2.36E-23 | 2.74E-24 | 1.45E-26 |
| BA | 139 | 8.44E-08 | 5.94E-11 | 2.46E-09 | 0.00E-01 | 5.60E-11 | 4.09E-11 | 7.53E-07 |
| BA | 140 | 4.85E 07 | 5.95E 04 | 3.13E 06 | 0.00E-01 | 2.02E 04 | 4.00E 04 | 7.48E 07 |
| BA | 141 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BA | 142 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| LA | 140 | 8.12E 00 | 3.99E 00 | 1.06E 00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.29E 05 |
| LA | 142 | 1.69E-11 | 7.52E-12 | 1.87E-12 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.29E-07 |
| CE | 141 | 8.88E 03 | 5.93E 03 | 6.81E 02 | 0.00E-01 | 2.79E 03 | 0.00E-01 | 1.70E 07 |
| CE | 143 | 7.64E 01 | 5.56E 04 | 6.21E 00 | 0.00E-01 | 2.49E 01 | 0.00E-01 | 1.67E 06 |
| CE | 144 | 6.58E 05 | 2.72E 05 | 3.54E 04 | 0.00E-01 | 1.63E 05 | 0.00E-01 | 1.66E 08 |
| PR | 143 | 2.90E 02 | 1.16E 02 | 1.44E 01 | 0.00E-01 | 6.73E 01 | 0.00E-01 | 9.55E 05 |
| PR | 144 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| ND | 147 | 1.82E 02 | 1.98E 02 | 1.19E 01 | 0.00E-01 | 1.16E 02 | 0.00E-01 | 7.15E 05 |
| W | 187 | 1.20E 04 | 9.78E 03 | 3.43E 03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.65E 06 |
| NP | 239 | 7.01E 00 | 6.61E-01 | 3.67E-01 | 0.00E-01 | 2.07E 00 | 0.00E-01 | 1.06E 05 |

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TABLE A.5-8
GRASS-COW-MILK PATHWAY FACTOR
M² MREM/YR PER μ CI/SEC
CHILD (RI FACTORS)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| H | 3 | 0.00E-01 | 1.57E 03 | 1.57E 03 | 1.57E 03 | 1.57E 03 | 1.57E 03 | 1.57E 03 |
| C | 14 | 1.19E 09 | 2.39E 08 | 2.39E 08 | 2.39E 08 | 2.39E 08 | 2.39E 08 | 2.39E 08 |
| NA | 24 | 8.86E 06 | 8.86E 06 | 8.86E 06 | 8.86E 06 | 8.86E 06 | 8.86E 06 | 8.86E 06 |
| P | 32 | 7.77E 10 | 3.64E 09 | 3.00E 09 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.15E 09 |
| CR | 51 | 0.00E-01 | 0.00E-01 | 1.02E 05 | 5.65E 04 | 1.54E 04 | 1.03E 05 | 5.40E 06 |
| MN | 54 | 0.00E-01 | 2.10E 07 | 5.59E 06 | 0.00E-01 | 5.88E 06 | 0.00E-01 | 1.76E 07 |
| MN | 56 | 0.00E-01 | 1.29E-02 | 2.90E-03 | 0.00E-01 | 1.56E-02 | 0.00E-01 | 1.86E 00 |
| FE | 55 | 1.12E 08 | 5.93E 07 | 1.84E 07 | 0.00E-01 | 0.00E-01 | 3.35E 07 | 1.10E 07 |
| FE | 59 | 1.20E 08 | 1.94E 08 | 9.69E 07 | 0.00E-01 | 0.00E-01 | 5.64E 07 | 2.02E 08 |
| CO | 58 | 0.00E-01 | 1.21E 07 | 3.71E 07 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 7.07E 07 |
| CO | 60 | 0.00E-01 | 4.32E 07 | 1.27E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.39E 08 |
| NI | 63 | 2.96E 10 | 1.59E 09 | 1.01E 09 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.07E 08 |
| NI | 65 | 2.07E 00 | 1.95E-01 | 1.14E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.39E 01 |
| CU | 64 | 0.00E-01 | 7.47E 04 | 4.51E 04 | 0.00E-01 | 1.81E 05 | 0.00E-01 | 3.51E 06 |
| ZN | 65 | 4.13E 09 | 1.10E 10 | 6.85E 09 | 0.00E-01 | 6.94E 09 | 0.00E-01 | 1.93E 09 |
| ZN | 69 | 2.36E-11 | 3.42E-11 | 3.16E-12 | 0.00E-01 | 2.07E-10 | 0.00E-01 | 2.15E-09 |
| BR | 83 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BR | 84 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BR | 85 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RB | 86 | 0.00E-01 | 8.77E 09 | 5.39E 09 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 5.64E 08 |
| RB | 88 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RB | 89 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| SR | 89 | 6.62E 09 | 0.00E-01 | 1.89E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.56E 08 |
| SR | 90 | 1.12E 11 | 0.00E-01 | 2.83E 10 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.50E 09 |
| SR | 91 | 1.29E 05 | 0.00E-01 | 4.88E 03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.85E 05 |
| SR | 92 | 2.19E 00 | 0.00E-01 | 8.78E-02 | 0.00E-01 | 0.00E-01 | 0.00E-02 | 4.15E 01 |
| Y | 90 | 3.22E 02 | 0.00E-01 | 8.61E 00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 9.15E 05 |
| Y | 91M | 2.70E-19 | 0.00E-01 | 9.82E-21 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 5.29E-16 |
| Y | 91 | 3.90E 04 | 0.00E-01 | 1.04E 03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 5.20E 06 |
| Y | 92 | 2.54E-04 | 0.00E-01 | 7.26E-06 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 7.33E 00 |
| Y | 93 | 1.06E 00 | 0.00E-01 | 2.90E-02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.57E 04 |
| ZR | 95 | 3.83E 03 | 8.43E 02 | 7.50E 02 | 0.00E-01 | 1.21E 03 | 0.00E-01 | 8.79E 05 |
| ZR | 97 | 1.92E 00 | 2.77E-01 | 1.64E-01 | 0.00E-01 | 3.98E-01 | 0.00E-01 | 4.20E 04 |
| NB | 95 | 3.18E 05 | 1.24E 05 | 8.85E 04 | 0.00E-01 | 1.16E 05 | 0.00E-01 | 2.29E 08 |
| MO | 99 | 0.00E-01 | 8.14E 07 | 2.01E 07 | 0.00E-01 | 1.74E 08 | 0.00E-01 | 6.73E 07 |
| TC | 99M | 1.32E 01 | 2.59E 01 | 4.30E 02 | 0.00E-01 | 3.77E 02 | 1.32E 01 | 1.48E 04 |

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TABLE A.5-8 (cont'd)
GRASS-COW-MILK PATHWAY FACTOR
M² MREM/YR PER μ CI/SEC
CHILD (RI FACTORS)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|------|----------|----------|----------|----------|----------|----------|----------|
| TC | 101 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RU | 103 | 4.28E 03 | 0.00E-01 | 1.65E 03 | 0.00E-01 | 1.08E 04 | 0.00E-01 | 1.11E 05 |
| RU | 105 | 3.83E-03 | 0.00E-01 | 1.39E-03 | 0.00E-01 | 3.36E-02 | 0.00E-01 | 2.50E 00 |
| RU | 106 | 9.24E 04 | 0.00E-01 | 1.15E 04 | 0.00E-01 | 1.25E 05 | 0.00E-01 | 1.44E 06 |
| AG | 110M | 2.09E 08 | 1.41E 08 | 1.13E 08 | 0.00E-01 | 2.63E 08 | 0.00E-01 | 1.68E 10 |
| TE | 125M | 7.38E 07 | 2.00E 07 | 9.84E 06 | 2.07E 07 | 0.00E-01 | 0.00E-01 | 7.12E 07 |
| TE | 127M | 2.08E 08 | 5.60E 07 | 2.47E 07 | 4.97E 07 | 5.93E 08 | 0.00E-01 | 1.68E 08 |
| TE | 127 | 2.98E 03 | 8.03E 02 | 6.39E 02 | 2.06E 03 | 8.47E 03 | 0.00E-01 | 1.16E 05 |
| TE | 129M | 2.71E 08 | 7.58E 07 | 4.21E 07 | 8.75E 07 | 7.97E 08 | 0.00E-01 | 3.31E 08 |
| TE | 129 | 1.29E-09 | 3.60E-10 | 3.06E-10 | 9.21E-10 | 3.78E-09 | 0.00E-01 | 8.03E-08 |
| TE | 131M | 1.60E 06 | 5.53E 05 | 5.89E 05 | 1.14E 06 | 5.36E 06 | 0.00E-01 | 2.24E 07 |
| TE | 131 | 1.64E-32 | 5.01E-33 | 4.89E-33 | 1.26E-32 | 4.97E-32 | 0.00E-01 | 8.64E-32 |
| TE | 132 | 1.02E 07 | 4.54E 06 | 5.48E 06 | 6.61E 06 | 4.21E 07 | 0.00E-01 | 4.57E 07 |
| I | 130 | 1.73E 06 | 3.49E 06 | 1.80E 06 | 3.85E 08 | 5.22E 06 | 0.00E-01 | 1.63E 06 |
| I | 131 | 1.30E 09 | 1.31E 09 | 7.45E 08 | 4.33E 11 | 2.15E 09 | 0.00E-01 | 1.17E 08 |
| I | 132 | 6.91E-01 | 1.27E 00 | 5.84E-01 | 5.89E 01 | 1.94E 00 | 0.00E-01 | 1.49E 00 |
| I | 133 | 1.72E 07 | 2.12E 07 | 8.04E 06 | 3.95E 09 | 3.54E 07 | 0.00E-01 | 8.56E 06 |
| I | 134 | 8.55E-12 | 1.59E-11 | 7.31E-12 | 3.65E-10 | 2.43E-11 | 0.00E-01 | 1.05E-11 |
| I | 135 | 5.41E 04 | 9.73E 04 | 4.60E 04 | 8.62E 06 | 1.49E 05 | 0.00E-01 | 7.41E 04 |
| CS | 134 | 2.27E 10 | 3.72E 10 | 7.84E 09 | 0.00E-01 | 1.15E 10 | 4.13E 09 | 2.00E 08 |
| CS | 136 | 1.00E 09 | 2.76E 09 | 1.78E 09 | 0.00E-01 | 1.47E 09 | 2.19E 08 | 9.69E 07 |
| CS | 137 | 3.22E 10 | 3.09E 10 | 4.55E 09 | 0.00E-01 | 1.01E 10 | 3.62E 09 | 1.93E 08 |
| CS | 138 | 4.03E-23 | 5.60E-23 | 3.55E-23 | 0.00E-01 | 3.94E-23 | 4.24E-24 | 2.58E-23 |
| BA | 139 | 2.07E-07 | 1.11E-10 | 6.01E-09 | 0.00E-01 | 9.67E-11 | 6.51E-11 | 1.20E-05 |
| BA | 140 | 1.17E 08 | 1.03E 05 | 6.84E 06 | 0.00E-01 | 3.34E 04 | 6.12E 04 | 5.94E 07 |
| BA | 141 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BA | 142 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| LA | 140 | 1.94E 01 | 6.80E 00 | 2.29E 00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.89E 05 |
| LA | 142 | 4.09E-11 | 1.30E-11 | 4.08E-12 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.58E-06 |
| CE | 141 | 2.19E 04 | 1.09E 04 | 1.62E 03 | 0.00E-01 | 4.78E 03 | 0.00E-01 | 1.36E 07 |
| CE | 143 | 1.88E 02 | 1.02E 05 | 1.47E 01 | 0.00E-01 | 4.27E 01 | 0.00E-01 | 1.49E 06 |
| CE | 144 | 1.62E 06 | 5.09E 05 | 8.66E 04 | 0.00E-01 | 2.82E 05 | 0.00E-01 | 1.33E 08 |
| PR | 143 | 7.18E 02 | 2.16E 02 | 3.56E 01 | 0.00E-01 | 1.17E 02 | 0.00E-01 | 7.75E 05 |
| PR | 144 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| ND | 147 | 4.47E 02 | 3.62E 02 | 2.80E 01 | 0.00E-01 | 1.99E 02 | 0.00E-01 | 5.73E 05 |
| W | 187 | 2.91E 04 | 1.72E 04 | 7.73E 03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.42E 06 |
| NP | 239 | 1.72E 01 | 1.24E 00 | 8.70E-01 | 0.00E-01 | 3.58E 00 | 0.00E-01 | 9.16E 04 |

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TABLE A.5-9
GRASS-COW-MILK PATHWAY FACTOR
M² MREM/YR PER μ CI/SEC
INFANT (RI FACTORS)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| H | 3 | 0.00E-01 | 2.38E 03 | 2.38E 03 | 2.38E 03 | 2.38E 03 | 2.38E 03 | 2.38E 03 |
| C | 14 | 2.34E 09 | 5.00E 08 | 5.00E 08 | 5.00E 08 | 5.00E 08 | 5.00E 08 | 5.00E 08 |
| NA | 24 | 1.54E 07 | 1.54E 07 | 1.54E 07 | 1.54E 07 | 1.54E 07 | 1.54E 07 | 1.54E 07 |
| P | 32 | 1.60E 11 | 9.42E 09 | 6.21E 09 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.17E 09 |
| CR | 51 | 0.00E-01 | 0.00E-01 | 1.61E 05 | 1.05E 05 | 2.30E 04 | 2.05E 05 | 4.70E 06 |
| MN | 54 | 0.00E-01 | 3.90E 07 | 8.84E 06 | 0.00E-01 | 8.64E 06 | 0.00E-01 | 1.43E 07 |
| MN | 56 | 0.00E-01 | 3.15E-02 | 5.43E-03 | 0.00E-01 | 2.71E-02 | 0.00E-01 | 2.86E 00 |
| FE | 55 | 1.35E 08 | 8.72E 07 | 2.33E 07 | 0.00E-01 | 0.00E-01 | 4.26E 07 | 1.11E 07 |
| FE | 59 | 2.24E 08 | 3.92E 08 | 1.54E 08 | 0.00E-01 | 0.00E-01 | 1.16E 08 | 1.87E 08 |
| CO | 58 | 0.00E-01 | 2.43E 07 | 6.05E 07 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 6.04E 07 |
| CO | 60 | 0.00E-01 | 8.82E 07 | 2.08E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.10E 08 |
| NI | 63 | 3.49E 10 | 2.16E 09 | 1.21E 09 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.07E 08 |
| NI | 65 | 4.39E 00 | 4.97E-01 | 2.26E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.78E 01 |
| CU | 64 | 0.00E-01 | 1.86E 05 | 8.60E 04 | 0.00E-01 | 3.14E 05 | 0.00E-01 | 3.81E 06 |
| ZN | 65 | 5.55E 09 | 1.90E 10 | 8.78E 09 | 0.00E-01 | 9.23E 09 | 0.00E-01 | 1.61E 10 |
| ZN | 69 | 5.04E-11 | 9.07E-11 | 6.75E-12 | 0.00E-01 | 3.77E-11 | 0.00E-01 | 7.40E-09 |
| BR | 83 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BR | 84 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BR | 85 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RB | 86 | 0.00E-01 | 2.23E 10 | 1.10E 10 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 5.70E 08 |
| RB | 88 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RB | 89 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| SR | 89 | 1.26E 10 | 0.00E-01 | 3.61E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.59E 08 |
| SR | 90 | 1.22E 11 | 0.00E-01 | 3.10E 10 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.52E 09 |
| SR | 91 | 2.69E 05 | 0.00E-01 | 9.75E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.19E 05 |
| SR | 92 | 4.66E 00 | 0.00E-01 | 1.73E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 5.02E 01 |
| Y | 90 | 6.80E 02 | 0.00E-01 | 1.82E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 9.39E 05 |
| Y | 91M | 5.72E-19 | 0.00E-01 | 1.95E-20 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.91E-15 |
| Y | 91 | 7.33E 04 | 0.00E-01 | 1.95E 03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 5.25E 06 |
| Y | 92 | 5.39E-04 | 0.00E-01 | 1.51E-05 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.03E 01 |
| Y | 93 | 2.25E 00 | 0.00E-01 | 6.13E-02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.78E 04 |
| ZR | 95 | 6.81E 03 | 1.66E 03 | 1.18E 03 | 0.00E-01 | 1.79E 03 | 0.00E-01 | 8.26E 05 |
| ZR | 97 | 4.06E 00 | 6.98E-01 | 3.19E-01 | 0.00E-01 | 7.03E-01 | 0.00E-01 | 4.45E 04 |
| NB | 95 | 5.94E 05 | 2.45E 05 | 1.41E 05 | 0.00E-01 | 1.75E 05 | 0.00E-01 | 2.06E 08 |
| MO | 99 | 0.00E-01 | 2.08E 08 | 4.06E 07 | 0.00E-01 | 3.11E 08 | 0.00E-01 | 6.85E 07 |
| TC | 99M | 2.75E 01 | 5.68E 01 | 7.31E 02 | 0.00E-01 | 6.11E 02 | 2.97E 01 | 1.65E 04 |

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TABLE A.5-9 (cont'd)
GRASS-COW-MILK PATHWAY FACTOR
M² MREM/YR PER μ CI/SEC
INFANT (RI FACTORS)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|------|----------|----------|----------|----------|----------|----------|----------|
| TC | 101 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RU | 103 | 8.67E 03 | 0.00E-01 | 2.90E 03 | 0.00E-01 | 1.80E 04 | 0.00E-01 | 1.05E 05 |
| RU | 105 | 8.07E-03 | 0.00E-01 | 2.72E-02 | 0.00E-01 | 5.93E-01 | 0.00E-01 | 3.21E 00 |
| RU | 106 | 1.90E 05 | 0.00E-01 | 2.38E 04 | 0.00E-01 | 2.25E 05 | 0.00E-01 | 1.44E 06 |
| AG | 110M | 3.86E 08 | 2.82E 08 | 1.86E 08 | 0.00E-01 | 4.03E 08 | 0.00E-01 | 1.46E 10 |
| TE | 125M | 1.51E 08 | 5.04E 07 | 2.04E 07 | 5.07E 07 | 0.00E-01 | 0.00E-01 | 7.18E 07 |
| TE | 127M | 4.21E 08 | 1.40E 08 | 5.10E 07 | 1.22E 08 | 1.04E 09 | 0.00E-01 | 1.70E 08 |
| TE | 127 | 6.32E 03 | 2.12E 03 | 1.36E 03 | 5.15E 03 | 1.54E 04 | 0.00E-01 | 1.33E 05 |
| TE | 129M | 5.57E 08 | 1.91E 08 | 8.58E 07 | 2.14E 08 | 1.39E 09 | 0.00E-01 | 3.33E 08 |
| TE | 129 | 2.74E-09 | 9.43E-10 | 6.39E-09 | 2.29E-08 | 6.81E-08 | 0.00E-01 | 2.19E-07 |
| TE | 131M | 3.38E 06 | 1.36E 06 | 1.12E 06 | 2.76E 06 | 9.36E 06 | 0.00E-01 | 2.29E 07 |
| TE | 131 | 3.49E-32 | 1.29E-32 | 9.78E-32 | 3.11E-31 | 8.91E-31 | 0.00E-01 | 1.41E-30 |
| TE | 132 | 2.11E 07 | 1.05E 07 | 9.75E 06 | 1.54E 07 | 6.53E 07 | 0.00E-01 | 3.87E 07 |
| I | 130 | 3.55E 06 | 7.81E 06 | 3.14E 06 | 8.76E 08 | 8.58E 06 | 0.00E-01 | 1.68E 06 |
| I | 131 | 2.72E 09 | 3.21E 09 | 1.41E 09 | 1.05E 12 | 3.74E 09 | 0.00E-01 | 1.14E 08 |
| I | 132 | 1.43E 00 | 2.91E 00 | 1.04E 00 | 1.37E 02 | 3.25E 00 | 0.00E-01 | 2.36E 00 |
| I | 133 | 3.63E 07 | 5.28E 07 | 1.55E 07 | 9.61E 09 | 6.21E 07 | 0.00E-01 | 8.94E 06 |
| I | 134 | 1.77E-11 | 3.63E-11 | 1.29E-10 | 8.47E-09 | 4.06E-10 | 0.00E-01 | 3.76E-11 |
| I | 135 | 1.12E 05 | 2.24E 05 | 8.15E 04 | 2.00E 07 | 2.49E 05 | 0.00E-01 | 8.09E 04 |
| CS | 134 | 3.65E 10 | 6.80E 10 | 6.87E 09 | 0.00E-01 | 1.75E 10 | 6.21E 09 | 1.85E 08 |
| CS | 136 | 1.96E 09 | 5.76E 09 | 2.15E 09 | 0.00E-01 | 2.30E 09 | 4.70E 08 | 8.75E 07 |
| CS | 137 | 5.15E 10 | 6.02E 10 | 4.27E 09 | 0.00E-01 | 1.62E 10 | 6.55E 09 | 1.88E 08 |
| CS | 138 | 8.50E-23 | 1.38E-22 | 6.70E-22 | 0.00E-01 | 6.89E-22 | 1.08E-23 | 2.21E-22 |
| BA | 139 | 4.41E-07 | 2.93E-10 | 1.28E-07 | 0.00E-01 | 1.76E-09 | 1.77E-10 | 2.80E-05 |
| BA | 140 | 2.41E 08 | 2.41E 08 | 1.24E 07 | 0.00E-01 | 5.72E 04 | 1.48E 05 | 5.92E 07 |
| BA | 141 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BA | 142 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| LA | 140 | 4.06E 01 | 1.60E 01 | 4.12E 00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.88E 05 |
| LA | 142 | 8.59E-11 | 3.15E-11 | 7.55E-11 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 5.36E-06 |
| CE | 141 | 4.34E 04 | 2.64E 04 | 3.11E 03 | 0.00E-01 | 8.16E 03 | 0.00E-01 | 1.37E 07 |
| CE | 143 | 3.97E 02 | 2.63E 05 | 3.00E 01 | 0.00E-01 | 7.67E 01 | 0.00E-01 | 1.54E 06 |
| CE | 144 | 2.33E 06 | 9.52E 05 | 1.30E 05 | 0.00E-01 | 3.85E 05 | 0.00E-01 | 1.33E 08 |
| PR | 143 | 1.49E 03 | 5.56E 02 | 7.36E 01 | 0.00E-01 | 2.07E 02 | 0.00E-01 | 7.84E 05 |
| PR | 144 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| ND | 147 | 8.86E 02 | 9.10E 02 | 5.57E 01 | 0.00E-01 | 3.51E 02 | 0.00E-01 | 5.77E 05 |
| W | 187 | 6.12E 04 | 4.26E 04 | 1.47E 04 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.50E 06 |
| NP | 239 | 3.65E 01 | 3.26E 00 | 1.84E 00 | 0.00E-01 | 1.50E 00 | 0.00E-01 | 9.43E 04 |

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TABLE A.5-10
GRASS-COW-MEAT PATHWAY FACTOR
M² MREM/YR PER μ CI/SEC
ADULT (RI FACTORS)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| H | 3 | 0.00E-01 | 3.25E 02 | 3.25E 02 | 3.25E 02 | 3.25E 02 | 3.25E 02 | 3.25E 02 |
| C | 14 | 2.41E 08 | 4.83E 07 | 4.83E 07 | 4.83E 07 | 4.83E 07 | 4.83E 07 | 4.83E 07 |
| NA | 24 | 1.36E-03 | 1.36E-03 | 1.36E-03 | 1.36E-03 | 1.36E-03 | 1.36E-03 | 1.36E-03 |
| P | 32 | 4.65E 09 | 2.89E 08 | 1.80E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| CR | 51 | 0.00E-01 | 0.00E-01 | 7.05E 03 | 4.21E 03 | 1.55E 03 | 9.35E 03 | 1.77E 06 |
| MN | 54 | 0.00E-01 | 9.18E 06 | 1.75E 06 | 0.00E-01 | 2.73E 06 | 0.00E-01 | 2.81E 07 |
| MN | 56 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| FE | 55 | 2.93E 08 | 2.20E 08 | 4.72E 07 | 0.00E-01 | 0.00E-01 | 1.13E 08 | 1.16E 08 |
| FE | 59 | 2.65E 08 | 6.24E 08 | 2.39E 08 | 0.00E-01 | 0.00E-01 | 1.74E 08 | 2.08E 09 |
| CO | 58 | 0.00E-01 | 1.82E 07 | 4.09E 07 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.70E 08 |
| CO | 60 | 0.00E-01 | 7.52E 07 | 1.66E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.41E 09 |
| NI | 63 | 1.89E 10 | 1.32E 09 | 6.33E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.73E 08 |
| NI | 65 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| CU | 64 | 0.00E-01 | 2.73E-07 | 1.28E-07 | 0.00E-01 | 6.89E-07 | 0.00E-01 | 2.33E-05 |
| ZN | 65 | 3.56E 08 | 1.13E 09 | 5.12E 08 | 0.00E-01 | 7.57E 08 | 0.00E-01 | 7.13E 08 |
| ZN | 69 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BR | 83 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BR | 84 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BR | 85 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RB | 86 | 0.00E-01 | 4.87E 08 | 2.27E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 9.61E 07 |
| RB | 88 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RB | 89 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| SR | 89 | 3.02E 08 | 0.00E-01 | 8.66E 06 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 4.84E 07 |
| SR | 90 | 1.24E 10 | 0.00E-01 | 3.05E 09 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.59E 08 |
| SR | 91 | 1.43E-10 | 0.00E-01 | 5.73E-12 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 6.76E-10 |
| SR | 92 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| Y | 90 | 1.07E 02 | 0.00E-01 | 2.86E 00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.13E 06 |
| Y | 91M | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| Y | 91 | 1.13E 06 | 0.00E-01 | 3.03E 04 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 6.23E 08 |
| Y | 92 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| Y | 93 | 6.59E-12 | 0.00E-01 | 1.82E-13 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.09E-07 |
| ZR | 95 | 1.87E 06 | 6.01E 05 | 4.07E 05 | 0.00E-01 | 9.43E 05 | 0.00E-01 | 1.90E 09 |
| ZR | 97 | 2.08E-05 | 4.19E-06 | 1.92E-06 | 0.00E-01 | 6.33E-06 | 0.00E-01 | 1.30E 00 |
| NB | 95 | 2.30E 06 | 1.28E 06 | 6.88E 05 | 0.00E-01 | 1.26E 06 | 0.00E-01 | 7.76E 09 |
| MC | 99 | 0.00E-01 | 9.99E 04 | 1.90E 04 | 0.00E-01 | 2.26E 05 | 0.00E-01 | 2.32E 05 |
| TC | 99M | 4.50E-21 | 1.27E-20 | 1.62E-10 | 0.00E-01 | 1.93E-19 | 6.23E-21 | 7.53E-18 |
| TC | 101 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |

TABLE A.5-10

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TABLE A.5-10 (cont'd)
GRASS-COW-MEAT PATHWAY FACTOR
M² MREM/YR PER μ CI/SEC
ADULT (RI FACTORS)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|------|----------|----------|----------|----------|----------|----------|----------|
| RU | 103 | 1.05E 08 | 0.00E-01 | 4.53E 07 | 0.00E-01 | 4.01E 08 | 0.00E-01 | 1.23E 10 |
| RU | 105 | 5.87E-28 | 0.00E-01 | 2.32E-28 | 0.00E-01 | 7.58E-27 | 0.00E-01 | 3.59E-25 |
| RU | 106 | 2.80E 09 | 0.00E-01 | 3.54E 08 | 0.00E-01 | 5.40E 09 | 0.00E-01 | 1.81E 11 |
| AG | 110M | 6.68E 06 | 6.18E 06 | 3.67E 06 | 0.00E-01 | 1.22E 07 | 0.00E-01 | 2.52E 09 |
| TE | 125M | 3.59E 08 | 1.30E 08 | 4.81E 07 | 1.08E 08 | 1.46E 09 | 0.00E-01 | 1.43E 09 |
| TE | 127M | 1.12E 09 | 3.99E 08 | 1.36E 08 | 2.85E 08 | 4.53E 09 | 0.00E-01 | 3.74E 09 |
| TE | 127 | 2.14E-10 | 7.68E-11 | 4.63E-11 | 1.58E-10 | 8.71E-10 | 0.00E-01 | 1.69E-08 |
| TE | 129M | 1.13E 09 | 4.23E 08 | 1.80E 08 | 3.90E 08 | 4.73E 09 | 0.00E-01 | 5.71E 09 |
| TE | 129 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| TE | 131M | 4.52E 02 | 2.21E 02 | 1.84E 02 | 3.50E 02 | 2.24E 03 | 0.00E-01 | 2.20E 04 |
| TE | 131 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| TE | 132 | 1.42E 06 | 9.19E 05 | 8.63E 05 | 1.01E 06 | 8.85E 06 | 0.00E-01 | 4.35E 07 |
| I | 130 | 2.12E-06 | 6.26E-06 | 2.47E-06 | 5.30E-04 | 9.76E-06 | 0.00E-01 | 5.39E-06 |
| I | 131 | 1.07E 07 | 1.54E 07 | 8.81E 06 | 5.04E 09 | 2.64E 07 | 0.00E-01 | 4.06E 06 |
| I | 132 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| I | 133 | 3.67E-01 | 6.38E-01 | 1.94E-01 | 9.37E 01 | 1.11E 00 | 0.00E-01 | 5.73E-01 |
| I | 134 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| I | 135 | 4.47E-17 | 1.17E-16 | 4.32E-17 | 7.73E-15 | 1.88E-16 | 0.00E-01 | 1.32E-16 |
| CS | 134 | 6.58E 08 | 1.56E 09 | 1.28E 09 | 0.00E-01 | 5.06E 08 | 1.68E 08 | 2.74E 07 |
| CS | 136 | 1.18E 07 | 4.66E 07 | 3.35E 07 | 0.00E-01 | 2.59E 07 | 3.55E 06 | 5.24E 06 |
| CS | 137 | 8.72E 08 | 1.19E 09 | 7.81E 08 | 0.00E-01 | 4.05E 08 | 1.35E 08 | 2.31E 07 |
| CS | 138 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BA | 139 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BA | 140 | 2.87E 07 | 3.61E 04 | 1.88E 06 | 0.00E-01 | 1.23E 04 | 2.07E 04 | 5.92E 07 |
| BA | 141 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BA | 142 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| LA | 140 | 3.76E-02 | 1.89E-02 | 5.00E-03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.39E 03 |
| LA | 142 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| CE | 141 | 1.40E 04 | 9.50E 03 | 1.08E 03 | 0.00E-01 | 4.41E 03 | 0.00E-01 | 3.63E 07 |
| CE | 143 | 2.01E-02 | 1.49E 01 | 1.65E-03 | 0.00E-01 | 6.55E-03 | 0.00E-01 | 5.56E 02 |
| CE | 144 | 1.46E 06 | 6.09E 05 | 9.83E 04 | 0.00E-01 | 3.61E 05 | 0.00E-01 | 4.93E 08 |
| PR | 143 | 2.10E 04 | 8.41E 03 | 1.04E 03 | 0.00E-01 | 4.86E 03 | 0.00E-01 | 9.19E 07 |
| PR | 144 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| ND | 147 | 7.17E 03 | 8.29E 03 | 4.96E 02 | 0.00E-01 | 4.84E 03 | 0.00E-01 | 3.98E 07 |
| W | 187 | 2.17E-02 | 1.81E-02 | 6.33E-03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 5.93E 00 |
| NP | 239 | 2.59E-01 | 2.55E-02 | 1.40E-02 | 0.00E-01 | 7.94E-02 | 0.00E-01 | 5.22E 03 |

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TABLE A.5-11
GRASS-COW-MEAT PATHWAY FACTOR
M² MREM/YR PER μ CI/SEC
TEEN (RI FACTORS)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| H | 3 | 0.00E-01 | 1.94E 02 | 1.94E 02 | 1.94E 02 | 1.94E 02 | 1.94E 02 | 1.94E 02 |
| C | 14 | 2.04E 08 | 4.08E 07 | 4.08E 07 | 4.08E 07 | 4.08E 07 | 4.08E 07 | 4.08E 07 |
| NA | 24 | 1.09E-03 | 1.09E-03 | 1.09E-03 | 1.09E-03 | 1.09E-03 | 1.09E-03 | 1.09E-03 |
| P | 32 | 3.93E 09 | 2.44E 08 | 1.52E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.30E 08 |
| CR | 51 | 0.00E-01 | 0.00E-01 | 5.64E 03 | 3.13E 03 | 1.24E 03 | 8.05E 03 | 9.47E 05 |
| MN | 54 | 0.00E-01 | 7.00E 06 | 1.39E 06 | 0.00E-01 | 2.09E 06 | 0.00E-01 | 1.44E 07 |
| MN | 56 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| FE | 55 | 2.38E 08 | 1.69E 08 | 3.93E 07 | 0.00E-01 | 0.00E-01 | 1.07E 08 | 7.30E 07 |
| FE | 59 | 2.12E 08 | 4.95E 08 | 1.01E 08 | 0.00E-01 | 0.00E-01 | 1.56E 08 | 1.17E 09 |
| CO | 58 | 0.00E-01 | 1.41E 07 | 3.24E 07 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.94E 08 |
| CO | 60 | 0.00E-01 | 5.83E 07 | 1.31E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 7.60E 08 |
| NI | 63 | 1.52E 10 | 1.07E 09 | 5.15E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.71E 08 |
| NI | 65 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| CU | 64 | 0.00E-01 | 2.23E-07 | 1.05E-07 | 0.00E-01 | 5.64E-07 | 0.00E-01 | 1.73E-05 |
| ZN | 65 | 2.50E 08 | 8.69E 08 | 4.05E 08 | 0.00E-01 | 5.56E 08 | 0.00E-01 | 3.68E 08 |
| ZN | 69 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BR | 83 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BR | 84 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BR | 85 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RB | 86 | 0.00E-01 | 4.07E 08 | 1.91E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 6.02E 07 |
| RB | 88 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RB | 89 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| SR | 89 | 2.55E 08 | 0.00E-01 | 7.29E 06 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.03E 07 |
| SR | 90 | 8.05E 09 | 0.00E-01 | 1.99E 09 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.26E 08 |
| SR | 91 | 1.19E-10 | 0.00E-01 | 4.75E-12 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 5.41E-10 |
| SR | 92 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| Y | 90 | 8.98E 01 | 0.00E-01 | 2.42E 00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 7.41E 05 |
| Y | 91M | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| Y | 91 | 9.54E 05 | 0.00E-01 | 2.56E 04 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.91E 08 |
| Y | 92 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| Y | 93 | 5.56E-12 | 0.00E-01 | 1.53E-13 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.70E-07 |
| ZR | 95 | 1.50E 06 | 4.73E 05 | 3.26E 05 | 0.00E-01 | 6.96E 05 | 0.00E-01 | 1.09E 09 |
| ZR | 97 | 1.73E-05 | 3.42E-06 | 1.58E-06 | 0.00E-01 | 5.19E-06 | 0.00E-01 | 9.27E-01 |
| NB | 95 | 1.80E 06 | 9.96E 05 | 5.48E 05 | 0.00E-01 | 9.66E 05 | 0.00E-01 | 4.26E 09 |
| MO | 99 | 0.00E-01 | 8.26E 04 | 1.58E 04 | 0.00E-01 | 1.89E 05 | 0.00E-01 | 1.48E 05 |
| TC | 99M | 3.58E-21 | 9.97E-21 | 1.29E-19 | 0.00E-01 | 1.49E-19 | 5.54E-21 | 6.55E-18 |

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TABLE A.5-11 (cont'd)
GRASS-COW-MEAT PATHWAY FACTOR
M² MREM/YR PER μ CI/SEC
TEEN (RI FACTORS)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|------|----------|----------|----------|----------|----------|----------|----------|
| TC | 101 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RU | 103 | 8.56E 07 | 0.00E-01 | 3.66E 07 | 0.00E-01 | 3.02E 08 | 0.00E-01 | 7.15E 09 |
| RU | 105 | 4.91E-28 | 0.00E-01 | 1.91E-28 | 0.00E-01 | 6.91E-27 | 0.00E-01 | 3.96E-25 |
| RU | 106 | 2.36E 09 | 0.00E-01 | 2.97E 08 | 0.00E-01 | 4.55E 09 | 0.00E-01 | 1.13E 11 |
| AG | 110M | 5.06E 06 | 4.79E 06 | 2.91E 06 | 0.00E-01 | 9.13E 06 | 0.00E-01 | 1.35E 09 |
| TE | 125M | 3.03E 08 | 1.09E 08 | 4.05E 07 | 8.47E 07 | 0.00E-01 | 0.00E-01 | 8.94E 08 |
| TE | 127M | 9.42E 08 | 3.34E 08 | 1.12E 08 | 2.24E 08 | 3.82E 09 | 0.00E-01 | 2.35E 09 |
| TE | 127 | 1.81E-10 | 6.43E-11 | 3.91E-11 | 1.25E-09 | 7.35E-10 | 0.00E-01 | 1.40E-08 |
| TE | 129M | 9.50E 08 | 3.53E 08 | 1.50E 08 | 3.07E 08 | 3.97E 09 | 0.00E-01 | 3.57E 09 |
| TE | 129 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| TE | 131M | 3.77E 02 | 1.81E 02 | 1.51E 02 | 2.72E 02 | 1.88E 03 | 0.00E-01 | 1.45E 04 |
| TE | 131 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| TE | 132 | 1.16E 06 | 7.36E 05 | 6.93E 05 | 7.76E 05 | 7.06E 06 | 0.00E-01 | 2.33E 07 |
| I | 130 | 1.71E-06 | 4.94E-06 | 1.97E-06 | 4.03E-04 | 7.61E-06 | 0.00E-01 | 3.80E-06 |
| I | 131 | 8.93E 06 | 1.25E 07 | 6.72E 06 | 3.65E 09 | 2.15E 07 | 0.00E-01 | 2.47E 06 |
| I | 132 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| I | 133 | 3.07E-01 | 5.20E-01 | 1.59E-01 | 7.26E 01 | 9.12E-01 | 0.00E-01 | 3.93E-01 |
| I | 134 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| I | 135 | 3.64E-17 | 9.37E-17 | 3.47E-17 | 6.03E-15 | 1.48E-16 | 0.00E-01 | 1.04E-16 |
| CS | 134 | 5.23E 08 | 1.23E 09 | 5.71E 08 | 0.00E-01 | 3.91E 08 | 1.49E 08 | 1.53E 07 |
| CS | 136 | 9.20E 06 | 3.62E 07 | 2.43E 07 | 0.00E-01 | 1.97E 07 | 3.11E 06 | 2.91E 06 |
| CS | 137 | 7.24E 08 | 9.63E 08 | 3.36E 08 | 0.00E-01 | 3.28E 08 | 1.27E 08 | 1.37E 07 |
| CS | 138 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BA | 139 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BA | 140 | 2.38E 07 | 2.91E 04 | 1.53E 06 | 0.00E-01 | 9.88E 03 | 1.96E 04 | 3.67E 07 |
| BA | 141 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BA | 142 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| LA | 140 | 3.09E-02 | 1.52E-02 | 4.04E-03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 8.72E 02 |
| LA | 142 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| CE | 141 | 1.18E 04 | 7.88E 03 | 9.05E 02 | 0.00E-01 | 3.71E 03 | 0.00E-01 | 2.25E 07 |
| CE | 143 | 1.69E-02 | 1.23E 01 | 1.38E-03 | 0.00E-01 | 5.53E-03 | 0.00E-01 | 3.70E 02 |
| CE | 144 | 1.23E 06 | 5.08E 05 | 6.60E 04 | 0.00E-01 | 3.04E 05 | 0.00E-01 | 3.09E 08 |
| PR | 143 | 1.77E 04 | 7.05E 03 | 8.78E 02 | 0.00E-01 | 4.10E 03 | 0.00E-01 | 5.81E 07 |
| PR | 144 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| ND | 147 | 6.32E 03 | 6.87E 03 | 4.11E 02 | 0.00E-01 | 4.03E 03 | 0.00E-01 | 2.48E 07 |
| W | 187 | 1.81E-02 | 1.48E-02 | 5.18E-03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 4.00E 00 |
| NP | 239 | 2.26E-01 | 2.13E-02 | 1.19E-02 | 0.00E-01 | 6.70E-07 | 0.00E-01 | 3.43E 03 |

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TABLE A.5-12
GRASS-COW-MEAT PATHWAY FACTOR
M² MREM/YR PER μ CI/SEC
CHILD (RI FACTORS)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| H | 3 | 0.00E-01 | 2.34E 02 | 2.34E 02 | 2.34E 02 | 2.34E 02 | 2.34E 02 | 2.34E 02 |
| C | 14 | 3.83E 08 | 7.67E 07 | 7.67E 07 | 7.67E 07 | 7.67E 07 | 7.67E 07 | 7.67E 07 |
| NA | 24 | 1.73E-03 | 1.73E-03 | 1.73E-03 | 1.73E-03 | 1.73E-03 | 1.73E-03 | 1.73E-03 |
| P | 32 | 7.41E 09 | 3.47E 08 | 2.86E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.05E 08 |
| CR | 51 | 0.00E-01 | 0.00E-01 | 8.79E 03 | 4.88E 03 | 1.33E 03 | 8.91E 03 | 4.66E 05 |
| MN | 54 | 0.00E-01 | 8.01E 06 | 2.13E 06 | 0.00E-01 | 2.25E 06 | 0.00E-01 | 6.72E 06 |
| MN | 56 | 0.00E-01 | 1.63E-53 | 3.67E-54 | 0.00E-01 | 1.97E-53 | 0.00E-01 | 2.36E-51 |
| FE | 55 | 4.57E 08 | 2.42E 08 | 7.50E 07 | 0.00E-01 | 0.00E-01 | 1.37E 08 | 4.49E 07 |
| FE | 59 | 3.76E 08 | 6.09E 08 | 3.03E 08 | 0.00E-01 | 0.00E-01 | 1.76E 08 | 6.34E 08 |
| CO | 58 | 0.00E-01 | 1.64E 07 | 5.03E 07 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 9.58E 07 |
| CO | 60 | 0.00E-01 | 6.93E 07 | 2.04E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.84E 08 |
| NI | 63 | 2.91E 10 | 1.56E 09 | 9.91E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.05E 08 |
| NI | 65 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| CU | 64 | 0.00E-01 | 3.00E-07 | 1.81E-07 | 0.00E-01 | 7.24E-07 | 0.00E-01 | 1.41E-05 |
| ZN | 65 | 3.75E 08 | 1.00E 09 | 6.22E 08 | 0.00E-01 | 6.30E 08 | 0.00E-01 | 1.76E 08 |
| ZN | 69 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BR | 83 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BR | 84 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BR | 85 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RB | 86 | 0.00E-01 | 5.77E 08 | 3.55E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.71E 07 |
| RB | 88 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RB | 89 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| SR | 89 | 4.82E 08 | 0.00E-01 | 1.38E 07 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.87E 07 |
| SR | 90 | 1.04E 10 | 0.00E-01 | 2.64E 09 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.40E 08 |
| SR | 91 | 2.24E-10 | 0.00E-01 | 8.45E-12 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 4.94E-10 |
| SR | 92 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| Y | 90 | 1.70E 02 | 0.00E-01 | 4.55E 00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 4.84E 05 |
| Y | 91M | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| Y | 91 | 1.80E 06 | 0.00E-01 | 4.82E 04 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.40E 08 |
| Y | 92 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| Y | 93 | 1.04E-11 | 0.00E-01 | 2.87E-13 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.56E-07 |
| ZR | 95 | 2.66E 06 | 5.86E 05 | 5.21E 05 | 0.00E-01 | 8.38E 05 | 0.00E-01 | 6.11E 08 |
| ZR | 97 | 3.22E-05 | 4.65E-06 | 2.74E-06 | 0.00E-01 | 6.68E-06 | 0.00E-01 | 7.05E-01 |
| NB | 95 | 3.10E 06 | 1.21E 06 | 8.63E 05 | 0.00E-01 | 1.13E 06 | 0.00E-01 | 2.23E 09 |
| MO | 99 | 0.00E-01 | 1.15E 05 | 2.84E 04 | 0.00E-01 | 2.45E 05 | 0.00E-01 | 9.51E 04 |
| TC | 99M | 6.27E-21 | 1.23E-20 | 2.04E-19 | 0.00E-01 | 1.79E-19 | 6.24E-21 | 7.00E-18 |

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TABLE A.5-12 (cont'd)
GRASS-COW-MEAT PATHWAY FACTOR
M² MREM/YR PER μ CI/SEC
CHILD (RI FACTORS)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|------|----------|----------|----------|----------|----------|----------|----------|
| TC | 101 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RU | 103 | 1.55E 08 | 0.00E-01 | 5.95E 07 | 0.00E-01 | 3.90E 08 | 0.00E-01 | 4.00E 09 |
| RU | 105 | 9.16E-28 | 0.00E-01 | 3.32E-28 | 0.00E-01 | 8.05E-27 | 0.00E-01 | 5.98E-25 |
| RU | 106 | 4.44E 09 | 0.00E-01 | 5.54E 08 | 0.00E-01 | 5.99E 09 | 0.00E-01 | 6.90E 10 |
| AG | 110M | 8.34E 06 | 5.67E 06 | 4.53E 06 | 0.00E-01 | 1.06E 07 | 0.00E-01 | 6.74E 08 |
| TE | 125M | 5.69E 08 | 1.54E 08 | 7.59E 07 | 1.60E 08 | 0.00E-01 | 0.00E-01 | 5.49E 08 |
| TE | 127M | 1.77E 09 | 4.78E 08 | 2.11E 08 | 4.24E 08 | 5.06E 09 | 0.00E-01 | 1.44E 09 |
| TE | 127 | 3.41E-10 | 9.20E-11 | 7.32E-11 | 2.36E-10 | 9.71E-10 | 0.00E-01 | 1.33E-08 |
| TE | 129M | 1.79E 09 | 5.00E 08 | 2.78E 08 | 5.77E 08 | 5.26E 09 | 0.00E-01 | 2.18E 09 |
| TE | 129 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| TE | 131M | 7.01E 02 | 2.43E 02 | 2.58E 02 | 4.99E 02 | 2.35E 03 | 0.00E-01 | 9.84E 03 |
| TE | 131 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| TE | 132 | 2.12E 06 | 9.39E 05 | 1.13E 06 | 1.37E 06 | 8.72E 06 | 0.00E-01 | 9.46E 06 |
| I | 130 | 3.05E-06 | 6.17E-06 | 3.18E-06 | 6.80E-04 | 9.22E-06 | 0.00E-01 | 2.89E-06 |
| I | 131 | 1.66E 07 | 1.67E 07 | 9.47E 06 | 5.51E 09 | 2.74E 07 | 0.00E-01 | 1.48E 06 |
| I | 132 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| I | 133 | 5.70E-01 | 7.04E-01 | 2.66E-01 | 1.31E 02 | 1.17E 00 | 0.00E-01 | 2.84E-01 |
| I | 134 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| I | 135 | 6.59E-17 | 1.19E-16 | 5.61E-17 | 1.05E-14 | 1.82E-16 | 0.00E-01 | 9.04E-17 |
| CS | 134 | 9.22E 08 | 1.51E 09 | 3.19E 08 | 0.00E-01 | 4.69E 08 | 1.68E 08 | 8.16E 06 |
| CS | 136 | 1.59E 07 | 4.36E 07 | 2.82E 07 | 0.00E-01 | 2.32E 07 | 3.46E 06 | 1.53E 06 |
| CS | 137 | 1.33E 09 | 1.28E 09 | 1.88E 08 | 0.00E-01 | 4.16E 08 | 1.50E 08 | 7.99E 06 |
| CS | 138 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BA | 139 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BA | 140 | 4.39E 07 | 3.84E 04 | 2.56E 06 | 0.00E-01 | 1.25E 04 | 2.29E 04 | 2.22E 07 |
| BA | 141 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BA | 142 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| LA | 140 | 5.66E-02 | 1.98E-02 | 6.66E-03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 5.51E 02 |
| LA | 142 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| CE | 141 | 2.22E 04 | 1.11E 04 | 1.64E 03 | 0.00E-01 | 4.86E 03 | 0.00E-01 | 1.38E 07 |
| CE | 143 | 3.18E-02 | 1.72E 01 | 2.50E-03 | 0.00E-01 | 7.23E-03 | 0.00E-01 | 2.52E 02 |
| CE | 144 | 2.32E 06 | 7.26E 05 | 1.24E 05 | 0.00E-01 | 4.02E 05 | 0.00E-01 | 1.89E 08 |
| PR | 143 | 3.34E 04 | 1.00E 04 | 1.66E 03 | 0.00E-01 | 5.43E 03 | 0.00E-01 | 3.60E 07 |
| PR | 144 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| ND | 147 | 1.19E 04 | 9.60E 03 | 7.43E 02 | 0.00E-01 | 5.27E 03 | 0.00E-01 | 1.52E 07 |
| W | 187 | 3.36E-02 | 1.99E-02 | 8.94E-03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.80E 00 |
| NP | 239 | 4.26E-01 | 3.06E-02 | 2.15E-02 | 0.00E-01 | 8.84E-02 | 0.00E-01 | 2.26E 03 |

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TABLE A.5-13
VEGETATION PATHWAY FACTOR
M² MREM/YR PER μ CI/SEC
ADULT (RI FACTORS)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| H | 3 | 0.00E-01 | 2.26E 03 | 2.26E 03 | 2.26E 03 | 2.26E 03 | 2.26E 03 | 2.26E 03 |
| C | 14 | 2.38E 08 | 4.55E 07 | 4.55E 07 | 4.55E 07 | 4.55E 07 | 4.55E 07 | 4.55E 07 |
| NA | 24 | 2.69E 05 | 2.69E 05 | 2.69E 05 | 2.69E 05 | 2.69E 05 | 2.69E 05 | 2.69E 05 |
| P | 32 | 1.40E 09 | 8.73E 07 | 5.42E 07 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.58E 08 |
| CR | 51 | 0.00E-01 | 0.00E-01 | 4.64E 04 | 2.78E 04 | 1.02E 04 | 6.16E 04 | 1.17E 07 |
| MN | 54 | 0.00E-01 | 3.13E 08 | 5.97E 07 | 0.00E-01 | 9.31E 07 | 0.00E-01 | 9.58E 08 |
| MN | 56 | 0.00E-01 | 1.59E 01 | 2.82E 00 | 0.00E-01 | 2.02E 01 | 0.00E-01 | 5.08E 02 |
| FE | 55 | 2.09E 08 | 1.45E 08 | 3.37E 07 | 0.00E-01 | 0.00E-01 | 8.06E 07 | 8.29E 07 |
| FE | 59 | 1.26E 08 | 2.96E 08 | 1.14E 08 | 0.00E-01 | 0.00E-01 | 8.28E 07 | 9.83E 08 |
| CO | 58 | 0.00E-01 | 3.07E 07 | 6.89E 07 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 6.23E 08 |
| CO | 60 | 0.00E-01 | 1.67E 08 | 3.69E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.14E 09 |
| NI | 63 | 1.04E 10 | 7.28E 08 | 3.49E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.50E 08 |
| NI | 65 | 6.93E 01 | 9.01E 00 | 4.11E 00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.28E 02 |
| CU | 64 | 0.00E-01 | 9.21E 03 | 4.32E 03 | 0.00E-01 | 2.32E 04 | 0.00E-01 | 7.85E 05 |
| ZN | 65 | 3.17E 08 | 1.01E 09 | 4.56E 08 | 0.00E-01 | 6.75E 08 | 0.00E-01 | 6.36E 08 |
| ZN | 69 | 8.77E-06 | 1.68E-05 | 1.17E-06 | 0.00E-01 | 1.09E-05 | 0.00E-01 | 2.52E-06 |
| BR | 83 | 0.00E-01 | 0.00E-01 | 3.11E 00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 4.48E 00 |
| BR | 84 | 0.00E-01 | 0.00E-01 | 2.49E-11 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.96E-16 |
| BR | 85 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RB | 86 | 0.00E-01 | 2.19E 08 | 1.02E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 4.33E 07 |
| RB | 88 | 0.00E-01 | 3.47E-22 | 1.84E-22 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RB | 89 | 0.00E-01 | 1.41E-26 | 9.88E-27 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| SR | 89 | 9.97E 09 | 0.00E-01 | 2.86E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.60E 09 |
| SR | 90 | 6.05E 11 | 0.00E-01 | 1.48E 11 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.75E 10 |
| SR | 91 | 3.03E 05 | 0.00E-01 | 1.22E 04 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.44E 06 |
| SR | 92 | 4.27E 02 | 0.00E-01 | 1.85E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 8.46E 03 |
| Y | 90 | 1.33E 04 | 0.00E-01 | 3.56E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.41E 08 |
| Y | 91M | 5.24E-09 | 0.00E-01 | 2.03E-10 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.54E-08 |
| Y | 91 | 5.11E 06 | 0.00E-01 | 1.37E 05 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.81E 09 |
| Y | 92 | 9.16E-01 | 0.00E-01 | 2.68E-02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.60E 04 |
| Y | 93 | 1.74E 02 | 0.00E-01 | 4.81E 00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 5.52E 06 |
| ZR | 95 | 1.18E 06 | 3.77E 05 | 2.55E 05 | 0.00E-01 | 5.92E 05 | 0.00E-01 | 1.20E 09 |
| ZR | 97 | 3.37E 02 | 6.81E 01 | 3.11E 01 | 0.00E-01 | 1.03E 02 | 0.00E-01 | 2.11E 07 |
| NB | 95 | 1.43E 05 | 7.93E 04 | 4.26E 04 | 0.00E-01 | 7.84E 04 | 0.00E-01 | 4.81E 08 |
| MO | 99 | 0.00E-01 | 6.15E 06 | 1.17E 06 | 0.00E-01 | 1.39E 07 | 0.00E-01 | 1.43E 07 |
| TC | 99M | 3.10E 00 | 8.77E 00 | 1.12E 02 | 0.00E-01 | 1.33E 02 | 4.30E 00 | 5.19E 03 |

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TABLE A.5-13 (cont'd)
VEGETATION PATHWAY FACTOR
M² MREM/YR PER μ CI/SEC
ADULT (RI FACTORS)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|------|----------|----------|----------|----------|----------|----------|----------|
| TC | 101 | 8.34E-31 | 1.20E-30 | 1.18E-29 | 0.00E-01 | 2.16E-29 | 6.14E-31 | 0.00E-01 |
| RU | 103 | 4.76E 06 | 0.00E-01 | 2.05E 06 | 0.00E-01 | 1.82E 07 | 0.00E-01 | 5.56E 08 |
| RU | 105 | 5.39E 01 | 0.00E-01 | 2.13E 01 | 0.00E-01 | 6.97E 02 | 0.00E-01 | 3.30E 04 |
| RU | 106 | 1.93E 08 | 0.00E-01 | 2.44E 07 | 0.00E-01 | 3.72E 08 | 0.00E-01 | 1.25E 10 |
| AG | 110M | 1.05E 07 | 9.75E 06 | 5.79E 06 | 0.00E-01 | 1.92E 07 | 0.00E-01 | 3.98E 09 |
| TE | 125M | 9.66E 07 | 3.50E 07 | 1.29E 07 | 2.90E 07 | 3.93E 08 | 0.00E-01 | 3.86E 08 |
| TE | 127M | 3.49E 08 | 1.25E 08 | 4.26E 07 | 8.93E 07 | 1.42E 09 | 0.00E-01 | 1.17E 09 |
| TE | 127 | 5.66E 03 | 2.03E 03 | 1.23E 03 | 4.20E 03 | 2.31E 04 | 0.00E-01 | 4.47E 05 |
| TE | 129M | 2.51E 08 | 9.38E 07 | 3.98E 07 | 8.63E 07 | 1.05E 09 | 0.00E-01 | 1.27E 09 |
| TE | 129 | 7.65E-04 | 2.87E-04 | 1.86E-04 | 5.87E-04 | 3.22E-03 | 0.00E-01 | 5.77E-04 |
| TE | 131M | 9.12E 05 | 4.46E 05 | 3.72E 05 | 7.07E 05 | 4.52E 06 | 0.00E-01 | 4.43E 07 |
| TE | 131 | 1.51E-15 | 6.32E-16 | 4.78E-16 | 1.24E-15 | 6.63E-15 | 0.00E-01 | 2.14E-16 |
| TE | 132 | 4.30E 06 | 2.78E 06 | 2.61E 06 | 3.07E 06 | 2.68E 07 | 0.00E-01 | 1.32E 08 |
| I | 130 | 3.95E 05 | 1.16E 06 | 4.57E 05 | 9.81E 07 | 1.81E 06 | 0.00E-01 | 9.97E 05 |
| I | 131 | 8.08E 07 | 1.16E 08 | 6.62E 07 | 3.79E 10 | 1.98E 08 | 0.00E-01 | 3.05E 07 |
| I | 132 | 5.77E 01 | 1.54E 02 | 5.40E 01 | 5.40E 03 | 2.46E 02 | 0.00E-01 | 2.90E 01 |
| I | 133 | 2.09E 06 | 3.63E 06 | 1.11E 06 | 5.33E 08 | 6.33E 06 | 0.00E-01 | 3.26E 06 |
| I | 134 | 9.69E-05 | 2.63E-04 | 9.42E-05 | 4.56E-03 | 4.19E-04 | 0.00E-01 | 2.30E-07 |
| I | 135 | 3.90E 04 | 1.02E 05 | 3.77E 04 | 6.74E 06 | 1.64E 05 | 0.00E-01 | 1.15E 05 |
| CS | 134 | 4.67E 09 | 1.11E 10 | 9.08E 09 | 0.00E-01 | 3.59E 09 | 1.19E 09 | 1.94E 08 |
| CS | 136 | 4.20E 07 | 1.66E 08 | 1.19E 08 | 0.00E-01 | 9.22E 07 | 1.26E 07 | 1.88E 07 |
| CS | 137 | 6.36E 09 | 8.70E 09 | 5.70E 09 | 0.00E-01 | 2.95E 09 | 9.81E 08 | 1.68E 08 |
| CS | 138 | 3.94E-11 | 7.78E-11 | 3.86E-11 | 0.00E-01 | 5.72E-11 | 5.65E-12 | 3.32E-16 |
| BA | 139 | 2.90E-02 | 2.07E-05 | 8.50E-04 | 0.00E-01 | 1.93E-05 | 1.17E-05 | 5.15E-02 |
| BA | 140 | 1.29E 08 | 1.61E 05 | 8.42E 06 | 0.00E-01 | 5.49E 04 | 9.25E 04 | 2.65E 08 |
| BA | 141 | 1.28E-21 | 9.64E-25 | 4.31E-23 | 0.00E-01 | 8.96E-25 | 5.47E-25 | 6.01E-31 |
| BA | 142 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| LA | 140 | 1.98E 03 | 9.99E 02 | 2.64E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 7.33E 07 |
| LA | 142 | 1.42E-04 | 6.44E-05 | 1.61E-05 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 4.70E-01 |
| CE | 141 | 1.97E 05 | 1.33E 05 | 1.51E 04 | 0.00E-01 | 6.19E 04 | 0.00E-01 | 5.10E 08 |
| CE | 143 | 9.98E 02 | 7.38E 05 | 8.17E 01 | 0.00E-01 | 3.25E 02 | 0.00E-01 | 2.76E 07 |
| CE | 144 | 3.29E 07 | 1.38E 07 | 1.77E 06 | 0.00E-01 | 8.16E 06 | 0.00E-01 | 1.11E 10 |
| PR | 143 | 6.26E 04 | 2.51E 04 | 3.11E 03 | 0.00E-01 | 1.45E 04 | 0.00E-01 | 2.74E 08 |
| PR | 144 | 3.13E-26 | 1.30E-26 | 1.59E-27 | 0.00E-01 | 7.32E-27 | 0.00E-01 | 0.00E-01 |
| ND | 147 | 3.36E 04 | 3.89E 04 | 2.32E 03 | 0.00E-01 | 2.27E 04 | 0.00E-01 | 1.87E 08 |
| W | 187 | 3.82E 04 | 3.20E 04 | 1.12E 04 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.05E 07 |
| NP | 239 | 1.43E 03 | 1.40E 02 | 7.74E 01 | 0.00E-01 | 4.38E 02 | 0.00E-01 | 2.88E 07 |

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TABLE A.5-14
VEGETATION PATHWAY FACTOR
M² MREM/YR PER μ CI/SEC
TEEN (RI FACTORS)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| H | 3 | 0.00E-01 | 2.59E 03 | 2.59E 03 | 2.59E 03 | 2.59E 03 | 2.59E 03 | 2.59E 03 |
| C | 14 | 3.69E 08 | 7.38E 07 | 7.38E 07 | 7.38E 07 | 7.38E 07 | 7.38E 07 | 7.38E 07 |
| NA | 24 | 2.39E 05 | 2.39E 05 | 2.39E 05 | 2.39E 05 | 2.39E 05 | 2.39E 05 | 2.39E 05 |
| P | 32 | 1.61E 09 | 9.96E 07 | 6.23E 07 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.35E 08 |
| CR | 51 | 0.00E-01 | 0.00E-01 | 6.17E 04 | 3.43E 04 | 1.35E 04 | 8.81E 04 | 1.04E 07 |
| MN | 54 | 0.00E-01 | 4.54E 08 | 9.01E 07 | 0.00E-01 | 1.36E 08 | 0.00E-01 | 9.32E 08 |
| MN | 56 | 0.00E-01 | 1.44E 01 | 2.55E 00 | 0.00E-01 | 1.82E 01 | 0.00E-01 | 9.45E 02 |
| FE | 55 | 3.25E 08 | 2.31E 08 | 5.38E 07 | 0.00E-01 | 0.00E-01 | 1.46E 08 | 9.98E 07 |
| FE | 59 | 1.79E 08 | 4.18E 08 | 1.62E 08 | 0.00E-01 | 0.00E-01 | 1.32E 08 | 9.90E 08 |
| CO | 58 | 0.00E-01 | 4.36E 07 | 1.01E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 6.01E 08 |
| CO | 60 | 0.00E-01 | 2.49E 08 | 5.60E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.24E 09 |
| NI | 63 | 1.61E 10 | 1.13E 09 | 5.44E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.81E 08 |
| NI | 65 | 6.45E 01 | 8.24E 00 | 3.76E 00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 4.47E 02 |
| CU | 64 | 0.00E-01 | 8.34E 03 | 3.92E 03 | 0.00E-01 | 2.11E 04 | 0.00E-01 | 6.47E 05 |
| ZN | 65 | 4.24E 08 | 1.47E 09 | 6.86E 08 | 0.00E-01 | 9.42E 08 | 0.00E-01 | 6.23E 08 |
| ZN | 69 | 8.21E-06 | 1.56E 05 | 1.10E-06 | 0.00E-01 | 1.02E-05 | 0.00E-01 | 2.88E-05 |
| BR | 83 | 0.00E-01 | 0.00E-01 | 2.92E 00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 5.08E-16 |
| BR | 84 | 0.00E-01 | 0.00E-01 | 2.27E-11 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.14E-28 |
| BR | 85 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RB | 86 | 0.00E-01 | 2.74E 08 | 1.29E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 4.05E 07 |
| RB | 88 | 0.00E-01 | 3.21E-22 | 1.71E-22 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.75E-29 |
| RB | 89 | 0.00E-01 | 1.26E-26 | 8.94E-27 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.94E-35 |
| SR | 89 | 1.51E 10 | 0.00E-01 | 4.34E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.80E 09 |
| SR | 90 | 7.51E 11 | 0.00E-01 | 1.85E 11 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.11E 10 |
| SR | 91 | 2.83E 05 | 0.00E-01 | 1.13E 04 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.28E 06 |
| SR | 92 | 3.98E 02 | 0.00E-01 | 1.70E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.01E 04 |
| Y | 90 | 1.24E 04 | 0.00E-01 | 3.34E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.02E 08 |
| Y | 91M | 4.88E-09 | 0.00E-01 | 1.87E-10 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.30E-07 |
| Y | 91 | 7.84E 06 | 0.00E-01 | 2.10E 05 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.21E 09 |
| Y | 92 | 8.61E-01 | 0.00E-01 | 2.49E-02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.36E 04 |
| Y | 93 | 1.63E 02 | 0.00E-01 | 4.47E 00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 4.99E 06 |
| ZR | 95 | 1.72E 06 | 5.44E 05 | 3.74E 05 | 0.00E-01 | 7.99E 05 | 0.00E-01 | 1.25E 09 |
| ZR | 97 | 3.12E 02 | 6.18E 01 | 2.85E 01 | 0.00E-01 | 9.37E 01 | 0.00E-01 | 1.67E 07 |
| NB | 95 | 1.93E 05 | 1.07E 05 | 5.88E 04 | 0.00E-01 | 1.04E 05 | 0.00E-01 | 4.57E 08 |
| MO | 99 | 0.00E-01 | 5.65E 06 | 1.08E 06 | 0.00E-01 | 1.29E 07 | 0.00E-01 | 1.01E 07 |
| TC | 99M | 2.74E 00 | 7.64E 00 | 9.90E 01 | 0.00E-01 | 1.14E 02 | 4.24E 00 | 5.02E 03 |

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TABLE A.5-14 (cont'd)
VEGETATION PATHWAY FACTOR
M² MREM/YR PER μ CI/SEC
TEEN (RI FACTORS)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|------|----------|----------|----------|----------|----------|----------|----------|
| TC | 101 | 7.76E-31 | 1.10E-30 | 1.08E-29 | 0.00E-01 | 2.00E-29 | 6.72E-31 | 0.00E-01 |
| RU | 103 | 6.81E 06 | 0.00E-01 | 2.91E 06 | 0.00E-01 | 2.40E 07 | 0.00E-01 | 5.69E 08 |
| RU | 105 | 5.01E 01 | 0.00E-01 | 1.94E 01 | 0.00E-01 | 6.32E 02 | 0.00E-01 | 4.04E 04 |
| RU | 106 | 3.09E 08 | 0.00E-01 | 3.90E 07 | 0.00E-01 | 5.97E 08 | 0.00E-01 | 1.48E 10 |
| AG | 110M | 1.52E 07 | 1.43E 07 | 8.72E 06 | 0.00E-01 | 2.74E 07 | 0.00E-01 | 4.03E 09 |
| TE | 125M | 1.48E 08 | 5.34E 07 | 1.98E 07 | 4.14E 07 | 0.00E-01 | 0.00E-01 | 4.39E 08 |
| TE | 127M | 5.52E 08 | 1.96E 08 | 6.56E 07 | 1.31E 08 | 2.24E 09 | 0.00E-01 | 1.37E 09 |
| TE | 127 | 5.34E 03 | 1.89E 03 | 1.15E 03 | 3.68E 03 | 2.16E 04 | 0.00E-01 | 4.12E 05 |
| TE | 129M | 3.62E 08 | 1.34E 08 | 5.73E 07 | 1.17E 08 | 1.51E 09 | 0.00E-01 | 1.36E 09 |
| TE | 129 | 7.16E-04 | 2.67E-04 | 1.74E-04 | 5.12E-04 | 3.01E-03 | 0.00E-01 | 3.92E-03 |
| TE | 131M | 8.44E 05 | 4.05E 05 | 3.38E 05 | 6.09E 05 | 4.22E 06 | 0.00E-01 | 3.25E 07 |
| TE | 131 | 1.41E-14 | 5.80E-16 | 4.40E-16 | 1.08E-15 | 6.15E-15 | 0.00E-01 | 1.15E-16 |
| TE | 132 | 3.91E 06 | 2.48E 06 | 2.33E 06 | 2.61E 06 | 2.37E 07 | 0.00E-01 | 7.84E 07 |
| I | 130 | 3.51E 05 | 1.02E 06 | 4.05E 05 | 8.28E 07 | 1.56E 06 | 0.00E-01 | 7.80E 05 |
| I | 131 | 7.69E 07 | 1.08E 08 | 5.78E 07 | 3.14E 10 | 1.85E 08 | 0.00E-01 | 2.13E 07 |
| I | 132 | 5.20E 01 | 1.36E 02 | 4.89E 01 | 4.59E 03 | 2.14E 02 | 0.00E-01 | 5.93E 01 |
| I | 133 | 1.94E 06 | 3.29E 06 | 1.00E 06 | 4.59E 08 | 5.77E 06 | 0.00E-01 | 2.49E 06 |
| I | 134 | 8.76E-05 | 2.32E-04 | 8.34E-05 | 3.87E-03 | 3.66E-04 | 0.00E-01 | 3.06E-06 |
| I | 135 | 3.52E 04 | 9.07E 04 | 3.36E 04 | 5.84E 06 | 1.43E 05 | 0.00E-01 | 1.01E 05 |
| CS | 134 | 7.10E 09 | 1.67E 10 | 7.75E 09 | 0.00E-01 | 5.31E 09 | 2.03E 09 | 2.08E 08 |
| CS | 136 | 4.28E 07 | 1.68E 08 | 1.13E 08 | 0.00E-01 | 9.16E 07 | 1.44E 07 | 1.35E 07 |
| CS | 137 | 1.01E 10 | 1.35E 10 | 4.69E 09 | 0.00E-01 | 4.59E 09 | 1.78E 09 | 1.92E 08 |
| CS | 138 | 3.64E-11 | 6.98E-11 | 3.49E-11 | 0.00E-01 | 5.15E-11 | 6.00E-12 | 3.17E-14 |
| BA | 139 | 2.73E-02 | 1.92E-05 | 7.96E-04 | 0.00E-01 | 1.81E-05 | 1.32E-05 | 2.44E-01 |
| BA | 140 | 1.38E 08 | 1.69E 05 | 8.91E 06 | 0.00E-01 | 5.74E 04 | 1.14E 05 | 2.13E 08 |
| BA | 141 | 1.19E-21 | 8.90E-25 | 3.98E-23 | 0.00E-01 | 8.27E-25 | 6.10E-25 | 2.54E-27 |
| BA | 142 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| LA | 140 | 1.81E 03 | 8.89E 02 | 2.37E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 5.11E 07 |
| LA | 142 | 1.30E-04 | 5.78E-05 | 1.44E-05 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.76E 00 |
| CE | 141 | 2.83E 05 | 1.89E 05 | 2.17E 04 | 0.00E-01 | 8.90E 04 | 0.00E-01 | 5.41E 08 |
| CE | 143 | 9.33E 02 | 6.79E 05 | 7.58E 01 | 0.00E-01 | 3.04E 02 | 0.00E-01 | 2.04E 07 |
| CE | 144 | 5.27E 07 | 2.18E 07 | 2.83E 06 | 0.00E-01 | 1.30E 07 | 0.00E-01 | 1.33E 10 |
| PR | 143 | 7.01E 04 | 2.80E 04 | 3.49E 03 | 0.00E-01 | 1.63E 04 | 0.00E-01 | 2.31E 08 |
| PR | 144 | 2.93E-26 | 1.20E-26 | 1.49E-27 | 0.00E-01 | 6.88E-27 | 0.00E-01 | 3.23E-29 |
| ND | 147 | 3.66E 04 | 3.98E 04 | 2.38E 03 | 0.00E-01 | 2.34E 04 | 0.00E-01 | 1.44E 08 |
| W | 187 | 3.56E 04 | 2.90E 04 | 1.02E 04 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 7.84E 06 |
| NP | 239 | 1.39E 02 | 1.31E 02 | 7.26E 01 | 0.00E-01 | 4.10E 02 | 0.00E-01 | 2.10E 07 |

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TABLE A.5-15
VEGETATION PATHWAY FACTOR
M² MREM/YR PER μ CI/SEC
CHILD (RI FACTORS)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| H | 3 | 0.00E-01 | 4.01E 03 | 4.01E 03 | 4.01E 03 | 4.01E 03 | 4.01E 03 | 4.01E 03 |
| C | 14 | 8.89E 08 | 1.78E 08 | 1.78E 08 | 1.78E 08 | 1.78E 08 | 1.78E 08 | 1.78E 08 |
| NA | 24 | 3.73E 05 | 3.73E 05 | 3.73E 05 | 3.73E 05 | 3.73E 05 | 3.73E 05 | 3.73E 05 |
| P | 32 | 3.37E 09 | 1.58E 08 | 1.30E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 9.30E 07 |
| CR | 51 | 0.00E-01 | 0.00E-01 | 1.17E 05 | 6.50E 04 | 1.78E 04 | 1.19E 05 | 6.21E 06 |
| MN | 54 | 0.00E-01 | 6.65E 08 | 1.77E 08 | 0.00E-01 | 1.86E 08 | 0.00E-01 | 5.58E 08 |
| MN | 56 | 0.00E-01 | 1.88E 01 | 4.24E 00 | 0.00E-01 | 2.27E 01 | 0.00E-01 | 2.72E 03 |
| FE | 55 | 8.00E 08 | 4.24E 08 | 1.31E 08 | 0.00E-01 | 0.00E-01 | 2.40E 08 | 7.86E 07 |
| FE | 59 | 3.97E 08 | 6.43E 08 | 3.20E 08 | 0.00E-01 | 0.00E-01 | 1.86E 08 | 6.69E 08 |
| CO | 58 | 0.00E-01 | 6.44E 07 | 1.97E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.76E 08 |
| CO | 60 | 0.00E-01 | 3.78E 08 | 1.12E 09 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.10E 09 |
| NI | 63 | 3.95E 10 | 2.11E 09 | 1.34E 09 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.42E 08 |
| NI | 65 | 1.18E 02 | 1.11E 01 | 6.51E 00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.37E 03 |
| CU | 64 | 0.00E-01 | 1.10E 04 | 6.65E 03 | 0.00E-01 | 2.66E 04 | 0.00E-01 | 5.16E 05 |
| ZN | 65 | 8.12E 08 | 2.16E 09 | 1.35E 09 | 0.00E-01 | 1.36E 09 | 0.00E-01 | 3.80E 08 |
| ZN | 69 | 1.51E-05 | 2.19E-05 | 2.02E-06 | 0.00E-01 | 1.33E-05 | 0.00E-01 | 1.38E-03 |
| BR | 83 | 0.00E-01 | 0.00E-01 | 5.38E 00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.14E-17 |
| BR | 84 | 0.00E-01 | 0.00E-01 | 3.85E-11 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.94E-28 |
| BR | 85 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RB | 86 | 0.00E-01 | 4.52E 08 | 2.78E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.91E 07 |
| RB | 88 | 0.00E-01 | 4.43E-22 | 3.08E-22 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.17E-23 |
| RB | 89 | 0.00E-01 | 1.67E-26 | 1.48E-26 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.45E-28 |
| SR | 89 | 3.60E 10 | 0.00E-01 | 1.03E 09 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.39E 09 |
| SR | 90 | 1.24E 12 | 0.00E-01 | 3.15E 11 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.67E 10 |
| SR | 91 | 5.21E 05 | 0.00E-01 | 1.97E 04 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.15E 06 |
| SR | 92 | 7.29E 02 | 0.00E-01 | 2.92E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.38E 04 |
| Y | 90 | 2.30E 04 | 0.00E-01 | 6.17E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 6.56E 07 |
| Y | 91M | 8.95E-09 | 0.00E-01 | 3.26E-10 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.75E-05 |
| Y | 91 | 1.86E 07 | 0.00E-01 | 4.99E 03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.48E 09 |
| Y | 92 | 1.59E 00 | 0.00E-01 | 4.54E-02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 4.58E 04 |
| Y | 93 | 3.01E 02 | 0.00E-01 | 8.26E 00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 4.48E 06 |
| ZR | 95 | 3.86E 06 | 8.49E 05 | 7.56E 05 | 0.00E-01 | 1.22E 06 | 0.00E-01 | 8.85E 08 |
| ZR | 97 | 5.70E 02 | 8.24E 01 | 4.86E 01 | 0.00E-01 | 1.18E 02 | 0.00E-01 | 1.25E 07 |
| NB | 95 | 4.11E 05 | 1.60E 05 | 1.14E 05 | 0.00E-01 | 1.50E 05 | 0.00E-01 | 2.96E 08 |
| MO | 99 | 0.00E-01 | 7.71E 06 | 1.91E 06 | 0.00E-01 | 1.65E 07 | 0.00E-01 | 6.38E 06 |
| TC | 99M | 4.71E 00 | 9.24E 00 | 1.51E 02 | 0.00E-01 | 1.34E 02 | 4.69E 00 | 5.26E 03 |

IMAGED 1994/12/04

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TABLE A.5-15 (cont'd)
VEGETATION PATHWAY FACTOR
M² MREM/YR PER μ CI/SEC
CHILD (RI FACTORS)

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|------|----------|----------|----------|----------|----------|----------|----------|
| TC | 101 | 1.43E-30 | 1.49E-30 | 1.89E-29 | 0.00E-01 | 2.55E-29 | 7.90E-31 | 4.75E-30 |
| RU | 103 | 1.53E 07 | 0.00E-01 | 5.88E 06 | 0.00E-01 | 3.85E 07 | 0.00E-01 | 3.96E 08 |
| RU | 105 | 9.17E 01 | 0.00E-01 | 3.33E 01 | 0.00E-01 | 8.06E 02 | 0.00E-01 | 5.99E 04 |
| RU | 106 | 7.45E 08 | 0.00E-01 | 9.30E 07 | 0.00E-01 | 1.01E 09 | 0.00E-01 | 1.16E 10 |
| AG | 110M | 3.21E 07 | 2.17E 07 | 1.73E 07 | 0.00E-01 | 4.04E 07 | 0.00E-01 | 2.58E 09 |
| TE | 125M | 3.51E 08 | 9.50E 07 | 4.67E 07 | 9.84E 07 | 0.00E-01 | 0.00E-01 | 3.38E 08 |
| TE | 127M | 1.32E 09 | 3.56E 08 | 1.57E 08 | 3.16E 08 | 3.77E 09 | 0.00E-01 | 1.07E 09 |
| TE | 127 | 9.85E 03 | 2.66E 03 | 2.11E 03 | 6.82E 03 | 2.80E 04 | 0.00E-01 | 3.85E 05 |
| TE | 129M | 8.41E 08 | 2.35E 08 | 1.30E 08 | 2.71E 08 | 2.47E 09 | 0.00E-01 | 1.03E 09 |
| TE | 129 | 1.33E-03 | 3.70E-04 | 3.15E-04 | 9.46E-04 | 3.88E-03 | 0.00E-01 | 8.25E-02 |
| TE | 131M | 1.54E 06 | 5.33E 05 | 5.68E 05 | 1.10E 06 | 5.16E 06 | 0.00E-01 | 2.16E 07 |
| TE | 131 | 2.59E-15 | 7.90E-16 | 7.71E-16 | 1.98E-15 | 7.84E-15 | 0.00E-01 | 1.36E-14 |
| TE | 132 | 7.00E 06 | 3.10E 06 | 3.74E 06 | 4.51E 06 | 2.88E 07 | 0.00E-01 | 3.12E 07 |
| I | 130 | 6.16E 05 | 1.24E 06 | 6.41E 05 | 1.37E 08 | 1.86E 06 | 0.00E-01 | 5.82E 05 |
| I | 131 | 1.43E 08 | 1.44E 08 | 8.17E 07 | 4.76E 10 | 2.36E 08 | 0.00E-01 | 1.28E 07 |
| I | 132 | 9.23E 01 | 1.70E 02 | 7.80E 01 | 7.87E 03 | 2.60E 02 | 0.00E-01 | 2.00E 02 |
| I | 133 | 3.53E 06 | 4.37E 06 | 1.65E 06 | 8.12E 08 | 7.28E 06 | 0.00E-01 | 1.76E 06 |
| I | 134 | 1.56E-04 | 2.89E-04 | 1.33E-04 | 6.65E-04 | 4.42E-04 | 0.00E-01 | 1.92E-04 |
| I | 135 | 6.26E 04 | 1.13E 05 | 5.33E 04 | 9.98E 06 | 1.73E 05 | 0.00E-01 | 8.59E 04 |
| CS | 134 | 1.60E 10 | 2.63E 10 | 5.55E 09 | 0.00E-01 | 8.15E 09 | 2.93E 09 | 1.42E 08 |
| CS | 136 | 8.04E 07 | 2.21E 08 | 1.43E 08 | 0.00E-01 | 1.18E 08 | 1.76E 07 | 7.77E 06 |
| CS | 137 | 2.39E 10 | 2.29E 10 | 3.38E 09 | 0.00E-01 | 7.46E 09 | 2.68E 09 | 1.43E 08 |
| CS | 138 | 6.61E-11 | 9.20E-11 | 5.83E-11 | 0.00E-01 | 6.47E-11 | 6.96E-12 | 4.24E-11 |
| BA | 139 | 5.04E-02 | 2.69E-05 | 1.46E-03 | 0.00E-01 | 2.35E-05 | 1.58E-05 | 2.91E 00 |
| BA | 140 | 2.77E 08 | 2.43E 05 | 1.62E 07 | 0.00E-01 | 7.90E 04 | 1.45E 05 | 1.40E 08 |
| BA | 141 | 2.20E-21 | 1.23E-24 | 7.16E-23 | 0.00E-01 | 1.07E-24 | 7.24E-24 | 1.25E-21 |
| BA | 142 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| LA | 140 | 3.25E 03 | 1.14E 03 | 3.83E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.17E 07 |
| LA | 142 | 2.36E-04 | 7.51E-05 | 2.35E-05 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.49E 01 |
| CE | 141 | 6.56E 05 | 3.27E 05 | 4.86E 04 | 0.00E-01 | 1.43E 05 | 0.00E-01 | 4.08E 08 |
| CE | 143 | 1.72E 03 | 9.31E 05 | 1.35E 02 | 0.00E-01 | 3.91E 02 | 0.00E-01 | 1.36E 07 |
| CE | 144 | 1.27E 08 | 3.98E 07 | 6.78E 06 | 0.00E-01 | 2.21E 07 | 0.00E-01 | 1.04E 10 |
| PR | 143 | 1.46E 05 | 4.38E 04 | 7.23E 03 | 0.00E-01 | 2.37E 04 | 0.00E-01 | 1.57E 08 |
| PR | 144 | 5.44E-26 | 1.68E-26 | 2.74E-27 | 0.00E-01 | 8.90E-27 | 0.00E-01 | 3.62E-23 |
| ND | 147 | 7.24E 04 | 5.86E 04 | 4.54E 03 | 0.00E-01 | 3.22E 04 | 0.00E-01 | 9.29E 07 |
| W | 187 | 6.47E 04 | 3.83E 04 | 1.72E 04 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 5.38E 07 |
| NP | 239 | 2.56E 03 | 1.84E 02 | 1.29E 02 | 0.00E-01 | 5.31E 02 | 0.00E-01 | 1.36E 07 |

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TABLE A.5-16
GROUND PLANE PATHWAY FACTOR
M² MREM/YR PER μ CI/SEC
(RI FACTOR)

| | | | | | |
|-------|----------|---------|----------|--------|----------|
| H-3 | 0.00E 00 | Y-91M | 1.00E 05 | CS-134 | 6.86E 09 |
| C-14 | 0.00E 00 | Y-91 | 1.07E 06 | CS-136 | 1.49E 08 |
| NA-24 | 1.19E 07 | Y-92 | 1.80E 05 | CS-137 | 1.03E 10 |
| P-32 | 0.00E 00 | Y-93 | 1.85E 05 | CS-138 | 3.59E 05 |
| CR-51 | 4.66E 06 | ZR-95 | 2.45E 08 | BA-139 | 1.06E 05 |
| MN-54 | 1.39E 09 | ZR-97 | 2.96E 06 | BA-140 | 2.05E 07 |
| MN-56 | 9.03E 05 | NB-95 | 1.37E 08 | BA-141 | 4.18E 04 |
| FE-55 | 0.00E 00 | MO-99 | 3.99E 06 | BA-142 | 4.49E 04 |
| FE-59 | 2.73E 08 | TC-99M | 1.84E 05 | LA-140 | 1.92E 07 |
| | | TC-101 | 2.04E 04 | | |
| CO-58 | 3.79E 08 | RU-103 | 1.08E 08 | LA-142 | 7.37E 05 |
| CO-60 | 2.15E 10 | RU-105 | 6.36E 05 | CE-141 | 1.37E 07 |
| NI-63 | 0.00E 00 | RU-106 | 4.21E 08 | CE-143 | 2.31E 06 |
| NI-65 | 3.02E 05 | AG-110M | 3.44E 09 | CE-144 | 6.96E 07 |
| CU-64 | 6.07E 05 | TE-125M | 1.55E 06 | PR-143 | 0.00E 00 |
| ZN-65 | 7.46E 08 | TE-127M | 9.17E 04 | PR-144 | 1.83E 03 |
| ZN-69 | 0.00E 00 | TE-127 | 2.98E 03 | ND-147 | 8.46E 06 |
| BR-83 | 4.87E 03 | TE-129M | 1.98E 07 | W-187 | 2.36E 06 |
| BR-84 | 2.03E 05 | TE-129 | 2.62E 04 | NP-239 | 1.71E 06 |
| BR-85 | 0.00E 00 | TE-131M | 8.03E 06 | | |
| RB-86 | 8.99E 06 | TE-131 | 2.92E 04 | | |
| RB-88 | 3.31E 04 | TE-132 | 4.23E 06 | | |
| RB-89 | 1.21E 05 | I-130 | 5.51E 06 | | |
| SR-89 | 2.16E 04 | I-131 | 1.72E 07 | | |
| SR-90 | 0.00E 00 | I-132 | 1.25E 06 | | |
| SR-91 | 2.14E 06 | I-133 | 2.45E 06 | | |
| SR-92 | 7.77E 05 | I-134 | 4.47E 05 | | |
| Y-90 | 4.49E 03 | I-135 | 2.53E 06 | | |

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TABLE A.5-17
GRASS-GOAT-MILK PATHWAY FACTOR
M² MREM/YR PER μ CI/SEC
ADULT

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| H | 3 | 0.00E-01 | 1.56E 03 | 1.56E 03 | 1.56E 03 | 1.56E 03 | 1.56E 03 | 1.56E 03 |
| C | 14 | 2.63E 08 | 5.27E 07 | 5.27E 07 | 5.27E 07 | 5.27E 07 | 5.27E 07 | 5.27E 07 |
| NA | 24 | 2.93E 05 | 2.93E 05 | 2.93E 05 | 2.93E 05 | 2.93E 05 | 2.93E 05 | 2.93E 05 |
| P | 32 | 2.05E 10 | 1.27E 09 | 7.93E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.31E 09 |
| CR | 51 | 0.00E-01 | 0.00E-01 | 3.43E 03 | 2.05E 03 | 7.55E 02 | 4.55E 03 | 8.62E 05 |
| MN | 54 | 0.00E-01 | 1.01E 06 | 1.93E 05 | 0.00E-01 | 3.00E 05 | 0.00E-01 | 3.09E 06 |
| MN | 56 | 0.00E-01 | 4.99E-03 | 8.85E-04 | 0.00E-01 | 6.34E-03 | 0.00E-01 | 1.59E-01 |
| FE | 55 | 3.26E 05 | 2.25E 05 | 5.26E 04 | 0.00E-01 | 0.00E-01 | 1.26E 05 | 1.29E 05 |
| FE | 59 | 3.86E 05 | 9.07E 05 | 3.48E 05 | 0.00E-01 | 0.00E-01 | 2.54E 05 | 3.02E 06 |
| CO | 58 | 0.00E-01 | 5.66E 05 | 1.27E 06 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.15E 07 |
| CO | 60 | 0.00E-01 | 1.97E 06 | 4.34E 06 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.70E 07 |
| NI | 63 | 8.07E 08 | 5.65E 07 | 2.71E 07 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.17E 07 |
| NI | 65 | 5.56E-02 | 7.22E-03 | 3.30E-03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.83E-01 |
| CU | 64 | 0.00E-01 | 2.66E 03 | 1.25E 03 | 0.00E-01 | 6.70E 03 | 0.00E-01 | 2.27E 05 |
| ZN | 65 | 1.65E 08 | 5.24E 08 | 2.37E 08 | 0.00E-01 | 3.50E 08 | 0.00E-01 | 3.30E 08 |
| ZN | 69 | 6.27E-13 | 1.20E-12 | 8.34E-14 | 0.00E-01 | 7.79E-13 | 0.00E-01 | 1.80E-13 |
| BR | 83 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BR | 84 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BR | 85 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RB | 86 | 0.00E-01 | 3.11E 08 | 1.45E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 6.14E 07 |
| RB | 88 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RB | 89 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| SR | 89 | 3.05E 09 | 0.00E-01 | 8.75E 07 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 4.89E 08 |
| SR | 90 | 9.83E 10 | 0.00E-01 | 2.41E 10 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.84E 09 |
| SR | 91 | 6.02E 04 | 0.00E-01 | 2.43E 03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.87E 05 |
| SR | 92 | 1.03E 00 | 0.00E-01 | 4.45E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.04E 01 |
| Y | 90 | 8.49E 00 | 0.00E-01 | 2.28E-00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 9.00E 04 |
| Y | 91M | 7.24E-21 | 0.00E-01 | 2.80E-22 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.13E-20 |
| Y | 91 | 1.03E 03 | 0.00E-01 | 2.76E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 5.67E 05 |
| Y | 92 | 6.71E-06 | 0.00E-01 | 1.96E-07 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.18E-01 |
| Y | 93 | 2.80E-02 | 0.00E-01 | 7.73E-04 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 8.87E 02 |
| ZR | 95 | 1.13E 02 | 3.63E 01 | 2.46E 01 | 0.00E-01 | 5.70E 01 | 0.00E-01 | 1.15E 05 |
| ZR | 97 | 5.20E-02 | 1.05E-01 | 4.80E-03 | 0.00E-01 | 1.58E-01 | 0.00E-01 | 3.25E 03 |
| NB | 95 | 9.91E 03 | 5.51E 03 | 2.96E 03 | 0.00E-01 | 5.45E 03 | 0.00E-01 | 3.35E 07 |
| MO | 99 | 0.00E-01 | 2.97E 06 | 5.65E 05 | 0.00E-01 | 6.73E 06 | 0.00E-01 | 6.89E 06 |
| TC | 99M | 3.99E-01 | 1.13E 00 | 1.44E 01 | 0.00E-01 | 1.71E 01 | 5.53E-01 | 6.67E 02 |

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TABLE A.5-17 (cont'd)
GRASS-GOAT-MILK PATHWAY FACTOR
M² MREM/YR PER μ CI/SEC
ADULT

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|------|----------|----------|----------|----------|----------|----------|----------|
| TC | 101 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RU | 103 | 1.22E 02 | 0.00E-01 | 5.26E 01 | 0.00E-01 | 4.66E 02 | 0.00E-01 | 1.43E 04 |
| RU | 105 | 1.03E-04 | 0.00E-01 | 4.07E-05 | 0.00E-01 | 1.33E-03 | 0.00E-01 | 6.30E-02 |
| RU | 106 | 2.45E 03 | 0.00E-01 | 3.10E 02 | 0.00E-01 | 4.73E 03 | 0.00E-01 | 1.58E 05 |
| AG | 110M | 6.99E 06 | 6.46E 06 | 3.84E 06 | 0.00E-01 | 1.27E 07 | 0.00E-01 | 2.64E 09 |
| TE | 125M | 1.95E 06 | 7.08E 05 | 2.62E 05 | 5.88E 05 | 7.95E 06 | 0.00E-01 | 7.81E 06 |
| TE | 127M | 5.49E 06 | 1.96E 06 | 6.70E 05 | 1.40E 06 | 2.23E 07 | 0.00E-01 | 1.84E 07 |
| TE | 127 | 7.84E 01 | 2.82E 01 | 1.70E 01 | 5.81E 01 | 3.19E 02 | 0.00E-01 | 6.19E 03 |
| TE | 129M | 7.22E 06 | 2.69E 06 | 1.14E 06 | 2.48E 06 | 3.02E 07 | 0.00E-01 | 3.64E 07 |
| TE | 129 | 3.41E-11 | 1.28E-11 | 8.31E-12 | 2.62E-11 | 1.43E-10 | 0.00E-01 | 2.57E-11 |
| TE | 131M | 4.33E 04 | 2.12E 04 | 1.77E 04 | 3.36E 04 | 2.15E 05 | 0.00E-01 | 2.10E 06 |
| TE | 131 | 4.40E-34 | 1.84E-34 | 1.39E-34 | 3.62E-34 | 1.93E-33 | 0.00E-01 | 6.23E-35 |
| TE | 132 | 2.88E 05 | 1.86E 05 | 1.75E 05 | 2.06E 05 | 1.80E 06 | 0.00E-01 | 8.82E 06 |
| I | 130 | 5.04E 05 | 1.49E 06 | 5.87E 05 | 1.26E 08 | 2.32E 06 | 0.00E-01 | 1.28E 06 |
| I | 131 | 3.55E 08 | 5.08E 08 | 2.91E 08 | 1.67E 11 | 8.71E 08 | 0.00E-01 | 1.34E 08 |
| I | 132 | 1.98E-00 | 5.29E-00 | 1.85E-00 | 1.85E 01 | 8.43E-00 | 0.00E-01 | 9.94E-01 |
| I | 133 | 4.65E 06 | 8.08E 06 | 2.46E 06 | 1.19E 09 | 1.41E 07 | 0.00E-01 | 7.26E 06 |
| I | 134 | 2.44E-12 | 6.63E-12 | 2.37E-12 | 1.15E-10 | 1.05E-11 | 0.00E-01 | 5.78E-15 |
| I | 135 | 1.54E 04 | 4.04E 04 | 1.49E 04 | 2.66E 06 | 6.48E 04 | 0.00E-01 | 4.56E 04 |
| CS | 134 | 1.70E 10 | 4.04E 10 | 3.30E 10 | 0.00E-01 | 1.31E 10 | 4.34E 09 | 7.06E 08 |
| CS | 136 | 7.83E 08 | 3.09E 09 | 2.23E 09 | 0.00E-01 | 1.72E 09 | 2.36E 08 | 3.51E 08 |
| CS | 137 | 2.21E 10 | 3.03E 10 | 1.98E 10 | 0.00E-01 | 1.03E 10 | 3.42E 09 | 5.86E 08 |
| CS | 138 | 2.75E-23 | 5.43E-23 | 2.69E-23 | 0.00E-01 | 3.99E-23 | 3.94E-24 | 2.32E-28 |
| BA | 139 | 5.48E-09 | 3.90E-12 | 1.60E-10 | 0.00E-01 | 3.65E-12 | 2.21E-12 | 9.71E-09 |
| BA | 140 | 3.23E 06 | 4.05E 03 | 2.11E 05 | 0.00E-01 | 1.38E 03 | 2.32E 03 | 6.64E 06 |
| BA | 141 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BA | 142 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| LA | 140 | 5.43E-01 | 2.73E-01 | 7.23E-02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.01E 04 |
| LA | 142 | 1.13E-12 | 5.12E-13 | 1.28E-13 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.74E-09 |
| CE | 141 | 5.81E 02 | 3.93E 02 | 4.46E 01 | 0.00E-01 | 1.83E 02 | 0.00E-01 | 1.50E 06 |
| CE | 143 | 4.99E 00 | 3.69E 03 | 4.08E-00 | 0.00E-01 | 1.62E 00 | 0.00E-01 | 1.38E 05 |
| CE | 144 | 4.29E 04 | 1.79E 04 | 2.30E 03 | 0.00E-01 | 1.06E 04 | 0.00E-01 | 1.45E 07 |
| PR | 143 | 1.90E 01 | 7.60E 00 | 9.39E-00 | 0.00E-01 | 4.39E 00 | 0.00E-01 | 8.30E 04 |
| PR | 144 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| ND | 147 | 1.14E 01 | 1.31E 01 | 7.85E-01 | 0.00E-01 | 7.67E 00 | 0.00E-01 | 6.30E 04 |
| W | 187 | 7.87E 02 | 6.58E 02 | 2.30E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.16E 05 |
| NP | 239 | 4.41E-01 | 4.33E-02 | 2.39E-02 | 0.00E-01 | 1.35E-01 | 0.00E-01 | 8.89E 03 |

TABLE A.5-17 (cont'd)

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TABLE A.5-18
GRASS-GOAT-MILK PATHWAY FACTOR
M² MREM/YR PER μ CI/SEC
TEEN

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| H | 3 | 0.00E-01 | 2.03E 03 | 2.03E 03 | 2.03E 03 | 2.03E 03 | 2.03E 03 | 2.03E 03 |
| C | 14 | 4.86E 08 | 9.72E 07 | 9.72E 07 | 9.72E 07 | 9.72E 07 | 9.72E 07 | 9.72E 07 |
| NA | 24 | 5.11E 05 | 5.11E 05 | 5.11E 05 | 5.11E 05 | 5.11E 05 | 5.11E 05 | 5.11E 05 |
| P | 32 | 3.78E 10 | 2.34E 09 | 1.47E 09 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.18E 09 |
| CR | 51 | 0.00E-01 | 0.00E-01 | 5.99E 03 | 3.33E 03 | 1.31E 03 | 8.55E 03 | 1.01E 06 |
| MN | 54 | 0.00E-01 | 1.68E 06 | 3.34E 05 | 0.00E-01 | 5.02E 05 | 0.00E-01 | 3.45E 06 |
| MN | 56 | 0.00E-01 | 8.85E-04 | 1.57E-04 | 0.00E-01 | 1.12E-03 | 0.00E-01 | 5.82E-02 |
| FE | 55 | 5.79E 05 | 4.10E 05 | 9.57E 04 | 0.00E-01 | 0.00E-01 | 2.60E 05 | 1.78E 05 |
| FE | 59 | 6.74E 05 | 1.57E 06 | 6.07E 05 | 0.00E-01 | 0.00E-01 | 4.96E 05 | 3.72E 06 |
| CO | 58 | 0.00E-01 | 9.52E 05 | 2.19E 06 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.31E 07 |
| CO | 60 | 0.00E-01 | 3.34E 06 | 7.52E 06 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 4.35E 07 |
| NI | 63 | 1.42E 09 | 1.00E 08 | 4.81E 07 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.59E 07 |
| NI | 65 | 1.02E-01 | 1.30E-02 | 5.92E-03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 7.05E-01 |
| CU | 64 | 0.00E-01 | 4.74E 03 | 2.23E 03 | 0.00E-01 | 1.20E 04 | 0.00E-01 | 3.67E 05 |
| ZN | 65 | 2.53E 08 | 8.78E 08 | 4.09E 08 | 0.00E-01 | 5.62E 08 | 0.00E-01 | 3.72E 08 |
| ZN | 69 | 1.15E-12 | 2.20E-12 | 1.54E-13 | 0.00E-01 | 1.44E-12 | 0.00E-01 | 4.05E-12 |
| BR | 83 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BR | 84 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BR | 85 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RB | 86 | 0.00E-01 | 5.67E 08 | 2.67E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 8.40E 07 |
| RB | 88 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RB | 89 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| SR | 89 | 5.62E 09 | 0.00E-01 | 1.61E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 6.69E 08 |
| SR | 90 | 1.39E 11 | 0.00E-01 | 3.43E 10 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.90E 09 |
| SR | 91 | 1.11E 05 | 0.00E-01 | 4.40E 03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 5.02E 05 |
| SR | 92 | 1.88E 00 | 0.00E-01 | 8.02E-02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 4.80E 01 |
| Y | 90 | 1.56E 01 | 0.00E-01 | 4.20E-00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.29E 05 |
| Y | 91M | 1.33E-20 | 0.00E-01 | 5.07E-22 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 6.26E-19 |
| Y | 91 | 1.90E 03 | 0.00E-01 | 5.08E 01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 7.77E 05 |
| Y | 92 | 1.24E-05 | 0.00E-01 | 3.59E-07 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.40E-01 |
| Y | 93 | 5.16E-02 | 0.00E-01 | 1.41E-03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.58E 03 |
| ZR | 95 | 1.98E 02 | 6.25E 01 | 4.30E 01 | 0.00E-01 | 9.18E 01 | 0.00E-01 | 1.44E 05 |
| ZR | 97 | 9.47E-02 | 1.87E-02 | 8.63E-03 | 0.00E-01 | 2.84E-02 | 0.00E-01 | 5.07E 03 |
| NB | 95 | 1.69E 04 | 9.37E 03 | 5.16E 03 | 0.00E-01 | 9.09E 03 | 0.00E-01 | 4.01E 07 |
| MO | 99 | 0.00E-01 | 5.37E 06 | 1.02E 06 | 0.00E-01 | 1.23E 07 | 0.00E-01 | 9.61E 06 |
| TC | 99M | 6.92E-00 | 1.93E 00 | 2.50E 01 | 0.00E-01 | 2.88E 01 | 1.07E 00 | 1.27E 03 |
| TC | 101 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |

TABLE A.5-18

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TABLE A.5-18 (cont'd)
GRASS-GOAT-MILK PATHWAY FACTOR
M² MREM/YR PER μ CI/SEC
TEEN

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|------|----------|----------|----------|----------|----------|----------|----------|
| RU | 103 | 2.17E 02 | 0.00E-01 | 9.28E 01 | 0.00E-01 | 7.66E 02 | 0.00E-01 | 1.81E 04 |
| RU | 105 | 1.88E-04 | 0.00E-01 | 7.30E-05 | 0.00E-01 | 2.37E-03 | 0.00E-01 | 1.52E-01 |
| RU | 106 | 4.50E 03 | 0.00E-01 | 5.67E 02 | 0.00E-01 | 8.68E 03 | 0.00E-01 | 2.16E 05 |
| AG | 110M | 1.16E 07 | 1.09E 07 | 6.65E 06 | 0.00E-01 | 2.08E 07 | 0.00E-01 | 3.07E 09 |
| TE | 125M | 3.60E 06 | 1.30E 06 | 4.82E 05 | 1.01E 06 | 0.00E-01 | 0.00E-01 | 1.06E 07 |
| TE | 127M | 1.01E 07 | 3.59E 06 | 1.20E 06 | 2.41E 06 | 4.10E 07 | 0.00E-01 | 2.52E 07 |
| TE | 127 | 1.45E 02 | 5.15E 01 | 3.13E 01 | 1.00E 02 | 5.89E 02 | 0.00E-01 | 1.12E 04 |
| TE | 129M | 1.32E 07 | 4.90E 06 | 2.09E 06 | 4.26E 06 | 5.53E 07 | 0.00E-01 | 4.96E 07 |
| TE | 129 | 6.28E-11 | 2.34E-11 | 1.53E-11 | 4.48E-11 | 2.63E-10 | 0.00E-01 | 3.43E-10 |
| TE | 131M | 7.89E 04 | 3.78E 04 | 3.16E 04 | 5.69E 04 | 3.94E 05 | 0.00E-01 | 3.04E 06 |
| TE | 131 | 8.04E-34 | 3.31E-34 | 2.51E-34 | 6.19E-34 | 3.51E-33 | 0.00E-01 | 6.60E-35 |
| TE | 132 | 5.15E 05 | 3.26E 05 | 3.07E 05 | 3.44E 05 | 3.13E 06 | 0.00E-01 | 1.03E 07 |
| I | 130 | 8.87E 05 | 2.57E 06 | 1.02E 06 | 2.09E 08 | 3.95E 06 | 0.00E-01 | 1.97E 06 |
| I | 131 | 6.45E 08 | 9.03E 08 | 4.85E 08 | 2.63E 11 | 1.55E 09 | 0.00E-01 | 1.79E 08 |
| I | 132 | 3.51E-01 | 9.18E-01 | 3.29E-01 | 3.09E 01 | 1.45E 00 | 0.00E-01 | 4.00E-01 |
| I | 133 | 8.49E 06 | 1.44E 07 | 4.39E 06 | 2.01E 09 | 2.52E 07 | 0.00E-01 | 1.09E 07 |
| I | 134 | 4.34E-12 | 1.15E-11 | 4.13E-12 | 1.92E-10 | 1.81E-11 | 0.00E-01 | 1.51E-13 |
| I | 135 | 2.74E 04 | 7.05E 04 | 2.61E 04 | 4.54E 06 | 1.11E 05 | 0.00E-01 | 7.82E 04 |
| CS | 134 | 2.94E 10 | 6.93E 10 | 3.22E 10 | 0.00E-01 | 2.20E 10 | 8.41E 09 | 8.62E 08 |
| CS | 136 | 1.33E 09 | 5.25E 09 | 3.52E 09 | 0.00E-01 | 2.86E 09 | 4.50E 08 | 4.22E 08 |
| CS | 137 | 4.02E 10 | 5.34E 10 | 1.86E 10 | 0.00E-01 | 1.82E 10 | 7.06E 09 | 7.60E 08 |
| CS | 138 | 4.99E-23 | 9.58E-23 | 4.79E-23 | 0.00E-01 | 7.07E-23 | 8.23E-24 | 4.34E-26 |
| BA | 139 | 1.01E-08 | 7.13E-12 | 2.95E-10 | 0.00E-01 | 6.72E-12 | 4.91E-12 | 9.04E-08 |
| BA | 140 | 5.82E 06 | 7.14E 03 | 3.75E 05 | 0.00E-01 | 2.42E 03 | 4.08E 03 | 8.98E 06 |
| BA | 141 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BA | 142 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| LA | 140 | 9.75E-01 | 4.79E-01 | 1.27E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.75E 04 |
| LA | 142 | 2.03E-12 | 9.03E 13 | 2.25E-13 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.75E-08 |
| CE | 141 | 1.07E 03 | 7.12E 02 | 8.18E 01 | 0.00E-01 | 3.35E 02 | 0.00E-01 | 2.04E 06 |
| CE | 143 | 9.17E 00 | 6.67E 03 | 7.45E-00 | 0.00E-01 | 2.99E 00 | 0.00E-01 | 2.01E 05 |
| CE | 144 | 7.90E 04 | 3.27E 04 | 4.24E 03 | 0.00E-01 | 1.95E 04 | 0.00E-01 | 1.99E 07 |
| PR | 143 | 3.48E 01 | 1.39E 00 | 1.73E 00 | 0.00E-01 | 8.08E 00 | 0.00E-01 | 1.15E 05 |
| PR | 144 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| ND | 147 | 2.19E 01 | 2.38E 01 | 1.42E 00 | 0.00E-01 | 1.40E 01 | 0.00E-01 | 8.57E 04 |
| W | 187 | 1.44E 03 | 1.17E 03 | 4.11E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.18E 05 |
| NP | 239 | 8.41E-01 | 7.93E-02 | 4.41E-02 | 0.00E-01 | 2.49E-01 | 0.00E-01 | 1.28E 04 |

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TABLE A.5-19
GRASS-GOAT-MILK PATHWAY FACTOR
M² MREM/YR PER μ CI/SEC
CHILD

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| H | 3 | 0.00E-01 | 3.20E 03 | 3.20E 03 | 3.20E 03 | 3.20E 03 | 3.20E 03 | 3.20E 03 |
| C | 14 | 1.19E 09 | 2.39E 08 | 2.39E 08 | 2.39E 08 | 2.39E 08 | 2.39E 08 | 2.39E 08 |
| NA | 24 | 1.06E 06 | 1.06E 06 | 1.06E 06 | 1.06E 06 | 1.06E 06 | 1.06E 06 | 1.06E 06 |
| P | 32 | 9.33E 10 | 4.37E 09 | 3.60E 09 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.58E 09 |
| CR | 51 | 0.00E-01 | 0.00E-01 | 1.22E 04 | 6.78E 03 | 1.85E 03 | 1.24E 04 | 6.48E 05 |
| MN | 54 | 0.00E-01 | 2.52E 06 | 6.70E 05 | 0.00E-01 | 7.06E 05 | 0.00E-01 | 2.11E 06 |
| MN | 56 | 0.00E-01 | 1.54E-03 | 3.48E-04 | 0.00E-01 | 1.87E-03 | 0.00E-01 | 2.24E-01 |
| FE | 55 | 1.45E 06 | 7.70E 05 | 2.39E 05 | 0.00E-01 | 0.00E-01 | 4.36E 05 | 1.43E 05 |
| FE | 59 | 1.56E 06 | 2.53E 06 | 1.26E 06 | 0.00E-01 | 0.00E-01 | 7.33E 05 | 2.63E 06 |
| CO | 58 | 0.00E-01 | 1.46E 06 | 4.45E 06 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 8.49E 06 |
| CO | 60 | 0.00E-01 | 5.18E 06 | 1.53E 07 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.87E 07 |
| NI | 63 | 3.56E 09 | 1.90E 08 | 1.21E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.28E 07 |
| NI | 65 | 2.49E-01 | 2.34E-02 | 1.37E-02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.87E 00 |
| CU | 64 | 0.00E-01 | 8.23E 03 | 5.03E 03 | 0.00E-01 | 2.01E 04 | 0.00E-01 | 3.91E 05 |
| ZN | 65 | 4.96E 08 | 1.32E 09 | 8.22E 08 | 0.00E-01 | 8.33E 08 | 0.00E-01 | 2.32E 08 |
| ZN | 69 | 2.84E-12 | 4.10E-12 | 3.79E-13 | 0.00E-01 | 2.49E-12 | 0.00E-01 | 2.58E-10 |
| BR | 83 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BR | 84 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BR | 85 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RB | 86 | 0.00E-01 | 1.05E 09 | 6.47E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 6.77E 07 |
| RB | 88 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RB | 89 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| SR | 89 | 1.39E 10 | 0.00E-01 | 3.97E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 5.38E 08 |
| SR | 90 | 2.35E 11 | 0.00E-01 | 5.95E 10 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.16E 09 |
| SR | 91 | 2.71E 05 | 0.00E-01 | 1.02E 04 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 5.99E 05 |
| SR | 92 | 4.60E 00 | 0.00E-01 | 1.84E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 8.71E 01 |
| Y | 90 | 3.86E 01 | 0.00E-01 | 1.03E-00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.10E 05 |
| Y | 91M | 3.24E-20 | 0.00E-01 | 1.18E-21 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 6.34E-17 |
| Y | 91 | 4.68E 03 | 0.00E-01 | 1.25E 00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 6.24E 05 |
| Y | 92 | 3.04E-05 | 0.00E-01 | 8.71E-07 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 8.79E-01 |
| Y | 93 | 1.27E-01 | 0.00E-01 | 3.48E-03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.89E 03 |
| ZR | 95 | 4.60E 02 | 1.01E 02 | 9.00E 01 | 0.00E-01 | 1.45E 02 | 0.00E-01 | 1.05E 05 |
| ZR | 97 | 2.30E-01 | 3.33E-02 | 1.96E-02 | 0.00E-01 | 4.78E-02 | 0.00E-01 | 5.04E 03 |
| NB | 95 | 3.82E 04 | 1.49E 04 | 1.06E 04 | 0.00E-01 | 1.40E 04 | 0.00E-01 | 2.75E 07 |
| MO | 99 | 0.00E-01 | 9.76E 06 | 2.42E 06 | 0.00E-01 | 2.08E 07 | 0.00E-01 | 8.07E 06 |
| TC | 99M | 1.59E 00 | 3.11E 00 | 5.16E 01 | 0.00E-01 | 4.52E 01 | 1.58E 00 | 1.77E 03 |
| TC | 101 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |

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TABLE A.5-19 (cont'd)
GRASS-GOAT-MILK PATHWAY FACTOR
M² MREM/YR PER μ CI/SEC
CHILD

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|------|----------|----------|----------|----------|----------|----------|----------|
| RU | 103 | 5.14E 02 | 0.00E-01 | 1.97E 02 | 0.00E-01 | 1.29E 03 | 0.00E-01 | 1.33E 04 |
| RU | 105 | 4.59E-04 | 0.00E-01 | 1.67E-04 | 0.00E-01 | 4.04E-03 | 0.00E-01 | 3.00E-01 |
| RU | 106 | 1.11E 04 | 0.00E-01 | 1.38E 03 | 0.00E-01 | 1.50E 04 | 0.00E-01 | 1.72E 05 |
| AG | 110M | 2.51E 07 | 1.69E 07 | 1.35E 07 | 0.00E-01 | 3.15E 07 | 0.00E-01 | 2.01E 09 |
| TE | 125M | 8.85E 06 | 2.40E 06 | 1.18E 06 | 2.48E 06 | 0.00E-01 | 0.00E-01 | 8.54E 06 |
| TE | 127M | 2.50E 07 | 6.72E 06 | 2.96E 06 | 5.97E 06 | 7.12E 07 | 0.00E-01 | 2.02E 07 |
| TE | 127 | 3.57E 02 | 9.64E 01 | 7.67E 01 | 2.47E 02 | 1.02E 03 | 0.00E-01 | 1.40E 04 |
| TE | 129M | 3.26E 07 | 9.09E 06 | 5.05E 06 | 1.05E 07 | 9.56E 07 | 0.00E-01 | 3.97E 07 |
| TE | 129 | 1.55E-10 | 4.32E-11 | 3.68E-11 | 1.11E-10 | 4.53E-10 | 0.00E-01 | 9.64E-09 |
| TE | 131M | 1.92E 05 | 6.64E 04 | 7.07E 04 | 1.37E 05 | 6.43E 05 | 0.00E-01 | 2.69E 06 |
| TE | 131 | 1.97E-33 | 6.01E-34 | 5.87E-34 | 1.51E-33 | 5.97E-33 | 0.00E-01 | 1.04E-32 |
| TE | 132 | 1.23E 06 | 5.44E 05 | 6.58E 05 | 7.93E 05 | 5.05E 06 | 0.00E-01 | 5.48E 06 |
| I | 130 | 2.07E 06 | 4.19E 06 | 2.16E 06 | 4.62E 08 | 6.27E 06 | 0.00E-01 | 1.96E 06 |
| I | 131 | 1.56E 09 | 1.57E 09 | 8.94E 08 | 5.20E 11 | 2.58E 09 | 0.00E-01 | 1.40E 08 |
| I | 132 | 8.30E-01 | 1.52E 00 | 7.01E-01 | 7.07E 01 | 2.33E 00 | 0.00E-01 | 1.79E 00 |
| I | 133 | 2.06E 07 | 2.55E 07 | 9.65E 06 | 4.74E 09 | 4.25E 07 | 0.00E-01 | 1.03E 07 |
| I | 134 | 1.03E-11 | 1.91E-11 | 8.77E-12 | 4.39E-10 | 2.92E-11 | 0.00E-01 | 1.26E-11 |
| I | 135 | 6.49E 04 | 1.17E 05 | 5.52E 04 | 1.03E 07 | 1.79E 05 | 0.00E-01 | 8.90E 04 |
| CS | 134 | 6.79E 10 | 1.11E 11 | 2.35E 10 | 0.00E-01 | 3.45E 10 | 1.24E 10 | 6.01E 08 |
| CS | 136 | 3.01E 09 | 8.27E 09 | 5.35E 09 | 0.00E-01 | 4.40E 09 | 6.57E 08 | 2.91E 08 |
| CS | 137 | 9.67E 10 | 9.26E 10 | 1.37E 10 | 0.00E-01 | 3.02E 10 | 1.09E 10 | 5.80E 08 |
| CS | 138 | 1.21E-22 | 1.68E-22 | 1.07E-22 | 0.00E-01 | 1.18E-22 | 1.27E-23 | 7.74E-23 |
| BA | 139 | 2.49E-08 | 1.33E-11 | 7.21E-10 | 0.00E-01 | 1.16E-11 | 7.82E-12 | 1.44E-06 |
| BA | 140 | 1.41E 07 | 1.23E 04 | 8.21E 05 | 0.00E-01 | 4.01E 03 | 7.34E 03 | 7.12E 06 |
| BA | 141 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BA | 142 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| LA | 140 | 2.33E 00 | 8.16E-00 | 2.75E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.27E 04 |
| LA | 142 | 4.91E-12 | 1.56E-12 | 4.90E-13 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.10E-07 |
| CE | 141 | 2.63E 03 | 1.31E 03 | 1.94E 02 | 0.00E-01 | 5.74E 02 | 0.00E-01 | 1.63E 06 |
| CE | 143 | 2.25E 01 | 1.22E 04 | 1.77E 00 | 0.00E-01 | 5.12E 00 | 0.00E-01 | 1.79E 05 |
| CE | 144 | 1.95E 05 | 6.11E 04 | 1.04E 04 | 0.00E-01 | 3.38E 04 | 0.00E-01 | 1.59E 07 |
| PR | 143 | 8.62E 01 | 2.59E 01 | 4.28E 00 | 0.00E-01 | 1.40E 01 | 0.00E-01 | 9.30E 04 |
| PR | 144 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| ND | 147 | 5.36E 01 | 4.34E 01 | 3.36E 00 | 0.00E-01 | 2.38E 01 | 0.00E-01 | 6.88E 04 |
| W | 187 | 3.49E 03 | 2.07E 03 | 9.28E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.90E 05 |
| NP | 239 | 2.07E 00 | 1.49E-01 | 1.04E-01 | 0.00E-01 | 4.30E-01 | 0.00E-01 | 1.10E 04 |

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TABLE A.5-20
GRASS-GOAT-MILK PATHWAY FACTOR
M² MREM/YR PER μ CI/SEC
INFANT

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|-----|----------|----------|----------|----------|----------|----------|----------|
| H | 3 | 0.00E-01 | 4.86E 03 | 4.86E 03 | 4.86E 03 | 4.86E 03 | 4.86E 03 | 4.86E 03 |
| C | 14 | 2.34E 09 | 5.00E 08 | 5.00E 08 | 5.00E 08 | 5.00E 08 | 5.00E 08 | 5.00E 08 |
| NA | 24 | 1.85E 06 | 1.85E 06 | 1.85E 06 | 1.85E 06 | 1.85E 06 | 1.85E 06 | 1.85E 06 |
| P | 32 | 1.92E 11 | 1.13E 10 | 7.45E 09 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.60E 09 |
| CR | 51 | 0.00E-01 | 0.00E-01 | 1.94E 04 | 1.26E 04 | 2.76E 03 | 2.46E 04 | 5.64E 05 |
| MN | 54 | 0.00E-01 | 4.68E 06 | 1.06E 06 | 0.00E-01 | 1.04E 06 | 0.00E-01 | 1.72E 06 |
| MN | 56 | 0.00E-01 | 3.78E-03 | 6.51E-04 | 0.00E-01 | 3.25E-03 | 0.00E-01 | 3.43E-01 |
| FE | 55 | 1.76E 06 | 1.13E 06 | 3.03E 06 | 0.00E-01 | 0.00E-01 | 5.54E 05 | 1.44E 05 |
| FE | 59 | 2.92E 06 | 5.09E 06 | 2.01E 06 | 0.00E-01 | 0.00E-01 | 1.51E 06 | 2.43E 06 |
| CO | 58 | 0.00E-01 | 2.91E 06 | 7.26E 06 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 7.25E 06 |
| CO | 60 | 0.00E-01 | 1.06E 07 | 2.50E 07 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.52E 07 |
| NI | 63 | 4.19E 09 | 2.59E 08 | 1.45E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.29E 07 |
| NI | 65 | 5.27E-01 | 5.96E-02 | 2.71E-02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 4.54E 00 |
| CU | 64 | 0.00E-01 | 2.07E 04 | 9.58E 03 | 0.00E-01 | 3.50E 04 | 0.00E-01 | 4.25E 05 |
| ZN | 65 | 6.66E 08 | 2.28E 09 | 1.05E 09 | 0.00E-01 | 1.11E 09 | 0.00E-01 | 1.93E 09 |
| ZN | 69 | 6.04E-12 | 1.09E-11 | 8.10E-13 | 0.00E-01 | 4.52E-12 | 0.00E-01 | 8.87E-10 |
| BR | 83 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BR | 84 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BR | 85 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RB | 86 | 0.00E-01 | 2.67E 09 | 1.32E 09 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 6.83E 07 |
| RB | 88 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RB | 89 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| SR | 89 | 2.64E 10 | 0.00E-01 | 7.58E 08 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 5.43E 08 |
| SR | 90 | 2.55E 11 | 0.00E-01 | 6.50E 10 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.19E 09 |
| SR | 91 | 5.65E 05 | 0.00E-01 | 2.05E 03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 6.69E 05 |
| SR | 92 | 9.78E 00 | 0.00E-01 | 3.63E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.05E 02 |
| Y | 90 | 8.16E 01 | 0.00E-01 | 2.19E 00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.13E 05 |
| Y | 91M | 6.87E-20 | 0.00E-01 | 2.34E-21 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.29E-16 |
| Y | 91 | 8.79E 03 | 0.00E-01 | 2.34E 02 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 6.30E 05 |
| Y | 92 | 6.47E-05 | 0.00E-01 | 1.82E-06 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 1.23E 00 |
| Y | 93 | 2.70E-01 | 0.00E-01 | 7.36E-03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.13E 03 |
| ZR | 95 | 8.17E 02 | 1.99E 02 | 1.41E 02 | 0.00E-01 | 2.14E 02 | 0.00E-01 | 9.91E 04 |
| ZR | 97 | 4.88E-01 | 8.37E-02 | 3.82E-02 | 0.00E-01 | 8.44E-02 | 0.00E-01 | 5.34E 03 |
| NB | 95 | 7.12E 04 | 2.93E 04 | 1.70E 04 | 0.00E-01 | 2.10E 04 | 0.00E-01 | 2.48E 07 |
| MO | 99 | 0.00E-01 | 2.50E 07 | 4.87E 06 | 0.00E-01 | 3.73E 07 | 0.00E-01 | 8.22E 06 |
| TC | 99M | 3.30E 00 | 6.81E 00 | 8.77E 01 | 0.00E-01 | 7.33E 01 | 3.56E 00 | 1.98E 03 |

INFORMED 1999/12/07

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TABLE A.5-20 (cont'd)
GRASS-GOAT-MILK PATHWAY FACTOR
M² MREM/YR PER μ CI/SEC
INFANT

| NUCLIDE | | BONE | LIVER | T BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---------|------|----------|----------|----------|----------|----------|----------|----------|
| TC | 101 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| RU | 103 | 1.04E 03 | 0.00E-01 | 3.48E 02 | 0.00E-01 | 2.16E 03 | 0.00E-01 | 1.26E 04 |
| RU | 105 | 9.68E-04 | 0.00E-01 | 3.26E-04 | 0.00E-01 | 7.12E-03 | 0.00E-01 | 3.85E-01 |
| RU | 106 | 2.28E 04 | 0.00E-01 | 2.85E 03 | 0.00E-01 | 2.70E 04 | 0.00E-01 | 1.73E 05 |
| AG | 110M | 4.63E 07 | 3.38E 07 | 2.24E 07 | 0.00E-01 | 4.83E 07 | 0.00E-01 | 1.75E 09 |
| TE | 125M | 1.81E 07 | 6.05E 06 | 2.45E 06 | 6.09E 06 | 0.00E-01 | 0.00E-01 | 8.62E 06 |
| TE | 127M | 5.05E 07 | 1.68E 07 | 6.12E 06 | 1.46E 07 | 1.24E 08 | 0.00E-01 | 2.04E 07 |
| TE | 127 | 7.59E 02 | 2.54E 02 | 1.63E 02 | 6.18E 02 | 1.85E 03 | 0.00E-01 | 1.59E 04 |
| TE | 129M | 6.69E 07 | 2.29E 07 | 1.03E 07 | 2.57E 07 | 1.67E 08 | 0.00E-01 | 3.99E 07 |
| TE | 129 | 3.28E-10 | 1.13E-10 | 7.66E-11 | 2.75E-10 | 8.17E-10 | 0.00E-01 | 2.62E-08 |
| TE | 131M | 4.05E 05 | 1.63E 05 | 1.35E 05 | 3.31E 05 | 1.12E 06 | 0.00E-01 | 2.75E 06 |
| TE | 131 | 4.18E-33 | 1.54E-33 | 1.17E-33 | 3.73E-33 | 1.07E-32 | 0.00E-01 | 1.69E-31 |
| TE | 132 | 2.53E 06 | 1.25E 06 | 1.17E 06 | 1.85E 06 | 7.84E 06 | 0.00E-01 | 4.64E 06 |
| I | 130 | 4.26E 06 | 9.38E 06 | 3.76E 06 | 1.05E 09 | 1.03E 07 | 0.00E-01 | 2.01E 06 |
| I | 131 | 3.26E 09 | 3.85E 09 | 1.69E 09 | 1.26E 12 | 4.49E 09 | 0.00E-01 | 1.37E 08 |
| I | 132 | 1.72E 00 | 3.49E 00 | 1.24E 00 | 1.64E 02 | 3.90E 00 | 0.00E-01 | 2.83E 00 |
| I | 133 | 4.35E 07 | 6.34E 07 | 1.86E 07 | 1.15E 10 | 7.45E 07 | 0.00E-01 | 1.07E 07 |
| I | 134 | 2.13E-11 | 4.36E-11 | 1.55E-11 | 1.02E-09 | 4.88E-11 | 0.00E-01 | 4.51E-11 |
| I | 135 | 1.35E 05 | 2.68E 05 | 9.79E 04 | 2.41E 07 | 2.99E 05 | 0.00E-01 | 9.71E 04 |
| CS | 134 | 1.09E 11 | 2.04E 11 | 2.06E 10 | 0.00E-01 | 5.25E 10 | 1.86E 10 | 5.54E 08 |
| CS | 136 | 5.88E 09 | 1.73E 10 | 6.45E 09 | 0.00E-01 | 6.89E 09 | 1.41E 09 | 2.63E 08 |
| CS | 137 | 1.54E 11 | 1.81E 11 | 1.28E 10 | 0.00E-01 | 4.85E 10 | 1.96E 10 | 5.65E 08 |
| CS | 138 | 2.55E-22 | 4.15E-22 | 2.01E-22 | 0.00E-01 | 2.07E-22 | 3.23E-23 | 6.63E-22 |
| BA | 139 | 5.30E-08 | 3.51E-11 | 1.53E-09 | 0.00E-01 | 2.11E-11 | 2.13E-11 | 3.35E-06 |
| BA | 140 | 2.89E 07 | 2.89E 04 | 1.49E 06 | 0.00E-01 | 6.87E 03 | 1.78E 04 | 7.11E 06 |
| BA | 141 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| BA | 142 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| LA | 140 | 4.88E 00 | 1.92E 00 | 4.94E-00 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 2.26E 04 |
| LA | 142 | 1.03E-11 | 3.78E-12 | 9.06E-13 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 6.43E-07 |
| CE | 141 | 5.20E 03 | 3.17E 03 | 3.74E 02 | 0.00E-01 | 9.79E 02 | 0.00E-01 | 1.64E 06 |
| CE | 143 | 4.76E 01 | 3.16E 04 | 3.61E 00 | 0.00E-01 | 9.21E 00 | 0.00E-01 | 1.84E 05 |
| CE | 144 | 2.79E 05 | 1.14E 05 | 1.56E 04 | 0.00E-01 | 4.62E 04 | 0.00E-01 | 1.60E 07 |
| PR | 143 | 1.78E 02 | 6.67E 01 | 8.84E 00 | 0.00E-01 | 2.48E 01 | 0.00E-01 | 9.41E 04 |
| PR | 144 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 0.00E-01 |
| ND | 147 | 1.06E 02 | 1.09E 02 | 6.69E 00 | 0.00E-01 | 4.21E 01 | 0.00E-01 | 6.92E 04 |
| W | 187 | 7.35E 03 | 5.11E 03 | 1.77E 03 | 0.00E-01 | 0.00E-01 | 0.00E-01 | 3.00E 05 |
| NP | 239 | 4.38E 00 | 3.91E-01 | 2.21E-01 | 0.00E-01 | 7.80E-01 | 0.00E-01 | 1.13E 04 |

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APPENDIX B
Meteorological Model

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APPENDIX B

PROPRIETARY INFORMATION SUPPLIED BY SAI

The X/Q's and D/Q's are calculated using the guidance of Reg. Guide 1.111.

The constant mean wind direction model, as defined in equation 3 of Reg. Guide 1.111, is used to calculate X/Q values.

$$(X/Q)_0 = \frac{2.032 \sum_j n_{ij} \exp[-h_e^2 / 2 \sigma_{zj}^2(x)]}{N \times \bar{U}_i \sum_j (x)}$$

Where:

h_e = effective release height (m). (All releases from Wolf Creek Generating Station are considered as ground releases therefore $h_e = 0$.)

n_{ij} = hours of valid data for weather conditions in given direction, windspeed class i , and atmospheric stability class j .

N = total hours of valid data

\bar{U}_i = midpoint of windspeed class (m/s)

x = distance downwind (m)

$\sigma_{zj}(x)$ = vertical plume spread without volumetric correction at distance x and stability class j . See Figure B.1.

$\Sigma_{zj}(x)$ = vertical plume spread with volumetric correction for release within buildings wake cavity, at distance x and stability class j .

For ground level releases $\Sigma_{zj}(x)$ is the lesser of

$$(\sigma_{zj}^2(x) + 0.5 D^2 z / \pi)^{1/2} \text{ or } \sqrt{3} \sigma_{zj}(x)$$

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Where:

D_z = maximum adjacent building height either up- or down-wind from the release point

$2.032 = (2/\pi)^{1/2}$ divided by width, in radians, of a 22.5 sector

$(X/Q)_D$ = Average effluent concentration, X , normalized to source strength, Q , at distance x in sector D .

For WCGS the above Meteorological Model will simplify to the following equation for X/Q :

$$(X/Q)_D = \frac{2.032 \sum_{ij} n_{ij}}{N \bar{U}_i \sum_{ij} (x)}$$

The calculation of the relative disposition per unit area, D/Q , is performed using the deposition rate graphs found in Reg. Guide 1.111. For a 22.5 sector, since the effluent concentration is assumed uniform across the sector, the relative deposition per unit area is assumed uniform across the sector.

The calculation of D/Q is determined from relative deposition by the following relationship:

$$D/Q = \frac{D_{ij}(x) \cdot \text{DEPL}_{ij}(x)}{(2\pi/16)x}$$

Where:

$D_{ij}(x)$ = Relative deposition rate for windspeed class i and stability class j at downwind distance x (1/m). See Figure B.3.

$(2\pi/16)x$ = length of arc across sector at downwind distance x (m).

D/Q = relative deposition per unit area (m)

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$DEPL_{ij}(x)$ = Reduction factor due to plume depletion at distance x
for windspeed i and stability class j .

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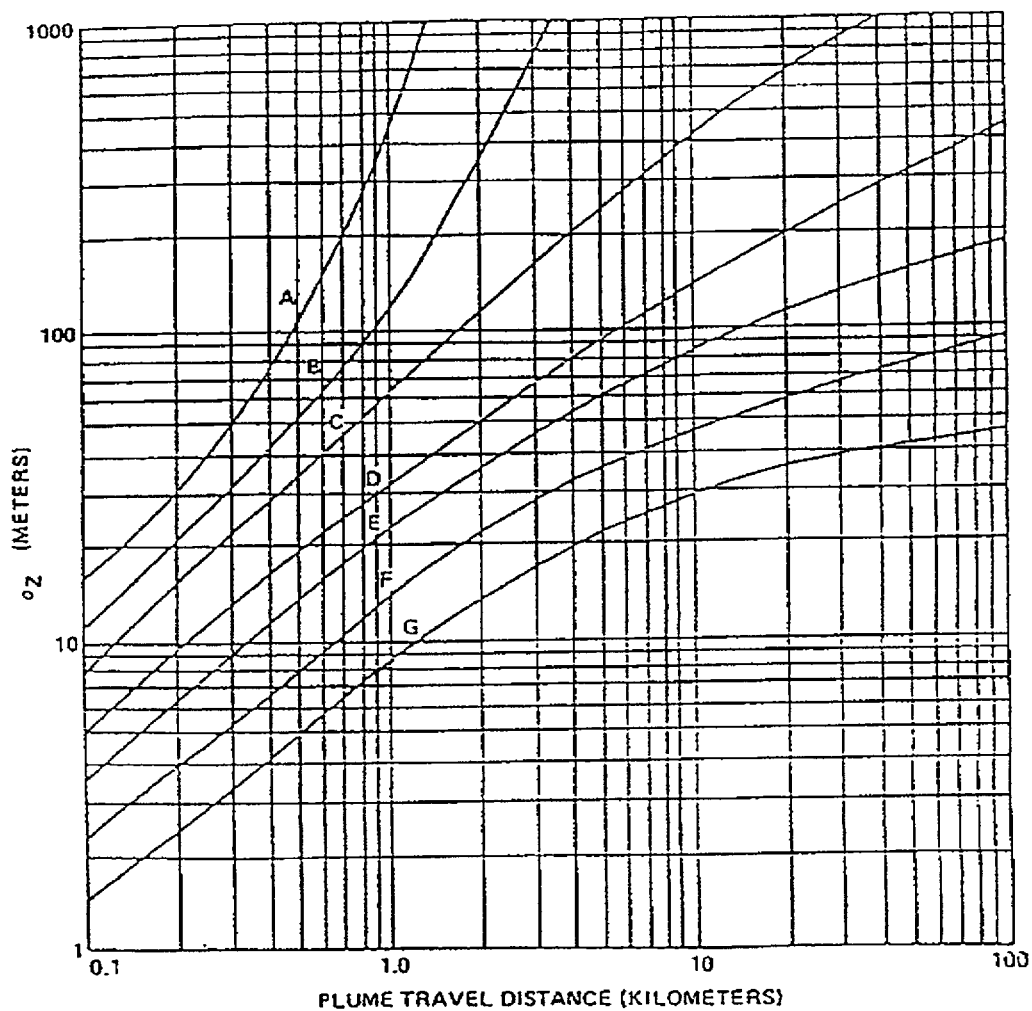
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Figure B.1

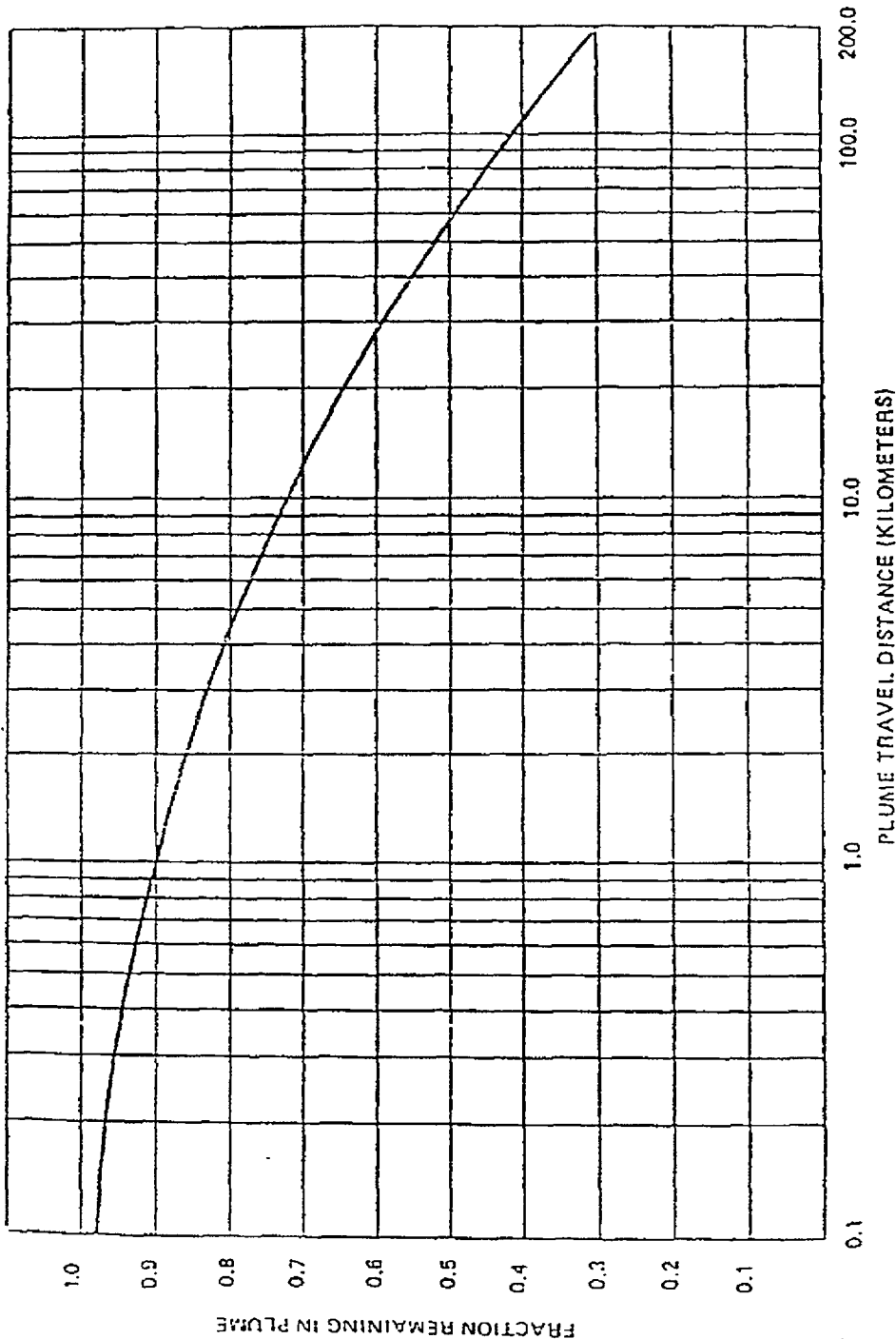


NOTE: THESE ARE STANDARD RELATIONSHIPS AND MAY HAVE TO BE
MODIFIED FOR CERTAIN TYPES OF TERRAIN AND/OR CLIMATIC
CONDITIONS (E.G. VALLEY DESERT OVER WATER).

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Figure B.2



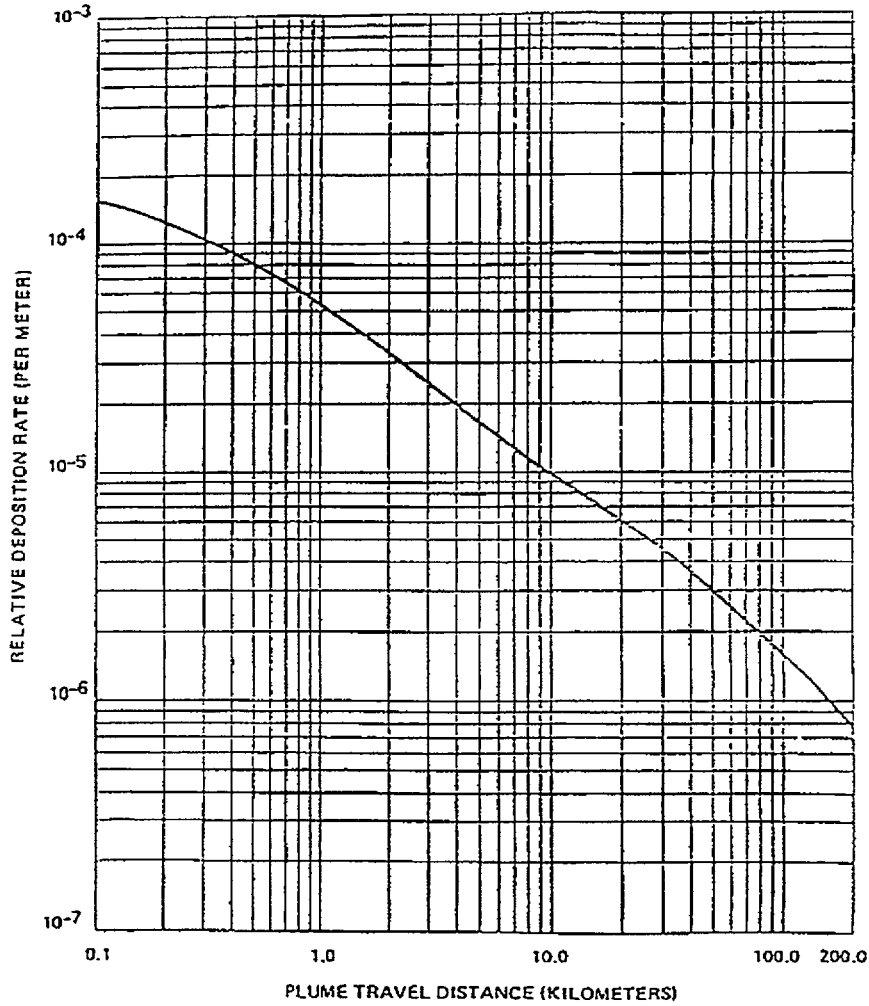
B-5

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Figure B.3



R-6
- END -

ATTACHMENT II

Wolf Creek Nuclear Operating Corporation
Administrative Procedure AP 07B-004, Revision 1,
“Offsite Dose Calculation Manual (Radiological
Environmental Monitoring Program)”



AP 07B-004

OFFSITE DOSE CALCULATION MANUAL (RADIOLOGICAL ENVIRONMENTAL MONITORING
PROGRAM)Responsible Manager

Manager Resource Protection

| | |
|-----------------------------------|-----------|
| Revision Number | 1 |
| Use Category | Reference |
| Administrative Controls Procedure | Yes |
| Infrequently Performed Procedure | No |
| Program Number | 07B |

DC12 06/29/2000

| | | |
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1.0 PURPOSE

- 1.1 This procedure contains the Offsite Dose Calculation Manual (ODCM) Radiological Environmental Monitoring Program (REMP) requirements.

2.0 SCOPE

- 2.1 Technical Specifications 5.6.2 and 5.5.1 shall be implemented by this procedure.
- 2.2 Procedure AP 07B-003, OFFSITE DOSE CALCULATION MANUAL has been split into two procedures. Requirements for the REMP are now contained in this procedure.

3.0 REFERENCES AND COMMITMENTS

3.1 References

- 3.1.1 AP 07B-003, OFFSITE DOSE CALCULATION MANUAL
- 3.1.2 Radiological Assessment Branch Technical Position on Environmental Monitoring, Revision 1, November 1979
- 3.1.3 PIR 1998-0112, Revising the ODCM with an OTSC
- 3.1.4 Technical Specification 5.5.1
- 3.1.5 Technical Specification 5.6.2
- 3.1.6 PIR 1998-3887, Wind Direction Frequency Rankings
- 3.1.7 Engineering Calculation AN-99-027, Calculation of Relative Deposition per Unit Area (D/Q)

3.2 Commitments

- 3.2.1 None

4.0 DEFINITIONS

- 4.1 None

5.0 RESPONSIBILITIES

5.1 Environmental Management

- 5.1.1 Ensures the REMP is established, implemented and maintained.

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6.0 PROCEDURE

6.1 Revisions to This Procedure

NOTE

To comply with Technical Specification 5.5.1, revisions to this procedure are not permitted via APF 15C-004-04, ON THE SPOT CHANGE form (Reference Step 3.1.3).

6.1.1 Revisions to this procedure are to be submitted through the Manager Resource Protection via APF 15C-004-01, DOCUMENT REVISION REQUEST (DRR).

6.1.2 Changes to ATTACHMENT A shall include:

1. Each change shall be identified by markings in the margin of the affected pages, clearly indicating the area of the page that was changed, and shall indicate the date (i.e., month and year) the change was implemented. (Reference Step 3.1.4)
2. Sufficient information to support the change(s) together with the appropriate analyses or evaluations justifying the change(s) and (Reference Step 3.1.4)

NOTE

Changes to the REMP will have no impact upon the level of radioactive effluent control nor will impact the accuracy or reliability of effluent dose or setpoint calculations.

3. A determination that the change(s) maintain the levels of radioactive effluent control required by 10 CFR 20.1302, 40 CFR 190, 10 CFR 50.36a, and 10 CFR 50, Appendix I, and not adversely impact the accuracy or reliability of effluent dose, or setpoint calculations. (Reference Step 3.1.4)

6.1.3 The changes shall become effective after the approval of the Plant Manager. (Reference Step 3.1.4)

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6.2 ODCM Submittal To NRC

NOTE

To comply with Technical Specification 5.5.1, a copy of this procedure must be submitted to the NRC with the Radioactive Effluent Release Report.

- 6.2.1 Changes to the ODCM shall be submitted to the NRC in the form of a complete, legible copy of the entire ODCM as a part of or concurrent with the Radioactive Effluent Release Report for the period of the report in which any change in the ODCM was made. (Reference Step 3.1.4)

7.0 RECORDS

- 7.1 The following is a lifetime QA Record:

- 7.1.1 AP 07B-004, OFFSITE DOSE CALCULATION MANUAL
(RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM)

8.0 FORMS

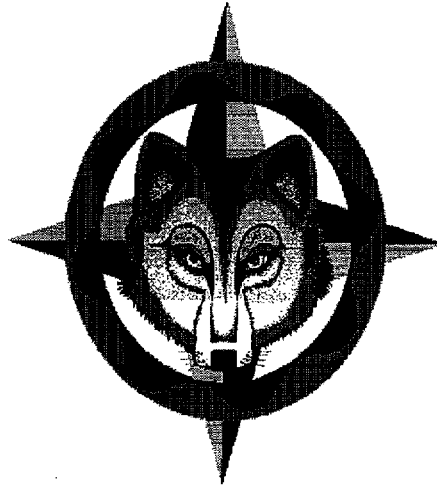
- 8.1 None

- END -

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Wolf Creek Generating Station



Offsite Dose Calculation Manual
Radiological Environmental Monitoring Program

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1.0 Introduction

This attachment contains the ODCM for the Radiological Environmental Monitoring Program which was previously contained in AP 07B-003. This program is provided to monitor the radiation and radionuclides in the environs of the plant. The program provides (1) representative measurements of radioactivity in the highest potential exposure pathways, and (2) verification of the accuracy of the effluent monitoring program and modeling of environmental exposure pathways. This program conforms to the guidance of Appendix I to 10 CFR part 50 and includes the following:

1. Monitoring, sampling, analysis and reporting of radiation and radionuclides in the environment.
2. A Land Use Census to ensure that changes in the use of areas at and beyond the site boundary are identified and the modifications to the monitoring program are made if required by the results of this census, and
3. Participation in an Interlaboratory Comparison Program to ensure that independent checks on the precision and accuracy of the measurements of radioactive materials in environmental sample matrices are performed as part of the quality assurance program for environmental monitoring.

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This attachment also provides a description of the information that should be included in the Annual Radiological Environmental Operating Report.

2.0 Liquid Effluents (Contained in AP 07B-003)

3.0 Gaseous Effluents (Contained in AP 07B-003)

4.0 Total Dose (Contained in AP 07B-003)

5.0 Radiological Environmental Monitoring Program

This section describes the Radiological Environmental Monitoring Program for Wolf Creek Generating Station.

06/00

5.1 Monitoring Program

Table 5-1 provides a schedule which describes the pathways, specific locations, sample collection frequencies, and analyses to be performed to implement the Radiological Environmental Monitoring Program.

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Figures 5.1 through 5.5 contain maps depicting sampling locations in relation to the WCGS site. Table 5-2 lists distances and directions to these locations from the WCGS site.

Table 5-3 lists required detection capabilities for the analyses performed.

5.2 Land Use Census

A Land Use Census shall be conducted annually during the growing season to identify the nearest (1) milk animal, (2) residence, and (3) garden of greater than 500 square feet producing broadleaf vegetation in each of the 16 meteorological sections within five miles of the WCGS site. (Broadleaf vegetation sampling of available vegetation may be performed at the site boundary in each of two different direction sectors with the highest predicted D/Qs in lieu of the garden census. Specifications for broadleaf vegetation sampling in Table 5-1 shall be followed, including analysis of control samples.) Methods shall be used in conducting the census that provide the best results, such as door-to-door surveys, telephone surveys, consulting the U.S.D.A. office in Burlington, inspection of aerial photographs of the area, or reviewing leasing records for area farms and residences.

If a location(s) is identified which yields a calculated dose or dose commitment (via the same exposure pathway) 20% greater than at a location from which samples are currently being obtained, and the cooperator agrees, the new location(s) shall be added to the Radiological Environmental Monitoring Program. The indicator sampling location(s) having the lowest calculated dose or dose commitment may then be deleted from the monitoring program.

The results of the Land Use Census shall be included in the Annual Radiological Environmental Operating Report described in Section 7.1.

5.3 Interlaboratory Comparison Program

The analysis laboratory contracted to analyze samples from the Radiological Environmental Monitoring Program participates in the EPA Laboratory Intercomparison Program or similar program.

A summary of intercomparison results shall be included in the Annual Radiological Environmental Operating Report described in Section 7.1.

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5.4 Reporting Requirements**5.4.1 Annual Radiological Environmental Operating Report**

To meet the requirements of Wolf Creek Technical Specification 5.6.2, the Annual Radiological Environmental Operating Report covering the operation of the unit during the previous calendar year shall be submitted to the NRC before May 1 of each year. The content of this report is described in Section 7.1. 06/00

5.4.2 Special Reports

A special report shall be prepared and submitted to the NRC within 30 days if levels of radioactivity as a result of plant effluents detected in an environmental medium at a specified location exceed the reporting levels of Table 5-4 when averaged over any calendar quarter. The special report shall identify the cause(s) for exceeding the limit(s) and define the corrective actions to be taken to reduce radioactive effluents so that the potential annual dose* to a member of the public is less than the calendar year limits of Wolf Creek Technical Specification 5.5.4. When one or more of the radionuclides in Table 5-4 is detected in the sampling medium, this report shall be submitted if: 06/00

$$\frac{\text{Concentration (1)}}{\text{Reporting Level (1)}} + \frac{\text{Concentration (2)}}{\text{Reporting Level (2)}} + \dots \geq 1.0$$

When radionuclides other than those in Table 5-4 are detected and are the result of plant effluents, this report shall be submitted if the potential annual dose* to a member of the public from all radionuclides is equal to or greater than the calendar year limits of Technical Specification 5.5.4. (*The methodology and parameters used to estimate the potential annual dose to a member of the public shall be indicated in this report.) 06/00

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TABLE 5-1
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

| <u>Exposure Pathway/ Sample Type</u> | <u>Number of Samples and Sample Locations (1)</u> | <u>Sample Collection Frequency</u> | <u>Type and Frequency of Analysis</u> |
|--|--|---|---|
| 1. AIRBORNE | FIGURES 5.1 & 5.5 | | |
| Radioiodine and Particulates | <p>Samples from five locations</p> <p>Samples from locations near the site boundary in three sectors having the highest calculated annual average D/Q (Locations 2, 18 & 37 on Figure 5.1);</p> <p>Sample from the vicinity of a community having the highest calculated annual average D/Q (Location 32 on Figure 5.1, New Strawn);</p> <p>Sample from a control location 10-20 miles distant in a low D/Q sector (Location 40 on Figure 5.5). (11)</p> | Continuous sampler operation with sample collection weekly, or more frequently if required, by dust loading | Analyze radioiodine canister weekly for I-131 |
| | | | 06/00 |
| | | | Analyze particulate filter weekly for gross beta activity (2); perform quarterly gamma isotopic analysis (3) composite (by location). |
| 2. DIRECT RADIATION (4) | FIGURES 5.2 AND 5.5 | | |
| | <p>40 routine monitoring stations with two or more dosimeters measuring dose continuously, placed as follows:</p> <p>An inner ring of stations, one in each meteorological sector 0-3 mile range from the site (Locations 1, 7-9, 11-13, 18, 26, 27, 29-31, 37, 38 & 47 on Figure 5.2).</p> | Quarterly | Gamma dose quarterly |

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TABLE 5-1 (Continued)
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

| <u>Exposure Pathway/ Sample Type</u> | <u>Number of Samples and Sample Locations (1)</u> | <u>Sample Collection Frequency</u> | <u>Type and Frequency of Analysis</u> |
|--|--|--|---|
| DIRECT RADIATION (4) (CONTINUED) | <p>An outer ring of stations, one in each meteorological sector in the 3 to 5 mile range from the site (Locations 4-6, 15-17, 19-25, and 33-36 on Figure 5.2). Five sectors [A, B, D, G & L] contain an additional station (Locations 2, 3, 10, 14 and 28)</p> <p>The balance of the stations to be placed in special interest areas such as population centers (Locations 23 and 32), nearby residences (many locations are near a residence), schools (Location 23), and in one or two areas to serve as control stations 10-20 miles distant from the site (Locations 39 and 40 on Figure 5.5) (11)</p> | | |
| 3. WATERBORNE | FIGURE 5.3 | | |
| Surface | One sample upstream (5) (Location MUSH on Figure 5.3) and one sample downstream (Location DC on Figure 5.3) | Monthly grab sample | Monthly gamma isotopic analysis (3) and composite for tritium analysis quarterly. |
| Ground | <p>Samples from one or two sources only if likely to be affected</p> <p>Indicator samples at locations hydrologically down-gradient of the site (Locations C-10, C-49 and D-65 on Figure 5.3); control sample at a location hydrologically upgradient of the site (Location B-12 on Figure 5.3) (6)</p> | Quarterly grab sample | Quarterly gamma isotopic analysis (3) and tritium analysis. |

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TABLE 5-1 (Continued)
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

| <u>Exposure Pathway/ Sample Type</u> | <u>Number of Samples and Sample Locations (1)</u> | <u>Sample Collection Frequency</u> | <u>Type and Frequency of Analysis</u> |
|--|--|---|--|
| 3. WATERBORNE (CONT.) Drinking | Sample of municipal water supply at an indicator location downstream of the site (Location LW-40 on Figure 5.5); control sample from location upstream of the site (Location BW-15 on Figure 5.3) | Monthly composite (7) | Monthly gamma isotopic analysis (3) and gross beta analysis of composite sample. Quarterly tritium analysis of composites (8). |
| Shoreline Sediment | One sample from the vicinity of Wolf Creek Cooling Lake discharge cove (Location DC on Figure 5.3); control sample from John Redmond Reservoir. | Semiannually | Semiannual gamma isotopic analysis (3) |
| 4. INGESTION | FIGURES 5.4 AND 5.5 | | |
| Milk | Samples from milking animals at three indicator locations within 5 miles of the site having the highest dose potential (currently there are no locations producing milk for human consumption within 5 miles of the site); one sample from a control location greater than 10 miles from the site if indicator locations are sampled. (11) | Semimonthly April to November; monthly December-March (9) | Gamma isotopic analysis (3) and I-131 analysis of each sample. |
| Fish | Indicator samples of 1 to 3 recreationally important species from Wolf Creek Cooling Lake (several sampling areas indicated in Figure 5.4); control samples of similar species from John Redmond Reservoir Spillway (indicated on Figure 5.4). | Semiannually | Gamma isotopic analysis (3) on edible portions |

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TABLE 5-1 (Continued)
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

| <u>Exposure Pathway/ Sample Type</u> | <u>Number of Samples and Sample Locations (1)</u> | <u>Sample Collection Frequency</u> | <u>Type and Frequency of Analysis</u> |
|--|---|--|---|
| 4. INGESTION (CONT.) Food Products | Samples of available broadleaf vegetation from two indicator locations (using the criteria from the "Land Use Census" section) with highest calculated annual average D/Q (Locations G-1 and F-1 and alternate Location E-1 on Figure 5.4); sample of similar broadleaf vegetation from a control location greater than 10 miles from the site in a low D/Q sector (Location S-4 on Figure 5.5). (11) | Monthly when available (9) | Gamma isotopic analysis (3) on edible portions. |
| Food Products | Sample of crops irrigated with water from the Neosho River downstream of the Neosho River-Wolf Creek confluence (locations will vary from year to year, e.g., Location NR-D1 & NR-D2 on Figure 5.5). | At time of harvest (10) | Gamma isotopic analysis (3) on edible portions |

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TABLE 5-1 (Continued)
TABLE NOTATIONS

- (1) Deviations are permitted from the required sampling schedule if specimens are unobtainable due to hazardous conditions, seasonal unavailability, malfunction of automatic sampling equipment, and other legitimate reasons. If specimens are unobtainable due to sampling equipment malfunction, every effort shall be made to complete corrective action prior to the end of the next sampling period. All deviations from the sampling schedule shall be documented in the Annual Radiological Environmental Operating Report described in Section 7.1.

It is recognized that, at times, it may not be possible or practicable to continue to obtain samples of the media of choice at the most desired location or time. In these instances, suitable specific alternative media and locations may be chosen for the particular pathway in question and appropriate substitutions made.
- (2) Airborne particulate sample filters shall be analyzed for gross beta radioactivity 24 hours or more after sampling to allow for Rn-220 and Rn-222 daughter decay. If gross beta activity in air particulate samples is greater than 10 times the yearly mean of control samples, gamma isotopic analysis shall be performed on the individual samples.
- (3) Gamma isotopic analysis means the identification and quantification of gamma-emitting radionuclides that may be attributable to the effluents from the facility.
- (4) One or more instruments, such as a pressurized ion chamber, for measuring and recording dose rate continuously may be used in place of, or in addition to, integrating dosimeters. For the purposes of this table, a thermoluminescent dosimeter (TLD) is considered to be one phosphor; two or more phosphors in a packet are considered as two or more dosimeters. Film badges shall not be used as dosimeters for measuring direct radiation. The 40 stations are not an absolute number. The number of direct radiation monitoring stations may be reduced according to geographical limitations, e.g., some sectors are over water so that the number of dosimeters may be reduced accordingly. The frequency of analysis or readout for the TLD system depends upon the characteristics of the specific system used and is selected to obtain optimum dose information with minimal fading.

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TABLE 5-1 (Continued)
TABLE NOTATIONS

- (5) The "upstream" sample is taken at a distance beyond significant influence of the discharge.
- (6) Ground water samples shall be taken when this source is tapped for drinking or irrigation purposes in areas where the hydraulic gradient or recharge properties are suitable for contamination.
- (7) A composite sample is one in which the quantity (aliquot) of liquid sampled is consistent over the sampling period and in which the method of sampling employed results in a specimen that is representative of the liquid concentrate. In this program, composite sample aliquots shall be collected at time intervals that are very short (e.g., every two hours) relative to the compositing period (e.g., monthly) in order to assure obtaining a representative sample.
- (8) If the dose calculated for consumption of water (using ODCM methodology and parameters) exceeds one millirem per year, composite sampling at the indicator location shall be performed every two weeks and I-131 analysis shall be performed on the composite samples.
- (9) Milk and broadleaf vegetation samples are often temporarily, but not permanently, unavailable at the scheduled sample collection times. Alternate sampling locations may therefore be listed in the Table and used at these times to provide continued monitoring of these pathways. If samples are considered permanently unavailable at a location, another location will be selected (if available) as described in Note (1).
- (10) If harvest occurs more than once a year, sampling shall be performed during each discrete harvest. If harvest occurs continuously, sampling shall be monthly. Attention shall be paid to including samples of tuberous and root food products.
- (11) The purpose of this sample is to obtain background information. If it is not practical to establish control locations in accordance with the distance and wind direction criteria, other sites that provide valid background data may be substituted.

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TABLE 5-2

SAMPLING LOCATION NUMBERS, DISTANCES (miles) AND DIRECTIONS

Air Particulate

| <u>Location</u> <u>Number</u> | <u>Distance/</u> <u>Direction</u> |
|----------------------------------|--------------------------------------|
|----------------------------------|--------------------------------------|

| | |
|----|-----------|
| 2 | 2.7/N |
| 18 | 3.0/SSE |
| 32 | 3.2/WWN |
| 37 | 2.1/NNW |
| 40 | >15.0/WWN |

06/00

TLD

| <u>Location</u> <u>Number</u> | <u>Distance/</u> <u>Direction</u> | <u>Location</u> <u>Number</u> | <u>Distance/</u> <u>Direction</u> | <u>Location</u> <u>Number</u> | <u>Distance/</u> <u>Direction</u> | <u>Location</u> <u>Number</u> | <u>Distance/</u> <u>Direction</u> |
|----------------------------------|--------------------------------------|----------------------------------|--------------------------------------|----------------------------------|--------------------------------------|----------------------------------|--------------------------------------|
|----------------------------------|--------------------------------------|----------------------------------|--------------------------------------|----------------------------------|--------------------------------------|----------------------------------|--------------------------------------|

| | | | | | | | |
|----|---------|----|---------|----|---------|----|-----------|
| 1 | 1.4/N | 11 | 1.6/E | 21 | 3.8/S | 31 | 3.0/WWN |
| 2 | 2.7/N | 12 | 1.8/ESE | 22 | 4.1/SSW | 32 | 3.2/WWN |
| 3 | 3.0/NNE | 13 | 1.5/SE | 23 | 4.5/SW | 33 | 3.7/WWN |
| 4 | 4.0/NNE | 14 | 2.6/SE | 24 | 4.1/WSW | 34 | 4.0/NW |
| 5 | 4.0/NE | 15 | 4.5/ESE | 25 | 3.6/W | 35 | 4.6/NNW |
| 6 | 4.4/ENE | 16 | 4.2/E | 26 | 2.6/WSW | 36 | 4.2/N |
| 7 | 1.9/NE | 17 | 3.6/SE | 27 | 2.1/SW | 37 | 2.1/NNW |
| 8 | 1.6/NNE | 18 | 3.0/SSE | 28 | 2.8/SW | 38 | 1.2/NW |
| 9 | 2.0/ENE | 19 | 4.0/SSE | 29 | 2.6/SSW | 39 | 13.0/N |
| 10 | 2.4/ENE | 20 | 3.3/S | 30 | 2.2/W | 40 | >15.0/WWN |
| | | | | | | 47 | .16/S |

Groundwater

Drinking Water

Surface Water

| | | | | | |
|------|---------|-------|---------|------|---------|
| B-12 | 2.2/NNE | BW-15 | 3.9/SW | MUSH | 3.6/W |
| C-10 | 2.8/W | LW-40 | >10/SSE | DC | 0.6/WWN |
| C-49 | 2.9/SW | | | | |
| D-65 | 3.9/S | | | | |

Milk & Food

Products

| | | | |
|-----|---------|-----|-----------|
| F-1 | 1.8/ESE | | |
| G-1 | 1.6/SE | S-4 | >15.0/WWN |
| E-1 | 1.8/E | | |

Fish

Shoreline Sediments

Irrigated Crops

| | | | | | |
|-----|-----|-----|---------|-------|-------|
| WCL | | DC | 0.6/WWN | NR-D1 | 9.2/S |
| JRR | 4/W | JRR | 4/W | NR-D2 | >10/S |

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TABLE 5-3
DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS ^{(1) (2)}
Lower Limit of Detection (LLD) ⁽³⁾

| ANALYSIS | WATER (pCi/l) | AIRBORNE PARTICULATE OR GASES (pCi/m ³) | FISH (pCi/kg, wet) | MILK (pCi/l) | FOOD PRODUCTS (pCi/kg, wet) | SEDIMENT (pCi/kg, dry) |
|------------|------------------|--|--------------------------|-----------------|--------------------------------------|------------------------------|
| Gross Beta | 4* | 0.01 | | | | 06/00 |
| H-3 | 2,000** | | | | | |
| Mn-54 | 15 | | 130 | | | |
| Co-58 | 15 | | 130 | | | |
| Fe-59 | 30 | | 260 | | | |
| Co-60 | 15 | | 130 | | | |
| Zn-65 | 30 | | 260 | | | |
| Zr-Nb-95 | 15 | | | | | |
| I-131 | 1*** | 0.07 | | 1 | 60 | |
| Cs-134 | 15 | 0.05 | 130 | 15 | 60 | 150 |
| Cs-137 | 18 | 0.06 | 150 | 18 | 80 | 180 |
| Ba-La-140 | 15 | | | 15 | | |

* LLD for drinking water samples.

06/00

** LLD for drinking water samples. If no drinking water pathway exists, a value of 3,000 pCi/l may be used.

***LLD for drinking water samples. If no drinking water pathway exists, the LLD of gamma isotopic analysis may be used.

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TABLE 5-3 (Continued)
TABLE NOTATIONS

- (1) This list does not mean that only these nuclides are to be considered. Other peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Annual Radiological Environmental Operating Report described in Section 7.1.
- (2) Required detection capabilities for thermoluminescent dosimeters used for environmental measurements shall be in accordance with the recommendations of Regulatory Guide 4.13, Revision 1, 1977.
- (3) The LLD is defined, as the smallest concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system, which may include radiochemical separation:

$$LLD = \frac{4.66 s_b}{E \cdot V \cdot 2.22 \cdot Y \cdot \exp(-\lambda \Delta t)}$$

Where:

- LLD = the "a priori" lower limit of detection (picoCuries per unit mass or volume),
- s_b = the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (counts per minute),
- E = the counting efficiency (counts per disintegration),
- V = the sample size (units of mass or volume),
- 2.22 = the number of disintegrations per minute per picoCurie,
- Y = the fractional radiochemical yield, when applicable,
- λ = the radioactive decay constant for the particular radionuclide (sec^{-1}), and
- Δt = the elapsed time between sample collection, or end of the sample collection period, and time of counting(sec).

Typical values of E, V, Y, and Δt should be used in the calculation.

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TABLE 5-3 (Continued)
TABLE NOTATIONS

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement. Analyses shall be performed in such a manner that the stated LLDs will be achieved under routine conditions. Occasionally background fluctuations, unavoidable small sample sizes, the presence of interfering nuclides, or other uncontrollable circumstances may render these LLDs unachievable. In such cases, the contributing factors shall be identified and described in the Annual Radiological Environmental Operating Report described in Section 7.1.

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TABLE 5-4
REPORTING LEVELS FOR RADIOACTIVITY CONCENTRATIONS IN ENVIRONMENTAL SAMPLES

| ANALYSIS | WATER (pCi/l) | AIRBORNE | | FISH (pCi/kg, wet) | MILK (pCi/l) | FOOD PRODUCTS (pCi/kg, wet) |
|-----------|------------------|---|--|-----------------------|-----------------|--------------------------------|
| | | PARTICULATE OR GASES (pCi/m ³) | | | | |
| H-3 | 20,000* | | | | | |
| Mn-54 | 1,000 | | | 30,000 | | |
| Co-58 | 1,000 | | | 30,000 | | |
| Fe-59 | 400 | | | 10,000 | | |
| Co-60 | 300 | | | 10,000 | | |
| Zn-65 | 300 | | | 20,000 | | |
| Zr-Nb-95 | 400 | | | | | |
| I-131 | 2** | 0.9 | | | 3 | 100 |
| Cs-134 | 30 | 10 | | 1,000 | 60 | 1,000 |
| Cs-137 | 50 | 20 | | 2,000 | 70 | 2,000 |
| Ba-La-140 | 200 | | | | 300 | |

* For drinking water samples. This is 40 CFR Part 141 value. If no drinking water pathway exists, a value of 30,000 pCi/l may be used.

** If no drinking water pathway exists, a value of 20 pCi/l may be used.

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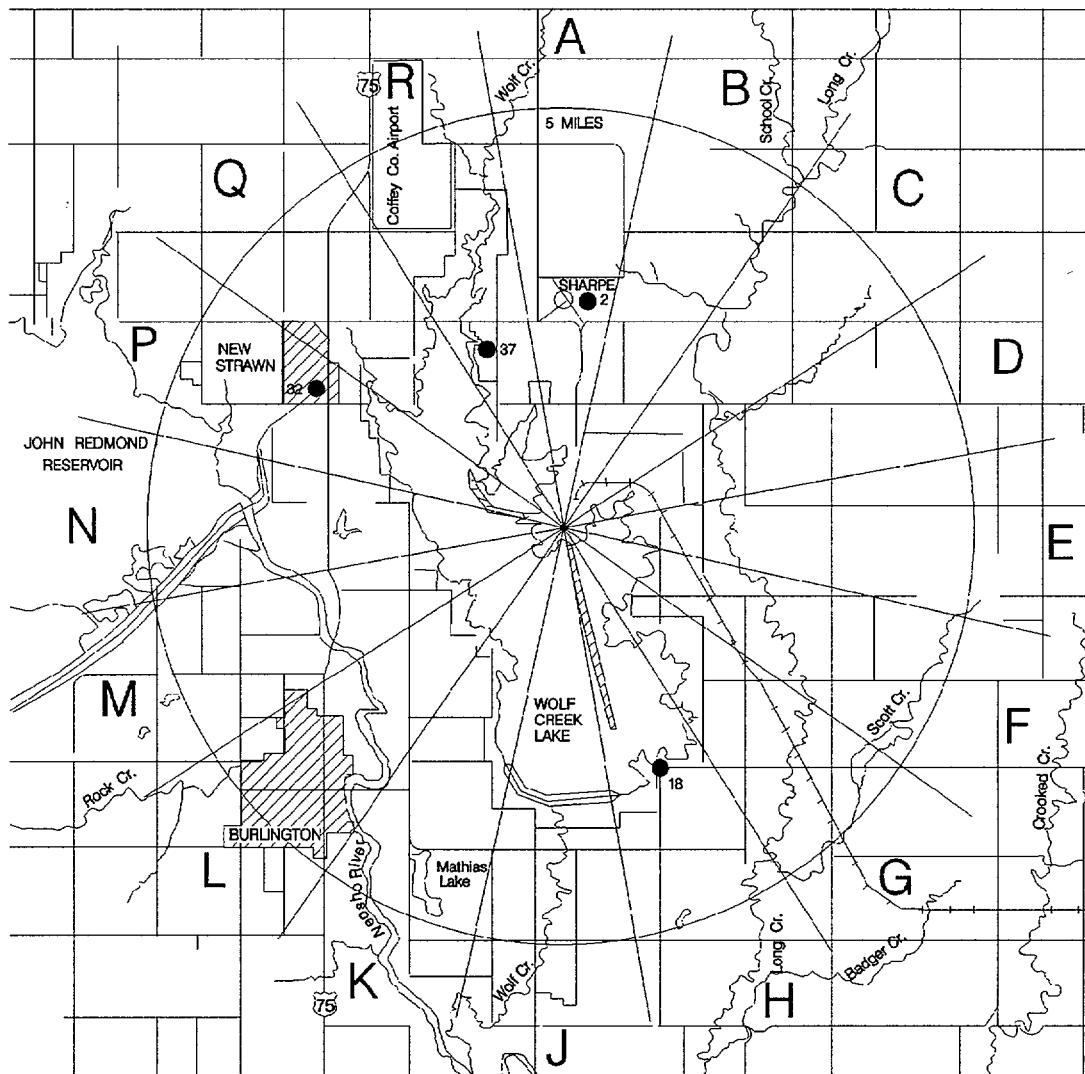
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FIGURE 5.1



AIRBORNE PATHWAY SAMPLING LOCATIONS

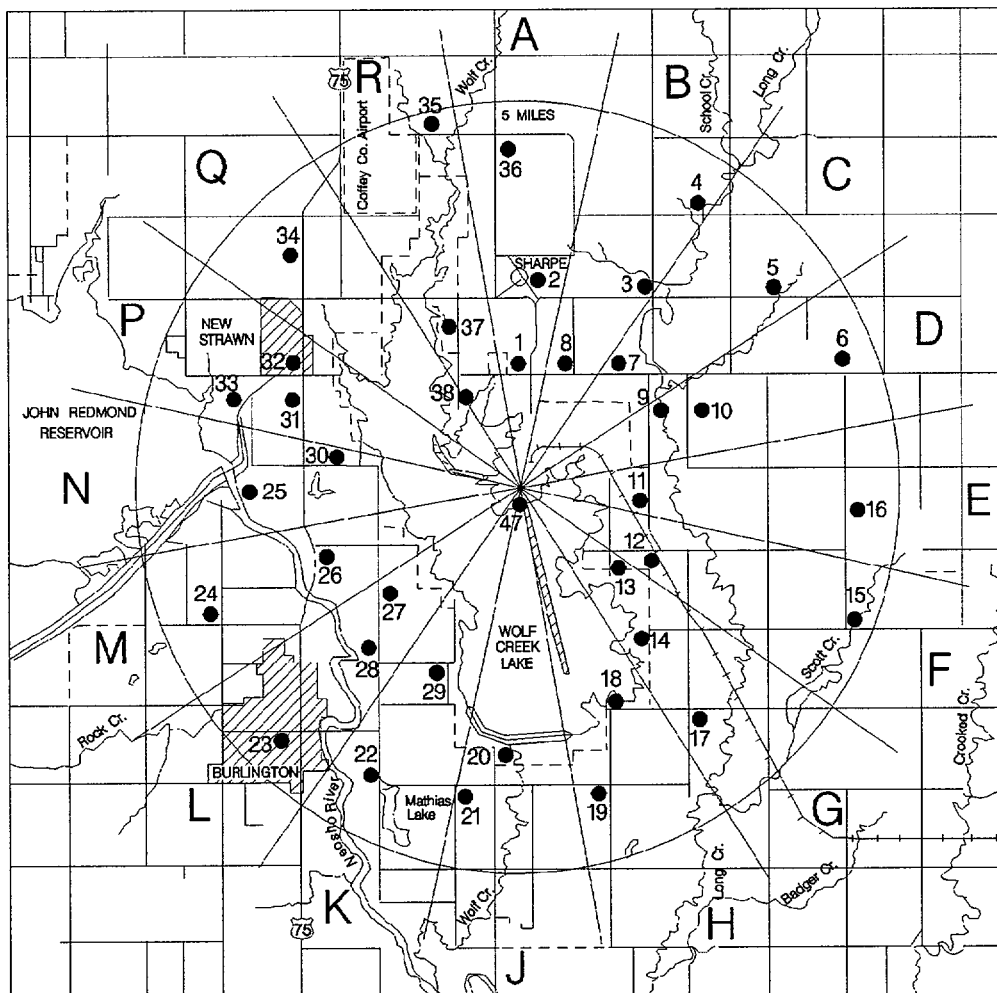
● = AIRBORNE PARTICULATE AND RADIOIODINE

06/00

| | | |
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FIGURE 5.2



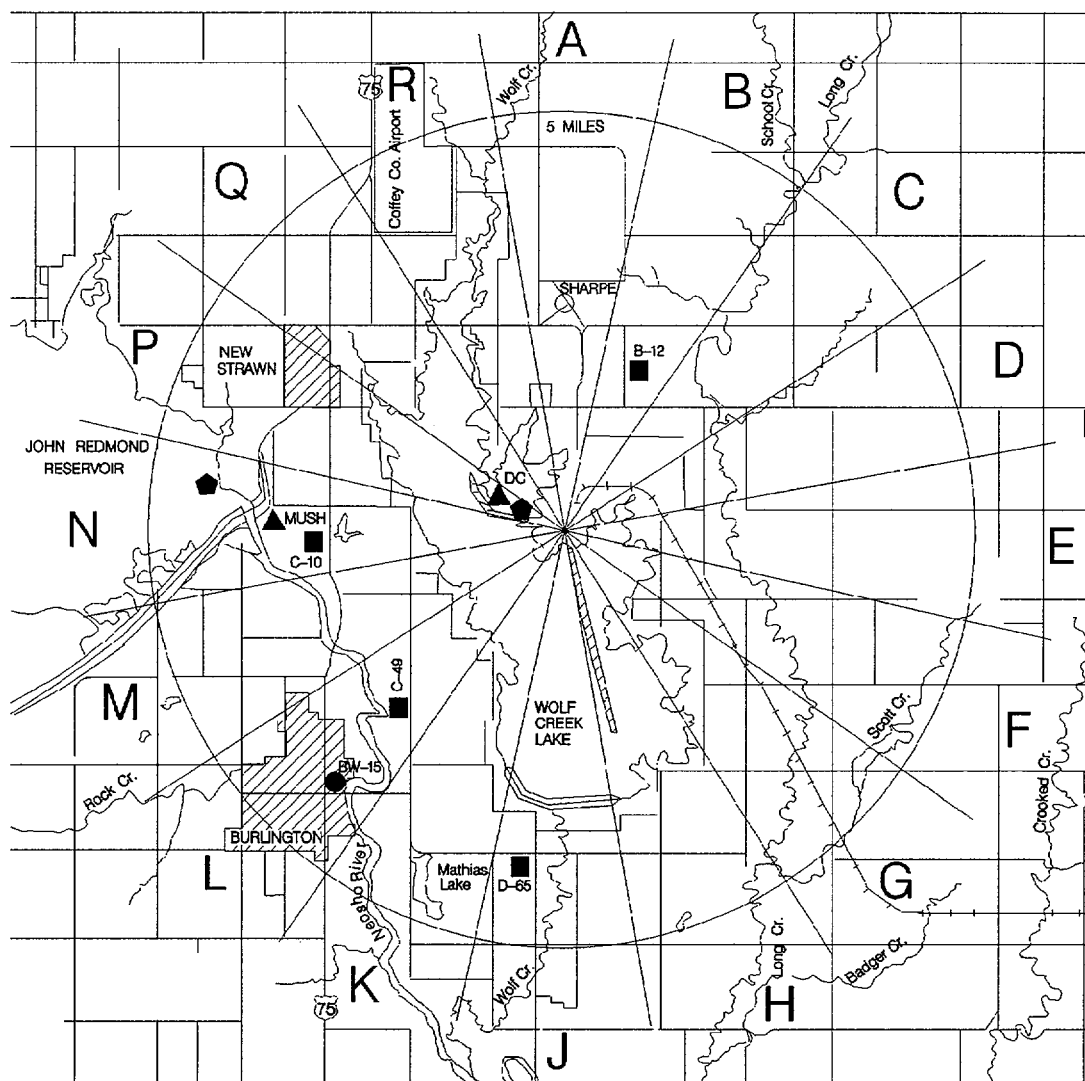
DIRECT RADIATION PATHWAY SAMPLING LOCATIONS

● = TLD LOCATIONS

| | | |
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FIGURE 5.3



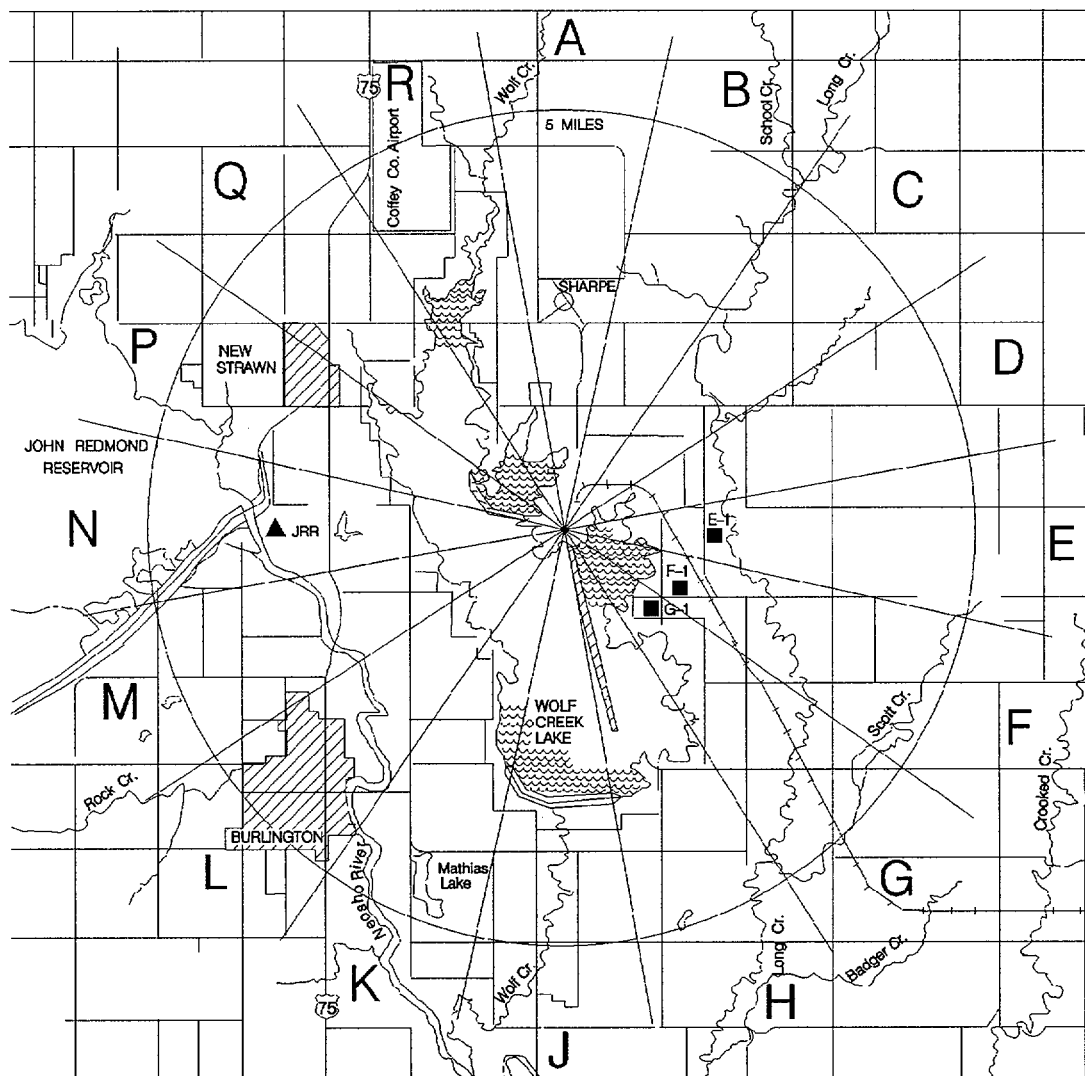
WATERBORNE PATHWAY SAMPLING LOCATIONS

- | | |
|--------------------|------------------------|
| ● = DRINKING WATER | ▲ = SURFACE WATER |
| ■ = GROUND WATER | ◆ = SHORELINE SEDIMENT |

| | | |
|---------------|---|---------------|
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FIGURE 5.4



INGESTION PATHWAY SAMPLING LOCATIONS

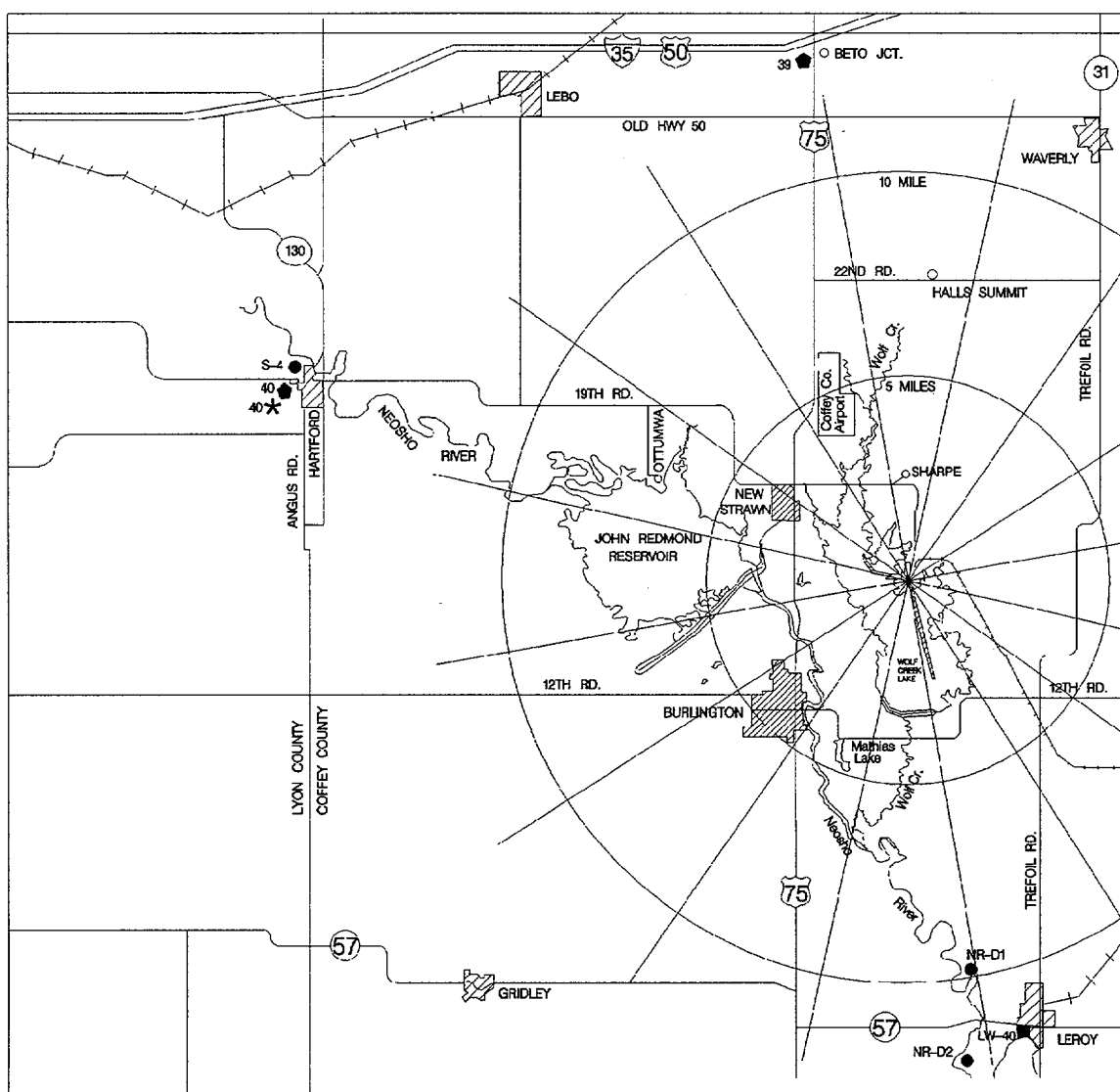
- ▲ = FISH (JRR) ■ = BROADLEAF VEGETATION
 ~~~~~ = FISH (WCL)

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|               |                                                                                       |               |
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FIGURE 5.5



DISTANT SAMPLING LOCATIONS

- |                                        |                                             |
|----------------------------------------|---------------------------------------------|
| ◆ = TLD                                | ■ = DRINKING WATER                          |
| * = AIRBORNE PARTICULATE & RADIOIODINE | ● = BROADLEAF VEGETATION<br>IRRIGATED CROPS |

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|               |                                                                                       |               |
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## 6.0 Bases

The bases contained on the succeeding pages summarize the general requirements of Section 5.0 of the ODCM (REMP).

### Section 2.0 Liquid Effluents (Contained in AP 07B-003)

### Section 3.0 Gaseous Effluents (Contained in AP 07B-003)

### Section 4.0 Total Dose (Contained in AP 07B-003)

### Section 5.0 Radiological Environmental Monitoring Program

#### Section 5.1 Monitoring Program

The Radiological Environmental Monitoring Program provides representative measurements of radiation and of radioactive materials in those exposure pathways and for those radionuclides that lead to the highest potential radiation exposures of MEMBERS OF THE PUBLIC resulting from the station operation. This monitoring program implements Section IV.B.2 of Appendix I to 10 CFR Part 50 and thereby supplements the Radiological Effluent Monitoring Program by verifying that the measurable concentrations of radioactive materials and levels of radiation are not higher than expected on the basis of the effluent measurements and the modeling of the environmental exposure pathways. Guidance for this monitoring program is provided by the Radiological Assessment Branch Technical Position on Environmental Monitoring, Revision 1, November 1979.

The required detection capabilities for environmental sample analyses are tabulated in terms of the lower limits of detection (LLDs). The LLDs are considered optimum for routine environmental measurements in industrial laboratories. It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement.

Detailed discussion of the LLD, and other detection limits, can be found in HASL Procedures Manual, HASL-300 (revised annually), Currie, L.A., "Limits for Qualitative Detection and Quantitative Determination-Application to Radiochemistry," Anal. Chem. 40, 586-93 (1968), and Hartwell, J.K., "Detection Limits for Radioanalytical Counting Techniques," Atlantic Richfield Hanford Company Report ARH-SA-215 (June 1975).

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**Section 5.2 Land Use Census**

This section is provided to ensure that changes in the use of areas at and beyond the SITE BOUNDARY are identified and that modifications to the Radiological Environmental Monitoring Program given in the ODCM are made if required by the results of this census. Information that will provide the best results, such as door-to-door survey, aerial survey, or consulting with local agricultural authorities, shall be used. This census satisfies the requirements of Section IV.B.3 of Appendix I to 10 CFR Part 50. Restricting the census to gardens of greater than 50 m<sup>2</sup> provides assurance that significant exposure pathways via leafy vegetables will be identified and monitored since a garden of this size is the minimum required to produce the quantity (26 kg/year) of leafy vegetables assume in Regulatory Guide 1.109 for consumption by a child.

To determine this minimum garden size, the following assumptions were made: (1) 20% of the garden was used for growing broadleaf vegetation (i.e., similar to lettuce and cabbage), and (2) a vegetation yield of 2 kg/m<sup>2</sup>.

**Section 5.3 Interlaboratory Comparison Program**

The requirement for participation in an approved Interlaboratory Comparison Program is provided to ensure that independent checks on the precision and accuracy of the measurements of radioactive material in environmental sample matrices are performed as part of the quality assurance program for environmental monitoring in order to demonstrate that the results are valid for the purposes of Section IV.B.2 of Appendix I to 10 CFR Part 50.

**7.0 Reports****7.1 Annual Radiological Environmental Operating Report**

The Annual Radiological Environmental Operating Report shall include summaries, interpretations, and analysis of trends of the results of the Radiological Environmental Monitoring Program for the reporting period. The material provided shall be consistent with the objectives outlined in (1) the ODCM and (2) Sections IV.B.2, IV.B.3 and IV.C of Appendix I to 10 CFR Part 50 (Reference Step 3.1.5), including a comparison with preoperational studies, with operational controls and with previous environmental surveillance reports, and an assessment of the observed impacts of the plant operation on the environment. The report shall also include the results of the Land Use Census described in Section 5.2.

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The Annual Radiological Environmental Operating Report shall include the results of analysis of all radiological environmental samples and of all environmental radiation measurements taken during the period pursuant to the locations specified in Table 5-1 as well as summarized and tabulated results of these analyses and measurements in the format of the table in the Radiological Assessment Branch Technical Position, Revision 1, November 1979. In the event that some individual results are not available for inclusion with the report, the report shall be submitted noting and explaining the reasons for the missing results. The missing data shall be submitted as soon as possible in a supplementary report.

The report shall also include the following: a summary description of the Radiological Environmental Monitoring Program; legible maps covering all sampling locations keyed to a table giving distances and directions from the centerline of the reactor; the results of licensee participation in the Interlaboratory Comparison Program and the corrective actions being taken if the specified program is not being performed as required by Section 5.3; reasons for not conducting the Radiological Environmental Program as required by Section 5.1 with plans for preventing a recurrence and discussion of all deviations from the sampling schedule of Table 5-1; discussion of environmental sample measurements that exceed the reporting levels of Table 5-4 but are not the result of plant effluents, and discussions of all analyses in which the LLD required by Table 5-3 was not achieved.

7.2 Annual Radioactive Effluent Release Report (Contained in AP 07B-003)

APPENDIX A Dose Conversion Factor Tables (Contained in AP 07B-003)

APPENDIX B Meteorological Model (Contained in AP 07B-003)

- END -

## ATTACHMENT III

Wolf Creek Nuclear Operating Corporation  
Administrative Procedure AP 31A-100, Revision 3,  
“Solid Radwaste Process Control Program”



AP 31A-100

SOLID RADWASTE PROCESS CONTROL PROGRAM

Responsible Manager

Manager Chemistry/Radiation Protection

|                                   |           |
|-----------------------------------|-----------|
| Revision Number                   | 3         |
| Use Category                      | Reference |
| Administrative Controls Procedure | Yes       |
| Infrequently Performed Procedure  | No        |
| Program Number                    | 25A       |

DC12 06/01/2000

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## 1.0 PURPOSE

- 1.1 This procedure provides instructional guidance and a description of the solid waste Process Control Program (PCP). The PCP describes the methods used for processing wet low-level radioactive waste into a waste form acceptable for disposal, in accordance with 10 CFR 61 requirements, at a licensed land disposal facility.

## 2.0 SCOPE

- 2.1 This procedure describes current and planned practice for sampling, sample evaluation, classification, processing and packaging of radioactive material. This procedure does not address irradiated hardware which will be managed on a case-by-case basis under the direction of the Manager Chemistry/Radiation Protection. System descriptions and operating practices are described in the following steps.

- 2.2 Waste Stream Identification - The station has initially identified eight different waste streams and treats each separately for classification purposes. The identification listing may be consolidated, expanded and streams deleted at the discretion of radwaste management without revising the PCP.

- o DAW
- o Steam Generator Blowdown Bead Resin
- o Chemical and Volume Control System Bead Resin <sup>(1)</sup> (CVCS)
- o Reactor Coolant System Filters
- o Floor Drain Tank Filters
- o Spent Fuel Pool Filters
- o Waste Monitor Tank Filters <sup>(2)</sup>
- o Steam Generator Blowdown Filters <sup>(2)</sup>

(1) Combination of CVCS, Diversified, and Spent Fuel Pool Resins

(2) May be disassembled and components handled as DAW

- 2.3 Non-Waste Stream Identification - The station has identified two different sources and treats each separately for classification purposes.

- o Non-irradiated material removed from the Spent Fuel Pool.

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- o Any other radioactive material generated by the station.

2.4 Disposition of Radioactive Material Sent to a Vendor for Intermediate Processing - Practices include sending radioactive material packages generated by the station to GTS or other vendors for volume reduction (VR)/processing instead of directly to a burial site.

2.4.1 This procedure addresses the requirements for 10 CFR 61.55 (Waste Classification) for radioactive material sent to vendor facilities.

2.4.2 This procedure does NOT address the requirements for 10 CFR 61.56 (Waste Characteristics), since the final processing and packaging are performed at the vendor facilities.

2.4.3 Possible types of radioactive material include, but are NOT limited to the following:

- o DAW
- o Surface Contaminated Objects
- o Steam Generator Blowdown Resin
- o Steam Generator Blowdown Filters
- o Contaminated Oil
- o Contaminated Soil

2.5 Disposition of Waste Sent Directly to a Burial Site - This procedure addresses both the 10 CFR 61.55 and 61.56 requirements for the waste streams listed in Step 2.2.

## 2.6 Waste Management Practices

### 2.6.1 DAW

- o This waste stream consists of plastic, wood, paper, metal, cloth, etc. generated at various locations within the station.
- o The material may be sent to intermediate processors or directly to a burial site.
- o The station may preprocess DAW by compacting.
- o Practices include shipping DAW classified as either SCO or LSA in numerous possible containers, such as:

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- 30 to 85 gallon drums
- B-25 type boxes
- SeaLand containers
- Large liners

- o Prepacking inspection criteria includes the removal of liquid, protective clothing and equipment, paints, solvents, lead, instruments, gages and other valuable plant equipment.

#### 2.6.2 Steam Generator Blowdown Bead Resin (S/G BD)

- o This waste stream consists of only S/G blowdown resin. The depleted resins are sluiced from the individual processing vessels to the S/G Blowdown Resin Storage Tank and then to a CNSI 6-80 or 8-120 High Integrity Container (HIC), OR any other container approved by the Health Physics Supervisor Radwaste (HPSR).
- o Once a container is full, the resins are then dewatered using plant equipment and approved vendor dewatering procedures.
- o Practice may include shipping dewatered resins to a volume reduction processor for incineration or release.

#### 2.6.3 Chemical and Volume Control System Bead Resin (CVCS)

- o This waste stream consists of CVCS, various DURATEK media and Spent Fuel Pool resins. The depleted charcoal filter media and resins are sluiced from the individual processing vessels to a common Spent Resin Storage Tank. The media is then transferred in a batch mode to a CNSI 6-80 or 8-120 HIC, OR any other container approved by the HPSR.
- o Once a container is full or the transfer has been terminated, the filter media (charcoal) and resins are then dewatered per RPP 07-131, BEAD RESIN/ACTIVATED CARBON DEWATERING PROCEDURE FOR CNSI 14-215 OR SMALLER LINERS.

#### 2.6.4 Cartridge Filters

- o This category includes several waste streams which were defined in Step 2.2 and includes all filters generated by the station.

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- o Filters are removed from service based on operating parameters determined by the Operations Department.
- o The filter housings are drained prior to filter removal. The filters are then gravity drained prior to being placed into an intermediate storage container OR the final disposal container.
- o A final dewatering verification is performed on the disposal container after it has been loaded with filters.
- o Absorbent material may be added to the disposal liner after final dewatering verification at the discretion of the HPSR.

#### 2.6.5 Solidification/Encapsulation Methods

- o Present and planned practice is NOT to solidify or encapsulate any waste streams.
- o All liquid waste is dewatered to less than 0.5 percent or 1 percent depending on the container type by volume prior to shipment.

#### 2.6.6 Operation and Maintenance of dewatering Systems and Equipment

- o Present and planned practice is to utilize station personnel to operate and maintain dewatering systems and equipment using station procedures.
- o All disposal liners are manufactured by and purchased from QA approved vendors.

#### 2.6.7 High Integrity Container Usage

- o High Integrity Containers (fabricated from high density cross-linked polyethylene) may be used as the disposal package for any waste.
- o All classes of waste, unless specifically exempted by the South Carolina Department of Health and Environmental Control must be disposed in vaults (approved concrete overpack structures) at the Barnwell burial site.

2.7 Amendment No. 42 to the Operating License deleted portions of Technical Specification that were incorporated into the Process Control Program (Rev. 6). Prior to issue of PCP Revision 5, a new procedure (RPP 07-102) was issued which incorporated applicable portions of PCP Revision 4. ATTACHMENT A reflects those changes that were made to the PCP per Amendment No. 42.

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### 3.0 REFERENCES AND COMMITMENTS

#### 3.1 References

- 3.1.1 WCGS Technical Specifications, Section 6.13 (TR 5.5.4)
- 3.1.2 RPP 07-101, CONTROL OF RADIOACTIVE MATERIAL MANAGEMENT SOFTWARE AND DATA BASES
- 3.1.3 RPP 07-120, PREPARATION AND SHIPMENT OF RADIOACTIVE WASTE
- 3.1.4 RPP 07-121, PREPARATION AND SHIPMENT OF RADIOACTIVE MATERIAL
- 3.1.5 RPP 07-131, BEAD RESIN/ACTIVATED CARBON DEWATERING PROCEDURE FOR CNSI 14-215 OR SMALLER LINERS
- 3.1.6 10 CFR 20, "Standard For Protection Against Radiation"
- 3.1.7 10 CFR 61, "Licensing Requirements for Land Disposal of Radioactive Waste"
- 3.1.8 10 CFR 71, "Packaging and Transportation of Radioactive Materials"
- 3.1.9 40 CFR 302, "Reportable Quantity Adjustment - Radionuclides"
- 3.1.10 49 CFR 171, "General Information, Regulations, and Definitions"
- 3.1.11 49 CFR 172, "Shippers' General Requirements for Shipments and Packaging"
- 3.1.12 49 CFR 177, "Carriage by Public Highway"
- 3.1.13 Barnwell Waste Management Facility Site Disposal Criteria; CNSI-S20-AD-010
- 3.1.14 CNSI's South Carolina Department of Health and Environmental Control (DHEC) Radioactive Materials License No. 097
- 3.1.15 South Carolina DHEC Regulation 61-83, Transportation of Radioactive Waste Into or Within South Carolina
- 3.1.16 USNRC Branch Technical Position on Radioactive Waste Classification, May 1983
- 3.1.17 USNRC Branch Technical Position on Waste Form, January 1991

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- 3.1.18 USNRC Branch Technical Position on Concentration Averaging and Encapsulation, Revision in Part To Waste Classification Technical Position, January 1995
- 3.1.19 NRC Bulletin No. 79-19, "Packaging of Low Level Radioactive Waste for Transport and Burial"
- 3.1.20 NRC Information Notice No. 80-24, "Low Level Radioactive Waste Burial Criteria"
- 3.1.21 NRC Information Notice No. 83-33, "Non-Representative Sampling of Contaminated Oil"
- 3.1.22 NRC Information Notice No. 85-92, "Surveys of Wastes Before Disposal from Nuclear Reactor Facilities"
- 3.1.23 NRC Information Notice No. 86-20, "Low Level Radioactive Waste Scaling Factors, 10 CFR 61"
- 3.1.24 NRC Information Notice No. 88-101, "Shipment of Contaminated Equipment Between Nuclear Power Stations"
- 3.1.25 WMG-SW-006, "Computer Software Quality Assurance Program"
- 3.1.26 WMG-QA-001, "Quality Assurance Program"
- 3.1.27 WMG-P-045 "RADMAN Operating Manual"
- 3.1.28 RADMAN Computer Code, Main Topical Report to the USNRC
- 3.1.29 WMG-P-007, "FILTRK Operating Procedure"
- 3.1.30 WMG-P-009, "RAMSHP Operating Procedure"
- 3.1.31 WMG-P-010, "TRASHP Operating Procedure"
- 3.1.32 WMG Report #9006, "Computer Program Dose to Curie Methodology Verification and Validation"
- 3.1.33 U.S. Nuclear Regulatory Commission, "Radiological Effluent Technical Specifications for PWRs," NUREG-0472
- 3.1.34 NRC Guidelines for Preparation and Implementation of Solid Waste Process Control Program "DRAFT," Revision 4, October 1986
- 3.1.35 CNSI FO-AD-002, "Operating Guidelines for Use of Polyethylene High Integrity Containers"
- 3.1.36 CNSI, FO-OP-023, "Bead Resin/Activated Carbon Dewatering Procedure for CNSI 14-215 or Smaller Liners"

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3.1.37 NRC Generic Letter No. 91-02, "Reporting Mishaps Involving LLW Forms Prepared For Disposal"

3.1.38 WMG-9217, "10 CFR 61 Practice Assessment at Wolf Creek Generating Station, 1992"

3.1.39 AP 25-001, RADIATION PROTECTION QUALITY PROGRAM REQUIREMENTS

### 3.2 Commitments

3.2.1 None

## 4.0 DEFINITIONS

### 4.1 Activity Correction Factor

4.1.1 The  $\mu\text{Ci/cc}$  or  $\mu\text{Ci/g}$  values may have to be corrected (plus or minus) if the waste stream specific 10 CFR 61 sample results (independent laboratory) and the replicate in-house specific activity values differ by more than 20 percent, and the differences cannot be resolved to the satisfaction of the HPSR.

### 4.2 Batch

4.2.1 An isolated quantity of feed waste to be processed having essentially constant physical and chemical characteristics. (The addition or removal of water will not be considered to create a new batch).

### 4.3 Chelating Agents

4.3.1 EDTA, DTPA, hydroxyl-carboxylic acids, citric acid, carboic acid and glucinic acid.

### 4.4 Confirmatory Analysis

4.4.1 Verification of Gross radioactivity measurements using MCA and independent laboratory sample data.

### 4.5 Density Correction

4.5.1 Density corrections may be required to convert sample data reported in  $\mu\text{Ci/g}$  to  $\mu\text{Ci/cc}$  or vice versa when comparing sample data with unlike units.

### 4.6 Dewatered Waste

4.6.1 Dewatered Waste refers to wet waste that has been processed by means other than solidification, encapsulation, or absorption to meet the free standing liquid requirements of 10 CFR 61.56 (a) (3) and (b) (2).

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#### 4.7 Encapsulation

4.7.1 Encapsulation is a means of providing stability for certain types of waste by surrounding the waste by an appropriate encapsulation media.

#### 4.8 Gamma-Spectral Analysis

4.8.1 Also known as IG, MCA, GE/Li and gamma spectroscopy.

#### 4.9 Gross Radioactivity Measurements

4.9.1 More commonly known as Dose to Curies conversion for packaged waste characterization and classification.

#### 4.10 Homogeneous

4.10.1 Of the same kind or nature; essentially alike. Most waste streams are considered to have the radioactivity distributed throughout for purposes of waste classification.

#### 4.11 Low-Level Radioactive Waste (LLW)

4.11.1 Those low-level radioactive wastes containing source, special nuclear, or by-product material that are acceptable for disposal in a land disposal facility. For the purposes of this definition, low-level radioactive waste has the same meaning as in the Low-Level Waste Policy Act, that is, radioactive waste not classified as high-level radioactive waste, transuranic waste, spent nuclear fuel, or by-product material as defined in Section 113.(2) of the Atomic Energy Act (uranium or thorium tailings and waste).

#### 4.12 Measurement of Specific Radionuclides

4.12.1 More commonly known as core sample or package sample using MCA data for packages waste characterization and classification.

#### 4.13 Operable

4.13.1 A system, subsystem, train, component or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified function(s), and when all necessary attendant instrumentation, controls, electrical power, cooling or seal water, lubrication or other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its function(s) are also capable of performing their related support function(s).

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#### 4.14 Pre-qualification Program

- 4.14.1 The testing program implemented to demonstrate that the proposed method of wet waste processing will result in a waste form acceptable to the land disposal facility.

#### 4.15 QA Verification Sample

- 4.15.1 A representative sample of the waste that is tested to demonstrate control of the waste processing. The sample shall be obtained from at least every tenth batch of each type of wet radioactive waste processed for stabilization.

#### 4.16 Quality Assurance/Quality Control

- 4.16.1 As used in this document, "quality assurance" comprises all those planned and systematic actions necessary to provide adequate confidence that a structure, system, or component will perform satisfactorily in service. Quality assurance includes quality control, which comprises those quality assurance actions related to control of the physical characteristics and quality of a material structure, component, or system to predetermined requirements.

#### 4.17 Sampling Plan

- 4.17.1 A sampling program implemented to ensure that representative samples from the feed waste and the final waste form are obtained and tested for conformance with parameters stated in the PCP and waste form acceptance criteria.

#### 4.18 Scaling Factor

- 4.18.1 A dimensionless number which relates the concentration of an easy to measure nuclide (gamma emitter) to one which is difficult to measure (beta/alpha emitters).

#### 4.19 Shipping Paper

- 4.19.1 At WCGS the shipping paper consists of an NRC form 540 (or equivalent). Additional documentation may be provided (i.e., bill of lading) but is not consecutively number as part of the shipping papers.

#### 4.20 Significant Quantity

- 4.20.1 For purposes of sample evaluation, waste classification and manifesting radionuclides on shipping papers, the following radionuclide limits shall be considered significant:

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- o Any LLD value for a 10 CFR Part 20, Appendix G required radionuclide.
- o Any radionuclide representing greater than 5 percent of the relative  $A_2$  fraction hazard.
- o Any radionuclide specifically listed in 10 CFR Part 61.55.
- o Any radionuclide representing greater than 1 percent of the total activity.
- o Any radionuclide greater than 0.5 RQ value.

#### 4.21 Special Nuclides

- 4.21.1 RADMAN Computer Code term for 10 CFR Part 20, Appendix G required nuclides.

#### 4.22 Stability

- 4.22.1 As used in this document, "stability" means structural stability. Stability requires that the waste form maintain its structural integrity under the expected disposal conditions.

#### 4.23 Waste Container

- 4.23.1 A vessel of any shape, size, and composition used to contain the final or intermediate processed waste.

#### 4.24 Waste Form

- 4.24.1 Waste in a stable waste form or container acceptable for disposal at a licensed disposal facility.

#### 4.25 Waste Processing

- 4.25.1 Changing, modifying, packaging the commercial nuclear power plant generated wet radioactive waste into a form that is acceptable to a disposal facility.

#### 4.26 Waste Stream

- 4.26.1 A station specific and constant source of waste with a distinct radionuclide content and distribution.

#### 4.27 Waste Type

- 4.27.1 A single packaging configuration tied to a specific waste stream, or multiple package types tied to the same waste stream.

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#### 4.28 Abbreviations

- 4.28.1 APG - Activity Per Gram
- 4.28.2 BTP - Branch Technical Position
- 4.28.3 CNSI - Chem Nuclear System, Inc.
- 4.28.4 HPS - Health Physics Supervisor
- 4.28.5 LLD - Lower Limit of Detection
- 4.28.6 MCA - Multi-Channel Analyzer

#### 5.0 RESPONSIBILITIES

##### 5.1 Health Physics Supervisor Radwaste is responsible for:

- 5.1.1 Implementing this procedure.
- 5.1.2 Ensuring that radioactive waste is classified and characterized in accordance with 10 CFR 61.55 and 61.56 and receiving facility criteria.
- 5.1.3 Designating other approved procedures (if required) to be implemented in the packaging of any specific batch of waste.

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## 6.0 PROCEDURE

6.1 The precautions/limitations of this procedure are listed below.

- 6.1.1 All plant personnel that have any involvement with the RADMAN, TRASHP, and FILTRK computer codes shall be familiar with its functions, operation, and maintenance.
- 6.1.2 Only authorized personnel will characterize or package radioactive waste or radioactive materials.
- 6.1.3 Radioactive materials shall be handled in accordance with applicable Radiation Protection Procedures.
- 6.1.4 Pressure and heat may be encountered during the operation of liquid waste processing systems.
  - 1. Caution must be exercised during disassembly and disconnection of lines or equipment and valve realignments.
- 6.1.5 Each HIC is matched with specific closure components and seals at time of manufacture.
  - 1. All components are identified using a common serial number.
  - 2. Should components become mismatched, contact the HPSR for instructions prior to use.
- 6.1.6 Waste must NOT be packaged for disposal in cardboard or fiberboard boxes.
- 6.1.7 Liquid waste must be solidified or packaged in sufficient absorbent material to absorb twice the volume of the liquid.
- 6.1.8 Solid waste containing liquid shall contain as little free standing and non-corrosive liquid as is reasonably achievable, but in no case shall the liquid exceed 1 percent of the volume.
- 6.1.9 Waste must NOT be readily capable of detonation or of explosive decomposition or reaction at normal pressures and temperatures, or of explosive reaction with water.
- 6.1.10 Waste must NOT contain, or be capable of generating, quantities of toxic gases, vapors, or fumes harmful to persons transporting, handling, or disposing of the waste. This does NOT apply to radioactive gaseous waste packaged in accordance with Step 6.1.12 of this section.

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- 6.1.11 Waste must NOT be pyrophoric. Pyrophoric materials contained in waste shall be treated, prepared, and packaged to be non-flammable.
- 6.1.12 Waste in a gaseous form must be packaged at a pressure that does not exceed 1.5 atmospheres at 20°C. Total activity must not exceed 100 curies per container.
- 6.1.13 Waste containing hazardous, biological, pathogenic, or infectious material must be treated to reduce to the maximum extent practicable the potential hazard from the non-radiological materials.
- 6.1.14 All data entries should use three significant figures only (i.e., X.XXE-x). IF more significant figures are provided, round off to generate three significant figures.
- 6.1.15 Use only those isotopes reported as real values, ignore all isotopes reported as LLD values, except those nuclides listed in Step 6.6.7.
- 6.1.16 Ignore all radioisotopes with half-lives less than five (5) days.
- 6.1.17 Changes to this procedure shall be documented with a form APF 31A-100-04, PROCESS CONTROL PROGRAM CHANGE RECORD submitted with the revised procedure and form APF 15C-004-01, DOCUMENT REVISION REQUEST. Form APF 31A-100-04 shall contain (Step 3.1.1):

1. Sufficient information to support the change together with the appropriate analyses or evaluation justifying the change(s).

AND

2. A determination that the change will maintain the overall conformance of the waste product to existing requirements of Federal, State, or other applicable regulations.

6.2 Special equipment, material, and parts needed to perform tasks are shown below.

- 6.2.1 Required tools and equipment will vary depending on the specific process and waste container that is used.
- 6.2.2 The various tools and equipment which may be required are detailed in the vendor procedures listed in Steps 3.1.36 and 3.1.37.

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6.3 Prerequisites before beginning work with this procedure.

- 6.3.1 Ensure that a current set of DOT, NRC and burial site regulations is maintained at the station and is available for reference.
- 6.3.2 Ensure that representative sample data is on file for each waste stream. Data is considered to be current if it meets the following:
  - 1. The waste stream must be sampled at least every two years for NRC Class A waste.
  - 2. The waste stream must be sampled at least every year for NRC Class B or C waste.
  - 3. Non-waste radioactive material shall be sampled on an annual or as generated basis with (non-irradiated) fuel pool material differentiated from balance of plant material.
- 6.3.3 A training program shall be developed and implemented for personnel having responsibilities related to waste processing operations to ensure the waste processing shall be performed within the requirements of the PCP.
  - 1. The training program shall be repeated and the personnel requalified on a periodic schedule, not to exceed three years.
  - 2. The individual's training records shall be maintained and available for audit and inspection.
- 6.3.4 Additional requirements for contracted vendors processing waste.
  - 1. Management shall review vendor(s) topical reports.

NOTE

The PCP does NOT have to include the vendors Topical Report if it has NRC approval, or has been previously submitted to the NRC.

- a. This review will assure the vendors operations and requirements are compatible with the responsibilities and operation of the plant.
- b. The training requirements and records listed in Step 6.3.3 also apply to contracted vendors.
- c. The station shall maintain copies of records to verify training of vendor personnel.

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6.3.5 Voluntarily report waste from mishaps to the NRCs Director of the Division of Low-Level Waste Management and Decommissioning and to the designated State Disposal-Site Regulatory Authority of the three classes of information outlined in Generic Letter 91-02.

1. The failure of high integrity containers used to ensure a stable waste form. (Not applicable at the Barnwell disposal facility).
2. The misuse of high integrity containers, evidenced by a quantity of free liquid greater than one (1) percent of container volume, or by an excessive void space within the container.
3. The production of a solidified Class B or C waste form that has any of the following characteristics:
  - a. Contains free liquid in quantities exceeding 0.5 percent of the volume of the waste.
  - b. Contains waste with radionuclides in concentrations exceeding those considered during waste form qualification testing accepted by the regulatory agency, which could lead to errors in assessment of waste class.
  - c. Contains a significantly different waste loading than that used in qualification testing accepted by the regulatory agency.
  - d. Contains chemical ingredients not present in qualification testing accepted by the regulatory agency, and those quantities are sufficient to unacceptably degrade the waste product.
  - e. Shows instability evidenced by crumbling, cracking, spalling, voids, softening, disintegration, nonhomogeneity, or dimensional changes.
  - f. Evidence of processing phenomena that exceed the limiting processing condition identified in applicable topical reports on process control plans, e.g., foaming, temperature extremes, premature or slow hardening, and production of volatile material.

#### 6.4 Procedure For Performing Work

- 6.4.1 Methods and frequency for determining the radionuclide concentration for each waste stream.

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1. Ensure samples are representative of the final waste form.
2. Determine the density for each waste stream (NOT applicable for DAW and filters). The density is determined in the laboratory by determining the weight of a known volume of waste. The mass divided by the volume equals the density.

NOTE

For WCGS, waste stream radionuclide content is considered to be distributed throughout for purpose of waste classification.

- 6.4.2 Treat each waste stream separately for classification purposes.
- 6.4.3 Send all NRC Class A waste samples to an independent laboratory for gamma, beta and alpha analysis at least once every two years.
  1. Perform an in-house analysis for gamma emitting radionuclides for each sample sent to an independent lab for future comparison.
  2. Periodically perform in-house analysis for gamma emitting nuclides for comparison to the current data base values for gamma emitters (the current data base is usually based on the most recent independent laboratory results).
- 6.4.4 Send all NRC Class B and C waste samples to an independent laboratory for gamma, beta and alpha analysis at least once a year. The additional steps required are identical to Substeps 1 and 2 of Step 6.4.3.
- 6.4.5 Determine the status (real value, LLD or not present) of the 10 CFR 20 Appendix G required nuclides for each waste stream from the recent independent laboratory data.
- 6.4.6 Document and track all samples per RPP 07-101, CONTROL OF RADIOACTIVE MATERIAL MANAGEMENT SOFTWARE AND DATA BASES.

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6.5 Current and planned practice for each waste stream is as follows:

6.5.1 DAW

1. Obtain composite smears from various contaminated areas of the plant on a semi-annual basis and analyze (IG) them in-house for gamma emitters.
2. Compare the results of the semi-annual samples to the data base to ensure adequacy of sample frequency.
3. Send the most recent group of composite smears to an independent laboratory for analysis biennially or more often IF determined necessary by the HPSR.
4. Maintain records for all samples for nuclide identification, distribution and scaling factors.

NOTE

The specific activity ( $\mu\text{Ci/cc}$  or  $\mu\text{Ci/g}$ ) is NOT required since all characterization/classification calculations are performed using a dose/curie methodology which only relies on fractional abundance and scaling factors.

5. Both in-house and independent laboratory results are normally reported in  $\mu\text{Ci/sample}$ .

6.5.2 S/G Blowdown Resin

1. Obtain several (as determined by the HPSR) composite samples from the resin transfer line during liner loading operations on an "as generated" basis.

NOTE

Each liner is considered a different batch for sampling and classification purposes.

2. Analyze the samples in-house (IG) and retain the results for future comparison to the replicate independent laboratory results.
3. Send the samples to an independent laboratory for analysis biennially or as generated.

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4. Maintain records for all samples for nuclide identification, distribution and scaling factors.
5. Both in-house independent laboratory results are normally reported in the same units ( $\mu\text{Ci/g}$  or  $\mu\text{Ci/cc}$ ).

#### 6.5.3 CVCS Resin

1. The sampling procedure is exactly the same as listed above for S/G Blowdown Resin in Step 6.5.2 except the analysis frequency is annual or as generated.

#### 6.5.4 Filters

1. Obtain samples from each individual filter waste stream defined in Step 2.2 on an annual OR as generated basis.

#### NOTE

Samples may be taken from the actual filter media, from a smear of the filter media, from a smear of the filter housing, or a crud sample, as determined by the HPSR.

2. Perform an in-house (IG) analysis of the sample (or replicate sample) and retain the output record for future comparison to the independent laboratory results.
3. Send the sample to an independent laboratory for analysis once per year or more often if determine necessary by the HPSR.
4. Maintain records for all samples for nuclide identification, distribution and scaling factors.

#### NOTE

The specific activity ( $\mu\text{Ci/cc}$  or  $\mu\text{Ci/g}$ ) is not required since all characterization/classification calculations are performed using a dose/curie methodology which only relies on fractional abundance and scaling factors.

5. Both in-house and laboratory results are normally reported in  $\mu\text{Ci/sample}$ .

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## 6.6 Sample Evaluation

### 6.6.1 Infrequent or Abnormal Waste Types

1. Infrequent or abnormal waste types that may be generated must be evaluated on a case-by-case basis.
2. The HPSR will determine if the waste can be correlated to an existing waste stream.
3. If the radioactive material cannot be correlated to an existing waste stream, the HPSR shall determine specific off-site sampling and analysis requirements necessary to properly classify the material.

### 6.6.2 Examples of these radioactive materials include, but are not limited to:

- o Contaminated Soil
- o Contaminated Oil
- o Special Filters or Resin
- o A mixture of radioactive material types in one container.

### 6.6.3 Requirements for analysis to be performed by an off-site vendor are as follows:

1. All sample results must reference the quantity received.
2. All sample results shall be decay corrected to a reference date provided by the station which is normally the sample date.
3. The sample results shall be reported in  $\mu\text{Ci}/\text{sample}$ ,  $\mu\text{Ci}/\text{g}$  or  $\mu\text{Ci}/\text{cc}$  as determined the HPSR.

#### NOTE

Outside analysis is NOT performed for any radionuclides with a half-life less than five days.

### 6.6.4 The vendor shall perform analysis for the following radionuclides listed in Table 1 of 10 CFR 61.55.

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1. C-14, Tc-99, I-129, Pu-241, Cm-242 and the following alpha emitting transuranics (TRUs) with half-lives greater than five years, Np-237, Pu-238, Pu-239/240, Pu-242, Am-241, and Cm-243/244.
  - a. Additionally Ni-59 and Nb-94 are required for Rx cavity and fuel pool filters.

NOTE

If evaluation of several sets (i.e., three or more) of waste stream specific historical sample data shows that some TRUs with half-life greater than five years are consistently reported as LLD values, sample analysis may be discontinued for those specific radionuclides.

2. Analysis for the "activated metal" radionuclides listed in Table 1 of 10 CFR Part 61 are only required for the fuel pool filters and reactor cavity filters waste streams identified at WCNO.
  3. It is NOT necessary to contract for an offsite vendor to perform analysis for enriched uranium or other naturally occurring radionuclides not delineated in this procedure.
  4. Radionuclides listed in Table 1 of 10 CFR 61.55 shall be specifically identified and the quantities reported on shipping manifests if they are significant for purposes of classification.
- 6.6.5 The vendor shall perform analysis for the following radionuclides listed in Table 2 of 10 CFR 61.55.
1. H-3, Co-60, Ni-63, Sr-90 and Cs-137
  2. Radionuclides listed in Table 2 of 10 CFR 61.55 shall be specifically identified and the quantities reported on shipping manifests if they are significant for purposes of classification.
- 6.6.6 The vendor shall perform analysis for the following radionuclides NOT listed in Table 1 or Table 2 of 10 CFR 61.
1. Activation Products - Cr-51, Mn-54, Fe-55, Co-58, Fe-59, Sb-124, Sb-125, Zn-65, Ag-110M and any other nuclides identified in significant quantities by in-house IG equipment.

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2. Fission Products - Zr-95, Nb-95, Ru-103, Ru-106, Cs-134, Ce-141, Sr-89, Ce-144 and any other nuclides identified in significant quantities by in-house IG equipment.

6.6.7 A waste stream specific data base must include the following radionuclides, even if they are reported as LLD values:

1. H-3, C-14, Tc-99, I-129 required by 10 CFR 20 Appendix G (H-3 is considered real or LLD for DAW because "not present" cannot be substantiated).
2. Co-60, Cs-137, and Ce-144 (only if TRUs are reported) required by the RADMAN computer code. They are used as the primary scaling radionuclides.

#### 6.7 Sample Analysis and Comparison

6.7.1 Whenever a sample is sent off-site for analysis, count the same sample (or replicate) in-house with the station IG system.

#### NOTE

Isotopic results that are not considered statistically positive at the 99.9% confidence level are considered "suspect" values and shall be discarded as necessary.

6.7.2 Comparison of on-site versus off-site analysis shall be evaluated by the HPSR to identify and resolve any discrepancies. As a minimum, the comparison shall include:

- o Specific activity by gamma emitting radionuclides. (NOT applicable for DAW or filter samples.)
- o Co-60/Cs-137 Ratio
- o Presence or absence of radionuclides
- o Predominant radionuclides
- o Individual radionuclide fractional abundance
- o Scaling factors

6.7.3 Records of on-site and off-site sample analysis and evaluations by waste type are maintained by the HPSR.

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- 6.7.4 IF a comparison between the in-house and independent laboratory results shows a variance of 20 percent or greater for specific activity, the MCA results may be adjusted until the discrepancy is resolved. Reported MDC should be consistent with the measurement uncertainty. The relative uncertainty ( $1\sigma$ ) of the measurement should be ~30% at the MDC and should get smaller as the measured concentration increases above the MDC level.
1. Any discrepancies should be resolved (if possible) in-house or with the independent laboratory as soon as possible.
  2. The use of these activity correction factors is only valid if other conditions defined in Step 6.7.2 above compare favorably, otherwise the sample set should be considered suspect and the data should not be used. This would require another sample as soon as possible. (3.1.38)
- 6.7.5 Radionuclides with a half-life less than five days are also ignored from internal MCA reports.
- 6.7.6 New sample data shall be periodically obtained and evaluated.
- 6.7.7 New sample data may be either off-site analysis or in-house MCA analysis.
- 6.7.8 Once a data base has been established, based on off-site analysis, the MCA results are primarily used as a "flag" to obtain and send additional samples off-site. Exceptions to this may occur during crud burst situations where it is necessary to adjust the scaling factor relationship of the activation products. An example would be the  $^{53}\text{Co}/^{60}\text{Co}$  ratio after hydrogen peroxide additions.
- 6.7.9 The SCAL utility program may be utilized to evaluate multiple sets of data.

**NOTE**

Isotopic results that are not considered statistically positive at the 99.9% confidence level are considered "suspect" values and shall be discarded as necessary.

- 6.7.10 Several comparisons to the existing data base shall be considered when evaluating new sample data.

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1. Radionuclide fractional abundance and scaling factor relationships
2. Specific activity by radionuclide
3. Swings in driving classifications radionuclides
4. Radionuclides present in data base, but NOT present in new sample or vice versa
5. Total activity by sample set

#### 6.8 Sample Frequency

6.8.1 The following may require increased sampling:

1. Increase in failed fuel fraction as determined by:
  - o D.E.I. 25% of Technical Specification limit
  - o Increase of I-131/I-133
  - o Np-239 greater than 0.01  $\mu\text{Ci/cc}$  in reactor coolant
  - o Positive in-house gross alpha sample results on any type of smear survey
2. Crud burst during 100% load rejection or chemical cleaning
3. Extended reactor shutdown (>90 days)
4. Changes to liquid waste processing, such as bypassing filters, utilizing filters or a change in ion exchange media

#### 6.9 Scaling Factors

- 6.9.1 WCGS has established an inferential measurement program, whereby, concentrations of radioisotopes which cannot be readily measured are estimated through ratioing to concentrations of radioisotopes which can be readily measured.
- 6.9.2 Scaling factors have been developed on a facility and waste stream specific basis, and are periodically confirmed through direct measurements.
- 6.9.3 Correlations between measured and inferred radionuclides are currently as follows:
  1. Ce-144 to transuranic nuclides

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2. Co-60 to activation product nuclides and C-14
3. Cs-137 to fission product nuclides

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## 6.10 Waste Classification

### NOTE

The volume and mass of the waste form (not the waste container) is used for most waste classification calculations.

6.10.1 Determine the waste classification (Class A stable or unstable, Class C) by the concentration of certain radionuclides in the final waste form as listed in 10 CFR 61.55.

6.10.2 Determine the radionuclide concentrations per RPP 07-120, PREPARATION AND SHIPMENT OF RADIOACTIVE MATERIAL, as follows:

1. DAW - "Gross Radioactivity Measurements" in conjunction with the RADMAN computer code or hand calculations
2. Filters - "Gross Radioactivity Measurements" in conjunction with the FILTRK computer code or hand calculations
3. All other waste streams - "Direct Measurement of Individual Radionuclides" in conjunction with the RADMAN computer code or hand calculations

## 6.11 Quality Control For Sampling And Classification

6.11.1 The RADMAN computer code provides a mechanism to assist WCGS in conducting a quality control program to aid in compliance with the waste classification requirements listed in 10 CFR 61.55.

6.11.2 Management audits of the WCNOG Sampling and Classification Program shall be performed in accordance with AP 25-001, RADIATION PROTECTION QUALITY PROGRAM REQUIREMENTS.

6.11.3 The audits are performed and documented by any of the following:

\*Health Physics Department

\*Corporate Radwaste and Document Services Department

\*Quality Assurance Department

OR

\*Qualified Vendors

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## 6.12 Non-Waste Classification

- 6.12.1 Determine the radioactive material classification (Limited Quantity, LSA, SCO, Type A, >Type A or Type B) by the total activity or activity as listed in DOT regulations and the receiver's radioactive material licenses.
- 6.12.2 Determine the radionuclide concentrations per RPP 07-121, PREPARATION AND SHIPMENT OF RADIOACTIVE MATERIAL, as follows:
1. Non-irradiated material removed from the spent fuel pool - "Gross Radioactivity Measurements," "Direct Measurement of Individual Radionuclides", or "Measurement of Surface Contamination Levels" for non-radioactive material contaminated with radioactive material in conjunction with the RAMSHIP computer code or hand calculations.
  2. Any other radioactive material generated by the station - The same methods listed for fuel pool material may be used with a separate radionuclide data base.

## 6.13 Processing General Requirements

### NOTE

The dewatering capabilities are verified by vendor Topical Reports or operating and testing procedures.

- 6.13.1 Verify the wastes contain only trace amounts of drainable liquid, and in NO case may the volume of free liquid exceed one percent of the waste volume when wastes are disposed of in containers designed to provide stability.

### NOTE

The following verification is performed on a case-by-case basis for each package using independent laboratory data and MCA data in conjunction with computer codes or hand calculations.

- 6.13.2 Verify that resins are NOT processed that have loadings which will produce greater than 1.0 E+8 rads (350  $\mu$ Ci/cc) total accumulated dose.
- 6.13.3 The as generated waste must be compatible with the disposal container.

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#### 6.14 Processing Requirements During Dewatering Operations

- 6.14.1 Perform all dewatering operations per RPP 07-131, BEAD RESIN/ACTIVATED CARBON DEWATERING PROCEDURE FOR CNSI 14-215 OR SMALLER LINERS.

##### NOTE

This procedure may only be used to dewater CNSI's 14-215 or smaller liners containing bead-type ion exchange resins and activated carbon with less than 1 percent oil.

- 6.14.2 Complete form RPF 07-131-01, HIC DEWATERING COMPLETION RECORD, for each liner prior to final closure.
- 6.14.3 Form RPF 07-131-01, HIC DEWATERING COMPLETION RECORD, must be included in the shipping paperwork package with the shipment.
- 6.14.4 The final transfer/dewatering cycle shall be counted as the first pumping cycle IF after the transfer is completed, the liner is dewatering per this procedure.
- 6.14.5 Final dewatering verification is determined by the following:
1. 1% Free-Standing Water or Less
    - a. After a minimum of two (2) pumping cycles for bead resins or five (5) cycles for activated carbon, a measured volume of less than five (5) gallons on the next eight (8) hours of pumping shall be the acceptance criteria.
    - b. IF five (5) gallons or more are collected, the waiting/pumping cycle shall be repeated until less than five (5) gallons are collected.
  2. 0.5% Free-Standing Water or Less
    - a. After a minimum of five (5) pumping cycles for bead resins or eight (8) pumping cycles for activated carbon, a measured volume of less than two (2) gallons on the next eight (8) hours of pumping shall be the acceptance criteria.
    - b. IF two (2) gallons or more are collected, the waiting/pumping cycle shall be repeated until less than two (2) gallons are collected.

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#### 6.15 Packaging General Requirements

##### NOTE

The following general requirements are normally verified by review of a HIC's Certificate of Compliance (C of C) and State/NRC approval.

- 6.15.1 Ensure that the waste is in a container or structure that provides stability after disposal.
- 6.15.2 Ensure that the container is resistant to degradation caused by radiation effects.
- 6.15.3 Ensure the container is resistant to bio-degradation.
- 6.15.4 Verify that the container will remain stable under the compressive loads inherent in the disposal environment.
- 6.15.5 Verify that the container will remain stable if exposed to moisture or water after disposal.
- 6.15.6 Ensure that the "as generated" waste is compatible with the container.

#### 6.16 Packaging Vendor Requirements

- 6.16.1 Perform all inspection, handling and loading operations per CNSI, FO-AD-002.

##### NOTE

Prior to use, each user will have on file within Chem-Nuclear System, Inc. Regulatory Affairs Department a "Polyethylene High Integrity Container Certification Statement."

- 6.16.2 IF not already on file, complete form FO-AD-002 HIC USER'S CHECKLIST, and transmit it to CNSI, maintain a copy of file in the HPSR office.
- 6.16.3 Complete form FO-AD-002 HIC USER'S CHECKLIST, for each HIC liner to be shipped to CNSI.
- 6.16.4 Form FO-AD-002 HIC USER'S CHECKLIST, must be included in the shipping paperwork package with the shipment.
- 6.16.5 Complete form FO-AD-002 CERTIFICATION STATEMENT FOR DISPOSAL OF POLYETHYLENE HIGH INTEGRITY CONTAINERS, for each HIC liner to be shipped to CNSI.

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6.16.6 Form FO-AD-002 CERTIFICATION STATEMENT FOR DISPOSAL OF POLYETHYLENE HIGH INTEGRITY CONTAINERS, must be included in the shipping paperwork package with the shipment.

#### 6.16.7 Storage Conditions

##### NOTES

- o Containers stored out-of-doors in direct sunlight must be used within one year of fabrication.
- o The design of the storage facility must preclude the possibility of a wet or damp environment and any prolonged exposure of the container to any source of ultraviolet light.

1. Ensure that containers are stored out of direct sunlight (if possible) and away from any other sources of ultraviolet radiation.
2. Store all containers in such a way that the bottom is flat and that no weight is located over the manway/fill port area.
3. Each container shall be stored with its designated closure assemblies to prevent mismatching.
4. Following filling and closure of the container, it may be stored on-site prior to shipment for burial.

#### 6.16.8 Inspection Prior To Use

1. Visually inspect thread and seal areas to verify they are free of foreign matter that could impair the seal or thread engagement.
2. Visually inspect the exterior surfaces for damage that may have occurred during transport or storage that could lessen container integrity.

#### 6.16.9 Handling And Lift Requirements

##### NOTE

Due to the nature of the container material, some bowing and deformation may be evident during lifting.

1. Use only lift band(s), lift lugs and slings provided with the liner for lifting.

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2. Inspect the underdrain assembly prior to use if the container was dropped or banged against another object.

#### 6.17 Additional Barnwell Waste Management Facility Requirements

- 6.17.1 Each package of waste must be clearly labeled to identify whether it is Class A, Class B, or Class C waste, in accordance with 10 CFR 61.55.
- 6.17.2 All waste received at the Barnwell facility must be disposed in approved disposal overpacks.
- 6.17.3 Void spaces within the waste and between the waste and its packaging shall be reduced to the extent practicable, but in NO case shall the container be less than eighty-five percent (85%) full. This requirement is not applicable to waste in DHEC approved HICs and irradiated hardware containers.

#### NOTE

The South Carolina DHEC and CNSI recognize that filters and irradiated hardware will NOT routinely meet the 85% condition. Provided that containers of these waste types are packaged to the fullest extent practicable, no written justification is required.

- 6.17.4 The HPSR must apply for a variance request prior to shipment if the 85 percent fill requirement is NOT achievable.
- 6.17.5 Ensure that a copy of the Certificate of Compliance (C of C) for the approved High Integrity Container(s) as issued and amended by DHEC is on file with Barnwell Regulatory Affairs/Licensing Department.

#### 7.0 RECORDS

- 7.1 The following QA Records are generated by this procedure.
  - 7.1.1 Completed HIC USER'S CHECKLIST (FO-AD-002)
  - 7.1.2 Completed CERTIFICATION STATEMENT FOR DISPOSAL OF POLYETHYLENE HIGH INTEGRITY CONTAINERS (FO-AD-002)
  - 7.1.3 Completed PROCESS CONTROL PROGRAM CHANGE RECORD (APF 31A-100-04)

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7.2 The following Non-QA Record is generated by this procedure.

7.2.1 Completed POLYETHYLENE HIGH INTEGRITY CONTAINER  
CERTIFICATION STATEMENT (FO-AD-002)

8.0 FORMS

8.1 FO-AD-002, HIC USER'S CHECKLIST

8.2 FO-AD-002, CERTIFICATION STATEMENT FOR DISPOSAL OF POLYETHYLENE  
HIGH INTEGRITY CONTAINERS

8.3 FO-AD-002, POLYETHYLENE HIGH INTEGRITY CONTAINER CERTIFICATION  
STATEMENT

8.4 APF 31A-100-04, PROCESS CONTROL PROGRAM CHANGE RECORD

- END -

|               |                                        |               |
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## ATTACHMENT A

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## TECHNICAL SPECIFICATION AMENDMENT CHANGES

Solidification

The conversion of wet wastes into a form that meets shipping and burial ground requirements.

ADMINISTRATIVE CONTROLS AND REPORTING REQUIREMENTSLimiting Condition of Operation

Radioactive wastes shall be solidified or dewatered in accordance with the Process Control Program to meet shipping and transportation requirements during transit, and disposal site requirement when received at the disposal site.

Applicability

At all times

Remedial Action

- a. With solidification or dewatering not meeting disposal site and shipping and transportation requirements, suspend shipment of the inadequately processed wastes and correct the Process Control Program, the procedures and/or the Solid Wastes System as necessary to prevent recurrence.
- b. With solidification or dewatering not performed in accordance with the Process Control Program, test the improperly processed waste in each container to ensure that it meets burial ground shipping requirements and take appropriate administrative action to prevent recurrence.

Surveillance Requirements

Solidification of at least one representative test specimen from at least every tenth batch of each type of wet radioactive wastes (e.g., filter sludges, spent resins, evaporator bottoms, boric acid solutions and sodium sulfate solutions) shall be verified in accordance with the Process Control Program:

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## TECHNICAL SPECIFICATION AMENDMENT CHANGES

- a. If any test specimen fails to verify solidification, the solidification of the batch under test shall be suspended until such time as additional test specimens can be obtained, alternative solidification parameters can be determined in accordance with the Process Control Program, and a subsequent test verifies solidification.

Solidification of the batch may then be resumed using the alternative solidification parameters determined by the Process Control Program;

- b. If the initial test specimen from a batch of waste fails to verify solidification, the Process Control Program shall provide for the collection and testing of representative test specimens from each consecutive batch of the same type of wet waste until at least three consecutive initial test specimens demonstrate solidification. The Process Control Program shall be modified as required, as provided in WCGS Technical Specifications 6.13 (TR 5.5.4), to assure solidification of subsequent batches of waste; and
- c. With the installed equipment incapable of meeting this Administrative Control or declared out-of-service, restore the equipment to operable status or provide for contract capability to process wastes as necessary to satisfy all applicable transportation and disposal requirements.

Basis

This Administrative Control implements the requirements of 10 CFR 50.36.a and General Design Criteria 60 Appendix A to 10 CFR 50. The process parameters included in establishing the Process Control Program may include, but are not limited to, waste type, waste pH, waste/liquid/solidification agent/catalyst ratios, waste oil content, waste principal chemical constituents, and mixing and curing times.

|               |                                        |               |
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TECHNICAL SPECIFICATION AMENDMENT CHANGES

REPORTING REQUIREMENTS

Annual Radioactive Effluent Release Report

The Annual Radioactive Effluent Release Reports covering the operation of the unit during the previous calendar year shall be submitted before May 1 of each year. The report shall include a summary of the quantities of radioactive liquid, gaseous effluents and solid waste released from the Unit. The material provided shall be (1) consistent with the objectives outline in the ODCM and PCP, and (2) in conformance with 10 CFR 50.36a and Section IV.B.1 of Appendix I to 10 CFR Part 50.

Changes to the PCP

- a. Shall be documented and records of reviews performed shall be retained for the duration of the Unit Operating License. This documentation shall contain:
  1. Sufficient information to support the change together with the appropriate analyses or evaluations justifying the change(s).
  2. The determination that the change will maintain the overall conformance of solidified waste product to existing requirements of Federal, State, or other applicable regulations.
- b. Shall become effective after review and acceptance by the PSRC and the approval of the Plant Manager.

- END -