

Summary : RESRAD Default

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Part I: Mixture Sums and Single Radionuclide Guidelines

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## Dose Conversion Factor (and Related) Parameter Summary

Dose Library: Zion ROC Screen BFM Plus FGR 11

| Menu | Parameter  | Current Value# | Base Case* | Parameter Name |
|------|--|----------------|------------|----------------|
| A-1  | DCF's for external ground radiation, (mrem/yr)/(pCi/g) |                |            |                |
| A-1  | Ac-225 (Source: FGR 12)                                | 6.371E-02      | 6.371E-02  | DCF1 ( 1)      |
| A-1  | Ac-227 (Source: FGR 12)                                | 4.951E-04      | 4.951E-04  | DCF1 ( 2)      |
| A-1  | Ac-228 (Source: FGR 12)                                | 5.978E+00      | 5.978E+00  | DCF1 ( 3)      |
| A-1  | Ag-108 (Source: FGR 12)                                | 1.143E-01      | 1.143E-01  | DCF1 ( 4)      |
| A-1  | Ag-108m (Source: FGR 12)                               | 9.640E+00      | 9.640E+00  | DCF1 ( 5)      |
| A-1  | Am-241 (Source: FGR 12)                                | 4.372E-02      | 4.372E-02  | DCF1 ( 6)      |
| A-1  | Am-243 (Source: FGR 12)                                | 1.420E-01      | 1.420E-01  | DCF1 ( 7)      |
| A-1  | At-217 (Source: FGR 12)                                | 1.773E-03      | 1.773E-03  | DCF1 ( 8)      |
| A-1  | At-218 (Source: FGR 12)                                | 5.847E-03      | 5.847E-03  | DCF1 ( 9)      |
| A-1  | At-219 (Source: no data)                               | 0.000E+00      | -2.000E+00 | DCF1 ( 10)     |
| A-1  | Ba-137m (Source: FGR 12)                               | 3.606E+00      | 3.606E+00  | DCF1 ( 11)     |
| A-1  | Bi-210 (Source: FGR 12)                                | 3.606E-03      | 3.606E-03  | DCF1 ( 12)     |
| A-1  | Bi-211 (Source: FGR 12)                                | 2.559E-01      | 2.559E-01  | DCF1 ( 13)     |
| A-1  | Bi-212 (Source: FGR 12)                                | 1.171E+00      | 1.171E+00  | DCF1 ( 14)     |
| A-1  | Bi-213 (Source: FGR 12)                                | 7.660E-01      | 7.660E-01  | DCF1 ( 15)     |
| A-1  | Bi-214 (Source: FGR 12)                                | 9.808E+00      | 9.808E+00  | DCF1 ( 16)     |
| A-1  | Bi-215 (Source: no data)                               | 0.000E+00      | -2.000E+00 | DCF1 ( 17)     |
| A-1  | C-14 (Source: FGR 12)                                  | 1.345E-05      | 1.345E-05  | DCF1 ( 18)     |
| A-1  | Cm-243 (Source: FGR 12)                                | 5.829E-01      | 5.829E-01  | DCF1 ( 19)     |
| A-1  | Cm-244 (Source: FGR 12)                                | 1.259E-04      | 1.259E-04  | DCF1 ( 20)     |
| A-1  | Co-60 (Source: FGR 12)                                 | 1.622E+01      | 1.622E+01  | DCF1 ( 21)     |
| A-1  | Cs-134 (Source: FGR 12)                                | 9.472E+00      | 9.472E+00  | DCF1 ( 22)     |
| A-1  | Cs-137 (Source: FGR 12)                                | 7.510E-04      | 7.510E-04  | DCF1 ( 23)     |
| A-1  | Eu-152 (Source: FGR 12)                                | 7.006E+00      | 7.006E+00  | DCF1 ( 24)     |
| A-1  | Eu-154 (Source: FGR 12)                                | 7.678E+00      | 7.678E+00  | DCF1 ( 25)     |
| A-1  | Eu-155 (Source: FGR 12)                                | 1.822E-01      | 1.822E-01  | DCF1 ( 26)     |
| A-1  | Fe-55 (Source: FGR 12)                                 | 0.000E+00      | 0.000E+00  | DCF1 ( 27)     |
| A-1  | Fr-221 (Source: FGR 12)                                | 1.536E-01      | 1.536E-01  | DCF1 ( 28)     |
| A-1  | Fr-223 (Source: FGR 12)                                | 1.980E-01      | 1.980E-01  | DCF1 ( 29)     |
| A-1  | Gd-152 (Source: FGR 12)                                | 0.000E+00      | 0.000E+00  | DCF1 ( 30)     |
| A-1  | H-3 (Source: FGR 12)                                   | 0.000E+00      | 0.000E+00  | DCF1 ( 31)     |
| A-1  | Hg-206 (Source: no data)                               | 0.000E+00      | -2.000E+00 | DCF1 ( 32)     |
| A-1  | Nb-94 (Source: FGR 12)                                 | 9.677E+00      | 9.677E+00  | DCF1 ( 33)     |
| A-1  | Nd-144 (Source: Zion ROC Screen BFM)                   | 0.000E+00      | -1.000E+00 | DCF1 ( 34)     |
| A-1  | Ni-59 (Source: FGR 12)                                 | 0.000E+00      | 0.000E+00  | DCF1 ( 35)     |
| A-1  | Ni-63 (Source: FGR 12)                                 | 0.000E+00      | 0.000E+00  | DCF1 ( 36)     |
| A-1  | Np-237 (Source: FGR 12)                                | 7.790E-02      | 7.790E-02  | DCF1 ( 37)     |
| A-1  | Np-239 (Source: FGR 12)                                | 7.529E-01      | 7.529E-01  | DCF1 ( 38)     |
| A-1  | Pa-231 (Source: FGR 12)                                | 1.906E-01      | 1.906E-01  | DCF1 ( 39)     |
| A-1  | Pa-233 (Source: FGR 12)                                | 1.020E+00      | 1.020E+00  | DCF1 ( 40)     |
| A-1  | Pb-209 (Source: FGR 12)                                | 7.734E-04      | 7.734E-04  | DCF1 ( 41)     |
| A-1  | Pb-210 (Source: FGR 12)                                | 2.447E-03      | 2.447E-03  | DCF1 ( 42)     |
| A-1  | Pb-211 (Source: FGR 12)                                | 3.064E-01      | 3.064E-01  | DCF1 ( 43)     |
| A-1  | Pb-212 (Source: FGR 12)                                | 7.043E-01      | 7.043E-01  | DCF1 ( 44)     |
| A-1  | Pb-214 (Source: FGR 12)                                | 1.341E+00      | 1.341E+00  | DCF1 ( 45)     |
| A-1  | Pm-147 (Source: FGR 12)                                | 5.007E-05      | 5.007E-05  | DCF1 ( 46)     |
| A-1  | Po-210 (Source: FGR 12)                                | 5.231E-05      | 5.231E-05  | DCF1 ( 47)     |
| A-1  | Po-211 (Source: FGR 12)                                | 4.764E-02      | 4.764E-02  | DCF1 ( 48)     |
| A-1  | Po-212 (Source: FGR 12)                                | 0.000E+00      | 0.000E+00  | DCF1 ( 49)     |

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

Dose Library: Zion ROC Screen BFM Plus FGR 11

| Menu | Parameter   | Current Value# | Base Case* | Parameter Name |
|------|---|----------------|------------|----------------|
| A-1  | Po-213 (Source: FGR 12)                           | 0.000E+00      | 0.000E+00  | DCF1 ( 50)     |
| A-1  | Po-214 (Source: FGR 12)                           | 5.138E-04      | 5.138E-04  | DCF1 ( 51)     |
| A-1  | Po-215 (Source: FGR 12)                           | 1.016E-03      | 1.016E-03  | DCF1 ( 52)     |
| A-1  | Po-216 (Source: FGR 12)                           | 1.042E-04      | 1.042E-04  | DCF1 ( 53)     |
| A-1  | Po-218 (Source: FGR 12)                           | 5.642E-05      | 5.642E-05  | DCF1 ( 54)     |
| A-1  | Pu-238 (Source: FGR 12)                           | 1.513E-04      | 1.513E-04  | DCF1 ( 55)     |
| A-1  | Pu-239 (Source: FGR 12)                           | 2.952E-04      | 2.952E-04  | DCF1 ( 56)     |
| A-1  | Pu-240 (Source: FGR 12)                           | 1.467E-04      | 1.467E-04  | DCF1 ( 57)     |
| A-1  | Pu-241 (Source: FGR 12)                           | 5.904E-06      | 5.904E-06  | DCF1 ( 58)     |
| A-1  | Ra-223 (Source: FGR 12)                           | 6.034E-01      | 6.034E-01  | DCF1 ( 59)     |
| A-1  | Ra-224 (Source: FGR 12)                           | 5.119E-02      | 5.119E-02  | DCF1 ( 60)     |
| A-1  | Ra-225 (Source: FGR 12)                           | 1.102E-02      | 1.102E-02  | DCF1 ( 61)     |
| A-1  | Ra-226 (Source: FGR 12)                           | 3.176E-02      | 3.176E-02  | DCF1 ( 62)     |
| A-1  | Ra-228 (Source: FGR 12)                           | 0.000E+00      | 0.000E+00  | DCF1 ( 63)     |
| A-1  | Rn-218 (Source: FGR 12)                           | 4.540E-03      | 4.540E-03  | DCF1 ( 64)     |
| A-1  | Rn-219 (Source: FGR 12)                           | 3.083E-01      | 3.083E-01  | DCF1 ( 65)     |
| A-1  | Rn-220 (Source: FGR 12)                           | 2.298E-03      | 2.298E-03  | DCF1 ( 66)     |
| A-1  | Rn-222 (Source: FGR 12)                           | 2.354E-03      | 2.354E-03  | DCF1 ( 67)     |
| A-1  | Sb-125 (Source: FGR 12)                           | 2.447E+00      | 2.447E+00  | DCF1 ( 68)     |
| A-1  | Sm-147 (Source: FGR 12)                           | 0.000E+00      | 0.000E+00  | DCF1 ( 69)     |
| A-1  | Sm-148 (Source: Zion ROC Screen BFM)              | 0.000E+00      | -1.000E+00 | DCF1 ( 70)     |
| A-1  | Sr-90 (Source: FGR 12)                            | 7.043E-04      | 7.043E-04  | DCF1 ( 71)     |
| A-1  | Tc-99 (Source: FGR 12)                            | 1.255E-04      | 1.255E-04  | DCF1 ( 72)     |
| A-1  | Te-125m (Source: FGR 12)                          | 1.515E-02      | 1.515E-02  | DCF1 ( 73)     |
| A-1  | Th-227 (Source: FGR 12)                           | 5.212E-01      | 5.212E-01  | DCF1 ( 74)     |
| A-1  | Th-228 (Source: FGR 12)                           | 7.940E-03      | 7.940E-03  | DCF1 ( 75)     |
| A-1  | Th-229 (Source: FGR 12)                           | 3.213E-01      | 3.213E-01  | DCF1 ( 76)     |
| A-1  | Th-230 (Source: FGR 12)                           | 1.209E-03      | 1.209E-03  | DCF1 ( 77)     |
| A-1  | Th-231 (Source: FGR 12)                           | 3.643E-02      | 3.643E-02  | DCF1 ( 78)     |
| A-1  | Th-232 (Source: FGR 12)                           | 5.212E-04      | 5.212E-04  | DCF1 ( 79)     |
| A-1  | Tl-206 (Source: FGR 12)                           | 7.697E-03      | 7.697E-03  | DCF1 ( 80)     |
| A-1  | Tl-207 (Source: FGR 12)                           | 1.980E-02      | 1.980E-02  | DCF1 ( 81)     |
| A-1  | Tl-208 (Source: FGR 12)                           | 2.298E+01      | 2.298E+01  | DCF1 ( 82)     |
| A-1  | Tl-209 (Source: FGR 12)                           | 1.293E+01      | 1.293E+01  | DCF1 ( 83)     |
| A-1  | Tl-210 (Source: no data)                          | 0.000E+00      | -2.000E+00 | DCF1 ( 84)     |
| A-1  | U-233 (Source: FGR 12)                            | 1.397E-03      | 1.397E-03  | DCF1 ( 85)     |
| A-1  | U-234 (Source: FGR 12)                            | 4.017E-04      | 4.017E-04  | DCF1 ( 86)     |
| A-1  | U-235 (Source: FGR 12)                            | 7.211E-01      | 7.211E-01  | DCF1 ( 87)     |
| A-1  | U-235m (Source: no data)                          | 0.000E+00      | -1.000E+00 | DCF1 ( 88)     |
| A-1  | U-236 (Source: FGR 12)                            | 2.148E-04      | 2.148E-04  | DCF1 ( 89)     |
| A-1  | U-237 (Source: FGR 12)                            | 5.306E-01      | 5.306E-01  | DCF1 ( 90)     |
| A-1  | Y-90 (Source: FGR 12)                             | 2.391E-02      | 2.391E-02  | DCF1 ( 91)     |
| B-1  | Dose conversion factors for inhalation, mrem/pCi: |                |            |                |
| B-1  | Ac-227+D  | 6.724E+00      | 6.700E+00  | DCF2 ( 1)      |
| B-1  | Ac-227+D1   | 6.724E+00      | 6.700E+00  | DCF2 ( 2)      |
| B-1  | Ac-227+D2   | 6.708E+00      | 6.700E+00  | DCF2 ( 3)      |
| B-1  | Ac-227+D3   | 6.708E+00      | 6.700E+00  | DCF2 ( 4)      |
| B-1  | Ac-227+D4   | 6.700E+00      | 6.700E+00  | DCF2 ( 5)      |
| B-1  | Ac-227+D5   | 6.700E+00      | 6.700E+00  | DCF2 ( 6)      |

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

Dose Library: Zion ROC Screen BFM Plus FGR 11

| Menu | Parameter                | Current Value# | Base Case* | Parameter Name |
|------|--------------------------|----------------|------------|----------------|
| B-1  | Ag-108m+D                | 2.830E-04      | 2.830E-04  | DCF2( 7)       |
| B-1  | Am-241                   | 4.440E-01      | 4.440E-01  | DCF2( 8)       |
| B-1  | Am-243+D                 | 4.400E-01      | 4.400E-01  | DCF2( 9)       |
| B-1  | C-14(p) (Class: ORGANIC) | 2.090E-06      | 2.090E-06  | DCF2( 21)      |
| B-1  | C-14(g) (Class: CO2)     | 2.350E-08      | 2.350E-08  | C14GInhDCF     |
| B-1  | Cm-243                   | 3.070E-01      | 3.070E-01  | DCF2( 22)      |
| B-1  | Cm-244                   | 2.480E-01      | 2.480E-01  | DCF2( 46)      |
| B-1  | Co-60                    | 2.190E-04      | 2.190E-04  | DCF2( 49)      |
| B-1  | Cs-134                   | 4.620E-05      | 4.620E-05  | DCF2( 50)      |
| B-1  | Cs-137+D                 | 3.190E-05      | 3.190E-05  | DCF2( 51)      |
| B-1  | Eu-152                   | 2.210E-04      | 2.210E-04  | DCF2( 52)      |
| B-1  | Eu-154                   | 2.860E-04      | 2.860E-04  | DCF2( 54)      |
| B-1  | Eu-155                   | 4.140E-05      | 4.140E-05  | DCF2( 55)      |
| B-1  | Fe-55                    | 2.690E-06      | 2.690E-06  | DCF2( 56)      |
| B-1  | Gd-152                   | 2.430E-01      | 2.430E-01  | DCF2( 57)      |
| B-1  | H-3                      | 6.400E-08      | 6.400E-08  | DCF2( 58)      |
| B-1  | Nb-94                    | 4.140E-04      | 4.140E-04  | DCF2( 59)      |
| B-1  | Nd-144                   | 7.040E-02      | -1.000E+00 | DCF2( 60)      |
| B-1  | Ni-59                    | 2.700E-06      | 2.700E-06  | DCF2( 61)      |
| B-1  | Ni-63                    | 6.290E-06      | 6.290E-06  | DCF2( 62)      |
| B-1  | Np-237+D                 | 5.400E-01      | 5.400E-01  | DCF2( 63)      |
| B-1  | Pa-231                   | 1.280E+00      | 1.280E+00  | DCF2( 64)      |
| B-1  | Pb-210+D                 | 1.380E-02      | 1.360E-02  | DCF2( 70)      |
| B-1  | Pb-210+D1                | 1.380E-02      | 1.360E-02  | DCF2( 71)      |
| B-1  | Pb-210+D2                | 1.360E-02      | 1.360E-02  | DCF2( 72)      |
| B-1  | Pm-147                   | 3.920E-05      | 3.920E-05  | DCF2( 73)      |
| B-1  | Po-210                   | 9.400E-03      | 9.400E-03  | DCF2( 74)      |
| B-1  | Pu-238                   | 3.920E-01      | 3.920E-01  | DCF2( 75)      |
| B-1  | Pu-239                   | 4.290E-01      | 4.290E-01  | DCF2( 91)      |
| B-1  | Pu-239+D                 | 4.290E-01      | 4.290E-01  | DCF2( 97)      |
| B-1  | Pu-240                   | 4.290E-01      | 4.290E-01  | DCF2(103)      |
| B-1  | Pu-241                   | 8.250E-03      | 8.250E-03  | DCF2(105)      |
| B-1  | Pu-241+D                 | 8.254E-03      | 8.250E-03  | DCF2(106)      |
| B-1  | Ra-226+D                 | 8.594E-03      | 8.580E-03  | DCF2(107)      |
| B-1  | Ra-226+D1                | 8.594E-03      | 8.580E-03  | DCF2(110)      |
| B-1  | Ra-226+D2                | 8.587E-03      | 8.580E-03  | DCF2(113)      |
| B-1  | Ra-226+D3                | 8.587E-03      | 8.580E-03  | DCF2(116)      |
| B-1  | Ra-226+D4                | 8.580E-03      | 8.580E-03  | DCF2(119)      |
| B-1  | Ra-228+D                 | 5.078E-03      | 4.770E-03  | DCF2(122)      |
| B-1  | Sb-125                   | 1.220E-05      | 1.220E-05  | DCF2(123)      |
| B-1  | Sm-147                   | 7.470E-02      | 7.470E-02  | DCF2(125)      |
| B-1  | Sm-148                   | 7.340E-02      | -1.000E+00 | DCF2(126)      |
| B-1  | Sr-90+D                  | 1.308E-03      | 1.300E-03  | DCF2(127)      |
| B-1  | Tc-99                    | 8.320E-06      | 8.320E-06  | DCF2(128)      |
| B-1  | Te-125m                  | 7.290E-06      | 7.290E-06  | DCF2(129)      |
| B-1  | Th-228+D                 | 3.454E-01      | 3.420E-01  | DCF2(130)      |
| B-1  | Th-229+D                 | 2.169E+00      | 2.150E+00  | DCF2(131)      |
| B-1  | Th-230                   | 3.260E-01      | 3.260E-01  | DCF2(132)      |
| B-1  | Th-232                   | 1.640E+00      | 1.640E+00  | DCF2(147)      |
| B-1  | U-233                    | 1.350E-01      | 1.350E-01  | DCF2(148)      |

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

Dose Library: Zion ROC Screen BFM Plus FGR 11

| Menu | Parameter  | Current Value# | Base Case* | Parameter Name |
|------|--|----------------|------------|----------------|
| B-1  | U-234  | 1.320E-01      | 1.320E-01  | DCF2(149)      |
| B-1  | U-235+D  | 1.230E-01      | 1.230E-01  | DCF2(164)      |
| B-1  | U-236  | 1.250E-01      | 1.250E-01  | DCF2(170)      |
| D-1  | Dose conversion factors for ingestion, mrem/pCi: |                |            |                |
| D-1  | Ac-227+D   | 1.480E-02      | 1.410E-02  | DCF3( 1)       |
| D-1  | Ac-227+D1  | 1.480E-02      | 1.410E-02  | DCF3( 2)       |
| D-1  | Ac-227+D2  | 1.477E-02      | 1.410E-02  | DCF3( 3)       |
| D-1  | Ac-227+D3  | 1.477E-02      | 1.410E-02  | DCF3( 4)       |
| D-1  | Ac-227+D4  | 1.411E-02      | 1.410E-02  | DCF3( 5)       |
| D-1  | Ac-227+D5  | 1.411E-02      | 1.410E-02  | DCF3( 6)       |
| D-1  | Ag-108m+D  | 7.620E-06      | 7.620E-06  | DCF3( 7)       |
| D-1  | Am-241   | 3.640E-03      | 3.640E-03  | DCF3( 8)       |
| D-1  | Am-243+D   | 3.623E-03      | 3.620E-03  | DCF3( 9)       |
| D-1  | C-14   | 2.090E-06      | 2.090E-06  | DCF3( 21)      |
| D-1  | Cm-243   | 2.510E-03      | 2.510E-03  | DCF3( 22)      |
| D-1  | Cm-244   | 2.020E-03      | 2.020E-03  | DCF3( 46)      |
| D-1  | Co-60  | 2.690E-05      | 2.690E-05  | DCF3( 49)      |
| D-1  | Cs-134   | 7.330E-05      | 7.330E-05  | DCF3( 50)      |
| D-1  | Cs-137+D   | 5.000E-05      | 5.000E-05  | DCF3( 51)      |
| D-1  | Eu-152   | 6.480E-06      | 6.480E-06  | DCF3( 52)      |
| D-1  | Eu-154   | 9.550E-06      | 9.550E-06  | DCF3( 54)      |
| D-1  | Eu-155   | 1.530E-06      | 1.530E-06  | DCF3( 55)      |
| D-1  | Fe-55  | 6.070E-07      | 6.070E-07  | DCF3( 56)      |
| D-1  | Gd-152   | 1.610E-04      | 1.610E-04  | DCF3( 57)      |
| D-1  | H-3  | 6.400E-08      | 6.400E-08  | DCF3( 58)      |
| D-1  | Nb-94  | 7.140E-06      | 7.140E-06  | DCF3( 59)      |
| D-1  | Nd-144   | 1.510E-04      | -1.000E+00 | DCF3( 60)      |
| D-1  | Ni-59  | 2.100E-07      | 2.100E-07  | DCF3( 61)      |
| D-1  | Ni-63  | 5.770E-07      | 5.770E-07  | DCF3( 62)      |
| D-1  | Np-237+D   | 4.444E-03      | 4.440E-03  | DCF3( 63)      |
| D-1  | Pa-231   | 1.060E-02      | 1.060E-02  | DCF3( 64)      |
| D-1  | Pb-210+D   | 5.376E-03      | 5.370E-03  | DCF3( 70)      |
| D-1  | Pb-210+D1  | 5.376E-03      | 5.370E-03  | DCF3( 71)      |
| D-1  | Pb-210+D2  | 5.370E-03      | 5.370E-03  | DCF3( 72)      |
| D-1  | Pm-147   | 1.050E-06      | 1.050E-06  | DCF3( 73)      |
| D-1  | Po-210   | 1.900E-03      | 1.900E-03  | DCF3( 74)      |
| D-1  | Pu-238   | 3.200E-03      | 3.200E-03  | DCF3( 75)      |
| D-1  | Pu-239   | 3.540E-03      | 3.540E-03  | DCF3( 91)      |
| D-1  | Pu-239+D   | 3.540E-03      | 3.540E-03  | DCF3( 97)      |
| D-1  | Pu-240   | 3.540E-03      | 3.540E-03  | DCF3(103)      |
| D-1  | Pu-241   | 6.840E-05      | 6.840E-05  | DCF3(105)      |
| D-1  | Pu-241+D   | 7.157E-05      | 6.840E-05  | DCF3(106)      |
| D-1  | Ra-226+D   | 1.321E-03      | 1.320E-03  | DCF3(107)      |
| D-1  | Ra-226+D1  | 1.321E-03      | 1.320E-03  | DCF3(110)      |
| D-1  | Ra-226+D2  | 1.320E-03      | 1.320E-03  | DCF3(113)      |
| D-1  | Ra-226+D3  | 1.320E-03      | 1.320E-03  | DCF3(116)      |
| D-1  | Ra-226+D4  | 1.320E-03      | 1.320E-03  | DCF3(119)      |
| D-1  | Ra-228+D   | 1.442E-03      | 1.440E-03  | DCF3(122)      |
| D-1  | Sb-125   | 2.810E-06      | 2.810E-06  | DCF3(123)      |

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

Dose Library: Zion ROC Screen BFM Plus FGR 11

| Menu | Parameter   | Current Value# | Base Case* | Parameter Name |
|------|---|----------------|------------|----------------|
| D-1  | Sm-147  | 1.850E-04      | 1.850E-04  | DCF3(125)      |
| D-1  | Sm-148  | 1.580E-04      | -1.000E+00 | DCF3(126)      |
| D-1  | Sr-90+D   | 1.528E-04      | 1.420E-04  | DCF3(127)      |
| D-1  | Tc-99   | 1.460E-06      | 1.460E-06  | DCF3(128)      |
| D-1  | Te-125m   | 3.670E-06      | 3.670E-06  | DCF3(129)      |
| D-1  | Th-228+D  | 8.086E-04      | 3.960E-04  | DCF3(130)      |
| D-1  | Th-229+D  | 4.027E-03      | 3.530E-03  | DCF3(131)      |
| D-1  | Th-230  | 5.480E-04      | 5.480E-04  | DCF3(132)      |
| D-1  | Th-232  | 2.730E-03      | 2.730E-03  | DCF3(147)      |
| D-1  | U-233   | 2.890E-04      | 2.890E-04  | DCF3(148)      |
| D-1  | U-234   | 2.830E-04      | 2.830E-04  | DCF3(149)      |
| D-1  | U-235+D   | 2.673E-04      | 2.660E-04  | DCF3(164)      |
| D-1  | U-236   | 2.690E-04      | 2.690E-04  | DCF3(170)      |
| D-34 | Food transfer factors:                                    |                |            |                |
| D-34 | Ac-227+D , plant/soil concentration ratio, dimensionless  | 1.000E-03      | 2.500E-03  | RTF( 1,1)      |
| D-34 | Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)  | 2.000E-05      | 2.000E-05  | RTF( 1,2)      |
| D-34 | Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)   | 2.000E-06      | 2.000E-05  | RTF( 1,3)      |
| D-34 |   |                |            |                |
| D-34 | Ac-227+D1 , plant/soil concentration ratio, dimensionless | 1.000E-03      | 2.500E-03  | RTF( 2,1)      |
| D-34 | Ac-227+D1 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 2.000E-05      | 2.000E-05  | RTF( 2,2)      |
| D-34 | Ac-227+D1 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)  | 2.000E-06      | 2.000E-05  | RTF( 2,3)      |
| D-34 |   |                |            |                |
| D-34 | Ac-227+D2 , plant/soil concentration ratio, dimensionless | 1.000E-03      | 2.500E-03  | RTF( 3,1)      |
| D-34 | Ac-227+D2 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 2.000E-05      | 2.000E-05  | RTF( 3,2)      |
| D-34 | Ac-227+D2 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)  | 2.000E-06      | 2.000E-05  | RTF( 3,3)      |
| D-34 |   |                |            |                |
| D-34 | Ac-227+D3 , plant/soil concentration ratio, dimensionless | 1.000E-03      | 2.500E-03  | RTF( 4,1)      |
| D-34 | Ac-227+D3 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 2.000E-05      | 2.000E-05  | RTF( 4,2)      |
| D-34 | Ac-227+D3 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)  | 2.000E-06      | 2.000E-05  | RTF( 4,3)      |
| D-34 |   |                |            |                |
| D-34 | Ac-227+D4 , plant/soil concentration ratio, dimensionless | 1.000E-03      | 2.500E-03  | RTF( 5,1)      |
| D-34 | Ac-227+D4 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 2.000E-05      | 2.000E-05  | RTF( 5,2)      |
| D-34 | Ac-227+D4 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)  | 2.000E-06      | 2.000E-05  | RTF( 5,3)      |
| D-34 |   |                |            |                |
| D-34 | Ac-227+D5 , plant/soil concentration ratio, dimensionless | 1.000E-03      | 2.500E-03  | RTF( 6,1)      |
| D-34 | Ac-227+D5 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 2.000E-05      | 2.000E-05  | RTF( 6,2)      |
| D-34 | Ac-227+D5 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)  | 2.000E-06      | 2.000E-05  | RTF( 6,3)      |
| D-34 |   |                |            |                |
| D-34 | Ag-108m+D , plant/soil concentration ratio, dimensionless | 7.400E-03      | 1.500E-01  | RTF( 7,1)      |
| D-34 | Ag-108m+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 3.200E-03      | 3.000E-03  | RTF( 7,2)      |
| D-34 | Ag-108m+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)  | 9.500E-03      | 2.500E-02  | RTF( 7,3)      |
| D-34 |   |                |            |                |
| D-34 | Am-241 , plant/soil concentration ratio, dimensionless    | 1.800E-03      | 1.000E-03  | RTF( 8,1)      |
| D-34 | Am-241 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)    | 5.700E-05      | 5.000E-05  | RTF( 8,2)      |
| D-34 | Am-241 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)     | 3.200E-06      | 2.000E-06  | RTF( 8,3)      |
| D-34 |   |                |            |                |
| D-34 | Am-243+D , plant/soil concentration ratio, dimensionless  | 1.800E-03      | 1.000E-03  | RTF( 9,1)      |
| D-34 | Am-243+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)  | 5.700E-05      | 5.000E-05  | RTF( 9,2)      |
| D-34 | Am-243+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)   | 3.200E-06      | 2.000E-06  | RTF( 9,3)      |

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

Dose Library: Zion ROC Screen BFM Plus FGR 11

| Menu | Parameter  | Current Value# | Base Case* | Parameter Name |
|------|--|----------------|------------|----------------|
| D-34 | C-14 , plant/soil concentration ratio, dimensionless     | 1.280E+00      | 5.500E+00  | RTF( 21,1)     |
| D-34 | C-14 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)     | 6.000E-02      | 3.100E-02  | RTF( 21,2)     |
| D-34 | C-14 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)      | 3.200E-06      | 1.200E-02  | RTF( 21,3)     |
| D-34 |  |                |            |                |
| D-34 | Cm-243 , plant/soil concentration ratio, dimensionless   | 1.800E-03      | 1.000E-03  | RTF( 22,1)     |
| D-34 | Cm-243 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)   | 4.000E-05      | 2.000E-05  | RTF( 22,2)     |
| D-34 | Cm-243 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)    | 3.700E-06      | 2.000E-06  | RTF( 22,3)     |
| D-34 |  |                |            |                |
| D-34 | Cm-244 , plant/soil concentration ratio, dimensionless   | 1.800E-03      | 1.000E-03  | RTF( 46,1)     |
| D-34 | Cm-244 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)   | 4.000E-05      | 2.000E-05  | RTF( 46,2)     |
| D-34 | Cm-244 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)    | 3.700E-06      | 2.000E-06  | RTF( 46,3)     |
| D-34 |  |                |            |                |
| D-34 | Co-60 , plant/soil concentration ratio, dimensionless    | 1.500E-01      | 8.000E-02  | RTF( 49,1)     |
| D-34 | Co-60 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)    | 5.800E-02      | 2.000E-02  | RTF( 49,2)     |
| D-34 | Co-60 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)     | 2.000E-03      | 2.000E-03  | RTF( 49,3)     |
| D-34 |  |                |            |                |
| D-34 | Cs-134 , plant/soil concentration ratio, dimensionless   | 7.800E-02      | 4.000E-02  | RTF( 50,1)     |
| D-34 | Cs-134 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)   | 6.500E-02      | 3.000E-02  | RTF( 50,2)     |
| D-34 | Cs-134 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)    | 1.400E-02      | 8.000E-03  | RTF( 50,3)     |
| D-34 |  |                |            |                |
| D-34 | Cs-137+D , plant/soil concentration ratio, dimensionless | 7.800E-02      | 4.000E-02  | RTF( 51,1)     |
| D-34 | Cs-137+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 6.500E-02      | 3.000E-02  | RTF( 51,2)     |
| D-34 | Cs-137+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)  | 1.400E-02      | 8.000E-03  | RTF( 51,3)     |
| D-34 |  |                |            |                |
| D-34 | Eu-152 , plant/soil concentration ratio, dimensionless   | 2.500E-03      | 2.500E-03  | RTF( 52,1)     |
| D-34 | Eu-152 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)   | 4.000E-03      | 2.000E-03  | RTF( 52,2)     |
| D-34 | Eu-152 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)    | 5.000E-05      | 5.000E-05  | RTF( 52,3)     |
| D-34 |  |                |            |                |
| D-34 | Eu-154 , plant/soil concentration ratio, dimensionless   | 2.500E-03      | 2.500E-03  | RTF( 54,1)     |
| D-34 | Eu-154 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)   | 4.000E-03      | 2.000E-03  | RTF( 54,2)     |
| D-34 | Eu-154 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)    | 5.000E-05      | 5.000E-05  | RTF( 54,3)     |
| D-34 |  |                |            |                |
| D-34 | Eu-155 , plant/soil concentration ratio, dimensionless   | 2.500E-03      | 2.500E-03  | RTF( 55,1)     |
| D-34 | Eu-155 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)   | 4.000E-03      | 2.000E-03  | RTF( 55,2)     |
| D-34 | Eu-155 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)    | 5.000E-05      | 5.000E-05  | RTF( 55,3)     |
| D-34 |  |                |            |                |
| D-34 | Fe-55 , plant/soil concentration ratio, dimensionless    | 1.900E-03      | 1.000E-03  | RTF( 56,1)     |
| D-34 | Fe-55 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)    | 3.900E-02      | 2.000E-02  | RTF( 56,2)     |
| D-34 | Fe-55 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)     | 4.700E-04      | 3.000E-04  | RTF( 56,3)     |
| D-34 |  |                |            |                |
| D-34 | Gd-152 , plant/soil concentration ratio, dimensionless   | 2.000E-03      | 2.500E-03  | RTF( 57,1)     |
| D-34 | Gd-152 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)   | 2.000E-03      | 2.000E-03  | RTF( 57,2)     |
| D-34 | Gd-152 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)    | 6.000E-05      | 2.000E-05  | RTF( 57,3)     |
| D-34 |  |                |            |                |
| D-34 | H-3 , plant/soil concentration ratio, dimensionless      | 4.800E+00      | 4.800E+00  | RTF( 58,1)     |
| D-34 | H-3 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)      | 1.200E-02      | 1.200E-02  | RTF( 58,2)     |
| D-34 | H-3 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)       | 1.000E-02      | 1.000E-02  | RTF( 58,3)     |
| D-34 |  |                |            |                |

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

Dose Library: Zion ROC Screen BFM Plus FGR 11

| Menu | Parameter   | Current Value# | Base Case* | Parameter Name |
|------|---|----------------|------------|----------------|
| D-34 | Nb-94 , plant/soil concentration ratio, dimensionless     | 2.100E-02      | 1.000E-02  | RTF( 59,1)     |
| D-34 | Nb-94 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)     | 1.800E-06      | 3.000E-07  | RTF( 59,2)     |
| D-34 | Nb-94 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)      | 3.200E-06      | 2.000E-06  | RTF( 59,3)     |
| D-34 |   |                |            |                |
| D-34 | Nd-144 , plant/soil concentration ratio, dimensionless    | 2.000E-03      | 2.400E-03  | RTF( 60,1)     |
| D-34 | Nd-144 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)    | 2.000E-03      | 2.000E-03  | RTF( 60,2)     |
| D-34 | Nd-144 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)     | 6.000E-05      | 2.000E-05  | RTF( 60,3)     |
| D-34 |   |                |            |                |
| D-34 | Ni-59 , plant/soil concentration ratio, dimensionless     | 9.200E-02      | 5.000E-02  | RTF( 61,1)     |
| D-34 | Ni-59 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)     | 5.000E-03      | 5.000E-03  | RTF( 61,2)     |
| D-34 | Ni-59 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)      | 3.200E-02      | 2.000E-02  | RTF( 61,3)     |
| D-34 |   |                |            |                |
| D-34 | Ni-63 , plant/soil concentration ratio, dimensionless     | 9.200E-02      | 5.000E-02  | RTF( 62,1)     |
| D-34 | Ni-63 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)     | 5.000E-03      | 5.000E-03  | RTF( 62,2)     |
| D-34 | Ni-63 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)      | 3.200E-02      | 2.000E-02  | RTF( 62,3)     |
| D-34 |   |                |            |                |
| D-34 | Np-237+D , plant/soil concentration ratio, dimensionless  | 2.000E-02      | 2.000E-02  | RTF( 63,1)     |
| D-34 | Np-237+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)  | 1.000E-03      | 1.000E-03  | RTF( 63,2)     |
| D-34 | Np-237+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)   | 1.000E-05      | 5.000E-06  | RTF( 63,3)     |
| D-34 |   |                |            |                |
| D-34 | Pa-231 , plant/soil concentration ratio, dimensionless    | 1.000E-02      | 1.000E-02  | RTF( 64,1)     |
| D-34 | Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)    | 5.000E-06      | 5.000E-03  | RTF( 64,2)     |
| D-34 | Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)     | 5.000E-06      | 5.000E-06  | RTF( 64,3)     |
| D-34 |   |                |            |                |
| D-34 | Pb-210+D , plant/soil concentration ratio, dimensionless  | 4.000E-03      | 1.000E-02  | RTF( 70,1)     |
| D-34 | Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)  | 8.000E-04      | 8.000E-04  | RTF( 70,2)     |
| D-34 | Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)   | 3.000E-04      | 3.000E-04  | RTF( 70,3)     |
| D-34 |   |                |            |                |
| D-34 | Pb-210+D1 , plant/soil concentration ratio, dimensionless | 4.000E-03      | 1.000E-02  | RTF( 71,1)     |
| D-34 | Pb-210+D1 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 8.000E-04      | 8.000E-04  | RTF( 71,2)     |
| D-34 | Pb-210+D1 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)  | 3.000E-04      | 3.000E-04  | RTF( 71,3)     |
| D-34 |   |                |            |                |
| D-34 | Pb-210+D2 , plant/soil concentration ratio, dimensionless | 4.000E-03      | 1.000E-02  | RTF( 72,1)     |
| D-34 | Pb-210+D2 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 8.000E-04      | 8.000E-04  | RTF( 72,2)     |
| D-34 | Pb-210+D2 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)  | 3.000E-04      | 3.000E-04  | RTF( 72,3)     |
| D-34 |   |                |            |                |
| D-34 | Pm-147 , plant/soil concentration ratio, dimensionless    | 4.200E-03      | 2.500E-03  | RTF( 73,1)     |
| D-34 | Pm-147 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)    | 4.000E-03      | 2.000E-03  | RTF( 73,2)     |
| D-34 | Pm-147 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)     | 1.100E-04      | 2.000E-05  | RTF( 73,3)     |
| D-34 |   |                |            |                |
| D-34 | Po-210 , plant/soil concentration ratio, dimensionless    | 1.000E-03      | 1.000E-03  | RTF( 74,1)     |
| D-34 | Po-210 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)    | 5.000E-03      | 5.000E-03  | RTF( 74,2)     |
| D-34 | Po-210 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)     | 4.000E-04      | 3.400E-04  | RTF( 74,3)     |
| D-34 |   |                |            |                |
| D-34 | Pu-238 , plant/soil concentration ratio, dimensionless    | 1.800E-03      | 1.000E-03  | RTF( 75,1)     |
| D-34 | Pu-238 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)    | 1.100E-04      | 1.000E-04  | RTF( 75,2)     |
| D-34 | Pu-238 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)     | 1.370E-06      | 1.000E-06  | RTF( 75,3)     |
| D-34 |   |                |            |                |



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

Dose Library: Zion ROC Screen BFM Plus FGR 11

| Menu | Parameter   | Current Value# | Base Case* | Parameter Name |
|------|---|----------------|------------|----------------|
| D-34 | Pu-239 , plant/soil concentration ratio, dimensionless    | 1.800E-03      | 1.000E-03  | RTF( 91,1)     |
| D-34 | Pu-239 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)    | 1.100E-04      | 1.000E-04  | RTF( 91,2)     |
| D-34 | Pu-239 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)     | 1.370E-06      | 1.000E-06  | RTF( 91,3)     |
| D-34 |   |                |            |                |
| D-34 | Pu-239+D , plant/soil concentration ratio, dimensionless  | 1.800E-03      | 1.000E-03  | RTF( 97,1)     |
| D-34 | Pu-239+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)  | 1.100E-04      | 1.000E-04  | RTF( 97,2)     |
| D-34 | Pu-239+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)   | 1.370E-06      | 1.000E-06  | RTF( 97,3)     |
| D-34 |   |                |            |                |
| D-34 | Pu-240 , plant/soil concentration ratio, dimensionless    | 1.800E-03      | 1.000E-03  | RTF(103,1)     |
| D-34 | Pu-240 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)    | 1.100E-04      | 1.000E-04  | RTF(103,2)     |
| D-34 | Pu-240 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)     | 1.370E-06      | 1.000E-06  | RTF(103,3)     |
| D-34 |   |                |            |                |
| D-34 | Pu-241 , plant/soil concentration ratio, dimensionless    | 1.800E-03      | 1.000E-03  | RTF(105,1)     |
| D-34 | Pu-241 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)    | 1.100E-04      | 1.000E-04  | RTF(105,2)     |
| D-34 | Pu-241 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)     | 1.370E-06      | 1.000E-06  | RTF(105,3)     |
| D-34 |   |                |            |                |
| D-34 | Pu-241+D , plant/soil concentration ratio, dimensionless  | 1.800E-03      | 1.000E-03  | RTF(106,1)     |
| D-34 | Pu-241+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)  | 1.100E-04      | 1.000E-04  | RTF(106,2)     |
| D-34 | Pu-241+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)   | 1.370E-06      | 1.000E-06  | RTF(106,3)     |
| D-34 |   |                |            |                |
| D-34 | Ra-226+D , plant/soil concentration ratio, dimensionless  | 4.000E-02      | 4.000E-02  | RTF(107,1)     |
| D-34 | Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)  | 1.000E-03      | 1.000E-03  | RTF(107,2)     |
| D-34 | Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)   | 1.000E-03      | 1.000E-03  | RTF(107,3)     |
| D-34 |   |                |            |                |
| D-34 | Ra-226+D1 , plant/soil concentration ratio, dimensionless | 4.000E-02      | 4.000E-02  | RTF(110,1)     |
| D-34 | Ra-226+D1 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.000E-03      | 1.000E-03  | RTF(110,2)     |
| D-34 | Ra-226+D1 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)  | 1.000E-03      | 1.000E-03  | RTF(110,3)     |
| D-34 |   |                |            |                |
| D-34 | Ra-226+D2 , plant/soil concentration ratio, dimensionless | 4.000E-02      | 4.000E-02  | RTF(113,1)     |
| D-34 | Ra-226+D2 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.000E-03      | 1.000E-03  | RTF(113,2)     |
| D-34 | Ra-226+D2 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)  | 1.000E-03      | 1.000E-03  | RTF(113,3)     |
| D-34 |   |                |            |                |
| D-34 | Ra-226+D3 , plant/soil concentration ratio, dimensionless | 4.000E-02      | 4.000E-02  | RTF(116,1)     |
| D-34 | Ra-226+D3 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.000E-03      | 1.000E-03  | RTF(116,2)     |
| D-34 | Ra-226+D3 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)  | 1.000E-03      | 1.000E-03  | RTF(116,3)     |
| D-34 |   |                |            |                |
| D-34 | Ra-226+D4 , plant/soil concentration ratio, dimensionless | 4.000E-02      | 4.000E-02  | RTF(119,1)     |
| D-34 | Ra-226+D4 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.000E-03      | 1.000E-03  | RTF(119,2)     |
| D-34 | Ra-226+D4 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)  | 1.000E-03      | 1.000E-03  | RTF(119,3)     |
| D-34 |   |                |            |                |
| D-34 | Ra-228+D , plant/soil concentration ratio, dimensionless  | 4.000E-02      | 4.000E-02  | RTF(122,1)     |
| D-34 | Ra-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)  | 1.000E-03      | 1.000E-03  | RTF(122,2)     |
| D-34 | Ra-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)   | 1.000E-03      | 1.000E-03  | RTF(122,3)     |
| D-34 |   |                |            |                |
| D-34 | Sb-125 , plant/soil concentration ratio, dimensionless    | 1.900E-02      | 1.000E-02  | RTF(123,1)     |
| D-34 | Sb-125 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)    | 1.850E-03      | 1.000E-03  | RTF(123,2)     |
| D-34 | Sb-125 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)     | 1.100E-04      | 1.000E-04  | RTF(123,3)     |
| D-34 |   |                |            |                |

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

Dose Library: Zion ROC Screen BFM Plus FGR 11

| Menu | Parameter  | Current Value# | Base Case* | Parameter Name |
|------|--|----------------|------------|----------------|
| D-34 | Sm-147 , plant/soil concentration ratio, dimensionless   | 2.000E-03      | 2.500E-03  | RTF(125,1)     |
| D-34 | Sm-147 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)   | 2.000E-03      | 2.000E-03  | RTF(125,2)     |
| D-34 | Sm-147 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)    | 6.000E-05      | 2.000E-05  | RTF(125,3)     |
| D-34 |  |                |            |                |
| D-34 | Sm-148 , plant/soil concentration ratio, dimensionless   | 2.000E-03      | 2.500E-03  | RTF(126,1)     |
| D-34 | Sm-148 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)   | 2.000E-03      | 2.000E-03  | RTF(126,2)     |
| D-34 | Sm-148 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)    | 6.000E-05      | 2.000E-05  | RTF(126,3)     |
| D-34 |  |                |            |                |
| D-34 | Sr-90+D , plant/soil concentration ratio, dimensionless  | 5.900E-01      | 3.000E-01  | RTF(127,1)     |
| D-34 | Sr-90+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)  | 8.000E-03      | 8.000E-03  | RTF(127,2)     |
| D-34 | Sr-90+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)   | 2.700E-03      | 2.000E-03  | RTF(127,3)     |
| D-34 |  |                |            |                |
| D-34 | Tc-99 , plant/soil concentration ratio, dimensionless    | 9.110E+00      | 5.000E+00  | RTF(128,1)     |
| D-34 | Tc-99 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)    | 1.600E-04      | 1.000E-04  | RTF(128,2)     |
| D-34 | Tc-99 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)     | 1.600E-03      | 1.000E-03  | RTF(128,3)     |
| D-34 |  |                |            |                |
| D-34 | Te-125m , plant/soil concentration ratio, dimensionless  | 1.000E-01      | 6.000E-01  | RTF(129,1)     |
| D-34 | Te-125m , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)  | 7.000E-03      | 7.000E-03  | RTF(129,2)     |
| D-34 | Te-125m , milk/livestock-intake ratio, (pCi/L)/(pCi/d)   | 5.000E-04      | 5.000E-04  | RTF(129,3)     |
| D-34 |  |                |            |                |
| D-34 | Th-228+D , plant/soil concentration ratio, dimensionless | 1.000E-03      | 1.000E-03  | RTF(130,1)     |
| D-34 | Th-228+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.000E-04      | 1.000E-04  | RTF(130,2)     |
| D-34 | Th-228+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)  | 5.000E-06      | 5.000E-06  | RTF(130,3)     |
| D-34 |  |                |            |                |
| D-34 | Th-229+D , plant/soil concentration ratio, dimensionless | 1.000E-03      | 1.000E-03  | RTF(131,1)     |
| D-34 | Th-229+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 1.000E-04      | 1.000E-04  | RTF(131,2)     |
| D-34 | Th-229+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)  | 5.000E-06      | 5.000E-06  | RTF(131,3)     |
| D-34 |  |                |            |                |
| D-34 | Th-230 , plant/soil concentration ratio, dimensionless   | 1.000E-03      | 1.000E-03  | RTF(132,1)     |
| D-34 | Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)   | 1.000E-04      | 1.000E-04  | RTF(132,2)     |
| D-34 | Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)    | 5.000E-06      | 5.000E-06  | RTF(132,3)     |
| D-34 |  |                |            |                |
| D-34 | Th-232 , plant/soil concentration ratio, dimensionless   | 1.000E-03      | 1.000E-03  | RTF(147,1)     |
| D-34 | Th-232 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)   | 1.000E-04      | 1.000E-04  | RTF(147,2)     |
| D-34 | Th-232 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)    | 5.000E-06      | 5.000E-06  | RTF(147,3)     |
| D-34 |  |                |            |                |
| D-34 | U-233 , plant/soil concentration ratio, dimensionless    | 2.000E-03      | 2.500E-03  | RTF(148,1)     |
| D-34 | U-233 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)    | 8.000E-04      | 3.400E-04  | RTF(148,2)     |
| D-34 | U-233 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)     | 4.000E-04      | 6.000E-04  | RTF(148,3)     |
| D-34 |  |                |            |                |
| D-34 | U-234 , plant/soil concentration ratio, dimensionless    | 2.000E-03      | 2.500E-03  | RTF(149,1)     |
| D-34 | U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)    | 8.000E-04      | 3.400E-04  | RTF(149,2)     |
| D-34 | U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)     | 4.000E-04      | 6.000E-04  | RTF(149,3)     |
| D-34 |  |                |            |                |
| D-34 | U-235+D , plant/soil concentration ratio, dimensionless  | 2.000E-03      | 2.500E-03  | RTF(164,1)     |
| D-34 | U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)  | 8.000E-04      | 3.400E-04  | RTF(164,2)     |
| D-34 | U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)   | 4.000E-04      | 6.000E-04  | RTF(164,3)     |
| D-34 |  |                |            |                |

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

Dose Library: Zion ROC Screen BFM Plus FGR 11

| Menu | Parameter   | Current Value# | Base Case* | Parameter Name |
|------|---|----------------|------------|----------------|
| D-34 | U-236 , plant/soil concentration ratio, dimensionless | 2.000E-03      | 2.500E-03  | RTF(170,1)     |
| D-34 | U-236 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) | 8.000E-04      | 3.400E-04  | RTF(170,2)     |
| D-34 | U-236 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)  | 4.000E-04      | 6.000E-04  | RTF(170,3)     |
| D-5  | Bioaccumulation factors, fresh water, L/kg:           |                |            |                |
| D-5  | Ac-227+D , fish                                       | 1.500E+01      | 1.500E+01  | BIOFAC( 1,1)   |
| D-5  | Ac-227+D , crustacea and mollusks                     | 1.000E+03      | 1.000E+03  | BIOFAC( 1,2)   |
| D-5  | Ac-227+D1 , fish                                      | 1.500E+01      | 1.500E+01  | BIOFAC( 2,1)   |
| D-5  | Ac-227+D1 , crustacea and mollusks                    | 1.000E+03      | 1.000E+03  | BIOFAC( 2,2)   |
| D-5  | Ac-227+D2 , fish                                      | 1.500E+01      | 1.500E+01  | BIOFAC( 3,1)   |
| D-5  | Ac-227+D2 , crustacea and mollusks                    | 1.000E+03      | 1.000E+03  | BIOFAC( 3,2)   |
| D-5  | Ac-227+D3 , fish                                      | 1.500E+01      | 1.500E+01  | BIOFAC( 4,1)   |
| D-5  | Ac-227+D3 , crustacea and mollusks                    | 1.000E+03      | 1.000E+03  | BIOFAC( 4,2)   |
| D-5  | Ac-227+D4 , fish                                      | 1.500E+01      | 1.500E+01  | BIOFAC( 5,1)   |
| D-5  | Ac-227+D4 , crustacea and mollusks                    | 1.000E+03      | 1.000E+03  | BIOFAC( 5,2)   |
| D-5  | Ac-227+D5 , fish                                      | 1.500E+01      | 1.500E+01  | BIOFAC( 6,1)   |
| D-5  | Ac-227+D5 , crustacea and mollusks                    | 1.000E+03      | 1.000E+03  | BIOFAC( 6,2)   |
| D-5  | Ag-108m+D , fish                                      | 5.000E+00      | 5.000E+00  | BIOFAC( 7,1)   |
| D-5  | Ag-108m+D , crustacea and mollusks                    | 7.700E+02      | 7.700E+02  | BIOFAC( 7,2)   |
| D-5  | Am-241 , fish   | 3.000E+01      | 3.000E+01  | BIOFAC( 8,1)   |
| D-5  | Am-241 , crustacea and mollusks                       | 1.000E+03      | 1.000E+03  | BIOFAC( 8,2)   |
| D-5  | Am-243+D , fish                                       | 3.000E+01      | 3.000E+01  | BIOFAC( 9,1)   |
| D-5  | Am-243+D , crustacea and mollusks                     | 1.000E+03      | 1.000E+03  | BIOFAC( 9,2)   |
| D-5  | C-14 , fish   | 5.000E+04      | 5.000E+04  | BIOFAC( 21,1)  |
| D-5  | C-14 , crustacea and mollusks                         | 9.100E+03      | 9.100E+03  | BIOFAC( 21,2)  |
| D-5  | Cm-243 , fish   | 3.000E+01      | 3.000E+01  | BIOFAC( 22,1)  |
| D-5  | Cm-243 , crustacea and mollusks                       | 1.000E+03      | 1.000E+03  | BIOFAC( 22,2)  |
| D-5  | Cm-244 , fish   | 3.000E+01      | 3.000E+01  | BIOFAC( 46,1)  |
| D-5  | Cm-244 , crustacea and mollusks                       | 1.000E+03      | 1.000E+03  | BIOFAC( 46,2)  |
| D-5  | Co-60 , fish  | 3.000E+02      | 3.000E+02  | BIOFAC( 49,1)  |
| D-5  | Co-60 , crustacea and mollusks                        | 2.000E+02      | 2.000E+02  | BIOFAC( 49,2)  |
| D-5  | Cs-134 , fish   | 2.000E+03      | 2.000E+03  | BIOFAC( 50,1)  |
| D-5  | Cs-134 , crustacea and mollusks                       | 1.000E+02      | 1.000E+02  | BIOFAC( 50,2)  |
| D-5  | Cs-137+D , fish                                       | 2.000E+03      | 2.000E+03  | BIOFAC( 51,1)  |
| D-5  | Cs-137+D , crustacea and mollusks                     | 1.000E+02      | 1.000E+02  | BIOFAC( 51,2)  |

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

Dose Library: Zion ROC Screen BFM Plus FGR 11

| Menu | Parameter                          | Current Value# | Base Case* | Parameter Name |
|------|------------------------------------|----------------|------------|----------------|
| D-5  | Eu-152 , fish                      | 5.000E+01      | 5.000E+01  | BIOFAC ( 52,1) |
| D-5  | Eu-152 , crustacea and mollusks    | 1.000E+03      | 1.000E+03  | BIOFAC ( 52,2) |
| D-5  |                                    |                |            |                |
| D-5  | Eu-154 , fish                      | 5.000E+01      | 5.000E+01  | BIOFAC ( 54,1) |
| D-5  | Eu-154 , crustacea and mollusks    | 1.000E+03      | 1.000E+03  | BIOFAC ( 54,2) |
| D-5  |                                    |                |            |                |
| D-5  | Eu-155 , fish                      | 5.000E+01      | 5.000E+01  | BIOFAC ( 55,1) |
| D-5  | Eu-155 , crustacea and mollusks    | 1.000E+03      | 1.000E+03  | BIOFAC ( 55,2) |
| D-5  |                                    |                |            |                |
| D-5  | Fe-55 , fish                       | 2.000E+02      | 2.000E+02  | BIOFAC ( 56,1) |
| D-5  | Fe-55 , crustacea and mollusks     | 3.200E+03      | 3.200E+03  | BIOFAC ( 56,2) |
| D-5  |                                    |                |            |                |
| D-5  | Gd-152 , fish                      | 2.500E+01      | 2.500E+01  | BIOFAC ( 57,1) |
| D-5  | Gd-152 , crustacea and mollusks    | 1.000E+03      | 1.000E+03  | BIOFAC ( 57,2) |
| D-5  |                                    |                |            |                |
| D-5  | H-3 , fish                         | 1.000E+00      | 1.000E+00  | BIOFAC ( 58,1) |
| D-5  | H-3 , crustacea and mollusks       | 1.000E+00      | 1.000E+00  | BIOFAC ( 58,2) |
| D-5  |                                    |                |            |                |
| D-5  | Nb-94 , fish                       | 3.000E+02      | 3.000E+02  | BIOFAC ( 59,1) |
| D-5  | Nb-94 , crustacea and mollusks     | 1.000E+02      | 1.000E+02  | BIOFAC ( 59,2) |
| D-5  |                                    |                |            |                |
| D-5  | Nd-144 , fish                      | 1.000E+02      | 1.000E+02  | BIOFAC ( 60,1) |
| D-5  | Nd-144 , crustacea and mollusks    | 1.000E+03      | 1.000E+03  | BIOFAC ( 60,2) |
| D-5  |                                    |                |            |                |
| D-5  | Ni-59 , fish                       | 1.000E+02      | 1.000E+02  | BIOFAC ( 61,1) |
| D-5  | Ni-59 , crustacea and mollusks     | 1.000E+02      | 1.000E+02  | BIOFAC ( 61,2) |
| D-5  |                                    |                |            |                |
| D-5  | Ni-63 , fish                       | 1.000E+02      | 1.000E+02  | BIOFAC ( 62,1) |
| D-5  | Ni-63 , crustacea and mollusks     | 1.000E+02      | 1.000E+02  | BIOFAC ( 62,2) |
| D-5  |                                    |                |            |                |
| D-5  | Np-237+D , fish                    | 3.000E+01      | 3.000E+01  | BIOFAC ( 63,1) |
| D-5  | Np-237+D , crustacea and mollusks  | 4.000E+02      | 4.000E+02  | BIOFAC ( 63,2) |
| D-5  |                                    |                |            |                |
| D-5  | Pa-231 , fish                      | 1.000E+01      | 1.000E+01  | BIOFAC ( 64,1) |
| D-5  | Pa-231 , crustacea and mollusks    | 1.100E+02      | 1.100E+02  | BIOFAC ( 64,2) |
| D-5  |                                    |                |            |                |
| D-5  | Pb-210+D , fish                    | 3.000E+02      | 3.000E+02  | BIOFAC ( 70,1) |
| D-5  | Pb-210+D , crustacea and mollusks  | 1.000E+02      | 1.000E+02  | BIOFAC ( 70,2) |
| D-5  |                                    |                |            |                |
| D-5  | Pb-210+D1 , fish                   | 3.000E+02      | 3.000E+02  | BIOFAC ( 71,1) |
| D-5  | Pb-210+D1 , crustacea and mollusks | 1.000E+02      | 1.000E+02  | BIOFAC ( 71,2) |
| D-5  |                                    |                |            |                |
| D-5  | Pb-210+D2 , fish                   | 3.000E+02      | 3.000E+02  | BIOFAC ( 72,1) |
| D-5  | Pb-210+D2 , crustacea and mollusks | 1.000E+02      | 1.000E+02  | BIOFAC ( 72,2) |
| D-5  |                                    |                |            |                |
| D-5  | Pm-147 , fish                      | 3.000E+01      | 3.000E+01  | BIOFAC ( 73,1) |
| D-5  | Pm-147 , crustacea and mollusks    | 1.000E+03      | 1.000E+03  | BIOFAC ( 73,2) |
| D-5  |                                    |                |            |                |
| D-5  | Po-210 , fish                      | 1.000E+02      | 1.000E+02  | BIOFAC ( 74,1) |
| D-5  | Po-210 , crustacea and mollusks    | 2.000E+04      | 2.000E+04  | BIOFAC ( 74,2) |

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

Dose Library: Zion ROC Screen BFM Plus FGR 11

| Menu | Parameter                          | Current Value# | Base Case* | Parameter Name |
|------|------------------------------------|----------------|------------|----------------|
| D-5  | Pu-238 , fish                      | 3.000E+01      | 3.000E+01  | BIOFAC( 75,1)  |
| D-5  | Pu-238 , crustacea and mollusks    | 1.000E+02      | 1.000E+02  | BIOFAC( 75,2)  |
| D-5  |                                    |                |            |                |
| D-5  | Pu-239 , fish                      | 3.000E+01      | 3.000E+01  | BIOFAC( 91,1)  |
| D-5  | Pu-239 , crustacea and mollusks    | 1.000E+02      | 1.000E+02  | BIOFAC( 91,2)  |
| D-5  |                                    |                |            |                |
| D-5  | Pu-239+D , fish                    | 3.000E+01      | 3.000E+01  | BIOFAC( 97,1)  |
| D-5  | Pu-239+D , crustacea and mollusks  | 1.000E+02      | 1.000E+02  | BIOFAC( 97,2)  |
| D-5  |                                    |                |            |                |
| D-5  | Pu-240 , fish                      | 3.000E+01      | 3.000E+01  | BIOFAC(103,1)  |
| D-5  | Pu-240 , crustacea and mollusks    | 1.000E+02      | 1.000E+02  | BIOFAC(103,2)  |
| D-5  |                                    |                |            |                |
| D-5  | Pu-241 , fish                      | 3.000E+01      | 3.000E+01  | BIOFAC(105,1)  |
| D-5  | Pu-241 , crustacea and mollusks    | 1.000E+02      | 1.000E+02  | BIOFAC(105,2)  |
| D-5  |                                    |                |            |                |
| D-5  | Pu-241+D , fish                    | 3.000E+01      | 3.000E+01  | BIOFAC(106,1)  |
| D-5  | Pu-241+D , crustacea and mollusks  | 1.000E+02      | 1.000E+02  | BIOFAC(106,2)  |
| D-5  |                                    |                |            |                |
| D-5  | Ra-226+D , fish                    | 5.000E+01      | 5.000E+01  | BIOFAC(107,1)  |
| D-5  | Ra-226+D , crustacea and mollusks  | 2.500E+02      | 2.500E+02  | BIOFAC(107,2)  |
| D-5  |                                    |                |            |                |
| D-5  | Ra-226+D1 , fish                   | 5.000E+01      | 5.000E+01  | BIOFAC(110,1)  |
| D-5  | Ra-226+D1 , crustacea and mollusks | 2.500E+02      | 2.500E+02  | BIOFAC(110,2)  |
| D-5  |                                    |                |            |                |
| D-5  | Ra-226+D2 , fish                   | 5.000E+01      | 5.000E+01  | BIOFAC(113,1)  |
| D-5  | Ra-226+D2 , crustacea and mollusks | 2.500E+02      | 2.500E+02  | BIOFAC(113,2)  |
| D-5  |                                    |                |            |                |
| D-5  | Ra-226+D3 , fish                   | 5.000E+01      | 5.000E+01  | BIOFAC(116,1)  |
| D-5  | Ra-226+D3 , crustacea and mollusks | 2.500E+02      | 2.500E+02  | BIOFAC(116,2)  |
| D-5  |                                    |                |            |                |
| D-5  | Ra-226+D4 , fish                   | 5.000E+01      | 5.000E+01  | BIOFAC(119,1)  |
| D-5  | Ra-226+D4 , crustacea and mollusks | 2.500E+02      | 2.500E+02  | BIOFAC(119,2)  |
| D-5  |                                    |                |            |                |
| D-5  | Ra-228+D , fish                    | 5.000E+01      | 5.000E+01  | BIOFAC(122,1)  |
| D-5  | Ra-228+D , crustacea and mollusks  | 2.500E+02      | 2.500E+02  | BIOFAC(122,2)  |
| D-5  |                                    |                |            |                |
| D-5  | Sb-125 , fish                      | 1.000E+02      | 1.000E+02  | BIOFAC(123,1)  |
| D-5  | Sb-125 , crustacea and mollusks    | 1.000E+01      | 1.000E+01  | BIOFAC(123,2)  |
| D-5  |                                    |                |            |                |
| D-5  | Sm-147 , fish                      | 2.500E+01      | 2.500E+01  | BIOFAC(125,1)  |
| D-5  | Sm-147 , crustacea and mollusks    | 1.000E+03      | 1.000E+03  | BIOFAC(125,2)  |
| D-5  |                                    |                |            |                |
| D-5  | Sm-148 , fish                      | 2.500E+01      | 2.500E+01  | BIOFAC(126,1)  |
| D-5  | Sm-148 , crustacea and mollusks    | 1.000E+03      | 1.000E+03  | BIOFAC(126,2)  |
| D-5  |                                    |                |            |                |
| D-5  | Sr-90+D , fish                     | 6.000E+01      | 6.000E+01  | BIOFAC(127,1)  |
| D-5  | Sr-90+D , crustacea and mollusks   | 1.000E+02      | 1.000E+02  | BIOFAC(127,2)  |
| D-5  |                                    |                |            |                |
| D-5  | Tc-99 , fish                       | 2.000E+01      | 2.000E+01  | BIOFAC(128,1)  |
| D-5  | Tc-99 , crustacea and mollusks     | 5.000E+00      | 5.000E+00  | BIOFAC(128,2)  |

Summary : RESRAD Default

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

Dose Library: Zion ROC Screen BFM Plus FGR 11

| Menu | Parameter                         | Current Value# | Base Case* | Parameter Name |
|------|-----------------------------------|----------------|------------|----------------|
| D-5  | Te-125m , fish                    | 4.000E+02      | 4.000E+02  | BIOFAC(129,1)  |
| D-5  | Te-125m , crustacea and mollusks  | 7.500E+01      | 7.500E+01  | BIOFAC(129,2)  |
| D-5  |                                   |                |            |                |
| D-5  | Th-228+D , fish                   | 1.000E+02      | 1.000E+02  | BIOFAC(130,1)  |
| D-5  | Th-228+D , crustacea and mollusks | 5.000E+02      | 5.000E+02  | BIOFAC(130,2)  |
| D-5  |                                   |                |            |                |
| D-5  | Th-229+D , fish                   | 1.000E+02      | 1.000E+02  | BIOFAC(131,1)  |
| D-5  | Th-229+D , crustacea and mollusks | 5.000E+02      | 5.000E+02  | BIOFAC(131,2)  |
| D-5  |                                   |                |            |                |
| D-5  | Th-230 , fish                     | 1.000E+02      | 1.000E+02  | BIOFAC(132,1)  |
| D-5  | Th-230 , crustacea and mollusks   | 5.000E+02      | 5.000E+02  | BIOFAC(132,2)  |
| D-5  |                                   |                |            |                |
| D-5  | Th-232 , fish                     | 1.000E+02      | 1.000E+02  | BIOFAC(147,1)  |
| D-5  | Th-232 , crustacea and mollusks   | 5.000E+02      | 5.000E+02  | BIOFAC(147,2)  |
| D-5  |                                   |                |            |                |
| D-5  | U-233 , fish                      | 1.000E+01      | 1.000E+01  | BIOFAC(148,1)  |
| D-5  | U-233 , crustacea and mollusks    | 6.000E+01      | 6.000E+01  | BIOFAC(148,2)  |
| D-5  |                                   |                |            |                |
| D-5  | U-234 , fish                      | 1.000E+01      | 1.000E+01  | BIOFAC(149,1)  |
| D-5  | U-234 , crustacea and mollusks    | 6.000E+01      | 6.000E+01  | BIOFAC(149,2)  |
| D-5  |                                   |                |            |                |
| D-5  | U-235+D , fish                    | 1.000E+01      | 1.000E+01  | BIOFAC(164,1)  |
| D-5  | U-235+D , crustacea and mollusks  | 6.000E+01      | 6.000E+01  | BIOFAC(164,2)  |
| D-5  |                                   |                |            |                |
| D-5  | U-236 , fish                      | 1.000E+01      | 1.000E+01  | BIOFAC(170,1)  |
| D-5  | U-236 , crustacea and mollusks    | 6.000E+01      | 6.000E+01  | BIOFAC(170,2)  |

#For DCF1(xxx) only, factors are for infinite depth &amp; area. See ETEG table in Ground Pathway of Detailed Report.

\*Base Case means Default.Lib w/o Associate Nuclide contributions.

Summary : RESRAD Default

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## Site-Specific Parameter Summary

| Menu | Parameter                                       | User Input | Default   | Used by RESRAD<br>(If different from user input) | Parameter Name |
|------|---|------------|-----------|--|----------------|
| R011 | Area of contaminated zone (m**2)                | 6.450E+04  | 1.000E+04 | ---  | AREA           |
| R011 | Thickness of contaminated zone (m)              | 1.500E-01  | 2.000E+00 | ---  | THICK0         |
| R011 | Fraction of contamination that is submerged     | 0.000E+00  | 0.000E+00 | ---  | SUBMFRACT      |
| R011 | Length parallel to aquifer flow (m)             | 2.870E+02  | 1.000E+02 | ---  | LCZPAQ         |
| R011 | Basic radiation dose limit (mrem/yr)            | 2.500E+01  | 3.000E+01 | ---  | BRDL           |
| R011 | Time since placement of material (yr)           | 0.000E+00  | 0.000E+00 | ---  | TI             |
| R011 | Times for calculations (yr)                     | 1.000E+00  | 1.000E+00 | ---  | T ( 2)         |
| R011 | Times for calculations (yr)                     | 3.000E+00  | 3.000E+00 | ---  | T ( 3)         |
| R011 | Times for calculations (yr)                     | 1.000E+01  | 1.000E+01 | ---  | T ( 4)         |
| R011 | Times for calculations (yr)                     | 3.000E+01  | 3.000E+01 | ---  | T ( 5)         |
| R011 | Times for calculations (yr)                     | 1.000E+02  | 1.000E+02 | ---  | T ( 6)         |
| R011 | Times for calculations (yr)                     | 3.000E+02  | 3.000E+02 | ---  | T ( 7)         |
| R011 | Times for calculations (yr)                     | 1.000E+03  | 1.000E+03 | ---  | T ( 8)         |
| R011 | Times for calculations (yr)                     | not used   | 0.000E+00 | ---  | T ( 9)         |
| R011 | Times for calculations (yr)                     | not used   | 0.000E+00 | ---  | T(10)          |
| R012 | Initial principal radionuclide (pCi/g): Ag-108m | 1.000E+00  | 0.000E+00 | ---  | S1(7)          |
| R012 | Initial principal radionuclide (pCi/g): Am-241  | 1.000E+00  | 0.000E+00 | ---  | S1(8)          |
| R012 | Initial principal radionuclide (pCi/g): Am-243  | 1.000E+00  | 0.000E+00 | ---  | S1(9)          |
| R012 | Initial principal radionuclide (pCi/g): C-14    | 1.000E+00  | 0.000E+00 | ---  | S1(21)         |
| R012 | Initial principal radionuclide (pCi/g): Cm-243  | 1.000E+00  | 0.000E+00 | ---  | S1(22)         |
| R012 | Initial principal radionuclide (pCi/g): Cm-244  | 1.000E+00  | 0.000E+00 | ---  | S1(46)         |
| R012 | Initial principal radionuclide (pCi/g): Co-60   | 1.000E+00  | 0.000E+00 | ---  | S1(49)         |
| R012 | Initial principal radionuclide (pCi/g): Cs-134  | 1.000E+00  | 0.000E+00 | ---  | S1(50)         |
| R012 | Initial principal radionuclide (pCi/g): Cs-137  | 1.000E+00  | 0.000E+00 | ---  | S1(51)         |
| R012 | Initial principal radionuclide (pCi/g): Eu-152  | 1.000E+00  | 0.000E+00 | ---  | S1(52)         |
| R012 | Initial principal radionuclide (pCi/g): Eu-154  | 1.000E+00  | 0.000E+00 | ---  | S1(54)         |
| R012 | Initial principal radionuclide (pCi/g): Eu-155  | 1.000E+00  | 0.000E+00 | ---  | S1(55)         |
| R012 | Initial principal radionuclide (pCi/g): Fe-55   | 1.000E+00  | 0.000E+00 | ---  | S1(56)         |
| R012 | Initial principal radionuclide (pCi/g): H-3     | 1.000E+00  | 0.000E+00 | ---  | S1(58)         |
| R012 | Initial principal radionuclide (pCi/g): Nb-94   | 1.000E+00  | 0.000E+00 | ---  | S1(59)         |
| R012 | Initial principal radionuclide (pCi/g): Ni-59   | 1.000E+00  | 0.000E+00 | ---  | S1(61)         |
| R012 | Initial principal radionuclide (pCi/g): Ni-63   | 1.000E+00  | 0.000E+00 | ---  | S1(62)         |
| R012 | Initial principal radionuclide (pCi/g): Np-237  | 1.000E+00  | 0.000E+00 | ---  | S1(63)         |
| R012 | Initial principal radionuclide (pCi/g): Pm-147  | 1.000E+00  | 0.000E+00 | ---  | S1(73)         |
| R012 | Initial principal radionuclide (pCi/g): Pu-238  | 1.000E+00  | 0.000E+00 | ---  | S1(75)         |
| R012 | Initial principal radionuclide (pCi/g): Pu-239  | 1.000E+00  | 0.000E+00 | ---  | S1(91)         |
| R012 | Initial principal radionuclide (pCi/g): Pu-240  | 1.000E+00  | 0.000E+00 | ---  | S1(103)        |
| R012 | Initial principal radionuclide (pCi/g): Pu-241  | 1.000E+00  | 0.000E+00 | ---  | S1(105)        |
| R012 | Initial principal radionuclide (pCi/g): Sb-125  | 1.000E+00  | 0.000E+00 | ---  | S1(123)        |
| R012 | Initial principal radionuclide (pCi/g): Sr-90   | 1.000E+00  | 0.000E+00 | ---  | S1(127)        |
| R012 | Initial principal radionuclide (pCi/g): Tc-99   | 1.000E+00  | 0.000E+00 | ---  | S1(128)        |
| R012 | Concentration in groundwater (pCi/L): Ag-108m   | not used   | 0.000E+00 | ---  | W1( 7)         |
| R012 | Concentration in groundwater (pCi/L): Am-241    | not used   | 0.000E+00 | ---  | W1( 8)         |
| R012 | Concentration in groundwater (pCi/L): Am-243    | not used   | 0.000E+00 | ---  | W1( 9)         |
| R012 | Concentration in groundwater (pCi/L): C-14      | not used   | 0.000E+00 | ---  | W1(21)         |
| R012 | Concentration in groundwater (pCi/L): Cm-243    | not used   | 0.000E+00 | ---  | W1(22)         |
| R012 | Concentration in groundwater (pCi/L): Cm-244    | not used   | 0.000E+00 | ---  | W1(46)         |
| R012 | Concentration in groundwater (pCi/L): Co-60     | not used   | 0.000E+00 | ---  | W1(49)         |
| R012 | Concentration in groundwater (pCi/L): Cs-134    | not used   | 0.000E+00 | ---  | W1(50)         |

Summary : RESRAD Default

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## Site-Specific Parameter Summary (continued)

| Menu | Parameter                                       | User Input | Default   | Used by RESRAD<br>(If different from user input) | Parameter Name |
|------|---|------------|-----------|--|----------------|
| R012 | Concentration in groundwater (pCi/L): Cs-137    | not used   | 0.000E+00 | ---  | W1 (51)        |
| R012 | Concentration in groundwater (pCi/L): Eu-152    | not used   | 0.000E+00 | ---  | W1 (52)        |
| R012 | Concentration in groundwater (pCi/L): Eu-154    | not used   | 0.000E+00 | ---  | W1 (54)        |
| R012 | Concentration in groundwater (pCi/L): Eu-155    | not used   | 0.000E+00 | ---  | W1 (55)        |
| R012 | Concentration in groundwater (pCi/L): Fe-55     | not used   | 0.000E+00 | ---  | W1 (56)        |
| R012 | Concentration in groundwater (pCi/L): H-3       | not used   | 0.000E+00 | ---  | W1 (58)        |
| R012 | Concentration in groundwater (pCi/L): Nb-94     | not used   | 0.000E+00 | ---  | W1 (59)        |
| R012 | Concentration in groundwater (pCi/L): Ni-59     | not used   | 0.000E+00 | ---  | W1 (61)        |
| R012 | Concentration in groundwater (pCi/L): Ni-63     | not used   | 0.000E+00 | ---  | W1 (62)        |
| R012 | Concentration in groundwater (pCi/L): Np-237    | not used   | 0.000E+00 | ---  | W1 (63)        |
| R012 | Concentration in groundwater (pCi/L): Pm-147    | not used   | 0.000E+00 | ---  | W1 (73)        |
| R012 | Concentration in groundwater (pCi/L): Pu-238    | not used   | 0.000E+00 | ---  | W1 (75)        |
| R012 | Concentration in groundwater (pCi/L): Pu-239    | not used   | 0.000E+00 | ---  | W1 (91)        |
| R012 | Concentration in groundwater (pCi/L): Pu-240    | not used   | 0.000E+00 | ---  | W1 (**)        |
| R012 | Concentration in groundwater (pCi/L): Pu-241    | not used   | 0.000E+00 | ---  | W1 (**)        |
| R012 | Concentration in groundwater (pCi/L): Sb-125    | not used   | 0.000E+00 | ---  | W1 (**)        |
| R012 | Concentration in groundwater (pCi/L): Sr-90     | not used   | 0.000E+00 | ---  | W1 (**)        |
| R012 | Concentration in groundwater (pCi/L): Tc-99     | not used   | 0.000E+00 | ---  | W1 (**)        |
| R013 | Cover depth (m)                                 | 0.000E+00  | 0.000E+00 | ---  | COVER0         |
| R013 | Density of cover material (g/cm**3)             | not used   | 1.500E+00 | ---  | DENSCV         |
| R013 | Cover depth erosion rate (m/yr)                 | not used   | 1.000E-03 | ---  | VCV            |
| R013 | Density of contaminated zone (g/cm**3)          | 1.800E+00  | 1.500E+00 | ---  | DENSCZ         |
| R013 | Contaminated zone erosion rate (m/yr)           | 1.500E-03  | 1.000E-03 | ---  | VCZ            |
| R013 | Contaminated zone total porosity                | 3.500E-01  | 4.000E-01 | ---  | TPCZ           |
| R013 | Contaminated zone field capacity                | 6.600E-02  | 2.000E-01 | ---  | FCCZ           |
| R013 | Contaminated zone hydraulic conductivity (m/yr) | 2.880E+03  | 1.000E+01 | ---  | HCCZ           |
| R013 | Contaminated zone b parameter                   | 9.700E-01  | 5.300E+00 | ---  | BCZ            |
| R013 | Average annual wind speed (m/sec)               | 4.200E+00  | 2.000E+00 | ---  | WIND           |
| R013 | Humidity in air (g/m**3)                        | 7.200E+00  | 8.000E+00 | ---  | HUMID          |
| R013 | Evapotranspiration coefficient                  | 6.250E-01  | 5.000E-01 | ---  | EVAPTR         |
| R013 | Precipitation (m/yr)                            | 8.300E-01  | 1.000E+00 | ---  | PRECIP         |
| R013 | Irrigation (m/yr)                               | 1.900E-01  | 2.000E-01 | ---  | RI             |
| R013 | Irrigation mode                                 | overhead   | overhead  | ---  | IDITCH         |
| R013 | Runoff coefficient                              | 2.000E-01  | 2.000E-01 | ---  | RUNOFF         |
| R013 | Watershed area for nearby stream or pond (m**2) | 1.000E+06  | 1.000E+06 | ---  | WAREA          |
| R013 | Accuracy for water/soil computations            | 1.000E-03  | 1.000E-03 | ---  | EPS            |
| R014 | Density of saturated zone (g/cm**3)             | 1.800E+00  | 1.500E+00 | ---  | DENSAQ         |
| R014 | Saturated zone total porosity                   | 3.500E-01  | 4.000E-01 | ---  | TPSZ           |
| R014 | Saturated zone effective porosity               | 2.900E-01  | 2.000E-01 | ---  | EPSZ           |
| R014 | Saturated zone field capacity                   | 6.600E-02  | 2.000E-01 | ---  | FCSZ           |
| R014 | Saturated zone hydraulic conductivity (m/yr)    | 2.880E+03  | 1.000E+02 | ---  | HCSZ           |
| R014 | Saturated zone hydraulic gradient               | 3.900E-03  | 2.000E-02 | ---  | HGWT           |
| R014 | Saturated zone b parameter                      | not used   | 5.300E+00 | ---  | BSZ            |
| R014 | Water table drop rate (m/yr)                    | 0.000E+00  | 1.000E-03 | ---  | VWT            |
| R014 | Well pump intake depth (m below water table)    | 3.300E+00  | 1.000E+01 | ---  | DWIBWT         |
| R014 | Model: Nondispersion (ND) or Mass-Balance (MB)  | ND         | ND        | ---  | MODEL          |
| R014 | Well pumping rate (m**3/yr)                     | 2.250E+03  | 2.500E+02 | ---  | UW             |



Summary : RESRAD Default

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## Site-Specific Parameter Summary (continued)

| Menu | Parameter                                    | User Input | Default    | Used by RESRAD<br>(If different from user input) | Parameter Name |
|------|--|------------|------------|--|----------------|
| R015 | Number of unsaturated zone strata            | 1          | 1          | ---  | NS             |
| R015 | Unsat. zone 1, thickness (m)                 | 3.450E+00  | 4.000E+00  | ---  | H(1)           |
| R015 | Unsat. zone 1, soil density (g/cm**3)        | 1.800E+00  | 1.500E+00  | ---  | DENSUZ(1)      |
| R015 | Unsat. zone 1, total porosity                | 3.500E-01  | 4.000E-01  | ---  | TPUZ(1)        |
| R015 | Unsat. zone 1, effective porosity            | 2.900E-01  | 2.000E-01  | ---  | EPUZ(1)        |
| R015 | Unsat. zone 1, field capacity                | 6.600E-02  | 2.000E-01  | ---  | FCUZ(1)        |
| R015 | Unsat. zone 1, soil-specific b parameter     | 9.700E-01  | 5.300E+00  | ---  | BUZ(1)         |
| R015 | Unsat. zone 1, hydraulic conductivity (m/yr) | 2.880E+03  | 1.000E+01  | ---  | HCUZ(1)        |
| R016 | Distribution coefficients for Ag-108m        |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)                  | 5.260E+01  | 0.000E+00  | ---  | DCNUCC ( 7)    |
| R016 | Unsat. zone 1 (cm**3/g)                      | 5.260E+01  | 0.000E+00  | ---  | DCNUCU ( 7,1)  |
| R016 | Saturated zone (cm**3/g)                     | 5.260E+01  | 0.000E+00  | ---  | DCNUCS ( 7)    |
| R016 | Leach rate (/yr)                             | 0.000E+00  | 0.000E+00  | 2.253E-02  | ALEACH ( 7)    |
| R016 | Solubility constant                          | 0.000E+00  | 0.000E+00  | not used   | SOLUBK ( 7)    |
| R016 | Distribution coefficients for Am-241         |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)                  | 1.770E+02  | 2.000E+01  | ---  | DCNUCC ( 8)    |
| R016 | Unsat. zone 1 (cm**3/g)                      | 1.770E+02  | 2.000E+01  | ---  | DCNUCU ( 8,1)  |
| R016 | Saturated zone (cm**3/g)                     | 1.770E+02  | 2.000E+01  | ---  | DCNUCS ( 8)    |
| R016 | Leach rate (/yr)                             | 0.000E+00  | 0.000E+00  | 6.700E-03  | ALEACH ( 8)    |
| R016 | Solubility constant                          | 0.000E+00  | 0.000E+00  | not used   | SOLUBK ( 8)    |
| R016 | Distribution coefficients for Am-243         |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)                  | 1.770E+02  | 2.000E+01  | ---  | DCNUCC ( 9)    |
| R016 | Unsat. zone 1 (cm**3/g)                      | 1.770E+02  | 2.000E+01  | ---  | DCNUCU ( 9,1)  |
| R016 | Saturated zone (cm**3/g)                     | 1.770E+02  | 2.000E+01  | ---  | DCNUCS ( 9)    |
| R016 | Leach rate (/yr)                             | 0.000E+00  | 0.000E+00  | 6.700E-03  | ALEACH ( 9)    |
| R016 | Solubility constant                          | 0.000E+00  | 0.000E+00  | not used   | SOLUBK ( 9)    |
| R016 | Distribution coefficients for C-14           |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)                  | 1.240E+00  | 0.000E+00  | ---  | DCNUCC(21)     |
| R016 | Unsat. zone 1 (cm**3/g)                      | 1.240E+00  | 0.000E+00  | ---  | DCNUCU(21,1)   |
| R016 | Saturated zone (cm**3/g)                     | 1.240E+00  | 0.000E+00  | ---  | DCNUCS(21)     |
| R016 | Leach rate (/yr)                             | 0.000E+00  | 0.000E+00  | 9.291E-01  | ALEACH(21)     |
| R016 | Solubility constant                          | 0.000E+00  | 0.000E+00  | not used   | SOLUBK(21)     |
| R016 | Distribution coefficients for Cm-243         |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)                  | 1.990E+03  | -1.000E+00 | ---  | DCNUCC(22)     |
| R016 | Unsat. zone 1 (cm**3/g)                      | 1.990E+03  | -1.000E+00 | ---  | DCNUCU(22,1)   |
| R016 | Saturated zone (cm**3/g)                     | 1.990E+03  | -1.000E+00 | ---  | DCNUCS(22)     |
| R016 | Leach rate (/yr)                             | 0.000E+00  | 0.000E+00  | 5.960E-04  | ALEACH(22)     |
| R016 | Solubility constant                          | 0.000E+00  | 0.000E+00  | not used   | SOLUBK(22)     |
| R016 | Distribution coefficients for Cm-244         |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)                  | 1.990E+03  | -1.000E+00 | ---  | DCNUCC(46)     |
| R016 | Unsat. zone 1 (cm**3/g)                      | 1.990E+03  | -1.000E+00 | ---  | DCNUCU(46,1)   |
| R016 | Saturated zone (cm**3/g)                     | 1.990E+03  | -1.000E+00 | ---  | DCNUCS(46)     |
| R016 | Leach rate (/yr)                             | 0.000E+00  | 0.000E+00  | 5.960E-04  | ALEACH(46)     |
| R016 | Solubility constant                          | 0.000E+00  | 0.000E+00  | not used   | SOLUBK(46)     |

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## Site-Specific Parameter Summary (continued)

| Menu | Parameter                            | User Input | Default    | Used by RESRAD<br>(If different from user input) | Parameter Name |
|------|--------------------------------------|------------|------------|--|----------------|
| R016 | Distribution coefficients for Co-60  |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)          | 1.161E+03  | 1.000E+03  | ---  | DCNUCC (49)    |
| R016 | Unsaturated zone 1 (cm**3/g)         | 1.161E+03  | 1.000E+03  | ---  | DCNUCU (49,1)  |
| R016 | Saturated zone (cm**3/g)             | 1.161E+03  | 1.000E+03  | ---  | DCNUCS (49)    |
| R016 | Leach rate (/yr)                     | 0.000E+00  | 0.000E+00  | 1.022E-03  | ALEACH (49)    |
| R016 | Solubility constant                  | 0.000E+00  | 0.000E+00  | not used   | SOLUBK (49)    |
| R016 | Distribution coefficients for Cs-134 |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)          | 6.150E+02  | 4.600E+03  | ---  | DCNUCC (50)    |
| R016 | Unsaturated zone 1 (cm**3/g)         | 6.150E+02  | 4.600E+03  | ---  | DCNUCU (50,1)  |
| R016 | Saturated zone (cm**3/g)             | 6.150E+02  | 4.600E+03  | ---  | DCNUCS (50)    |
| R016 | Leach rate (/yr)                     | 0.000E+00  | 0.000E+00  | 1.929E-03  | ALEACH (50)    |
| R016 | Solubility constant                  | 0.000E+00  | 0.000E+00  | not used   | SOLUBK (50)    |
| R016 | Distribution coefficients for Cs-137 |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)          | 6.150E+02  | 4.600E+03  | ---  | DCNUCC (51)    |
| R016 | Unsaturated zone 1 (cm**3/g)         | 6.150E+02  | 4.600E+03  | ---  | DCNUCU (51,1)  |
| R016 | Saturated zone (cm**3/g)             | 6.150E+02  | 4.600E+03  | ---  | DCNUCS (51)    |
| R016 | Leach rate (/yr)                     | 0.000E+00  | 0.000E+00  | 1.929E-03  | ALEACH (51)    |
| R016 | Solubility constant                  | 0.000E+00  | 0.000E+00  | not used   | SOLUBK (51)    |
| R016 | Distribution coefficients for Eu-152 |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)          | 9.500E+01  | -1.000E+00 | ---  | DCNUCC (52)    |
| R016 | Unsaturated zone 1 (cm**3/g)         | 9.500E+01  | -1.000E+00 | ---  | DCNUCU (52,1)  |
| R016 | Saturated zone (cm**3/g)             | 9.500E+01  | -1.000E+00 | ---  | DCNUCS (52)    |
| R016 | Leach rate (/yr)                     | 0.000E+00  | 0.000E+00  | 1.248E-02  | ALEACH (52)    |
| R016 | Solubility constant                  | 0.000E+00  | 0.000E+00  | not used   | SOLUBK (52)    |
| R016 | Distribution coefficients for Eu-154 |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)          | 9.500E+01  | -1.000E+00 | ---  | DCNUCC (54)    |
| R016 | Unsaturated zone 1 (cm**3/g)         | 9.500E+01  | -1.000E+00 | ---  | DCNUCU (54,1)  |
| R016 | Saturated zone (cm**3/g)             | 9.500E+01  | -1.000E+00 | ---  | DCNUCS (54)    |
| R016 | Leach rate (/yr)                     | 0.000E+00  | 0.000E+00  | 1.248E-02  | ALEACH (54)    |
| R016 | Solubility constant                  | 0.000E+00  | 0.000E+00  | not used   | SOLUBK (54)    |
| R016 | Distribution coefficients for Eu-155 |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)          | 9.500E+01  | -1.000E+00 | ---  | DCNUCC (55)    |
| R016 | Unsaturated zone 1 (cm**3/g)         | 9.500E+01  | -1.000E+00 | ---  | DCNUCU (55,1)  |
| R016 | Saturated zone (cm**3/g)             | 9.500E+01  | -1.000E+00 | ---  | DCNUCS (55)    |
| R016 | Leach rate (/yr)                     | 0.000E+00  | 0.000E+00  | 1.248E-02  | ALEACH (55)    |
| R016 | Solubility constant                  | 0.000E+00  | 0.000E+00  | not used   | SOLUBK (55)    |
| R016 | Distribution coefficients for Fe-55  |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)          | 2.857E+03  | 1.000E+03  | ---  | DCNUCC (56)    |
| R016 | Unsaturated zone 1 (cm**3/g)         | 2.857E+03  | 1.000E+03  | ---  | DCNUCU (56,1)  |
| R016 | Saturated zone (cm**3/g)             | 2.857E+03  | 1.000E+03  | ---  | DCNUCS (56)    |
| R016 | Leach rate (/yr)                     | 0.000E+00  | 0.000E+00  | 4.152E-04  | ALEACH (56)    |
| R016 | Solubility constant                  | 0.000E+00  | 0.000E+00  | not used   | SOLUBK (56)    |

Summary : RESRAD Default

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## Site-Specific Parameter Summary (continued)

| Menu | Parameter                            | User Input | Default    | Used by RESRAD<br>(If different from user input) | Parameter Name |
|------|--------------------------------------|------------|------------|--|----------------|
| R016 | Distribution coefficients for H-3    |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)          | 4.000E-02  | 0.000E+00  | ---  | DCNUCC (58)    |
| R016 | Unsaturated zone 1 (cm**3/g)         | 4.000E-02  | 0.000E+00  | ---  | DCNUCU (58,1)  |
| R016 | Saturated zone (cm**3/g)             | 4.000E-02  | 0.000E+00  | ---  | DCNUCS (58)    |
| R016 | Leach rate (/yr)                     | 0.000E+00  | 0.000E+00  | 1.547E+01  | ALEACH (58)    |
| R016 | Solubility constant                  | 0.000E+00  | 0.000E+00  | not used   | SOLUBK (58)    |
| R016 | Distribution coefficients for Nb-94  |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)          | 4.460E+01  | 0.000E+00  | ---  | DCNUCC (59)    |
| R016 | Unsaturated zone 1 (cm**3/g)         | 4.460E+01  | 0.000E+00  | ---  | DCNUCU (59,1)  |
| R016 | Saturated zone (cm**3/g)             | 4.460E+01  | 0.000E+00  | ---  | DCNUCS (59)    |
| R016 | Leach rate (/yr)                     | 0.000E+00  | 0.000E+00  | 2.657E-02  | ALEACH (59)    |
| R016 | Solubility constant                  | 0.000E+00  | 0.000E+00  | not used   | SOLUBK (59)    |
| R016 | Distribution coefficients for Ni-59  |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)          | 6.200E+01  | 1.000E+03  | ---  | DCNUCC (61)    |
| R016 | Unsaturated zone 1 (cm**3/g)         | 6.200E+01  | 1.000E+03  | ---  | DCNUCU (61,1)  |
| R016 | Saturated zone (cm**3/g)             | 6.200E+01  | 1.000E+03  | ---  | DCNUCS (61)    |
| R016 | Leach rate (/yr)                     | 0.000E+00  | 0.000E+00  | 1.912E-02  | ALEACH (61)    |
| R016 | Solubility constant                  | 0.000E+00  | 0.000E+00  | not used   | SOLUBK (61)    |
| R016 | Distribution coefficients for Ni-63  |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)          | 6.200E+01  | 1.000E+03  | ---  | DCNUCC (62)    |
| R016 | Unsaturated zone 1 (cm**3/g)         | 6.200E+01  | 1.000E+03  | ---  | DCNUCU (62,1)  |
| R016 | Saturated zone (cm**3/g)             | 6.200E+01  | 1.000E+03  | ---  | DCNUCS (62)    |
| R016 | Leach rate (/yr)                     | 0.000E+00  | 0.000E+00  | 1.912E-02  | ALEACH (62)    |
| R016 | Solubility constant                  | 0.000E+00  | 0.000E+00  | not used   | SOLUBK (62)    |
| R016 | Distribution coefficients for Np-237 |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)          | 3.750E+00  | -1.000E+00 | ---  | DCNUCC (63)    |
| R016 | Unsaturated zone 1 (cm**3/g)         | 3.750E+00  | -1.000E+00 | ---  | DCNUCU (63,1)  |
| R016 | Saturated zone (cm**3/g)             | 3.750E+00  | -1.000E+00 | ---  | DCNUCS (63)    |
| R016 | Leach rate (/yr)                     | 0.000E+00  | 0.000E+00  | 3.132E-01  | ALEACH (63)    |
| R016 | Solubility constant                  | 0.000E+00  | 0.000E+00  | not used   | SOLUBK (63)    |
| R016 | Distribution coefficients for Pm-147 |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)          | 9.480E+01  | -1.000E+00 | ---  | DCNUCC (73)    |
| R016 | Unsaturated zone 1 (cm**3/g)         | 9.480E+01  | -1.000E+00 | ---  | DCNUCU (73,1)  |
| R016 | Saturated zone (cm**3/g)             | 9.480E+01  | -1.000E+00 | ---  | DCNUCS (73)    |
| R016 | Leach rate (/yr)                     | 0.000E+00  | 0.000E+00  | 1.251E-02  | ALEACH (73)    |
| R016 | Solubility constant                  | 0.000E+00  | 0.000E+00  | not used   | SOLUBK (73)    |
| R016 | Distribution coefficients for Pu-238 |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)          | 2.680E+02  | 2.000E+03  | ---  | DCNUCC (75)    |
| R016 | Unsaturated zone 1 (cm**3/g)         | 2.680E+02  | 2.000E+03  | ---  | DCNUCU (75,1)  |
| R016 | Saturated zone (cm**3/g)             | 2.680E+02  | 2.000E+03  | ---  | DCNUCS (75)    |
| R016 | Leach rate (/yr)                     | 0.000E+00  | 0.000E+00  | 4.425E-03  | ALEACH (75)    |
| R016 | Solubility constant                  | 0.000E+00  | 0.000E+00  | not used   | SOLUBK (75)    |

Summary : RESRAD Default

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## Site-Specific Parameter Summary (continued)

| Menu | Parameter                                     | User Input | Default   | Used by RESRAD<br>(If different from user input) | Parameter Name |
|------|---|------------|-----------|--|----------------|
| R016 | Distribution coefficients for Pu-239          |            |           |  |                |
| R016 | Contaminated zone (cm**3/g)                   | 2.680E+02  | 2.000E+03 | ---  | DCNUCC (91)    |
| R016 | Unsaturated zone 1 (cm**3/g)                  | 2.680E+02  | 2.000E+03 | ---  | DCNUCU (91,1)  |
| R016 | Saturated zone (cm**3/g)                      | 2.680E+02  | 2.000E+03 | ---  | DCNUCS (91)    |
| R016 | Leach rate (/yr)                              | 0.000E+00  | 0.000E+00 | 4.425E-03  | ALEACH (91)    |
| R016 | Solubility constant                           | 0.000E+00  | 0.000E+00 | not used   | SOLUBK (91)    |
| R016 | Distribution coefficients for Pu-240          |            |           |  |                |
| R016 | Contaminated zone (cm**3/g)                   | 2.680E+02  | 2.000E+03 | ---  | DCNUCC (**)    |
| R016 | Unsaturated zone 1 (cm**3/g)                  | 2.680E+02  | 2.000E+03 | ---  | DCNUCU (**,1)  |
| R016 | Saturated zone (cm**3/g)                      | 2.680E+02  | 2.000E+03 | ---  | DCNUCS (**)    |
| R016 | Leach rate (/yr)                              | 0.000E+00  | 0.000E+00 | 4.425E-03  | ALEACH (**)    |
| R016 | Solubility constant                           | 0.000E+00  | 0.000E+00 | not used   | SOLUBK (**)    |
| R016 | Distribution coefficients for Pu-241          |            |           |  |                |
| R016 | Contaminated zone (cm**3/g)                   | 2.680E+02  | 2.000E+03 | ---  | DCNUCC (**)    |
| R016 | Unsaturated zone 1 (cm**3/g)                  | 2.600E+01  | 2.000E+03 | ---  | DCNUCU (**,1)  |
| R016 | Saturated zone (cm**3/g)                      | 2.680E+02  | 2.000E+03 | ---  | DCNUCS (**)    |
| R016 | Leach rate (/yr)                              | 0.000E+00  | 0.000E+00 | 4.425E-03  | ALEACH (**)    |
| R016 | Solubility constant                           | 0.000E+00  | 0.000E+00 | not used   | SOLUBK (**)    |
| R016 | Distribution coefficients for Sb-125          |            |           |  |                |
| R016 | Contaminated zone (cm**3/g)                   | 1.700E+01  | 0.000E+00 | ---  | DCNUCC (**)    |
| R016 | Unsaturated zone 1 (cm**3/g)                  | 1.700E+01  | 0.000E+00 | ---  | DCNUCU (**,1)  |
| R016 | Saturated zone (cm**3/g)                      | 1.700E+01  | 0.000E+00 | ---  | DCNUCS (**)    |
| R016 | Leach rate (/yr)                              | 0.000E+00  | 0.000E+00 | 6.962E-02  | ALEACH (**)    |
| R016 | Solubility constant                           | 0.000E+00  | 0.000E+00 | not used   | SOLUBK (**)    |
| R016 | Distribution coefficients for Sr-90           |            |           |  |                |
| R016 | Contaminated zone (cm**3/g)                   | 2.300E+00  | 3.000E+01 | ---  | DCNUCC (**)    |
| R016 | Unsaturated zone 1 (cm**3/g)                  | 2.300E+00  | 3.000E+01 | ---  | DCNUCU (**,1)  |
| R016 | Saturated zone (cm**3/g)                      | 2.300E+00  | 3.000E+01 | ---  | DCNUCS (**)    |
| R016 | Leach rate (/yr)                              | 0.000E+00  | 0.000E+00 | 5.076E-01  | ALEACH (**)    |
| R016 | Solubility constant                           | 0.000E+00  | 0.000E+00 | not used   | SOLUBK (**)    |
| R016 | Distribution coefficients for Tc-99           |            |           |  |                |
| R016 | Contaminated zone (cm**3/g)                   | 6.000E-02  | 0.000E+00 | ---  | DCNUCC (**)    |
| R016 | Unsaturated zone 1 (cm**3/g)                  | 6.000E-02  | 0.000E+00 | ---  | DCNUCU (**,1)  |
| R016 | Saturated zone (cm**3/g)                      | 6.000E-02  | 0.000E+00 | ---  | DCNUCS (**)    |
| R016 | Leach rate (/yr)                              | 0.000E+00  | 0.000E+00 | 1.227E+01  | ALEACH (**)    |
| R016 | Solubility constant                           | 0.000E+00  | 0.000E+00 | not used   | SOLUBK (**)    |
| R016 | Distribution coefficients for daughter Ac-227 |            |           |  |                |
| R016 | Contaminated zone (cm**3/g)                   | 8.250E+02  | 2.000E+01 | ---  | DCNUCC ( 1)    |
| R016 | Unsaturated zone 1 (cm**3/g)                  | 8.250E+02  | 2.000E+01 | ---  | DCNUCU ( 1,1)  |
| R016 | Saturated zone (cm**3/g)                      | 8.250E+02  | 2.000E+01 | ---  | DCNUCS ( 1)    |
| R016 | Leach rate (/yr)                              | 0.000E+00  | 0.000E+00 | 1.438E-03  | ALEACH ( 1)    |
| R016 | Solubility constant                           | 0.000E+00  | 0.000E+00 | not used   | SOLUBK ( 1)    |

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## Site-Specific Parameter Summary (continued)

| Menu | Parameter                                     | User Input | Default    | Used by RESRAD<br>(If different from user input) | Parameter Name |
|------|---|------------|------------|--|----------------|
| R016 | Distribution coefficients for daughter Gd-152 |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)                   | 8.250E+02  | -1.000E+00 | ---  | DCNUCC (57)    |
| R016 | Unsaturated zone 1 (cm**3/g)                  | 8.250E+02  | -1.000E+00 | ---  | DCNUCU (57,1)  |
| R016 | Saturated zone (cm**3/g)                      | 8.250E+02  | -1.000E+00 | ---  | DCNUCS (57)    |
| R016 | Leach rate (/yr)                              | 0.000E+00  | 0.000E+00  | 1.438E-03  | ALEACH (57)    |
| R016 | Solubility constant                           | 0.000E+00  | 0.000E+00  | not used   | SOLUBK (57)    |
| R016 | Distribution coefficients for daughter Nd-144 |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)                   | 1.580E+02  | 1.580E+02  | ---  | DCNUCC (60)    |
| R016 | Unsaturated zone 1 (cm**3/g)                  | 1.580E+02  | 1.580E+02  | ---  | DCNUCU (60,1)  |
| R016 | Saturated zone (cm**3/g)                      | 1.580E+02  | 1.580E+02  | ---  | DCNUCS (60)    |
| R016 | Leach rate (/yr)                              | 0.000E+00  | 0.000E+00  | 7.505E-03  | ALEACH (60)    |
| R016 | Solubility constant                           | 0.000E+00  | 0.000E+00  | not used   | SOLUBK (60)    |
| R016 | Distribution coefficients for daughter Pa-231 |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)                   | 3.800E+02  | 5.000E+01  | ---  | DCNUCC (64)    |
| R016 | Unsaturated zone 1 (cm**3/g)                  | 3.800E+02  | 5.000E+01  | ---  | DCNUCU (64,1)  |
| R016 | Saturated zone (cm**3/g)                      | 3.800E+02  | 5.000E+01  | ---  | DCNUCS (64)    |
| R016 | Leach rate (/yr)                              | 0.000E+00  | 0.000E+00  | 3.121E-03  | ALEACH (64)    |
| R016 | Solubility constant                           | 0.000E+00  | 0.000E+00  | not used   | SOLUBK (64)    |
| R016 | Distribution coefficients for daughter Pb-210 |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)                   | 2.392E+03  | 1.000E+02  | ---  | DCNUCC (70)    |
| R016 | Unsaturated zone 1 (cm**3/g)                  | 2.392E+03  | 1.000E+02  | ---  | DCNUCU (70,1)  |
| R016 | Saturated zone (cm**3/g)                      | 2.392E+03  | 1.000E+02  | ---  | DCNUCS (70)    |
| R016 | Leach rate (/yr)                              | 0.000E+00  | 0.000E+00  | 4.959E-04  | ALEACH (70)    |
| R016 | Solubility constant                           | 0.000E+00  | 0.000E+00  | not used   | SOLUBK (70)    |
| R016 | Distribution coefficients for daughter Po-210 |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)                   | 1.810E+02  | 1.000E+01  | ---  | DCNUCC (74)    |
| R016 | Unsaturated zone 1 (cm**3/g)                  | 1.810E+02  | 1.000E+01  | ---  | DCNUCU (74,1)  |
| R016 | Saturated zone (cm**3/g)                      | 1.810E+02  | 1.000E+01  | ---  | DCNUCS (74)    |
| R016 | Leach rate (/yr)                              | 0.000E+00  | 0.000E+00  | 6.552E-03  | ALEACH (74)    |
| R016 | Solubility constant                           | 0.000E+00  | 0.000E+00  | not used   | SOLUBK (74)    |
| R016 | Distribution coefficients for daughter Ra-226 |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)                   | 3.533E+03  | 7.000E+01  | ---  | DCNUCC (**)    |
| R016 | Unsaturated zone 1 (cm**3/g)                  | 3.533E+03  | 7.000E+01  | ---  | DCNUCU (**,1)  |
| R016 | Saturated zone (cm**3/g)                      | 3.533E+03  | 7.000E+01  | ---  | DCNUCS (**)    |
| R016 | Leach rate (/yr)                              | 0.000E+00  | 0.000E+00  | 3.357E-04  | ALEACH (**)    |
| R016 | Solubility constant                           | 0.000E+00  | 0.000E+00  | not used   | SOLUBK (**)    |
| R016 | Distribution coefficients for daughter Ra-228 |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)                   | 3.533E+03  | 7.000E+01  | ---  | DCNUCC (**)    |
| R016 | Unsaturated zone 1 (cm**3/g)                  | 3.533E+03  | 7.000E+01  | ---  | DCNUCU (**,1)  |
| R016 | Saturated zone (cm**3/g)                      | 3.533E+03  | 7.000E+01  | ---  | DCNUCS (**)    |
| R016 | Leach rate (/yr)                              | 0.000E+00  | 0.000E+00  | 3.357E-04  | ALEACH (**)    |
| R016 | Solubility constant                           | 0.000E+00  | 0.000E+00  | not used   | SOLUBK (**)    |

Summary : RESRAD Default

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## Site-Specific Parameter Summary (continued)

| Menu | Parameter                                      | User Input | Default    | Used by RESRAD<br>(If different from user input) | Parameter Name |
|------|--|------------|------------|--|----------------|
| R016 | Distribution coefficients for daughter Sm-147  |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)                    | 8.250E+02  | -1.000E+00 | ---  | DCNUCC(**)     |
| R016 | Unsaturated zone 1 (cm**3/g)                   | 8.250E+02  | -1.000E+00 | ---  | DCNUCU(**,1)   |
| R016 | Saturated zone (cm**3/g)                       | 8.250E+02  | -1.000E+00 | ---  | DCNUCS(**)     |
| R016 | Leach rate (/yr)                               | 0.000E+00  | 0.000E+00  | 1.438E-03  | ALEACH(**)     |
| R016 | Solubility constant                            | 0.000E+00  | 0.000E+00  | not used   | SOLUBK(**)     |
| R016 | Distribution coefficients for daughter Sm-148  |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)                    | 8.250E+02  | -1.000E+00 | ---  | DCNUCC(**)     |
| R016 | Unsaturated zone 1 (cm**3/g)                   | 8.250E+02  | -1.000E+00 | ---  | DCNUCU(**,1)   |
| R016 | Saturated zone (cm**3/g)                       | 8.250E+02  | -1.000E+00 | ---  | DCNUCS(**)     |
| R016 | Leach rate (/yr)                               | 0.000E+00  | 0.000E+00  | 1.438E-03  | ALEACH(**)     |
| R016 | Solubility constant                            | 0.000E+00  | 0.000E+00  | not used   | SOLUBK(**)     |
| R016 | Distribution coefficients for daughter Te-125m |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)                    | 0.000E+00  | 0.000E+00  | ---  | DCNUCC(**)     |
| R016 | Unsaturated zone 1 (cm**3/g)                   | 0.000E+00  | 0.000E+00  | ---  | DCNUCU(**,1)   |
| R016 | Saturated zone (cm**3/g)                       | 0.000E+00  | 0.000E+00  | ---  | DCNUCS(**)     |
| R016 | Leach rate (/yr)                               | 0.000E+00  | 0.000E+00  | 3.235E+01  | ALEACH(**)     |
| R016 | Solubility constant                            | 0.000E+00  | 0.000E+00  | not used   | SOLUBK(**)     |
| R016 | Distribution coefficients for daughter Th-228  |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)                    | 5.884E+03  | 6.000E+04  | ---  | DCNUCC(**)     |
| R016 | Unsaturated zone 1 (cm**3/g)                   | 5.884E+03  | 6.000E+04  | ---  | DCNUCU(**,1)   |
| R016 | Saturated zone (cm**3/g)                       | 5.884E+03  | 6.000E+04  | ---  | DCNUCS(**)     |
| R016 | Leach rate (/yr)                               | 0.000E+00  | 0.000E+00  | 2.016E-04  | ALEACH(**)     |
| R016 | Solubility constant                            | 0.000E+00  | 0.000E+00  | not used   | SOLUBK(**)     |
| R016 | Distribution coefficients for daughter Th-229  |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)                    | 5.884E+03  | 6.000E+04  | ---  | DCNUCC(**)     |
| R016 | Unsaturated zone 1 (cm**3/g)                   | 5.884E+03  | 6.000E+04  | ---  | DCNUCU(**,1)   |
| R016 | Saturated zone (cm**3/g)                       | 5.884E+03  | 6.000E+04  | ---  | DCNUCS(**)     |
| R016 | Leach rate (/yr)                               | 0.000E+00  | 0.000E+00  | 2.016E-04  | ALEACH(**)     |
| R016 | Solubility constant                            | 0.000E+00  | 0.000E+00  | not used   | SOLUBK(**)     |
| R016 | Distribution coefficients for daughter Th-230  |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)                    | 5.884E+03  | 6.000E+04  | ---  | DCNUCC(**)     |
| R016 | Unsaturated zone 1 (cm**3/g)                   | 5.884E+03  | 6.000E+04  | ---  | DCNUCU(**,1)   |
| R016 | Saturated zone (cm**3/g)                       | 5.884E+03  | 6.000E+04  | ---  | DCNUCS(**)     |
| R016 | Leach rate (/yr)                               | 0.000E+00  | 0.000E+00  | 2.016E-04  | ALEACH(**)     |
| R016 | Solubility constant                            | 0.000E+00  | 0.000E+00  | not used   | SOLUBK(**)     |
| R016 | Distribution coefficients for daughter Th-232  |            |            |  |                |
| R016 | Contaminated zone (cm**3/g)                    | 5.884E+03  | 6.000E+04  | ---  | DCNUCC(**)     |
| R016 | Unsaturated zone 1 (cm**3/g)                   | 5.884E+03  | 6.000E+04  | ---  | DCNUCU(**,1)   |
| R016 | Saturated zone (cm**3/g)                       | 5.884E+03  | 6.000E+04  | ---  | DCNUCS(**)     |
| R016 | Leach rate (/yr)                               | 0.000E+00  | 0.000E+00  | 2.016E-04  | ALEACH(**)     |
| R016 | Solubility constant                            | 0.000E+00  | 0.000E+00  | not used   | SOLUBK(**)     |

Summary : RESRAD Default

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## Site-Specific Parameter Summary (continued)

| Menu | Parameter                                      | User Input | Default   | Used by RESRAD<br>(If different from user input) | Parameter Name |
|------|--|------------|-----------|--|----------------|
| R016 | Distribution coefficients for daughter U-233   |            |           |  |                |
| R016 | Contaminated zone (cm**3/g)                    | 1.260E+02  | 5.000E+01 | ---  | DCNUCC(**)     |
| R016 | Unsaturated zone 1 (cm**3/g)                   | 1.260E+02  | 5.000E+01 | ---  | DCNUCU(**,1)   |
| R016 | Saturated zone (cm**3/g)                       | 1.260E+02  | 5.000E+01 | ---  | DCNUCS(**)     |
| R016 | Leach rate (/yr)                               | 0.000E+00  | 0.000E+00 | 9.411E-03  | ALEACH(**)     |
| R016 | Solubility constant                            | 0.000E+00  | 0.000E+00 | not used   | SOLUBK(**)     |
| R016 | Distribution coefficients for daughter U-234   |            |           |  |                |
| R016 | Contaminated zone (cm**3/g)                    | 1.260E+02  | 5.000E+01 | ---  | DCNUCC(**)     |
| R016 | Unsaturated zone 1 (cm**3/g)                   | 1.260E+02  | 5.000E+01 | ---  | DCNUCU(**,1)   |
| R016 | Saturated zone (cm**3/g)                       | 1.260E+02  | 5.000E+01 | ---  | DCNUCS(**)     |
| R016 | Leach rate (/yr)                               | 0.000E+00  | 0.000E+00 | 9.411E-03  | ALEACH(**)     |
| R016 | Solubility constant                            | 0.000E+00  | 0.000E+00 | not used   | SOLUBK(**)     |
| R016 | Distribution coefficients for daughter U-235   |            |           |  |                |
| R016 | Contaminated zone (cm**3/g)                    | 1.260E+02  | 5.000E+01 | ---  | DCNUCC(**)     |
| R016 | Unsaturated zone 1 (cm**3/g)                   | 1.260E+02  | 5.000E+01 | ---  | DCNUCU(**,1)   |
| R016 | Saturated zone (cm**3/g)                       | 1.260E+02  | 5.000E+01 | ---  | DCNUCS(**)     |
| R016 | Leach rate (/yr)                               | 0.000E+00  | 0.000E+00 | 9.411E-03  | ALEACH(**)     |
| R016 | Solubility constant                            | 0.000E+00  | 0.000E+00 | not used   | SOLUBK(**)     |
| R016 | Distribution coefficients for daughter U-236   |            |           |  |                |
| R016 | Contaminated zone (cm**3/g)                    | 1.260E+02  | 5.000E+01 | ---  | DCNUCC(**)     |
| R016 | Unsaturated zone 1 (cm**3/g)                   | 1.260E+02  | 5.000E+01 | ---  | DCNUCU(**,1)   |
| R016 | Saturated zone (cm**3/g)                       | 1.260E+02  | 5.000E+01 | ---  | DCNUCS(**)     |
| R016 | Leach rate (/yr)                               | 0.000E+00  | 0.000E+00 | 9.411E-03  | ALEACH(**)     |
| R016 | Solubility constant                            | 0.000E+00  | 0.000E+00 | not used   | SOLUBK(**)     |
| R017 | Inhalation rate (m**3/yr)                      | 8.400E+03  | 8.400E+03 | ---  | INHALR         |
| R017 | Mass loading for inhalation (g/m**3)           | 2.350E-05  | 1.000E-04 | ---  | MLINH          |
| R017 | Exposure duration                              | 3.000E+01  | 3.000E+01 | ---  | ED             |
| R017 | Shielding factor, inhalation                   | 5.500E-01  | 4.000E-01 | ---  | SHF3           |
| R017 | Shielding factor, external gamma               | 4.000E-01  | 7.000E-01 | ---  | SHF1           |
| R017 | Fraction of time spent indoors                 | 6.490E-01  | 5.000E-01 | ---  | FIND           |
| R017 | Fraction of time spent outdoors (on site)      | 1.240E-01  | 2.500E-01 | ---  | FOTD           |
| R017 | Shape factor flag, external gamma              | 1.000E+00  | 1.000E+00 | >0 shows circular AREA.                          | FS             |
| R017 | Radii of shape factor array (used if FS = -1): |            |           |  |                |
| R017 | Outer annular radius (m), ring 1:              | not used   | 5.000E+01 | ---  | RAD_SHAPE( 1)  |
| R017 | Outer annular radius (m), ring 2:              | not used   | 7.071E+01 | ---  | RAD_SHAPE( 2)  |
| R017 | Outer annular radius (m), ring 3:              | not used   | 0.000E+00 | ---  | RAD_SHAPE( 3)  |
| R017 | Outer annular radius (m), ring 4:              | not used   | 0.000E+00 | ---  | RAD_SHAPE( 4)  |
| R017 | Outer annular radius (m), ring 5:              | not used   | 0.000E+00 | ---  | RAD_SHAPE( 5)  |
| R017 | Outer annular radius (m), ring 6:              | not used   | 0.000E+00 | ---  | RAD_SHAPE( 6)  |
| R017 | Outer annular radius (m), ring 7:              | not used   | 0.000E+00 | ---  | RAD_SHAPE( 7)  |
| R017 | Outer annular radius (m), ring 8:              | not used   | 0.000E+00 | ---  | RAD_SHAPE( 8)  |
| R017 | Outer annular radius (m), ring 9:              | not used   | 0.000E+00 | ---  | RAD_SHAPE( 9)  |
| R017 | Outer annular radius (m), ring 10:             | not used   | 0.000E+00 | ---  | RAD_SHAPE(10)  |
| R017 | Outer annular radius (m), ring 11:             | not used   | 0.000E+00 | ---  | RAD_SHAPE(11)  |
| R017 | Outer annular radius (m), ring 12:             | not used   | 0.000E+00 | ---  | RAD_SHAPE(12)  |

Summary : RESRAD Default

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## Site-Specific Parameter Summary (continued)

| Menu | Parameter  | User Input | Default   | Used by RESRAD<br>(If different from user input) | Parameter Name |
|------|--|------------|-----------|--|----------------|
| R017 | Fractions of annular areas within AREA:          |            |           |  |                |
| R017 | Ring 1   | not used   | 1.000E+00 | ---  | FRACA( 1)      |
| R017 | Ring 2   | not used   | 2.732E-01 | ---  | FRACA( 2)      |
| R017 | Ring 3   | not used   | 0.000E+00 | ---  | FRACA( 3)      |
| R017 | Ring 4   | not used   | 0.000E+00 | ---  | FRACA( 4)      |
| R017 | Ring 5   | not used   | 0.000E+00 | ---  | FRACA( 5)      |
| R017 | Ring 6   | not used   | 0.000E+00 | ---  | FRACA( 6)      |
| R017 | Ring 7   | not used   | 0.000E+00 | ---  | FRACA( 7)      |
| R017 | Ring 8   | not used   | 0.000E+00 | ---  | FRACA( 8)      |
| R017 | Ring 9   | not used   | 0.000E+00 | ---  | FRACA( 9)      |
| R017 | Ring 10  | not used   | 0.000E+00 | ---  | FRACA(10)      |
| R017 | Ring 11  | not used   | 0.000E+00 | ---  | FRACA(11)      |
| R017 | Ring 12  | not used   | 0.000E+00 | ---  | FRACA(12)      |
| R018 | Fruits, vegetables and grain consumption (kg/yr) | 1.120E+02  | 1.600E+02 | ---  | DIET(1)        |
| R018 | Leafy vegetable consumption (kg/yr)              | 2.140E+01  | 1.400E+01 | ---  | DIET(2)        |
| R018 | Milk consumption (L/yr)                          | 2.330E+02  | 9.200E+01 | ---  | DIET(3)        |
| R018 | Meat and poultry consumption (kg/yr)             | 6.510E+01  | 6.300E+01 | ---  | DIET(4)        |
| R018 | Fish consumption (kg/yr)                         | not used   | 5.400E+00 | ---  | DIET(5)        |
| R018 | Other seafood consumption (kg/yr)                | not used   | 9.000E-01 | ---  | DIET(6)        |
| R018 | Soil ingestion rate (g/yr)                       | 1.830E+01  | 3.650E+01 | ---  | SOIL           |
| R018 | Drinking water intake (L/yr)                     | 4.780E+02  | 5.100E+02 | ---  | DWI            |
| R018 | Contamination fraction of drinking water         | 1.000E+00  | 1.000E+00 | ---  | FDW            |
| R018 | Contamination fraction of household water        | not used   | 1.000E+00 | ---  | FHHW           |
| R018 | Contamination fraction of livestock water        | 1.000E+00  | 1.000E+00 | ---  | FLW            |
| R018 | Contamination fraction of irrigation water       | 1.000E+00  | 1.000E+00 | ---  | FIRW           |
| R018 | Contamination fraction of aquatic food           | not used   | 5.000E-01 | ---  | FR9            |
| R018 | Contamination fraction of plant food             | 1.000E+00  | -1        | ---  | FPLANT         |
| R018 | Contamination fraction of meat                   | 1.000E+00  | -1        | ---  | FMEAT          |
| R018 | Contamination fraction of milk                   | 1.000E+00  | -1        | ---  | FMILK          |
| R019 | Livestock fodder intake for meat (kg/day)        | 2.830E+01  | 6.800E+01 | ---  | LFI5           |
| R019 | Livestock fodder intake for milk (kg/day)        | 6.520E+01  | 5.500E+01 | ---  | LFI6           |
| R019 | Livestock water intake for meat (L/day)          | 5.060E+01  | 5.000E+01 | ---  | LWI5           |
| R019 | Livestock water intake for milk (L/day)          | 6.000E+01  | 1.600E+02 | ---  | LWI6           |
| R019 | Livestock soil intake (kg/day)                   | 5.000E-01  | 5.000E-01 | ---  | LSI            |
| R019 | Mass loading for foliar deposition (g/m**3)      | 4.000E-04  | 1.000E-04 | ---  | MLFD           |
| R019 | Depth of soil mixing layer (m)                   | 1.500E-01  | 1.500E-01 | ---  | DM             |
| R019 | Depth of roots (m)                               | 1.220E+00  | 9.000E-01 | ---  | DROOT          |
| R019 | Drinking water fraction from ground water        | 1.000E+00  | 1.000E+00 | ---  | FGWDW          |
| R019 | Household water fraction from ground water       | not used   | 1.000E+00 | ---  | FGWHH          |
| R019 | Livestock water fraction from ground water       | 1.000E+00  | 1.000E+00 | ---  | FGWLW          |
| R019 | Irrigation fraction from ground water            | 1.000E+00  | 1.000E+00 | ---  | FGWIR          |
| R19B | Wet weight crop yield for Non-Leafy (kg/m**2)    | 1.750E+00  | 7.000E-01 | ---  | YV(1)          |
| R19B | Wet weight crop yield for Leafy (kg/m**2)        | 2.900E+00  | 1.500E+00 | ---  | YV(2)          |
| R19B | Wet weight crop yield for Fodder (kg/m**2)       | 1.900E+00  | 1.100E+00 | ---  | YV(3)          |
| R19B | Growing Season for Non-Leafy (years)             | 2.460E-01  | 1.700E-01 | ---  | TE(1)          |
| R19B | Growing Season for Leafy (years)                 | 1.230E-01  | 2.500E-01 | ---  | TE(2)          |
| R19B | Growing Season for Fodder (years)                | 8.200E-02  | 8.000E-02 | ---  | TE(3)          |



Summary : RESRAD Default

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## Site-Specific Parameter Summary (continued)

| Menu | Parameter  | User Input | Default    | Used by RESRAD<br>(If different from user input) | Parameter Name |
|------|--|------------|------------|--|----------------|
| R19B | Translocation Factor for Non-Leafy               | 1.000E-01  | 1.000E-01  | ---  | TIV(1)         |
| R19B | Translocation Factor for Leafy                   | 1.000E+00  | 1.000E+00  | ---  | TIV(2)         |
| R19B | Translocation Factor for Fodder                  | 1.000E+00  | 1.000E+00  | ---  | TIV(3)         |
| R19B | Dry Foliar Interception Fraction for Non-Leafy   | 3.500E-01  | 2.500E-01  | ---  | RDRY(1)        |
| R19B | Dry Foliar Interception Fraction for Leafy       | 3.500E-01  | 2.500E-01  | ---  | RDRY(2)        |
| R19B | Dry Foliar Interception Fraction for Fodder      | 3.500E-01  | 2.500E-01  | ---  | RDRY(3)        |
| R19B | Wet Foliar Interception Fraction for Non-Leafy   | 3.500E-01  | 2.500E-01  | ---  | RWET(1)        |
| R19B | Wet Foliar Interception Fraction for Leafy       | 5.800E-01  | 2.500E-01  | ---  | RWET(2)        |
| R19B | Wet Foliar Interception Fraction for Fodder      | 3.500E-01  | 2.500E-01  | ---  | RWET(3)        |
| R19B | Weathering Removal Constant for Vegetation       | 3.300E+01  | 2.000E+01  | ---  | WLAM           |
| C14  | C-12 concentration in water (g/cm**3)            | 2.000E-05  | 2.000E-05  | ---  | C12WTR         |
| C14  | C-12 concentration in contaminated soil (g/g)    | 3.000E-02  | 3.000E-02  | ---  | C12CZ          |
| C14  | Fraction of vegetation carbon from soil          | 2.000E-02  | 2.000E-02  | ---  | CSOIL          |
| C14  | Fraction of vegetation carbon from air           | 9.800E-01  | 9.800E-01  | ---  | CAIR           |
| C14  | C-14 evasion layer thickness in soil (m)         | 4.300E-01  | 3.000E-01  | ---  | DMC            |
| C14  | C-14 evasion flux rate from soil (1/sec)         | 7.000E-07  | 7.000E-07  | ---  | EVSN           |
| C14  | C-12 evasion flux rate from soil (1/sec)         | 1.000E-10  | 1.000E-10  | ---  | REVSN          |
| C14  | Fraction of grain in beef cattle feed            | 2.500E-01  | 8.000E-01  | ---  | AVFG4          |
| C14  | Fraction of grain in milk cow feed               | 1.000E-01  | 2.000E-01  | ---  | AVFG5          |
| STOR | Storage times of contaminated foodstuffs (days): |            |            |  |                |
| STOR | Fruits, non-leafy vegetables, and grain          | 1.400E+01  | 1.400E+01  | ---  | STOR_T(1)      |
| STOR | Leafy vegetables                                 | 1.000E+00  | 1.000E+00  | ---  | STOR_T(2)      |
| STOR | Milk   | 1.000E+00  | 1.000E+00  | ---  | STOR_T(3)      |
| STOR | Meat and poultry                                 | 1.000E+00  | 2.000E+01  | ---  | STOR_T(4)      |
| STOR | Fish   | 7.000E+00  | 7.000E+00  | ---  | STOR_T(5)      |
| STOR | Crustacea and mollusks                           | 7.000E+00  | 7.000E+00  | ---  | STOR_T(6)      |
| STOR | Well water                                       | 1.000E+00  | 1.000E+00  | ---  | STOR_T(7)      |
| STOR | Surface water                                    | 1.000E+00  | 1.000E+00  | ---  | STOR_T(8)      |
| STOR | Livestock fodder                                 | 4.500E+01  | 4.500E+01  | ---  | STOR_T(9)      |
| R021 | Thickness of building foundation (m)             | not used   | 1.500E-01  | ---  | FLOOR1         |
| R021 | Bulk density of building foundation (g/cm**3)    | not used   | 2.400E+00  | ---  | DENSFL         |
| R021 | Total porosity of the cover material             | not used   | 4.000E-01  | ---  | TPCV           |
| R021 | Total porosity of the building foundation        | not used   | 1.000E-01  | ---  | TPFL           |
| R021 | Volumetric water content of the cover material   | not used   | 5.000E-02  | ---  | PH2OCV         |
| R021 | Volumetric water content of the foundation       | not used   | 3.000E-02  | ---  | PH2OFL         |
| R021 | Diffusion coefficient for radon gas (m/sec):     |            |            |  |                |
| R021 | in cover material                                | not used   | 2.000E-06  | ---  | DIFCV          |
| R021 | in foundation material                           | not used   | 3.000E-07  | ---  | DIFFL          |
| R021 | in contaminated zone soil                        | not used   | 2.000E-06  | ---  | DIFCZ          |
| R021 | Radon vertical dimension of mixing (m)           | not used   | 2.000E+00  | ---  | HMIX           |
| R021 | Average building air exchange rate (1/hr)        | not used   | 5.000E-01  | ---  | REXG           |
| R021 | Height of the building (room) (m)                | not used   | 2.500E+00  | ---  | HRM            |
| R021 | Building interior area factor                    | not used   | 0.000E+00  | ---  | FAI            |
| R021 | Building depth below ground surface (m)          | not used   | -1.000E+00 | ---  | DMFL           |
| R021 | Emanating power of Rn-222 gas                    | not used   | 2.500E-01  | ---  | EMANA(1)       |
| R021 | Emanating power of Rn-220 gas                    | not used   | 1.500E-01  | ---  | EMANA(2)       |
| TITL | Number of graphical time points                  | 512        | ---        | ---  | NPTS           |

Summary : RESRAD Default

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## Site-Specific Parameter Summary (continued)

| Menu | Parameter                                     | User Input | Default | Used by RESRAD<br>(If different from user input) | Parameter Name |
|------|---|------------|---------|--|----------------|
| TITL | Maximum number of integration points for dose | 17         | ---     | ---  | LYMAX          |
| TITL | Maximum number of integration points for risk | 17         | ---     | ---  | KYMAX          |

## Summary of Pathway Selections

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

Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

| Contaminated Zone Dimensions | Initial Soil Concentrations, pCi/g |           |
|------------------------------|------------------------------------|-----------|
| Area: 64500.00 square meters | Ag-108m                            | 1.000E+00 |
| Thickness: 0.15 meters       | Am-241                             | 1.000E+00 |
| Cover Depth: 0.00 meters     | Am-243                             | 1.000E+00 |
|                              | C-14                               | 1.000E+00 |
|                              | Cm-243                             | 1.000E+00 |
|                              | Cm-244                             | 1.000E+00 |
|                              | Co-60                              | 1.000E+00 |
|                              | Cs-134                             | 1.000E+00 |
|                              | Cs-137                             | 1.000E+00 |
|                              | Eu-152                             | 1.000E+00 |
|                              | Eu-154                             | 1.000E+00 |
|                              | Eu-155                             | 1.000E+00 |
|                              | Fe-55                              | 1.000E+00 |
|                              | H-3                                | 1.000E+00 |
|                              | Nb-94                              | 1.000E+00 |
|                              | Ni-59                              | 1.000E+00 |
|                              | Ni-63                              | 1.000E+00 |
|                              | Np-237                             | 1.000E+00 |
|                              | Pm-147                             | 1.000E+00 |
|                              | Pu-238                             | 1.000E+00 |
|                              | Pu-239                             | 1.000E+00 |
|                              | Pu-240                             | 1.000E+00 |
|                              | Pu-241                             | 1.000E+00 |
|                              | Sb-125                             | 1.000E+00 |
|                              | Sr-90                              | 1.000E+00 |
|                              | Tc-99                              | 1.000E+00 |

Total Dose TDOSE(t), mrem/yr

Basic Radiation Dose Limit = 2.500E+01 mrem/yr

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

|            |           |           |           |           |           |           |           |           |
|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| t (years): | 0.000E+00 | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| TDOSE(t):  | 2.801E+01 | 2.409E+01 | 1.923E+01 | 1.136E+01 | 4.946E+00 | 3.116E+01 | 1.454E-04 | 3.793E-03 |
| M(t):      | 1.121E+00 | 9.637E-01 | 7.690E-01 | 4.545E-01 | 1.979E-01 | 1.247E+00 | 5.817E-06 | 1.517E-04 |

Maximum TDOSE(t): 3.220E+01 mrem/yr at t = 75.1 ± 0.2 years

Summary : RESRAD Default

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## Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 7.507E+01 years

## Water Independent Pathways (Inhalation excludes radon)

| Radio-<br>Nuclide<br>Nuclide | Ground    |        | Inhalation |        | Radon     |        | Plant     |        | Meat      |        | Milk      |        | Soil      |        |
|------------------------------|-----------|--------|------------|--------|-----------|--------|-----------|--------|-----------|--------|-----------|--------|-----------|--------|
|                              | mrem/yr   | fract. | mrem/yr    | fract. | mrem/yr   | fract. | mrem/yr   | fract. | mrem/yr   | fract. | mrem/yr   | fract. | mrem/yr   | fract. |
| Ag-108m                      | 3.008E-01 | 0.0093 | 1.068E-07  | 0.0000 | 0.000E+00 | 0.0000 | 3.645E-05 | 0.0000 | 3.280E-05 | 0.0000 | 3.711E-04 | 0.0000 | 4.233E-06 | 0.0000 |
| Am-241                       | 7.979E-03 | 0.0002 | 5.567E-04  | 0.0000 | 0.000E+00 | 0.0000 | 1.413E-02 | 0.0004 | 8.926E-04 | 0.0000 | 1.823E-04 | 0.0000 | 6.717E-03 | 0.0002 |
| Am-243                       | 1.347E-01 | 0.0042 | 6.198E-04  | 0.0000 | 0.000E+00 | 0.0000 | 1.580E-02 | 0.0005 | 1.000E-03 | 0.0000 | 2.036E-04 | 0.0000 | 7.512E-03 | 0.0002 |
| C-14                         | 0.000E+00 | 0.0000 | 0.000E+00  | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 |
| Cm-243                       | 2.177E-02 | 0.0007 | 1.147E-04  | 0.0000 | 0.000E+00 | 0.0000 | 2.904E-03 | 0.0001 | 1.304E-04 | 0.0000 | 4.314E-05 | 0.0000 | 1.381E-03 | 0.0000 |
| Cm-244                       | 2.661E-06 | 0.0000 | 3.286E-05  | 0.0000 | 0.000E+00 | 0.0000 | 8.291E-04 | 0.0000 | 4.079E-05 | 0.0000 | 1.189E-05 | 0.0000 | 3.943E-04 | 0.0000 |
| Co-60                        | 1.234E-04 | 0.0000 | 2.305E-11  | 0.0000 | 0.000E+00 | 0.0000 | 7.258E-07 | 0.0000 | 1.140E-06 | 0.0000 | 2.347E-07 | 0.0000 | 4.167E-09 | 0.0000 |
| Cs-134                       | 1.496E-11 | 0.0000 | 9.068E-19  | 0.0000 | 0.000E+00 | 0.0000 | 1.918E-13 | 0.0000 | 4.897E-13 | 0.0000 | 5.514E-13 | 0.0000 | 2.118E-15 | 0.0000 |
| Cs-137                       | 9.922E-02 | 0.0031 | 1.141E-08  | 0.0000 | 0.000E+00 | 0.0000 | 2.384E-03 | 0.0001 | 6.086E-03 | 0.0002 | 6.853E-03 | 0.0002 | 2.632E-05 | 0.0000 |
| Eu-152                       | 1.031E-02 | 0.0003 | 4.219E-09  | 0.0000 | 0.000E+00 | 0.0000 | 5.311E-07 | 0.0000 | 1.706E-06 | 0.0000 | 7.809E-08 | 0.0000 | 1.821E-07 | 0.0000 |
| Eu-154                       | 1.210E-03 | 0.0000 | 5.895E-10  | 0.0000 | 0.000E+00 | 0.0000 | 8.451E-08 | 0.0000 | 2.715E-07 | 0.0000 | 1.242E-08 | 0.0000 | 2.897E-08 | 0.0000 |
| Eu-155                       | 3.417E-07 | 0.0000 | 6.322E-13  | 0.0000 | 0.000E+00 | 0.0000 | 1.003E-10 | 0.0000 | 3.223E-10 | 0.0000 | 1.475E-11 | 0.0000 | 3.439E-11 | 0.0000 |
| Fe-55                        | 0.000E+00 | 0.0000 | 2.999E-17  | 0.0000 | 0.000E+00 | 0.0000 | 2.211E-14 | 0.0000 | 9.063E-13 | 0.0000 | 3.978E-14 | 0.0000 | 9.962E-15 | 0.0000 |
| H-3                          | 0.000E+00 | 0.0000 | 0.000E+00  | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 |
| Nb-94                        | 2.414E-01 | 0.0075 | 1.302E-07  | 0.0000 | 0.000E+00 | 0.0000 | 8.069E-05 | 0.0000 | 1.571E-08 | 0.0000 | 1.168E-07 | 0.0000 | 3.305E-06 | 0.0000 |
| Ni-59                        | 0.000E+00 | 0.0000 | 1.494E-09  | 0.0000 | 0.000E+00 | 0.0000 | 1.828E-05 | 0.0000 | 3.239E-06 | 0.0000 | 1.121E-04 | 0.0000 | 1.711E-07 | 0.0000 |
| Ni-63                        | 0.000E+00 | 0.0000 | 2.064E-09  | 0.0000 | 0.000E+00 | 0.0000 | 2.979E-05 | 0.0000 | 5.276E-06 | 0.0000 | 1.827E-04 | 0.0000 | 2.787E-07 | 0.0000 |
| Np-237                       | 2.557E-08 | 0.0000 | 2.577E-09  | 0.0000 | 0.000E+00 | 0.0000 | 1.755E-08 | 0.0000 | 1.335E-08 | 0.0000 | 2.396E-08 | 0.0000 | 7.975E-09 | 0.0000 |
| Pm-147                       | 1.281E-14 | 0.0000 | 3.814E-15  | 0.0000 | 0.000E+00 | 0.0000 | 4.658E-14 | 0.0000 | 9.223E-14 | 0.0000 | 9.879E-15 | 0.0000 | 1.664E-14 | 0.0000 |
| Pu-238                       | 2.099E-05 | 0.0000 | 3.626E-04  | 0.0000 | 0.000E+00 | 0.0000 | 9.163E-03 | 0.0003 | 1.117E-03 | 0.0000 | 5.094E-05 | 0.0000 | 4.357E-03 | 0.0001 |
| Pu-239                       | 5.399E-05 | 0.0000 | 7.195E-04  | 0.0000 | 0.000E+00 | 0.0000 | 1.838E-02 | 0.0006 | 2.241E-03 | 0.0001 | 1.016E-04 | 0.0000 | 8.738E-03 | 0.0003 |
| Pu-240                       | 3.706E-05 | 0.0000 | 7.153E-04  | 0.0000 | 0.000E+00 | 0.0000 | 1.827E-02 | 0.0006 | 2.228E-03 | 0.0001 | 1.010E-04 | 0.0000 | 8.688E-03 | 0.0003 |
| Pu-241                       | 2.781E-04 | 0.0000 | 1.976E-05  | 0.0000 | 0.000E+00 | 0.0000 | 5.015E-04 | 0.0000 | 3.223E-05 | 0.0000 | 6.404E-06 | 0.0000 | 2.384E-04 | 0.0000 |
| Sb-125                       | 1.422E-11 | 0.0000 | 8.617E-19  | 0.0000 | 0.000E+00 | 0.0000 | 7.682E-15 | 0.0000 | 1.710E-15 | 0.0000 | 4.733E-16 | 0.0000 | 2.978E-16 | 0.0000 |
| Sr-90                        | 1.976E-20 | 0.0000 | 1.107E-23  | 0.0000 | 0.000E+00 | 0.0000 | 1.325E-18 | 0.0000 | 1.892E-19 | 0.0000 | 4.713E-19 | 0.0000 | 1.903E-21 | 0.0000 |
| Tc-99                        | 0.000E+00 | 0.0000 | 0.000E+00  | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 |
| Total                        | 8.179E-01 | 0.0254 | 3.141E-03  | 0.0001 | 0.000E+00 | 0.0000 | 8.253E-02 | 0.0026 | 1.381E-02 | 0.0004 | 8.220E-03 | 0.0003 | 3.806E-02 | 0.0012 |

Summary : RESRAD Default

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Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)  
As mrem/yr and Fraction of Total Dose At t = 7.507E+01 years

## Water Dependent Pathways

| Radio-<br>Nuclide<br>Nuclide | Water     |        | Fish      |        | Radon     |        | Plant     |        | Meat      |        | Milk      |        | All Pathways* |        |
|------------------------------|-----------|--------|-----------|--------|-----------|--------|-----------|--------|-----------|--------|-----------|--------|---------------|--------|
|                              | mrem/yr   | fract. | mrem/yr   | fract. | mrem/yr   | fract. | mrem/yr   | fract. | mrem/yr   | fract. | mrem/yr   | fract. | mrem/yr       | fract. |
| Ag-108m                      | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 3.013E-01     | 0.0094 |
| Am-241                       | 1.025E-04 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 8.017E-06 | 0.0000 | 1.094E-06 | 0.0000 | 6.194E-08 | 0.0000 | 3.057E-02     | 0.0009 |
| Am-243                       | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.598E-01     | 0.0050 |
| C-14                         | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00     | 0.0000 |
| Cm-243                       | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.634E-02     | 0.0008 |
| Cm-244                       | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.312E-03     | 0.0000 |
| Co-60                        | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.255E-04     | 0.0000 |
| Cs-134                       | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.620E-11     | 0.0000 |
| Cs-137                       | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.146E-01     | 0.0036 |
| Eu-152                       | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.031E-02     | 0.0003 |
| Eu-154                       | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.211E-03     | 0.0000 |
| Eu-155                       | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 3.421E-07     | 0.0000 |
| Fe-55                        | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 9.782E-13     | 0.0000 |
| H-3                          | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00     | 0.0000 |
| Nb-94                        | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.415E-01     | 0.0075 |
| Ni-59                        | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.338E-04     | 0.0000 |
| Ni-63                        | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.180E-04     | 0.0000 |
| Np-237                       | 2.836E+01 | 0.8805 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.220E+00 | 0.0689 | 3.036E-01 | 0.0094 | 1.722E-02 | 0.0005 | 3.090E+01     | 0.9594 |
| Pm-147                       | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.820E-13     | 0.0000 |
| Pu-238                       | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 1.507E-02     | 0.0005 |
| Pu-239                       | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 3.023E-02     | 0.0009 |
| Pu-240                       | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 3.004E-02     | 0.0009 |
| Pu-241                       | 8.362E-07 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 6.532E-08 | 0.0000 | 8.897E-09 | 0.0000 | 5.031E-10 | 0.0000 | 1.077E-03     | 0.0000 |
| Sb-125                       | 3.043E-10 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.235E-11 | 0.0000 | 1.931E-11 | 0.0000 | 7.228E-12 | 0.0000 | 3.674E-10     | 0.0000 |
| Sr-90                        | 2.538E-01 | 0.0079 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.447E-02 | 0.0008 | 2.200E-02 | 0.0007 | 4.234E-02 | 0.0013 | 3.426E-01     | 0.0106 |
| Tc-99                        | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 0.000E+00     | 0.0000 |
| Total                        | 2.861E+01 | 0.8884 | 0.000E+00 | 0.0000 | 0.000E+00 | 0.0000 | 2.244E+00 | 0.0697 | 3.256E-01 | 0.0101 | 5.955E-02 | 0.0018 | 3.220E+01     | 1.0000 |

\*Sum of all water independent and dependent pathways.

Summary : RESRAD Default

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## Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

## Water Independent Pathways (Inhalation excludes radon)

| Radio-<br>Nuclide | Ground           |               | Inhalation       |               | Radon            |               | Plant            |               | Meat             |               | Milk             |               | Soil             |               |
|-------------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|
|                   | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        |
| Ag-108m           | 3.367E+00        | 0.1202        | 2.674E-06        | 0.0000        | 0.000E+00        | 0.0000        | 9.114E-04        | 0.0000        | 8.209E-04        | 0.0000        | 9.286E-03        | 0.0003        | 1.060E-04        | 0.0000        |
| Am-241            | 1.655E-02        | 0.0006        | 4.228E-03        | 0.0002        | 0.000E+00        | 0.0000        | 1.072E-01        | 0.0038        | 6.779E-03        | 0.0002        | 1.385E-03        | 0.0000        | 5.102E-02        | 0.0018        |
| Am-243            | 3.322E-01        | 0.0119        | 4.193E-03        | 0.0001        | 0.000E+00        | 0.0000        | 1.068E-01        | 0.0038        | 6.753E-03        | 0.0002        | 1.379E-03        | 0.0000        | 5.083E-02        | 0.0018        |
| C-14              | 2.268E-07        | 0.0000        | 1.927E-05        | 0.0000        | 0.000E+00        | 0.0000        | 1.402E-01        | 0.0050        | 6.793E-02        | 0.0024        | 7.094E-02        | 0.0025        | 1.307E-06        | 0.0000        |
| Cm-243            | 2.132E-01        | 0.0076        | 2.900E-03        | 0.0001        | 0.000E+00        | 0.0000        | 7.332E-02        | 0.0026        | 3.254E-03        | 0.0001        | 1.095E-03        | 0.0000        | 3.490E-02        | 0.0012        |
| Cm-244            | 4.735E-05        | 0.0000        | 2.326E-03        | 0.0001        | 0.000E+00        | 0.0000        | 5.859E-02        | 0.0021        | 2.601E-03        | 0.0001        | 8.751E-04        | 0.0000        | 2.789E-02        | 0.0010        |
| Co-60             | 5.102E+00        | 0.1821        | 1.962E-06        | 0.0000        | 0.000E+00        | 0.0000        | 6.170E-02        | 0.0022        | 9.681E-02        | 0.0035        | 1.991E-02        | 0.0007        | 3.546E-04        | 0.0000        |
| Cs-134            | 2.813E+00        | 0.1004        | 3.750E-07        | 0.0000        | 0.000E+00        | 0.0000        | 7.925E-02        | 0.0028        | 2.022E-01        | 0.0072        | 2.275E-01        | 0.0081        | 8.758E-04        | 0.0000        |
| Cs-137            | 1.182E+00        | 0.0422        | 3.013E-07        | 0.0000        | 0.000E+00        | 0.0000        | 6.289E-02        | 0.0022        | 1.605E-01        | 0.0057        | 1.806E-01        | 0.0064        | 6.951E-04        | 0.0000        |
| Eu-152            | 2.327E+00        | 0.0831        | 2.048E-06        | 0.0000        | 0.000E+00        | 0.0000        | 2.575E-04        | 0.0000        | 8.279E-04        | 0.0000        | 3.788E-05        | 0.0000        | 8.837E-05        | 0.0000        |
| Eu-154            | 2.506E+00        | 0.0895        | 2.612E-06        | 0.0000        | 0.000E+00        | 0.0000        | 3.740E-04        | 0.0000        | 1.203E-03        | 0.0000        | 5.503E-05        | 0.0000        | 1.284E-04        | 0.0000        |
| Eu-155            | 6.368E-02        | 0.0023        | 3.662E-07        | 0.0000        | 0.000E+00        | 0.0000        | 5.804E-05        | 0.0000        | 1.866E-04        | 0.0000        | 8.541E-06        | 0.0000        | 1.992E-05        | 0.0000        |
| Fe-55             | 0.000E+00        | 0.0000        | 2.272E-08        | 0.0000        | 0.000E+00        | 0.0000        | 1.673E-05        | 0.0000        | 6.866E-04        | 0.0000        | 3.013E-05        | 0.0000        | 7.548E-06        | 0.0000        |
| H-3               | 0.000E+00        | 0.0000        | 3.800E-05        | 0.0000        | 0.000E+00        | 0.0000        | 4.085E-04        | 0.0000        | 6.513E-05        | 0.0000        | 5.116E-04        | 0.0000        | 3.309E-08        | 0.0000        |
| Nb-94             | 3.328E+00        | 0.1188        | 3.907E-06        | 0.0000        | 0.000E+00        | 0.0000        | 2.419E-03        | 0.0001        | 4.712E-07        | 0.0000        | 3.500E-06        | 0.0000        | 9.917E-05        | 0.0000        |
| Ni-59             | 0.000E+00        | 0.0000        | 2.557E-08        | 0.0000        | 0.000E+00        | 0.0000        | 3.126E-04        | 0.0000        | 5.533E-05        | 0.0000        | 1.914E-03        | 0.0001        | 2.928E-06        | 0.0000        |
| Ni-63             | 0.000E+00        | 0.0000        | 5.937E-08        | 0.0000        | 0.000E+00        | 0.0000        | 8.559E-04        | 0.0000        | 1.515E-04        | 0.0000        | 5.241E-03        | 0.0002        | 8.017E-06        | 0.0000        |
| Np-237            | 3.446E-01        | 0.0123        | 4.434E-03        | 0.0002        | 0.000E+00        | 0.0000        | 1.257E+00        | 0.0449        | 1.415E-01        | 0.0051        | 5.898E-03        | 0.0002        | 5.371E-02        | 0.0019        |
| Pm-147            | 1.655E-05        | 0.0000        | 3.275E-07        | 0.0000        | 0.000E+00        | 0.0000        | 6.309E-05        | 0.0000        | 1.224E-04        | 0.0000        | 1.250E-05        | 0.0000        | 1.291E-05        | 0.0000        |
| Pu-238            | 5.740E-05        | 0.0000        | 3.726E-03        | 0.0001        | 0.000E+00        | 0.0000        | 9.405E-02        | 0.0034        | 1.148E-02        | 0.0004        | 5.201E-04        | 0.0000        | 4.476E-02        | 0.0016        |
| Pu-239            | 1.095E-04        | 0.0000        | 4.093E-03        | 0.0001        | 0.000E+00        | 0.0000        | 1.045E-01        | 0.0037        | 1.275E-02        | 0.0005        | 5.776E-04        | 0.0000        | 4.972E-02        | 0.0018        |
| Pu-240            | 5.587E-05        | 0.0000        | 4.093E-03        | 0.0001        | 0.000E+00        | 0.0000        | 1.044E-01        | 0.0037        | 1.275E-02        | 0.0005        | 5.776E-04        | 0.0000        | 4.971E-02        | 0.0018        |
| Pu-241            | 1.995E-05        | 0.0000        | 8.018E-05        | 0.0000        | 0.000E+00        | 0.0000        | 2.055E-03        | 0.0001        | 2.458E-04        | 0.0000        | 1.198E-05        | 0.0000        | 9.780E-04        | 0.0000        |
| Sb-125            | 7.413E-01        | 0.0265        | 1.014E-07        | 0.0000        | 0.000E+00        | 0.0000        | 8.964E-04        | 0.0000        | 1.993E-04        | 0.0000        | 5.476E-05        | 0.0000        | 3.504E-05        | 0.0000        |
| Sr-90             | 6.969E-03        | 0.0002        | 9.709E-06        | 0.0000        | 0.000E+00        | 0.0000        | 1.158E+00        | 0.0413        | 1.639E-01        | 0.0058        | 4.076E-01        | 0.0145        | 1.669E-03        | 0.0001        |
| Tc-99             | 3.880E-06        | 0.0000        | 6.523E-09        | 0.0000        | 0.000E+00        | 0.0000        | 1.926E-02        | 0.0007        | 6.326E-05        | 0.0000        | 5.187E-03        | 0.0002        | 1.685E-06        | 0.0000        |
| <b>Total</b>      | <b>2.234E+01</b> | <b>0.7976</b> | <b>3.016E-02</b> | <b>0.0011</b> | <b>0.000E+00</b> | <b>0.0000</b> | <b>3.436E+00</b> | <b>0.1226</b> | <b>8.939E-01</b> | <b>0.0319</b> | <b>9.412E-01</b> | <b>0.0336</b> | <b>3.676E-01</b> | <b>0.0131</b> |

Summary : RESRAD Default

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## Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

## Water Dependent Pathways

| Radio-<br>Nuclide | Water            |               | Fish             |               | Radon            |               | Plant            |               | Meat             |               | Milk             |               | All Pathways*    |               |
|-------------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|
|                   | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        |
| Ag-108m           | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 3.378E+00        | 0.1206        |
| Am-241            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.872E-01        | 0.0067        |
| Am-243            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 5.021E-01        | 0.0179        |
| C-14              | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 2.791E-01        | 0.0100        |
| Cm-243            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 3.287E-01        | 0.0117        |
| Cm-244            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 9.233E-02        | 0.0033        |
| Co-60             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 5.280E+00        | 0.1885        |
| Cs-134            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 3.323E+00        | 0.1186        |
| Cs-137            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.586E+00        | 0.0566        |
| Eu-152            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 2.329E+00        | 0.0831        |
| Eu-154            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 2.508E+00        | 0.0895        |
| Eu-155            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 6.396E-02        | 0.0023        |
| Fe-55             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 7.410E-04        | 0.0000        |
| H-3               | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.023E-03        | 0.0000        |
| Nb-94             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 3.330E+00        | 0.1189        |
| Ni-59             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 2.285E-03        | 0.0001        |
| Ni-63             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 6.256E-03        | 0.0002        |
| Np-237            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.807E+00        | 0.0645        |
| Pm-147            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 2.278E-04        | 0.0000        |
| Pu-238            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.546E-01        | 0.0055        |
| Pu-239            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.717E-01        | 0.0061        |
| Pu-240            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.716E-01        | 0.0061        |
| Pu-241            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 3.391E-03        | 0.0001        |
| Sb-125            | 1.413E-03        | 0.0001        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 9.771E-05        | 0.0000        | 7.808E-05        | 0.0000        | 2.695E-05        | 0.0000        | 7.441E-01        | 0.0266        |
| Sr-90             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.738E+00        | 0.0620        |
| Tc-99             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 2.452E-02        | 0.0009        |
| <b>Total</b>      | <b>1.413E-03</b> | <b>0.0001</b> | <b>0.000E+00</b> | <b>0.0000</b> | <b>0.000E+00</b> | <b>0.0000</b> | <b>9.771E-05</b> | <b>0.0000</b> | <b>7.808E-05</b> | <b>0.0000</b> | <b>2.695E-05</b> | <b>0.0000</b> | <b>2.801E+01</b> | <b>1.0000</b> |

\*Sum of all water independent and dependent pathways.

Summary : RESRAD Default

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## Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

## Water Independent Pathways (Inhalation excludes radon)

| Radio-<br>Nuclide | Ground           |               | Inhalation       |               | Radon            |               | Plant            |               | Meat             |               | Milk             |               | Soil             |               |
|-------------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|
|                   | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        |
| Ag-108m           | 3.281E+00        | 0.1362        | 2.584E-06        | 0.0000        | 0.000E+00        | 0.0000        | 8.808E-04        | 0.0000        | 7.933E-04        | 0.0000        | 8.973E-03        | 0.0004        | 1.024E-04        | 0.0000        |
| Am-241            | 1.641E-02        | 0.0007        | 4.151E-03        | 0.0002        | 0.000E+00        | 0.0000        | 1.053E-01        | 0.0044        | 6.655E-03        | 0.0003        | 1.359E-03        | 0.0001        | 5.009E-02        | 0.0021        |
| Am-243            | 3.297E-01        | 0.0137        | 4.123E-03        | 0.0002        | 0.000E+00        | 0.0000        | 1.050E-01        | 0.0044        | 6.640E-03        | 0.0003        | 1.356E-03        | 0.0001        | 4.998E-02        | 0.0021        |
| C-14              | 2.216E-17        | 0.0000        | 1.864E-15        | 0.0000        | 0.000E+00        | 0.0000        | 3.115E-11        | 0.0000        | 7.920E-11        | 0.0000        | 8.278E-11        | 0.0000        | 1.264E-16        | 0.0000        |
| Cm-243            | 2.079E-01        | 0.0086        | 2.802E-03        | 0.0001        | 0.000E+00        | 0.0000        | 7.084E-02        | 0.0029        | 3.144E-03        | 0.0001        | 1.058E-03        | 0.0000        | 3.372E-02        | 0.0014        |
| Cm-244            | 4.555E-05        | 0.0000        | 2.215E-03        | 0.0001        | 0.000E+00        | 0.0000        | 5.580E-02        | 0.0023        | 2.478E-03        | 0.0001        | 8.333E-04        | 0.0000        | 2.656E-02        | 0.0011        |
| Co-60             | 4.457E+00        | 0.1850        | 1.701E-06        | 0.0000        | 0.000E+00        | 0.0000        | 5.351E-02        | 0.0022        | 8.396E-02        | 0.0035        | 1.727E-02        | 0.0007        | 3.075E-04        | 0.0000        |
| Cs-134            | 2.003E+00        | 0.0831        | 2.649E-07        | 0.0000        | 0.000E+00        | 0.0000        | 5.598E-02        | 0.0023        | 1.429E-01        | 0.0059        | 1.607E-01        | 0.0067        | 6.186E-04        | 0.0000        |
| Cs-137            | 1.150E+00        | 0.0477        | 2.909E-07        | 0.0000        | 0.000E+00        | 0.0000        | 6.073E-02        | 0.0025        | 1.550E-01        | 0.0064        | 1.744E-01        | 0.0072        | 6.712E-04        | 0.0000        |
| Eu-152            | 2.179E+00        | 0.0904        | 1.902E-06        | 0.0000        | 0.000E+00        | 0.0000        | 2.392E-04        | 0.0000        | 7.690E-04        | 0.0000        | 3.519E-05        | 0.0000        | 8.208E-05        | 0.0000        |
| Eu-154            | 2.278E+00        | 0.0945        | 2.355E-06        | 0.0000        | 0.000E+00        | 0.0000        | 3.373E-04        | 0.0000        | 1.085E-03        | 0.0000        | 4.963E-05        | 0.0000        | 1.158E-04        | 0.0000        |
| Eu-155            | 5.436E-02        | 0.0023        | 3.095E-07        | 0.0000        | 0.000E+00        | 0.0000        | 4.907E-05        | 0.0000        | 1.578E-04        | 0.0000        | 7.219E-06        | 0.0000        | 1.684E-05        | 0.0000        |
| Fe-55             | 0.000E+00        | 0.0000        | 1.746E-08        | 0.0000        | 0.000E+00        | 0.0000        | 1.285E-05        | 0.0000        | 5.274E-04        | 0.0000        | 2.315E-05        | 0.0000        | 5.798E-06        | 0.0000        |
| H-3               | 0.000E+00        | 0.0000        | 1.672E-17        | 0.0000        | 0.000E+00        | 0.0000        | 4.843E-16        | 0.0000        | 7.114E-16        | 0.0000        | 5.618E-15        | 0.0000        | 1.456E-20        | 0.0000        |
| Nb-94             | 3.234E+00        | 0.1342        | 3.766E-06        | 0.0000        | 0.000E+00        | 0.0000        | 2.332E-03        | 0.0001        | 4.543E-07        | 0.0000        | 3.374E-06        | 0.0000        | 9.560E-05        | 0.0000        |
| Ni-59             | 0.000E+00        | 0.0000        | 2.484E-08        | 0.0000        | 0.000E+00        | 0.0000        | 3.036E-04        | 0.0000        | 5.375E-05        | 0.0000        | 1.859E-03        | 0.0001        | 2.843E-06        | 0.0000        |
| Ni-63             | 0.000E+00        | 0.0000        | 5.727E-08        | 0.0000        | 0.000E+00        | 0.0000        | 8.257E-04        | 0.0000        | 1.462E-04        | 0.0000        | 5.056E-03        | 0.0002        | 7.732E-06        | 0.0000        |
| Np-237            | 2.517E-01        | 0.0104        | 3.209E-03        | 0.0001        | 0.000E+00        | 0.0000        | 9.115E-01        | 0.0378        | 1.025E-01        | 0.0043        | 4.276E-03        | 0.0002        | 3.887E-02        | 0.0016        |
| Pm-147            | 1.255E-05        | 0.0000        | 2.459E-07        | 0.0000        | 0.000E+00        | 0.0000        | 4.737E-05        | 0.0000        | 9.187E-05        | 0.0000        | 9.383E-06        | 0.0000        | 9.693E-06        | 0.0000        |
| Pu-238            | 5.669E-05        | 0.0000        | 3.643E-03        | 0.0002        | 0.000E+00        | 0.0000        | 9.197E-02        | 0.0038        | 1.122E-02        | 0.0005        | 5.086E-04        | 0.0000        | 4.377E-02        | 0.0018        |
| Pu-239            | 1.089E-04        | 0.0000        | 4.034E-03        | 0.0002        | 0.000E+00        | 0.0000        | 1.029E-01        | 0.0043        | 1.256E-02        | 0.0005        | 5.693E-04        | 0.0000        | 4.900E-02        | 0.0020        |
| Pu-240            | 5.562E-05        | 0.0000        | 4.034E-03        | 0.0002        | 0.000E+00        | 0.0000        | 1.029E-01        | 0.0043        | 1.256E-02        | 0.0005        | 5.692E-04        | 0.0000        | 4.899E-02        | 0.0020        |
| Pu-241            | 4.466E-05        | 0.0000        | 8.181E-05        | 0.0000        | 0.000E+00        | 0.0000        | 2.095E-03        | 0.0001        | 2.413E-04        | 0.0000        | 1.339E-05        | 0.0000        | 9.970E-04        | 0.0000        |
| Sb-125            | 5.368E-01        | 0.0223        | 7.289E-08        | 0.0000        | 0.000E+00        | 0.0000        | 6.492E-04        | 0.0000        | 1.446E-04        | 0.0000        | 3.998E-05        | 0.0000        | 2.519E-05        | 0.0000        |
| Sr-90             | 4.090E-03        | 0.0002        | 5.648E-06        | 0.0000        | 0.000E+00        | 0.0000        | 6.754E-01        | 0.0280        | 9.622E-02        | 0.0040        | 2.396E-01        | 0.0099        | 9.708E-04        | 0.0000        |
| Tc-99             | 1.819E-11        | 0.0000        | 3.029E-14        | 0.0000        | 0.000E+00        | 0.0000        | 1.250E-07        | 0.0000        | 8.603E-10        | 0.0000        | 7.080E-08        | 0.0000        | 7.823E-12        | 0.0000        |
| <b>Total</b>      | <b>1.998E+01</b> | <b>0.8294</b> | <b>2.831E-02</b> | <b>0.0012</b> | <b>0.000E+00</b> | <b>0.0000</b> | <b>2.400E+00</b> | <b>0.0996</b> | <b>6.398E-01</b> | <b>0.0266</b> | <b>6.186E-01</b> | <b>0.0257</b> | <b>3.450E-01</b> | <b>0.0143</b> |



Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

## Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

## Water Dependent Pathways

| Radio-<br>Nuclide | Water            |               | Fish             |               | Radon            |               | Plant            |               | Meat             |               | Milk             |               | All Pathways*    |               |
|-------------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|
|                   | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        |
| Ag-108m           | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 3.291E+00        | 0.1366        |
| Am-241            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.839E-01        | 0.0076        |
| Am-243            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 4.968E-01        | 0.0206        |
| C-14              | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.931E-10        | 0.0000        |
| Cm-243            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 3.195E-01        | 0.0133        |
| Cm-244            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 8.793E-02        | 0.0036        |
| Co-60             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 4.612E+00        | 0.1914        |
| Cs-134            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 2.363E+00        | 0.0981        |
| Cs-137            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.541E+00        | 0.0640        |
| Eu-152            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 2.180E+00        | 0.0905        |
| Eu-154            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 2.279E+00        | 0.0946        |
| Eu-155            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 5.459E-02        | 0.0023        |
| Fe-55             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 5.692E-04        | 0.0000        |
| H-3               | 2.614E-03        | 0.0001        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 3.805E-04        | 0.0000        | 1.748E-04        | 0.0000        | 8.173E-04        | 0.0000        | 3.986E-03        | 0.0002        |
| Nb-94             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 3.236E+00        | 0.1343        |
| Ni-59             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 2.220E-03        | 0.0001        |
| Ni-63             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 6.036E-03        | 0.0003        |
| Np-237            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.312E+00        | 0.0545        |
| Pm-147            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.711E-04        | 0.0000        |
| Pu-238            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.512E-01        | 0.0063        |
| Pu-239            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.692E-01        | 0.0070        |
| Pu-240            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.691E-01        | 0.0070        |
| Pu-241            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 3.473E-03        | 0.0001        |
| Sb-125            | 5.992E-03        | 0.0002        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 4.386E-04        | 0.0000        | 3.769E-04        | 0.0000        | 1.403E-04        | 0.0000        | 5.446E-01        | 0.0226        |
| Sr-90             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.016E+00        | 0.0422        |
| Tc-99             | 5.418E-02        | 0.0022        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 8.998E-03        | 0.0004        | 8.639E-05        | 0.0000        | 4.749E-03        | 0.0002        | 6.801E-02        | 0.0028        |
| <b>Total</b>      | <b>6.279E-02</b> | <b>0.0026</b> | <b>0.000E+00</b> | <b>0.0000</b> | <b>0.000E+00</b> | <b>0.0000</b> | <b>9.817E-03</b> | <b>0.0004</b> | <b>6.381E-04</b> | <b>0.0000</b> | <b>5.707E-03</b> | <b>0.0002</b> | <b>2.409E+01</b> | <b>1.0000</b> |

\*Sum of all water independent and dependent pathways.

Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

## Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

## Water Independent Pathways (Inhalation excludes radon)

| Radio-<br>Nuclide | Ground           |               | Inhalation       |               | Radon            |               | Plant            |               | Meat             |               | Milk             |               | Soil             |               |
|-------------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|
|                   | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        |
| Ag-108m           | 3.113E+00        | 0.1619        | 2.412E-06        | 0.0000        | 0.000E+00        | 0.0000        | 8.222E-04        | 0.0000        | 7.405E-04        | 0.0000        | 8.376E-03        | 0.0004        | 9.558E-05        | 0.0000        |
| Am-241            | 1.614E-02        | 0.0008        | 4.000E-03        | 0.0002        | 0.000E+00        | 0.0000        | 1.014E-01        | 0.0053        | 6.413E-03        | 0.0003        | 1.310E-03        | 0.0001        | 4.827E-02        | 0.0025        |
| Am-243            | 3.248E-01        | 0.0169        | 3.985E-03        | 0.0002        | 0.000E+00        | 0.0000        | 1.015E-01        | 0.0053        | 6.418E-03        | 0.0003        | 1.311E-03        | 0.0001        | 4.830E-02        | 0.0025        |
| C-14              | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Cm-243            | 1.976E-01        | 0.0103        | 2.614E-03        | 0.0001        | 0.000E+00        | 0.0000        | 6.610E-02        | 0.0034        | 2.934E-03        | 0.0002        | 9.872E-04        | 0.0001        | 3.146E-02        | 0.0016        |
| Cm-244            | 4.215E-05        | 0.0000        | 2.009E-03        | 0.0001        | 0.000E+00        | 0.0000        | 5.060E-02        | 0.0026        | 2.248E-03        | 0.0001        | 7.554E-04        | 0.0000        | 2.408E-02        | 0.0013        |
| Co-60             | 3.400E+00        | 0.1768        | 1.278E-06        | 0.0000        | 0.000E+00        | 0.0000        | 4.022E-02        | 0.0021        | 6.310E-02        | 0.0033        | 1.298E-02        | 0.0007        | 2.311E-04        | 0.0000        |
| Cs-134            | 1.015E+00        | 0.0528        | 1.321E-07        | 0.0000        | 0.000E+00        | 0.0000        | 2.791E-02        | 0.0015        | 7.124E-02        | 0.0037        | 8.015E-02        | 0.0042        | 3.085E-04        | 0.0000        |
| Cs-137            | 1.090E+00        | 0.0567        | 2.712E-07        | 0.0000        | 0.000E+00        | 0.0000        | 5.661E-02        | 0.0029        | 1.445E-01        | 0.0075        | 1.625E-01        | 0.0085        | 6.256E-04        | 0.0000        |
| Eu-152            | 1.909E+00        | 0.0993        | 1.640E-06        | 0.0000        | 0.000E+00        | 0.0000        | 2.063E-04        | 0.0000        | 6.633E-04        | 0.0000        | 3.035E-05        | 0.0000        | 7.080E-05        | 0.0000        |
| Eu-154            | 1.881E+00        | 0.0978        | 1.915E-06        | 0.0000        | 0.000E+00        | 0.0000        | 2.743E-04        | 0.0000        | 8.820E-04        | 0.0000        | 4.036E-05        | 0.0000        | 9.414E-05        | 0.0000        |
| Eu-155            | 3.961E-02        | 0.0021        | 2.211E-07        | 0.0000        | 0.000E+00        | 0.0000        | 3.504E-05        | 0.0000        | 1.127E-04        | 0.0000        | 5.155E-06        | 0.0000        | 1.203E-05        | 0.0000        |
| Fe-55             | 0.000E+00        | 0.0000        | 1.030E-08        | 0.0000        | 0.000E+00        | 0.0000        | 7.582E-06        | 0.0000        | 3.111E-04        | 0.0000        | 1.365E-05        | 0.0000        | 3.420E-06        | 0.0000        |
| H-3               | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Nb-94             | 3.052E+00        | 0.1588        | 3.498E-06        | 0.0000        | 0.000E+00        | 0.0000        | 2.166E-03        | 0.0001        | 4.220E-07        | 0.0000        | 3.134E-06        | 0.0000        | 8.880E-05        | 0.0000        |
| Ni-59             | 0.000E+00        | 0.0000        | 2.342E-08        | 0.0000        | 0.000E+00        | 0.0000        | 2.863E-04        | 0.0000        | 5.068E-05        | 0.0000        | 1.753E-03        | 0.0001        | 2.681E-06        | 0.0000        |
| Ni-63             | 0.000E+00        | 0.0000        | 5.326E-08        | 0.0000        | 0.000E+00        | 0.0000        | 7.679E-04        | 0.0000        | 1.359E-04        | 0.0000        | 4.702E-03        | 0.0002        | 7.191E-06        | 0.0000        |
| Np-237            | 1.342E-01        | 0.0070        | 1.681E-03        | 0.0001        | 0.000E+00        | 0.0000        | 4.773E-01        | 0.0248        | 5.369E-02        | 0.0028        | 2.239E-03        | 0.0001        | 2.035E-02        | 0.0011        |
| Pm-147            | 7.212E-06        | 0.0000        | 1.385E-07        | 0.0000        | 0.000E+00        | 0.0000        | 2.668E-05        | 0.0000        | 5.175E-05        | 0.0000        | 5.285E-06        | 0.0000        | 5.460E-06        | 0.0000        |
| Pu-238            | 5.531E-05        | 0.0000        | 3.482E-03        | 0.0002        | 0.000E+00        | 0.0000        | 8.791E-02        | 0.0046        | 1.073E-02        | 0.0006        | 4.863E-04        | 0.0000        | 4.184E-02        | 0.0022        |
| Pu-239            | 1.078E-04        | 0.0000        | 3.917E-03        | 0.0002        | 0.000E+00        | 0.0000        | 9.996E-02        | 0.0052        | 1.220E-02        | 0.0006        | 5.528E-04        | 0.0000        | 4.758E-02        | 0.0025        |
| Pu-240            | 5.512E-05        | 0.0000        | 3.916E-03        | 0.0002        | 0.000E+00        | 0.0000        | 9.994E-02        | 0.0052        | 1.220E-02        | 0.0006        | 5.527E-04        | 0.0000        | 4.756E-02        | 0.0025        |
| Pu-241            | 8.973E-05        | 0.0000        | 8.440E-05        | 0.0000        | 0.000E+00        | 0.0000        | 2.158E-03        | 0.0001        | 2.324E-04        | 0.0000        | 1.582E-05        | 0.0000        | 1.027E-03        | 0.0001        |
| Sb-125            | 2.815E-01        | 0.0146        | 3.759E-08        | 0.0000        | 0.000E+00        | 0.0000        | 3.348E-04        | 0.0000        | 7.454E-05        | 0.0000        | 2.062E-05        | 0.0000        | 1.299E-05        | 0.0000        |
| Sr-90             | 1.409E-03        | 0.0001        | 1.911E-06        | 0.0000        | 0.000E+00        | 0.0000        | 2.285E-01        | 0.0119        | 3.255E-02        | 0.0017        | 8.105E-02        | 0.0042        | 3.284E-04        | 0.0000        |
| Tc-99             | 4.001E-22        | 0.0000        | 6.526E-25        | 0.0000        | 0.000E+00        | 0.0000        | 2.694E-18        | 0.0000        | 1.854E-20        | 0.0000        | 1.526E-18        | 0.0000        | 1.686E-22        | 0.0000        |
| <b>Total</b>      | <b>1.646E+01</b> | <b>0.8560</b> | <b>2.570E-02</b> | <b>0.0013</b> | <b>0.000E+00</b> | <b>0.0000</b> | <b>1.445E+00</b> | <b>0.0752</b> | <b>4.214E-01</b> | <b>0.0219</b> | <b>3.599E-01</b> | <b>0.0187</b> | <b>3.124E-01</b> | <b>0.0162</b> |

Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

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

## Water Dependent Pathways

| Radio-<br>Nuclide | Water            |               | Fish             |               | Radon            |               | Plant            |               | Meat             |               | Milk             |               | All Pathways*    |               |
|-------------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|
|                   | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        |
| Ag-108m           | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 3.123E+00        | 0.1625        |
| Am-241            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.776E-01        | 0.0092        |
| Am-243            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 4.863E-01        | 0.0253        |
| C-14              | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Cm-243            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 3.017E-01        | 0.0157        |
| Cm-244            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 7.974E-02        | 0.0041        |
| Co-60             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 3.517E+00        | 0.1829        |
| Cs-134            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.195E+00        | 0.0621        |
| Cs-137            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.454E+00        | 0.0756        |
| Eu-152            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.910E+00        | 0.0993        |
| Eu-154            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.882E+00        | 0.0979        |
| Eu-155            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 3.978E-02        | 0.0021        |
| Fe-55             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 3.358E-04        | 0.0000        |
| H-3               | 3.223E-03        | 0.0002        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 4.901E-04        | 0.0000        | 2.235E-04        | 0.0000        | 1.068E-03        | 0.0001        | 5.005E-03        | 0.0003        |
| Nb-94             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 3.055E+00        | 0.1589        |
| Ni-59             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 2.093E-03        | 0.0001        |
| Ni-63             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 5.613E-03        | 0.0003        |
| Np-237            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 6.894E-01        | 0.0359        |
| Pm-147            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 9.653E-05        | 0.0000        |
| Pu-238            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.445E-01        | 0.0075        |
| Pu-239            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.643E-01        | 0.0085        |
| Pu-240            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.642E-01        | 0.0085        |
| Pu-241            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 3.608E-03        | 0.0002        |
| Sb-125            | 3.847E-03        | 0.0002        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 2.826E-04        | 0.0000        | 2.444E-04        | 0.0000        | 9.149E-05        | 0.0000        | 2.864E-01        | 0.0149        |
| Sr-90             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 3.438E-01        | 0.0179        |
| Tc-99             | 1.516E-01        | 0.0079        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 2.692E-02        | 0.0014        | 2.836E-04        | 0.0000        | 1.670E-02        | 0.0009        | 1.955E-01        | 0.0102        |
| <b>Total</b>      | <b>1.587E-01</b> | <b>0.0083</b> | <b>0.000E+00</b> | <b>0.0000</b> | <b>0.000E+00</b> | <b>0.0000</b> | <b>2.769E-02</b> | <b>0.0014</b> | <b>7.514E-04</b> | <b>0.0000</b> | <b>1.785E-02</b> | <b>0.0009</b> | <b>1.923E+01</b> | <b>1.0000</b> |

\*Sum of all water independent and dependent pathways.

Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

## Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

## Water Independent Pathways (Inhalation excludes radon)

| Radio-<br>Nuclide | Ground           |               | Inhalation       |               | Radon            |               | Plant            |               | Meat             |               | Milk             |               | Soil             |               |
|-------------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|
|                   | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        |
| Ag-108m           | 2.587E+00        | 0.2277        | 1.888E-06        | 0.0000        | 0.000E+00        | 0.0000        | 6.438E-04        | 0.0001        | 5.798E-04        | 0.0001        | 6.558E-03        | 0.0006        | 7.484E-05        | 0.0000        |
| Am-241            | 1.524E-02        | 0.0013        | 3.500E-03        | 0.0003        | 0.000E+00        | 0.0000        | 8.876E-02        | 0.0078        | 5.612E-03        | 0.0005        | 1.146E-03        | 0.0001        | 4.224E-02        | 0.0037        |
| Am-243            | 3.078E-01        | 0.0271        | 3.525E-03        | 0.0003        | 0.000E+00        | 0.0000        | 8.979E-02        | 0.0079        | 5.678E-03        | 0.0005        | 1.159E-03        | 0.0001        | 4.273E-02        | 0.0038        |
| C-14              | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Cm-243            | 1.653E-01        | 0.0145        | 2.045E-03        | 0.0002        | 0.000E+00        | 0.0000        | 5.169E-02        | 0.0045        | 2.296E-03        | 0.0002        | 7.719E-04        | 0.0001        | 2.460E-02        | 0.0022        |
| Cm-244            | 3.214E-05        | 0.0000        | 1.421E-03        | 0.0001        | 0.000E+00        | 0.0000        | 3.580E-02        | 0.0032        | 1.595E-03        | 0.0001        | 5.340E-04        | 0.0000        | 1.704E-02        | 0.0015        |
| Co-60             | 1.316E+00        | 0.1158        | 4.689E-07        | 0.0000        | 0.000E+00        | 0.0000        | 1.475E-02        | 0.0013        | 2.315E-02        | 0.0020        | 4.761E-03        | 0.0004        | 8.478E-05        | 0.0000        |
| Cs-134            | 9.393E-02        | 0.0083        | 1.153E-08        | 0.0000        | 0.000E+00        | 0.0000        | 2.436E-03        | 0.0002        | 6.218E-03        | 0.0005        | 6.996E-03        | 0.0006        | 2.692E-05        | 0.0000        |
| Cs-137            | 9.008E-01        | 0.0793        | 2.113E-07        | 0.0000        | 0.000E+00        | 0.0000        | 4.410E-02        | 0.0039        | 1.126E-01        | 0.0099        | 1.266E-01        | 0.0111        | 4.874E-04        | 0.0000        |
| Eu-152            | 1.199E+00        | 0.1055        | 9.742E-07        | 0.0000        | 0.000E+00        | 0.0000        | 1.225E-04        | 0.0000        | 3.939E-04        | 0.0000        | 1.803E-05        | 0.0000        | 4.205E-05        | 0.0000        |
| Eu-154            | 9.610E-01        | 0.0846        | 9.255E-07        | 0.0000        | 0.000E+00        | 0.0000        | 1.326E-04        | 0.0000        | 4.262E-04        | 0.0000        | 1.950E-05        | 0.0000        | 4.549E-05        | 0.0000        |
| Eu-155            | 1.307E-02        | 0.0012        | 6.781E-08        | 0.0000        | 0.000E+00        | 0.0000        | 1.075E-05        | 0.0000        | 3.456E-05        | 0.0000        | 1.581E-06        | 0.0000        | 3.689E-06        | 0.0000        |
| Fe-55             | 0.000E+00        | 0.0000        | 1.618E-09        | 0.0000        | 0.000E+00        | 0.0000        | 1.191E-06        | 0.0000        | 4.887E-05        | 0.0000        | 2.145E-06        | 0.0000        | 5.372E-07        | 0.0000        |
| H-3               | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Nb-94             | 2.490E+00        | 0.2191        | 2.693E-06        | 0.0000        | 0.000E+00        | 0.0000        | 1.668E-03        | 0.0001        | 3.249E-07        | 0.0000        | 2.413E-06        | 0.0000        | 6.837E-05        | 0.0000        |
| Ni-59             | 0.000E+00        | 0.0000        | 1.900E-08        | 0.0000        | 0.000E+00        | 0.0000        | 2.323E-04        | 0.0000        | 4.112E-05        | 0.0000        | 1.422E-03        | 0.0001        | 2.175E-06        | 0.0000        |
| Ni-63             | 0.000E+00        | 0.0000        | 4.116E-08        | 0.0000        | 0.000E+00        | 0.0000        | 5.935E-04        | 0.0001        | 1.051E-04        | 0.0000        | 3.635E-03        | 0.0003        | 5.558E-06        | 0.0000        |
| Np-237            | 1.483E-02        | 0.0013        | 1.740E-04        | 0.0000        | 0.000E+00        | 0.0000        | 4.941E-02        | 0.0043        | 5.558E-03        | 0.0005        | 2.320E-04        | 0.0000        | 2.107E-03        | 0.0002        |
| Pm-147            | 1.039E-06        | 0.0000        | 1.851E-08        | 0.0000        | 0.000E+00        | 0.0000        | 3.567E-06        | 0.0000        | 6.918E-06        | 0.0000        | 7.065E-07        | 0.0000        | 7.299E-07        | 0.0000        |
| Pu-238            | 5.071E-05        | 0.0000        | 2.962E-03        | 0.0003        | 0.000E+00        | 0.0000        | 7.479E-02        | 0.0066        | 9.127E-03        | 0.0008        | 4.139E-04        | 0.0000        | 3.560E-02        | 0.0031        |
| Pu-239            | 1.038E-04        | 0.0000        | 3.521E-03        | 0.0003        | 0.000E+00        | 0.0000        | 8.987E-02        | 0.0079        | 1.097E-02        | 0.0010        | 4.970E-04        | 0.0000        | 4.277E-02        | 0.0038        |
| Pu-240            | 5.338E-05        | 0.0000        | 3.519E-03        | 0.0003        | 0.000E+00        | 0.0000        | 8.980E-02        | 0.0079        | 1.096E-02        | 0.0010        | 4.966E-04        | 0.0000        | 4.274E-02        | 0.0038        |
| Pu-241            | 2.090E-04        | 0.0000        | 8.789E-05        | 0.0000        | 0.000E+00        | 0.0000        | 2.240E-03        | 0.0002        | 2.032E-04        | 0.0000        | 2.121E-05        | 0.0000        | 1.066E-03        | 0.0001        |
| Sb-125            | 2.932E-02        | 0.0026        | 3.688E-09        | 0.0000        | 0.000E+00        | 0.0000        | 3.285E-05        | 0.0000        | 7.315E-06        | 0.0000        | 2.023E-06        | 0.0000        | 1.275E-06        | 0.0000        |
| Sr-90             | 3.373E-05        | 0.0000        | 4.287E-08        | 0.0000        | 0.000E+00        | 0.0000        | 5.127E-03        | 0.0005        | 7.304E-04        | 0.0001        | 1.819E-03        | 0.0002        | 7.368E-06        | 0.0000        |
| Tc-99             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| <b>Total</b>      | <b>1.009E+01</b> | <b>0.8883</b> | <b>2.076E-02</b> | <b>0.0018</b> | <b>0.000E+00</b> | <b>0.0000</b> | <b>6.420E-01</b> | <b>0.0565</b> | <b>1.963E-01</b> | <b>0.0173</b> | <b>1.571E-01</b> | <b>0.0138</b> | <b>2.517E-01</b> | <b>0.0222</b> |

Summary : RESRAD Default

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## Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

## Water Dependent Pathways

| Radio-<br>Nuclide | Water            |               | Fish             |               | Radon            |               | Plant            |               | Meat             |               | Milk             |               | All Pathways*    |               |
|-------------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|
|                   | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        |
| Ag-108m           | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 2.595E+00        | 0.2284        |
| Am-241            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.565E-01        | 0.0138        |
| Am-243            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 4.507E-01        | 0.0397        |
| C-14              | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Cm-243            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 2.467E-01        | 0.0217        |
| Cm-244            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 5.643E-02        | 0.0050        |
| Co-60             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.358E+00        | 0.1196        |
| Cs-134            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.096E-01        | 0.0096        |
| Cs-137            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.185E+00        | 0.1043        |
| Eu-152            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.199E+00        | 0.1056        |
| Eu-154            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 9.616E-01        | 0.0846        |
| Eu-155            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.312E-02        | 0.0012        |
| Fe-55             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 5.274E-05        | 0.0000        |
| H-3               | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Nb-94             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 2.491E+00        | 0.2193        |
| Ni-59             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.698E-03        | 0.0001        |
| Ni-63             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 4.339E-03        | 0.0004        |
| Np-237            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 7.231E-02        | 0.0064        |
| Pm-147            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.298E-05        | 0.0000        |
| Pu-238            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.229E-01        | 0.0108        |
| Pu-239            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.477E-01        | 0.0130        |
| Pu-240            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.476E-01        | 0.0130        |
| Pu-241            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 3.828E-03        | 0.0003        |
| Sb-125            | 7.120E-04        | 0.0001        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 5.230E-05        | 0.0000        | 4.521E-05        | 0.0000        | 1.692E-05        | 0.0000        | 3.019E-02        | 0.0027        |
| Sr-90             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 7.717E-03        | 0.0007        |
| Tc-99             | 8.204E-27        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 2.050E-27        | 0.0000        | 3.890E-29        | 0.0000        | 2.832E-27        | 0.0000        | 1.312E-26        | 0.0000        |
| <b>Total</b>      | <b>7.120E-04</b> | <b>0.0001</b> | <b>0.000E+00</b> | <b>0.0000</b> | <b>0.000E+00</b> | <b>0.0000</b> | <b>5.230E-05</b> | <b>0.0000</b> | <b>4.521E-05</b> | <b>0.0000</b> | <b>1.692E-05</b> | <b>0.0000</b> | <b>1.136E+01</b> | <b>1.0000</b> |

\*Sum of all water independent and dependent pathways.

Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

## Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

## Water Independent Pathways (Inhalation excludes radon)

| Radio-<br>Nuclide | Ground           |               | Inhalation       |               | Radon            |               | Plant            |               | Meat             |               | Milk             |               | Soil             |               |
|-------------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|
|                   | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        |
| Ag-108m           | 1.489E+00        | 0.3010        | 9.038E-07        | 0.0000        | 0.000E+00        | 0.0000        | 3.082E-04        | 0.0001        | 2.775E-04        | 0.0001        | 3.139E-03        | 0.0006        | 3.582E-05        | 0.0000        |
| Am-241            | 1.290E-02        | 0.0026        | 2.302E-03        | 0.0005        | 0.000E+00        | 0.0000        | 5.838E-02        | 0.0118        | 3.691E-03        | 0.0007        | 7.540E-04        | 0.0002        | 2.778E-02        | 0.0056        |
| Am-243            | 2.604E-01        | 0.0526        | 2.391E-03        | 0.0005        | 0.000E+00        | 0.0000        | 6.091E-02        | 0.0123        | 3.854E-03        | 0.0008        | 7.862E-04        | 0.0002        | 2.898E-02        | 0.0059        |
| C-14              | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Cm-243            | 9.757E-02        | 0.0197        | 9.755E-04        | 0.0002        | 0.000E+00        | 0.0000        | 2.467E-02        | 0.0050        | 1.098E-03        | 0.0002        | 3.680E-04        | 0.0001        | 1.174E-02        | 0.0024        |
| Cm-244            | 1.484E-05        | 0.0000        | 5.109E-04        | 0.0001        | 0.000E+00        | 0.0000        | 1.287E-02        | 0.0026        | 5.810E-04        | 0.0001        | 1.910E-04        | 0.0000        | 6.126E-03        | 0.0012        |
| Co-60             | 8.508E-02        | 0.0172        | 2.572E-08        | 0.0000        | 0.000E+00        | 0.0000        | 8.092E-04        | 0.0002        | 1.270E-03        | 0.0003        | 2.612E-04        | 0.0001        | 4.650E-06        | 0.0000        |
| Cs-134            | 1.021E-04        | 0.0000        | 1.046E-11        | 0.0000        | 0.000E+00        | 0.0000        | 2.210E-06        | 0.0000        | 5.641E-06        | 0.0000        | 6.347E-06        | 0.0000        | 2.442E-08        | 0.0000        |
| Cs-137            | 5.102E-01        | 0.1031        | 9.969E-08        | 0.0000        | 0.000E+00        | 0.0000        | 2.081E-02        | 0.0042        | 5.312E-02        | 0.0107        | 5.977E-02        | 0.0121        | 2.300E-04        | 0.0000        |
| Eu-152            | 3.096E-01        | 0.0626        | 2.117E-07        | 0.0000        | 0.000E+00        | 0.0000        | 2.662E-05        | 0.0000        | 8.559E-05        | 0.0000        | 3.917E-06        | 0.0000        | 9.136E-06        | 0.0000        |
| Eu-154            | 1.375E-01        | 0.0278        | 1.116E-07        | 0.0000        | 0.000E+00        | 0.0000        | 1.598E-05        | 0.0000        | 5.137E-05        | 0.0000        | 2.351E-06        | 0.0000        | 5.483E-06        | 0.0000        |
| Eu-155            | 5.462E-04        | 0.0001        | 2.231E-09        | 0.0000        | 0.000E+00        | 0.0000        | 3.537E-07        | 0.0000        | 1.137E-06        | 0.0000        | 5.203E-08        | 0.0000        | 1.214E-07        | 0.0000        |
| Fe-55             | 0.000E+00        | 0.0000        | 7.866E-12        | 0.0000        | 0.000E+00        | 0.0000        | 5.792E-09        | 0.0000        | 2.376E-07        | 0.0000        | 1.043E-08        | 0.0000        | 2.612E-09        | 0.0000        |
| H-3               | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Nb-94             | 1.357E+00        | 0.2744        | 1.228E-06        | 0.0000        | 0.000E+00        | 0.0000        | 7.607E-04        | 0.0002        | 1.482E-07        | 0.0000        | 1.101E-06        | 0.0000        | 3.118E-05        | 0.0000        |
| Ni-59             | 0.000E+00        | 0.0000        | 1.006E-08        | 0.0000        | 0.000E+00        | 0.0000        | 1.230E-04        | 0.0000        | 2.178E-05        | 0.0000        | 7.537E-04        | 0.0002        | 1.152E-06        | 0.0000        |
| Ni-63             | 0.000E+00        | 0.0000        | 1.899E-08        | 0.0000        | 0.000E+00        | 0.0000        | 2.738E-04        | 0.0001        | 4.847E-05        | 0.0000        | 1.677E-03        | 0.0003        | 2.564E-06        | 0.0000        |
| Np-237            | 2.691E-05        | 0.0000        | 2.672E-07        | 0.0000        | 0.000E+00        | 0.0000        | 7.308E-05        | 0.0000        | 8.269E-06        | 0.0000        | 4.466E-07        | 0.0000        | 3.145E-06        | 0.0000        |
| Pm-147            | 4.066E-09        | 0.0000        | 5.677E-11        | 0.0000        | 0.000E+00        | 0.0000        | 1.094E-08        | 0.0000        | 2.121E-08        | 0.0000        | 2.166E-09        | 0.0000        | 2.238E-09        | 0.0000        |
| Pu-238            | 3.946E-05        | 0.0000        | 1.798E-03        | 0.0004        | 0.000E+00        | 0.0000        | 4.539E-02        | 0.0092        | 5.539E-03        | 0.0011        | 2.516E-04        | 0.0001        | 2.160E-02        | 0.0044        |
| Pu-239            | 9.185E-05        | 0.0000        | 2.501E-03        | 0.0005        | 0.000E+00        | 0.0000        | 6.385E-02        | 0.0129        | 7.790E-03        | 0.0016        | 3.530E-04        | 0.0001        | 3.038E-02        | 0.0061        |
| Pu-240            | 4.861E-05        | 0.0000        | 2.496E-03        | 0.0005        | 0.000E+00        | 0.0000        | 6.370E-02        | 0.0129        | 7.772E-03        | 0.0016        | 3.522E-04        | 0.0001        | 3.031E-02        | 0.0061        |
| Pu-241            | 3.469E-04        | 0.0001        | 7.270E-05        | 0.0000        | 0.000E+00        | 0.0000        | 1.847E-03        | 0.0004        | 1.334E-04        | 0.0000        | 2.176E-05        | 0.0000        | 8.788E-04        | 0.0002        |
| Sb-125            | 4.475E-05        | 0.0000        | 4.675E-12        | 0.0000        | 0.000E+00        | 0.0000        | 4.164E-08        | 0.0000        | 9.273E-09        | 0.0000        | 2.565E-09        | 0.0000        | 1.616E-09        | 0.0000        |
| Sr-90             | 7.739E-10        | 0.0000        | 8.020E-13        | 0.0000        | 0.000E+00        | 0.0000        | 9.593E-08        | 0.0000        | 1.367E-08        | 0.0000        | 3.404E-08        | 0.0000        | 1.379E-10        | 0.0000        |
| Tc-99             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| <b>Total</b>      | <b>4.261E+00</b> | <b>0.8614</b> | <b>1.305E-02</b> | <b>0.0026</b> | <b>0.000E+00</b> | <b>0.0000</b> | <b>3.548E-01</b> | <b>0.0717</b> | <b>8.535E-02</b> | <b>0.0173</b> | <b>6.870E-02</b> | <b>0.0139</b> | <b>1.581E-01</b> | <b>0.0320</b> |

Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

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

Water Dependent Pathways

| Radio-<br>Nuclide | Water            |               | Fish             |               | Radon            |               | Plant            |               | Meat             |               | Milk             |               | All Pathways*    |               |
|-------------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|
|                   | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        |
| Ag-108m           | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.493E+00        | 0.3018        |
| Am-241            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.058E-01        | 0.0214        |
| Am-243            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 3.573E-01        | 0.0722        |
| C-14              | 1.561E-03        | 0.0003        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 2.495E-03        | 0.0005        | 8.469E-04        | 0.0002        | 7.221E-04        | 0.0001        | 5.625E-03        | 0.0011        |
| Cm-243            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.364E-01        | 0.0276        |
| Cm-244            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 2.030E-02        | 0.0041        |
| Co-60             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 8.742E-02        | 0.0177        |
| Cs-134            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.163E-04        | 0.0000        |
| Cs-137            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 6.442E-01        | 0.1302        |
| Eu-152            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 3.097E-01        | 0.0626        |
| Eu-154            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.376E-01        | 0.0278        |
| Eu-155            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 5.479E-04        | 0.0001        |
| Fe-55             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 2.565E-07        | 0.0000        |
| H-3               | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Nb-94             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.358E+00        | 0.2745        |
| Ni-59             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 8.997E-04        | 0.0002        |
| Ni-63             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 2.002E-03        | 0.0004        |
| Np-237            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.121E-04        | 0.0000        |
| Pm-147            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 4.068E-08        | 0.0000        |
| Pu-238            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 7.462E-02        | 0.0151        |
| Pu-239            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.050E-01        | 0.0212        |
| Pu-240            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.047E-01        | 0.0212        |
| Pu-241            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 3.300E-03        | 0.0007        |
| Sb-125            | 7.292E-06        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 5.356E-07        | 0.0000        | 4.629E-07        | 0.0000        | 1.732E-07        | 0.0000        | 5.327E-05        | 0.0000        |
| Sr-90             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.446E-07        | 0.0000        |
| Tc-99             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| <b>Total</b>      | <b>1.568E-03</b> | <b>0.0003</b> | <b>0.000E+00</b> | <b>0.0000</b> | <b>0.000E+00</b> | <b>0.0000</b> | <b>2.496E-03</b> | <b>0.0005</b> | <b>8.473E-04</b> | <b>0.0002</b> | <b>7.223E-04</b> | <b>0.0001</b> | <b>4.946E+00</b> | <b>1.0000</b> |

\*Sum of all water independent and dependent pathways.

Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

## Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

## Water Independent Pathways (Inhalation excludes radon)

| Radio-<br>Nuclide | Ground           |               | Inhalation       |               | Radon            |               | Plant            |               | Meat             |               | Milk             |               | Soil             |               |
|-------------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|
|                   | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        |
| Ag-108m           | 8.946E-10        | 0.0000        | 1.565E-16        | 0.0000        | 0.000E+00        | 0.0000        | 5.364E-10        | 0.0000        | 3.199E-10        | 0.0000        | 7.442E-09        | 0.0000        | 6.204E-15        | 0.0000        |
| Am-241            | 8.876E-11        | 0.0000        | 1.203E-12        | 0.0000        | 0.000E+00        | 0.0000        | 3.059E-07        | 0.0000        | 4.194E-09        | 0.0000        | 1.634E-09        | 0.0000        | 1.452E-11        | 0.0000        |
| Am-243            | 8.082E-10        | 0.0000        | 1.391E-12        | 0.0000        | 0.000E+00        | 0.0000        | 3.553E-07        | 0.0000        | 4.884E-09        | 0.0000        | 1.894E-09        | 0.0000        | 1.686E-11        | 0.0000        |
| C-14              | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Cm-243            | 8.282E-11        | 0.0000        | 1.682E-13        | 0.0000        | 0.000E+00        | 0.0000        | 4.265E-08        | 0.0000        | 4.191E-10        | 0.0000        | 2.611E-10        | 0.0000        | 2.024E-12        | 0.0000        |
| Cm-244            | 1.518E-13        | 0.0000        | 3.658E-14        | 0.0000        | 0.000E+00        | 0.0000        | 9.259E-09        | 0.0000        | 1.107E-10        | 0.0000        | 5.209E-11        | 0.0000        | 4.394E-13        | 0.0000        |
| Co-60             | 2.834E-14        | 0.0000        | 2.392E-21        | 0.0000        | 0.000E+00        | 0.0000        | 7.569E-13        | 0.0000        | 7.405E-12        | 0.0000        | 2.100E-12        | 0.0000        | 4.325E-19        | 0.0000        |
| Cs-134            | 2.078E-23        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.327E-21        | 0.0000        | 1.449E-20        | 0.0000        | 2.559E-20        | 0.0000        | 1.457E-27        | 0.0000        |
| Cs-137            | 2.918E-10        | 0.0000        | 1.643E-17        | 0.0000        | 0.000E+00        | 0.0000        | 3.449E-08        | 0.0000        | 3.817E-07        | 0.0000        | 6.744E-07        | 0.0000        | 3.791E-14        | 0.0000        |
| Eu-152            | 1.289E-11        | 0.0000        | 2.356E-18        | 0.0000        | 0.000E+00        | 0.0000        | 2.974E-12        | 0.0000        | 2.619E-12        | 0.0000        | 2.363E-13        | 0.0000        | 1.017E-16        | 0.0000        |
| Eu-154            | 7.095E-13        | 0.0000        | 1.602E-19        | 0.0000        | 0.000E+00        | 0.0000        | 2.303E-13        | 0.0000        | 2.027E-13        | 0.0000        | 1.828E-14        | 0.0000        | 7.873E-18        | 0.0000        |
| Eu-155            | 6.494E-17        | 0.0000        | 3.514E-23        | 0.0000        | 0.000E+00        | 0.0000        | 5.592E-17        | 0.0000        | 4.911E-17        | 0.0000        | 4.428E-18        | 0.0000        | 1.911E-21        | 0.0000        |
| Fe-55             | 0.000E+00        | 0.0000        | 1.609E-28        | 0.0000        | 0.000E+00        | 0.0000        | 1.189E-21        | 0.0000        | 1.091E-20        | 0.0000        | 9.166E-22        | 0.0000        | 5.345E-26        | 0.0000        |
| H-3               | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Nb-94             | 6.988E-10        | 0.0000        | 1.799E-16        | 0.0000        | 0.000E+00        | 0.0000        | 1.120E-09        | 0.0000        | 3.530E-13        | 0.0000        | 5.078E-12        | 0.0000        | 4.566E-15        | 0.0000        |
| Ni-59             | 0.000E+00        | 0.0000        | 2.479E-18        | 0.0000        | 0.000E+00        | 0.0000        | 3.047E-10        | 0.0000        | 2.595E-10        | 0.0000        | 1.363E-08        | 0.0000        | 2.838E-16        | 0.0000        |
| Ni-63             | 0.000E+00        | 0.0000        | 2.891E-18        | 0.0000        | 0.000E+00        | 0.0000        | 4.192E-10        | 0.0000        | 3.569E-10        | 0.0000        | 1.875E-08        | 0.0000        | 3.904E-16        | 0.0000        |
| Np-237            | 2.083E-16        | 0.0000        | 5.795E-18        | 0.0000        | 0.000E+00        | 0.0000        | 3.814E-13        | 0.0000        | 6.564E-14        | 0.0000        | 2.276E-13        | 0.0000        | 1.780E-17        | 0.0000        |
| Pm-147            | 2.485E-25        | 0.0000        | 9.552E-24        | 0.0000        | 0.000E+00        | 0.0000        | 8.154E-19        | 0.0000        | 3.806E-19        | 0.0000        | 8.033E-20        | 0.0000        | 3.483E-23        | 0.0000        |
| Pu-238            | 1.908E-12        | 0.0000        | 7.102E-13        | 0.0000        | 0.000E+00        | 0.0000        | 1.798E-07        | 0.0000        | 4.756E-09        | 0.0000        | 4.149E-10        | 0.0000        | 8.533E-12        | 0.0000        |
| Pu-239            | 1.826E-12        | 0.0000        | 1.708E-12        | 0.0000        | 0.000E+00        | 0.0000        | 4.372E-07        | 0.0000        | 1.156E-08        | 0.0000        | 9.997E-10        | 0.0000        | 2.075E-11        | 0.0000        |
| Pu-240            | 3.992E-12        | 0.0000        | 1.695E-12        | 0.0000        | 0.000E+00        | 0.0000        | 4.338E-07        | 0.0000        | 1.148E-08        | 0.0000        | 9.921E-10        | 0.0000        | 2.059E-11        | 0.0000        |
| Pu-241            | 3.167E-12        | 0.0000        | 4.318E-14        | 0.0000        | 0.000E+00        | 0.0000        | 1.098E-08        | 0.0000        | 1.514E-10        | 0.0000        | 5.845E-11        | 0.0000        | 5.211E-13        | 0.0000        |
| Sb-125            | 3.116E-23        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 8.020E-23        | 0.0000        | 4.027E-23        | 0.0000        | 2.135E-23        | 0.0000        | 3.087E-28        | 0.0000        |
| Sr-90             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 7.965E-29        | 0.0000        | 1.100E-28        | 0.0000        | 3.059E-28        | 0.0000        | 0.000E+00        | 0.0000        |
| Tc-99             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| <b>Total</b>      | <b>2.890E-09</b> | <b>0.0000</b> | <b>6.955E-12</b> | <b>0.0000</b> | <b>0.000E+00</b> | <b>0.0000</b> | <b>1.812E-06</b> | <b>0.0000</b> | <b>4.202E-07</b> | <b>0.0000</b> | <b>7.206E-07</b> | <b>0.0000</b> | <b>8.427E-11</b> | <b>0.0000</b> |



Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

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

Water Dependent Pathways

| Radio-<br>Nuclide | Water            |               | Fish             |               | Radon            |               | Plant            |               | Meat             |               | Milk             |               | All Pathways*    |               |
|-------------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|
|                   | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        |
| Ag-108m           | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 9.193E-09        | 0.0000        |
| Am-241            | 2.786E-04        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 2.180E-05        | 0.0000        | 2.980E-06        | 0.0000        | 1.689E-07        | 0.0000        | 3.038E-04        | 0.0000        |
| Am-243            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 3.629E-07        | 0.0000        |
| C-14              | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Cm-243            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 4.342E-08        | 0.0000        |
| Cm-244            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 9.422E-09        | 0.0000        |
| Co-60             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.029E-11        | 0.0000        |
| Cs-134            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 4.143E-20        | 0.0000        |
| Cs-137            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.091E-06        | 0.0000        |
| Eu-152            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.871E-11        | 0.0000        |
| Eu-154            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.161E-12        | 0.0000        |
| Eu-155            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.744E-16        | 0.0000        |
| Fe-55             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.301E-20        | 0.0000        |
| H-3               | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Nb-94             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.824E-09        | 0.0000        |
| Ni-59             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.420E-08        | 0.0000        |
| Ni-63             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.953E-08        | 0.0000        |
| Np-237            | 2.860E+01        | 0.9178        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 2.239E+00        | 0.0718        | 3.063E-01        | 0.0098        | 1.737E-02        | 0.0006        | 3.116E+01        | 1.0000        |
| Pm-147            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.276E-18        | 0.0000        |
| Pu-238            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.850E-07        | 0.0000        |
| Pu-239            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 4.498E-07        | 0.0000        |
| Pu-240            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 4.463E-07        | 0.0000        |
| Pu-241            | 4.728E-06        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 3.699E-07        | 0.0000        | 5.055E-08        | 0.0000        | 2.864E-09        | 0.0000        | 5.162E-06        | 0.0000        |
| Sb-125            | 1.007E-12        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 7.396E-14        | 0.0000        | 6.394E-14        | 0.0000        | 2.394E-14        | 0.0000        | 1.169E-12        | 0.0000        |
| Sr-90             | 3.981E-07        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 3.873E-08        | 0.0000        | 3.530E-08        | 0.0000        | 6.854E-08        | 0.0000        | 5.407E-07        | 0.0000        |
| Tc-99             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| <b>Total</b>      | <b>2.860E+01</b> | <b>0.9178</b> | <b>0.000E+00</b> | <b>0.0000</b> | <b>0.000E+00</b> | <b>0.0000</b> | <b>2.239E+00</b> | <b>0.0718</b> | <b>3.063E-01</b> | <b>0.0098</b> | <b>1.737E-02</b> | <b>0.0006</b> | <b>3.116E+01</b> | <b>1.0000</b> |

\*Sum of all water independent and dependent pathways.



Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

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

## Water Dependent Pathways

| Radio-<br>Nuclide | Water            |               | Fish             |               | Radon            |               | Plant            |               | Meat             |               | Milk             |               | All Pathways*    |               |
|-------------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|
|                   | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        |
| Ag-108m           | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Am-241            | 1.141E-04        | 0.7842        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 8.929E-06        | 0.0614        | 1.222E-06        | 0.0084        | 6.928E-08        | 0.0005        | 1.243E-04        | 0.8545        |
| Am-243            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| C-14              | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Cm-243            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Cm-244            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Co-60             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Cs-134            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Cs-137            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Eu-152            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Eu-154            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Eu-155            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Fe-55             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| H-3               | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Nb-94             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Ni-59             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Ni-63             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Np-237            | 1.560E-05        | 0.1073        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.212E-06        | 0.0083        | 1.329E-07        | 0.0009        | 3.767E-07        | 0.0026        | 1.732E-05        | 0.1191        |
| Pm-147            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Pu-238            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Pu-239            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Pu-240            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Pu-241            | 3.521E-06        | 0.0242        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 2.757E-07        | 0.0019        | 3.771E-08        | 0.0003        | 2.139E-09        | 0.0000        | 3.837E-06        | 0.0264        |
| Sb-125            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Sr-90             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Tc-99             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| <b>Total</b>      | <b>1.332E-04</b> | <b>0.9157</b> | <b>0.000E+00</b> | <b>0.0000</b> | <b>0.000E+00</b> | <b>0.0000</b> | <b>1.042E-05</b> | <b>0.0716</b> | <b>1.392E-06</b> | <b>0.0096</b> | <b>4.481E-07</b> | <b>0.0031</b> | <b>1.454E-04</b> | <b>1.0000</b> |

\*Sum of all water independent and dependent pathways.



Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

## Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)

As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

## Water Dependent Pathways

| Radio-<br>Nuclide | Water            |               | Fish             |               | Radon            |               | Plant            |               | Meat             |               | Milk             |               | All Pathways*    |               |
|-------------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|
|                   | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        | mrem/yr          | fract.        |
| Ag-108m           | 4.342E-04        | 0.1145        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 3.382E-05        | 0.0089        | 1.488E-05        | 0.0039        | 2.505E-04        | 0.0660        | 7.334E-04        | 0.1934        |
| Am-241            | 3.620E-05        | 0.0095        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 2.834E-06        | 0.0007        | 3.877E-07        | 0.0001        | 2.201E-08        | 0.0000        | 3.944E-05        | 0.0104        |
| Am-243            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| C-14              | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Cm-243            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Cm-244            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Co-60             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Cs-134            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Cs-137            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Eu-152            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Eu-154            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Eu-155            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Fe-55             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| H-3               | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Nb-94             | 2.626E-03        | 0.6924        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 2.057E-04        | 0.0542        | 5.062E-08        | 0.0000        | 5.103E-07        | 0.0001        | 2.832E-03        | 0.7467        |
| Ni-59             | 5.984E-06        | 0.0016        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 4.811E-07        | 0.0001        | 3.170E-07        | 0.0001        | 1.145E-05        | 0.0030        | 1.824E-05        | 0.0048        |
| Ni-63             | 1.622E-08        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.304E-09        | 0.0000        | 8.594E-10        | 0.0000        | 3.105E-08        | 0.0000        | 4.943E-08        | 0.0000        |
| Np-237            | 1.584E-05        | 0.0042        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.231E-06        | 0.0003        | 1.328E-07        | 0.0000        | 3.756E-07        | 0.0001        | 1.758E-05        | 0.0046        |
| Pm-147            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Pu-238            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Pu-239            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Pu-240            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Pu-241            | 1.408E-04        | 0.0371        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 1.094E-05        | 0.0029        | 9.720E-08        | 0.0000        | 2.781E-08        | 0.0000        | 1.518E-04        | 0.0400        |
| Sb-125            | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Sr-90             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| Tc-99             | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        | 0.000E+00        | 0.0000        |
| <b>Total</b>      | <b>3.259E-03</b> | <b>0.8593</b> | <b>0.000E+00</b> | <b>0.0000</b> | <b>0.000E+00</b> | <b>0.0000</b> | <b>2.550E-04</b> | <b>0.0672</b> | <b>1.586E-05</b> | <b>0.0042</b> | <b>2.629E-04</b> | <b>0.0693</b> | <b>3.793E-03</b> | <b>1.0000</b> |

\*Sum of all water independent and dependent pathways.

Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

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

| Parent<br>(i) | Product<br>(j) | Thread<br>Fraction | DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) |           |           |           |           |           |           |           |
|---------------|----------------|--------------------|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|               |                |                    | 0.000E+00                                   | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| Ag-108m+D     | Ag-108m+D      | 1.000E+00          | 3.378E+00                                   | 3.291E+00 | 3.123E+00 | 2.595E+00 | 1.493E+00 | 9.193E-09 | 0.000E+00 | 7.334E-04 |
| Am-241        | Am-241         | 1.000E+00          | 1.872E-01                                   | 1.839E-01 | 1.776E-01 | 1.565E-01 | 1.058E-01 | 3.119E-07 | 0.000E+00 | 0.000E+00 |
| Am-241        | Np-237+D       | 1.000E+00          | 2.937E-07                                   | 7.827E-07 | 1.371E-06 | 1.787E-06 | 1.283E-06 | 3.035E-04 | 1.243E-04 | 3.944E-05 |
| Am-241        | U-233          | 1.000E+00          | 9.825E-15                                   | 5.576E-14 | 2.256E-13 | 1.039E-12 | 2.491E-12 | 5.529E-11 | 4.462E-10 | 9.157E-10 |
| Am-241        | Th-229+D       | 1.000E+00          | 3.877E-18                                   | 5.334E-17 | 5.332E-16 | 8.907E-15 | 8.709E-14 | 2.396E-14 | 1.617E-12 | 1.503E-11 |
| Am-241        | ΣDSR(j)        |                    | 1.872E-01                                   | 1.839E-01 | 1.776E-01 | 1.565E-01 | 1.058E-01 | 3.038E-04 | 1.243E-04 | 3.944E-05 |
| Am-243+D      | Am-243+D       | 9.829E-01          | 4.935E-01                                   | 4.883E-01 | 4.780E-01 | 4.429E-01 | 3.511E-01 | 3.555E-07 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Pu-239+D       | 9.829E-01          | 2.418E-06                                   | 7.153E-06 | 1.618E-05 | 4.329E-05 | 8.731E-05 | 1.133E-09 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | U-235+D        | 9.829E-01          | 1.450E-15                                   | 1.008E-14 | 5.239E-14 | 4.406E-13 | 3.064E-12 | 7.501E-18 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Pa-231         | 9.829E-01          | 4.406E-20                                   | 6.822E-19 | 7.894E-18 | 1.891E-16 | 3.232E-15 | 6.204E-19 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Ac-227+D       | 9.829E-01          | 2.427E-22                                   | 6.726E-21 | 1.546E-19 | 1.036E-17 | 5.127E-16 | 4.481E-20 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | ΣDSR(j)        |                    | 4.935E-01                                   | 4.883E-01 | 4.780E-01 | 4.430E-01 | 3.512E-01 | 3.567E-07 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Am-243+D       | 2.720E-03          | 1.366E-03                                   | 1.351E-03 | 1.323E-03 | 1.226E-03 | 9.718E-04 | 9.840E-10 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Pu-239+D       | 2.720E-03          | 6.692E-09                                   | 1.980E-08 | 4.478E-08 | 1.198E-07 | 2.416E-07 | 3.136E-12 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | U-235+D        | 2.720E-03          | 4.013E-18                                   | 2.790E-17 | 1.450E-16 | 1.220E-15 | 8.481E-15 | 2.076E-20 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Pa-231         | 2.720E-03          | 1.219E-22                                   | 1.888E-21 | 2.185E-20 | 5.234E-19 | 8.946E-18 | 1.717E-21 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Ac-227+D1      | 2.720E-03          | 5.283E-25                                   | 1.639E-23 | 4.034E-22 | 2.824E-20 | 1.419E-18 | 1.211E-22 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | ΣDSR(j)        |                    | 1.366E-03                                   | 1.351E-03 | 1.323E-03 | 1.226E-03 | 9.721E-04 | 9.871E-10 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Am-243+D       | 1.375E-02          | 6.905E-03                                   | 6.832E-03 | 6.688E-03 | 6.198E-03 | 4.913E-03 | 4.975E-09 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Pu-239+D       | 1.375E-02          | 3.383E-08                                   | 1.001E-07 | 2.264E-07 | 6.057E-07 | 1.222E-06 | 1.586E-11 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | U-235+D        | 1.375E-02          | 2.029E-17                                   | 1.410E-16 | 7.331E-16 | 6.165E-15 | 4.288E-14 | 1.050E-19 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Pa-231         | 1.375E-02          | 6.165E-22                                   | 9.546E-21 | 1.105E-19 | 2.646E-18 | 4.523E-17 | 8.681E-21 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Ac-227+D2      | 1.375E-02          | 2.394E-24                                   | 7.436E-23 | 1.830E-21 | 1.279E-19 | 6.373E-18 | 6.107E-22 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | ΣDSR(j)        |                    | 6.905E-03                                   | 6.832E-03 | 6.688E-03 | 6.198E-03 | 4.914E-03 | 4.990E-09 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Am-243+D       | 3.806E-05          | 1.911E-05                                   | 1.891E-05 | 1.851E-05 | 1.715E-05 | 1.360E-05 | 1.377E-11 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Pu-239+D       | 3.806E-05          | 9.363E-11                                   | 2.770E-10 | 6.265E-10 | 1.676E-09 | 3.381E-09 | 4.388E-14 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | U-235+D        | 3.806E-05          | 5.615E-20                                   | 3.903E-19 | 2.029E-18 | 1.706E-17 | 1.187E-16 | 2.905E-22 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Pa-231         | 3.806E-05          | 1.706E-24                                   | 2.642E-23 | 3.057E-22 | 7.324E-21 | 1.252E-19 | 2.403E-23 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Ac-227+D3      | 3.806E-05          | 6.683E-27                                   | 2.076E-25 | 5.109E-24 | 3.569E-22 | 1.780E-20 | 1.690E-24 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | ΣDSR(j)        |                    | 1.911E-05                                   | 1.891E-05 | 1.851E-05 | 1.715E-05 | 1.360E-05 | 1.381E-11 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Am-243+D       | 8.252E-07          | 4.143E-07                                   | 4.100E-07 | 4.013E-07 | 3.719E-07 | 2.948E-07 | 2.985E-13 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Pu-239+D       | 8.252E-07          | 2.030E-12                                   | 6.006E-12 | 1.358E-11 | 3.635E-11 | 7.330E-11 | 9.514E-16 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | U-235+D        | 8.252E-07          | 1.217E-21                                   | 8.462E-21 | 4.399E-20 | 3.699E-19 | 2.573E-18 | 6.298E-24 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Pa-231         | 8.252E-07          | 3.699E-26                                   | 5.728E-25 | 6.627E-24 | 1.588E-22 | 2.714E-21 | 5.209E-25 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Ac-227+D4      | 8.252E-07          | 9.776E-29                                   | 3.052E-27 | 7.514E-26 | 5.195E-24 | 2.491E-22 | 3.498E-26 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | ΣDSR(j)        |                    | 4.143E-07                                   | 4.100E-07 | 4.013E-07 | 3.719E-07 | 2.949E-07 | 2.994E-13 | 0.000E+00 | 0.000E+00 |

Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

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

| Parent<br>(i) | Product<br>(j) | Thread<br>Fraction | DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) |           |           |           |           |           |           |           |
|---------------|----------------|--------------------|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|               |                |                    | 0.000E+00                                   | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| Am-243+D      | Am-243+D       | 2.284E-09          | 1.147E-09                                   | 1.135E-09 | 1.111E-09 | 1.029E-09 | 8.159E-10 | 8.261E-16 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Pu-239+D       | 2.284E-09          | 5.618E-15                                   | 1.662E-14 | 3.759E-14 | 1.006E-13 | 2.029E-13 | 2.633E-18 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | U-235+D        | 2.284E-09          | 3.369E-24                                   | 2.342E-23 | 1.217E-22 | 1.024E-21 | 7.121E-21 | 1.743E-26 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Pa-231         | 2.284E-09          | 1.024E-28                                   | 1.585E-27 | 1.834E-26 | 4.395E-25 | 7.511E-24 | 1.442E-27 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Ac-227+D5      | 2.284E-09          | 2.740E-31                                   | 8.552E-30 | 2.105E-28 | 1.456E-26 | 6.990E-25 | 9.682E-29 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | ΣDSR(j)        |                    | 1.147E-09                                   | 1.135E-09 | 1.111E-09 | 1.029E-09 | 8.161E-10 | 8.287E-16 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Am-243+D       | 5.901E-04          | 2.963E-04                                   | 2.931E-04 | 2.869E-04 | 2.659E-04 | 2.108E-04 | 2.134E-10 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Pu-239         | 5.901E-04          | 1.452E-09                                   | 4.295E-09 | 9.713E-09 | 2.599E-08 | 5.242E-08 | 6.803E-13 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | U-235+D        | 5.901E-04          | 8.705E-19                                   | 6.051E-18 | 3.145E-17 | 2.645E-16 | 1.840E-15 | 4.503E-21 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Pa-231         | 5.901E-04          | 2.645E-23                                   | 4.096E-22 | 4.739E-21 | 1.135E-19 | 1.941E-18 | 3.725E-22 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Ac-227+D       | 5.901E-04          | 1.457E-25                                   | 4.038E-24 | 9.281E-23 | 6.222E-21 | 3.078E-19 | 2.690E-23 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | ΣDSR(j)        |                    | 2.963E-04                                   | 2.932E-04 | 2.870E-04 | 2.660E-04 | 2.109E-04 | 2.141E-10 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Am-243+D       | 1.633E-06          | 8.200E-07                                   | 8.113E-07 | 7.942E-07 | 7.360E-07 | 5.834E-07 | 5.907E-13 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Pu-239         | 1.633E-06          | 4.017E-12                                   | 1.189E-11 | 2.688E-11 | 7.193E-11 | 1.451E-10 | 1.883E-15 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | U-235+D        | 1.633E-06          | 2.409E-21                                   | 1.675E-20 | 8.705E-20 | 7.321E-19 | 5.092E-18 | 1.246E-23 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Pa-231         | 1.633E-06          | 7.321E-26                                   | 1.134E-24 | 1.312E-23 | 3.143E-22 | 5.371E-21 | 1.031E-24 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Ac-227+D1      | 1.633E-06          | 3.172E-28                                   | 9.839E-27 | 2.422E-25 | 1.695E-23 | 8.520E-22 | 7.269E-26 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | ΣDSR(j)        |                    | 8.200E-07                                   | 8.113E-07 | 7.942E-07 | 7.361E-07 | 5.836E-07 | 5.926E-13 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Am-243+D       | 8.257E-06          | 4.146E-06                                   | 4.102E-06 | 4.015E-06 | 3.721E-06 | 2.950E-06 | 2.987E-12 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Pu-239         | 8.257E-06          | 2.031E-11                                   | 6.009E-11 | 1.359E-10 | 3.637E-10 | 7.334E-10 | 9.519E-15 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | U-235+D        | 8.257E-06          | 1.218E-20                                   | 8.467E-20 | 4.401E-19 | 3.701E-18 | 2.574E-17 | 6.301E-23 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Pa-231         | 8.257E-06          | 3.701E-25                                   | 5.731E-24 | 6.631E-23 | 1.589E-21 | 2.715E-20 | 5.212E-24 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Ac-227+D2      | 8.257E-06          | 1.437E-27                                   | 4.464E-26 | 1.099E-24 | 7.676E-23 | 3.826E-21 | 3.667E-25 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | ΣDSR(j)        |                    | 4.146E-06                                   | 4.102E-06 | 4.015E-06 | 3.721E-06 | 2.950E-06 | 2.996E-12 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Am-243+D       | 2.285E-08          | 1.147E-08                                   | 1.135E-08 | 1.111E-08 | 1.030E-08 | 8.164E-09 | 8.266E-15 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Pu-239         | 2.285E-08          | 5.621E-14                                   | 1.663E-13 | 3.761E-13 | 1.006E-12 | 2.030E-12 | 2.635E-17 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | U-235+D        | 2.285E-08          | 3.371E-23                                   | 2.343E-22 | 1.218E-21 | 1.024E-20 | 7.125E-20 | 1.744E-25 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Pa-231         | 2.285E-08          | 1.024E-27                                   | 1.586E-26 | 1.835E-25 | 4.397E-24 | 7.515E-23 | 1.442E-26 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Ac-227+D3      | 2.285E-08          | 4.012E-30                                   | 1.246E-28 | 3.067E-27 | 2.143E-25 | 1.069E-23 | 1.015E-27 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | ΣDSR(j)        |                    | 1.147E-08                                   | 1.135E-08 | 1.111E-08 | 1.030E-08 | 8.166E-09 | 8.292E-15 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Am-243+D       | 4.954E-10          | 2.488E-10                                   | 2.461E-10 | 2.409E-10 | 2.233E-10 | 1.770E-10 | 1.792E-16 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Pu-239         | 4.954E-10          | 1.219E-15                                   | 3.606E-15 | 8.155E-15 | 2.182E-14 | 4.401E-14 | 5.712E-19 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | U-235+D        | 4.954E-10          | 7.309E-25                                   | 5.080E-24 | 2.641E-23 | 2.221E-22 | 1.545E-21 | 3.781E-27 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Pa-231         | 4.954E-10          | 2.221E-29                                   | 3.439E-28 | 3.979E-27 | 9.533E-26 | 1.629E-24 | 3.127E-28 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Ac-227+D4      | 4.954E-10          | 5.869E-32                                   | 1.832E-30 | 4.511E-29 | 3.119E-27 | 1.495E-25 | 2.100E-29 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | ΣDSR(j)        |                    | 2.488E-10                                   | 2.461E-10 | 2.409E-10 | 2.233E-10 | 1.770E-10 | 1.798E-16 | 0.000E+00 | 0.000E+00 |

Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

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

| Parent<br>(i) | Product<br>(j) | Thread<br>Fraction | DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) |           |           |           |           |           |           |           |
|---------------|----------------|--------------------|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|               |                |                    | 0.000E+00                                   | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| Am-243+D      | Am-243+D       | 1.371E-12          | 6.885E-13                                   | 6.812E-13 | 6.668E-13 | 6.179E-13 | 4.899E-13 | 4.960E-19 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Pu-239         | 1.371E-12          | 3.373E-18                                   | 9.979E-18 | 2.257E-17 | 6.039E-17 | 1.218E-16 | 1.581E-21 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | U-235+D        | 1.371E-12          | 2.023E-27                                   | 1.406E-26 | 7.309E-26 | 6.147E-25 | 4.275E-24 | 1.046E-29 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Pa-231         | 1.371E-12          | 6.146E-32                                   | 9.517E-31 | 1.101E-29 | 2.638E-28 | 4.509E-27 | 8.655E-31 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | Ac-227+D5      | 1.371E-12          | 1.645E-34                                   | 5.134E-33 | 1.264E-31 | 8.742E-30 | 4.196E-28 | 5.812E-32 | 0.000E+00 | 0.000E+00 |
| Am-243+D      | ΣDSR(j)        |                    | 6.885E-13                                   | 6.812E-13 | 6.668E-13 | 6.180E-13 | 4.900E-13 | 4.975E-19 | 0.000E+00 | 0.000E+00 |
| C-14          | C-14           | 1.000E+00          | 2.791E-01                                   | 1.931E-10 | 1.806E-30 | 0.000E+00 | 5.625E-03 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Cm-243         | 2.359E-03          | 7.754E-04                                   | 7.536E-04 | 7.117E-04 | 5.819E-04 | 3.216E-04 | 1.011E-10 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Am-243+D       | 2.359E-03          | 5.527E-08                                   | 1.630E-07 | 3.660E-07 | 9.583E-07 | 1.870E-06 | 3.772E-12 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pu-239+D       | 2.359E-03          | 1.808E-13                                   | 1.242E-12 | 6.291E-12 | 4.811E-11 | 2.505E-10 | 7.468E-15 | 0.000E+00 | 0.000E+00 |
| Cm-243        | U-235+D        | 2.359E-03          | 8.148E-23                                   | 1.209E-21 | 1.376E-20 | 3.331E-19 | 6.184E-18 | 3.830E-23 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pa-231         | 2.359E-03          | 1.942E-27                                   | 6.248E-26 | 1.560E-24 | 1.079E-22 | 4.988E-21 | 2.517E-24 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Ac-227+D       | 2.359E-03          | 9.390E-30                                   | 5.232E-28 | 2.519E-26 | 4.838E-24 | 6.613E-22 | 1.624E-25 | 0.000E+00 | 0.000E+00 |
| Cm-243        | ΣDSR(j)        |                    | 7.754E-04                                   | 7.537E-04 | 7.121E-04 | 5.828E-04 | 3.235E-04 | 1.049E-10 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Cm-243         | 6.529E-06          | 2.146E-06                                   | 2.086E-06 | 1.970E-06 | 1.610E-06 | 8.902E-07 | 2.798E-13 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Am-243+D       | 6.529E-06          | 1.530E-10                                   | 4.511E-10 | 1.013E-09 | 2.652E-09 | 5.175E-09 | 1.044E-14 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pu-239+D       | 6.529E-06          | 5.004E-16                                   | 3.438E-15 | 1.741E-14 | 1.332E-13 | 6.932E-13 | 2.067E-17 | 0.000E+00 | 0.000E+00 |
| Cm-243        | U-235+D        | 6.529E-06          | 2.255E-25                                   | 3.347E-24 | 3.809E-23 | 9.219E-22 | 1.712E-20 | 1.060E-25 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pa-231         | 6.529E-06          | 5.374E-30                                   | 1.729E-28 | 4.317E-27 | 2.985E-25 | 1.380E-23 | 6.965E-27 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Ac-227+D1      | 6.529E-06          | 1.973E-32                                   | 1.244E-30 | 6.479E-29 | 1.311E-26 | 1.827E-24 | 4.375E-28 | 0.000E+00 | 0.000E+00 |
| Cm-243        | ΣDSR(j)        |                    | 2.146E-06                                   | 2.086E-06 | 1.971E-06 | 1.613E-06 | 8.954E-07 | 2.903E-13 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Cm-243         | 3.301E-05          | 1.085E-05                                   | 1.054E-05 | 9.958E-06 | 8.141E-06 | 4.500E-06 | 1.415E-12 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Am-243+D       | 3.301E-05          | 7.734E-10                                   | 2.281E-09 | 5.121E-09 | 1.341E-08 | 2.617E-08 | 5.278E-14 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pu-239+D       | 3.301E-05          | 2.530E-15                                   | 1.738E-14 | 8.803E-14 | 6.732E-13 | 3.505E-12 | 1.045E-16 | 0.000E+00 | 0.000E+00 |
| Cm-243        | U-235+D        | 3.301E-05          | 1.140E-24                                   | 1.692E-23 | 1.926E-22 | 4.661E-21 | 8.653E-20 | 5.359E-25 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pa-231         | 3.301E-05          | 2.717E-29                                   | 8.743E-28 | 2.182E-26 | 1.509E-24 | 6.979E-23 | 3.521E-26 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Ac-227+D2      | 3.301E-05          | 8.933E-32                                   | 5.641E-30 | 2.939E-28 | 5.937E-26 | 8.207E-24 | 2.207E-27 | 0.000E+00 | 0.000E+00 |
| Cm-243        | ΣDSR(j)        |                    | 1.085E-05                                   | 1.055E-05 | 9.964E-06 | 8.155E-06 | 4.527E-06 | 1.467E-12 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Cm-243         | 9.135E-08          | 3.003E-08                                   | 2.918E-08 | 2.756E-08 | 2.253E-08 | 1.246E-08 | 3.915E-15 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Am-243+D       | 9.135E-08          | 2.140E-12                                   | 6.312E-12 | 1.417E-11 | 3.711E-11 | 7.242E-11 | 1.461E-16 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pu-239+D       | 9.135E-08          | 7.002E-18                                   | 4.811E-17 | 2.436E-16 | 1.863E-15 | 9.699E-15 | 2.892E-19 | 0.000E+00 | 0.000E+00 |
| Cm-243        | U-235+D        | 9.135E-08          | 3.155E-27                                   | 4.683E-26 | 5.330E-25 | 1.290E-23 | 2.395E-22 | 1.483E-27 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pa-231         | 9.135E-08          | 7.519E-32                                   | 2.420E-30 | 6.040E-29 | 4.177E-27 | 1.932E-25 | 9.746E-29 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Ac-227+D3      | 9.135E-08          | 2.494E-34                                   | 1.575E-32 | 8.204E-31 | 1.657E-28 | 2.292E-26 | 6.108E-30 | 0.000E+00 | 0.000E+00 |
| Cm-243        | ΣDSR(j)        |                    | 3.003E-08                                   | 2.919E-08 | 2.758E-08 | 2.257E-08 | 1.253E-08 | 4.061E-15 | 0.000E+00 | 0.000E+00 |



Summary : RESRAD Default

File    : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

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

| Parent<br>(i) | Product<br>(j) | Thread<br>Fraction | DSR(j,t) At Time in Years    (mrem/yr)/(pCi/g) |           |           |           |           |           |           |           |
|---------------|----------------|--------------------|--|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|               |                |                    | 0.000E+00                                      | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| Cm-243        | Cm-243         | 1.981E-09          | 6.510E-10                                      | 6.327E-10 | 5.975E-10 | 4.885E-10 | 2.700E-10 | 8.488E-17 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Am-243+D       | 1.981E-09          | 4.641E-14                                      | 1.368E-13 | 3.073E-13 | 8.045E-13 | 1.570E-12 | 3.167E-18 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pu-239+D       | 1.981E-09          | 1.518E-19                                      | 1.043E-18 | 5.282E-18 | 4.039E-17 | 2.103E-16 | 6.270E-21 | 0.000E+00 | 0.000E+00 |
| Cm-243        | U-235+D        | 1.981E-09          | 6.841E-29                                      | 1.015E-27 | 1.156E-26 | 2.797E-25 | 5.192E-24 | 3.215E-29 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pa-231         | 1.981E-09          | 1.630E-33                                      | 5.246E-32 | 1.310E-30 | 9.055E-29 | 4.188E-27 | 2.113E-30 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Ac-227+D4      | 1.981E-09          | 3.639E-36                                      | 2.312E-34 | 1.206E-32 | 2.411E-30 | 3.207E-28 | 1.264E-31 | 0.000E+00 | 0.000E+00 |
| Cm-243        | ΣDSR(j)        |                    | 6.510E-10                                      | 6.328E-10 | 5.978E-10 | 4.893E-10 | 2.716E-10 | 8.805E-17 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Cm-243         | 5.481E-12          | 1.802E-12                                      | 1.751E-12 | 1.654E-12 | 1.352E-12 | 7.474E-13 | 2.349E-19 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Am-243+D       | 5.481E-12          | 1.284E-16                                      | 3.787E-16 | 8.505E-16 | 2.227E-15 | 4.345E-15 | 8.765E-21 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pu-239+D       | 5.481E-12          | 4.202E-22                                      | 2.887E-21 | 1.462E-20 | 1.118E-19 | 5.820E-19 | 1.735E-23 | 0.000E+00 | 0.000E+00 |
| Cm-243        | U-235+D        | 5.481E-12          | 1.893E-31                                      | 2.810E-30 | 3.198E-29 | 7.740E-28 | 1.437E-26 | 8.899E-32 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pa-231         | 5.481E-12          | 4.512E-36                                      | 1.452E-34 | 3.624E-33 | 2.506E-31 | 1.159E-29 | 5.848E-33 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Ac-227+D5      | 5.481E-12          | 1.020E-38                                      | 6.479E-37 | 3.378E-35 | 6.759E-33 | 9.000E-31 | 3.498E-34 | 0.000E+00 | 0.000E+00 |
| Cm-243        | ΣDSR(j)        |                    | 1.802E-12                                      | 1.751E-12 | 1.655E-12 | 1.354E-12 | 7.517E-13 | 2.437E-19 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Cm-243         | 1.416E-06          | 4.655E-07                                      | 4.524E-07 | 4.273E-07 | 3.493E-07 | 1.931E-07 | 6.069E-14 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Am-243+D       | 1.416E-06          | 3.318E-11                                      | 9.785E-11 | 2.197E-10 | 5.753E-10 | 1.123E-09 | 2.265E-15 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pu-239         | 1.416E-06          | 1.026E-16                                      | 7.271E-16 | 3.735E-15 | 2.878E-14 | 1.502E-13 | 4.481E-18 | 0.000E+00 | 0.000E+00 |
| Cm-243        | U-235+D        | 1.416E-06          | 4.892E-26                                      | 7.260E-25 | 8.263E-24 | 2.000E-22 | 3.713E-21 | 2.299E-26 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pa-231         | 1.416E-06          | 1.166E-30                                      | 3.751E-29 | 9.364E-28 | 6.475E-26 | 2.995E-24 | 1.511E-27 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Ac-227+D       | 1.416E-06          | 5.638E-33                                      | 3.141E-31 | 1.512E-29 | 2.904E-27 | 3.970E-25 | 9.748E-29 | 0.000E+00 | 0.000E+00 |
| Cm-243        | ΣDSR(j)        |                    | 4.655E-07                                      | 4.525E-07 | 4.275E-07 | 3.499E-07 | 1.942E-07 | 6.296E-14 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Cm-243         | 3.920E-09          | 1.288E-09                                      | 1.252E-09 | 1.183E-09 | 9.668E-10 | 5.344E-10 | 1.680E-16 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Am-243+D       | 3.920E-09          | 9.184E-14                                      | 2.708E-13 | 6.082E-13 | 1.592E-12 | 3.107E-12 | 6.268E-18 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pu-239         | 3.920E-09          | 2.839E-19                                      | 2.012E-18 | 1.034E-17 | 7.965E-17 | 4.157E-16 | 1.240E-20 | 0.000E+00 | 0.000E+00 |
| Cm-243        | U-235+D        | 3.920E-09          | 1.354E-28                                      | 2.009E-27 | 2.287E-26 | 5.535E-25 | 1.028E-23 | 6.364E-29 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pa-231         | 3.920E-09          | 3.226E-33                                      | 1.038E-31 | 2.592E-30 | 1.792E-28 | 8.288E-27 | 4.182E-30 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Ac-227+D1      | 3.920E-09          | 1.184E-35                                      | 7.467E-34 | 3.889E-32 | 7.872E-30 | 1.097E-27 | 2.627E-31 | 0.000E+00 | 0.000E+00 |
| Cm-243        | ΣDSR(j)        |                    | 1.288E-09                                      | 1.252E-09 | 1.183E-09 | 9.684E-10 | 5.375E-10 | 1.743E-16 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Cm-243         | 1.982E-08          | 6.513E-09                                      | 6.330E-09 | 5.979E-09 | 4.888E-09 | 2.702E-09 | 8.493E-16 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Am-243+D       | 1.982E-08          | 4.643E-13                                      | 1.369E-12 | 3.075E-12 | 8.050E-12 | 1.571E-11 | 3.169E-17 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pu-239         | 1.982E-08          | 1.435E-18                                      | 1.017E-17 | 5.226E-17 | 4.027E-16 | 2.101E-15 | 6.270E-20 | 0.000E+00 | 0.000E+00 |
| Cm-243        | U-235+D        | 1.982E-08          | 6.845E-28                                      | 1.016E-26 | 1.156E-25 | 2.798E-24 | 5.195E-23 | 3.217E-28 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pa-231         | 1.982E-08          | 1.631E-32                                      | 5.249E-31 | 1.310E-29 | 9.060E-28 | 4.190E-26 | 2.114E-29 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Ac-227+D2      | 1.982E-08          | 5.363E-35                                      | 3.387E-33 | 1.765E-31 | 3.564E-29 | 4.927E-27 | 1.325E-30 | 0.000E+00 | 0.000E+00 |
| Cm-243        | ΣDSR(j)        |                    | 6.514E-09                                      | 6.332E-09 | 5.982E-09 | 4.896E-09 | 2.718E-09 | 8.810E-16 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Cm-243         | 5.484E-11          | 1.803E-11                                      | 1.752E-11 | 1.655E-11 | 1.353E-11 | 7.478E-12 | 2.350E-18 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Am-243+D       | 5.484E-11          | 1.285E-15                                      | 3.789E-15 | 8.510E-15 | 2.228E-14 | 4.348E-14 | 8.770E-20 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pu-239         | 5.484E-11          | 3.973E-21                                      | 2.816E-20 | 1.446E-19 | 1.114E-18 | 5.816E-18 | 1.735E-22 | 0.000E+00 | 0.000E+00 |
| Cm-243        | U-235+D        | 5.484E-11          | 1.894E-30                                      | 2.812E-29 | 3.200E-28 | 7.744E-27 | 1.438E-25 | 8.904E-31 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pa-231         | 5.484E-11          | 4.514E-35                                      | 1.453E-33 | 3.626E-32 | 2.508E-30 | 1.160E-28 | 5.851E-32 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Ac-227+D3      | 5.484E-11          | 1.497E-37                                      | 9.454E-36 | 4.925E-34 | 9.949E-32 | 1.376E-29 | 3.667E-33 | 0.000E+00 | 0.000E+00 |
| Cm-243        | ΣDSR(j)        |                    | 1.803E-11                                      | 1.752E-11 | 1.656E-11 | 1.355E-11 | 7.521E-12 | 2.438E-18 | 0.000E+00 | 0.000E+00 |

Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

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

| Parent<br>(i) | Product<br>(j) | Thread<br>Fraction | DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) |           |           |           |           |           |           |           |
|---------------|----------------|--------------------|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|               |                |                    | 0.000E+00                                   | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| Cm-243        | Cm-243         | 1.189E-12          | 3.908E-13                                   | 3.798E-13 | 3.587E-13 | 2.933E-13 | 1.621E-13 | 5.096E-20 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Am-243+D       | 1.189E-12          | 2.786E-17                                   | 8.215E-17 | 1.845E-16 | 4.830E-16 | 9.426E-16 | 1.901E-21 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pu-239         | 1.189E-12          | 8.613E-23                                   | 6.105E-22 | 3.136E-21 | 2.416E-20 | 1.261E-19 | 3.762E-24 | 0.000E+00 | 0.000E+00 |
| Cm-243        | U-235+D        | 1.189E-12          | 4.107E-32                                   | 6.096E-31 | 6.938E-30 | 1.679E-28 | 3.117E-27 | 1.930E-32 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pa-231         | 1.189E-12          | 9.787E-37                                   | 3.149E-35 | 7.862E-34 | 5.436E-32 | 2.514E-30 | 1.269E-33 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Ac-227+D4      | 1.189E-12          | 2.184E-39                                   | 1.388E-37 | 7.238E-36 | 1.448E-33 | 1.925E-31 | 7.589E-35 | 0.000E+00 | 0.000E+00 |
| Cm-243        | ΣDSR(j)        |                    | 3.909E-13                                   | 3.799E-13 | 3.589E-13 | 2.938E-13 | 1.631E-13 | 5.286E-20 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Cm-243         | 3.291E-15          | 1.082E-15                                   | 1.051E-15 | 9.929E-16 | 8.117E-16 | 4.487E-16 | 1.410E-22 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Am-243+D       | 3.291E-15          | 7.711E-20                                   | 2.274E-19 | 5.106E-19 | 1.337E-18 | 2.609E-18 | 5.262E-24 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pu-239         | 3.291E-15          | 2.384E-25                                   | 1.690E-24 | 8.679E-24 | 6.687E-23 | 3.490E-22 | 1.041E-26 | 0.000E+00 | 0.000E+00 |
| Cm-243        | U-235+D        | 3.291E-15          | 1.137E-34                                   | 1.687E-33 | 1.920E-32 | 4.647E-31 | 8.627E-30 | 5.343E-35 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pa-231         | 3.291E-15          | 2.707E-39                                   | 8.717E-38 | 2.176E-36 | 1.505E-34 | 6.958E-33 | 3.511E-36 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Ac-227+D5      | 3.291E-15          | 5.709E-42                                   | 3.883E-40 | 2.028E-38 | 4.058E-36 | 5.403E-34 | 2.100E-37 | 0.000E+00 | 0.000E+00 |
| Cm-243        | ΣDSR(j)        |                    | 1.082E-15                                   | 1.051E-15 | 9.934E-16 | 8.130E-16 | 4.513E-16 | 1.463E-22 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Cm-243         | 9.805E-01          | 3.223E-01                                   | 3.132E-01 | 2.958E-01 | 2.419E-01 | 1.337E-01 | 4.202E-08 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pu-239+D       | 9.805E-01          | 2.398E-06                                   | 7.039E-06 | 1.565E-05 | 3.944E-05 | 6.759E-05 | 5.489E-10 | 0.000E+00 | 0.000E+00 |
| Cm-243        | U-235+D        | 9.805E-01          | 1.440E-15                                   | 9.961E-15 | 5.120E-14 | 4.136E-13 | 2.575E-12 | 4.500E-18 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pa-231         | 9.805E-01          | 4.380E-20                                   | 6.757E-19 | 7.753E-18 | 1.803E-16 | 2.836E-15 | 4.229E-19 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Ac-227+D       | 9.805E-01          | 2.414E-22                                   | 6.669E-21 | 1.523E-19 | 9.963E-18 | 4.600E-16 | 3.205E-20 | 0.000E+00 | 0.000E+00 |
| Cm-243        | ΣDSR(j)        |                    | 3.223E-01                                   | 3.132E-01 | 2.958E-01 | 2.419E-01 | 1.338E-01 | 4.257E-08 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Cm-243         | 2.714E-03          | 8.920E-04                                   | 8.669E-04 | 8.188E-04 | 6.694E-04 | 3.700E-04 | 1.163E-10 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pu-239+D       | 2.714E-03          | 6.636E-09                                   | 1.948E-08 | 4.331E-08 | 1.092E-07 | 1.871E-07 | 1.519E-12 | 0.000E+00 | 0.000E+00 |
| Cm-243        | U-235+D        | 2.714E-03          | 3.986E-18                                   | 2.757E-17 | 1.417E-16 | 1.145E-15 | 7.128E-15 | 1.245E-20 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pa-231         | 2.714E-03          | 1.212E-22                                   | 1.870E-21 | 2.146E-20 | 4.989E-19 | 7.849E-18 | 1.171E-21 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Ac-227+D1      | 2.714E-03          | 5.255E-25                                   | 1.625E-23 | 3.974E-22 | 2.715E-20 | 1.273E-18 | 8.671E-23 | 0.000E+00 | 0.000E+00 |
| Cm-243        | ΣDSR(j)        |                    | 8.920E-04                                   | 8.669E-04 | 8.188E-04 | 6.695E-04 | 3.702E-04 | 1.178E-10 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Cm-243         | 1.372E-02          | 4.510E-03                                   | 4.383E-03 | 4.139E-03 | 3.384E-03 | 1.871E-03 | 5.880E-10 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pu-239+D       | 1.372E-02          | 3.355E-08                                   | 9.850E-08 | 2.190E-07 | 5.519E-07 | 9.458E-07 | 7.680E-12 | 0.000E+00 | 0.000E+00 |
| Cm-243        | U-235+D        | 1.372E-02          | 2.015E-17                                   | 1.394E-16 | 7.163E-16 | 5.788E-15 | 3.604E-14 | 6.297E-20 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pa-231         | 1.372E-02          | 6.129E-22                                   | 9.455E-21 | 1.085E-19 | 2.522E-18 | 3.968E-17 | 5.918E-21 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Ac-227+D2      | 1.372E-02          | 2.381E-24                                   | 7.374E-23 | 1.803E-21 | 1.229E-19 | 5.719E-18 | 4.374E-22 | 0.000E+00 | 0.000E+00 |
| Cm-243        | ΣDSR(j)        |                    | 4.510E-03                                   | 4.383E-03 | 4.140E-03 | 3.385E-03 | 1.872E-03 | 5.957E-10 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Cm-243         | 3.797E-05          | 1.248E-05                                   | 1.213E-05 | 1.146E-05 | 9.366E-06 | 5.177E-06 | 1.627E-12 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pu-239+D       | 3.797E-05          | 9.286E-11                                   | 2.726E-10 | 6.060E-10 | 1.527E-09 | 2.618E-09 | 2.126E-14 | 0.000E+00 | 0.000E+00 |
| Cm-243        | U-235+D        | 3.797E-05          | 5.577E-20                                   | 3.857E-19 | 1.983E-18 | 1.602E-17 | 9.974E-17 | 1.743E-22 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pa-231         | 3.797E-05          | 1.696E-24                                   | 2.617E-23 | 3.002E-22 | 6.981E-21 | 1.098E-19 | 1.638E-23 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Ac-227+D3      | 3.797E-05          | 6.647E-27                                   | 2.058E-25 | 5.033E-24 | 3.432E-22 | 1.597E-20 | 1.211E-24 | 0.000E+00 | 0.000E+00 |
| Cm-243        | ΣDSR(j)        |                    | 1.248E-05                                   | 1.213E-05 | 1.146E-05 | 9.368E-06 | 5.180E-06 | 1.649E-12 | 0.000E+00 | 0.000E+00 |

Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

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

| Parent<br>(i) | Product<br>(j) | Thread<br>Fraction | DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) |           |           |           |           |           |           |           |
|---------------|----------------|--------------------|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|               |                |                    | 0.000E+00                                   | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| Cm-243        | Cm-243         | 8.232E-07          | 2.706E-07                                   | 2.630E-07 | 2.484E-07 | 2.031E-07 | 1.122E-07 | 3.528E-14 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pu-239+D       | 8.232E-07          | 2.013E-12                                   | 5.910E-12 | 1.314E-11 | 3.311E-11 | 5.675E-11 | 4.608E-16 | 0.000E+00 | 0.000E+00 |
| Cm-243        | U-235+D        | 8.232E-07          | 1.209E-21                                   | 8.363E-21 | 4.298E-20 | 3.473E-19 | 2.162E-18 | 3.778E-24 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pa-231         | 8.232E-07          | 3.678E-26                                   | 5.673E-25 | 6.510E-24 | 1.514E-22 | 2.381E-21 | 3.551E-25 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Ac-227+D4      | 8.232E-07          | 9.724E-29                                   | 3.027E-27 | 7.402E-26 | 4.995E-24 | 2.235E-22 | 2.505E-26 | 0.000E+00 | 0.000E+00 |
| Cm-243        | ΣDSR(j)        |                    | 2.706E-07                                   | 2.630E-07 | 2.484E-07 | 2.031E-07 | 1.123E-07 | 3.574E-14 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Cm-243         | 2.278E-09          | 7.489E-10                                   | 7.279E-10 | 6.874E-10 | 5.620E-10 | 3.107E-10 | 9.765E-17 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pu-239+D       | 2.278E-09          | 5.572E-15                                   | 1.636E-14 | 3.636E-14 | 9.165E-14 | 1.571E-13 | 1.275E-18 | 0.000E+00 | 0.000E+00 |
| Cm-243        | U-235+D        | 2.278E-09          | 3.346E-24                                   | 2.315E-23 | 1.190E-22 | 9.611E-22 | 5.985E-21 | 1.046E-26 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pa-231         | 2.278E-09          | 1.018E-28                                   | 1.570E-27 | 1.802E-26 | 4.189E-25 | 6.590E-24 | 9.828E-28 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Ac-227+D5      | 2.278E-09          | 2.725E-31                                   | 8.481E-30 | 2.074E-28 | 1.400E-26 | 6.272E-25 | 6.934E-29 | 0.000E+00 | 0.000E+00 |
| Cm-243        | ΣDSR(j)        |                    | 7.489E-10                                   | 7.279E-10 | 6.875E-10 | 5.621E-10 | 3.108E-10 | 9.892E-17 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Cm-243         | 5.887E-04          | 1.935E-04                                   | 1.881E-04 | 1.776E-04 | 1.452E-04 | 8.026E-05 | 2.523E-11 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pu-239         | 5.887E-04          | 1.440E-09                                   | 4.226E-09 | 9.395E-09 | 2.368E-08 | 4.058E-08 | 3.295E-13 | 0.000E+00 | 0.000E+00 |
| Cm-243        | U-235+D        | 5.887E-04          | 8.646E-19                                   | 5.980E-18 | 3.074E-17 | 2.483E-16 | 1.546E-15 | 2.702E-21 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pa-231         | 5.887E-04          | 2.630E-23                                   | 4.057E-22 | 4.655E-21 | 1.082E-19 | 1.703E-18 | 2.539E-22 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Ac-227+D       | 5.887E-04          | 1.449E-25                                   | 4.004E-24 | 9.141E-23 | 5.981E-21 | 2.761E-19 | 1.924E-23 | 0.000E+00 | 0.000E+00 |
| Cm-243        | ΣDSR(j)        |                    | 1.935E-04                                   | 1.881E-04 | 1.776E-04 | 1.452E-04 | 8.031E-05 | 2.556E-11 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Cm-243         | 1.629E-06          | 5.355E-07                                   | 5.205E-07 | 4.916E-07 | 4.019E-07 | 2.221E-07 | 6.982E-14 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pu-239         | 1.629E-06          | 3.984E-12                                   | 1.170E-11 | 2.600E-11 | 6.553E-11 | 1.123E-10 | 9.120E-16 | 0.000E+00 | 0.000E+00 |
| Cm-243        | U-235+D        | 1.629E-06          | 2.393E-21                                   | 1.655E-20 | 8.506E-20 | 6.873E-19 | 4.279E-18 | 7.477E-24 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pa-231         | 1.629E-06          | 7.278E-26                                   | 1.123E-24 | 1.288E-23 | 2.995E-22 | 4.712E-21 | 7.028E-25 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Ac-227+D1      | 1.629E-06          | 3.155E-28                                   | 9.758E-27 | 2.386E-25 | 1.630E-23 | 7.645E-22 | 5.206E-26 | 0.000E+00 | 0.000E+00 |
| Cm-243        | ΣDSR(j)        |                    | 5.355E-07                                   | 5.205E-07 | 4.916E-07 | 4.019E-07 | 2.223E-07 | 7.074E-14 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Cm-243         | 8.237E-06          | 2.707E-06                                   | 2.631E-06 | 2.485E-06 | 2.032E-06 | 1.123E-06 | 3.530E-13 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pu-239         | 8.237E-06          | 2.014E-11                                   | 5.913E-11 | 1.315E-10 | 3.313E-10 | 5.678E-10 | 4.611E-15 | 0.000E+00 | 0.000E+00 |
| Cm-243        | U-235+D        | 8.237E-06          | 1.210E-20                                   | 8.367E-20 | 4.301E-19 | 3.475E-18 | 2.164E-17 | 3.780E-23 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pa-231         | 8.237E-06          | 3.680E-25                                   | 5.676E-24 | 6.513E-23 | 1.514E-21 | 2.382E-20 | 3.553E-24 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Ac-227+D2      | 8.237E-06          | 1.430E-27                                   | 4.427E-26 | 1.083E-24 | 7.380E-23 | 3.433E-21 | 2.626E-25 | 0.000E+00 | 0.000E+00 |
| Cm-243        | ΣDSR(j)        |                    | 2.707E-06                                   | 2.631E-06 | 2.485E-06 | 2.032E-06 | 1.124E-06 | 3.576E-13 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Cm-243         | 2.280E-08          | 7.493E-09                                   | 7.282E-09 | 6.878E-09 | 5.623E-09 | 3.108E-09 | 9.770E-16 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pu-239         | 2.280E-08          | 5.575E-14                                   | 1.637E-13 | 3.638E-13 | 9.170E-13 | 1.571E-12 | 1.276E-17 | 0.000E+00 | 0.000E+00 |
| Cm-243        | U-235+D        | 2.280E-08          | 3.348E-23                                   | 2.316E-22 | 1.190E-21 | 9.617E-21 | 5.988E-20 | 1.046E-25 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pa-231         | 2.280E-08          | 1.018E-27                                   | 1.571E-26 | 1.803E-25 | 4.191E-24 | 6.594E-23 | 9.833E-27 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Ac-227+D3      | 2.280E-08          | 3.991E-30                                   | 1.236E-28 | 3.022E-27 | 2.060E-25 | 9.589E-24 | 7.268E-28 | 0.000E+00 | 0.000E+00 |
| Cm-243        | ΣDSR(j)        |                    | 7.493E-09                                   | 7.283E-09 | 6.878E-09 | 5.624E-09 | 3.110E-09 | 9.898E-16 | 0.000E+00 | 0.000E+00 |

Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

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

| Parent<br>(i) | Product<br>(j) | Thread<br>Fraction | DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) |           |           |           |           |           |           |           |
|---------------|----------------|--------------------|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|               |                |                    | 0.000E+00                                   | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| Cm-243        | Cm-243         | 4.942E-10          | 1.625E-10                                   | 1.579E-10 | 1.491E-10 | 1.219E-10 | 6.739E-11 | 2.118E-17 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pu-239         | 4.942E-10          | 1.209E-15                                   | 3.548E-15 | 7.888E-15 | 1.988E-14 | 3.407E-14 | 2.767E-19 | 0.000E+00 | 0.000E+00 |
| Cm-243        | U-235+D        | 4.942E-10          | 7.259E-25                                   | 5.021E-24 | 2.581E-23 | 2.085E-22 | 1.298E-21 | 2.268E-27 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pa-231         | 4.942E-10          | 2.208E-29                                   | 3.406E-28 | 3.908E-27 | 9.087E-26 | 1.430E-24 | 2.132E-28 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Ac-227+D4      | 4.942E-10          | 5.838E-32                                   | 1.817E-30 | 4.444E-29 | 2.999E-27 | 1.342E-25 | 1.504E-29 | 0.000E+00 | 0.000E+00 |
| Cm-243        | ΣDSR(j)        |                    | 1.625E-10                                   | 1.579E-10 | 1.491E-10 | 1.219E-10 | 6.742E-11 | 2.146E-17 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Cm-243         | 1.368E-12          | 4.496E-13                                   | 4.370E-13 | 4.127E-13 | 3.374E-13 | 1.865E-13 | 5.862E-20 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pu-239         | 1.368E-12          | 3.345E-18                                   | 9.820E-18 | 2.183E-17 | 5.502E-17 | 9.429E-17 | 7.657E-22 | 0.000E+00 | 0.000E+00 |
| Cm-243        | U-235+D        | 1.368E-12          | 2.009E-27                                   | 1.390E-26 | 7.142E-26 | 5.770E-25 | 3.593E-24 | 6.278E-30 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Pa-231         | 1.368E-12          | 6.111E-32                                   | 9.427E-31 | 1.082E-29 | 2.515E-28 | 3.956E-27 | 5.900E-31 | 0.000E+00 | 0.000E+00 |
| Cm-243        | Ac-227+D5      | 1.368E-12          | 1.636E-34                                   | 5.091E-33 | 1.245E-31 | 8.405E-30 | 3.765E-28 | 4.163E-32 | 0.000E+00 | 0.000E+00 |
| Cm-243        | ΣDSR(j)        |                    | 4.496E-13                                   | 4.370E-13 | 4.127E-13 | 3.375E-13 | 1.866E-13 | 5.939E-20 | 0.000E+00 | 0.000E+00 |
| Cm-244        | Cm-244         | 1.371E-06          | 1.266E-07                                   | 1.205E-07 | 1.092E-07 | 7.717E-08 | 2.754E-08 | 1.110E-14 | 0.000E+00 | 0.000E+00 |
| Cm-244        | Cm-244         | 5.750E-08          | 5.308E-09                                   | 5.055E-09 | 4.582E-09 | 3.237E-09 | 1.155E-09 | 4.654E-16 | 0.000E+00 | 0.000E+00 |
| Cm-244        | Pu-240         | 5.750E-08          | 5.138E-13                                   | 1.499E-12 | 3.286E-12 | 7.896E-12 | 1.201E-11 | 7.633E-17 | 0.000E+00 | 0.000E+00 |
| Cm-244        | ΣDSR(j)        |                    | 5.309E-09                                   | 5.056E-09 | 4.585E-09 | 3.245E-09 | 1.167E-09 | 5.418E-16 | 0.000E+00 | 0.000E+00 |
| Cm-244        | Cm-244         | 1.000E+00          | 9.232E-02                                   | 8.791E-02 | 7.968E-02 | 5.629E-02 | 2.009E-02 | 8.095E-09 | 0.000E+00 | 0.000E+00 |
| Cm-244        | Pu-240         | 1.000E+00          | 8.936E-06                                   | 2.607E-05 | 5.714E-05 | 1.373E-04 | 2.089E-04 | 1.328E-09 | 0.000E+00 | 0.000E+00 |
| Cm-244        | U-236          | 1.000E+00          | 1.680E-14                                   | 1.169E-13 | 5.905E-13 | 4.367E-12 | 2.062E-11 | 3.644E-16 | 0.000E+00 | 0.000E+00 |
| Cm-244        | Th-232         | 1.000E+00          | 7.406E-25                                   | 1.057E-23 | 1.159E-22 | 2.582E-21 | 3.821E-20 | 2.525E-24 | 0.000E+00 | 0.000E+00 |
| Cm-244        | Ra-228+D       | 1.000E+00          | 4.716E-25                                   | 1.456E-23 | 3.459E-22 | 2.093E-20 | 7.258E-19 | 1.091E-22 | 0.000E+00 | 0.000E+00 |
| Cm-244        | Th-228+D       | 1.000E+00          | 2.959E-26                                   | 1.705E-24 | 7.685E-23 | 1.016E-20 | 5.897E-19 | 1.035E-24 | 0.000E+00 | 0.000E+00 |
| Cm-244        | ΣDSR(j)        |                    | 9.233E-02                                   | 8.793E-02 | 7.974E-02 | 5.643E-02 | 2.030E-02 | 9.422E-09 | 0.000E+00 | 0.000E+00 |
| Co-60         | Co-60          | 1.000E+00          | 5.280E+00                                   | 4.612E+00 | 3.517E+00 | 1.358E+00 | 8.742E-02 | 1.029E-11 | 0.000E+00 | 0.000E+00 |
| Cs-134        | Cs-134         | 1.000E+00          | 3.323E+00                                   | 2.363E+00 | 1.195E+00 | 1.096E-01 | 1.163E-04 | 4.143E-20 | 0.000E+00 | 0.000E+00 |
| Cs-137+D      | Cs-137+D       | 1.000E+00          | 1.586E+00                                   | 1.541E+00 | 1.454E+00 | 1.185E+00 | 6.442E-01 | 1.091E-06 | 0.000E+00 | 0.000E+00 |
| Eu-152        | Eu-152         | 7.210E-01          | 1.679E+00                                   | 1.572E+00 | 1.377E+00 | 8.647E-01 | 2.233E-01 | 1.349E-11 | 0.000E+00 | 0.000E+00 |
| Eu-152        | Eu-152         | 2.790E-01          | 6.497E-01                                   | 6.082E-01 | 5.328E-01 | 3.346E-01 | 8.642E-02 | 5.221E-12 | 0.000E+00 | 0.000E+00 |
| Eu-152        | Gd-152         | 2.790E-01          | 1.902E-17                                   | 5.475E-17 | 1.174E-16 | 2.643E-16 | 3.534E-16 | 1.342E-21 | 0.000E+00 | 0.000E+00 |
| Eu-152        | Sm-148         | 2.790E-01          | 5.694E-34                                   | 3.876E-33 | 1.926E-32 | 1.383E-31 | 6.296E-31 | 1.097E-35 | 0.000E+00 | 0.000E+00 |
| Eu-152        | Nd-144         | 2.790E-01          | 0.000E+00                                   | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| Eu-152        | ΣDSR(j)        |                    | 6.497E-01                                   | 6.082E-01 | 5.328E-01 | 3.346E-01 | 8.642E-02 | 5.221E-12 | 0.000E+00 | 0.000E+00 |
| Eu-154        | Eu-154         | 1.000E+00          | 2.508E+00                                   | 2.279E+00 | 1.882E+00 | 9.616E-01 | 1.376E-01 | 1.161E-12 | 0.000E+00 | 0.000E+00 |
| Eu-155        | Eu-155         | 1.000E+00          | 6.396E-02                                   | 5.459E-02 | 3.978E-02 | 1.312E-02 | 5.479E-04 | 1.744E-16 | 0.000E+00 | 0.000E+00 |

Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

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

| Parent<br>(i) | Product<br>(j) | Thread<br>Fraction | DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) |           |           |           |           |           |           |           |
|---------------|----------------|--------------------|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|               |                |                    | 0.000E+00                                   | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| Fe-55         | Fe-55          | 1.000E+00          | 7.410E-04                                   | 5.692E-04 | 3.358E-04 | 5.274E-05 | 2.565E-07 | 1.301E-20 | 0.000E+00 | 0.000E+00 |
| H-3           | H-3            | 1.000E+00          | 1.023E-03                                   | 3.986E-03 | 5.005E-03 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| Nb-94         | Nb-94          | 1.000E+00          | 3.330E+00                                   | 3.236E+00 | 3.055E+00 | 2.491E+00 | 1.358E+00 | 1.824E-09 | 0.000E+00 | 2.832E-03 |
| Ni-59         | Ni-59          | 1.000E+00          | 2.285E-03                                   | 2.220E-03 | 2.093E-03 | 1.698E-03 | 8.997E-04 | 1.420E-08 | 0.000E+00 | 1.824E-05 |
| Ni-63         | Ni-63          | 1.000E+00          | 6.256E-03                                   | 6.036E-03 | 5.613E-03 | 4.339E-03 | 2.002E-03 | 1.953E-08 | 0.000E+00 | 4.943E-08 |
| Np-237+D      | Np-237+D       | 1.000E+00          | 1.807E+00                                   | 1.312E+00 | 6.894E-01 | 7.231E-02 | 1.118E-04 | 3.116E+01 | 0.000E+00 | 0.000E+00 |
| Np-237+D      | U-233          | 1.000E+00          | 8.261E-08                                   | 1.962E-07 | 3.283E-07 | 4.131E-07 | 2.779E-07 | 1.045E-05 | 1.723E-05 | 1.717E-05 |
| Np-237+D      | Th-229+D       | 1.000E+00          | 4.685E-11                                   | 2.966E-10 | 1.291E-09 | 6.582E-09 | 2.014E-08 | 5.265E-09 | 9.627E-08 | 4.095E-07 |
| Np-237+D      | ΣDSR(j)        |                    | 1.807E+00                                   | 1.312E+00 | 6.894E-01 | 7.231E-02 | 1.121E-04 | 3.116E+01 | 1.732E-05 | 1.758E-05 |
| Pm-147        | Pm-147         | 1.000E+00          | 2.278E-04                                   | 1.711E-04 | 9.653E-05 | 1.298E-05 | 4.068E-08 | 8.855E-22 | 0.000E+00 | 0.000E+00 |
| Pm-147        | Sm-147         | 1.000E+00          | 6.957E-14                                   | 1.816E-13 | 3.243E-13 | 4.547E-13 | 3.632E-13 | 1.275E-18 | 0.000E+00 | 0.000E+00 |
| Pm-147        | ΣDSR(j)        |                    | 2.278E-04                                   | 1.711E-04 | 9.653E-05 | 1.298E-05 | 4.068E-08 | 1.276E-18 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Pu-238         | 1.850E-09          | 2.860E-10                                   | 2.797E-10 | 2.673E-10 | 2.274E-10 | 1.380E-10 | 3.422E-16 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Pu-238         | 9.996E-01          | 1.545E-01                                   | 1.511E-01 | 1.444E-01 | 1.229E-01 | 7.459E-02 | 1.849E-07 | 0.000E+00 | 0.000E+00 |
| Pu-238        | U-234          | 9.996E-01          | 4.969E-08                                   | 1.467E-07 | 3.288E-07 | 8.487E-07 | 1.543E-06 | 1.067E-11 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Th-230         | 9.996E-01          | 1.012E-13                                   | 6.793E-13 | 3.429E-12 | 2.692E-11 | 1.533E-10 | 3.955E-15 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Ra-226+D       | 9.996E-01          | 2.235E-15                                   | 3.376E-14 | 3.894E-13 | 9.647E-12 | 1.873E-10 | 1.584E-14 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Pb-210+D       | 9.996E-01          | 3.680E-18                                   | 9.191E-17 | 1.931E-15 | 1.178E-13 | 5.076E-12 | 2.097E-15 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Po-210         | 9.996E-01          | 3.620E-19                                   | 1.708E-17 | 6.011E-16 | 5.503E-14 | 2.781E-12 | 4.727E-16 | 0.000E+00 | 0.000E+00 |
| Pu-238        | ΣDSR(j)        |                    | 1.545E-01                                   | 1.511E-01 | 1.444E-01 | 1.229E-01 | 7.459E-02 | 1.849E-07 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Pu-238         | 1.319E-06          | 2.040E-07                                   | 1.995E-07 | 1.907E-07 | 1.622E-07 | 9.846E-08 | 2.441E-13 | 0.000E+00 | 0.000E+00 |
| Pu-238        | U-234          | 1.319E-06          | 6.559E-14                                   | 1.937E-13 | 4.340E-13 | 1.120E-12 | 2.037E-12 | 1.409E-17 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Th-230         | 1.319E-06          | 1.336E-19                                   | 8.966E-19 | 4.526E-18 | 3.553E-17 | 2.023E-16 | 5.220E-21 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Ra-226+D       | 1.319E-06          | 2.950E-21                                   | 4.456E-20 | 5.140E-19 | 1.273E-17 | 2.473E-16 | 2.091E-20 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Pb-210+D1      | 1.319E-06          | 2.707E-24                                   | 8.614E-23 | 2.134E-21 | 1.457E-19 | 6.556E-18 | 2.654E-21 | 0.000E+00 | 0.000E+00 |
| Pu-238        | ΣDSR(j)        |                    | 2.040E-07                                   | 1.995E-07 | 1.907E-07 | 1.622E-07 | 9.846E-08 | 2.441E-13 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Pu-238         | 1.899E-08          | 2.936E-09                                   | 2.871E-09 | 2.744E-09 | 2.335E-09 | 1.417E-09 | 3.513E-15 | 0.000E+00 | 0.000E+00 |
| Pu-238        | U-234          | 1.899E-08          | 9.442E-16                                   | 2.788E-15 | 6.246E-15 | 1.613E-14 | 2.932E-14 | 2.028E-19 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Th-230         | 1.899E-08          | 1.923E-21                                   | 1.291E-20 | 6.515E-20 | 5.114E-19 | 2.912E-18 | 7.514E-23 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Ra-226+D       | 1.899E-08          | 4.246E-23                                   | 6.414E-22 | 7.399E-21 | 1.833E-19 | 3.559E-18 | 3.010E-22 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Pb-210+D2      | 1.899E-08          | 3.885E-26                                   | 1.236E-24 | 3.063E-23 | 2.091E-21 | 9.403E-20 | 3.816E-23 | 0.000E+00 | 0.000E+00 |
| Pu-238        | ΣDSR(j)        |                    | 2.936E-09                                   | 2.871E-09 | 2.744E-09 | 2.335E-09 | 1.417E-09 | 3.513E-15 | 0.000E+00 | 0.000E+00 |

Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

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

| Parent<br>(i) | Product<br>(j) | Thread<br>Fraction | DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) |           |           |           |           |           |           |           |
|---------------|----------------|--------------------|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|               |                |                    | 0.000E+00                                   | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| Pu-238        | Pu-238         | 2.100E-04          | 3.246E-05                                   | 3.174E-05 | 3.034E-05 | 2.581E-05 | 1.567E-05 | 3.884E-11 | 0.000E+00 | 0.000E+00 |
| Pu-238        | U-234          | 2.100E-04          | 1.044E-11                                   | 3.082E-11 | 6.905E-11 | 1.783E-10 | 3.241E-10 | 2.242E-15 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Th-230         | 2.100E-04          | 2.125E-17                                   | 1.427E-16 | 7.202E-16 | 5.653E-15 | 3.220E-14 | 8.307E-19 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Ra-226+D1      | 2.100E-04          | 4.690E-19                                   | 7.088E-18 | 8.177E-17 | 2.026E-15 | 3.935E-14 | 3.328E-18 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Pb-210+D       | 2.100E-04          | 7.729E-22                                   | 1.930E-20 | 4.056E-19 | 2.474E-17 | 1.066E-15 | 4.405E-19 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Po-210         | 2.100E-04          | 7.604E-23                                   | 3.588E-21 | 1.263E-19 | 1.156E-17 | 5.841E-16 | 9.929E-20 | 0.000E+00 | 0.000E+00 |
| Pu-238        | ΣDSR(j)        |                    | 3.246E-05                                   | 3.174E-05 | 3.034E-05 | 2.581E-05 | 1.567E-05 | 3.884E-11 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Pu-238         | 2.771E-10          | 4.284E-11                                   | 4.190E-11 | 4.005E-11 | 3.407E-11 | 2.068E-11 | 5.127E-17 | 0.000E+00 | 0.000E+00 |
| Pu-238        | U-234          | 2.771E-10          | 1.378E-17                                   | 4.068E-17 | 9.115E-17 | 2.353E-16 | 4.279E-16 | 2.959E-21 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Th-230         | 2.771E-10          | 2.806E-23                                   | 1.883E-22 | 9.507E-22 | 7.463E-21 | 4.250E-20 | 1.096E-24 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Ra-226+D1      | 2.771E-10          | 6.190E-25                                   | 9.356E-24 | 1.079E-22 | 2.675E-21 | 5.194E-20 | 4.393E-24 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Pb-210+D1      | 2.771E-10          | 5.687E-28                                   | 1.809E-26 | 4.483E-25 | 3.061E-23 | 1.377E-21 | 5.575E-25 | 0.000E+00 | 0.000E+00 |
| Pu-238        | ΣDSR(j)        |                    | 4.284E-11                                   | 4.190E-11 | 4.005E-11 | 3.407E-11 | 2.068E-11 | 5.127E-17 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Pu-238         | 3.989E-12          | 6.167E-13                                   | 6.031E-13 | 5.764E-13 | 4.904E-13 | 2.977E-13 | 7.379E-19 | 0.000E+00 | 0.000E+00 |
| Pu-238        | U-234          | 3.989E-12          | 1.983E-19                                   | 5.855E-19 | 1.312E-18 | 3.387E-18 | 6.159E-18 | 4.259E-23 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Th-230         | 3.989E-12          | 4.038E-25                                   | 2.711E-24 | 1.368E-23 | 1.074E-22 | 6.117E-22 | 1.578E-26 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Ra-226+D1      | 3.989E-12          | 8.910E-27                                   | 1.347E-25 | 1.554E-24 | 3.850E-23 | 7.476E-22 | 6.323E-26 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Pb-210+D2      | 3.989E-12          | 8.160E-30                                   | 2.597E-28 | 6.433E-27 | 4.393E-25 | 1.975E-23 | 8.016E-27 | 0.000E+00 | 0.000E+00 |
| Pu-238        | ΣDSR(j)        |                    | 6.167E-13                                   | 6.031E-13 | 5.764E-13 | 4.904E-13 | 2.977E-13 | 7.380E-19 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Pu-238         | 1.998E-04          | 3.088E-05                                   | 3.020E-05 | 2.886E-05 | 2.456E-05 | 1.491E-05 | 3.695E-11 | 0.000E+00 | 0.000E+00 |
| Pu-238        | U-234          | 1.998E-04          | 9.931E-12                                   | 2.932E-11 | 6.570E-11 | 1.696E-10 | 3.084E-10 | 2.133E-15 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Th-230         | 1.998E-04          | 2.022E-17                                   | 1.357E-16 | 6.852E-16 | 5.379E-15 | 3.063E-14 | 7.903E-19 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Ra-226+D2      | 1.998E-04          | 4.011E-19                                   | 6.072E-18 | 7.007E-17 | 1.733E-15 | 3.341E-14 | 3.164E-18 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Pb-210+D       | 1.998E-04          | 7.353E-22                                   | 1.837E-20 | 3.859E-19 | 2.353E-17 | 1.014E-15 | 4.191E-19 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Po-210         | 1.998E-04          | 7.235E-23                                   | 3.414E-21 | 1.201E-19 | 1.100E-17 | 5.557E-16 | 9.447E-20 | 0.000E+00 | 0.000E+00 |
| Pu-238        | ΣDSR(j)        |                    | 3.088E-05                                   | 3.020E-05 | 2.886E-05 | 2.456E-05 | 1.491E-05 | 3.695E-11 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Pu-238         | 2.637E-10          | 4.076E-11                                   | 3.986E-11 | 3.810E-11 | 3.242E-11 | 1.968E-11 | 4.878E-17 | 0.000E+00 | 0.000E+00 |
| Pu-238        | U-234          | 2.637E-10          | 1.311E-17                                   | 3.870E-17 | 8.672E-17 | 2.239E-16 | 4.071E-16 | 2.815E-21 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Th-230         | 2.637E-10          | 2.669E-23                                   | 1.792E-22 | 9.045E-22 | 7.100E-21 | 4.043E-20 | 1.043E-24 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Ra-226+D2      | 2.637E-10          | 5.295E-25                                   | 8.015E-24 | 9.250E-23 | 2.288E-21 | 4.410E-20 | 4.177E-24 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Pb-210+D1      | 2.637E-10          | 5.411E-28                                   | 1.721E-26 | 4.265E-25 | 2.913E-23 | 1.310E-21 | 5.305E-25 | 0.000E+00 | 0.000E+00 |
| Pu-238        | ΣDSR(j)        |                    | 4.076E-11                                   | 3.986E-11 | 3.810E-11 | 3.242E-11 | 1.968E-11 | 4.878E-17 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Pu-238         | 3.795E-12          | 5.867E-13                                   | 5.738E-13 | 5.484E-13 | 4.666E-13 | 2.832E-13 | 7.021E-19 | 0.000E+00 | 0.000E+00 |
| Pu-238        | U-234          | 3.795E-12          | 1.887E-19                                   | 5.571E-19 | 1.248E-18 | 3.223E-18 | 5.860E-18 | 4.052E-23 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Th-230         | 3.795E-12          | 3.842E-25                                   | 2.579E-24 | 1.302E-23 | 1.022E-22 | 5.820E-22 | 1.502E-26 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Ra-226+D2      | 3.795E-12          | 7.622E-27                                   | 1.154E-25 | 1.331E-24 | 3.293E-23 | 6.347E-22 | 6.012E-26 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Pb-210+D2      | 3.795E-12          | 7.764E-30                                   | 2.470E-28 | 6.121E-27 | 4.179E-25 | 1.879E-23 | 7.626E-27 | 0.000E+00 | 0.000E+00 |
| Pu-238        | ΣDSR(j)        |                    | 5.867E-13                                   | 5.738E-13 | 5.484E-13 | 4.666E-13 | 2.832E-13 | 7.021E-19 | 0.000E+00 | 0.000E+00 |

Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

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

| Parent<br>(i) | Product<br>(j) | Thread<br>Fraction | DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) |           |           |           |           |           |           |           |
|---------------|----------------|--------------------|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|               |                |                    | 0.000E+00                                   | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| Pu-238        | Pu-238         | 4.196E-08          | 6.486E-09                                   | 6.343E-09 | 6.063E-09 | 5.158E-09 | 3.131E-09 | 7.762E-15 | 0.000E+00 | 0.000E+00 |
| Pu-238        | U-234          | 4.196E-08          | 2.086E-15                                   | 6.159E-15 | 1.380E-14 | 3.563E-14 | 6.478E-14 | 4.480E-19 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Th-230         | 4.196E-08          | 4.248E-21                                   | 2.851E-20 | 1.439E-19 | 1.130E-18 | 6.434E-18 | 1.660E-22 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Ra-226+D3      | 4.196E-08          | 8.425E-23                                   | 1.275E-21 | 1.472E-20 | 3.640E-19 | 7.017E-18 | 6.646E-22 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Pb-210+D       | 4.196E-08          | 1.544E-25                                   | 3.858E-24 | 8.106E-23 | 4.943E-21 | 2.131E-19 | 8.802E-23 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Po-210         | 4.196E-08          | 1.520E-26                                   | 7.170E-25 | 2.523E-23 | 2.310E-21 | 1.167E-19 | 1.984E-23 | 0.000E+00 | 0.000E+00 |
| Pu-238        | ΣDSR(j)        |                    | 6.486E-09                                   | 6.343E-09 | 6.063E-09 | 5.158E-09 | 3.131E-09 | 7.762E-15 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Pu-238         | 5.538E-14          | 8.562E-15                                   | 8.373E-15 | 8.003E-15 | 6.809E-15 | 4.133E-15 | 1.025E-20 | 0.000E+00 | 0.000E+00 |
| Pu-238        | U-234          | 5.538E-14          | 2.753E-21                                   | 8.130E-21 | 1.822E-20 | 4.703E-20 | 8.551E-20 | 5.913E-25 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Th-230         | 5.538E-14          | 5.607E-27                                   | 3.764E-26 | 1.900E-25 | 1.491E-24 | 8.493E-24 | 2.191E-28 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Ra-226+D3      | 5.538E-14          | 1.112E-28                                   | 1.683E-27 | 1.943E-26 | 4.805E-25 | 9.262E-24 | 8.773E-28 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Pb-210+D1      | 5.538E-14          | 1.136E-31                                   | 3.616E-30 | 8.959E-29 | 6.118E-27 | 2.752E-25 | 1.114E-28 | 0.000E+00 | 0.000E+00 |
| Pu-238        | ΣDSR(j)        |                    | 8.562E-15                                   | 8.373E-15 | 8.003E-15 | 6.809E-15 | 4.133E-15 | 1.025E-20 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Pu-238         | 7.972E-16          | 1.232E-16                                   | 1.205E-16 | 1.152E-16 | 9.801E-17 | 5.949E-17 | 1.475E-22 | 0.000E+00 | 0.000E+00 |
| Pu-238        | U-234          | 7.972E-16          | 3.963E-23                                   | 1.170E-22 | 2.622E-22 | 6.769E-22 | 1.231E-21 | 8.511E-27 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Th-230         | 7.972E-16          | 8.070E-29                                   | 5.417E-28 | 2.735E-27 | 2.147E-26 | 1.222E-25 | 3.154E-30 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Ra-226+D3      | 7.972E-16          | 1.601E-30                                   | 2.423E-29 | 2.796E-28 | 6.916E-27 | 1.333E-25 | 1.263E-29 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Pb-210+D2      | 7.972E-16          | 1.631E-33                                   | 5.189E-32 | 1.286E-30 | 8.779E-29 | 3.947E-27 | 1.602E-30 | 0.000E+00 | 0.000E+00 |
| Pu-238        | ΣDSR(j)        |                    | 1.232E-16                                   | 1.205E-16 | 1.152E-16 | 9.801E-17 | 5.949E-17 | 1.475E-22 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Pu-238         | 2.000E-07          | 3.092E-08                                   | 3.023E-08 | 2.890E-08 | 2.459E-08 | 1.492E-08 | 3.700E-14 | 0.000E+00 | 0.000E+00 |
| Pu-238        | U-234          | 2.000E-07          | 9.943E-15                                   | 2.936E-14 | 6.578E-14 | 1.698E-13 | 3.088E-13 | 2.135E-18 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Th-230         | 2.000E-07          | 2.025E-20                                   | 1.359E-19 | 6.860E-19 | 5.385E-18 | 3.067E-17 | 7.913E-22 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Ra-226+D4      | 2.000E-07          | 9.766E-23                                   | 1.553E-21 | 1.821E-20 | 4.399E-19 | 7.554E-18 | 3.165E-21 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Pb-210+D       | 2.000E-07          | 7.362E-25                                   | 1.839E-23 | 3.864E-22 | 2.356E-20 | 1.016E-18 | 4.196E-22 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Po-210         | 2.000E-07          | 7.243E-26                                   | 3.418E-24 | 1.203E-22 | 1.101E-20 | 5.564E-19 | 9.458E-23 | 0.000E+00 | 0.000E+00 |
| Pu-238        | ΣDSR(j)        |                    | 3.092E-08                                   | 3.023E-08 | 2.890E-08 | 2.459E-08 | 1.492E-08 | 3.700E-14 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Pu-238         | 2.640E-13          | 4.081E-14                                   | 3.991E-14 | 3.815E-14 | 3.246E-14 | 1.970E-14 | 4.884E-20 | 0.000E+00 | 0.000E+00 |
| Pu-238        | U-234          | 2.640E-13          | 1.312E-20                                   | 3.875E-20 | 8.683E-20 | 2.242E-19 | 4.076E-19 | 2.819E-24 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Th-230         | 2.640E-13          | 2.673E-26                                   | 1.794E-25 | 9.056E-25 | 7.109E-24 | 4.048E-23 | 1.044E-27 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Ra-226+D4      | 2.640E-13          | 1.289E-28                                   | 2.049E-27 | 2.404E-26 | 5.806E-25 | 9.972E-24 | 4.178E-27 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Pb-210+D1      | 2.640E-13          | 5.417E-31                                   | 1.724E-29 | 4.270E-28 | 2.916E-26 | 1.312E-24 | 5.311E-28 | 0.000E+00 | 0.000E+00 |
| Pu-238        | ΣDSR(j)        |                    | 4.081E-14                                   | 3.991E-14 | 3.815E-14 | 3.246E-14 | 1.970E-14 | 4.884E-20 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Pu-238         | 3.800E-15          | 5.875E-16                                   | 5.745E-16 | 5.491E-16 | 4.672E-16 | 2.836E-16 | 7.029E-22 | 0.000E+00 | 0.000E+00 |
| Pu-238        | U-234          | 3.800E-15          | 1.889E-22                                   | 5.578E-22 | 1.250E-21 | 3.226E-21 | 5.867E-21 | 4.057E-26 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Th-230         | 3.800E-15          | 3.847E-28                                   | 2.582E-27 | 1.303E-26 | 1.023E-25 | 5.827E-25 | 1.503E-29 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Ra-226+D4      | 3.800E-15          | 1.856E-30                                   | 2.950E-29 | 3.460E-28 | 8.358E-27 | 1.435E-25 | 6.014E-29 | 0.000E+00 | 0.000E+00 |
| Pu-238        | Pb-210+D2      | 3.800E-15          | 7.773E-33                                   | 2.473E-31 | 6.128E-30 | 4.184E-28 | 1.881E-26 | 7.635E-30 | 0.000E+00 | 0.000E+00 |
| Pu-238        | ΣDSR(j)        |                    | 5.875E-16                                   | 5.745E-16 | 5.491E-16 | 4.672E-16 | 2.836E-16 | 7.030E-22 | 0.000E+00 | 0.000E+00 |

Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

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

| Parent<br>(i) | Product<br>(j) | Thread<br>Fraction | DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) |           |           |           |           |           |           |           |
|---------------|----------------|--------------------|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|               |                |                    | 0.000E+00                                   | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| Pu-239        | Pu-239         | 5.901E-04          | 1.013E-04                                   | 9.986E-05 | 9.696E-05 | 8.717E-05 | 6.194E-05 | 2.654E-10 | 0.000E+00 | 0.000E+00 |
| Pu-239        | U-235+D        | 5.901E-04          | 9.093E-14                                   | 2.708E-13 | 6.211E-13 | 1.751E-12 | 4.192E-12 | 3.134E-18 | 0.000E+00 | 0.000E+00 |
| Pu-239        | Pa-231         | 5.901E-04          | 3.765E-18                                   | 2.696E-17 | 1.404E-16 | 1.133E-15 | 6.702E-15 | 4.012E-19 | 0.000E+00 | 0.000E+00 |
| Pu-239        | Ac-227+D       | 5.901E-04          | 2.449E-20                                   | 3.313E-19 | 3.555E-18 | 8.093E-17 | 1.359E-15 | 3.454E-20 | 0.000E+00 | 0.000E+00 |
| Pu-239        | ΣDSR(j)        |                    | 1.013E-04                                   | 9.986E-05 | 9.696E-05 | 8.717E-05 | 6.194E-05 | 2.654E-10 | 0.000E+00 | 0.000E+00 |
| Pu-239        | Pu-239         | 1.633E-06          | 2.804E-07                                   | 2.764E-07 | 2.684E-07 | 2.413E-07 | 1.714E-07 | 7.345E-13 | 0.000E+00 | 0.000E+00 |
| Pu-239        | U-235+D        | 1.633E-06          | 2.517E-16                                   | 7.494E-16 | 1.719E-15 | 4.845E-15 | 1.160E-14 | 8.674E-21 | 0.000E+00 | 0.000E+00 |
| Pu-239        | Pa-231         | 1.633E-06          | 1.042E-20                                   | 7.461E-20 | 3.887E-19 | 3.135E-18 | 1.855E-17 | 1.110E-21 | 0.000E+00 | 0.000E+00 |
| Pu-239        | Ac-227+D1      | 1.633E-06          | 5.545E-23                                   | 8.297E-22 | 9.418E-21 | 2.217E-19 | 3.767E-18 | 9.370E-23 | 0.000E+00 | 0.000E+00 |
| Pu-239        | ΣDSR(j)        |                    | 2.804E-07                                   | 2.764E-07 | 2.684E-07 | 2.413E-07 | 1.714E-07 | 7.345E-13 | 0.000E+00 | 0.000E+00 |
| Pu-239        | Pu-239         | 8.257E-06          | 1.418E-06                                   | 1.397E-06 | 1.357E-06 | 1.220E-06 | 8.667E-07 | 3.714E-12 | 0.000E+00 | 0.000E+00 |
| Pu-239        | U-235+D        | 8.257E-06          | 1.272E-15                                   | 3.789E-15 | 8.690E-15 | 2.450E-14 | 5.866E-14 | 4.385E-20 | 0.000E+00 | 0.000E+00 |
| Pu-239        | Pa-231         | 8.257E-06          | 5.268E-20                                   | 3.772E-19 | 1.965E-18 | 1.585E-17 | 9.378E-17 | 5.614E-21 | 0.000E+00 | 0.000E+00 |
| Pu-239        | Ac-227+D2      | 8.257E-06          | 2.514E-22                                   | 3.766E-21 | 4.275E-20 | 1.004E-18 | 1.692E-17 | 4.727E-22 | 0.000E+00 | 0.000E+00 |
| Pu-239        | ΣDSR(j)        |                    | 1.418E-06                                   | 1.397E-06 | 1.357E-06 | 1.220E-06 | 8.667E-07 | 3.714E-12 | 0.000E+00 | 0.000E+00 |
| Pu-239        | Pu-239         | 2.285E-08          | 3.923E-09                                   | 3.867E-09 | 3.755E-09 | 3.376E-09 | 2.399E-09 | 1.028E-14 | 0.000E+00 | 0.000E+00 |
| Pu-239        | U-235+D        | 2.285E-08          | 3.521E-18                                   | 1.049E-17 | 2.405E-17 | 6.780E-17 | 1.623E-16 | 1.214E-22 | 0.000E+00 | 0.000E+00 |
| Pu-239        | Pa-231         | 2.285E-08          | 1.458E-22                                   | 1.044E-21 | 5.439E-21 | 4.386E-20 | 2.596E-19 | 1.554E-23 | 0.000E+00 | 0.000E+00 |
| Pu-239        | Ac-227+D3      | 2.285E-08          | 7.018E-25                                   | 1.051E-23 | 1.193E-22 | 2.802E-21 | 4.725E-20 | 1.308E-24 | 0.000E+00 | 0.000E+00 |
| Pu-239        | ΣDSR(j)        |                    | 3.923E-09                                   | 3.867E-09 | 3.755E-09 | 3.376E-09 | 2.399E-09 | 1.028E-14 | 0.000E+00 | 0.000E+00 |
| Pu-239        | Pu-239         | 4.954E-10          | 8.506E-11                                   | 8.384E-11 | 8.141E-11 | 7.319E-11 | 5.200E-11 | 2.228E-16 | 0.000E+00 | 0.000E+00 |
| Pu-239        | U-235+D        | 4.954E-10          | 7.634E-20                                   | 2.273E-19 | 5.214E-19 | 1.470E-18 | 3.520E-18 | 2.631E-24 | 0.000E+00 | 0.000E+00 |
| Pu-239        | Pa-231         | 4.954E-10          | 3.161E-24                                   | 2.263E-23 | 1.179E-22 | 9.509E-22 | 5.627E-21 | 3.368E-25 | 0.000E+00 | 0.000E+00 |
| Pu-239        | Ac-227+D4      | 4.954E-10          | 1.029E-26                                   | 1.548E-25 | 1.756E-24 | 4.080E-23 | 6.612E-22 | 2.707E-26 | 0.000E+00 | 0.000E+00 |
| Pu-239        | ΣDSR(j)        |                    | 8.506E-11                                   | 8.384E-11 | 8.141E-11 | 7.319E-11 | 5.200E-11 | 2.228E-16 | 0.000E+00 | 0.000E+00 |
| Pu-239        | Pu-239         | 1.371E-12          | 2.354E-13                                   | 2.320E-13 | 2.253E-13 | 2.026E-13 | 1.439E-13 | 6.167E-19 | 0.000E+00 | 0.000E+00 |
| Pu-239        | U-235+D        | 1.371E-12          | 2.113E-22                                   | 6.292E-22 | 1.443E-21 | 4.068E-21 | 9.741E-21 | 7.283E-27 | 0.000E+00 | 0.000E+00 |
| Pu-239        | Pa-231         | 1.371E-12          | 8.749E-27                                   | 6.264E-26 | 3.263E-25 | 2.632E-24 | 1.557E-23 | 9.323E-28 | 0.000E+00 | 0.000E+00 |
| Pu-239        | Ac-227+D5      | 1.371E-12          | 2.885E-29                                   | 4.337E-28 | 4.920E-27 | 1.144E-25 | 1.856E-24 | 7.493E-29 | 0.000E+00 | 0.000E+00 |
| Pu-239        | ΣDSR(j)        |                    | 2.354E-13                                   | 2.320E-13 | 2.253E-13 | 2.026E-13 | 1.439E-13 | 6.167E-19 | 0.000E+00 | 0.000E+00 |
| Pu-239+D      | Pu-239+D       | 9.829E-01          | 1.688E-01                                   | 1.663E-01 | 1.615E-01 | 1.452E-01 | 1.032E-01 | 4.421E-07 | 0.000E+00 | 0.000E+00 |
| Pu-239+D      | U-235+D        | 9.829E-01          | 1.515E-10                                   | 4.510E-10 | 1.034E-09 | 2.916E-09 | 6.983E-09 | 5.220E-15 | 0.000E+00 | 0.000E+00 |
| Pu-239+D      | Pa-231         | 9.829E-01          | 6.271E-15                                   | 4.491E-14 | 2.339E-13 | 1.887E-12 | 1.116E-11 | 6.683E-16 | 0.000E+00 | 0.000E+00 |
| Pu-239+D      | Ac-227+D       | 9.829E-01          | 4.079E-17                                   | 5.519E-16 | 5.921E-15 | 1.348E-13 | 2.263E-12 | 5.753E-17 | 0.000E+00 | 0.000E+00 |
| Pu-239+D      | ΣDSR(j)        |                    | 1.688E-01                                   | 1.663E-01 | 1.615E-01 | 1.452E-01 | 1.032E-01 | 4.421E-07 | 0.000E+00 | 0.000E+00 |
| Pu-239+D      | Pu-239+D       | 2.720E-03          | 4.671E-04                                   | 4.603E-04 | 4.470E-04 | 4.019E-04 | 2.855E-04 | 1.223E-09 | 0.000E+00 | 0.000E+00 |
| Pu-239+D      | U-235+D        | 2.720E-03          | 4.192E-13                                   | 1.248E-12 | 2.863E-12 | 8.071E-12 | 1.933E-11 | 1.445E-17 | 0.000E+00 | 0.000E+00 |
| Pu-239+D      | Pa-231         | 2.720E-03          | 1.736E-17                                   | 1.243E-16 | 6.474E-16 | 5.221E-15 | 3.090E-14 | 1.850E-18 | 0.000E+00 | 0.000E+00 |
| Pu-239+D      | Ac-227+D1      | 2.720E-03          | 9.236E-20                                   | 1.382E-18 | 1.569E-17 | 3.693E-16 | 6.274E-15 | 1.561E-19 | 0.000E+00 | 0.000E+00 |
| Pu-239+D      | ΣDSR(j)        |                    | 4.671E-04                                   | 4.603E-04 | 4.470E-04 | 4.019E-04 | 2.855E-04 | 1.223E-09 | 0.000E+00 | 0.000E+00 |



Summary : RESRAD Default

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

| Parent<br>(i) | Product<br>(j) | Thread<br>Fraction | DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) |           |           |           |           |           |           |           |
|---------------|----------------|--------------------|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|               |                |                    | 0.000E+00                                   | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| Pu-239+D      | Pu-239+D       | 1.375E-02          | 2.361E-03                                   | 2.327E-03 | 2.260E-03 | 2.032E-03 | 1.444E-03 | 6.186E-09 | 0.000E+00 | 0.000E+00 |
| Pu-239+D      | U-235+D        | 1.375E-02          | 2.119E-12                                   | 6.311E-12 | 1.447E-11 | 4.080E-11 | 9.771E-11 | 7.304E-17 | 0.000E+00 | 0.000E+00 |
| Pu-239+D      | Pa-231         | 1.375E-02          | 8.775E-17                                   | 6.283E-16 | 3.273E-15 | 2.640E-14 | 1.562E-13 | 9.351E-18 | 0.000E+00 | 0.000E+00 |
| Pu-239+D      | Ac-227+D2      | 1.375E-02          | 4.188E-19                                   | 6.273E-18 | 7.120E-17 | 1.672E-15 | 2.818E-14 | 7.873E-19 | 0.000E+00 | 0.000E+00 |
| Pu-239+D      | ΣDSR(j)        |                    | 2.361E-03                                   | 2.327E-03 | 2.260E-03 | 2.032E-03 | 1.444E-03 | 6.186E-09 | 0.000E+00 | 0.000E+00 |
| Pu-239+D      | Pu-239+D       | 3.806E-05          | 6.535E-06                                   | 6.441E-06 | 6.254E-06 | 5.623E-06 | 3.995E-06 | 1.712E-11 | 0.000E+00 | 0.000E+00 |
| Pu-239+D      | U-235+D        | 3.806E-05          | 5.865E-15                                   | 1.747E-14 | 4.006E-14 | 1.129E-13 | 2.704E-13 | 2.022E-19 | 0.000E+00 | 0.000E+00 |
| Pu-239+D      | Pa-231         | 3.806E-05          | 2.429E-19                                   | 1.739E-18 | 9.059E-18 | 7.306E-17 | 4.323E-16 | 2.588E-20 | 0.000E+00 | 0.000E+00 |
| Pu-239+D      | Ac-227+D3      | 3.806E-05          | 1.169E-21                                   | 1.751E-20 | 1.987E-19 | 4.668E-18 | 7.870E-17 | 2.179E-21 | 0.000E+00 | 0.000E+00 |
| Pu-239+D      | ΣDSR(j)        |                    | 6.535E-06                                   | 6.441E-06 | 6.254E-06 | 5.623E-06 | 3.995E-06 | 1.712E-11 | 0.000E+00 | 0.000E+00 |
| Pu-239+D      | Pu-239+D       | 8.252E-07          | 1.417E-07                                   | 1.396E-07 | 1.356E-07 | 1.219E-07 | 8.662E-08 | 3.712E-13 | 0.000E+00 | 0.000E+00 |
| Pu-239+D      | U-235+D        | 8.252E-07          | 1.272E-16                                   | 3.787E-16 | 8.685E-16 | 2.448E-15 | 5.863E-15 | 4.383E-21 | 0.000E+00 | 0.000E+00 |
| Pu-239+D      | Pa-231         | 8.252E-07          | 5.265E-21                                   | 3.770E-20 | 1.964E-19 | 1.584E-18 | 9.373E-18 | 5.611E-22 | 0.000E+00 | 0.000E+00 |
| Pu-239+D      | Ac-227+D4      | 8.252E-07          | 1.714E-23                                   | 2.578E-22 | 2.925E-21 | 6.796E-20 | 1.101E-18 | 4.509E-23 | 0.000E+00 | 0.000E+00 |
| Pu-239+D      | ΣDSR(j)        |                    | 1.417E-07                                   | 1.396E-07 | 1.356E-07 | 1.219E-07 | 8.662E-08 | 3.712E-13 | 0.000E+00 | 0.000E+00 |
| Pu-239+D      | Pu-239+D       | 2.284E-09          | 3.921E-10                                   | 3.865E-10 | 3.753E-10 | 3.374E-10 | 2.397E-10 | 1.027E-15 | 0.000E+00 | 0.000E+00 |
| Pu-239+D      | U-235+D        | 2.284E-09          | 3.519E-19                                   | 1.048E-18 | 2.404E-18 | 6.776E-18 | 1.623E-17 | 1.213E-23 | 0.000E+00 | 0.000E+00 |
| Pu-239+D      | Pa-231         | 2.284E-09          | 1.457E-23                                   | 1.043E-22 | 5.436E-22 | 4.384E-21 | 2.594E-20 | 1.553E-24 | 0.000E+00 | 0.000E+00 |
| Pu-239+D      | Ac-227+D5      | 2.284E-09          | 4.805E-26                                   | 7.224E-25 | 8.196E-24 | 1.905E-22 | 3.091E-21 | 1.248E-25 | 0.000E+00 | 0.000E+00 |
| Pu-239+D      | ΣDSR(j)        |                    | 3.921E-10                                   | 3.865E-10 | 3.753E-10 | 3.374E-10 | 2.397E-10 | 1.027E-15 | 0.000E+00 | 0.000E+00 |
| Pu-240        | Pu-240         | 5.750E-08          | 9.869E-09                                   | 9.726E-09 | 9.443E-09 | 8.485E-09 | 6.019E-09 | 2.566E-14 | 0.000E+00 | 0.000E+00 |
| Pu-240        | Pu-240         | 1.000E+00          | 1.716E-01                                   | 1.691E-01 | 1.642E-01 | 1.476E-01 | 1.047E-01 | 4.463E-07 | 0.000E+00 | 0.000E+00 |
| Pu-240        | U-236          | 1.000E+00          | 4.956E-10                                   | 1.468E-09 | 3.316E-09 | 8.795E-09 | 1.729E-08 | 1.581E-13 | 0.000E+00 | 0.000E+00 |
| Pu-240        | Th-232         | 1.000E+00          | 2.795E-20                                   | 1.879E-19 | 9.529E-19 | 7.604E-18 | 4.531E-17 | 1.414E-21 | 0.000E+00 | 0.000E+00 |
| Pu-240        | Ra-228+D       | 1.000E+00          | 2.263E-20                                   | 3.369E-19 | 3.704E-18 | 7.692E-17 | 9.861E-16 | 6.343E-20 | 0.000E+00 | 0.000E+00 |
| Pu-240        | Th-228+D       | 1.000E+00          | 1.666E-21                                   | 4.696E-20 | 9.824E-19 | 4.271E-17 | 8.556E-16 | 6.072E-22 | 0.000E+00 | 0.000E+00 |
| Pu-240        | ΣDSR(j)        |                    | 1.716E-01                                   | 1.691E-01 | 1.642E-01 | 1.476E-01 | 1.047E-01 | 4.463E-07 | 0.000E+00 | 0.000E+00 |
| Pu-241        | Pu-241         | 1.000E+00          | 3.239E-03                                   | 3.041E-03 | 2.682E-03 | 1.720E-03 | 4.653E-04 | 6.959E-11 | 0.000E+00 | 1.423E-24 |
| Pu-241        | Am-241         | 1.000E+00          | 1.475E-04                                   | 4.271E-04 | 9.222E-04 | 2.105E-03 | 2.834E-03 | 1.113E-08 | 0.000E+00 | 1.506E-04 |
| Pu-241        | Np-237+D       | 1.000E+00          | 1.547E-10                                   | 1.007E-09 | 4.265E-09 | 1.830E-08 | 3.233E-08 | 5.147E-06 | 3.837E-06 | 1.218E-06 |
| Pu-241        | U-233          | 1.000E+00          | 4.175E-18                                   | 5.073E-17 | 4.545E-16 | 6.257E-15 | 3.825E-14 | 7.112E-13 | 1.143E-11 | 2.594E-11 |
| Pu-241        | Th-229+D       | 1.000E+00          | 1.259E-21                                   | 3.569E-20 | 7.743E-19 | 3.803E-17 | 9.643E-16 | 3.519E-16 | 3.752E-14 | 4.090E-13 |
| Pu-241        | ΣDSR(j)        |                    | 3.386E-03                                   | 3.469E-03 | 3.604E-03 | 3.825E-03 | 3.300E-03 | 5.159E-06 | 3.837E-06 | 1.518E-04 |
| Pu-241+D      | Pu-241+D       | 2.450E-05          | 4.811E-06                                   | 4.560E-06 | 4.097E-06 | 2.813E-06 | 9.477E-07 | 1.904E-15 | 0.000E+00 | 3.649E-29 |
| Pu-241+D      | Np-237+D       | 2.450E-05          | 7.090E-12                                   | 1.849E-11 | 3.069E-11 | 3.136E-11 | 9.502E-12 | 3.704E-09 | 1.389E-13 | 1.105E-28 |
| Pu-241+D      | U-233          | 2.450E-05          | 2.379E-19                                   | 1.332E-18 | 5.219E-18 | 2.121E-17 | 3.507E-17 | 8.381E-16 | 2.266E-15 | 2.258E-15 |
| Pu-241+D      | Th-229+D       | 2.450E-05          | 9.413E-23                                   | 1.283E-21 | 1.254E-20 | 1.924E-19 | 1.479E-18 | 3.279E-19 | 1.167E-17 | 5.294E-17 |
| Pu-241+D      | ΣDSR(j)        |                    | 4.811E-06                                   | 4.560E-06 | 4.097E-06 | 2.813E-06 | 9.478E-07 | 3.704E-09 | 1.412E-13 | 2.311E-15 |

Summary : RESRAD Default

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

| Parent<br>(i) | Product<br>(j) | Thread<br>Fraction | DSR(j,t) At Time in Years (mrem/yr)/(pCi/g) |           |           |           |           |           |           |           |
|---------------|----------------|--------------------|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|               |                |                    | 0.000E+00                                   | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| Sb-125        | Sb-125         | 7.686E-01          | 5.704E-01                                   | 4.131E-01 | 2.166E-01 | 2.256E-02 | 3.443E-05 | 9.907E-23 | 0.000E+00 | 0.000E+00 |
| Sb-125        | Sb-125         | 2.314E-01          | 1.717E-01                                   | 1.243E-01 | 6.519E-02 | 6.790E-03 | 1.036E-05 | 2.982E-23 | 0.000E+00 | 0.000E+00 |
| Sb-125        | Te-125m        | 2.314E-01          | 1.951E-03                                   | 7.200E-03 | 4.597E-03 | 8.397E-04 | 8.483E-06 | 1.169E-12 | 8.172E-38 | 0.000E+00 |
| Sb-125        | ∑DSR(j)        |                    | 1.736E-01                                   | 1.315E-01 | 6.979E-02 | 7.630E-03 | 1.884E-05 | 1.169E-12 | 8.172E-38 | 0.000E+00 |
| Sr-90+D       | Sr-90+D        | 1.000E+00          | 1.738E+00                                   | 1.016E+00 | 3.438E-01 | 7.717E-03 | 1.446E-07 | 5.407E-07 | 0.000E+00 | 0.000E+00 |
| Tc-99         | Tc-99          | 1.000E+00          | 2.452E-02                                   | 6.801E-02 | 1.955E-01 | 1.312E-26 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |

The DSR includes contributions from associated (half-life ≤ 30 days) daughters.

## Single Radionuclide Soil Guidelines G(i,t) in pCi/g

Basic Radiation Dose Limit = 2.500E+01 mrem/yr

| Nuclide<br>(i) | t=        | 0.000E+00 | 1.000E+00  | 3.000E+00  | 1.000E+01  | 3.000E+01  | 1.000E+02  | 3.000E+02  | 1.000E+03 |
|----------------|-----------|-----------|------------|------------|------------|------------|------------|------------|-----------|
| Ag-108m        | 7.400E+00 | 7.596E+00 | 8.005E+00  | 9.635E+00  | 1.675E+01  | 2.719E+09  | *7.853E+12 | 3.409E+04  |           |
| Am-241         | 1.336E+02 | 1.359E+02 | 1.408E+02  | 1.598E+02  | 2.363E+02  | 8.229E+04  | 2.012E+05  | 6.339E+05  |           |
| Am-243         | 4.979E+01 | 5.032E+01 | 5.141E+01  | 5.547E+01  | 6.996E+01  | 6.890E+07  | *1.996E+11 | *1.996E+11 |           |
| C-14           | 8.959E+01 | 1.294E+11 | *4.479E+12 | *4.479E+12 | 4.445E+03  | *4.479E+12 | *4.479E+12 | *4.479E+12 |           |
| Cm-243         | 7.606E+01 | 7.826E+01 | 8.286E+01  | 1.013E+02  | 1.833E+02  | 5.758E+08  | *5.054E+13 | *5.054E+13 |           |
| Cm-244         | 2.708E+02 | 2.843E+02 | 3.135E+02  | 4.430E+02  | 1.232E+03  | 2.653E+09  | *8.092E+13 | *8.092E+13 |           |
| Co-60          | 4.734E+00 | 5.421E+00 | 7.109E+00  | 1.840E+01  | 2.860E+02  | 2.430E+12  | *1.113E+15 | *1.113E+15 |           |
| Cs-134         | 7.524E+00 | 1.058E+01 | 2.092E+01  | 2.281E+02  | 2.150E+05  | *1.283E+15 | *1.283E+15 | *1.283E+15 |           |
| Cs-137         | 1.576E+01 | 1.622E+01 | 1.719E+01  | 2.111E+01  | 3.881E+01  | 2.292E+07  | *8.593E+13 | *8.593E+13 |           |
| Eu-152         | 1.074E+01 | 1.147E+01 | 1.309E+01  | 2.084E+01  | 8.071E+01  | 1.336E+12  | *1.727E+14 | *1.727E+14 |           |
| Eu-154         | 9.969E+00 | 1.097E+01 | 1.328E+01  | 2.600E+01  | 1.817E+02  | 2.154E+13  | *2.685E+14 | *2.685E+14 |           |
| Eu-155         | 3.909E+02 | 4.579E+02 | 6.285E+02  | 1.905E+03  | 4.563E+04  | *4.815E+14 | *4.815E+14 | *4.815E+14 |           |
| Fe-55          | 3.374E+04 | 4.392E+04 | 7.446E+04  | 4.740E+05  | 9.747E+07  | *2.335E+15 | *2.335E+15 | *2.335E+15 |           |
| H-3            | 2.443E+04 | 6.271E+03 | 4.995E+03  | *9.621E+15 | *9.621E+15 | *9.621E+15 | *9.621E+15 | *9.621E+15 |           |
| Nb-94          | 7.507E+00 | 7.726E+00 | 8.184E+00  | 1.004E+01  | 1.841E+01  | 1.371E+10  | *1.856E+11 | 8.827E+03  |           |
| Ni-59          | 1.094E+04 | 1.126E+04 | 1.194E+04  | 1.472E+04  | 2.779E+04  | 1.761E+09  | *5.906E+10 | 1.371E+06  |           |
| Ni-63          | 3.996E+03 | 4.142E+03 | 4.454E+03  | 5.762E+03  | 1.249E+04  | 1.280E+09  | *5.586E+13 | 5.058E+08  |           |
| Np-237         | 1.383E+01 | 1.905E+01 | 3.626E+01  | 3.457E+02  | 2.230E+05  | 8.022E-01  | 1.443E+06  | 1.422E+06  |           |
| Pm-147         | 1.098E+05 | 1.461E+05 | 2.590E+05  | 1.926E+06  | 6.146E+08  | *9.212E+14 | *9.212E+14 | *9.212E+14 |           |
| Pu-238         | 1.617E+02 | 1.654E+02 | 1.730E+02  | 2.033E+02  | 3.350E+02  | 1.351E+08  | *1.712E+13 | *1.712E+13 |           |
| Pu-239         | 1.456E+02 | 1.477E+02 | 1.521E+02  | 1.692E+02  | 2.382E+02  | 5.558E+07  | *6.202E+10 | *6.202E+10 |           |
| Pu-240         | 1.457E+02 | 1.478E+02 | 1.522E+02  | 1.694E+02  | 2.388E+02  | 5.601E+07  | *2.269E+11 | *2.269E+11 |           |
| Pu-241         | 7.373E+03 | 7.198E+03 | 6.929E+03  | 6.531E+03  | 7.575E+03  | 4.843E+06  | 6.516E+06  | 1.646E+05  |           |
| Sb-125         | 3.360E+01 | 4.590E+01 | 8.730E+01  | 8.281E+02  | 4.693E+05  | 2.139E+13  | *1.029E+15 | *1.029E+15 |           |
| Sr-90          | 1.439E+01 | 2.460E+01 | 7.271E+01  | 3.240E+03  | 1.729E+08  | 4.624E+07  | *1.366E+14 | *1.366E+14 |           |
| Tc-99          | 1.020E+03 | 3.676E+02 | 1.279E+02  | *1.695E+10 | *1.695E+10 | *1.695E+10 | *1.695E+10 | *1.695E+10 |           |

\*At specific activity limit

Summary : RESRAD Default

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Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)  
 and Single Radionuclide Soil Guidelines G(i,t) in pCi/g  
 at tmin = time of minimum single radionuclide soil guideline  
 and at tmax = time of maximum total dose = 75.1 ± 0.2 years

| Nuclide<br>(i) | Initial<br>(pCi/g) | tmin<br>(years) | DSR(i,tmin) | G(i,tmin)<br>(pCi/g) | DSR(i,tmax) | G(i,tmax)<br>(pCi/g) |
|----------------|--------------------|-----------------|-------------|----------------------|-------------|----------------------|
| Ag-108m        | 1.000E+00          | 0.000E+00       | 3.378E+00   | 7.400E+00            | 3.013E-01   | 8.298E+01            |
| Am-241         | 1.000E+00          | 0.000E+00       | 1.872E-01   | 1.336E+02            | 3.057E-02   | 8.178E+02            |
| Am-243         | 1.000E+00          | 0.000E+00       | 5.021E-01   | 4.979E+01            | 1.598E-01   | 1.564E+02            |
| C-14           | 1.000E+00          | 0.000E+00       | 2.791E-01   | 8.959E+01            | 0.000E+00   | *4.479E+12           |
| Cm-243         | 1.000E+00          | 0.000E+00       | 3.287E-01   | 7.606E+01            | 2.634E-02   | 9.491E+02            |
| Cm-244         | 1.000E+00          | 0.000E+00       | 9.233E-02   | 2.708E+02            | 1.312E-03   | 1.906E+04            |
| Co-60          | 1.000E+00          | 0.000E+00       | 5.280E+00   | 4.734E+00            | 1.255E-04   | 1.993E+05            |
| Cs-134         | 1.000E+00          | 0.000E+00       | 3.323E+00   | 7.524E+00            | 1.620E-11   | 1.544E+12            |
| Cs-137         | 1.000E+00          | 0.000E+00       | 1.586E+00   | 1.576E+01            | 1.146E-01   | 2.182E+02            |
| Eu-152         | 1.000E+00          | 0.000E+00       | 2.329E+00   | 1.074E+01            | 1.031E-02   | 2.424E+03            |
| Eu-154         | 1.000E+00          | 0.000E+00       | 2.508E+00   | 9.969E+00            | 1.211E-03   | 2.065E+04            |
| Eu-155         | 1.000E+00          | 0.000E+00       | 6.396E-02   | 3.909E+02            | 3.421E-07   | 7.307E+07            |
| Fe-55          | 1.000E+00          | 0.000E+00       | 7.410E-04   | 3.374E+04            | 9.782E-13   | 2.556E+13            |
| H-3            | 1.000E+00          | 1.399 ± 0.003   | 5.457E-03   | 4.581E+03            | 0.000E+00   | *9.621E+15           |
| Nb-94          | 1.000E+00          | 0.000E+00       | 3.330E+00   | 7.507E+00            | 2.415E-01   | 1.035E+02            |
| Ni-59          | 1.000E+00          | 0.000E+00       | 2.285E-03   | 1.094E+04            | 1.338E-04   | 1.868E+05            |
| Ni-63          | 1.000E+00          | 0.000E+00       | 6.256E-03   | 3.996E+03            | 2.180E-04   | 1.147E+05            |
| Np-237         | 1.000E+00          | 120.3 ± 0.2     | 3.123E+01   | 8.006E-01            | 3.090E+01   | 8.092E-01            |
| Pm-147         | 1.000E+00          | 0.000E+00       | 2.278E-04   | 1.098E+05            | 1.820E-13   | 1.374E+14            |
| Pu-238         | 1.000E+00          | 0.000E+00       | 1.546E-01   | 1.617E+02            | 1.507E-02   | 1.659E+03            |
| Pu-239         | 1.000E+00          | 0.000E+00       | 1.717E-01   | 1.456E+02            | 3.023E-02   | 8.269E+02            |
| Pu-240         | 1.000E+00          | 0.000E+00       | 1.716E-01   | 1.457E+02            | 3.004E-02   | 8.322E+02            |
| Pu-241         | 1.000E+00          | 11.69 ± 0.02    | 3.835E-03   | 6.519E+03            | 1.077E-03   | 2.320E+04            |
| Sb-125         | 1.000E+00          | 0.000E+00       | 7.441E-01   | 3.360E+01            | 3.674E-10   | 6.805E+10            |
| Sr-90          | 1.000E+00          | 0.000E+00       | 1.738E+00   | 1.439E+01            | 3.426E-01   | 7.297E+01            |
| Tc-99          | 1.000E+00          | 3.077 ± 0.006   | 1.957E-01   | 1.277E+02            | 0.000E+00   | *1.695E+10           |

\*At specific activity limit

Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

Individual Nuclide Dose Summed Over All Pathways  
Parent Nuclide and Branch Fraction Indicated

| Nuclide<br>(j) | Parent<br>(i) | THF(i)    | DOSE (j,t), mrem/yr |           |           |           |           |           |           |           |
|----------------|---------------|-----------|---------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                |               |           | t= 0.000E+00        | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| Ag-108m        | Ag-108m       | 1.000E+00 | 3.378E+00           | 3.291E+00 | 3.123E+00 | 2.595E+00 | 1.493E+00 | 9.193E-09 | 0.000E+00 | 7.334E-04 |
| Am-241         | Am-241        | 1.000E+00 | 1.872E-01           | 1.839E-01 | 1.776E-01 | 1.565E-01 | 1.058E-01 | 3.119E-07 | 0.000E+00 | 0.000E+00 |
| Am-241         | Pu-241        | 1.000E+00 | 1.475E-04           | 4.271E-04 | 9.222E-04 | 2.105E-03 | 2.834E-03 | 1.113E-08 | 0.000E+00 | 1.506E-04 |
| Am-241         | ΣDOSE (j)     |           | 1.873E-01           | 1.843E-01 | 1.785E-01 | 1.586E-01 | 1.086E-01 | 3.230E-07 | 0.000E+00 | 1.506E-04 |
| Np-237         | Am-241        | 1.000E+00 | 2.937E-07           | 7.827E-07 | 1.371E-06 | 1.787E-06 | 1.283E-06 | 3.035E-04 | 1.243E-04 | 3.944E-05 |
| Np-237         | Np-237        | 1.000E+00 | 1.807E+00           | 1.312E+00 | 6.894E-01 | 7.231E-02 | 1.118E-04 | 3.116E+01 | 0.000E+00 | 0.000E+00 |
| Np-237         | Pu-241        | 1.000E+00 | 1.547E-10           | 1.007E-09 | 4.265E-09 | 1.830E-08 | 3.233E-08 | 5.147E-06 | 3.837E-06 | 1.218E-06 |
| Np-237         | Pu-241        | 2.450E-05 | 7.090E-12           | 1.849E-11 | 3.069E-11 | 3.136E-11 | 9.502E-12 | 3.704E-09 | 1.389E-13 | 1.104E-28 |
| Np-237         | ΣDOSE (j)     |           | 1.807E+00           | 1.312E+00 | 6.894E-01 | 7.231E-02 | 1.131E-04 | 3.116E+01 | 1.281E-04 | 4.066E-05 |
| U-233          | Am-241        | 1.000E+00 | 9.825E-15           | 5.576E-14 | 2.256E-13 | 1.039E-12 | 2.491E-12 | 5.529E-11 | 4.462E-10 | 9.157E-10 |
| U-233          | Np-237        | 1.000E+00 | 8.261E-08           | 1.962E-07 | 3.283E-07 | 4.131E-07 | 2.779E-07 | 1.045E-05 | 1.723E-05 | 1.717E-05 |
| U-233          | Pu-241        | 1.000E+00 | 4.175E-18           | 5.073E-17 | 4.545E-16 | 6.257E-15 | 3.825E-14 | 7.112E-13 | 1.143E-11 | 2.594E-11 |
| U-233          | Pu-241        | 2.450E-05 | 2.379E-19           | 1.332E-18 | 5.219E-18 | 2.121E-17 | 3.507E-17 | 8.381E-16 | 2.266E-15 | 2.258E-15 |
| U-233          | ΣDOSE (j)     |           | 8.261E-08           | 1.962E-07 | 3.283E-07 | 4.131E-07 | 2.779E-07 | 1.045E-05 | 1.723E-05 | 1.717E-05 |
| Th-229         | Am-241        | 1.000E+00 | 3.877E-18           | 5.334E-17 | 5.332E-16 | 8.907E-15 | 8.709E-14 | 2.396E-14 | 1.617E-12 | 1.503E-11 |
| Th-229         | Np-237        | 1.000E+00 | 4.685E-11           | 2.966E-10 | 1.291E-09 | 6.582E-09 | 2.014E-08 | 5.265E-09 | 9.627E-08 | 4.095E-07 |
| Th-229         | Pu-241        | 1.000E+00 | 1.259E-21           | 3.569E-20 | 7.743E-19 | 3.803E-17 | 9.643E-16 | 3.519E-16 | 3.752E-14 | 4.090E-13 |
| Th-229         | Pu-241        | 2.450E-05 | 9.413E-23           | 1.283E-21 | 1.254E-20 | 1.924E-19 | 1.479E-18 | 3.279E-19 | 1.167E-17 | 5.294E-17 |
| Th-229         | ΣDOSE (j)     |           | 4.685E-11           | 2.966E-10 | 1.291E-09 | 6.582E-09 | 2.014E-08 | 5.265E-09 | 9.627E-08 | 4.096E-07 |
| Am-243         | Am-243        | 9.829E-01 | 4.935E-01           | 4.883E-01 | 4.780E-01 | 4.429E-01 | 3.511E-01 | 3.555E-07 | 0.000E+00 | 0.000E+00 |
| Am-243         | Am-243        | 2.720E-03 | 1.366E-03           | 1.351E-03 | 1.323E-03 | 1.226E-03 | 9.718E-04 | 9.840E-10 | 0.000E+00 | 0.000E+00 |
| Am-243         | Cm-243        | 2.359E-03 | 5.527E-08           | 1.630E-07 | 3.660E-07 | 9.583E-07 | 1.870E-06 | 3.772E-12 | 0.000E+00 | 0.000E+00 |
| Am-243         | Cm-243        | 6.529E-06 | 1.530E-10           | 4.511E-10 | 1.013E-09 | 2.652E-09 | 5.175E-09 | 1.044E-14 | 0.000E+00 | 0.000E+00 |
| Am-243         | Cm-243        | 3.301E-05 | 7.734E-10           | 2.281E-09 | 5.121E-09 | 1.341E-08 | 2.617E-08 | 5.278E-14 | 0.000E+00 | 0.000E+00 |
| Am-243         | Cm-243        | 9.135E-08 | 2.140E-12           | 6.312E-12 | 1.417E-11 | 3.711E-11 | 7.242E-11 | 1.461E-16 | 0.000E+00 | 0.000E+00 |
| Am-243         | Cm-243        | 1.981E-09 | 4.641E-14           | 1.368E-13 | 3.073E-13 | 8.045E-13 | 1.570E-12 | 3.167E-18 | 0.000E+00 | 0.000E+00 |
| Am-243         | Cm-243        | 5.481E-12 | 1.284E-16           | 3.787E-16 | 8.505E-16 | 2.227E-15 | 4.345E-15 | 8.765E-21 | 0.000E+00 | 0.000E+00 |
| Am-243         | Cm-243        | 1.416E-06 | 3.318E-11           | 9.785E-11 | 2.197E-10 | 5.753E-10 | 1.123E-09 | 2.265E-15 | 0.000E+00 | 0.000E+00 |
| Am-243         | Cm-243        | 3.920E-09 | 9.184E-14           | 2.708E-13 | 6.082E-13 | 1.592E-12 | 3.107E-12 | 6.268E-18 | 0.000E+00 | 0.000E+00 |
| Am-243         | Cm-243        | 1.982E-08 | 4.643E-13           | 1.369E-12 | 3.075E-12 | 8.050E-12 | 1.571E-11 | 3.169E-17 | 0.000E+00 | 0.000E+00 |
| Am-243         | Cm-243        | 5.484E-11 | 1.285E-15           | 3.789E-15 | 8.510E-15 | 2.228E-14 | 4.348E-14 | 8.770E-20 | 0.000E+00 | 0.000E+00 |
| Am-243         | Cm-243        | 1.189E-12 | 2.786E-17           | 8.215E-17 | 1.845E-16 | 4.830E-16 | 9.426E-16 | 1.901E-21 | 0.000E+00 | 0.000E+00 |
| Am-243         | Cm-243        | 3.291E-15 | 7.711E-20           | 2.274E-19 | 5.106E-19 | 1.337E-18 | 2.609E-18 | 5.262E-24 | 0.000E+00 | 0.000E+00 |
| Am-243         | ΣDOSE (j)     |           | 4.949E-01           | 4.896E-01 | 4.793E-01 | 4.442E-01 | 3.521E-01 | 3.565E-07 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Am-243        | 9.829E-01 | 2.418E-06           | 7.153E-06 | 1.618E-05 | 4.329E-05 | 8.731E-05 | 1.133E-09 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Am-243        | 2.720E-03 | 6.692E-09           | 1.980E-08 | 4.478E-08 | 1.198E-07 | 2.416E-07 | 3.136E-12 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Am-243        | 1.375E-02 | 3.383E-08           | 1.001E-07 | 2.264E-07 | 6.057E-07 | 1.222E-06 | 1.586E-11 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Am-243        | 3.806E-05 | 9.363E-11           | 2.770E-10 | 6.265E-10 | 1.676E-09 | 3.381E-09 | 4.388E-14 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Am-243        | 8.252E-07 | 2.030E-12           | 6.006E-12 | 1.358E-11 | 3.635E-11 | 7.330E-11 | 9.514E-16 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Am-243        | 2.284E-09 | 5.618E-15           | 1.662E-14 | 3.759E-14 | 1.006E-13 | 2.029E-13 | 2.633E-18 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Cm-243        | 2.359E-03 | 1.808E-13           | 1.242E-12 | 6.291E-12 | 4.811E-11 | 2.505E-10 | 7.468E-15 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Cm-243        | 6.529E-06 | 5.004E-16           | 3.438E-15 | 1.741E-14 | 1.332E-13 | 6.932E-13 | 2.067E-17 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Cm-243        | 3.301E-05 | 2.530E-15           | 1.738E-14 | 8.803E-14 | 6.732E-13 | 3.505E-12 | 1.045E-16 | 0.000E+00 | 0.000E+00 |

Summary : RESRAD Default

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Individual Nuclide Dose Summed Over All Pathways  
Parent Nuclide and Branch Fraction Indicated

| Nuclide<br>(j) | Parent<br>(i) | THF(i)    | DOSE (j,t), mrem/yr |           |           |           |           |           |           |           |
|----------------|---------------|-----------|---------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                |               |           | t= 0.000E+00        | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| Pu-239         | Cm-243        | 9.135E-08 | 7.002E-18           | 4.811E-17 | 2.436E-16 | 1.863E-15 | 9.699E-15 | 2.892E-19 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Cm-243        | 1.981E-09 | 1.518E-19           | 1.043E-18 | 5.282E-18 | 4.039E-17 | 2.103E-16 | 6.270E-21 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Cm-243        | 5.481E-12 | 4.202E-22           | 2.887E-21 | 1.462E-20 | 1.118E-19 | 5.820E-19 | 1.735E-23 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Cm-243        | 9.805E-01 | 2.398E-06           | 7.039E-06 | 1.565E-05 | 3.944E-05 | 6.759E-05 | 5.489E-10 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Cm-243        | 2.714E-03 | 6.636E-09           | 1.948E-08 | 4.331E-08 | 1.092E-07 | 1.871E-07 | 1.519E-12 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Cm-243        | 1.372E-02 | 3.355E-08           | 9.850E-08 | 2.190E-07 | 5.519E-07 | 9.458E-07 | 7.680E-12 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Cm-243        | 3.797E-05 | 9.286E-11           | 2.726E-10 | 6.060E-10 | 1.527E-09 | 2.618E-09 | 2.126E-14 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Cm-243        | 8.232E-07 | 2.013E-12           | 5.910E-12 | 1.314E-11 | 3.311E-11 | 5.675E-11 | 4.608E-16 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Cm-243        | 2.278E-09 | 5.572E-15           | 1.636E-14 | 3.636E-14 | 9.165E-14 | 1.571E-13 | 1.275E-18 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Pu-239        | 9.829E-01 | 1.688E-01           | 1.663E-01 | 1.615E-01 | 1.452E-01 | 1.032E-01 | 4.421E-07 | 0.000E+00 | 0.000E+00 |
| Pu-239         | ΣDOSE(j)      |           | 1.688E-01           | 1.663E-01 | 1.615E-01 | 1.453E-01 | 1.033E-01 | 4.438E-07 | 0.000E+00 | 0.000E+00 |
| U-235          | Am-243        | 9.829E-01 | 1.450E-15           | 1.008E-14 | 5.239E-14 | 4.406E-13 | 3.064E-12 | 7.501E-18 | 0.000E+00 | 0.000E+00 |
| U-235          | Am-243        | 2.720E-03 | 4.013E-18           | 2.790E-17 | 1.450E-16 | 1.220E-15 | 8.481E-15 | 2.076E-20 | 0.000E+00 | 0.000E+00 |
| U-235          | Am-243        | 1.375E-02 | 2.029E-17           | 1.410E-16 | 7.331E-16 | 6.165E-15 | 4.288E-14 | 1.050E-19 | 0.000E+00 | 0.000E+00 |
| U-235          | Am-243        | 3.806E-05 | 5.615E-20           | 3.903E-19 | 2.029E-18 | 1.706E-17 | 1.187E-16 | 2.905E-22 | 0.000E+00 | 0.000E+00 |
| U-235          | Am-243        | 8.252E-07 | 1.217E-21           | 8.462E-21 | 4.399E-20 | 3.699E-19 | 2.573E-18 | 6.298E-24 | 0.000E+00 | 0.000E+00 |
| U-235          | Am-243        | 2.284E-09 | 3.369E-24           | 2.342E-23 | 1.217E-22 | 1.024E-21 | 7.121E-21 | 1.743E-26 | 0.000E+00 | 0.000E+00 |
| U-235          | Am-243        | 5.901E-04 | 8.705E-19           | 6.051E-18 | 3.145E-17 | 2.645E-16 | 1.840E-15 | 4.503E-21 | 0.000E+00 | 0.000E+00 |
| U-235          | Am-243        | 1.633E-06 | 2.409E-21           | 1.675E-20 | 8.705E-20 | 7.321E-19 | 5.092E-18 | 1.246E-23 | 0.000E+00 | 0.000E+00 |
| U-235          | Am-243        | 8.257E-06 | 1.218E-20           | 8.467E-20 | 4.401E-19 | 3.701E-18 | 2.574E-17 | 6.301E-23 | 0.000E+00 | 0.000E+00 |
| U-235          | Am-243        | 2.285E-08 | 3.371E-23           | 2.343E-22 | 1.218E-21 | 1.024E-20 | 7.125E-20 | 1.744E-25 | 0.000E+00 | 0.000E+00 |
| U-235          | Am-243        | 4.954E-10 | 7.309E-25           | 5.080E-24 | 2.641E-23 | 2.221E-22 | 1.545E-21 | 3.781E-27 | 0.000E+00 | 0.000E+00 |
| U-235          | Am-243        | 1.371E-12 | 2.023E-27           | 1.406E-26 | 7.309E-26 | 6.147E-25 | 4.275E-24 | 1.034E-29 | 0.000E+00 | 0.000E+00 |
| U-235          | Cm-243        | 2.359E-03 | 8.148E-23           | 1.209E-21 | 1.376E-20 | 3.331E-19 | 6.184E-18 | 3.830E-23 | 0.000E+00 | 0.000E+00 |
| U-235          | Cm-243        | 6.529E-06 | 2.255E-25           | 3.347E-24 | 3.809E-23 | 9.219E-22 | 1.712E-20 | 1.060E-25 | 0.000E+00 | 0.000E+00 |
| U-235          | Cm-243        | 3.301E-05 | 1.140E-24           | 1.692E-23 | 1.926E-22 | 4.661E-21 | 8.653E-20 | 5.359E-25 | 0.000E+00 | 0.000E+00 |
| U-235          | Cm-243        | 9.135E-08 | 3.155E-27           | 4.683E-26 | 5.330E-25 | 1.290E-23 | 2.395E-22 | 1.483E-27 | 0.000E+00 | 0.000E+00 |
| U-235          | Cm-243        | 1.981E-09 | 6.734E-29           | 1.015E-27 | 1.156E-26 | 2.797E-25 | 5.192E-24 | 3.178E-29 | 0.000E+00 | 0.000E+00 |
| U-235          | Cm-243        | 5.481E-12 | 0.000E+00           | 2.515E-30 | 2.993E-29 | 7.740E-28 | 1.437E-26 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| U-235          | Cm-243        | 1.416E-06 | 4.892E-26           | 7.260E-25 | 8.263E-24 | 2.000E-22 | 3.713E-21 | 2.299E-26 | 0.000E+00 | 0.000E+00 |
| U-235          | Cm-243        | 3.920E-09 | 1.349E-28           | 2.009E-27 | 2.287E-26 | 5.535E-25 | 1.028E-23 | 6.290E-29 | 0.000E+00 | 0.000E+00 |
| U-235          | Cm-243        | 1.982E-08 | 6.845E-28           | 1.016E-26 | 1.156E-25 | 2.798E-24 | 5.195E-23 | 3.217E-28 | 0.000E+00 | 0.000E+00 |
| U-235          | Cm-243        | 5.484E-11 | 1.695E-30           | 2.629E-29 | 3.200E-28 | 7.744E-27 | 1.438E-25 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| U-235          | Cm-243        | 1.189E-12 | 0.000E+00           | 0.000E+00 | 6.218E-30 | 1.673E-28 | 3.117E-27 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| U-235          | Cm-243        | 3.291E-15 | 0.000E+00           | 0.000E+00 | 0.000E+00 | 0.000E+00 | 7.935E-30 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| U-235          | Cm-243        | 9.805E-01 | 1.440E-15           | 9.961E-15 | 5.120E-14 | 4.136E-13 | 2.575E-12 | 4.500E-18 | 0.000E+00 | 0.000E+00 |
| U-235          | Cm-243        | 2.714E-03 | 3.986E-18           | 2.757E-17 | 1.417E-16 | 1.145E-15 | 7.128E-15 | 1.245E-20 | 0.000E+00 | 0.000E+00 |
| U-235          | Cm-243        | 1.372E-02 | 2.015E-17           | 1.394E-16 | 7.163E-16 | 5.788E-15 | 3.604E-14 | 6.297E-20 | 0.000E+00 | 0.000E+00 |
| U-235          | Cm-243        | 3.797E-05 | 5.577E-20           | 3.857E-19 | 1.983E-18 | 1.602E-17 | 9.974E-17 | 1.743E-22 | 0.000E+00 | 0.000E+00 |
| U-235          | Cm-243        | 8.232E-07 | 1.209E-21           | 8.363E-21 | 4.298E-20 | 3.473E-19 | 2.162E-18 | 3.778E-24 | 0.000E+00 | 0.000E+00 |
| U-235          | Cm-243        | 2.278E-09 | 3.346E-24           | 2.315E-23 | 1.190E-22 | 9.611E-22 | 5.985E-21 | 1.046E-26 | 0.000E+00 | 0.000E+00 |
| U-235          | Cm-243        | 5.887E-04 | 8.646E-19           | 5.980E-18 | 3.074E-17 | 2.483E-16 | 1.546E-15 | 2.702E-21 | 0.000E+00 | 0.000E+00 |
| U-235          | Cm-243        | 1.629E-06 | 2.393E-21           | 1.655E-20 | 8.506E-20 | 6.873E-19 | 4.279E-18 | 7.477E-24 | 0.000E+00 | 0.000E+00 |
| U-235          | Cm-243        | 8.237E-06 | 1.210E-20           | 8.367E-20 | 4.301E-19 | 3.475E-18 | 2.164E-17 | 3.780E-23 | 0.000E+00 | 0.000E+00 |
| U-235          | Cm-243        | 2.280E-08 | 3.348E-23           | 2.316E-22 | 1.190E-21 | 9.617E-21 | 5.988E-20 | 1.046E-25 | 0.000E+00 | 0.000E+00 |
| U-235          | Cm-243        | 4.942E-10 | 7.259E-25           | 5.021E-24 | 2.581E-23 | 2.085E-22 | 1.298E-21 | 2.268E-27 | 0.000E+00 | 0.000E+00 |
| U-235          | Cm-243        | 1.368E-12 | 2.009E-27           | 1.390E-26 | 7.142E-26 | 5.770E-25 | 3.593E-24 | 5.577E-30 | 0.000E+00 | 0.000E+00 |
| U-235          | Pu-239        | 5.901E-04 | 9.093E-14           | 2.708E-13 | 6.211E-13 | 1.751E-12 | 4.192E-12 | 3.134E-18 | 0.000E+00 | 0.000E+00 |

Summary : RESRAD Default

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Individual Nuclide Dose Summed Over All Pathways  
Parent Nuclide and Branch Fraction Indicated

| Nuclide<br>(j) | Parent<br>(i) | THF(i)    | DOSE (j,t), mrem/yr |           |           |           |           |           |           |           |
|----------------|---------------|-----------|---------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                |               |           | t= 0.000E+00        | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| U-235          | Pu-239        | 1.633E-06 | 2.517E-16           | 7.494E-16 | 1.719E-15 | 4.845E-15 | 1.160E-14 | 8.674E-21 | 0.000E+00 | 0.000E+00 |
| U-235          | Pu-239        | 8.257E-06 | 1.272E-15           | 3.789E-15 | 8.690E-15 | 2.450E-14 | 5.866E-14 | 4.385E-20 | 0.000E+00 | 0.000E+00 |
| U-235          | Pu-239        | 2.285E-08 | 3.521E-18           | 1.049E-17 | 2.405E-17 | 6.780E-17 | 1.623E-16 | 1.214E-22 | 0.000E+00 | 0.000E+00 |
| U-235          | Pu-239        | 4.954E-10 | 7.634E-20           | 2.273E-19 | 5.214E-19 | 1.470E-18 | 3.520E-18 | 2.631E-24 | 0.000E+00 | 0.000E+00 |
| U-235          | Pu-239        | 1.371E-12 | 2.113E-22           | 6.292E-22 | 1.443E-21 | 4.068E-21 | 9.741E-21 | 7.282E-27 | 0.000E+00 | 0.000E+00 |
| U-235          | Pu-239        | 9.829E-01 | 1.515E-10           | 4.510E-10 | 1.034E-09 | 2.916E-09 | 6.983E-09 | 5.220E-15 | 0.000E+00 | 0.000E+00 |
| U-235          | Pu-239        | 2.720E-03 | 4.192E-13           | 1.248E-12 | 2.863E-12 | 8.071E-12 | 1.933E-11 | 1.445E-17 | 0.000E+00 | 0.000E+00 |
| U-235          | Pu-239        | 1.375E-02 | 2.119E-12           | 6.311E-12 | 1.447E-11 | 4.080E-11 | 9.771E-11 | 7.304E-17 | 0.000E+00 | 0.000E+00 |
| U-235          | Pu-239        | 3.806E-05 | 5.865E-15           | 1.747E-14 | 4.006E-14 | 1.129E-13 | 2.704E-13 | 2.022E-19 | 0.000E+00 | 0.000E+00 |
| U-235          | Pu-239        | 8.252E-07 | 1.272E-16           | 3.787E-16 | 8.685E-16 | 2.448E-15 | 5.863E-15 | 4.383E-21 | 0.000E+00 | 0.000E+00 |
| U-235          | Pu-239        | 2.284E-09 | 3.519E-19           | 1.048E-18 | 2.404E-18 | 6.776E-18 | 1.623E-17 | 1.213E-23 | 0.000E+00 | 0.000E+00 |
| U-235          | ΣDOSE (j)     |           | 1.541E-10           | 4.589E-10 | 1.053E-09 | 2.968E-09 | 7.110E-09 | 5.323E-15 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Am-243        | 9.829E-01 | 4.406E-20           | 6.822E-19 | 7.894E-18 | 1.891E-16 | 3.232E-15 | 6.204E-19 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Am-243        | 2.720E-03 | 1.219E-22           | 1.888E-21 | 2.185E-20 | 5.234E-19 | 8.946E-18 | 1.717E-21 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Am-243        | 1.375E-02 | 6.165E-22           | 9.546E-21 | 1.105E-19 | 2.646E-18 | 4.523E-17 | 8.681E-21 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Am-243        | 3.806E-05 | 1.706E-24           | 2.642E-23 | 3.057E-22 | 7.324E-21 | 1.252E-19 | 2.403E-23 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Am-243        | 8.252E-07 | 3.699E-26           | 5.728E-25 | 6.627E-24 | 1.588E-22 | 2.714E-21 | 5.209E-25 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Am-243        | 2.284E-09 | 1.007E-28           | 1.585E-27 | 1.834E-26 | 4.395E-25 | 7.511E-24 | 1.442E-27 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Am-243        | 5.901E-04 | 2.645E-23           | 4.096E-22 | 4.739E-21 | 1.135E-19 | 1.941E-18 | 3.725E-22 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Am-243        | 1.633E-06 | 7.321E-26           | 1.134E-24 | 1.312E-23 | 3.143E-22 | 5.371E-21 | 1.031E-24 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Am-243        | 8.257E-06 | 3.701E-25           | 5.731E-24 | 6.631E-23 | 1.589E-21 | 2.715E-20 | 5.212E-24 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Am-243        | 2.285E-08 | 1.024E-27           | 1.586E-26 | 1.835E-25 | 4.397E-24 | 7.515E-23 | 1.442E-26 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Am-243        | 4.954E-10 | 2.100E-29           | 3.433E-28 | 3.979E-27 | 9.533E-26 | 1.629E-24 | 3.124E-28 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Am-243        | 1.371E-12 | 0.000E+00           | 0.000E+00 | 9.629E-30 | 2.636E-28 | 4.509E-27 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Cm-243        | 2.359E-03 | 1.942E-27           | 6.248E-26 | 1.560E-24 | 1.079E-22 | 4.988E-21 | 2.517E-24 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Cm-243        | 6.529E-06 | 4.616E-30           | 1.716E-28 | 4.317E-27 | 2.985E-25 | 1.380E-23 | 6.965E-27 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Cm-243        | 3.301E-05 | 2.669E-29           | 8.743E-28 | 2.182E-26 | 1.509E-24 | 6.979E-23 | 3.521E-26 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Cm-243        | 9.135E-08 | 0.000E+00           | 2.103E-30 | 5.967E-29 | 4.177E-27 | 1.932E-25 | 9.667E-29 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Cm-243        | 1.981E-09 | 0.000E+00           | 0.000E+00 | 1.144E-30 | 8.954E-29 | 4.188E-27 | 2.096E-30 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Cm-243        | 5.481E-12 | 0.000E+00           | 0.000E+00 | 0.000E+00 | 0.000E+00 | 1.006E-29 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Cm-243        | 1.416E-06 | 1.001E-30           | 3.699E-29 | 9.364E-28 | 6.475E-26 | 2.995E-24 | 1.511E-27 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Cm-243        | 3.920E-09 | 0.000E+00           | 0.000E+00 | 2.264E-30 | 1.783E-28 | 8.288E-27 | 4.148E-30 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Cm-243        | 1.982E-08 | 0.000E+00           | 0.000E+00 | 1.246E-29 | 9.050E-28 | 4.190E-26 | 2.097E-29 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Cm-243        | 5.484E-11 | 0.000E+00           | 0.000E+00 | 0.000E+00 | 2.192E-30 | 1.147E-28 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Cm-243        | 1.189E-12 | 0.000E+00           | 0.000E+00 | 0.000E+00 | 0.000E+00 | 2.181E-30 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Cm-243        | 3.291E-15 | 0.000E+00           | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Cm-243        | 9.805E-01 | 4.380E-20           | 6.757E-19 | 7.753E-18 | 1.803E-16 | 2.836E-15 | 4.229E-19 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Cm-243        | 2.714E-03 | 1.212E-22           | 1.870E-21 | 2.146E-20 | 4.989E-19 | 7.849E-18 | 1.171E-21 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Cm-243        | 1.372E-02 | 6.129E-22           | 9.455E-21 | 1.085E-19 | 2.522E-18 | 3.968E-17 | 5.918E-21 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Cm-243        | 3.797E-05 | 1.696E-24           | 2.617E-23 | 3.002E-22 | 6.981E-21 | 1.098E-19 | 1.638E-23 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Cm-243        | 8.232E-07 | 3.678E-26           | 5.673E-25 | 6.510E-24 | 1.514E-22 | 2.381E-21 | 3.551E-25 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Cm-243        | 2.278E-09 | 1.001E-28           | 1.570E-27 | 1.802E-26 | 4.189E-25 | 6.590E-24 | 9.819E-28 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Cm-243        | 5.887E-04 | 2.630E-23           | 4.057E-22 | 4.655E-21 | 1.082E-19 | 1.703E-18 | 2.539E-22 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Cm-243        | 1.629E-06 | 7.278E-26           | 1.123E-24 | 1.288E-23 | 2.995E-22 | 4.712E-21 | 7.028E-25 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Cm-243        | 8.237E-06 | 3.680E-25           | 5.676E-24 | 6.513E-23 | 1.514E-21 | 2.382E-20 | 3.553E-24 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Cm-243        | 2.280E-08 | 1.018E-27           | 1.571E-26 | 1.803E-25 | 4.191E-24 | 6.594E-23 | 9.833E-27 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Cm-243        | 4.942E-10 | 2.087E-29           | 3.400E-28 | 3.908E-27 | 9.087E-26 | 1.430E-24 | 2.130E-28 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Cm-243        | 1.368E-12 | 0.000E+00           | 0.000E+00 | 9.458E-30 | 2.503E-28 | 3.956E-27 | 0.000E+00 | 0.000E+00 | 0.000E+00 |

Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

Individual Nuclide Dose Summed Over All Pathways  
Parent Nuclide and Branch Fraction Indicated

| Nuclide<br>(j) | Parent<br>(i) | THF (i)   | DOSE (j, t), mrem/yr |           |           |           |           |           |           |           |
|----------------|---------------|-----------|----------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                |               |           | t= 0.000E+00         | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| Pa-231         | Pu-239        | 5.901E-04 | 3.765E-18            | 2.696E-17 | 1.404E-16 | 1.133E-15 | 6.702E-15 | 4.012E-19 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Pu-239        | 1.633E-06 | 1.042E-20            | 7.461E-20 | 3.887E-19 | 3.135E-18 | 1.855E-17 | 1.110E-21 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Pu-239        | 8.257E-06 | 5.268E-20            | 3.772E-19 | 1.965E-18 | 1.585E-17 | 9.378E-17 | 5.614E-21 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Pu-239        | 2.285E-08 | 1.458E-22            | 1.044E-21 | 5.439E-21 | 4.386E-20 | 2.596E-19 | 1.554E-23 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Pu-239        | 4.954E-10 | 3.161E-24            | 2.263E-23 | 1.179E-22 | 9.509E-22 | 5.627E-21 | 3.368E-25 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Pu-239        | 1.371E-12 | 8.749E-27            | 6.264E-26 | 3.263E-25 | 2.632E-24 | 1.557E-23 | 9.314E-28 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Pu-239        | 9.829E-01 | 6.271E-15            | 4.491E-14 | 2.339E-13 | 1.887E-12 | 1.116E-11 | 6.683E-16 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Pu-239        | 2.720E-03 | 1.736E-17            | 1.243E-16 | 6.474E-16 | 5.221E-15 | 3.090E-14 | 1.850E-18 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Pu-239        | 1.375E-02 | 8.775E-17            | 6.283E-16 | 3.273E-15 | 2.640E-14 | 1.562E-13 | 9.351E-18 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Pu-239        | 3.806E-05 | 2.429E-19            | 1.739E-18 | 9.059E-18 | 7.306E-17 | 4.323E-16 | 2.588E-20 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Pu-239        | 8.252E-07 | 5.265E-21            | 3.770E-20 | 1.964E-19 | 1.584E-18 | 9.373E-18 | 5.611E-22 | 0.000E+00 | 0.000E+00 |
| Pa-231         | Pu-239        | 2.284E-09 | 1.457E-23            | 1.043E-22 | 5.436E-22 | 4.384E-21 | 2.594E-20 | 1.553E-24 | 0.000E+00 | 0.000E+00 |
| Pa-231         | ΣDOSE (j)     |           | 6.380E-15            | 4.569E-14 | 2.380E-13 | 1.920E-12 | 1.136E-11 | 6.810E-16 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Am-243        | 9.829E-01 | 2.427E-22            | 6.726E-21 | 1.546E-19 | 1.036E-17 | 5.127E-16 | 4.481E-20 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Am-243        | 5.901E-04 | 1.457E-25            | 4.038E-24 | 9.281E-23 | 6.222E-21 | 3.078E-19 | 2.690E-23 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Cm-243        | 2.359E-03 | 8.939E-30            | 5.232E-28 | 2.519E-26 | 4.838E-24 | 6.613E-22 | 1.624E-25 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Cm-243        | 1.416E-06 | 0.000E+00            | 0.000E+00 | 1.427E-29 | 2.904E-27 | 3.970E-25 | 9.633E-29 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Cm-243        | 9.805E-01 | 2.414E-22            | 6.669E-21 | 1.523E-19 | 9.963E-18 | 4.600E-16 | 3.205E-20 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Cm-243        | 5.887E-04 | 1.449E-25            | 4.004E-24 | 9.141E-23 | 5.981E-21 | 2.761E-19 | 1.924E-23 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Pu-239        | 5.901E-04 | 2.449E-20            | 3.313E-19 | 3.555E-18 | 8.093E-17 | 1.359E-15 | 3.454E-20 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Pu-239        | 9.829E-01 | 4.079E-17            | 5.519E-16 | 5.921E-15 | 1.348E-13 | 2.263E-12 | 5.753E-17 | 0.000E+00 | 0.000E+00 |
| Ac-227         | ΣDOSE (j)     |           | 4.081E-17            | 5.522E-16 | 5.925E-15 | 1.349E-13 | 2.265E-12 | 5.765E-17 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Am-243        | 2.720E-03 | 5.283E-25            | 1.639E-23 | 4.034E-22 | 2.824E-20 | 1.419E-18 | 1.211E-22 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Am-243        | 1.375E-02 | 2.394E-24            | 7.436E-23 | 1.830E-21 | 1.279E-19 | 6.373E-18 | 6.107E-22 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Am-243        | 1.633E-06 | 3.163E-28            | 9.839E-27 | 2.422E-25 | 1.695E-23 | 8.520E-22 | 7.269E-26 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Cm-243        | 6.529E-06 | 0.000E+00            | 0.000E+00 | 6.412E-29 | 1.311E-26 | 1.827E-24 | 4.366E-28 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Cm-243        | 3.920E-09 | 0.000E+00            | 0.000E+00 | 0.000E+00 | 7.418E-30 | 1.097E-27 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Cm-243        | 2.714E-03 | 5.255E-25            | 1.625E-23 | 3.974E-22 | 2.715E-20 | 1.273E-18 | 8.671E-23 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Cm-243        | 1.629E-06 | 3.146E-28            | 9.758E-27 | 2.386E-25 | 1.630E-23 | 7.645E-22 | 5.206E-26 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Pu-239        | 1.633E-06 | 5.545E-23            | 8.297E-22 | 9.418E-21 | 2.217E-19 | 3.767E-18 | 9.370E-23 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Pu-239        | 2.720E-03 | 9.236E-20            | 1.382E-18 | 1.569E-17 | 3.693E-16 | 6.274E-15 | 1.561E-19 | 0.000E+00 | 0.000E+00 |
| Ac-227         | ΣDOSE (j)     |           | 9.242E-20            | 1.383E-18 | 1.570E-17 | 3.697E-16 | 6.287E-15 | 1.570E-19 | 0.000E+00 | 0.000E+00 |
| Am-243         | Am-243        | 1.375E-02 | 6.905E-03            | 6.832E-03 | 6.688E-03 | 6.198E-03 | 4.913E-03 | 4.975E-09 | 0.000E+00 | 0.000E+00 |
| Am-243         | Am-243        | 3.806E-05 | 1.911E-05            | 1.891E-05 | 1.851E-05 | 1.715E-05 | 1.360E-05 | 1.377E-11 | 0.000E+00 | 0.000E+00 |
| Am-243         | ΣDOSE (j)     |           | 6.924E-03            | 6.851E-03 | 6.706E-03 | 6.215E-03 | 4.927E-03 | 4.988E-09 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Am-243        | 3.806E-05 | 6.683E-27            | 2.076E-25 | 5.109E-24 | 3.569E-22 | 1.780E-20 | 1.690E-24 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Am-243        | 8.252E-07 | 9.734E-29            | 3.052E-27 | 7.514E-26 | 5.195E-24 | 2.491E-22 | 3.498E-26 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Am-243        | 2.285E-08 | 2.249E-30            | 1.242E-28 | 3.067E-27 | 2.143E-25 | 1.069E-23 | 1.015E-27 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Cm-243        | 9.135E-08 | 0.000E+00            | 0.000E+00 | 0.000E+00 | 1.652E-28 | 2.292E-26 | 6.039E-30 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Cm-243        | 5.484E-11 | 0.000E+00            | 0.000E+00 | 0.000E+00 | 0.000E+00 | 1.298E-29 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Cm-243        | 3.797E-05 | 6.647E-27            | 2.058E-25 | 5.033E-24 | 3.432E-22 | 1.597E-20 | 1.211E-24 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Cm-243        | 2.280E-08 | 2.237E-30            | 1.232E-28 | 3.022E-27 | 2.060E-25 | 9.589E-24 | 7.267E-28 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Pu-239        | 2.285E-08 | 7.018E-25            | 1.051E-23 | 1.193E-22 | 2.802E-21 | 4.725E-20 | 1.308E-24 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Pu-239        | 3.806E-05 | 1.169E-21            | 1.751E-20 | 1.987E-19 | 4.668E-18 | 7.870E-17 | 2.179E-21 | 0.000E+00 | 0.000E+00 |
| Ac-227         | ΣDOSE (j)     |           | 1.170E-21            | 1.752E-20 | 1.989E-19 | 4.671E-18 | 7.878E-17 | 2.183E-21 | 0.000E+00 | 0.000E+00 |

Summary : RESRAD Default

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Individual Nuclide Dose Summed Over All Pathways  
Parent Nuclide and Branch Fraction Indicated

| Nuclide<br>(j) | Parent<br>(i) | THF(i)    | DOSE (j, t), mrem/yr |           |           |           |           |           |           |           |
|----------------|---------------|-----------|----------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                |               |           | t= 0.000E+00         | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| Am-243         | Am-243        | 8.252E-07 | 4.143E-07            | 4.100E-07 | 4.013E-07 | 3.719E-07 | 2.948E-07 | 2.985E-13 | 0.000E+00 | 0.000E+00 |
| Am-243         | Am-243        | 2.284E-09 | 1.147E-09            | 1.135E-09 | 1.111E-09 | 1.029E-09 | 8.159E-10 | 8.261E-16 | 0.000E+00 | 0.000E+00 |
| Am-243         | ΣDOSE (j)     |           | 4.155E-07            | 4.111E-07 | 4.024E-07 | 3.729E-07 | 2.956E-07 | 2.993E-13 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Am-243        | 2.284E-09 | 0.000E+00            | 7.718E-30 | 2.097E-28 | 1.456E-26 | 6.990E-25 | 9.580E-29 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Am-243        | 1.371E-12 | 0.000E+00            | 0.000E+00 | 0.000E+00 | 7.929E-30 | 4.196E-28 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Cm-243        | 5.481E-12 | 0.000E+00            | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Cm-243        | 3.291E-15 | 0.000E+00            | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Cm-243        | 2.278E-09 | 0.000E+00            | 7.654E-30 | 2.065E-28 | 1.400E-26 | 6.272E-25 | 6.861E-29 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Cm-243        | 1.368E-12 | 0.000E+00            | 0.000E+00 | 0.000E+00 | 7.623E-30 | 3.765E-28 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Pu-239        | 1.371E-12 | 2.838E-29            | 4.337E-28 | 4.920E-27 | 1.144E-25 | 1.856E-24 | 7.414E-29 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Pu-239        | 2.284E-09 | 4.805E-26            | 7.224E-25 | 8.196E-24 | 1.905E-22 | 3.091E-21 | 1.248E-25 | 0.000E+00 | 0.000E+00 |
| Ac-227         | ΣDOSE (j)     |           | 4.808E-26            | 7.229E-25 | 8.201E-24 | 1.906E-22 | 3.094E-21 | 1.250E-25 | 0.000E+00 | 0.000E+00 |
| Am-243         | Am-243        | 5.901E-04 | 2.963E-04            | 2.931E-04 | 2.869E-04 | 2.659E-04 | 2.108E-04 | 2.134E-10 | 0.000E+00 | 0.000E+00 |
| Am-243         | Am-243        | 1.633E-06 | 8.200E-07            | 8.113E-07 | 7.942E-07 | 7.360E-07 | 5.834E-07 | 5.907E-13 | 0.000E+00 | 0.000E+00 |
| Am-243         | ΣDOSE (j)     |           | 2.971E-04            | 2.940E-04 | 2.877E-04 | 2.667E-04 | 2.114E-04 | 2.140E-10 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Am-243        | 5.901E-04 | 1.452E-09            | 4.295E-09 | 9.713E-09 | 2.599E-08 | 5.242E-08 | 6.803E-13 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Am-243        | 1.633E-06 | 4.017E-12            | 1.189E-11 | 2.688E-11 | 7.193E-11 | 1.451E-10 | 1.883E-15 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Am-243        | 8.257E-06 | 2.031E-11            | 6.009E-11 | 1.359E-10 | 3.637E-10 | 7.334E-10 | 9.519E-15 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Am-243        | 2.285E-08 | 5.621E-14            | 1.663E-13 | 3.761E-13 | 1.006E-12 | 2.030E-12 | 2.635E-17 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Am-243        | 4.954E-10 | 1.219E-15            | 3.606E-15 | 8.155E-15 | 2.182E-14 | 4.401E-14 | 5.712E-19 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Am-243        | 1.371E-12 | 3.373E-18            | 9.979E-18 | 2.257E-17 | 6.039E-17 | 1.218E-16 | 1.581E-21 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Cm-243        | 1.416E-06 | 1.026E-16            | 7.271E-16 | 3.735E-15 | 2.878E-14 | 1.502E-13 | 4.481E-18 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Cm-243        | 3.920E-09 | 2.839E-19            | 2.012E-18 | 1.034E-17 | 7.965E-17 | 4.157E-16 | 1.240E-20 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Cm-243        | 1.982E-08 | 1.435E-18            | 1.017E-17 | 5.226E-17 | 4.027E-16 | 2.101E-15 | 6.270E-20 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Cm-243        | 5.484E-11 | 3.973E-21            | 2.816E-20 | 1.446E-19 | 1.114E-18 | 5.816E-18 | 1.735E-22 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Cm-243        | 1.189E-12 | 8.613E-23            | 6.105E-22 | 3.136E-21 | 2.416E-20 | 1.261E-19 | 3.762E-24 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Cm-243        | 3.291E-15 | 2.384E-25            | 1.690E-24 | 8.679E-24 | 6.687E-23 | 3.490E-22 | 1.041E-26 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Cm-243        | 5.887E-04 | 1.440E-09            | 4.226E-09 | 9.395E-09 | 2.368E-08 | 4.058E-08 | 3.295E-13 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Cm-243        | 1.629E-06 | 3.984E-12            | 1.170E-11 | 2.600E-11 | 6.553E-11 | 1.123E-10 | 9.120E-16 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Cm-243        | 8.237E-06 | 2.014E-11            | 5.913E-11 | 1.315E-10 | 3.313E-10 | 5.678E-10 | 4.611E-15 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Cm-243        | 2.280E-08 | 5.575E-14            | 1.637E-13 | 3.638E-13 | 9.170E-13 | 1.571E-12 | 1.276E-17 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Cm-243        | 4.942E-10 | 1.209E-15            | 3.548E-15 | 7.888E-15 | 1.988E-14 | 3.407E-14 | 2.767E-19 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Cm-243        | 1.368E-12 | 3.345E-18            | 9.820E-18 | 2.183E-17 | 5.502E-17 | 9.429E-17 | 7.657E-22 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Pu-239        | 5.901E-04 | 1.013E-04            | 9.986E-05 | 9.696E-05 | 8.717E-05 | 6.194E-05 | 2.654E-10 | 0.000E+00 | 0.000E+00 |
| Pu-239         | ΣDOSE (j)     |           | 1.013E-04            | 9.986E-05 | 9.698E-05 | 8.722E-05 | 6.203E-05 | 2.664E-10 | 0.000E+00 | 0.000E+00 |
| Am-243         | Am-243        | 8.257E-06 | 4.146E-06            | 4.102E-06 | 4.015E-06 | 3.721E-06 | 2.950E-06 | 2.987E-12 | 0.000E+00 | 0.000E+00 |
| Am-243         | Am-243        | 2.285E-08 | 1.147E-08            | 1.135E-08 | 1.111E-08 | 1.030E-08 | 8.164E-09 | 8.266E-15 | 0.000E+00 | 0.000E+00 |
| Am-243         | ΣDOSE (j)     |           | 4.157E-06            | 4.113E-06 | 4.026E-06 | 3.731E-06 | 2.958E-06 | 2.995E-12 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Am-243        | 8.257E-06 | 1.437E-27            | 4.464E-26 | 1.099E-24 | 7.676E-23 | 3.826E-21 | 3.667E-25 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Cm-243        | 3.301E-05 | 0.000E+00            | 5.256E-30 | 2.930E-28 | 5.937E-26 | 8.207E-24 | 2.207E-27 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Cm-243        | 1.982E-08 | 0.000E+00            | 0.000E+00 | 0.000E+00 | 3.525E-29 | 4.927E-27 | 1.310E-30 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Cm-243        | 1.372E-02 | 2.381E-24            | 7.374E-23 | 1.803E-21 | 1.229E-19 | 5.719E-18 | 4.374E-22 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Cm-243        | 8.237E-06 | 1.430E-27            | 4.427E-26 | 1.083E-24 | 7.380E-23 | 3.433E-21 | 2.626E-25 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Pu-239        | 8.257E-06 | 2.514E-22            | 3.766E-21 | 4.275E-20 | 1.004E-18 | 1.692E-17 | 4.727E-22 | 0.000E+00 | 0.000E+00 |



Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

## Individual Nuclide Dose Summed Over All Pathways

Parent Nuclide and Branch Fraction Indicated

| Nuclide<br>(j) | Parent<br>(i) | THF(i)    | DOSE (j, t), mrem/yr |           |           |           |           |           |           |           |
|----------------|---------------|-----------|----------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                |               |           | t= 0.000E+00         | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| Ac-227         | Pu-239        | 1.375E-02 | 4.188E-19            | 6.273E-18 | 7.120E-17 | 1.672E-15 | 2.818E-14 | 7.873E-19 | 0.000E+00 | 0.000E+00 |
| Ac-227         | ΣDOSE (j)     |           | 4.190E-19            | 6.276E-18 | 7.125E-17 | 1.673E-15 | 2.820E-14 | 7.882E-19 | 0.000E+00 | 0.000E+00 |
| Am-243         | Am-243        | 4.954E-10 | 2.488E-10            | 2.461E-10 | 2.409E-10 | 2.233E-10 | 1.770E-10 | 1.792E-16 | 0.000E+00 | 0.000E+00 |
| Am-243         | Am-243        | 1.371E-12 | 6.885E-13            | 6.812E-13 | 6.668E-13 | 6.179E-13 | 4.899E-13 | 4.960E-19 | 0.000E+00 | 0.000E+00 |
| Am-243         | ΣDOSE (j)     |           | 2.494E-10            | 2.468E-10 | 2.416E-10 | 2.239E-10 | 1.775E-10 | 1.797E-16 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Am-243        | 4.954E-10 | 0.000E+00            | 0.000E+00 | 4.440E-29 | 3.119E-27 | 1.495E-25 | 2.078E-29 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Cm-243        | 1.981E-09 | 0.000E+00            | 0.000E+00 | 0.000E+00 | 0.000E+00 | 3.207E-28 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Cm-243        | 1.189E-12 | 0.000E+00            | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Cm-243        | 8.232E-07 | 9.682E-29            | 3.027E-27 | 7.402E-26 | 4.995E-24 | 2.235E-22 | 2.505E-26 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Cm-243        | 4.942E-10 | 0.000E+00            | 0.000E+00 | 4.374E-29 | 2.999E-27 | 1.342E-25 | 1.488E-29 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Pu-239        | 4.954E-10 | 1.029E-26            | 1.548E-25 | 1.756E-24 | 4.080E-23 | 6.612E-22 | 2.707E-26 | 0.000E+00 | 0.000E+00 |
| Ac-227         | Pu-239        | 8.252E-07 | 1.714E-23            | 2.578E-22 | 2.925E-21 | 6.796E-20 | 1.101E-18 | 4.509E-23 | 0.000E+00 | 0.000E+00 |
| Ac-227         | ΣDOSE (j)     |           | 1.716E-23            | 2.580E-22 | 2.927E-21 | 6.800E-20 | 1.102E-18 | 4.515E-23 | 0.000E+00 | 0.000E+00 |
| C-14           | C-14          | 1.000E+00 | 2.791E-01            | 1.931E-10 | 0.000E+00 | 0.000E+00 | 5.625E-03 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| Cm-243         | Cm-243        | 2.359E-03 | 7.754E-04            | 7.536E-04 | 7.117E-04 | 5.819E-04 | 3.216E-04 | 1.011E-10 | 0.000E+00 | 0.000E+00 |
| Cm-243         | Cm-243        | 6.529E-06 | 2.146E-06            | 2.086E-06 | 1.970E-06 | 1.610E-06 | 8.902E-07 | 2.798E-13 | 0.000E+00 | 0.000E+00 |
| Cm-243         | ΣDOSE (j)     |           | 7.775E-04            | 7.557E-04 | 7.137E-04 | 5.835E-04 | 3.225E-04 | 1.014E-10 | 0.000E+00 | 0.000E+00 |
| Cm-243         | Cm-243        | 3.301E-05 | 1.085E-05            | 1.054E-05 | 9.958E-06 | 8.141E-06 | 4.500E-06 | 1.415E-12 | 0.000E+00 | 0.000E+00 |
| Cm-243         | Cm-243        | 9.135E-08 | 3.003E-08            | 2.918E-08 | 2.756E-08 | 2.253E-08 | 1.246E-08 | 3.915E-15 | 0.000E+00 | 0.000E+00 |
| Cm-243         | ΣDOSE (j)     |           | 1.088E-05            | 1.057E-05 | 9.986E-06 | 8.164E-06 | 4.513E-06 | 1.418E-12 | 0.000E+00 | 0.000E+00 |
| Cm-243         | Cm-243        | 1.981E-09 | 6.510E-10            | 6.327E-10 | 5.975E-10 | 4.885E-10 | 2.700E-10 | 8.488E-17 | 0.000E+00 | 0.000E+00 |
| Cm-243         | Cm-243        | 5.481E-12 | 1.802E-12            | 1.751E-12 | 1.654E-12 | 1.352E-12 | 7.474E-13 | 2.349E-19 | 0.000E+00 | 0.000E+00 |
| Cm-243         | ΣDOSE (j)     |           | 6.528E-10            | 6.344E-10 | 5.992E-10 | 4.899E-10 | 2.708E-10 | 8.511E-17 | 0.000E+00 | 0.000E+00 |
| Cm-243         | Cm-243        | 1.416E-06 | 4.655E-07            | 4.524E-07 | 4.273E-07 | 3.493E-07 | 1.931E-07 | 6.069E-14 | 0.000E+00 | 0.000E+00 |
| Cm-243         | Cm-243        | 3.920E-09 | 1.288E-09            | 1.252E-09 | 1.183E-09 | 9.668E-10 | 5.344E-10 | 1.680E-16 | 0.000E+00 | 0.000E+00 |
| Cm-243         | ΣDOSE (j)     |           | 4.668E-07            | 4.537E-07 | 4.285E-07 | 3.503E-07 | 1.936E-07 | 6.086E-14 | 0.000E+00 | 0.000E+00 |
| Cm-243         | Cm-243        | 1.982E-08 | 6.513E-09            | 6.330E-09 | 5.979E-09 | 4.888E-09 | 2.702E-09 | 8.493E-16 | 0.000E+00 | 0.000E+00 |
| Cm-243         | Cm-243        | 5.484E-11 | 1.803E-11            | 1.752E-11 | 1.655E-11 | 1.353E-11 | 7.478E-12 | 2.350E-18 | 0.000E+00 | 0.000E+00 |
| Cm-243         | ΣDOSE (j)     |           | 6.531E-09            | 6.348E-09 | 5.995E-09 | 4.901E-09 | 2.709E-09 | 8.516E-16 | 0.000E+00 | 0.000E+00 |
| Cm-243         | Cm-243        | 1.189E-12 | 3.908E-13            | 3.798E-13 | 3.587E-13 | 2.933E-13 | 1.621E-13 | 5.096E-20 | 0.000E+00 | 0.000E+00 |
| Cm-243         | Cm-243        | 3.291E-15 | 1.082E-15            | 1.051E-15 | 9.929E-16 | 8.117E-16 | 4.487E-16 | 1.410E-22 | 0.000E+00 | 0.000E+00 |
| Cm-243         | ΣDOSE (j)     |           | 3.919E-13            | 3.809E-13 | 3.597E-13 | 2.941E-13 | 1.626E-13 | 5.110E-20 | 0.000E+00 | 0.000E+00 |
| Cm-243         | Cm-243        | 9.805E-01 | 3.223E-01            | 3.132E-01 | 2.958E-01 | 2.419E-01 | 1.337E-01 | 4.202E-08 | 0.000E+00 | 0.000E+00 |
| Cm-243         | Cm-243        | 2.714E-03 | 8.920E-04            | 8.669E-04 | 8.188E-04 | 6.694E-04 | 3.700E-04 | 1.163E-10 | 0.000E+00 | 0.000E+00 |
| Cm-243         | ΣDOSE (j)     |           | 3.232E-01            | 3.141E-01 | 2.967E-01 | 2.425E-01 | 1.341E-01 | 4.214E-08 | 0.000E+00 | 0.000E+00 |
| Cm-243         | Cm-243        | 1.372E-02 | 4.510E-03            | 4.383E-03 | 4.139E-03 | 3.384E-03 | 1.871E-03 | 5.880E-10 | 0.000E+00 | 0.000E+00 |
| Cm-243         | Cm-243        | 3.797E-05 | 1.248E-05            | 1.213E-05 | 1.146E-05 | 9.366E-06 | 5.177E-06 | 1.627E-12 | 0.000E+00 | 0.000E+00 |
| Cm-243         | ΣDOSE (j)     |           | 4.522E-03            | 4.395E-03 | 4.151E-03 | 3.393E-03 | 1.876E-03 | 5.896E-10 | 0.000E+00 | 0.000E+00 |

Summary : RESRAD Default

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## Individual Nuclide Dose Summed Over All Pathways

Parent Nuclide and Branch Fraction Indicated

| Nuclide<br>(j) | Parent<br>(i) | THF(i)    | DOSE(j,t), mrem/yr |           |           |           |           |           |           |           |
|----------------|---------------|-----------|--------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                |               |           | t= 0.000E+00       | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| Cm-243         | Cm-243        | 8.232E-07 | 2.706E-07          | 2.630E-07 | 2.484E-07 | 2.031E-07 | 1.122E-07 | 3.528E-14 | 0.000E+00 | 0.000E+00 |
| Cm-243         | Cm-243        | 2.278E-09 | 7.489E-10          | 7.279E-10 | 6.874E-10 | 5.620E-10 | 3.107E-10 | 9.765E-17 | 0.000E+00 | 0.000E+00 |
| Cm-243         | ΣDOSE(j)      |           | 2.713E-07          | 2.637E-07 | 2.491E-07 | 2.036E-07 | 1.126E-07 | 3.538E-14 | 0.000E+00 | 0.000E+00 |
| Cm-243         | Cm-243        | 5.887E-04 | 1.935E-04          | 1.881E-04 | 1.776E-04 | 1.452E-04 | 8.026E-05 | 2.523E-11 | 0.000E+00 | 0.000E+00 |
| Cm-243         | Cm-243        | 1.629E-06 | 5.355E-07          | 5.205E-07 | 4.916E-07 | 4.019E-07 | 2.221E-07 | 6.982E-14 | 0.000E+00 | 0.000E+00 |
| Cm-243         | ΣDOSE(j)      |           | 1.940E-04          | 1.886E-04 | 1.781E-04 | 1.456E-04 | 8.049E-05 | 2.530E-11 | 0.000E+00 | 0.000E+00 |
| Cm-243         | Cm-243        | 8.237E-06 | 2.707E-06          | 2.631E-06 | 2.485E-06 | 2.032E-06 | 1.123E-06 | 3.530E-13 | 0.000E+00 | 0.000E+00 |
| Cm-243         | Cm-243        | 2.280E-08 | 7.493E-09          | 7.282E-09 | 6.878E-09 | 5.623E-09 | 3.108E-09 | 9.770E-16 | 0.000E+00 | 0.000E+00 |
| Cm-243         | ΣDOSE(j)      |           | 2.715E-06          | 2.639E-06 | 2.492E-06 | 2.037E-06 | 1.126E-06 | 3.540E-13 | 0.000E+00 | 0.000E+00 |
| Cm-243         | Cm-243        | 4.942E-10 | 1.625E-10          | 1.579E-10 | 1.491E-10 | 1.219E-10 | 6.739E-11 | 2.118E-17 | 0.000E+00 | 0.000E+00 |
| Cm-243         | Cm-243        | 1.368E-12 | 4.496E-13          | 4.370E-13 | 4.127E-13 | 3.374E-13 | 1.865E-13 | 5.862E-20 | 0.000E+00 | 0.000E+00 |
| Cm-243         | ΣDOSE(j)      |           | 1.629E-10          | 1.583E-10 | 1.495E-10 | 1.222E-10 | 6.758E-11 | 2.124E-17 | 0.000E+00 | 0.000E+00 |
| Cm-244         | Cm-244        | 1.371E-06 | 1.266E-07          | 1.205E-07 | 1.092E-07 | 7.717E-08 | 2.754E-08 | 1.110E-14 | 0.000E+00 | 0.000E+00 |
| Cm-244         | Cm-244        | 5.750E-08 | 5.308E-09          | 5.055E-09 | 4.582E-09 | 3.237E-09 | 1.155E-09 | 4.654E-16 | 0.000E+00 | 0.000E+00 |
| Cm-244         | ΣDOSE(j)      |           | 1.319E-07          | 1.256E-07 | 1.138E-07 | 8.041E-08 | 2.869E-08 | 1.156E-14 | 0.000E+00 | 0.000E+00 |
| Pu-240         | Cm-244        | 5.750E-08 | 5.138E-13          | 1.499E-12 | 3.286E-12 | 7.896E-12 | 1.201E-11 | 7.633E-17 | 0.000E+00 | 0.000E+00 |
| Pu-240         | Pu-240        | 5.750E-08 | 9.869E-09          | 9.726E-09 | 9.443E-09 | 8.485E-09 | 6.019E-09 | 2.566E-14 | 0.000E+00 | 0.000E+00 |
| Pu-240         | ΣDOSE(j)      |           | 9.869E-09          | 9.728E-09 | 9.446E-09 | 8.493E-09 | 6.031E-09 | 2.574E-14 | 0.000E+00 | 0.000E+00 |
| Cm-244         | Cm-244        | 1.000E+00 | 9.232E-02          | 8.791E-02 | 7.968E-02 | 5.629E-02 | 2.009E-02 | 8.095E-09 | 0.000E+00 | 0.000E+00 |
| Pu-240         | Cm-244        | 1.000E+00 | 8.936E-06          | 2.607E-05 | 5.714E-05 | 1.373E-04 | 2.089E-04 | 1.328E-09 | 0.000E+00 | 0.000E+00 |
| U-236          | Cm-244        | 1.000E+00 | 1.680E-14          | 1.169E-13 | 5.905E-13 | 4.367E-12 | 2.062E-11 | 3.644E-16 | 0.000E+00 | 0.000E+00 |
| U-236          | Pu-240        | 1.000E+00 | 4.956E-10          | 1.468E-09 | 3.316E-09 | 8.795E-09 | 1.729E-08 | 1.581E-13 | 0.000E+00 | 0.000E+00 |
| U-236          | ΣDOSE(j)      |           | 4.956E-10          | 1.469E-09 | 3.316E-09 | 8.800E-09 | 1.731E-08 | 1.585E-13 | 0.000E+00 | 0.000E+00 |
| Th-232         | Cm-244        | 1.000E+00 | 7.406E-25          | 1.057E-23 | 1.159E-22 | 2.582E-21 | 3.821E-20 | 2.525E-24 | 0.000E+00 | 0.000E+00 |
| Th-232         | Pu-240        | 1.000E+00 | 2.795E-20          | 1.879E-19 | 9.529E-19 | 7.604E-18 | 4.531E-17 | 1.414E-21 | 0.000E+00 | 0.000E+00 |
| Th-232         | ΣDOSE(j)      |           | 2.795E-20          | 1.880E-19 | 9.530E-19 | 7.607E-18 | 4.535E-17 | 1.417E-21 | 0.000E+00 | 0.000E+00 |
| Ra-228         | Cm-244        | 1.000E+00 | 4.716E-25          | 1.456E-23 | 3.459E-22 | 2.093E-20 | 7.258E-19 | 1.091E-22 | 0.000E+00 | 0.000E+00 |
| Ra-228         | Pu-240        | 1.000E+00 | 2.263E-20          | 3.369E-19 | 3.704E-18 | 7.692E-17 | 9.861E-16 | 6.343E-20 | 0.000E+00 | 0.000E+00 |
| Ra-228         | ΣDOSE(j)      |           | 2.263E-20          | 3.369E-19 | 3.704E-18 | 7.694E-17 | 9.868E-16 | 6.354E-20 | 0.000E+00 | 0.000E+00 |
| Th-228         | Cm-244        | 1.000E+00 | 2.959E-26          | 1.705E-24 | 7.685E-23 | 1.016E-20 | 5.897E-19 | 1.035E-24 | 0.000E+00 | 0.000E+00 |
| Th-228         | Pu-240        | 1.000E+00 | 1.666E-21          | 4.696E-20 | 9.824E-19 | 4.271E-17 | 8.556E-16 | 6.072E-22 | 0.000E+00 | 0.000E+00 |
| Th-228         | ΣDOSE(j)      |           | 1.666E-21          | 4.696E-20 | 9.824E-19 | 4.272E-17 | 8.562E-16 | 6.082E-22 | 0.000E+00 | 0.000E+00 |
| Co-60          | Co-60         | 1.000E+00 | 5.280E+00          | 4.612E+00 | 3.517E+00 | 1.358E+00 | 8.742E-02 | 1.029E-11 | 0.000E+00 | 0.000E+00 |
| Cs-134         | Cs-134        | 1.000E+00 | 3.323E+00          | 2.363E+00 | 1.195E+00 | 1.096E-01 | 1.163E-04 | 4.143E-20 | 0.000E+00 | 0.000E+00 |
| Cs-137         | Cs-137        | 1.000E+00 | 1.586E+00          | 1.541E+00 | 1.454E+00 | 1.185E+00 | 6.442E-01 | 1.091E-06 | 0.000E+00 | 0.000E+00 |

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Individual Nuclide Dose Summed Over All Pathways  
Parent Nuclide and Branch Fraction Indicated

| Nuclide<br>(j) | Parent<br>(i) | THF(i)    | DOSE(j,t), mrem/yr |           |           |           |           |           |           |           |
|----------------|---------------|-----------|--------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                |               |           | t= 0.000E+00       | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| Eu-152         | Eu-152        | 7.210E-01 | 1.679E+00          | 1.572E+00 | 1.377E+00 | 8.647E-01 | 2.233E-01 | 1.349E-11 | 0.000E+00 | 0.000E+00 |
| Eu-152         | Eu-152        | 2.790E-01 | 6.497E-01          | 6.082E-01 | 5.328E-01 | 3.346E-01 | 8.642E-02 | 5.221E-12 | 0.000E+00 | 0.000E+00 |
| Eu-152         | ΣDOSE(j)      |           | 2.329E+00          | 2.180E+00 | 1.910E+00 | 1.199E+00 | 3.097E-01 | 1.871E-11 | 0.000E+00 | 0.000E+00 |
| Gd-152         | Eu-152        | 2.790E-01 | 1.902E-17          | 5.475E-17 | 1.174E-16 | 2.643E-16 | 3.534E-16 | 1.342E-21 | 0.000E+00 | 0.000E+00 |
| Sm-148         | Eu-152        | 2.790E-01 | 0.000E+00          | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| Nd-144         | Eu-152        | 2.790E-01 | 0.000E+00          | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| Eu-154         | Eu-154        | 1.000E+00 | 2.508E+00          | 2.279E+00 | 1.882E+00 | 9.616E-01 | 1.376E-01 | 1.161E-12 | 0.000E+00 | 0.000E+00 |
| Eu-155         | Eu-155        | 1.000E+00 | 6.396E-02          | 5.459E-02 | 3.978E-02 | 1.312E-02 | 5.479E-04 | 1.744E-16 | 0.000E+00 | 0.000E+00 |
| Fe-55          | Fe-55         | 1.000E+00 | 7.410E-04          | 5.692E-04 | 3.358E-04 | 5.274E-05 | 2.565E-07 | 1.301E-20 | 0.000E+00 | 0.000E+00 |
| H-3            | H-3           | 1.000E+00 | 1.023E-03          | 3.986E-03 | 5.005E-03 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| Nb-94          | Nb-94         | 1.000E+00 | 3.330E+00          | 3.236E+00 | 3.055E+00 | 2.491E+00 | 1.358E+00 | 1.824E-09 | 0.000E+00 | 2.832E-03 |
| Ni-59          | Ni-59         | 1.000E+00 | 2.285E-03          | 2.220E-03 | 2.093E-03 | 1.698E-03 | 8.997E-04 | 1.420E-08 | 0.000E+00 | 1.824E-05 |
| Ni-63          | Ni-63         | 1.000E+00 | 6.256E-03          | 6.036E-03 | 5.613E-03 | 4.339E-03 | 2.002E-03 | 1.953E-08 | 0.000E+00 | 4.943E-08 |
| Pm-147         | Pm-147        | 1.000E+00 | 2.278E-04          | 1.711E-04 | 9.653E-05 | 1.298E-05 | 4.068E-08 | 8.855E-22 | 0.000E+00 | 0.000E+00 |
| Sm-147         | Pm-147        | 1.000E+00 | 6.957E-14          | 1.816E-13 | 3.243E-13 | 4.547E-13 | 3.632E-13 | 1.275E-18 | 0.000E+00 | 0.000E+00 |
| Pu-238         | Pu-238        | 1.850E-09 | 2.860E-10          | 2.797E-10 | 2.673E-10 | 2.274E-10 | 1.380E-10 | 3.422E-16 | 0.000E+00 | 0.000E+00 |
| Pu-238         | Pu-238        | 9.996E-01 | 1.545E-01          | 1.511E-01 | 1.444E-01 | 1.229E-01 | 7.459E-02 | 1.849E-07 | 0.000E+00 | 0.000E+00 |
| Pu-238         | ΣDOSE(j)      |           | 1.545E-01          | 1.511E-01 | 1.444E-01 | 1.229E-01 | 7.459E-02 | 1.849E-07 | 0.000E+00 | 0.000E+00 |
| U-234          | Pu-238        | 9.996E-01 | 4.969E-08          | 1.467E-07 | 3.288E-07 | 8.487E-07 | 1.543E-06 | 1.067E-11 | 0.000E+00 | 0.000E+00 |
| U-234          | Pu-238        | 1.899E-08 | 9.442E-16          | 2.788E-15 | 6.246E-15 | 1.613E-14 | 2.932E-14 | 2.028E-19 | 0.000E+00 | 0.000E+00 |
| U-234          | Pu-238        | 2.100E-04 | 1.044E-11          | 3.082E-11 | 6.905E-11 | 1.783E-10 | 3.241E-10 | 2.242E-15 | 0.000E+00 | 0.000E+00 |
| U-234          | Pu-238        | 2.771E-10 | 1.378E-17          | 4.068E-17 | 9.115E-17 | 2.353E-16 | 4.279E-16 | 2.959E-21 | 0.000E+00 | 0.000E+00 |
| U-234          | Pu-238        | 3.989E-12 | 1.983E-19          | 5.855E-19 | 1.312E-18 | 3.387E-18 | 6.159E-18 | 4.259E-23 | 0.000E+00 | 0.000E+00 |
| U-234          | Pu-238        | 1.998E-04 | 9.931E-12          | 2.932E-11 | 6.570E-11 | 1.696E-10 | 3.084E-10 | 2.133E-15 | 0.000E+00 | 0.000E+00 |
| U-234          | Pu-238        | 2.637E-10 | 1.311E-17          | 3.870E-17 | 8.672E-17 | 2.239E-16 | 4.071E-16 | 2.815E-21 | 0.000E+00 | 0.000E+00 |
| U-234          | Pu-238        | 3.795E-12 | 1.887E-19          | 5.571E-19 | 1.248E-18 | 3.223E-18 | 5.860E-18 | 4.052E-23 | 0.000E+00 | 0.000E+00 |
| U-234          | Pu-238        | 4.196E-08 | 2.086E-15          | 6.159E-15 | 1.380E-14 | 3.563E-14 | 6.478E-14 | 4.480E-19 | 0.000E+00 | 0.000E+00 |
| U-234          | Pu-238        | 5.538E-14 | 2.753E-21          | 8.130E-21 | 1.822E-20 | 4.703E-20 | 8.551E-20 | 5.913E-25 | 0.000E+00 | 0.000E+00 |
| U-234          | Pu-238        | 7.972E-16 | 3.963E-23          | 1.170E-22 | 2.622E-22 | 6.769E-22 | 1.231E-21 | 8.510E-27 | 0.000E+00 | 0.000E+00 |
| U-234          | Pu-238        | 2.000E-07 | 9.943E-15          | 2.936E-14 | 6.578E-14 | 1.698E-13 | 3.088E-13 | 2.135E-18 | 0.000E+00 | 0.000E+00 |
| U-234          | Pu-238        | 2.640E-13 | 1.312E-20          | 3.875E-20 | 8.683E-20 | 2.242E-19 | 4.076E-19 | 2.819E-24 | 0.000E+00 | 0.000E+00 |
| U-234          | Pu-238        | 3.800E-15 | 1.889E-22          | 5.578E-22 | 1.250E-21 | 3.226E-21 | 5.867E-21 | 4.057E-26 | 0.000E+00 | 0.000E+00 |
| U-234          | ΣDOSE(j)      |           | 4.971E-08          | 1.468E-07 | 3.289E-07 | 8.491E-07 | 1.544E-06 | 1.068E-11 | 0.000E+00 | 0.000E+00 |
| Th-230         | Pu-238        | 9.996E-01 | 1.012E-13          | 6.793E-13 | 3.429E-12 | 2.692E-11 | 1.533E-10 | 3.955E-15 | 0.000E+00 | 0.000E+00 |

Summary : RESRAD Default

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Individual Nuclide Dose Summed Over All Pathways  
Parent Nuclide and Branch Fraction Indicated

| Nuclide<br>(j) | Parent<br>(i) | THF(i)    | DOSE (j,t), mrem/yr |           |           |           |           |           |           |           |
|----------------|---------------|-----------|---------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                |               |           | t= 0.000E+00        | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| Th-230         | Pu-238        | 1.899E-08 | 1.923E-21           | 1.291E-20 | 6.515E-20 | 5.114E-19 | 2.912E-18 | 7.514E-23 | 0.000E+00 | 0.000E+00 |
| Th-230         | Pu-238        | 2.100E-04 | 2.125E-17           | 1.427E-16 | 7.202E-16 | 5.653E-15 | 3.220E-14 | 8.307E-19 | 0.000E+00 | 0.000E+00 |
| Th-230         | Pu-238        | 2.771E-10 | 2.806E-23           | 1.883E-22 | 9.507E-22 | 7.463E-21 | 4.250E-20 | 1.096E-24 | 0.000E+00 | 0.000E+00 |
| Th-230         | Pu-238        | 3.989E-12 | 4.038E-25           | 2.711E-24 | 1.368E-23 | 1.074E-22 | 6.117E-22 | 1.578E-26 | 0.000E+00 | 0.000E+00 |
| Th-230         | Pu-238        | 1.998E-04 | 2.022E-17           | 1.357E-16 | 6.852E-16 | 5.379E-15 | 3.063E-14 | 7.903E-19 | 0.000E+00 | 0.000E+00 |
| Th-230         | Pu-238        | 2.637E-10 | 2.669E-23           | 1.792E-22 | 9.045E-22 | 7.100E-21 | 4.043E-20 | 1.043E-24 | 0.000E+00 | 0.000E+00 |
| Th-230         | Pu-238        | 3.795E-12 | 3.842E-25           | 2.579E-24 | 1.302E-23 | 1.022E-22 | 5.820E-22 | 1.502E-26 | 0.000E+00 | 0.000E+00 |
| Th-230         | Pu-238        | 4.196E-08 | 4.248E-21           | 2.851E-20 | 1.439E-19 | 1.130E-18 | 6.434E-18 | 1.660E-22 | 0.000E+00 | 0.000E+00 |
| Th-230         | Pu-238        | 5.538E-14 | 5.607E-27           | 3.764E-26 | 1.900E-25 | 1.491E-24 | 8.493E-24 | 2.191E-28 | 0.000E+00 | 0.000E+00 |
| Th-230         | Pu-238        | 7.972E-16 | 8.070E-29           | 5.417E-28 | 2.735E-27 | 2.147E-26 | 1.222E-25 | 3.034E-30 | 0.000E+00 | 0.000E+00 |
| Th-230         | Pu-238        | 2.000E-07 | 2.025E-20           | 1.359E-19 | 6.860E-19 | 5.385E-18 | 3.067E-17 | 7.913E-22 | 0.000E+00 | 0.000E+00 |
| Th-230         | Pu-238        | 2.640E-13 | 2.673E-26           | 1.794E-25 | 9.056E-25 | 7.109E-24 | 4.048E-23 | 1.044E-27 | 0.000E+00 | 0.000E+00 |
| Th-230         | Pu-238        | 3.800E-15 | 3.847E-28           | 2.582E-27 | 1.303E-26 | 1.023E-25 | 5.827E-25 | 1.446E-29 | 0.000E+00 | 0.000E+00 |
| Th-230         | ΣDOSE (j)     |           | 1.012E-13           | 6.795E-13 | 3.430E-12 | 2.693E-11 | 1.533E-10 | 3.956E-15 | 0.000E+00 | 0.000E+00 |
| Ra-226         | Pu-238        | 9.996E-01 | 2.235E-15           | 3.376E-14 | 3.894E-13 | 9.647E-12 | 1.873E-10 | 1.584E-14 | 0.000E+00 | 0.000E+00 |
| Ra-226         | Pu-238        | 1.899E-08 | 4.246E-23           | 6.414E-22 | 7.399E-21 | 1.833E-19 | 3.559E-18 | 3.010E-22 | 0.000E+00 | 0.000E+00 |
| Ra-226         | ΣDOSE (j)     |           | 2.235E-15           | 3.376E-14 | 3.894E-13 | 9.647E-12 | 1.873E-10 | 1.584E-14 | 0.000E+00 | 0.000E+00 |
| Pb-210         | Pu-238        | 9.996E-01 | 3.680E-18           | 9.191E-17 | 1.931E-15 | 1.178E-13 | 5.076E-12 | 2.097E-15 | 0.000E+00 | 0.000E+00 |
| Pb-210         | Pu-238        | 1.319E-06 | 2.707E-24           | 8.614E-23 | 2.134E-21 | 1.457E-19 | 6.556E-18 | 2.654E-21 | 0.000E+00 | 0.000E+00 |
| Pb-210         | Pu-238        | 2.100E-04 | 7.729E-22           | 1.930E-20 | 4.056E-19 | 2.474E-17 | 1.066E-15 | 4.405E-19 | 0.000E+00 | 0.000E+00 |
| Pb-210         | Pu-238        | 1.998E-04 | 7.353E-22           | 1.837E-20 | 3.859E-19 | 2.353E-17 | 1.014E-15 | 4.191E-19 | 0.000E+00 | 0.000E+00 |
| Pb-210         | Pu-238        | 4.196E-08 | 1.544E-25           | 3.858E-24 | 8.106E-23 | 4.943E-21 | 2.131E-19 | 8.802E-23 | 0.000E+00 | 0.000E+00 |
| Pb-210         | Pu-238        | 2.000E-07 | 7.362E-25           | 1.839E-23 | 3.864E-22 | 2.356E-20 | 1.016E-18 | 4.196E-22 | 0.000E+00 | 0.000E+00 |
| Pb-210         | ΣDOSE (j)     |           | 3.681E-18           | 9.195E-17 | 1.932E-15 | 1.178E-13 | 5.078E-12 | 2.098E-15 | 0.000E+00 | 0.000E+00 |
| Po-210         | Pu-238        | 9.996E-01 | 3.620E-19           | 1.708E-17 | 6.011E-16 | 5.503E-14 | 2.781E-12 | 4.727E-16 | 0.000E+00 | 0.000E+00 |
| Po-210         | Pu-238        | 2.100E-04 | 7.604E-23           | 3.588E-21 | 1.263E-19 | 1.156E-17 | 5.841E-16 | 9.929E-20 | 0.000E+00 | 0.000E+00 |
| Po-210         | Pu-238        | 1.998E-04 | 7.235E-23           | 3.414E-21 | 1.201E-19 | 1.100E-17 | 5.557E-16 | 9.447E-20 | 0.000E+00 | 0.000E+00 |
| Po-210         | Pu-238        | 4.196E-08 | 1.520E-26           | 7.170E-25 | 2.523E-23 | 2.310E-21 | 1.167E-19 | 1.984E-23 | 0.000E+00 | 0.000E+00 |
| Po-210         | Pu-238        | 2.000E-07 | 7.243E-26           | 3.418E-24 | 1.203E-22 | 1.101E-20 | 5.564E-19 | 9.458E-23 | 0.000E+00 | 0.000E+00 |
| Po-210         | ΣDOSE (j)     |           | 3.622E-19           | 1.709E-17 | 6.014E-16 | 5.506E-14 | 2.782E-12 | 4.729E-16 | 0.000E+00 | 0.000E+00 |
| Pu-238         | Pu-238        | 1.319E-06 | 2.040E-07           | 1.995E-07 | 1.907E-07 | 1.622E-07 | 9.846E-08 | 2.441E-13 | 0.000E+00 | 0.000E+00 |
| Pu-238         | Pu-238        | 1.899E-08 | 2.936E-09           | 2.871E-09 | 2.744E-09 | 2.335E-09 | 1.417E-09 | 3.513E-15 | 0.000E+00 | 0.000E+00 |
| Pu-238         | ΣDOSE (j)     |           | 2.069E-07           | 2.023E-07 | 1.934E-07 | 1.646E-07 | 9.987E-08 | 2.476E-13 | 0.000E+00 | 0.000E+00 |
| U-234          | Pu-238        | 1.319E-06 | 6.559E-14           | 1.937E-13 | 4.340E-13 | 1.120E-12 | 2.037E-12 | 1.409E-17 | 0.000E+00 | 0.000E+00 |
| Th-230         | Pu-238        | 1.319E-06 | 1.336E-19           | 8.966E-19 | 4.526E-18 | 3.553E-17 | 2.023E-16 | 5.220E-21 | 0.000E+00 | 0.000E+00 |
| Ra-226         | Pu-238        | 1.319E-06 | 2.950E-21           | 4.456E-20 | 5.140E-19 | 1.273E-17 | 2.473E-16 | 2.091E-20 | 0.000E+00 | 0.000E+00 |
| Pb-210         | Pu-238        | 1.899E-08 | 3.885E-26           | 1.236E-24 | 3.063E-23 | 2.091E-21 | 9.403E-20 | 3.816E-23 | 0.000E+00 | 0.000E+00 |
| Pb-210         | Pu-238        | 3.989E-12 | 7.244E-30           | 2.596E-28 | 6.433E-27 | 4.393E-25 | 1.975E-23 | 8.015E-27 | 0.000E+00 | 0.000E+00 |
| Pb-210         | Pu-238        | 3.795E-12 | 6.892E-30           | 2.470E-28 | 6.121E-27 | 4.179E-25 | 1.879E-23 | 7.626E-27 | 0.000E+00 | 0.000E+00 |
| Pb-210         | Pu-238        | 7.972E-16 | 0.000E+00           | 0.000E+00 | 0.000E+00 | 8.729E-29 | 3.946E-27 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| Pb-210         | Pu-238        | 3.800E-15 | 0.000E+00           | 0.000E+00 | 5.484E-30 | 4.184E-28 | 1.881E-26 | 6.877E-30 | 0.000E+00 | 0.000E+00 |
| Pb-210         | ΣDOSE (j)     |           | 3.887E-26           | 1.237E-24 | 3.064E-23 | 2.092E-21 | 9.407E-20 | 3.818E-23 | 0.000E+00 | 0.000E+00 |

Summary : RESRAD Default

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Individual Nuclide Dose Summed Over All Pathways  
Parent Nuclide and Branch Fraction Indicated

| Nuclide<br>(j) | Parent<br>(i) | THF(i)    | DOSE (j,t), mrem/yr |           |           |           |           |           |           |           |
|----------------|---------------|-----------|---------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                |               |           | t= 0.000E+00        | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| Pu-238         | Pu-238        | 2.100E-04 | 3.246E-05           | 3.174E-05 | 3.034E-05 | 2.581E-05 | 1.567E-05 | 3.884E-11 | 0.000E+00 | 0.000E+00 |
| Pu-238         | Pu-238        | 2.771E-10 | 4.284E-11           | 4.190E-11 | 4.005E-11 | 3.407E-11 | 2.068E-11 | 5.127E-17 | 0.000E+00 | 0.000E+00 |
| Pu-238         | ΣDOSE (j)     |           | 3.246E-05           | 3.174E-05 | 3.034E-05 | 2.581E-05 | 1.567E-05 | 3.884E-11 | 0.000E+00 | 0.000E+00 |
| Ra-226         | Pu-238        | 2.100E-04 | 4.690E-19           | 7.088E-18 | 8.177E-17 | 2.026E-15 | 3.935E-14 | 3.328E-18 | 0.000E+00 | 0.000E+00 |
| Ra-226         | Pu-238        | 2.771E-10 | 6.190E-25           | 9.356E-24 | 1.079E-22 | 2.675E-21 | 5.194E-20 | 4.393E-24 | 0.000E+00 | 0.000E+00 |
| Ra-226         | Pu-238        | 3.989E-12 | 8.910E-27           | 1.347E-25 | 1.554E-24 | 3.850E-23 | 7.476E-22 | 6.323E-26 | 0.000E+00 | 0.000E+00 |
| Ra-226         | ΣDOSE (j)     |           | 4.690E-19           | 7.088E-18 | 8.177E-17 | 2.026E-15 | 3.935E-14 | 3.328E-18 | 0.000E+00 | 0.000E+00 |
| Pb-210         | Pu-238        | 2.771E-10 | 5.686E-28           | 1.809E-26 | 4.483E-25 | 3.061E-23 | 1.377E-21 | 5.575E-25 | 0.000E+00 | 0.000E+00 |
| Pb-210         | Pu-238        | 2.637E-10 | 5.410E-28           | 1.721E-26 | 4.265E-25 | 2.913E-23 | 1.310E-21 | 5.305E-25 | 0.000E+00 | 0.000E+00 |
| Pb-210         | Pu-238        | 5.538E-14 | 0.000E+00           | 1.584E-30 | 8.895E-29 | 6.118E-27 | 2.752E-25 | 1.114E-28 | 0.000E+00 | 0.000E+00 |
| Pb-210         | Pu-238        | 2.640E-13 | 0.000E+00           | 1.711E-29 | 4.270E-28 | 2.916E-26 | 1.312E-24 | 5.311E-28 | 0.000E+00 | 0.000E+00 |
| Pb-210         | ΣDOSE (j)     |           | 1.110E-27           | 3.533E-26 | 8.753E-25 | 5.977E-23 | 2.689E-21 | 1.089E-24 | 0.000E+00 | 0.000E+00 |
| Pu-238         | Pu-238        | 3.989E-12 | 6.167E-13           | 6.031E-13 | 5.764E-13 | 4.904E-13 | 2.977E-13 | 7.379E-19 | 0.000E+00 | 0.000E+00 |
| Pu-238         | Pu-238        | 1.998E-04 | 3.088E-05           | 3.020E-05 | 2.886E-05 | 2.456E-05 | 1.491E-05 | 3.695E-11 | 0.000E+00 | 0.000E+00 |
| Pu-238         | ΣDOSE (j)     |           | 3.088E-05           | 3.020E-05 | 2.886E-05 | 2.456E-05 | 1.491E-05 | 3.695E-11 | 0.000E+00 | 0.000E+00 |
| Ra-226         | Pu-238        | 1.998E-04 | 4.011E-19           | 6.072E-18 | 7.007E-17 | 1.733E-15 | 3.341E-14 | 3.164E-18 | 0.000E+00 | 0.000E+00 |
| Ra-226         | Pu-238        | 3.795E-12 | 7.621E-27           | 1.154E-25 | 1.331E-24 | 3.293E-23 | 6.347E-22 | 6.012E-26 | 0.000E+00 | 0.000E+00 |
| Ra-226         | ΣDOSE (j)     |           | 4.011E-19           | 6.072E-18 | 7.007E-17 | 1.733E-15 | 3.341E-14 | 3.164E-18 | 0.000E+00 | 0.000E+00 |
| Pu-238         | Pu-238        | 2.637E-10 | 4.076E-11           | 3.986E-11 | 3.810E-11 | 3.242E-11 | 1.968E-11 | 4.878E-17 | 0.000E+00 | 0.000E+00 |
| Pu-238         | Pu-238        | 3.795E-12 | 5.867E-13           | 5.738E-13 | 5.484E-13 | 4.666E-13 | 2.832E-13 | 7.021E-19 | 0.000E+00 | 0.000E+00 |
| Pu-238         | ΣDOSE (j)     |           | 4.135E-11           | 4.043E-11 | 3.865E-11 | 3.288E-11 | 1.996E-11 | 4.948E-17 | 0.000E+00 | 0.000E+00 |
| Ra-226         | Pu-238        | 2.637E-10 | 5.295E-25           | 8.015E-24 | 9.250E-23 | 2.288E-21 | 4.410E-20 | 4.177E-24 | 0.000E+00 | 0.000E+00 |
| Pu-238         | Pu-238        | 4.196E-08 | 6.486E-09           | 6.343E-09 | 6.063E-09 | 5.158E-09 | 3.131E-09 | 7.762E-15 | 0.000E+00 | 0.000E+00 |
| Pu-238         | Pu-238        | 5.538E-14 | 8.562E-15           | 8.373E-15 | 8.003E-15 | 6.809E-15 | 4.133E-15 | 1.025E-20 | 0.000E+00 | 0.000E+00 |
| Pu-238         | ΣDOSE (j)     |           | 6.486E-09           | 6.343E-09 | 6.063E-09 | 5.158E-09 | 3.131E-09 | 7.762E-15 | 0.000E+00 | 0.000E+00 |
| Ra-226         | Pu-238        | 4.196E-08 | 8.425E-23           | 1.275E-21 | 1.472E-20 | 3.640E-19 | 7.017E-18 | 6.646E-22 | 0.000E+00 | 0.000E+00 |
| Ra-226         | Pu-238        | 5.538E-14 | 1.107E-28           | 1.683E-27 | 1.943E-26 | 4.805E-25 | 9.262E-24 | 8.767E-28 | 0.000E+00 | 0.000E+00 |
| Ra-226         | Pu-238        | 7.972E-16 | 1.218E-30           | 2.384E-29 | 2.796E-28 | 6.916E-27 | 1.333E-25 | 1.178E-29 | 0.000E+00 | 0.000E+00 |
| Ra-226         | ΣDOSE (j)     |           | 8.425E-23           | 1.275E-21 | 1.472E-20 | 3.640E-19 | 7.017E-18 | 6.646E-22 | 0.000E+00 | 0.000E+00 |
| Pu-238         | Pu-238        | 7.972E-16 | 1.232E-16           | 1.205E-16 | 1.152E-16 | 9.801E-17 | 5.949E-17 | 1.475E-22 | 0.000E+00 | 0.000E+00 |
| Pu-238         | Pu-238        | 2.000E-07 | 3.092E-08           | 3.023E-08 | 2.890E-08 | 2.459E-08 | 1.492E-08 | 3.700E-14 | 0.000E+00 | 0.000E+00 |
| Pu-238         | ΣDOSE (j)     |           | 3.092E-08           | 3.023E-08 | 2.890E-08 | 2.459E-08 | 1.492E-08 | 3.700E-14 | 0.000E+00 | 0.000E+00 |
| Ra-226         | Pu-238        | 2.000E-07 | 9.766E-23           | 1.553E-21 | 1.821E-20 | 4.399E-19 | 7.554E-18 | 3.165E-21 | 0.000E+00 | 0.000E+00 |
| Ra-226         | Pu-238        | 3.800E-15 | 1.337E-30           | 2.857E-29 | 3.460E-28 | 8.357E-27 | 1.435E-25 | 6.014E-29 | 0.000E+00 | 0.000E+00 |
| Ra-226         | ΣDOSE (j)     |           | 9.766E-23           | 1.553E-21 | 1.821E-20 | 4.399E-19 | 7.554E-18 | 3.165E-21 | 0.000E+00 | 0.000E+00 |
| Pu-238         | Pu-238        | 2.640E-13 | 4.081E-14           | 3.991E-14 | 3.815E-14 | 3.246E-14 | 1.970E-14 | 4.884E-20 | 0.000E+00 | 0.000E+00 |
| Pu-238         | Pu-238        | 3.800E-15 | 5.875E-16           | 5.745E-16 | 5.491E-16 | 4.672E-16 | 2.836E-16 | 7.029E-22 | 0.000E+00 | 0.000E+00 |
| Pu-238         | ΣDOSE (j)     |           | 4.140E-14           | 4.048E-14 | 3.870E-14 | 3.292E-14 | 1.998E-14 | 4.954E-20 | 0.000E+00 | 0.000E+00 |

Summary : RESRAD Default

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Individual Nuclide Dose Summed Over All Pathways  
Parent Nuclide and Branch Fraction Indicated

| Nuclide<br>(j) | Parent<br>(i) | THF(i)    | DOSE(j,t), mrem/yr |           |           |           |           |           |           |           |
|----------------|---------------|-----------|--------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                |               |           | t= 0.000E+00       | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| Ra-226         | Pu-238        | 2.640E-13 | 1.289E-28          | 2.049E-27 | 2.404E-26 | 5.806E-25 | 9.972E-24 | 4.178E-27 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Pu-239        | 1.633E-06 | 2.804E-07          | 2.764E-07 | 2.684E-07 | 2.413E-07 | 1.714E-07 | 7.345E-13 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Pu-239        | 8.257E-06 | 1.418E-06          | 1.397E-06 | 1.357E-06 | 1.220E-06 | 8.667E-07 | 3.714E-12 | 0.000E+00 | 0.000E+00 |
| Pu-239         | ΣDOSE(j)      |           | 1.698E-06          | 1.674E-06 | 1.625E-06 | 1.461E-06 | 1.038E-06 | 4.448E-12 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Pu-239        | 2.285E-08 | 3.923E-09          | 3.867E-09 | 3.755E-09 | 3.376E-09 | 2.399E-09 | 1.028E-14 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Pu-239        | 4.954E-10 | 8.506E-11          | 8.384E-11 | 8.141E-11 | 7.319E-11 | 5.200E-11 | 2.228E-16 | 0.000E+00 | 0.000E+00 |
| Pu-239         | ΣDOSE(j)      |           | 4.009E-09          | 3.951E-09 | 3.836E-09 | 3.449E-09 | 2.451E-09 | 1.050E-14 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Pu-239        | 1.371E-12 | 2.354E-13          | 2.320E-13 | 2.253E-13 | 2.026E-13 | 1.439E-13 | 6.167E-19 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Pu-239        | 2.720E-03 | 4.671E-04          | 4.603E-04 | 4.470E-04 | 4.019E-04 | 2.855E-04 | 1.223E-09 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Pu-239        | 1.375E-02 | 2.361E-03          | 2.327E-03 | 2.260E-03 | 2.032E-03 | 1.444E-03 | 6.186E-09 | 0.000E+00 | 0.000E+00 |
| Pu-239         | ΣDOSE(j)      |           | 2.828E-03          | 2.788E-03 | 2.707E-03 | 2.434E-03 | 1.729E-03 | 7.409E-09 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Pu-239        | 3.806E-05 | 6.535E-06          | 6.441E-06 | 6.254E-06 | 5.623E-06 | 3.995E-06 | 1.712E-11 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Pu-239        | 8.252E-07 | 1.417E-07          | 1.396E-07 | 1.356E-07 | 1.219E-07 | 8.662E-08 | 3.712E-13 | 0.000E+00 | 0.000E+00 |
| Pu-239         | ΣDOSE(j)      |           | 6.677E-06          | 6.581E-06 | 6.390E-06 | 5.745E-06 | 4.082E-06 | 1.749E-11 | 0.000E+00 | 0.000E+00 |
| Pu-239         | Pu-239        | 2.284E-09 | 3.921E-10          | 3.865E-10 | 3.753E-10 | 3.374E-10 | 2.397E-10 | 1.027E-15 | 0.000E+00 | 0.000E+00 |
| Pu-240         | Pu-240        | 1.000E+00 | 1.716E-01          | 1.691E-01 | 1.642E-01 | 1.476E-01 | 1.047E-01 | 4.463E-07 | 0.000E+00 | 0.000E+00 |
| Pu-241         | Pu-241        | 1.000E+00 | 3.239E-03          | 3.041E-03 | 2.682E-03 | 1.720E-03 | 4.653E-04 | 6.959E-11 | 0.000E+00 | 1.423E-24 |
| Pu-241         | Pu-241        | 2.450E-05 | 4.811E-06          | 4.560E-06 | 4.097E-06 | 2.813E-06 | 9.477E-07 | 1.904E-15 | 0.000E+00 | 3.644E-29 |
| Pu-241         | ΣDOSE(j)      |           | 3.243E-03          | 3.046E-03 | 2.686E-03 | 1.722E-03 | 4.662E-04 | 6.959E-11 | 0.000E+00 | 1.423E-24 |
| Sb-125         | Sb-125        | 7.686E-01 | 5.704E-01          | 4.131E-01 | 2.166E-01 | 2.256E-02 | 3.443E-05 | 9.907E-23 | 0.000E+00 | 0.000E+00 |
| Sb-125         | Sb-125        | 2.314E-01 | 1.717E-01          | 1.243E-01 | 6.519E-02 | 6.790E-03 | 1.036E-05 | 2.982E-23 | 0.000E+00 | 0.000E+00 |
| Sb-125         | ΣDOSE(j)      |           | 7.421E-01          | 5.374E-01 | 2.818E-01 | 2.935E-02 | 4.479E-05 | 1.289E-22 | 0.000E+00 | 0.000E+00 |
| Te-125m        | Sb-125        | 2.314E-01 | 1.951E-03          | 7.200E-03 | 4.597E-03 | 8.397E-04 | 8.483E-06 | 1.169E-12 | 0.000E+00 | 0.000E+00 |
| Sr-90          | Sr-90         | 1.000E+00 | 1.738E+00          | 1.016E+00 | 3.438E-01 | 7.717E-03 | 1.446E-07 | 5.407E-07 | 0.000E+00 | 0.000E+00 |
| Tc-99          | Tc-99         | 1.000E+00 | 2.452E-02          | 6.801E-02 | 1.955E-01 | 1.312E-26 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |

THF(i) is the thread fraction of the parent nuclide.

Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

Individual Nuclide Soil Concentration  
Parent Nuclide and Branch Fraction Indicated

| Nuclide<br>(j) | Parent<br>(i) | THF(i)    | S(j,t), pCi/g |           |           |           |           |           |           |           |
|----------------|---------------|-----------|---------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                |               |           | t= 0.000E+00  | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| Ag-108m        | Ag-108m       | 1.000E+00 | 1.000E+00     | 9.761E-01 | 9.300E-01 | 7.851E-01 | 4.840E-01 | 8.899E-02 | 7.048E-04 | 3.115E-11 |
| Am-241         | Am-241        | 1.000E+00 | 1.000E+00     | 9.917E-01 | 9.754E-01 | 9.203E-01 | 7.795E-01 | 4.359E-01 | 8.282E-02 | 2.476E-04 |
| Am-241         | Pu-241        | 1.000E+00 | 0.000E+00     | 1.556E-03 | 4.394E-03 | 1.192E-02 | 2.072E-02 | 1.555E-02 | 2.990E-03 | 8.939E-06 |
| Am-241         | ΣS(j):        |           | 1.000E+00     | 9.933E-01 | 9.798E-01 | 9.322E-01 | 8.002E-01 | 4.514E-01 | 8.581E-02 | 2.566E-04 |
| Np-237         | Am-241        | 1.000E+00 | 0.000E+00     | 2.764E-07 | 6.199E-07 | 9.295E-07 | 8.264E-07 | 4.621E-07 | 8.781E-08 | 2.625E-10 |
| Np-237         | Np-237        | 1.000E+00 | 1.000E+00     | 7.311E-01 | 3.907E-01 | 4.362E-02 | 8.297E-05 | 2.491E-14 | 1.546E-41 | 0.000E+00 |
| Np-237         | Pu-241        | 1.000E+00 | 0.000E+00     | 2.293E-10 | 1.637E-09 | 9.067E-09 | 2.062E-08 | 1.645E-08 | 3.170E-09 | 9.478E-12 |
| Np-237         | Pu-241        | 2.450E-05 | 0.000E+00     | 6.615E-12 | 1.408E-11 | 1.662E-11 | 6.249E-12 | 1.560E-13 | 4.103E-18 | 3.832E-34 |
| Np-237         | ΣS(j):        |           | 1.000E+00     | 7.311E-01 | 3.907E-01 | 4.362E-02 | 8.382E-05 | 4.786E-07 | 9.098E-08 | 2.720E-10 |
| U-233          | Am-241        | 1.000E+00 | 0.000E+00     | 6.319E-13 | 4.652E-12 | 2.908E-11 | 9.471E-11 | 1.845E-10 | 9.663E-11 | 6.887E-13 |
| U-233          | Np-237        | 1.000E+00 | 0.000E+00     | 3.720E-06 | 8.332E-06 | 1.242E-05 | 1.080E-05 | 5.589E-06 | 8.503E-07 | 1.168E-09 |
| U-233          | Pu-241        | 1.000E+00 | 0.000E+00     | 3.424E-16 | 7.724E-15 | 1.654E-13 | 1.434E-12 | 5.178E-12 | 3.259E-12 | 2.455E-14 |
| U-233          | Pu-241        | 2.450E-05 | 0.000E+00     | 1.525E-17 | 1.087E-16 | 6.003E-16 | 1.347E-15 | 1.006E-15 | 1.555E-16 | 2.135E-19 |
| U-233          | ΣS(j):        |           | 0.000E+00     | 3.720E-06 | 8.332E-06 | 1.242E-05 | 1.080E-05 | 5.590E-06 | 8.504E-07 | 1.168E-09 |
| Th-229         | Am-241        | 1.000E+00 | 0.000E+00     | 2.043E-17 | 4.737E-16 | 1.123E-14 | 1.314E-13 | 1.134E-12 | 3.828E-12 | 4.318E-12 |
| Th-229         | Np-237        | 1.000E+00 | 0.000E+00     | 1.851E-10 | 1.370E-09 | 8.773E-09 | 3.092E-08 | 8.199E-08 | 1.230E-07 | 1.071E-07 |
| Th-229         | Pu-241        | 1.000E+00 | 0.000E+00     | 8.235E-21 | 5.773E-19 | 4.562E-17 | 1.435E-15 | 2.537E-14 | 1.112E-13 | 1.320E-13 |
| Th-229         | Pu-241        | 2.450E-05 | 0.000E+00     | 4.949E-22 | 1.121E-20 | 2.441E-19 | 2.244E-18 | 1.057E-17 | 1.831E-17 | 1.619E-17 |
| Th-229         | ΣS(j):        |           | 0.000E+00     | 1.851E-10 | 1.370E-09 | 8.773E-09 | 3.092E-08 | 8.199E-08 | 1.230E-07 | 1.072E-07 |
| Am-243         | Am-243        | 9.829E-01 | 9.829E-01     | 9.762E-01 | 9.631E-01 | 9.183E-01 | 8.017E-01 | 4.983E-01 | 1.280E-01 | 1.101E-03 |
| Am-243         | Am-243        | 2.720E-03 | 2.720E-03     | 2.702E-03 | 2.665E-03 | 2.542E-03 | 2.219E-03 | 1.379E-03 | 3.544E-04 | 3.048E-06 |
| Am-243         | Cm-243        | 2.359E-03 | 0.000E+00     | 2.184E-07 | 6.352E-07 | 1.900E-06 | 4.216E-06 | 5.287E-06 | 1.632E-06 | 1.411E-08 |
| Am-243         | Cm-243        | 6.529E-06 | 0.000E+00     | 6.045E-10 | 1.758E-09 | 5.260E-09 | 1.167E-08 | 1.463E-08 | 4.516E-09 | 3.905E-11 |
| Am-243         | Cm-243        | 3.301E-05 | 0.000E+00     | 3.056E-09 | 8.888E-09 | 2.659E-08 | 5.900E-08 | 7.397E-08 | 2.283E-08 | 1.974E-10 |
| Am-243         | Cm-243        | 9.135E-08 | 0.000E+00     | 8.459E-12 | 2.460E-11 | 7.360E-11 | 1.633E-10 | 2.047E-10 | 6.319E-11 | 5.464E-13 |
| Am-243         | Cm-243        | 1.981E-09 | 0.000E+00     | 1.834E-13 | 5.333E-13 | 1.596E-12 | 3.540E-12 | 4.439E-12 | 1.370E-12 | 1.185E-14 |
| Am-243         | Cm-243        | 5.481E-12 | 0.000E+00     | 5.075E-16 | 1.476E-15 | 4.416E-15 | 9.797E-15 | 1.228E-14 | 3.792E-15 | 3.278E-17 |
| Am-243         | Cm-243        | 1.416E-06 | 0.000E+00     | 1.311E-10 | 3.814E-10 | 1.141E-09 | 2.531E-09 | 3.174E-09 | 9.797E-10 | 8.470E-12 |
| Am-243         | Cm-243        | 3.920E-09 | 0.000E+00     | 3.629E-13 | 1.055E-12 | 3.158E-12 | 7.006E-12 | 8.784E-12 | 2.711E-12 | 2.344E-14 |
| Am-243         | Cm-243        | 1.982E-08 | 0.000E+00     | 1.835E-12 | 5.336E-12 | 1.596E-11 | 3.542E-11 | 4.441E-11 | 1.371E-11 | 1.185E-13 |
| Am-243         | Cm-243        | 5.484E-11 | 0.000E+00     | 5.078E-15 | 1.477E-14 | 4.418E-14 | 9.803E-14 | 1.229E-13 | 3.794E-14 | 3.280E-16 |
| Am-243         | Cm-243        | 1.189E-12 | 0.000E+00     | 1.101E-16 | 3.202E-16 | 9.579E-16 | 2.125E-15 | 2.665E-15 | 8.225E-16 | 7.112E-18 |
| Am-243         | Cm-243        | 3.291E-15 | 0.000E+00     | 3.047E-19 | 8.861E-19 | 2.651E-18 | 5.882E-18 | 7.375E-18 | 2.276E-18 | 1.968E-20 |
| Am-243         | ΣS(j):        |           | 9.856E-01     | 9.789E-01 | 9.657E-01 | 9.209E-01 | 8.039E-01 | 4.996E-01 | 1.284E-01 | 1.105E-03 |
| Pu-239         | Am-243        | 9.829E-01 | 0.000E+00     | 2.810E-05 | 8.335E-05 | 2.671E-04 | 7.163E-04 | 1.614E-03 | 1.601E-03 | 1.269E-04 |
| Pu-239         | Am-243        | 2.720E-03 | 0.000E+00     | 7.777E-08 | 2.307E-07 | 7.393E-07 | 1.982E-06 | 4.467E-06 | 4.431E-06 | 3.513E-07 |
| Pu-239         | Am-243        | 1.375E-02 | 0.000E+00     | 3.932E-07 | 1.166E-06 | 3.738E-06 | 1.002E-05 | 2.258E-05 | 2.240E-05 | 1.776E-06 |
| Pu-239         | Am-243        | 3.806E-05 | 0.000E+00     | 1.088E-09 | 3.228E-09 | 1.034E-08 | 2.774E-08 | 6.250E-08 | 6.200E-08 | 4.916E-09 |
| Pu-239         | Am-243        | 8.252E-07 | 0.000E+00     | 2.359E-11 | 6.998E-11 | 2.243E-10 | 6.014E-10 | 1.355E-09 | 1.344E-09 | 1.066E-10 |
| Pu-239         | Am-243        | 2.284E-09 | 0.000E+00     | 6.529E-14 | 1.937E-13 | 6.207E-13 | 1.664E-12 | 3.750E-12 | 3.720E-12 | 2.950E-13 |
| Pu-239         | Cm-243        | 2.359E-03 | 0.000E+00     | 3.151E-12 | 2.770E-11 | 2.834E-10 | 2.027E-09 | 1.064E-08 | 1.575E-08 | 1.415E-09 |
| Pu-239         | Cm-243        | 6.529E-06 | 0.000E+00     | 8.722E-15 | 7.666E-14 | 7.845E-13 | 5.609E-12 | 2.944E-11 | 4.360E-11 | 3.917E-12 |
| Pu-239         | Cm-243        | 3.301E-05 | 0.000E+00     | 4.410E-14 | 3.876E-13 | 3.966E-12 | 2.836E-11 | 1.488E-10 | 2.204E-10 | 1.980E-11 |

Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

Individual Nuclide Soil Concentration  
Parent Nuclide and Branch Fraction Indicated

| Nuclide<br>(j) | Parent<br>(i) | THF(i)    | S(j,t), pCi/g |           |           |           |           |           |           |           |
|----------------|---------------|-----------|---------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                |               |           | t= 0.000E+00  | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| Pu-239         | Cm-243        | 9.135E-08 | 0.000E+00     | 1.220E-16 | 1.073E-15 | 1.098E-14 | 7.849E-14 | 4.119E-13 | 6.101E-13 | 5.480E-14 |
| Pu-239         | Cm-243        | 1.981E-09 | 0.000E+00     | 2.646E-18 | 2.326E-17 | 2.380E-16 | 1.702E-15 | 8.930E-15 | 1.323E-14 | 1.188E-15 |
| Pu-239         | Cm-243        | 5.481E-12 | 0.000E+00     | 7.323E-21 | 6.436E-20 | 6.586E-19 | 4.710E-18 | 2.471E-17 | 3.661E-17 | 3.288E-18 |
| Pu-239         | Cm-243        | 9.805E-01 | 0.000E+00     | 2.779E-05 | 8.100E-05 | 2.444E-04 | 5.567E-04 | 7.817E-04 | 3.703E-04 | 1.643E-05 |
| Pu-239         | Cm-243        | 2.714E-03 | 0.000E+00     | 7.690E-08 | 2.242E-07 | 6.764E-07 | 1.541E-06 | 2.164E-06 | 1.025E-06 | 4.547E-08 |
| Pu-239         | Cm-243        | 1.372E-02 | 0.000E+00     | 3.888E-07 | 1.133E-06 | 3.420E-06 | 7.789E-06 | 1.094E-05 | 5.181E-06 | 2.299E-07 |
| Pu-239         | Cm-243        | 3.797E-05 | 0.000E+00     | 1.076E-09 | 3.137E-09 | 9.465E-09 | 2.156E-08 | 3.027E-08 | 1.434E-08 | 6.362E-10 |
| Pu-239         | Cm-243        | 8.232E-07 | 0.000E+00     | 2.333E-11 | 6.800E-11 | 2.052E-10 | 4.674E-10 | 6.563E-10 | 3.109E-10 | 1.379E-11 |
| Pu-239         | Cm-243        | 2.278E-09 | 0.000E+00     | 6.457E-14 | 1.882E-13 | 5.679E-13 | 1.294E-12 | 1.816E-12 | 8.604E-13 | 3.817E-14 |
| Pu-239         | Pu-239        | 9.829E-01 | 9.829E-01     | 9.785E-01 | 9.698E-01 | 9.401E-01 | 8.600E-01 | 6.296E-01 | 2.584E-01 | 1.143E-02 |
| Pu-239         | ΣS(j):        |           | 9.829E-01     | 9.786E-01 | 9.700E-01 | 9.406E-01 | 8.612E-01 | 6.320E-01 | 2.604E-01 | 1.158E-02 |
| U-235          | Am-243        | 9.829E-01 | 0.000E+00     | 1.382E-14 | 1.226E-13 | 1.299E-12 | 1.019E-11 | 7.023E-11 | 1.660E-10 | 2.299E-11 |
| U-235          | Am-243        | 2.720E-03 | 0.000E+00     | 3.824E-17 | 3.394E-16 | 3.594E-15 | 2.820E-14 | 1.944E-13 | 4.596E-13 | 6.362E-14 |
| U-235          | Am-243        | 1.375E-02 | 0.000E+00     | 1.933E-16 | 1.716E-15 | 1.817E-14 | 1.425E-13 | 9.827E-13 | 2.323E-12 | 3.216E-13 |
| U-235          | Am-243        | 3.806E-05 | 0.000E+00     | 5.350E-19 | 4.749E-18 | 5.029E-17 | 3.945E-16 | 2.720E-15 | 6.430E-15 | 8.902E-16 |
| U-235          | Am-243        | 8.252E-07 | 0.000E+00     | 1.160E-20 | 1.030E-19 | 1.090E-18 | 8.553E-18 | 5.896E-17 | 1.394E-16 | 1.930E-17 |
| U-235          | Am-243        | 2.284E-09 | 0.000E+00     | 3.210E-23 | 2.850E-22 | 3.017E-21 | 2.367E-20 | 1.632E-19 | 3.858E-19 | 5.341E-20 |
| U-235          | Am-243        | 5.901E-04 | 0.000E+00     | 8.294E-18 | 7.363E-17 | 7.796E-16 | 6.116E-15 | 4.216E-14 | 9.969E-14 | 1.380E-14 |
| U-235          | Am-243        | 1.633E-06 | 0.000E+00     | 2.296E-20 | 2.038E-19 | 2.158E-18 | 1.693E-17 | 1.167E-16 | 2.759E-16 | 3.820E-17 |
| U-235          | Am-243        | 8.257E-06 | 0.000E+00     | 1.161E-19 | 1.030E-18 | 1.091E-17 | 8.558E-17 | 5.899E-16 | 1.395E-15 | 1.931E-16 |
| U-235          | Am-243        | 2.285E-08 | 0.000E+00     | 3.212E-22 | 2.851E-21 | 3.019E-20 | 2.369E-19 | 1.633E-18 | 3.860E-18 | 5.344E-19 |
| U-235          | Am-243        | 4.954E-10 | 0.000E+00     | 6.964E-24 | 6.182E-23 | 6.546E-22 | 5.135E-21 | 3.540E-20 | 8.370E-20 | 1.159E-20 |
| U-235          | Am-243        | 1.371E-12 | 0.000E+00     | 1.927E-26 | 1.711E-25 | 1.812E-24 | 1.421E-23 | 9.797E-23 | 2.316E-22 | 3.207E-23 |
| U-235          | Cm-243        | 2.359E-03 | 0.000E+00     | 1.035E-21 | 2.732E-20 | 9.357E-19 | 2.026E-17 | 3.586E-16 | 1.464E-15 | 2.529E-16 |
| U-235          | Cm-243        | 6.529E-06 | 0.000E+00     | 2.864E-24 | 7.562E-23 | 2.590E-21 | 5.608E-20 | 9.924E-19 | 4.052E-18 | 7.001E-19 |
| U-235          | Cm-243        | 3.301E-05 | 0.000E+00     | 1.448E-23 | 3.823E-22 | 1.309E-20 | 2.835E-19 | 5.017E-18 | 2.049E-17 | 3.539E-18 |
| U-235          | Cm-243        | 9.135E-08 | 0.000E+00     | 4.008E-26 | 1.058E-24 | 3.623E-23 | 7.846E-22 | 1.389E-20 | 5.670E-20 | 9.795E-21 |
| U-235          | Cm-243        | 1.981E-09 | 0.000E+00     | 8.689E-28 | 2.294E-26 | 7.856E-25 | 1.701E-23 | 3.010E-22 | 1.229E-21 | 2.124E-22 |
| U-235          | Cm-243        | 5.481E-12 | 0.000E+00     | 2.405E-30 | 6.349E-29 | 2.174E-27 | 4.708E-26 | 8.332E-25 | 3.402E-24 | 5.878E-25 |
| U-235          | Cm-243        | 1.416E-06 | 0.000E+00     | 6.213E-25 | 1.640E-23 | 5.617E-22 | 1.216E-20 | 2.153E-19 | 8.790E-19 | 1.519E-19 |
| U-235          | Cm-243        | 3.920E-09 | 0.000E+00     | 1.720E-27 | 4.540E-26 | 1.555E-24 | 3.367E-23 | 5.958E-22 | 2.433E-21 | 4.203E-22 |
| U-235          | Cm-243        | 1.982E-08 | 0.000E+00     | 8.694E-27 | 2.295E-25 | 7.860E-24 | 1.702E-22 | 3.012E-21 | 1.230E-20 | 2.125E-21 |
| U-235          | Cm-243        | 5.484E-11 | 0.000E+00     | 2.406E-29 | 6.352E-28 | 2.175E-26 | 4.711E-25 | 8.336E-24 | 3.404E-23 | 5.881E-24 |
| U-235          | Cm-243        | 1.189E-12 | 0.000E+00     | 5.217E-31 | 1.377E-29 | 4.716E-28 | 1.021E-26 | 1.807E-25 | 7.380E-25 | 1.275E-25 |
| U-235          | Cm-243        | 3.291E-15 | 0.000E+00     | 1.444E-33 | 3.811E-32 | 1.305E-30 | 2.827E-29 | 5.002E-28 | 2.043E-27 | 3.529E-28 |
| U-235          | Cm-243        | 9.805E-01 | 0.000E+00     | 1.370E-14 | 1.202E-13 | 1.223E-12 | 8.585E-12 | 4.213E-11 | 5.162E-11 | 3.232E-12 |
| U-235          | Cm-243        | 2.714E-03 | 0.000E+00     | 3.792E-17 | 3.327E-16 | 3.384E-15 | 2.376E-14 | 1.166E-13 | 1.429E-13 | 8.946E-15 |
| U-235          | Cm-243        | 1.372E-02 | 0.000E+00     | 1.917E-16 | 1.682E-15 | 1.711E-14 | 1.201E-13 | 5.896E-13 | 7.223E-13 | 4.523E-14 |
| U-235          | Cm-243        | 3.797E-05 | 0.000E+00     | 5.306E-19 | 4.655E-18 | 4.735E-17 | 3.325E-16 | 1.632E-15 | 1.999E-15 | 1.252E-16 |
| U-235          | Cm-243        | 8.232E-07 | 0.000E+00     | 1.150E-20 | 1.009E-19 | 1.026E-18 | 7.208E-18 | 3.538E-17 | 4.334E-17 | 2.714E-18 |
| U-235          | Cm-243        | 2.278E-09 | 0.000E+00     | 3.184E-23 | 2.793E-22 | 2.841E-21 | 1.995E-20 | 9.791E-20 | 1.199E-19 | 7.511E-21 |
| U-235          | Cm-243        | 5.887E-04 | 0.000E+00     | 8.226E-18 | 7.217E-17 | 7.340E-16 | 5.154E-15 | 2.530E-14 | 3.099E-14 | 1.941E-15 |
| U-235          | Cm-243        | 1.629E-06 | 0.000E+00     | 2.277E-20 | 1.997E-19 | 2.031E-18 | 1.427E-17 | 7.001E-17 | 8.577E-17 | 5.371E-18 |
| U-235          | Cm-243        | 8.237E-06 | 0.000E+00     | 1.151E-19 | 1.010E-18 | 1.027E-17 | 7.212E-17 | 3.539E-16 | 4.336E-16 | 2.715E-17 |
| U-235          | Cm-243        | 2.280E-08 | 0.000E+00     | 3.186E-22 | 2.795E-21 | 2.842E-20 | 1.996E-19 | 9.796E-19 | 1.200E-18 | 7.515E-20 |
| U-235          | Cm-243        | 4.942E-10 | 0.000E+00     | 6.906E-24 | 6.060E-23 | 6.163E-22 | 4.327E-21 | 2.124E-20 | 2.602E-20 | 1.629E-21 |
| U-235          | Cm-243        | 1.368E-12 | 0.000E+00     | 1.911E-26 | 1.677E-25 | 1.706E-24 | 1.198E-23 | 5.878E-23 | 7.201E-23 | 4.509E-24 |
| U-235          | Pu-239        | 5.901E-04 | 0.000E+00     | 5.770E-13 | 1.707E-12 | 5.421E-12 | 1.417E-11 | 2.935E-11 | 2.384E-11 | 1.354E-12 |



Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

Individual Nuclide Soil Concentration  
Parent Nuclide and Branch Fraction Indicated

| Nuclide<br>(j) | Parent<br>(i) | THF(i)    | S(j,t), pCi/g |           |           |           |           |           |           |           |
|----------------|---------------|-----------|---------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                |               |           | t= 0.000E+00  | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| U-235          | Pu-239        | 1.633E-06 | 0.000E+00     | 1.597E-15 | 4.725E-15 | 1.500E-14 | 3.922E-14 | 8.122E-14 | 6.599E-14 | 3.747E-15 |
| U-235          | Pu-239        | 8.257E-06 | 0.000E+00     | 8.073E-15 | 2.389E-14 | 7.586E-14 | 1.983E-13 | 4.106E-13 | 3.336E-13 | 1.894E-14 |
| U-235          | Pu-239        | 2.285E-08 | 0.000E+00     | 2.234E-17 | 6.611E-17 | 2.099E-16 | 5.487E-16 | 1.136E-15 | 9.234E-16 | 5.243E-17 |
| U-235          | Pu-239        | 4.954E-10 | 0.000E+00     | 4.844E-19 | 1.433E-18 | 4.552E-18 | 1.190E-17 | 2.464E-17 | 2.002E-17 | 1.137E-18 |
| U-235          | Pu-239        | 1.371E-12 | 0.000E+00     | 1.341E-21 | 3.967E-21 | 1.260E-20 | 3.293E-20 | 6.819E-20 | 5.541E-20 | 3.146E-21 |
| U-235          | Pu-239        | 9.829E-01 | 0.000E+00     | 9.611E-10 | 2.843E-09 | 9.030E-09 | 2.360E-08 | 4.888E-08 | 3.972E-08 | 2.255E-09 |
| U-235          | Pu-239        | 2.720E-03 | 0.000E+00     | 2.660E-12 | 7.870E-12 | 2.499E-11 | 6.532E-11 | 1.353E-10 | 1.099E-10 | 6.241E-12 |
| U-235          | Pu-239        | 1.375E-02 | 0.000E+00     | 1.345E-11 | 3.979E-11 | 1.264E-10 | 3.303E-10 | 6.839E-10 | 5.557E-10 | 3.155E-11 |
| U-235          | Pu-239        | 3.806E-05 | 0.000E+00     | 3.722E-14 | 1.101E-13 | 3.497E-13 | 9.140E-13 | 1.893E-12 | 1.538E-12 | 8.733E-14 |
| U-235          | Pu-239        | 8.252E-07 | 0.000E+00     | 8.069E-16 | 2.387E-15 | 7.582E-15 | 1.982E-14 | 4.104E-14 | 3.335E-14 | 1.893E-15 |
| U-235          | Pu-239        | 2.284E-09 | 0.000E+00     | 2.233E-18 | 6.607E-18 | 2.098E-17 | 5.484E-17 | 1.136E-16 | 9.229E-17 | 5.240E-18 |
| U-235          | ΣS(j) :       |           | 0.000E+00     | 9.778E-10 | 2.893E-09 | 9.190E-09 | 2.403E-08 | 4.984E-08 | 4.063E-08 | 2.321E-09 |
| Pa-231         | Am-243        | 9.829E-01 | 0.000E+00     | 9.753E-20 | 2.602E-18 | 9.245E-17 | 2.217E-15 | 5.442E-14 | 4.672E-13 | 4.255E-13 |
| Pa-231         | Am-243        | 2.720E-03 | 0.000E+00     | 2.699E-22 | 7.202E-21 | 2.559E-19 | 6.136E-18 | 1.506E-16 | 1.293E-15 | 1.178E-15 |
| Pa-231         | Am-243        | 1.375E-02 | 0.000E+00     | 1.365E-21 | 3.641E-20 | 1.294E-18 | 3.102E-17 | 7.615E-16 | 6.537E-15 | 5.954E-15 |
| Pa-231         | Am-243        | 3.806E-05 | 0.000E+00     | 3.777E-24 | 1.008E-22 | 3.580E-21 | 8.586E-20 | 2.107E-18 | 1.809E-17 | 1.648E-17 |
| Pa-231         | Am-243        | 8.252E-07 | 0.000E+00     | 8.188E-26 | 2.185E-24 | 7.762E-23 | 1.861E-21 | 4.569E-20 | 3.923E-19 | 3.572E-19 |
| Pa-231         | Am-243        | 2.284E-09 | 0.000E+00     | 2.266E-28 | 6.046E-27 | 2.148E-25 | 5.152E-24 | 1.265E-22 | 1.086E-21 | 9.887E-22 |
| Pa-231         | Am-243        | 5.901E-04 | 0.000E+00     | 5.855E-23 | 1.562E-21 | 5.550E-20 | 1.331E-18 | 3.267E-17 | 2.805E-16 | 2.555E-16 |
| Pa-231         | Am-243        | 1.633E-06 | 0.000E+00     | 1.621E-25 | 4.324E-24 | 1.536E-22 | 3.684E-21 | 9.042E-20 | 7.763E-19 | 7.070E-19 |
| Pa-231         | Am-243        | 8.257E-06 | 0.000E+00     | 8.193E-25 | 2.186E-23 | 7.766E-22 | 1.862E-20 | 4.571E-19 | 3.925E-18 | 3.574E-18 |
| Pa-231         | Am-243        | 2.285E-08 | 0.000E+00     | 2.267E-27 | 6.050E-26 | 2.149E-24 | 5.155E-23 | 1.265E-21 | 1.086E-20 | 9.893E-21 |
| Pa-231         | Am-243        | 4.954E-10 | 0.000E+00     | 4.916E-29 | 1.312E-27 | 4.660E-26 | 1.118E-24 | 2.743E-23 | 2.355E-22 | 2.145E-22 |
| Pa-231         | Am-243        | 1.371E-12 | 0.000E+00     | 1.361E-31 | 3.630E-30 | 1.290E-28 | 3.093E-27 | 7.592E-26 | 6.518E-25 | 5.936E-25 |
| Pa-231         | Cm-243        | 2.359E-03 | 0.000E+00     | 5.483E-27 | 4.357E-25 | 5.030E-23 | 3.372E-21 | 2.208E-19 | 3.501E-18 | 4.263E-18 |
| Pa-231         | Cm-243        | 6.529E-06 | 0.000E+00     | 1.518E-29 | 1.206E-27 | 1.392E-25 | 9.334E-24 | 6.111E-22 | 9.690E-21 | 1.180E-20 |
| Pa-231         | Cm-243        | 3.301E-05 | 0.000E+00     | 7.672E-29 | 6.096E-27 | 7.038E-25 | 4.719E-23 | 3.089E-21 | 4.899E-20 | 5.965E-20 |
| Pa-231         | Cm-243        | 9.135E-08 | 0.000E+00     | 2.123E-31 | 1.687E-29 | 1.948E-27 | 1.306E-25 | 8.550E-24 | 1.356E-22 | 1.651E-22 |
| Pa-231         | Cm-243        | 1.981E-09 | 0.000E+00     | 4.604E-33 | 3.658E-31 | 4.223E-29 | 2.831E-27 | 1.854E-25 | 2.940E-24 | 3.579E-24 |
| Pa-231         | Cm-243        | 5.481E-12 | 0.000E+00     | 1.274E-35 | 1.012E-33 | 1.169E-31 | 7.836E-30 | 5.131E-28 | 8.135E-27 | 9.906E-27 |
| Pa-231         | Cm-243        | 1.416E-06 | 0.000E+00     | 3.292E-30 | 2.616E-28 | 3.020E-26 | 2.025E-24 | 1.326E-22 | 2.102E-21 | 2.559E-21 |
| Pa-231         | Cm-243        | 3.920E-09 | 0.000E+00     | 9.111E-33 | 7.239E-31 | 8.358E-29 | 5.604E-27 | 3.669E-25 | 5.817E-24 | 7.084E-24 |
| Pa-231         | Cm-243        | 1.982E-08 | 0.000E+00     | 4.606E-32 | 3.660E-30 | 4.225E-28 | 2.833E-26 | 1.855E-24 | 2.941E-23 | 3.581E-23 |
| Pa-231         | Cm-243        | 5.484E-11 | 0.000E+00     | 1.275E-34 | 1.013E-32 | 1.169E-30 | 7.841E-29 | 5.133E-27 | 8.140E-26 | 9.912E-26 |
| Pa-231         | Cm-243        | 1.189E-12 | 0.000E+00     | 2.764E-36 | 2.196E-34 | 2.535E-32 | 1.700E-30 | 1.113E-28 | 1.765E-27 | 2.149E-27 |
| Pa-231         | Cm-243        | 3.291E-15 | 0.000E+00     | 7.649E-39 | 6.078E-37 | 7.017E-35 | 4.705E-33 | 3.080E-31 | 4.884E-30 | 5.947E-30 |
| Pa-231         | Cm-243        | 9.805E-01 | 0.000E+00     | 9.687E-20 | 2.562E-18 | 8.831E-17 | 1.949E-15 | 3.709E-14 | 1.934E-13 | 9.246E-14 |
| Pa-231         | Cm-243        | 2.714E-03 | 0.000E+00     | 2.681E-22 | 7.091E-21 | 2.444E-19 | 5.394E-18 | 1.027E-16 | 5.353E-16 | 2.559E-16 |
| Pa-231         | Cm-243        | 1.372E-02 | 0.000E+00     | 1.355E-21 | 3.585E-20 | 1.236E-18 | 2.727E-17 | 5.190E-16 | 2.706E-15 | 1.294E-15 |
| Pa-231         | Cm-243        | 3.797E-05 | 0.000E+00     | 3.751E-24 | 9.921E-23 | 3.420E-21 | 7.548E-20 | 1.436E-18 | 7.490E-18 | 3.580E-18 |
| Pa-231         | Cm-243        | 8.232E-07 | 0.000E+00     | 8.133E-26 | 2.151E-24 | 7.414E-23 | 1.636E-21 | 3.114E-20 | 1.624E-19 | 7.763E-20 |
| Pa-231         | Cm-243        | 2.278E-09 | 0.000E+00     | 2.251E-28 | 5.953E-27 | 2.052E-25 | 4.529E-24 | 8.619E-23 | 4.494E-22 | 2.148E-22 |
| Pa-231         | Cm-243        | 5.887E-04 | 0.000E+00     | 5.816E-23 | 1.538E-21 | 5.302E-20 | 1.170E-18 | 2.227E-17 | 1.161E-16 | 5.551E-17 |
| Pa-231         | Cm-243        | 1.629E-06 | 0.000E+00     | 1.610E-25 | 4.257E-24 | 1.467E-22 | 3.239E-21 | 6.163E-20 | 3.214E-19 | 1.536E-19 |
| Pa-231         | Cm-243        | 8.237E-06 | 0.000E+00     | 8.137E-25 | 2.152E-23 | 7.418E-22 | 1.637E-20 | 3.116E-19 | 1.625E-18 | 7.767E-19 |
| Pa-231         | Cm-243        | 2.280E-08 | 0.000E+00     | 2.252E-27 | 5.956E-26 | 2.053E-24 | 4.531E-23 | 8.624E-22 | 4.497E-21 | 2.150E-21 |
| Pa-231         | Cm-243        | 4.942E-10 | 0.000E+00     | 4.883E-29 | 1.291E-27 | 4.451E-26 | 9.824E-25 | 1.870E-23 | 9.749E-23 | 4.660E-23 |
| Pa-231         | Cm-243        | 1.368E-12 | 0.000E+00     | 1.351E-31 | 3.574E-30 | 1.232E-28 | 2.719E-27 | 5.175E-26 | 2.698E-25 | 1.290E-25 |

Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

Individual Nuclide Soil Concentration  
Parent Nuclide and Branch Fraction Indicated

| Nuclide<br>(j) | Parent<br>(i) | THF(i)    | S(j,t), pCi/g |           |           |           |           |           |           |           |
|----------------|---------------|-----------|---------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                |               |           | t= 0.000E+00  | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| Pa-231         | Pu-239        | 5.901E-04 | 0.000E+00     | 6.112E-18 | 5.439E-17 | 5.808E-16 | 4.670E-15 | 3.518E-14 | 1.090E-13 | 4.260E-14 |
| Pa-231         | Pu-239        | 1.633E-06 | 0.000E+00     | 1.691E-20 | 1.505E-19 | 1.607E-18 | 1.293E-17 | 9.736E-17 | 3.017E-16 | 1.179E-16 |
| Pa-231         | Pu-239        | 8.257E-06 | 0.000E+00     | 8.552E-20 | 7.610E-19 | 8.127E-18 | 6.535E-17 | 4.922E-16 | 1.525E-15 | 5.961E-16 |
| Pa-231         | Pu-239        | 2.285E-08 | 0.000E+00     | 2.367E-22 | 2.106E-21 | 2.249E-20 | 1.809E-19 | 1.362E-18 | 4.221E-18 | 1.650E-18 |
| Pa-231         | Pu-239        | 4.954E-10 | 0.000E+00     | 5.131E-24 | 4.566E-23 | 4.876E-22 | 3.921E-21 | 2.954E-20 | 9.151E-20 | 3.577E-20 |
| Pa-231         | Pu-239        | 1.371E-12 | 0.000E+00     | 1.420E-26 | 1.264E-25 | 1.350E-24 | 1.085E-23 | 8.175E-23 | 2.533E-22 | 9.900E-23 |
| Pa-231         | Pu-239        | 9.829E-01 | 0.000E+00     | 1.018E-14 | 9.059E-14 | 9.674E-13 | 7.779E-12 | 5.860E-11 | 1.815E-10 | 7.096E-11 |
| Pa-231         | Pu-239        | 2.720E-03 | 0.000E+00     | 2.817E-17 | 2.507E-16 | 2.678E-15 | 2.153E-14 | 1.622E-13 | 5.025E-13 | 1.964E-13 |
| Pa-231         | Pu-239        | 1.375E-02 | 0.000E+00     | 1.424E-16 | 1.268E-15 | 1.354E-14 | 1.089E-13 | 8.199E-13 | 2.540E-12 | 9.929E-13 |
| Pa-231         | Pu-239        | 3.806E-05 | 0.000E+00     | 3.942E-19 | 3.508E-18 | 3.746E-17 | 3.013E-16 | 2.269E-15 | 7.031E-15 | 2.748E-15 |
| Pa-231         | Pu-239        | 8.252E-07 | 0.000E+00     | 8.547E-21 | 7.606E-20 | 8.123E-19 | 6.531E-18 | 4.920E-17 | 1.524E-16 | 5.958E-17 |
| Pa-231         | Pu-239        | 2.284E-09 | 0.000E+00     | 2.365E-23 | 2.105E-22 | 2.248E-21 | 1.808E-20 | 1.362E-19 | 4.219E-19 | 1.649E-19 |
| Pa-231         | ΣS(j):        |           | 0.000E+00     | 1.036E-14 | 9.217E-14 | 9.845E-13 | 7.919E-12 | 5.971E-11 | 1.854E-10 | 7.273E-11 |
| Ac-227         | Am-243        | 9.829E-01 | 0.000E+00     | 7.720E-22 | 6.113E-20 | 6.973E-18 | 4.531E-16 | 2.727E-14 | 3.849E-13 | 4.321E-13 |
| Ac-227         | Am-243        | 5.901E-04 | 0.000E+00     | 4.635E-25 | 3.670E-23 | 4.187E-21 | 2.720E-19 | 1.637E-17 | 2.311E-16 | 2.594E-16 |
| Ac-227         | Cm-243        | 2.359E-03 | 0.000E+00     | 3.478E-29 | 8.225E-27 | 3.080E-24 | 5.745E-22 | 9.858E-20 | 2.776E-18 | 4.312E-18 |
| Ac-227         | Cm-243        | 1.416E-06 | 0.000E+00     | 2.088E-32 | 4.938E-30 | 1.849E-27 | 3.449E-25 | 5.918E-23 | 1.666E-21 | 2.589E-21 |
| Ac-227         | Cm-243        | 9.805E-01 | 0.000E+00     | 7.675E-22 | 6.034E-20 | 6.717E-18 | 4.073E-16 | 1.953E-14 | 1.678E-13 | 9.519E-14 |
| Ac-227         | Cm-243        | 5.887E-04 | 0.000E+00     | 4.608E-25 | 3.623E-23 | 4.033E-21 | 2.445E-19 | 1.173E-17 | 1.007E-16 | 5.715E-17 |
| Ac-227         | Pu-239        | 5.901E-04 | 0.000E+00     | 6.441E-20 | 1.696E-18 | 5.761E-17 | 1.223E-15 | 2.110E-14 | 9.779E-14 | 4.397E-14 |
| Ac-227         | Pu-239        | 9.829E-01 | 0.000E+00     | 1.073E-16 | 2.825E-15 | 9.595E-14 | 2.038E-12 | 3.514E-11 | 1.629E-10 | 7.323E-11 |
| Ac-227         | ΣS(j):        |           | 0.000E+00     | 1.074E-16 | 2.827E-15 | 9.602E-14 | 2.040E-12 | 3.521E-11 | 1.635E-10 | 7.380E-11 |
| Ac-227         | Am-243        | 2.720E-03 | 0.000E+00     | 2.137E-24 | 1.692E-22 | 1.930E-20 | 1.254E-18 | 7.548E-17 | 1.065E-15 | 1.196E-15 |
| Ac-227         | Am-243        | 1.375E-02 | 0.000E+00     | 1.080E-23 | 8.553E-22 | 9.757E-20 | 6.340E-18 | 3.816E-16 | 5.385E-15 | 6.046E-15 |
| Ac-227         | Am-243        | 1.633E-06 | 0.000E+00     | 1.283E-27 | 1.016E-25 | 1.159E-23 | 7.529E-22 | 4.532E-20 | 6.395E-19 | 7.179E-19 |
| Ac-227         | Cm-243        | 6.529E-06 | 0.000E+00     | 9.625E-32 | 2.276E-29 | 8.525E-27 | 1.590E-24 | 2.728E-22 | 7.682E-21 | 1.193E-20 |
| Ac-227         | Cm-243        | 3.920E-09 | 0.000E+00     | 5.778E-35 | 1.367E-32 | 5.118E-30 | 9.546E-28 | 1.638E-25 | 4.612E-24 | 7.165E-24 |
| Ac-227         | Cm-243        | 2.714E-03 | 0.000E+00     | 2.124E-24 | 1.670E-22 | 1.859E-20 | 1.127E-18 | 5.405E-17 | 4.644E-16 | 2.634E-16 |
| Ac-227         | Cm-243        | 1.629E-06 | 0.000E+00     | 1.275E-27 | 1.003E-25 | 1.116E-23 | 6.767E-22 | 3.245E-20 | 2.788E-19 | 1.582E-19 |
| Ac-227         | Pu-239        | 1.633E-06 | 0.000E+00     | 1.783E-22 | 4.694E-21 | 1.594E-19 | 3.386E-18 | 5.839E-17 | 2.706E-16 | 1.217E-16 |
| Ac-227         | Pu-239        | 2.720E-03 | 0.000E+00     | 2.969E-19 | 7.819E-18 | 2.656E-16 | 5.640E-15 | 9.726E-14 | 4.508E-13 | 2.027E-13 |
| Ac-227         | ΣS(j):        |           | 0.000E+00     | 2.971E-19 | 7.825E-18 | 2.659E-16 | 5.652E-15 | 9.783E-14 | 4.580E-13 | 2.103E-13 |
| Am-243         | Am-243        | 1.375E-02 | 1.375E-02     | 1.366E-02 | 1.348E-02 | 1.285E-02 | 1.122E-02 | 6.972E-03 | 1.792E-03 | 1.541E-05 |
| Am-243         | Am-243        | 3.806E-05 | 3.806E-05     | 3.781E-05 | 3.729E-05 | 3.556E-05 | 3.104E-05 | 1.930E-05 | 4.958E-06 | 4.265E-08 |
| Am-243         | ΣS(j):        |           | 1.379E-02     | 1.370E-02 | 1.351E-02 | 1.289E-02 | 1.125E-02 | 6.991E-03 | 1.797E-03 | 1.545E-05 |
| Ac-227         | Am-243        | 3.806E-05 | 0.000E+00     | 2.990E-26 | 2.367E-24 | 2.701E-22 | 1.755E-20 | 1.056E-18 | 1.490E-17 | 1.673E-17 |
| Ac-227         | Am-243        | 8.252E-07 | 0.000E+00     | 6.482E-28 | 5.132E-26 | 5.855E-24 | 3.804E-22 | 2.290E-20 | 3.231E-19 | 3.628E-19 |
| Ac-227         | Am-243        | 2.285E-08 | 0.000E+00     | 1.795E-29 | 1.421E-27 | 1.621E-25 | 1.053E-23 | 6.341E-22 | 8.948E-21 | 1.005E-20 |
| Ac-227         | Cm-243        | 9.135E-08 | 0.000E+00     | 1.347E-33 | 3.185E-31 | 1.193E-28 | 2.225E-26 | 3.818E-24 | 1.075E-22 | 1.670E-22 |
| Ac-227         | Cm-243        | 5.484E-11 | 0.000E+00     | 8.085E-37 | 1.912E-34 | 7.161E-32 | 1.336E-29 | 2.292E-27 | 6.453E-26 | 1.003E-25 |
| Ac-227         | Cm-243        | 3.797E-05 | 0.000E+00     | 2.972E-26 | 2.337E-24 | 2.601E-22 | 1.577E-20 | 7.563E-19 | 6.498E-18 | 3.686E-18 |
| Ac-227         | Cm-243        | 2.280E-08 | 0.000E+00     | 1.784E-29 | 1.403E-27 | 1.562E-25 | 9.469E-24 | 4.541E-22 | 3.901E-21 | 2.213E-21 |
| Ac-227         | Pu-239        | 2.285E-08 | 0.000E+00     | 2.494E-24 | 6.569E-23 | 2.231E-21 | 4.738E-20 | 8.171E-19 | 3.787E-18 | 1.703E-18 |
| Ac-227         | Pu-239        | 3.806E-05 | 0.000E+00     | 4.155E-21 | 1.094E-19 | 3.716E-18 | 7.891E-17 | 1.361E-15 | 6.308E-15 | 2.836E-15 |
| Ac-227         | ΣS(j):        |           | 0.000E+00     | 4.157E-21 | 1.095E-19 | 3.719E-18 | 7.900E-17 | 1.364E-15 | 6.333E-15 | 2.858E-15 |

Summary : RESRAD Default

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Individual Nuclide Soil Concentration  
Parent Nuclide and Branch Fraction Indicated

| Nuclide<br>(j) | Parent<br>(i) | THF(i)    | S(j,t), pCi/g |           |           |           |           |           |           |           |
|----------------|---------------|-----------|---------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                |               |           | t= 0.000E+00  | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| Am-243         | Am-243        | 8.252E-07 | 8.252E-07     | 8.196E-07 | 8.086E-07 | 7.710E-07 | 6.731E-07 | 4.183E-07 | 1.075E-07 | 9.248E-10 |
| Am-243         | Am-243        | 2.284E-09 | 2.284E-09     | 2.268E-09 | 2.238E-09 | 2.134E-09 | 1.863E-09 | 1.158E-09 | 2.975E-10 | 2.559E-12 |
| Am-243         | ΣS(j):        |           | 8.275E-07     | 8.219E-07 | 8.108E-07 | 7.732E-07 | 6.749E-07 | 4.195E-07 | 1.078E-07 | 9.273E-10 |
| Ac-227         | Am-243        | 2.284E-09 | 0.000E+00     | 1.794E-30 | 1.420E-28 | 1.620E-26 | 1.053E-24 | 6.337E-23 | 8.943E-22 | 1.004E-21 |
| Ac-227         | Am-243        | 1.371E-12 | 0.000E+00     | 1.077E-33 | 8.528E-32 | 9.728E-30 | 6.321E-28 | 3.805E-26 | 5.369E-25 | 6.027E-25 |
| Ac-227         | Cm-243        | 5.481E-12 | 0.000E+00     | 8.081E-38 | 1.911E-35 | 7.158E-33 | 1.335E-30 | 2.291E-28 | 6.450E-27 | 1.002E-26 |
| Ac-227         | Cm-243        | 3.291E-15 | 0.000E+00     | 4.851E-41 | 1.147E-38 | 4.297E-36 | 8.015E-34 | 1.375E-31 | 3.872E-30 | 6.016E-30 |
| Ac-227         | Cm-243        | 2.278E-09 | 0.000E+00     | 1.783E-30 | 1.402E-28 | 1.561E-26 | 9.464E-25 | 4.538E-23 | 3.899E-22 | 2.212E-22 |
| Ac-227         | Cm-243        | 1.368E-12 | 0.000E+00     | 1.071E-33 | 8.418E-32 | 9.370E-30 | 5.682E-28 | 2.725E-26 | 2.341E-25 | 1.328E-25 |
| Ac-227         | Pu-239        | 1.371E-12 | 0.000E+00     | 1.497E-28 | 3.941E-27 | 1.339E-25 | 2.843E-24 | 4.903E-23 | 2.272E-22 | 1.022E-22 |
| Ac-227         | Pu-239        | 2.284E-09 | 0.000E+00     | 2.493E-25 | 6.565E-24 | 2.230E-22 | 4.735E-21 | 8.166E-20 | 3.785E-19 | 1.702E-19 |
| Ac-227         | ΣS(j):        |           | 0.000E+00     | 2.495E-25 | 6.569E-24 | 2.231E-22 | 4.740E-21 | 8.182E-20 | 3.800E-19 | 1.715E-19 |
| Am-243         | Am-243        | 5.901E-04 | 5.901E-04     | 5.861E-04 | 5.782E-04 | 5.513E-04 | 4.813E-04 | 2.991E-04 | 7.687E-05 | 6.613E-07 |
| Am-243         | Am-243        | 1.633E-06 | 1.633E-06     | 1.622E-06 | 1.600E-06 | 1.526E-06 | 1.332E-06 | 8.279E-07 | 2.127E-07 | 1.830E-09 |
| Am-243         | ΣS(j):        |           | 5.917E-04     | 5.877E-04 | 5.798E-04 | 5.529E-04 | 4.826E-04 | 3.000E-04 | 7.708E-05 | 6.631E-07 |
| Pu-239         | Am-243        | 5.901E-04 | 0.000E+00     | 1.687E-08 | 5.004E-08 | 1.604E-07 | 4.300E-07 | 9.689E-07 | 9.612E-07 | 7.621E-08 |
| Pu-239         | Am-243        | 1.633E-06 | 0.000E+00     | 4.669E-11 | 1.385E-10 | 4.439E-10 | 1.190E-09 | 2.682E-09 | 2.660E-09 | 2.109E-10 |
| Pu-239         | Am-243        | 8.257E-06 | 0.000E+00     | 2.360E-10 | 7.002E-10 | 2.244E-09 | 6.017E-09 | 1.356E-08 | 1.345E-08 | 1.066E-09 |
| Pu-239         | Am-243        | 2.285E-08 | 0.000E+00     | 6.533E-13 | 1.938E-12 | 6.211E-12 | 1.665E-11 | 3.752E-11 | 3.722E-11 | 2.951E-12 |
| Pu-239         | Am-243        | 4.954E-10 | 0.000E+00     | 1.416E-14 | 4.201E-14 | 1.346E-13 | 3.610E-13 | 8.135E-13 | 8.070E-13 | 6.399E-14 |
| Pu-239         | Am-243        | 1.371E-12 | 0.000E+00     | 3.920E-17 | 1.163E-16 | 3.727E-16 | 9.992E-16 | 2.251E-15 | 2.234E-15 | 1.771E-16 |
| Pu-239         | Cm-243        | 1.416E-06 | 0.000E+00     | 1.892E-15 | 1.663E-14 | 1.702E-13 | 1.217E-12 | 6.385E-12 | 9.458E-12 | 8.496E-13 |
| Pu-239         | Cm-243        | 3.920E-09 | 0.000E+00     | 5.236E-18 | 4.602E-17 | 4.710E-16 | 3.368E-15 | 1.767E-14 | 2.618E-14 | 2.351E-15 |
| Pu-239         | Cm-243        | 1.982E-08 | 0.000E+00     | 2.647E-17 | 2.327E-16 | 2.381E-15 | 1.703E-14 | 8.934E-14 | 1.323E-13 | 1.189E-14 |
| Pu-239         | Cm-243        | 5.484E-11 | 0.000E+00     | 7.327E-20 | 6.440E-19 | 6.590E-18 | 4.712E-17 | 2.473E-16 | 3.663E-16 | 3.290E-17 |
| Pu-239         | Cm-243        | 1.189E-12 | 0.000E+00     | 1.589E-21 | 1.396E-20 | 1.429E-19 | 1.022E-18 | 5.361E-18 | 7.941E-18 | 7.133E-19 |
| Pu-239         | Cm-243        | 3.291E-15 | 0.000E+00     | 4.396E-24 | 3.864E-23 | 3.954E-22 | 2.827E-21 | 1.484E-20 | 2.198E-20 | 1.974E-21 |
| Pu-239         | Cm-243        | 5.887E-04 | 0.000E+00     | 1.668E-08 | 4.863E-08 | 1.467E-07 | 3.342E-07 | 4.693E-07 | 2.223E-07 | 9.863E-09 |
| Pu-239         | Cm-243        | 1.629E-06 | 0.000E+00     | 4.617E-11 | 1.346E-10 | 4.061E-10 | 9.250E-10 | 1.299E-09 | 6.152E-10 | 2.730E-11 |
| Pu-239         | Cm-243        | 8.237E-06 | 0.000E+00     | 2.334E-10 | 6.804E-10 | 2.053E-09 | 4.676E-09 | 6.567E-09 | 3.110E-09 | 1.380E-10 |
| Pu-239         | Cm-243        | 2.280E-08 | 0.000E+00     | 6.460E-13 | 1.883E-12 | 5.682E-12 | 1.294E-11 | 1.817E-11 | 8.608E-12 | 3.819E-13 |
| Pu-239         | Cm-243        | 4.942E-10 | 0.000E+00     | 1.401E-14 | 4.083E-14 | 1.232E-13 | 2.806E-13 | 3.940E-13 | 1.866E-13 | 8.280E-15 |
| Pu-239         | Cm-243        | 1.368E-12 | 0.000E+00     | 3.876E-17 | 1.130E-16 | 3.410E-16 | 7.766E-16 | 1.091E-15 | 5.165E-16 | 2.292E-17 |
| Pu-239         | Pu-239        | 5.901E-04 | 5.901E-04     | 5.875E-04 | 5.823E-04 | 5.644E-04 | 5.163E-04 | 3.780E-04 | 1.551E-04 | 6.864E-06 |
| Pu-239         | ΣS(j):        |           | 5.901E-04     | 5.875E-04 | 5.824E-04 | 5.647E-04 | 5.171E-04 | 3.795E-04 | 1.563E-04 | 6.952E-06 |
| Am-243         | Am-243        | 8.257E-06 | 8.257E-06     | 8.201E-06 | 8.090E-06 | 7.714E-06 | 6.734E-06 | 4.186E-06 | 1.076E-06 | 9.253E-09 |
| Am-243         | Am-243        | 2.285E-08 | 2.285E-08     | 2.270E-08 | 2.239E-08 | 2.135E-08 | 1.864E-08 | 1.158E-08 | 2.977E-09 | 2.561E-11 |
| Am-243         | ΣS(j):        |           | 8.280E-06     | 8.223E-06 | 8.112E-06 | 7.736E-06 | 6.753E-06 | 4.197E-06 | 1.079E-06 | 9.278E-09 |
| Ac-227         | Am-243        | 8.257E-06 | 0.000E+00     | 6.485E-27 | 5.135E-25 | 5.858E-23 | 3.806E-21 | 2.291E-19 | 3.233E-18 | 3.630E-18 |
| Ac-227         | Cm-243        | 3.301E-05 | 0.000E+00     | 4.866E-31 | 1.151E-28 | 4.310E-26 | 8.039E-24 | 1.379E-21 | 3.884E-20 | 6.034E-20 |
| Ac-227         | Cm-243        | 1.982E-08 | 0.000E+00     | 2.921E-34 | 6.909E-32 | 2.588E-29 | 4.826E-27 | 8.281E-25 | 2.332E-23 | 3.622E-23 |
| Ac-227         | Cm-243        | 1.372E-02 | 0.000E+00     | 1.074E-23 | 8.443E-22 | 9.398E-20 | 5.699E-18 | 2.733E-16 | 2.348E-15 | 1.332E-15 |
| Ac-227         | Cm-243        | 8.237E-06 | 0.000E+00     | 6.447E-27 | 5.069E-25 | 5.642E-23 | 3.421E-21 | 1.641E-19 | 1.410E-18 | 7.996E-19 |
| Ac-227         | Pu-239        | 8.257E-06 | 0.000E+00     | 9.013E-22 | 2.373E-20 | 8.060E-19 | 1.712E-17 | 2.952E-16 | 1.368E-15 | 6.152E-16 |

Summary : RESRAD Default

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Individual Nuclide Soil Concentration  
Parent Nuclide and Branch Fraction Indicated

| Nuclide<br>(j) | Parent<br>(i) | THF(i)    | S(j,t), pCi/g |           |           |           |           |           |           |           |
|----------------|---------------|-----------|---------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                |               |           | t= 0.000E+00  | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| Ac-227         | Pu-239        | 1.375E-02 | 0.000E+00     | 1.501E-18 | 3.953E-17 | 1.343E-15 | 2.851E-14 | 4.917E-13 | 2.279E-12 | 1.025E-12 |
| Ac-227         | ΣS(j):        |           | 0.000E+00     | 1.502E-18 | 3.956E-17 | 1.343E-15 | 2.854E-14 | 4.923E-13 | 2.283E-12 | 1.027E-12 |
| Am-243         | Am-243        | 4.954E-10 | 4.954E-10     | 4.921E-10 | 4.854E-10 | 4.629E-10 | 4.041E-10 | 2.511E-10 | 6.454E-11 | 5.552E-13 |
| Am-243         | Am-243        | 1.371E-12 | 1.371E-12     | 1.362E-12 | 1.344E-12 | 1.281E-12 | 1.118E-12 | 6.951E-13 | 1.786E-13 | 1.537E-15 |
| Am-243         | ΣS(j):        |           | 4.968E-10     | 4.934E-10 | 4.868E-10 | 4.642E-10 | 4.052E-10 | 2.518E-10 | 6.472E-11 | 5.567E-13 |
| Ac-227         | Am-243        | 4.954E-10 | 0.000E+00     | 3.891E-31 | 3.081E-29 | 3.515E-27 | 2.284E-25 | 1.375E-23 | 1.940E-22 | 2.178E-22 |
| Ac-227         | Cm-243        | 1.981E-09 | 0.000E+00     | 2.920E-35 | 6.905E-33 | 2.586E-30 | 4.823E-28 | 8.277E-26 | 2.330E-24 | 3.620E-24 |
| Ac-227         | Cm-243        | 1.189E-12 | 0.000E+00     | 1.753E-38 | 4.146E-36 | 1.553E-33 | 2.896E-31 | 4.969E-29 | 1.399E-27 | 2.174E-27 |
| Ac-227         | Cm-243        | 8.232E-07 | 0.000E+00     | 6.443E-28 | 5.066E-26 | 5.639E-24 | 3.420E-22 | 1.640E-20 | 1.409E-19 | 7.992E-20 |
| Ac-227         | Cm-243        | 4.942E-10 | 0.000E+00     | 3.868E-31 | 3.041E-29 | 3.386E-27 | 2.053E-25 | 9.844E-24 | 8.458E-23 | 4.798E-23 |
| Ac-227         | Pu-239        | 4.954E-10 | 0.000E+00     | 5.408E-26 | 1.424E-24 | 4.837E-23 | 1.027E-21 | 1.771E-20 | 8.210E-20 | 3.691E-20 |
| Ac-227         | Pu-239        | 8.252E-07 | 0.000E+00     | 9.008E-23 | 2.372E-21 | 8.056E-20 | 1.711E-18 | 2.951E-17 | 1.368E-16 | 6.148E-17 |
| Ac-227         | ΣS(j):        |           | 0.000E+00     | 9.013E-23 | 2.374E-21 | 8.061E-20 | 1.712E-18 | 2.954E-17 | 1.370E-16 | 6.160E-17 |
| C-14           | C-14          | 1.000E+00 | 1.000E+00     | 9.769E-11 | 9.324E-31 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |
| Cm-243         | Cm-243        | 2.359E-03 | 2.359E-03     | 2.302E-03 | 2.192E-03 | 1.848E-03 | 1.134E-03 | 2.053E-04 | 1.555E-06 | 5.877E-14 |
| Cm-243         | Cm-243        | 6.529E-06 | 6.529E-06     | 6.371E-06 | 6.068E-06 | 5.114E-06 | 3.138E-06 | 5.682E-07 | 4.303E-09 | 1.627E-16 |
| Cm-243         | ΣS(j):        |           | 2.365E-03     | 2.308E-03 | 2.198E-03 | 1.853E-03 | 1.137E-03 | 2.059E-04 | 1.559E-06 | 5.894E-14 |
| Cm-243         | Cm-243        | 3.301E-05 | 3.301E-05     | 3.221E-05 | 3.068E-05 | 2.586E-05 | 1.587E-05 | 2.872E-06 | 2.175E-08 | 8.224E-16 |
| Cm-243         | Cm-243        | 9.135E-08 | 9.135E-08     | 8.915E-08 | 8.490E-08 | 7.156E-08 | 4.391E-08 | 7.950E-09 | 6.021E-11 | 2.276E-18 |
| Cm-243         | ΣS(j):        |           | 3.310E-05     | 3.230E-05 | 3.076E-05 | 2.593E-05 | 1.591E-05 | 2.880E-06 | 2.181E-08 | 8.247E-16 |
| Cm-243         | Cm-243        | 1.981E-09 | 1.981E-09     | 1.933E-09 | 1.841E-09 | 1.551E-09 | 9.521E-10 | 1.724E-10 | 1.305E-12 | 4.935E-20 |
| Cm-243         | Cm-243        | 5.481E-12 | 5.481E-12     | 5.349E-12 | 5.094E-12 | 4.294E-12 | 2.635E-12 | 4.770E-13 | 3.613E-15 | 1.366E-22 |
| Cm-243         | ΣS(j):        |           | 1.986E-09     | 1.938E-09 | 1.846E-09 | 1.556E-09 | 9.547E-10 | 1.728E-10 | 1.309E-12 | 4.948E-20 |
| Cm-243         | Cm-243        | 1.416E-06 | 1.416E-06     | 1.382E-06 | 1.316E-06 | 1.109E-06 | 6.808E-07 | 1.232E-07 | 9.334E-10 | 3.529E-17 |
| Cm-243         | Cm-243        | 3.920E-09 | 3.920E-09     | 3.825E-09 | 3.643E-09 | 3.070E-09 | 1.884E-09 | 3.411E-10 | 2.583E-12 | 9.766E-20 |
| Cm-243         | ΣS(j):        |           | 1.420E-06     | 1.386E-06 | 1.320E-06 | 1.112E-06 | 6.827E-07 | 1.236E-07 | 9.360E-10 | 3.538E-17 |
| Cm-243         | Cm-243        | 1.982E-08 | 1.982E-08     | 1.934E-08 | 1.842E-08 | 1.552E-08 | 9.526E-09 | 1.724E-09 | 1.306E-11 | 4.937E-19 |
| Cm-243         | Cm-243        | 5.484E-11 | 5.484E-11     | 5.352E-11 | 5.097E-11 | 4.296E-11 | 2.636E-11 | 4.773E-12 | 3.615E-14 | 1.366E-21 |
| Cm-243         | ΣS(j):        |           | 1.987E-08     | 1.939E-08 | 1.847E-08 | 1.557E-08 | 9.552E-09 | 1.729E-09 | 1.310E-11 | 4.951E-19 |
| Cm-243         | Cm-243        | 1.189E-12 | 1.189E-12     | 1.160E-12 | 1.105E-12 | 9.314E-13 | 5.716E-13 | 1.035E-13 | 7.837E-16 | 2.963E-23 |
| Cm-243         | Cm-243        | 3.291E-15 | 3.291E-15     | 3.211E-15 | 3.058E-15 | 2.578E-15 | 1.582E-15 | 2.864E-16 | 2.169E-18 | 8.199E-26 |
| Cm-243         | ΣS(j):        |           | 1.192E-12     | 1.164E-12 | 1.108E-12 | 9.340E-13 | 5.732E-13 | 1.038E-13 | 7.858E-16 | 2.971E-23 |
| Cm-243         | Cm-243        | 9.805E-01 | 9.805E-01     | 9.569E-01 | 9.113E-01 | 7.681E-01 | 4.714E-01 | 8.533E-02 | 6.463E-04 | 2.443E-11 |
| Cm-243         | Cm-243        | 2.714E-03 | 2.714E-03     | 2.648E-03 | 2.522E-03 | 2.126E-03 | 1.305E-03 | 2.362E-04 | 1.789E-06 | 6.762E-14 |
| Cm-243         | ΣS(j):        |           | 9.832E-01     | 9.595E-01 | 9.138E-01 | 7.702E-01 | 4.727E-01 | 8.557E-02 | 6.480E-04 | 2.450E-11 |
| Cm-243         | Cm-243        | 1.372E-02 | 1.372E-02     | 1.339E-02 | 1.275E-02 | 1.075E-02 | 6.595E-03 | 1.194E-03 | 9.043E-06 | 3.418E-13 |
| Cm-243         | Cm-243        | 3.797E-05 | 3.797E-05     | 3.706E-05 | 3.529E-05 | 2.975E-05 | 1.825E-05 | 3.304E-06 | 2.503E-08 | 9.461E-16 |
| Cm-243         | ΣS(j):        |           | 1.376E-02     | 1.343E-02 | 1.279E-02 | 1.078E-02 | 6.614E-03 | 1.197E-03 | 9.068E-06 | 3.428E-13 |

Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

Individual Nuclide Soil Concentration  
Parent Nuclide and Branch Fraction Indicated

| Nuclide<br>(j) | Parent<br>(i) | THF(i)    | S(j,t), pCi/g |           |           |           |           |           |           |           |  |
|----------------|---------------|-----------|---------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|--|
|                |               |           | t= 0.000E+00  | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |  |
| Cm-243         | Cm-243        | 8.232E-07 | 8.232E-07     | 8.034E-07 | 7.651E-07 | 6.449E-07 | 3.957E-07 | 7.164E-08 | 5.426E-10 | 2.051E-17 |  |
| Cm-243         | Cm-243        | 2.278E-09 | 2.278E-09     | 2.223E-09 | 2.118E-09 | 1.785E-09 | 1.095E-09 | 1.983E-10 | 1.502E-12 | 5.677E-20 |  |
| Cm-243         | ΣS(j):        |           | 8.255E-07     | 8.056E-07 | 7.672E-07 | 6.467E-07 | 3.968E-07 | 7.184E-08 | 5.441E-10 | 2.057E-17 |  |
| Cm-243         | Cm-243        | 5.887E-04 | 5.887E-04     | 5.745E-04 | 5.471E-04 | 4.611E-04 | 2.830E-04 | 5.123E-05 | 3.880E-07 | 1.467E-14 |  |
| Cm-243         | Cm-243        | 1.629E-06 | 1.629E-06     | 1.590E-06 | 1.514E-06 | 1.276E-06 | 7.832E-07 | 1.418E-07 | 1.074E-09 | 4.059E-17 |  |
| Cm-243         | ΣS(j):        |           | 5.903E-04     | 5.761E-04 | 5.486E-04 | 4.624E-04 | 2.838E-04 | 5.137E-05 | 3.891E-07 | 1.471E-14 |  |
| Cm-243         | Cm-243        | 8.237E-06 | 8.237E-06     | 8.038E-06 | 7.655E-06 | 6.452E-06 | 3.960E-06 | 7.168E-07 | 5.429E-09 | 2.052E-16 |  |
| Cm-243         | Cm-243        | 2.280E-08 | 2.280E-08     | 2.225E-08 | 2.119E-08 | 1.786E-08 | 1.096E-08 | 1.984E-09 | 1.502E-11 | 5.680E-19 |  |
| Cm-243         | ΣS(j):        |           | 8.260E-06     | 8.060E-06 | 7.676E-06 | 6.470E-06 | 3.971E-06 | 7.188E-07 | 5.444E-09 | 2.058E-16 |  |
| Cm-243         | Cm-243        | 4.942E-10 | 4.942E-10     | 4.823E-10 | 4.593E-10 | 3.872E-10 | 2.376E-10 | 4.301E-11 | 3.257E-13 | 1.231E-20 |  |
| Cm-243         | Cm-243        | 1.368E-12 | 1.368E-12     | 1.335E-12 | 1.271E-12 | 1.072E-12 | 6.576E-13 | 1.190E-13 | 9.016E-16 | 3.408E-23 |  |
| Cm-243         | ΣS(j):        |           | 4.956E-10     | 4.837E-10 | 4.606E-10 | 3.882E-10 | 2.382E-10 | 4.313E-11 | 3.266E-13 | 1.235E-20 |  |
| Cm-244         | Cm-244        | 1.371E-06 | 1.371E-06     | 1.319E-06 | 1.220E-06 | 9.293E-07 | 4.269E-07 | 2.805E-08 | 1.175E-11 | 1.765E-23 |  |
| Cm-244         | Cm-244        | 5.750E-08 | 5.750E-08     | 5.531E-08 | 5.117E-08 | 3.897E-08 | 1.790E-08 | 1.177E-09 | 4.927E-13 | 7.402E-25 |  |
| Cm-244         | ΣS(j):        |           | 1.429E-06     | 1.374E-06 | 1.271E-06 | 9.682E-07 | 4.448E-07 | 2.923E-08 | 1.224E-11 | 1.839E-23 |  |
| Pu-240         | Cm-244        | 5.750E-08 | 0.000E+00     | 5.942E-12 | 1.707E-11 | 4.911E-11 | 9.923E-11 | 1.087E-10 | 4.539E-11 | 1.904E-12 |  |
| Pu-240         | Pu-240        | 5.750E-08 | 5.750E-08     | 5.724E-08 | 5.672E-08 | 5.495E-08 | 5.019E-08 | 3.655E-08 | 1.477E-08 | 6.194E-10 |  |
| Pu-240         | ΣS(j):        |           | 5.750E-08     | 5.725E-08 | 5.674E-08 | 5.500E-08 | 5.029E-08 | 3.666E-08 | 1.481E-08 | 6.213E-10 |  |
| Cm-244         | Cm-244        | 1.000E+00 | 1.000E+00     | 9.619E-01 | 8.899E-01 | 6.778E-01 | 3.114E-01 | 2.046E-02 | 8.568E-06 | 1.287E-17 |  |
| Pu-240         | Cm-244        | 1.000E+00 | 0.000E+00     | 1.033E-04 | 2.969E-04 | 8.541E-04 | 1.726E-03 | 1.891E-03 | 7.894E-04 | 3.311E-05 |  |
| U-236          | Cm-244        | 1.000E+00 | 0.000E+00     | 1.535E-12 | 1.334E-11 | 1.314E-10 | 8.500E-10 | 3.434E-09 | 3.497E-09 | 1.990E-10 |  |
| U-236          | Pu-240        | 1.000E+00 | 0.000E+00     | 2.939E-08 | 8.695E-08 | 2.761E-07 | 7.210E-07 | 1.489E-06 | 1.197E-06 | 6.483E-08 |  |
| U-236          | ΣS(j):        |           | 0.000E+00     | 2.939E-08 | 8.697E-08 | 2.762E-07 | 7.218E-07 | 1.492E-06 | 1.201E-06 | 6.503E-08 |  |
| Th-232         | Cm-244        | 1.000E+00 | 0.000E+00     | 2.536E-23 | 6.669E-22 | 2.256E-20 | 4.754E-19 | 8.277E-18 | 4.645E-17 | 7.943E-17 |  |
| Th-232         | Pu-240        | 1.000E+00 | 0.000E+00     | 7.266E-19 | 6.478E-18 | 6.966E-17 | 5.713E-16 | 4.637E-15 | 1.865E-14 | 2.920E-14 |  |
| Th-232         | ΣS(j):        |           | 0.000E+00     | 7.267E-19 | 6.479E-18 | 6.968E-17 | 5.718E-16 | 4.645E-15 | 1.870E-14 | 2.927E-14 |  |
| Ra-228         | Cm-244        | 1.000E+00 | 0.000E+00     | 7.481E-25 | 5.660E-23 | 5.558E-21 | 2.519E-19 | 6.960E-18 | 4.494E-17 | 7.926E-17 |  |
| Ra-228         | Pu-240        | 1.000E+00 | 0.000E+00     | 2.837E-20 | 7.174E-19 | 2.144E-17 | 3.471E-16 | 4.045E-15 | 1.813E-14 | 2.914E-14 |  |
| Ra-228         | ΣS(j):        |           | 0.000E+00     | 2.837E-20 | 7.174E-19 | 2.144E-17 | 3.474E-16 | 4.052E-15 | 1.818E-14 | 2.921E-14 |  |
| Th-228         | Cm-244        | 1.000E+00 | 0.000E+00     | 5.142E-26 | 1.054E-23 | 2.543E-21 | 1.904E-19 | 6.535E-18 | 4.445E-17 | 7.923E-17 |  |
| Th-228         | Pu-240        | 1.000E+00 | 0.000E+00     | 2.411E-21 | 1.620E-19 | 1.128E-17 | 2.807E-16 | 3.853E-15 | 1.796E-14 | 2.913E-14 |  |
| Th-228         | ΣS(j):        |           | 0.000E+00     | 2.411E-21 | 1.620E-19 | 1.129E-17 | 2.809E-16 | 3.859E-15 | 1.801E-14 | 2.921E-14 |  |
| Co-60          | Co-60         | 1.000E+00 | 1.000E+00     | 8.759E-01 | 6.720E-01 | 2.658E-01 | 1.877E-02 | 1.758E-06 | 5.429E-18 | 0.000E+00 |  |
| Cs-134         | Cs-134        | 1.000E+00 | 1.000E+00     | 7.135E-01 | 3.632E-01 | 3.418E-02 | 3.991E-05 | 2.173E-15 | 9.809E-45 | 0.000E+00 |  |
| Cs-137         | Cs-137        | 1.000E+00 | 1.000E+00     | 9.754E-01 | 9.280E-01 | 7.795E-01 | 4.737E-01 | 8.286E-02 | 5.690E-04 | 1.527E-11 |  |

Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

Individual Nuclide Soil Concentration  
Parent Nuclide and Branch Fraction Indicated

| Nuclide<br>(j) | Parent<br>(i) | THF(i)    | S(j,t), pCi/g |           |           |           |           |           |           |           |  |
|----------------|---------------|-----------|---------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|--|
|                |               |           | t= 0.000E+00  | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |  |
| Eu-152         | Eu-152        | 7.210E-01 | 7.210E-01     | 6.765E-01 | 5.956E-01 | 3.814E-01 | 1.067E-01 | 1.236E-03 | 3.636E-09 | 1.585E-28 |  |
| Eu-152         | Eu-152        | 2.790E-01 | 2.790E-01     | 2.618E-01 | 2.305E-01 | 1.476E-01 | 4.129E-02 | 4.784E-04 | 1.407E-09 | 6.135E-29 |  |
| Eu-152         | ΣS(j):        |           | 1.000E+00     | 9.383E-01 | 8.261E-01 | 5.290E-01 | 1.480E-01 | 1.715E-03 | 5.043E-09 | 2.199E-28 |  |
| Gd-152         | Eu-152        | 2.790E-01 | 0.000E+00     | 1.734E-15 | 4.879E-15 | 1.314E-14 | 2.329E-14 | 2.487E-14 | 1.869E-14 | 6.832E-15 |  |
| Sm-148         | Eu-152        | 2.790E-01 | 0.000E+00     | 8.672E-32 | 7.472E-31 | 7.176E-30 | 4.479E-29 | 2.072E-28 | 5.254E-28 | 6.656E-28 |  |
| Nd-144         | Eu-152        | 2.790E-01 | 0.000E+00     | 0.000E+00 | 0.000E+00 | 7.006E-45 | 1.471E-43 | 2.297E-42 | 1.373E-41 | 2.766E-41 |  |
| Eu-154         | Eu-154        | 1.000E+00 | 1.000E+00     | 9.111E-01 | 7.562E-01 | 3.940E-01 | 6.116E-02 | 9.011E-05 | 7.317E-13 | 3.530E-41 |  |
| Eu-155         | Eu-155        | 1.000E+00 | 1.000E+00     | 8.538E-01 | 6.224E-01 | 2.058E-01 | 8.721E-03 | 1.365E-07 | 2.546E-21 | 0.000E+00 |  |
| Fe-55          | Fe-55         | 1.000E+00 | 1.000E+00     | 7.760E-01 | 4.672E-01 | 7.913E-02 | 4.955E-04 | 9.626E-12 | 8.919E-34 | 0.000E+00 |  |
| H-3            | H-3           | 1.000E+00 | 1.000E+00     | 4.444E-13 | 8.779E-38 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |  |
| Nb-94          | Nb-94         | 1.000E+00 | 1.000E+00     | 9.737E-01 | 9.233E-01 | 7.664E-01 | 4.501E-01 | 6.990E-02 | 3.416E-04 | 2.785E-12 |  |
| Ni-59          | Ni-59         | 1.000E+00 | 1.000E+00     | 9.811E-01 | 9.442E-01 | 8.259E-01 | 5.634E-01 | 1.477E-01 | 3.221E-03 | 4.938E-09 |  |
| Ni-63          | Ni-63         | 1.000E+00 | 1.000E+00     | 9.743E-01 | 9.248E-01 | 7.707E-01 | 4.578E-01 | 7.395E-02 | 4.044E-04 | 4.889E-12 |  |
| Pm-147         | Pm-147        | 1.000E+00 | 1.000E+00     | 7.583E-01 | 4.360E-01 | 6.284E-02 | 2.481E-04 | 9.595E-13 | 8.833E-37 | 0.000E+00 |  |
| Sm-147         | Pm-147        | 1.000E+00 | 0.000E+00     | 5.708E-12 | 1.330E-11 | 2.192E-11 | 2.275E-11 | 2.057E-11 | 1.543E-11 | 5.641E-12 |  |
| Pu-238         | Pu-238        | 1.850E-09 | 1.850E-09     | 1.827E-09 | 1.783E-09 | 1.635E-09 | 1.278E-09 | 5.392E-10 | 4.580E-11 | 8.182E-15 |  |
| Pu-238         | Pu-238        | 9.996E-01 | 9.996E-01     | 9.873E-01 | 9.633E-01 | 8.836E-01 | 6.905E-01 | 2.913E-01 | 2.475E-02 | 4.421E-06 |  |
| Pu-238         | ΣS(j):        |           | 9.996E-01     | 9.873E-01 | 9.633E-01 | 8.836E-01 | 6.905E-01 | 2.913E-01 | 2.475E-02 | 4.421E-06 |  |
| U-234          | Pu-238        | 9.996E-01 | 0.000E+00     | 2.792E-06 | 8.195E-06 | 2.532E-05 | 6.112E-05 | 9.550E-05 | 3.350E-05 | 7.472E-08 |  |
| U-234          | Pu-238        | 1.899E-08 | 0.000E+00     | 5.304E-14 | 1.557E-13 | 4.810E-13 | 1.161E-12 | 1.814E-12 | 6.365E-13 | 1.420E-15 |  |
| U-234          | Pu-238        | 2.100E-04 | 0.000E+00     | 5.864E-10 | 1.721E-09 | 5.318E-09 | 1.284E-08 | 2.006E-08 | 7.037E-09 | 1.569E-11 |  |
| U-234          | Pu-238        | 2.771E-10 | 0.000E+00     | 7.740E-16 | 2.272E-15 | 7.019E-15 | 1.695E-14 | 2.648E-14 | 9.289E-15 | 2.072E-17 |  |
| U-234          | Pu-238        | 3.989E-12 | 0.000E+00     | 1.114E-17 | 3.271E-17 | 1.010E-16 | 2.439E-16 | 3.811E-16 | 1.337E-16 | 2.982E-19 |  |
| U-234          | Pu-238        | 1.998E-04 | 0.000E+00     | 5.579E-10 | 1.638E-09 | 5.059E-09 | 1.222E-08 | 1.908E-08 | 6.695E-09 | 1.493E-11 |  |
| U-234          | Pu-238        | 2.637E-10 | 0.000E+00     | 7.364E-16 | 2.162E-15 | 6.678E-15 | 1.612E-14 | 2.519E-14 | 8.838E-15 | 1.971E-17 |  |
| U-234          | Pu-238        | 3.795E-12 | 0.000E+00     | 1.060E-17 | 3.112E-17 | 9.612E-17 | 2.321E-16 | 3.626E-16 | 1.272E-16 | 2.837E-19 |  |
| U-234          | Pu-238        | 4.196E-08 | 0.000E+00     | 1.172E-13 | 3.440E-13 | 1.063E-12 | 2.566E-12 | 4.009E-12 | 1.406E-12 | 3.136E-15 |  |
| U-234          | Pu-238        | 5.538E-14 | 0.000E+00     | 1.547E-19 | 4.541E-19 | 1.403E-18 | 3.387E-18 | 5.291E-18 | 1.856E-18 | 4.140E-21 |  |
| U-234          | Pu-238        | 7.972E-16 | 0.000E+00     | 2.226E-21 | 6.536E-21 | 2.019E-20 | 4.875E-20 | 7.616E-20 | 2.672E-20 | 5.959E-23 |  |
| U-234          | Pu-238        | 2.000E-07 | 0.000E+00     | 5.586E-13 | 1.640E-12 | 5.065E-12 | 1.223E-11 | 1.911E-11 | 6.703E-12 | 1.495E-14 |  |
| U-234          | Pu-238        | 2.640E-13 | 0.000E+00     | 7.373E-19 | 2.164E-18 | 6.686E-18 | 1.614E-17 | 2.522E-17 | 8.848E-18 | 1.973E-20 |  |
| U-234          | Pu-238        | 3.800E-15 | 0.000E+00     | 1.061E-20 | 3.115E-20 | 9.624E-20 | 2.324E-19 | 3.630E-19 | 1.274E-19 | 2.841E-22 |  |
| U-234          | ΣS(j):        |           | 0.000E+00     | 2.793E-06 | 8.198E-06 | 2.533E-05 | 6.115E-05 | 9.554E-05 | 3.352E-05 | 7.475E-08 |  |
| Th-230         | Pu-238        | 9.996E-01 | 0.000E+00     | 1.288E-11 | 1.142E-10 | 1.206E-09 | 9.405E-09 | 6.461E-08 | 1.792E-07 | 1.884E-07 |  |

Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

Individual Nuclide Soil Concentration  
Parent Nuclide and Branch Fraction Indicated

| Nuclide<br>(j) | Parent<br>(i) | THF(i)    | S(j,t), pCi/g |           |           |           |           |           |           |           |
|----------------|---------------|-----------|---------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                |               |           | t= 0.000E+00  | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |
| Th-230         | Pu-238        | 1.899E-08 | 0.000E+00     | 2.447E-19 | 2.171E-18 | 2.292E-17 | 1.787E-16 | 1.228E-15 | 3.405E-15 | 3.580E-15 |
| Th-230         | Pu-238        | 2.100E-04 | 0.000E+00     | 2.706E-15 | 2.400E-14 | 2.534E-13 | 1.975E-12 | 1.357E-11 | 3.764E-11 | 3.957E-11 |
| Th-230         | Pu-238        | 2.771E-10 | 0.000E+00     | 3.571E-21 | 3.168E-20 | 3.345E-19 | 2.608E-18 | 1.791E-17 | 4.969E-17 | 5.224E-17 |
| Th-230         | Pu-238        | 3.989E-12 | 0.000E+00     | 5.141E-23 | 4.560E-22 | 4.815E-21 | 3.753E-20 | 2.578E-19 | 7.152E-19 | 7.519E-19 |
| Th-230         | Pu-238        | 1.998E-04 | 0.000E+00     | 2.574E-15 | 2.283E-14 | 2.411E-13 | 1.879E-12 | 1.291E-11 | 3.581E-11 | 3.765E-11 |
| Th-230         | Pu-238        | 2.637E-10 | 0.000E+00     | 3.398E-21 | 3.014E-20 | 3.182E-19 | 2.481E-18 | 1.704E-17 | 4.727E-17 | 4.970E-17 |
| Th-230         | Pu-238        | 3.795E-12 | 0.000E+00     | 4.891E-23 | 4.338E-22 | 4.581E-21 | 3.571E-20 | 2.453E-19 | 6.805E-19 | 7.154E-19 |
| Th-230         | Pu-238        | 4.196E-08 | 0.000E+00     | 5.407E-19 | 4.796E-18 | 5.064E-17 | 3.948E-16 | 2.712E-15 | 7.522E-15 | 7.908E-15 |
| Th-230         | Pu-238        | 5.538E-14 | 0.000E+00     | 7.137E-25 | 6.330E-24 | 6.684E-23 | 5.211E-22 | 3.580E-21 | 9.930E-21 | 1.044E-20 |
| Th-230         | Pu-238        | 7.972E-16 | 0.000E+00     | 1.027E-26 | 9.112E-26 | 9.622E-25 | 7.501E-24 | 5.153E-23 | 1.429E-22 | 1.503E-22 |
| Th-230         | Pu-238        | 2.000E-07 | 0.000E+00     | 2.577E-18 | 2.286E-17 | 2.414E-16 | 1.882E-15 | 1.293E-14 | 3.586E-14 | 3.770E-14 |
| Th-230         | Pu-238        | 2.640E-13 | 0.000E+00     | 3.402E-24 | 3.017E-23 | 3.186E-22 | 2.484E-21 | 1.706E-20 | 4.733E-20 | 4.976E-20 |
| Th-230         | Pu-238        | 3.800E-15 | 0.000E+00     | 4.897E-26 | 4.343E-25 | 4.586E-24 | 3.575E-23 | 2.456E-22 | 6.813E-22 | 7.162E-22 |
| Th-230         | ΣS(j):        |           | 0.000E+00     | 1.289E-11 | 1.143E-10 | 1.207E-09 | 9.409E-09 | 6.464E-08 | 1.793E-07 | 1.885E-07 |
| Ra-226         | Pu-238        | 9.996E-01 | 0.000E+00     | 1.863E-15 | 4.974E-14 | 1.771E-12 | 4.277E-11 | 1.092E-09 | 1.171E-08 | 5.287E-08 |
| Ra-226         | Pu-238        | 1.899E-08 | 0.000E+00     | 3.540E-23 | 9.450E-22 | 3.365E-20 | 8.127E-19 | 2.074E-17 | 2.224E-16 | 1.005E-15 |
| Ra-226         | ΣS(j):        |           | 0.000E+00     | 1.863E-15 | 4.974E-14 | 1.771E-12 | 4.277E-11 | 1.092E-09 | 1.171E-08 | 5.287E-08 |
| Pb-210         | Pu-238        | 9.996E-01 | 0.000E+00     | 1.447E-17 | 1.147E-15 | 1.313E-13 | 8.628E-12 | 5.435E-10 | 9.495E-09 | 5.072E-08 |
| Pb-210         | Pu-238        | 1.319E-06 | 0.000E+00     | 1.910E-23 | 1.514E-21 | 1.733E-19 | 1.139E-17 | 7.174E-16 | 1.253E-14 | 6.695E-14 |
| Pb-210         | Pu-238        | 2.100E-04 | 0.000E+00     | 3.039E-21 | 2.409E-19 | 2.758E-17 | 1.812E-15 | 1.142E-13 | 1.994E-12 | 1.065E-11 |
| Pb-210         | Pu-238        | 1.998E-04 | 0.000E+00     | 2.891E-21 | 2.292E-19 | 2.624E-17 | 1.724E-15 | 1.086E-13 | 1.897E-12 | 1.014E-11 |
| Pb-210         | Pu-238        | 4.196E-08 | 0.000E+00     | 6.073E-25 | 4.814E-23 | 5.512E-21 | 3.621E-19 | 2.281E-17 | 3.985E-16 | 2.129E-15 |
| Pb-210         | Pu-238        | 2.000E-07 | 0.000E+00     | 2.895E-24 | 2.294E-22 | 2.627E-20 | 1.726E-18 | 1.087E-16 | 1.900E-15 | 1.015E-14 |
| Pb-210         | ΣS(j):        |           | 0.000E+00     | 1.447E-17 | 1.147E-15 | 1.314E-13 | 8.631E-12 | 5.437E-10 | 9.499E-09 | 5.074E-08 |
| Po-210         | Pu-238        | 9.996E-01 | 0.000E+00     | 4.024E-18 | 6.324E-16 | 1.070E-13 | 8.047E-12 | 5.325E-10 | 9.426E-09 | 5.052E-08 |
| Po-210         | Pu-238        | 2.100E-04 | 0.000E+00     | 8.452E-22 | 1.328E-19 | 2.248E-17 | 1.690E-15 | 1.119E-13 | 1.980E-12 | 1.061E-11 |
| Po-210         | Pu-238        | 1.998E-04 | 0.000E+00     | 8.042E-22 | 1.264E-19 | 2.139E-17 | 1.608E-15 | 1.064E-13 | 1.884E-12 | 1.010E-11 |
| Po-210         | Pu-238        | 4.196E-08 | 0.000E+00     | 1.689E-25 | 2.654E-23 | 4.492E-21 | 3.378E-19 | 2.235E-17 | 3.957E-16 | 2.121E-15 |
| Po-210         | Pu-238        | 2.000E-07 | 0.000E+00     | 8.051E-25 | 1.265E-22 | 2.141E-20 | 1.610E-18 | 1.065E-16 | 1.886E-15 | 1.011E-14 |
| Po-210         | ΣS(j):        |           | 0.000E+00     | 4.026E-18 | 6.326E-16 | 1.071E-13 | 8.051E-12 | 5.327E-10 | 9.430E-09 | 5.054E-08 |
| Pu-238         | Pu-238        | 1.319E-06 | 1.319E-06     | 1.303E-06 | 1.272E-06 | 1.166E-06 | 9.115E-07 | 3.846E-07 | 3.267E-08 | 5.835E-12 |
| Pu-238         | Pu-238        | 1.899E-08 | 1.899E-08     | 1.876E-08 | 1.830E-08 | 1.679E-08 | 1.312E-08 | 5.535E-09 | 4.702E-10 | 8.399E-14 |
| Pu-238         | ΣS(j):        |           | 1.338E-06     | 1.322E-06 | 1.290E-06 | 1.183E-06 | 9.246E-07 | 3.901E-07 | 3.314E-08 | 5.919E-12 |
| U-234          | Pu-238        | 1.319E-06 | 0.000E+00     | 3.685E-12 | 1.082E-11 | 3.342E-11 | 8.068E-11 | 1.261E-10 | 4.422E-11 | 9.863E-14 |
| Th-230         | Pu-238        | 1.319E-06 | 0.000E+00     | 1.700E-17 | 1.508E-16 | 1.592E-15 | 1.241E-14 | 8.528E-14 | 2.366E-13 | 2.487E-13 |
| Ra-226         | Pu-238        | 1.319E-06 | 0.000E+00     | 2.459E-21 | 6.565E-20 | 2.337E-18 | 5.646E-17 | 1.441E-15 | 1.545E-14 | 6.979E-14 |
| Pb-210         | Pu-238        | 1.899E-08 | 0.000E+00     | 2.749E-25 | 2.179E-23 | 2.495E-21 | 1.639E-19 | 1.033E-17 | 1.804E-16 | 9.637E-16 |
| Pb-210         | Pu-238        | 3.989E-12 | 0.000E+00     | 5.774E-29 | 4.577E-27 | 5.241E-25 | 3.443E-23 | 2.169E-21 | 3.789E-20 | 2.024E-19 |
| Pb-210         | Pu-238        | 3.795E-12 | 0.000E+00     | 5.493E-29 | 4.354E-27 | 4.986E-25 | 3.276E-23 | 2.064E-21 | 3.605E-20 | 1.926E-19 |
| Pb-210         | Pu-238        | 7.972E-16 | 0.000E+00     | 1.154E-32 | 9.146E-31 | 1.047E-28 | 6.881E-27 | 4.335E-25 | 7.572E-24 | 4.045E-23 |
| Pb-210         | Pu-238        | 3.800E-15 | 0.000E+00     | 5.500E-32 | 4.359E-30 | 4.992E-28 | 3.280E-26 | 2.066E-24 | 3.609E-23 | 1.928E-22 |
| Pb-210         | ΣS(j):        |           | 0.000E+00     | 2.750E-25 | 2.180E-23 | 2.496E-21 | 1.640E-19 | 1.033E-17 | 1.805E-16 | 9.641E-16 |

Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

Individual Nuclide Soil Concentration  
Parent Nuclide and Branch Fraction Indicated

| Nuclide<br>(j) | Parent<br>(i) | THF(i)    | S(j,t), pCi/g |           |           |           |           |           |           |           |  |
|----------------|---------------|-----------|---------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|--|
|                |               |           | t= 0.000E+00  | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |  |
| Pu-238         | Pu-238        | 2.100E-04 | 2.100E-04     | 2.074E-04 | 2.023E-04 | 1.856E-04 | 1.450E-04 | 6.119E-05 | 5.198E-06 | 9.285E-10 |  |
| Pu-238         | Pu-238        | 2.771E-10 | 2.771E-10     | 2.737E-10 | 2.671E-10 | 2.450E-10 | 1.915E-10 | 8.077E-11 | 6.861E-12 | 1.226E-15 |  |
| Pu-238         | ΣS(j):        |           | 2.100E-04     | 2.074E-04 | 2.023E-04 | 1.856E-04 | 1.450E-04 | 6.119E-05 | 5.198E-06 | 9.285E-10 |  |
| Ra-226         | Pu-238        | 2.100E-04 | 0.000E+00     | 3.913E-19 | 1.045E-17 | 3.719E-16 | 8.984E-15 | 2.293E-13 | 2.459E-12 | 1.110E-11 |  |
| Ra-226         | Pu-238        | 2.771E-10 | 0.000E+00     | 5.166E-25 | 1.379E-23 | 4.910E-22 | 1.186E-20 | 3.027E-19 | 3.246E-18 | 1.466E-17 |  |
| Ra-226         | Pu-238        | 3.989E-12 | 0.000E+00     | 7.436E-27 | 1.985E-25 | 7.067E-24 | 1.707E-22 | 4.357E-21 | 4.672E-20 | 2.110E-19 |  |
| Ra-226         | ΣS(j):        |           | 0.000E+00     | 3.913E-19 | 1.045E-17 | 3.719E-16 | 8.984E-15 | 2.293E-13 | 2.459E-12 | 1.110E-11 |  |
| Pb-210         | Pu-238        | 2.771E-10 | 0.000E+00     | 4.011E-27 | 3.179E-25 | 3.641E-23 | 2.392E-21 | 1.507E-19 | 2.633E-18 | 1.406E-17 |  |
| Pb-210         | Pu-238        | 2.637E-10 | 0.000E+00     | 3.816E-27 | 3.025E-25 | 3.464E-23 | 2.276E-21 | 1.434E-19 | 2.505E-18 | 1.338E-17 |  |
| Pb-210         | Pu-238        | 5.538E-14 | 0.000E+00     | 8.016E-31 | 6.354E-29 | 7.276E-27 | 4.780E-25 | 3.011E-23 | 5.261E-22 | 2.810E-21 |  |
| Pb-210         | Pu-238        | 2.640E-13 | 0.000E+00     | 3.821E-30 | 3.029E-28 | 3.468E-26 | 2.279E-24 | 1.435E-22 | 2.508E-21 | 1.340E-20 |  |
| Pb-210         | ΣS(j):        |           | 0.000E+00     | 7.832E-27 | 6.208E-25 | 7.109E-23 | 4.671E-21 | 2.942E-19 | 5.140E-18 | 2.746E-17 |  |
| Pu-238         | Pu-238        | 3.989E-12 | 3.989E-12     | 3.940E-12 | 3.844E-12 | 3.526E-12 | 2.756E-12 | 1.163E-12 | 9.876E-14 | 1.764E-17 |  |
| Pu-238         | Pu-238        | 1.998E-04 | 1.998E-04     | 1.973E-04 | 1.925E-04 | 1.766E-04 | 1.380E-04 | 5.822E-05 | 4.945E-06 | 8.834E-10 |  |
| Pu-238         | ΣS(j):        |           | 1.998E-04     | 1.973E-04 | 1.925E-04 | 1.766E-04 | 1.380E-04 | 5.822E-05 | 4.945E-06 | 8.834E-10 |  |
| Ra-226         | Pu-238        | 1.998E-04 | 0.000E+00     | 3.723E-19 | 9.940E-18 | 3.539E-16 | 8.548E-15 | 2.182E-13 | 2.339E-12 | 1.057E-11 |  |
| Ra-226         | Pu-238        | 3.795E-12 | 0.000E+00     | 7.074E-27 | 1.889E-25 | 6.724E-24 | 1.624E-22 | 4.145E-21 | 4.445E-20 | 2.007E-19 |  |
| Ra-226         | ΣS(j):        |           | 0.000E+00     | 3.723E-19 | 9.940E-18 | 3.539E-16 | 8.548E-15 | 2.182E-13 | 2.339E-12 | 1.057E-11 |  |
| Pu-238         | Pu-238        | 2.637E-10 | 2.637E-10     | 2.604E-10 | 2.541E-10 | 2.331E-10 | 1.822E-10 | 7.685E-11 | 6.528E-12 | 1.166E-15 |  |
| Pu-238         | Pu-238        | 3.795E-12 | 3.795E-12     | 3.749E-12 | 3.658E-12 | 3.355E-12 | 2.622E-12 | 1.106E-12 | 9.396E-14 | 1.679E-17 |  |
| Pu-238         | ΣS(j):        |           | 2.675E-10     | 2.642E-10 | 2.578E-10 | 2.365E-10 | 1.848E-10 | 7.796E-11 | 6.622E-12 | 1.183E-15 |  |
| Ra-226         | Pu-238        | 2.637E-10 | 0.000E+00     | 4.915E-25 | 1.312E-23 | 4.671E-22 | 1.128E-20 | 2.880E-19 | 3.088E-18 | 1.395E-17 |  |
| Pu-238         | Pu-238        | 4.196E-08 | 4.196E-08     | 4.144E-08 | 4.043E-08 | 3.709E-08 | 2.899E-08 | 1.223E-08 | 1.039E-09 | 1.856E-13 |  |
| Pu-238         | Pu-238        | 5.538E-14 | 5.538E-14     | 5.471E-14 | 5.337E-14 | 4.896E-14 | 3.826E-14 | 1.614E-14 | 1.371E-15 | 2.449E-19 |  |
| Pu-238         | ΣS(j):        |           | 4.196E-08     | 4.144E-08 | 4.043E-08 | 3.709E-08 | 2.899E-08 | 1.223E-08 | 1.039E-09 | 1.856E-13 |  |
| Ra-226         | Pu-238        | 4.196E-08 | 0.000E+00     | 7.821E-23 | 2.088E-21 | 7.433E-20 | 1.795E-18 | 4.582E-17 | 4.914E-16 | 2.219E-15 |  |
| Ra-226         | Pu-238        | 5.538E-14 | 0.000E+00     | 1.032E-28 | 2.756E-27 | 9.812E-26 | 2.370E-24 | 6.048E-23 | 6.486E-22 | 2.929E-21 |  |
| Ra-226         | Pu-238        | 7.972E-16 | 0.000E+00     | 1.486E-30 | 3.967E-29 | 1.412E-27 | 3.411E-26 | 8.706E-25 | 9.336E-24 | 4.217E-23 |  |
| Ra-226         | ΣS(j):        |           | 0.000E+00     | 7.821E-23 | 2.088E-21 | 7.433E-20 | 1.795E-18 | 4.582E-17 | 4.914E-16 | 2.219E-15 |  |
| Pu-238         | Pu-238        | 7.972E-16 | 7.972E-16     | 7.874E-16 | 7.683E-16 | 7.047E-16 | 5.507E-16 | 2.323E-16 | 1.974E-17 | 3.526E-21 |  |
| Pu-238         | Pu-238        | 2.000E-07 | 2.000E-07     | 1.975E-07 | 1.927E-07 | 1.768E-07 | 1.382E-07 | 5.829E-08 | 4.951E-09 | 8.845E-13 |  |
| Pu-238         | ΣS(j):        |           | 2.000E-07     | 1.975E-07 | 1.927E-07 | 1.768E-07 | 1.382E-07 | 5.829E-08 | 4.951E-09 | 8.845E-13 |  |
| Ra-226         | Pu-238        | 2.000E-07 | 0.000E+00     | 3.728E-22 | 9.952E-21 | 3.543E-19 | 8.558E-18 | 2.184E-16 | 2.342E-15 | 1.058E-14 |  |
| Ra-226         | Pu-238        | 3.800E-15 | 0.000E+00     | 7.083E-30 | 1.891E-28 | 6.732E-27 | 1.626E-25 | 4.150E-24 | 4.450E-23 | 2.010E-22 |  |
| Ra-226         | ΣS(j):        |           | 0.000E+00     | 3.728E-22 | 9.952E-21 | 3.543E-19 | 8.558E-18 | 2.184E-16 | 2.342E-15 | 1.058E-14 |  |
| Pu-238         | Pu-238        | 2.640E-13 | 2.640E-13     | 2.608E-13 | 2.544E-13 | 2.334E-13 | 1.824E-13 | 7.694E-14 | 6.536E-15 | 1.168E-18 |  |
| Pu-238         | Pu-238        | 3.800E-15 | 3.800E-15     | 3.753E-15 | 3.662E-15 | 3.359E-15 | 2.625E-15 | 1.108E-15 | 9.408E-17 | 1.681E-20 |  |
| Pu-238         | ΣS(j):        |           | 2.678E-13     | 2.645E-13 | 2.581E-13 | 2.367E-13 | 1.850E-13 | 7.805E-14 | 6.630E-15 | 1.184E-18 |  |



Summary : RESRAD Default

File : C:\USERS\DAVID FAUVER\DOCUMENTS\ZION\RESRAD\TSD\SOIL DCGL\RESRAD INPUT FILE\ZION SOIL ROC SCREENING AF.RAD

Individual Nuclide Soil Concentration  
Parent Nuclide and Branch Fraction Indicated

| Nuclide<br>(j) | Parent<br>(i) | THF(i)    | S(j,t), pCi/g |           |           |           |           |           |           |           |  |
|----------------|---------------|-----------|---------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|--|
|                |               |           | t= 0.000E+00  | 1.000E+00 | 3.000E+00 | 1.000E+01 | 3.000E+01 | 1.000E+02 | 3.000E+02 | 1.000E+03 |  |
| Ra-226         | Pu-238        | 2.640E-13 | 0.000E+00     | 4.921E-28 | 1.314E-26 | 4.677E-25 | 1.130E-23 | 2.883E-22 | 3.092E-21 | 1.396E-20 |  |
| Pu-239         | Pu-239        | 1.633E-06 | 1.633E-06     | 1.626E-06 | 1.611E-06 | 1.562E-06 | 1.429E-06 | 1.046E-06 | 4.293E-07 | 1.900E-08 |  |
| Pu-239         | Pu-239        | 8.257E-06 | 8.257E-06     | 8.220E-06 | 8.147E-06 | 7.897E-06 | 7.224E-06 | 5.289E-06 | 2.170E-06 | 9.605E-08 |  |
| Pu-239         | ΣS(j):        |           | 9.890E-06     | 9.846E-06 | 9.759E-06 | 9.459E-06 | 8.653E-06 | 6.335E-06 | 2.600E-06 | 1.150E-07 |  |
| Pu-239         | Pu-239        | 2.285E-08 | 2.285E-08     | 2.275E-08 | 2.255E-08 | 2.186E-08 | 1.999E-08 | 1.464E-08 | 6.006E-09 | 2.658E-10 |  |
| Pu-239         | Pu-239        | 4.954E-10 | 4.954E-10     | 4.932E-10 | 4.889E-10 | 4.738E-10 | 4.335E-10 | 3.174E-10 | 1.302E-10 | 5.763E-12 |  |
| Pu-239         | ΣS(j):        |           | 2.335E-08     | 2.324E-08 | 2.304E-08 | 2.233E-08 | 2.043E-08 | 1.496E-08 | 6.137E-09 | 2.716E-10 |  |
| Pu-239         | Pu-239        | 1.371E-12 | 1.371E-12     | 1.365E-12 | 1.353E-12 | 1.311E-12 | 1.200E-12 | 8.783E-13 | 3.604E-13 | 1.595E-14 |  |
| Pu-239         | Pu-239        | 2.720E-03 | 2.720E-03     | 2.708E-03 | 2.684E-03 | 2.602E-03 | 2.380E-03 | 1.743E-03 | 7.150E-04 | 3.164E-05 |  |
| Pu-239         | Pu-239        | 1.375E-02 | 1.375E-02     | 1.369E-02 | 1.357E-02 | 1.315E-02 | 1.203E-02 | 8.810E-03 | 3.615E-03 | 1.600E-04 |  |
| Pu-239         | ΣS(j):        |           | 1.647E-02     | 1.640E-02 | 1.625E-02 | 1.576E-02 | 1.441E-02 | 1.055E-02 | 4.330E-03 | 1.916E-04 |  |
| Pu-239         | Pu-239        | 3.806E-05 | 3.806E-05     | 3.789E-05 | 3.756E-05 | 3.640E-05 | 3.330E-05 | 2.438E-05 | 1.000E-05 | 4.428E-07 |  |
| Pu-239         | Pu-239        | 8.252E-07 | 8.252E-07     | 8.216E-07 | 8.143E-07 | 7.893E-07 | 7.220E-07 | 5.286E-07 | 2.169E-07 | 9.600E-09 |  |
| Pu-239         | ΣS(j):        |           | 3.889E-05     | 3.872E-05 | 3.837E-05 | 3.719E-05 | 3.402E-05 | 2.491E-05 | 1.022E-05 | 4.524E-07 |  |
| Pu-239         | Pu-239        | 2.284E-09 | 2.284E-09     | 2.274E-09 | 2.254E-09 | 2.184E-09 | 1.998E-09 | 1.463E-09 | 6.003E-10 | 2.657E-11 |  |
| Pu-240         | Pu-240        | 1.000E+00 | 1.000E+00     | 9.955E-01 | 9.865E-01 | 9.557E-01 | 8.729E-01 | 6.357E-01 | 2.569E-01 | 1.077E-02 |  |
| Pu-241         | Pu-241        | 1.000E+00 | 1.000E+00     | 9.486E-01 | 8.537E-01 | 5.902E-01 | 2.056E-01 | 5.129E-03 | 1.349E-07 | 1.260E-23 |  |
| Pu-241         | Pu-241        | 2.450E-05 | 2.450E-05     | 2.324E-05 | 2.092E-05 | 1.446E-05 | 5.037E-06 | 1.257E-07 | 3.306E-12 | 3.088E-28 |  |
| Pu-241         | ΣS(j):        |           | 1.000E+00     | 9.486E-01 | 8.537E-01 | 5.902E-01 | 2.056E-01 | 5.129E-03 | 1.349E-07 | 1.260E-23 |  |
| Sb-125         | Sb-125        | 7.686E-01 | 7.686E-01     | 5.576E-01 | 2.935E-01 | 3.105E-02 | 5.068E-05 | 8.903E-15 | 1.194E-42 | 0.000E+00 |  |
| Sb-125         | Sb-125        | 2.314E-01 | 2.314E-01     | 1.679E-01 | 8.835E-02 | 9.347E-03 | 1.526E-05 | 2.680E-15 | 3.601E-43 | 0.000E+00 |  |
| Sb-125         | ΣS(j):        |           | 1.000E+00     | 7.255E-01 | 3.819E-01 | 4.040E-02 | 6.594E-05 | 1.158E-14 | 1.554E-42 | 0.000E+00 |  |
| Te-125m        | Sb-125        | 2.314E-01 | 0.000E+00     | 2.032E-02 | 1.069E-02 | 1.131E-03 | 1.847E-06 | 3.244E-16 | 4.344E-44 | 0.000E+00 |  |
| Sr-90          | Sr-90         | 1.000E+00 | 1.000E+00     | 5.876E-01 | 2.029E-01 | 4.908E-03 | 1.182E-07 | 8.114E-24 | 0.000E+00 | 0.000E+00 |  |
| Tc-99          | Tc-99         | 1.000E+00 | 1.000E+00     | 4.690E-06 | 1.031E-16 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 | 0.000E+00 |  |

THF(i) is the thread fraction of the parent nuclide.

RESALC.EXE execution time = 232.10 seconds