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Results of Calculations of External Gamma Radiation Exposure Rates from Fallout and the Related Radionuclide Compositions—the Trinity Event

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Results of Calculations of External Gamma Radiation Exposure Rates from Fallout and the Related Radionuclide Compositions—the Trinity Event

Abstract

This report presents data on calculated gamma radiation exposure rates and ground deposition of related radionuclides resulting from the Trinity Event.

Introduction

In the past, we calculated the normalized external gamma radiation exposure rates resulting from local fallout from the Nevada Test Site (NTS)¹ and from Pacific Tests.² These calculations

were used to reconstruct radiation doses downwind. Recently, we were asked to make the calculations for the 20-kt Trinity Event, fired on July 16, 1945 at Alamogordo, New Mexico.

Results

Results of the calculations of relative external gamma radiation exposure rates and related radionuclide ground deposition are given in the Appendix. Activation products created by neutron interaction with the earth and other environmental materials present on the earth's surface are unimportant in the context of food and water contamination and are therefore not included. Plutonium and most uranium isotopes are not included in the calculations because they do not contribute significantly to the external gamma radiation and to ensure that this document is not classified. These calculations are described in detail in Ref. 3. The output of the calculation has 30 decay times: 10 from 1 to 21 hours, 10 from 1 to 300 days, and 10 from 1 to 50 years. For each of these times and for zero time, there are values of the external gamma radiation exposure rate normalized to 1 mR/h, 1 meter above the surface, 12 hours after the event; the associated values of $\mu\text{Ci}/\text{m}^2$ for each radionuclide; and the total $\mu\text{Ci}/\text{m}^2$.

Surface roughness effects were simulated by using Beck's values⁴ of $(\text{mR}/\text{h})/(\mu\text{Ci}/\text{m}^2)$ for a re-

laxation length of $0.16 \text{ g}/\text{cm}^2$. According to Beck, the concentration of fallout varies exponentially with soil depth Z , according to the relation $C = C_0 e^{-\alpha Z}$. He defines relaxation length as $1/\alpha$.

Fractionation effects were simulated by the removal of one-half of the refractory nuclides from the calculation.

The Appendix contains 11 pages of calculated results that are marked Page 2 through Page 12. Page 2 gives the external gamma-ray exposure rates and associated values of total microcuries per square meter at 30 decay intervals and at zero time. The remaining pages give calculated values for each radionuclide at various decay intervals—from 1 to 21 hours on pp. 3–7, from 1 to 300 days on pp. 8–11, and from 1 to 50 years on p. 12. The production of nuclides designated by (*) has been estimated. When no estimate could be made, the value appears as zero. Note that the totals at zero time include *only* the listed nuclides and not all nuclides present at zero time.

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Part 5—Operation Teapot, 1955
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2. H. G. Hicks, *Results of Calculations of External Gamma Radiation Exposure Rates from Local Fallout and the Related Radionuclide Compositions of Selected U.S. Pacific Events*, Lawrence Livermore National Laboratory, Livermore, CA, UCRL-53505 (February 1984).
3. H. G. Hicks, "Calculation of the Concentration of Any Radionuclide Deposited on the Ground by Fallout from a Nuclear Detonation," *Health Physics* **42**(5), 585-600 (May 1982).
4. H. L. Beck, *Exposure Rate Conversion Factors for Radionuclides Deposited on the Ground*, Environmental Measurements Laboratory, Department of Energy, New York, NY, EML-387 (July 1980).

Appendix
Detailed Results for the Trinity Event

TRINITY
 MR/HR AT H+12 HOURS = 1.000
 FRACTION OF REFRACTORIES PRESENT = 0.500
 RELAXATION LENGTH = 0.16 GM/SQCM
 BOMB FRACTION PER SQ. METER = 2.937E-13

TIME	MR/HR	MICROCURIES/SQ METER
ZERO TIME HOURS	1.22E+02	1.51E+04
1.00E+00	3.50E+01	2.84E+03
2.00E+00	1.35E+01	9.77E+02
3.00E+00	7.15E+00	5.55E+02
4.00E+00	4.42E+00	3.99E+02
6.00E+00	2.30E+00	2.70E+02
9.00E+00	1.36E+00	1.90E+02
1.20E+01	1.00E+00	1.49E+02
1.50E+01	7.91E-01	1.23E+02
1.80E+01	6.51E-01	1.05E+02
2.10E+01	5.49E-01	9.11E+01
1.00E+00 DAYS	4.67E-01	7.98E+01
2.00E+00	2.25E-01	4.17E+01
5.00E+00	9.17E-02	1.64E+01
1.00E+01	4.11E-02	6.43E+00
2.00E+01	1.59E-02	2.29E+00
3.00E+01	9.10E-03	1.34E+00
5.00E+01	4.25E-03	7.22E-01
1.00E+02	1.47E-03	3.09E-01
2.00E+02	4.86E-04	1.10E-01
3.00E+02	1.90E-04	5.76E-02
1.00E+00 YEARS	1.23E-04	4.37E-02
1.50E+00	5.00E-05	2.67E-02
2.00E+00	3.31E-05	1.90E-02
3.50E+00	1.84E-05	8.67E-03
5.00E+00	1.32E-05	5.09E-03
7.00E+00	1.04E-05	3.45E-03
1.00E+01	8.73E-06	2.69E-03
2.00E+01	6.17E-06	1.89E-03
3.50E+01	4.21E-06	1.30E-03
5.00E+01	2.95E-06	9.07E-04

TRINITY MICROCURIES/SQ METER
 MR/HR AT H+12 HOURS = 1.000
 FRACTION OF REFRACTORIES PRESENT = 0.500
 RELAXATION LENGTH = 0.16 GM/SQCM
 BOMB FRACTION PER SQ. METER = 2.937E-13

PAGE 3

DEBRIS DECAY FROM 1 TO 21 HOURS

	ZERO TIME	1.00E+00	2.00E+00	3.00E+00	4.00E+00	6.00E+00	9.00E+00	1.20E+01	1.50E+01	1.30E+01	2.10E+01
*BE 7	1.96E-07	1.96E-07	1.96E-07	1.96E-07	1.96E-07	1.95E-07	1.95E-07	1.94E-07	1.94E-07	1.94E-07	1.93E-07
*NA 24	2.95E-02	2.82E-02	2.69E-02	2.57E-02	2.45E-02	2.24E-02	1.95E-02	1.70E-02	1.48E-02	1.29E-02	1.12E-02
*MN 54	1.34E-05	1.34E-05	1.34E-05	1.34E-05	1.34E-05	1.34E-05	1.34E-05	1.33E-05	1.33E-05	1.33E-05	1.33E-05
*FE 55	2.37E-05	2.37E-05	2.37E-05	2.37E-05	2.37E-05	2.37E-05	2.37E-05	2.37E-05	2.37E-05	2.37E-05	2.37E-05
*FE 59	1.97E-05	1.97E-05	1.97E-05	1.97E-05	1.97E-05	1.97E-05	1.96E-05	1.96E-05	1.96E-05	1.95E-05	1.95E-05
*CO 57	2.40E-05	2.40E-05	2.40E-05	2.40E-05	2.40E-05	2.40E-05	2.40E-05	2.40E-05	2.40E-05	2.40E-05	2.40E-05
*CO 58	2.79E-02	2.79E-02	2.79E-02	2.79E-02	2.79E-02	2.78E-02	2.78E-02	2.78E-02	2.77E-02	2.77E-02	2.76E-02
*CO 60	1.00E-04	1.00E-04	1.00E-04	1.00E-04	1.00E-04	1.00E-04	1.00E-04	1.00E-04	1.00E-04	1.00E-04	1.00E-04
*CU 64	1.54E+00	1.46E+00	1.38E+00	1.31E+00	1.24E+00	1.11E+00	9.45E-01	8.04E-01	6.83E-01	5.81E-01	4.94E-01
*CU 67	6.94E-05	6.88E-05	6.76E-05	6.70E-05	6.65E-05	6.47E-05	6.23E-05	6.05E-05	5.86E-05	5.64E-05	5.48E-05
W181	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W185	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W187	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W188	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
AU198	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
AU199	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5 PB203	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
U237	1.60E+00	1.59E+00	1.59E+00	1.58E+00	1.57E+00	1.56E+00	1.54E+00	1.52E+00	1.50E+00	1.48E+00	1.46E+00
*U239	3.90E+03	6.65E+02	1.14E+02	1.93E+01	3.28E+00	9.57E-02	4.74E-04	2.34E-06	1.16E-08	5.73E-11	2.83E-13
*U240	8.82E-01	8.40E-01	8.00E-01	7.62E-01	7.25E-01	6.57E-01	5.67E-01	4.89E-01	4.22E-01	3.63E-01	3.13E-01
*NP239	1.33E-02	2.24E+01	2.59E+01	2.63E+01	2.61E+01	2.55E+01	2.44E+01	2.36E+01	2.28E+01	2.20E+01	2.11E+01
*NP240M	1.40E-03	8.44E-01	8.07E-01	7.69E-01	7.32E-01	6.62E-01	5.72E-01	4.94E-01	4.25E-01	3.67E-01	3.17E-01
*NP240	3.53E-11	1.82E-11	9.44E-12	4.87E-12	2.52E-12	6.74E-13	9.29E-14	1.28E-14	1.77E-15	2.43E-16	3.37E-17
AM241	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
CM242	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
GE 75	7.26E-06	3.52E-02	2.12E-02	1.28E-02	7.68E-03	2.79E-03	6.08E-04	1.33E-04	2.91E-05	6.34E-06	1.39E-06
GE 77	5.91E-03	1.52E-02	1.43E-02	1.35E-02	1.27E-02	1.12E-02	9.32E-03	7.74E-03	6.45E-03	5.36E-03	4.46E-03
AS 77	6.10E-05	9.65E-03	9.76E-03	9.82E-03	9.89E-03	9.95E-03	9.95E-03	9.89E-03	9.73E-03	9.54E-03	9.30E-03
SE 77M	2.41E-09	2.89E-05	2.93E-05	2.95E-05	2.95E-05	2.97E-05	3.00E-05	2.97E-05	2.93E-05	2.87E-05	2.78E-05
GE 78	9.56E-01	5.98E-01	3.72E-01	2.32E-01	1.45E-01	5.64E-02	1.37E-02	3.32E-03	8.10E-04	1.97E-04	4.78E-05
AS 78	1.72E-02	2.85E-01	3.52E-01	3.30E-01	2.76E-01	1.63E-01	6.04E-02	2.01E-02	6.21E-03	1.86E-03	5.38E-04
AS 79	1.74E+01	1.71E-01	1.69E-03	1.66E-05	1.63E-07	1.58E-11	1.51E-17	1.44E-23	1.37E-29	1.31E-35	1.25E-41
SE 79M	2.57E-02	3.02E-01	2.98E-03	2.94E-05	2.89E-07	2.79E-11	2.66E-17	2.54E-23	2.43E-29	2.32E-35	2.21E-41
BR 80	9.97E-02	9.40E-03	8.84E-04	8.31E-05	7.83E-06	6.94E-08	5.81E-11	4.84E-14	4.04E-17	3.37E-20	2.81E-23
SE 81M	8.02E-02	3.74E+00	1.81E+00	8.68E-01	4.17E-01	9.75E-02	1.09E-02	1.22E-03	1.37E-04	1.54E-05	1.72E-06
SE 81	9.79E-01	4.42E+00	2.56E+00	1.28E+00	6.20E-01	1.45E-01	1.62E-02	1.81E-03	2.03E-04	2.28E-05	2.55E-06
BR 82	4.26E-04	4.18E-04	4.10E-04	4.02E-04	3.94E-04	3.79E-04	3.57E-04	3.37E-04	3.18E-04	2.99E-04	2.82E-04
SE 83	3.84E+01	7.28E+00	1.38E+00	2.61E-01	4.94E-02	1.78E-03	1.21E-05	8.22E-08	5.62E-10	3.81E-12	2.42E-14
BR 83	3.19E-01	4.76E+00	4.41E+00	3.47E+00	2.63E+00	1.49E+00	6.29E-01	2.65E-01	1.12E-01	4.72E-02	1.99E-02
KR 83M	1.65E-05	1.08E+00	2.20E+00	2.74E+00	2.82E+00	2.35E+00	1.39E+00	7.14E-01	3.44E-01	1.59E-01	7.14E-02

TRINITY MICROCURIES/SQ METER
 MR/HR AT H+12 HOURS = 1.000
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 BOMB FRACTION PER SQ. METER = 2.937E-13

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DEBRIS DECAY FROM 1 TO 21 HOURS

ZERO TIME 1.000E+00 2.000E+00 3.000E+00 4.000E+00 6.000E+00 9.000E+00 1.200E+01 1.500E+01 1.800E+01 2.100E+01

BR 84	7.48E-02	1.29E+01	3.49E+00	9.45E-01	2.55E-01	1.87E-02	3.69E-04	7.29E-06	1.44E-07	2.85E-09	5.63E-11
KR 85M	2.95E-03	6.33E+00	5.39E+00	4.60E+00	3.93E+00	2.87E+00	1.79E+00	1.12E+00	6.96E-01	4.32E-01	2.70E-01
KR 87	4.35E+01	2.51E+01	1.45E+01	8.40E+00	4.85E+00	1.63E+00	3.15E-01	6.11E-02	1.18E-02	2.29E-03	4.43E-04
KR 88	2.42E+01	1.89E+01	1.48E+01	1.15E+01	9.00E+00	5.46E+00	2.61E+00	1.24E+00	5.90E-01	2.81E-01	1.34E-01
RB 88	6.16E+00	1.91E+01	1.63E+01	1.29E+01	1.01E+01	6.12E+00	2.92E+00	1.39E+00	6.63E-01	3.15E-01	1.50E-01
RB 89	3.20E+01	3.01E+01	2.02E+00	1.36E-01	9.11E-03	4.12E-05	1.25E-08	3.77E-12	1.15E-15	3.48E-19	1.05E-22
SR 89	2.45E-06	8.61E-02	9.18E-02	9.18E-02	9.18E-02	9.18E-02	9.18E-02	9.15E-02	9.15E-02	9.11E-02	9.11E-02
SR 90	4.81E-06	4.94E-04	4.94E-04	4.94E-04	4.94E-04	4.94E-04	4.94E-04	4.94E-04	4.94E-04	4.94E-04	4.94E-04
SR 91	6.03E-01	1.12E+01	1.05E+01	9.74E+00	9.06E+00	7.85E+00	6.33E+00	5.12E+00	4.13E+00	3.32E+00	2.68E+00
Y 91M	4.06E-05	3.87E+00	5.27E+00	5.65E+00	5.57E+00	5.00E+00	4.09E+00	3.29E+00	2.66E+00	2.14E+00	1.73E+00
Y 91	1.66E-08	3.44E-03	7.92E-03	1.27E-02	1.73E-02	2.59E-02	3.68E-02	4.55E-02	5.27E-02	5.84E-02	6.29E-02
SR 92	4.67E+00	2.08E+01	1.62E+01	1.25E+01	9.68E+00	5.80E+00	2.69E+00	1.25E+00	5.80E-01	2.69E-01	1.25E-01
Y 92	2.15E-01	4.39E+00	6.88E+00	8.19E+00	8.69E+00	8.27E+00	6.34E+00	4.32E+00	2.78E+00	1.71E+00	1.03E+00
SR 93	2.14E+02	3.69E+00	2.04E-02	1.13E-04	6.21E-07	1.90E-11	3.20E-18	5.40E-25	9.12E-32	1.54E-38	2.59E-45
Y 93	2.62E-01	8.46E+00	7.95E+00	7.43E+00	6.95E+00	6.06E+00	4.94E+00	4.04E+00	3.28E+00	2.69E+00	2.19E+00
Y 94	3.21E+01	4.39E+01	5.65E+00	7.29E-01	9.40E-02	1.56E-03	3.35E-06	7.18E-09	1.54E-11	3.35E-14	1.86E-15
Y 95	1.46E+02	1.38E+01	3.03E-01	6.68E-03	1.47E-04	7.14E-08	7.64E-13	8.17E-18	8.73E-23	9.33E-28	9.98E-33
ZR 95	5.48E-04	7.16E-02	7.31E-02	7.31E-02	7.31E-02	7.31E-02	7.31E-02	7.28E-02	7.28E-02	7.26E-02	7.26E-02
NB 95	6.11E-11	4.42E-05	1.03E-04	1.62E-04	2.21E-04	3.39E-04	5.14E-04	6.92E-04	8.65E-04	1.04E-03	1.21E-03
ZR 97	1.47E+00	6.39E+00	6.11E+00	5.89E+00	5.63E+00	5.20E+00	4.60E+00	4.07E+00	3.61E+00	3.18E+00	2.83E+00
NB 97M	7.55E-03	6.14E+00	5.89E+00	5.66E+00	5.43E+00	5.00E+00	4.42E+00	3.92E+00	3.46E+00	3.06E+00	2.70E+00
NB 97	7.35E-01	3.21E+00	4.52E+00	5.15E+00	5.41E+00	5.38E+00	4.90E+00	4.37E+00	3.86E+00	3.41E+00	3.03E+00
NB 98	8.64E+00	3.82E+00	1.69E+00	7.48E-01	3.31E-01	6.48E-02	5.61E-03	4.84E-04	4.22E-05	3.65E-06	3.14E-07
MO 99	4.80E-03	1.98E+00	1.96E+00	1.94E+00	1.92E+00	1.88E+00	1.82E+00	1.77E+00	1.71E+00	1.66E+00	1.61E+00
TC 99M	4.46E-08	1.89E-01	3.55E-01	5.01E-01	6.30E-01	8.41E-01	1.07E+00	1.21E+00	1.30E+00	1.35E+00	1.37E+00
MO101	1.60E+02	7.21E+01	4.19E+00	2.43E-01	1.41E-02	4.72E-05	9.17E-09	1.79E-12	3.47E-16	6.74E-20	1.31E-23
TC101	6.74E+00	2.02E+02	2.21E+01	1.81E+00	1.32E-01	5.96E-04	1.49E-07	3.34E-11	7.08E-15	1.46E-18	2.95E-22
MO102	1.52E+03	3.46E+01	7.88E-01	1.80E-02	4.11E-04	2.13E-07	2.54E-12	3.01E-17	3.57E-22	4.23E-27	5.03E-32
TC102M	9.76E-01	2.93E+01	6.71E-01	1.53E-02	3.49E-04	1.81E-07	2.15E-12	2.55E-17	3.02E-22	3.58E-27	4.25E-32
TC102	4.57E+03	1.74E+01	3.98E-01	9.04E-03	2.07E-04	1.08E-07	1.28E-12	1.52E-17	1.80E-22	2.13E-27	2.53E-32
RU103	1.28E-04	2.97E-01	2.96E-01	2.96E-01	2.96E-01	2.95E-01	2.95E-01	2.95E-01	2.94E-01	2.93E-01	2.92E-01
RH103M	8.54E-09	1.53E-01	2.27E-01	2.63E-01	2.81E-01	2.92E-01	2.95E-01	2.95E-01	2.94E-01	2.93E-01	2.93E-01
TC104	1.19E+02	8.56E+01	8.56E+00	8.48E-01	8.38E-02	8.26E-04	8.06E-07	7.88E-10	7.69E-13	7.52E-16	7.34E-19
RU105	1.11E+00	3.84E+01	3.28E+01	2.81E+01	2.40E+01	1.76E+01	1.10E+01	6.88E+00	4.30E+00	2.69E+00	1.69E+00
RH105M	7.29E-03	3.84E+01	3.29E+01	2.82E+01	2.40E+01	1.76E+01	1.10E+01	6.90E+00	4.32E+00	2.70E+00	1.69E+00
RH105	1.20E-08	7.80E-01	1.45E+00	2.00E+00	2.46E+00	3.15E+00	3.76E+00	4.05E+00	4.13E+00	4.09E+00	3.98E+00
RU106	1.05E-03	1.99E-02	1.99E-02	1.99E-02	1.99E-02	1.99E-02	1.99E-02	1.99E-02	1.99E-02	1.99E-02	1.99E-02
RH106	1.13E-05	1.99E-02	1.99E-02	1.99E-02	1.99E-02	1.99E-02	1.99E-02	1.99E-02	1.99E-02	1.99E-02	1.99E-02
RH107	3.23E-01	4.38E+01	6.65E+00	1.00E+00	1.51E-01	3.44E-03	1.19E-05	4.09E-08	1.41E-10	4.81E-14	4.79E-17
PD107M	6.71E-04	8.92E+00	1.35E+00	2.04E-01	3.07E-02	7.00E-04	2.41E-06	8.32E-09	2.86E-11	9.88E-14	3.37E-16

TRINITY MICROCURIES/SQ METER
 MR/HR AT H+12 HOURS = 1.000
 FRACTION OF REFRACTORIES PRESENT = 0.500
 RELAXATION LENGTH = 0.16 GM/SQCM
 BOMB FRACTION PER SQ. METER = 2.937E-13

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DEBRIS DECAY FROM 1 TO 21 HOURS

	ZERO TIME	1.00E+00	2.00E+00	3.00E+00	4.00E+00	6.00E+00	9.00E+00	1.20E+01	1.50E+01	1.80E+01	2.10E+01
PD109	1.86E-02	1.54E+00	1.46E+00	1.39E+00	1.32E+00	1.19E+00	1.02E+00	8.77E-01	7.51E-01	6.44E-01	5.53E-01
AG109M	1.07E-04	1.54E+00	1.46E+00	1.39E+00	1.32E+00	1.19E+00	1.02E+00	8.77E-01	7.51E-01	6.44E-01	5.53E-01
PD111M	2.05E+00	1.80E+00	1.59E+00	1.41E+00	1.24E+00	9.63E-01	6.59E-01	4.52E-01	3.10E-01	2.12E-01	1.45E-01
PD111	7.29E-01	1.31E+00	1.26E+00	1.12E+00	9.93E-01	7.72E-01	5.30E-01	3.63E-01	2.48E-01	1.70E-01	1.17E-01
AG111M	5.79E-03	1.77E+00	1.67E+00	1.49E+00	1.31E+00	1.02E+00	6.95E-01	4.76E-01	3.26E-01	2.24E-01	1.53E-01
AG111	2.06E-09	6.11E-03	1.28E-02	1.89E-02	2.42E-02	3.30E-02	4.24E-02	4.86E-02	5.27E-02	5.52E-02	5.67E-02
PD112	3.84E-01	3.72E-01	3.59E-01	3.48E-01	3.37E-01	3.15E-01	2.86E-01	2.59E-01	2.34E-01	2.12E-01	1.92E-01
AG112	1.16E-05	7.36E-02	1.30E-01	1.74E-01	2.07E-01	2.48E-01	2.73E-01	2.72E-01	2.59E-01	2.41E-01	2.22E-01
AG113	2.91E-03	6.22E-01	5.45E-01	4.79E-01	4.20E-01	3.23E-01	2.19E-01	1.48E-01	9.97E-02	6.73E-02	4.55E-02
AG115	8.25E-01	8.84E-01	1.10E-01	1.37E-02	1.72E-03	2.69E-05	5.26E-08	1.03E-10	1.99E-13	1.98E-16	1.83E-16
CD115M	6.74E-09	1.79E-04	2.02E-04	2.04E-04	2.04E-04	2.04E-04	2.04E-04	2.04E-04	2.03E-04	2.02E-04	2.02E-04
CD115	2.61E-06	4.91E-02	5.28E-02	5.27E-02	5.20E-02	5.07E-02	4.88E-02	4.69E-02	4.52E-02	4.35E-02	4.18E-02
IN115M	3.25E-11	5.42E-03	1.20E-02	1.79E-02	2.28E-02	3.04E-02	3.75E-02	4.13E-02	4.31E-02	4.35E-02	4.31E-02
CD117	5.73E-02	9.53E-01	7.18E-01	5.36E-01	4.02E-01	2.26E-01	9.46E-02	3.99E-02	1.68E-02	7.05E-03	2.97E-03
IN117M	2.75E-06	3.32E-01	4.80E-01	5.21E-01	5.03E-01	3.97E-01	2.27E-01	1.16E-01	5.58E-02	2.58E-02	1.17E-02
IN117	1.11E-10	6.05E-02	1.46E-01	2.03E-01	2.27E-01	2.09E-01	1.33E-01	7.12E-02	3.54E-02	1.66E-02	7.65E-03
CD118	3.73E+00	1.60E+00	6.87E-01	2.93E-01	1.25E-01	2.29E-02	1.80E-03	1.41E-04	1.11E-05	8.67E-07	6.80E-08
IN118	2.47E-01	1.60E+00	6.87E-01	2.93E-01	1.25E-01	2.30E-02	1.80E-03	1.41E-04	1.11E-05	8.67E-07	6.80E-08
CD119	9.33E+00	1.46E-01	2.27E-03	3.55E-05	5.55E-07	1.36E-10	5.17E-16	1.98E-21	7.52E-27	2.88E-32	1.10E-37
IN119M	1.41E-02	1.57E+00	1.71E-01	1.73E-02	1.72E-03	1.69E-05	1.65E-08	1.62E-11	1.57E-14	1.54E-17	1.50E-20
IN119	6.94E-01	8.29E-02	9.61E-03	9.75E-04	9.75E-05	9.54E-07	9.33E-10	9.12E-13	8.91E-16	8.70E-19	8.50E-22
SN121	1.17E-03	1.21E-01	1.17E-01	1.14E-01	1.12E-01	1.06E-01	9.78E-02	9.09E-02	8.40E-02	7.78E-02	7.23E-02
SN123M	6.92E-01	1.29E+00	4.59E-01	1.62E-01	5.73E-02	7.16E-03	3.17E-04	1.40E-05	6.20E-07	2.74E-08	1.21E-09
SN123	6.50E-06	6.80E-04	6.80E-04	6.80E-04	6.80E-04	6.80E-04	6.80E-04	6.80E-04	6.80E-04	6.80E-04	6.80E-04
SN125	1.85E-02	1.84E-02	1.84E-02	1.83E-02	1.82E-02	1.81E-02	1.80E-02	1.78E-02	1.77E-02	1.75E-02	1.73E-02
SB125	1.11E-04	1.11E-04	1.12E-04	1.12E-04	1.13E-04	1.14E-04	1.16E-04	1.17E-04	1.19E-04	1.20E-04	1.22E-04
SB126	3.22E-03	3.21E-03	3.20E-03	3.20E-03	3.19E-03	3.17E-03	3.15E-03	3.13E-03	3.10E-03	3.08E-03	3.06E-03
SN127	3.28E+00	2.36E+00	1.69E+00	1.22E+00	8.79E-01	4.53E-01	1.68E-01	6.26E-02	2.32E-02	8.63E-03	3.20E-03
SB127	3.83E-02	1.32E-01	1.46E-01	1.56E-01	1.63E-01	1.69E-01	1.72E-01	1.70E-01	1.68E-01	1.64E-01	1.61E-01
TE127	2.16E-02	2.69E-02	3.27E-02	3.88E-02	4.49E-02	5.63E-02	7.21E-02	8.42E-02	9.37E-02	1.01E-01	1.06E-01
SN128	2.25E+01	1.11E+01	5.50E+00	2.72E+00	1.34E+00	3.28E-01	3.96E-02	4.78E-03	5.77E-04	6.99E-05	8.43E-06
SB128M	1.15E-02	1.27E+01	6.57E+00	3.24E+00	1.60E+00	3.92E-01	4.72E-02	5.70E-03	6.87E-04	8.31E-05	1.00E-05
SB128	9.50E-01	9.14E-01	8.60E-01	8.07E-01	7.53E-01	6.45E-01	5.15E-01	4.09E-01	3.24E-01	2.58E-01	2.04E-01
SN129M	1.40E+01	6.96E+00	3.49E+00	1.75E+00	8.73E-01	2.18E-01	2.73E-02	3.42E-03	4.27E-04	5.33E-05	6.67E-06
SN129	9.32E+01	9.15E-01	9.03E-03	8.91E-05	8.73E-07	8.50E-11	8.08E-17	7.73E-23	7.38E-29	7.02E-35	6.73E-41
SB129	5.25E+00	8.79E+00	8.26E+00	7.38E+00	6.49E+00	4.82E+00	3.00E+00	1.86E+00	1.14E+00	7.08E-01	4.35E-01
TE129M	9.91E-08	1.10E-03	2.26E-03	3.32E-03	4.27E-03	5.78E-03	7.32E-03	8.26E-03	8.85E-03	9.21E-03	9.44E-03
TE129	3.78E+00	5.19E+00	6.08E+00	6.31E+00	6.08E+00	5.03E+00	3.35E+00	2.11E+00	1.32E+00	8.14E-01	5.05E-01
SB130M	5.78E-01	1.09E+00	2.86E-03	7.52E-06	1.98E-08	1.37E-13	2.49E-21	4.52E-29	8.21E-37	1.49E-44	2.71E-52
SB130	9.90E+01	2.99E+01	8.52E+00	2.41E+00	6.83E-01	5.49E-02	1.25E-03	2.86E-05	6.51E-07	1.48E-08	3.39E-10

TRINITY MICROCURIES/SQ METER
 MR/HR AT H+12 HOURS = 1.000
 FRACTION OF REFRACTORIES PRESENT = 0.500
 RELAXATION LENGTH = 0.16 GM/SQCM
 BOMB FRACTION PER SQ. METER = 2.937E-13

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DEBRIS DECAY FROM 1 TO 21 HOURS

ZERO TIME 1.00E+00 2.00E+00 3.00E+00 4.00E+00 6.00E+00 9.00E+00 1.20E+01 1.50E+01 1.80E+01 2.10E+01

I130	2.76E-02	2.61E-02	2.47E-02	2.33E-02	2.20E-02	1.97E-02	1.67E-02	1.41E-02	1.19E-02	1.01E-02	8.52E-03
SB131	2.31E+02	6.02E+01	9.84E+00	1.62E+00	2.65E-01	7.14E-03	3.14E-05	1.39E-07	6.11E-10	2.70E-12	1.34E-14
TE131M	1.11E-04	5.80E-01	6.62E-01	6.63E-01	6.50E-01	6.21E-01	5.80E-01	5.41E-01	5.05E-01	4.71E-01	4.39E-01
TE131	1.02E+02	1.11E+02	3.61E+01	9.40E+00	2.28E+00	2.14E-01	1.07E-01	9.84E-02	9.18E-02	8.59E-02	8.01E-02
I131	1.48E-02	5.14E-01	7.57E-01	8.30E-01	8.45E-01	8.52E-01	8.52E-01	8.45E-01	8.45E-01	8.37E-01	8.37E-01
TE132	1.09E+00	2.64E+00	2.62E+00	2.60E+00	2.57E+00	2.53E+00	2.46E+00	2.39E+00	2.33E+00	2.27E+00	2.21E+00
I132	2.67E+00	2.66E+00	2.66E+00	2.64E+00	2.62E+00	2.59E+00	2.53E+00	2.47E+00	2.40E+00	2.34E+00	2.28E+00
TE133M	1.25E-01	4.33E+01	1.89E+01	8.21E+00	3.57E+00	6.79E-01	5.58E-02	4.61E-03	3.80E-04	3.13E-05	2.58E-06
TE133	7.02E+02	3.98E+01	4.43E+00	1.46E+00	6.19E-01	1.17E-01	9.70E-03	7.98E-04	6.61E-05	5.43E-06	4.48E-07
I133	1.09E+00	1.17E+01	1.27E+01	1.27E+01	1.24E+01	1.18E+01	1.07E+01	9.70E+00	8.75E+00	7.98E+00	7.20E+00
XE133M	4.64E-08	2.64E-03	6.37E-03	1.02E-02	1.39E-02	2.08E-02	3.02E-02	3.83E-02	4.51E-02	5.10E-02	5.59E-02
XE133	8.10E-07	4.61E-02	1.12E-01	1.79E-01	2.45E-01	3.71E-01	5.45E-01	6.96E-01	8.33E-01	9.52E-01	1.06E+00
TE134	2.33E+02	1.08E+02	4.02E+01	1.49E+01	5.54E+00	7.69E-01	3.93E-02	2.01E-03	1.03E-04	5.29E-06	2.71E-07
I134	1.07E+02	1.43E+02	1.00E+02	5.86E+01	3.15E+01	7.99E+00	8.78E-01	8.97E-02	8.78E-03	8.42E-04	7.99E-05
I135	1.87E+01	3.30E+01	2.97E+01	2.68E+01	2.42E+01	1.96E+01	1.44E+01	1.05E+01	7.75E+00	5.70E+00	4.16E+00
XE135M	2.07E-03	9.52E+00	9.25E+00	8.39E+00	7.53E+00	6.13E+00	4.50E+00	3.30E+00	2.42E+00	1.78E+00	1.30E+00
XE135	2.16E+00	4.27E+00	6.24E+00	7.85E+00	9.14E+00	1.10E+01	1.22E+01	1.22E+01	1.16E+01	1.06E+01	9.47E+00
CS136	1.48E-02	1.48E-02	1.47E-02	1.47E-02	1.47E-02	1.46E-02	1.45E-02	1.44E-02	1.43E-02	1.42E-02	1.41E-02
CS137	9.36E-05	1.01E-03	1.01E-03	1.01E-03	1.01E-03	1.01E-03	1.01E-03	1.01E-03	1.01E-03	1.01E-03	1.01E-03
BA137M	1.97E-07	9.41E-04	9.41E-04	9.41E-04	9.41E-04	9.41E-04	9.41E-04	9.41E-04	9.41E-04	9.41E-04	9.41E-04
XE138	6.38E+02	5.49E+01	4.78E+00	4.14E-01	3.58E-02	2.69E-04	1.75E-07	1.13E-10	7.37E-14	4.79E-17	3.11E-20
CS138	9.50E+01	1.60E+02	5.54E+01	1.63E+01	4.56E+00	3.47E-01	7.22E-03	1.50E-04	3.11E-06	6.48E-08	1.34E-09
CS139	6.94E+02	2.22E+01	2.78E-01	3.49E-03	4.38E-05	6.88E-09	1.37E-14	2.70E-20	5.35E-26	1.06E-31	2.10E-37
BA139	1.28E+01	1.43E+02	8.81E+01	5.35E+01	3.24E+01	1.19E+01	2.64E+00	5.85E-01	1.30E-01	2.88E-02	6.41E-03
BA140	1.05E-01	6.53E-01	6.53E-01	6.48E-01	6.48E-01	6.43E-01	6.43E-01	6.38E-01	6.33E-01	6.28E-01	6.23E-01
LA140	2.49E-07	1.12E-02	2.21E-02	3.29E-02	4.34E-02	6.38E-02	9.32E-02	1.21E-01	1.47E-01	1.71E-01	1.94E-01
BA141	1.52E+02	4.59E+01	4.55E+00	4.52E-01	4.48E-02	4.45E-04	4.34E-07	4.23E-10	4.12E-13	4.05E-16	3.94E-19
LA141	1.40E+00	2.97E+01	2.77E+01	2.35E+01	1.97E+01	1.38E+01	8.10E+00	4.73E+00	2.79E+00	1.63E+00	9.58E-01
CE141	1.73E-07	1.93E-02	4.52E-02	6.79E-02	8.71E-02	1.17E-01	1.45E-01	1.61E-01	1.71E-01	1.76E-01	1.79E-01
BA142	3.10E+02	1.23E+01	2.81E-01	6.40E-03	1.46E-04	7.58E-08	9.00E-13	1.07E-17	1.27E-22	1.50E-27	1.78E-32
LA142	7.11E+00	4.93E+01	3.25E+01	2.07E+01	1.32E+01	5.33E+00	1.37E+00	3.54E-01	9.13E-02	2.35E-02	6.06E-03
LA143	1.08E+02	2.10E+01	1.08E+00	5.54E-02	2.85E-03	7.45E-06	1.00E-09	1.35E-13	1.83E-17	2.46E-21	3.32E-25
CE143	4.31E-02	2.74E+00	2.85E+00	2.77E+00	2.72E+00	2.62E+00	2.45E+00	2.30E+00	2.16E+00	2.03E+00	1.91E+00
PR143	1.26E-08	4.21E-03	1.01E-02	1.60E-02	2.18E-02	3.30E-02	4.86E-02	6.35E-02	7.71E-02	8.99E-02	1.02E-01
CE144	1.72E-03	1.23E-02	1.23E-02	1.23E-02	1.23E-02	1.23E-02	1.23E-02	1.23E-02	1.23E-02	1.23E-02	1.23E-02
PR144	4.72E-07	1.12E-02	1.22E-02	1.23E-02	1.23E-02	1.23E-02	1.23E-02	1.23E-02	1.23E-02	1.23E-02	1.23E-02
PR145	7.45E-02	1.10E+01	9.74E+00	8.66E+00	7.73E+00	6.12E+00	4.32E+00	3.05E+00	2.16E+00	1.52E+00	1.08E+00
CE146	2.43E+02	1.25E+01	6.39E-01	3.27E-02	1.68E-03	4.43E-06	5.97E-10	8.04E-14	1.08E-17	1.46E-21	1.97E-25
PR146	5.03E+00	4.38E+01	9.92E+00	1.86E+00	3.35E-01	1.05E-02	5.82E-05	3.21E-07	1.78E-09	9.83E-12	5.37E-14
PR147	2.80E+01	8.09E+00	2.52E-01	7.88E-03	2.47E-04	2.41E-07	7.35E-12	2.25E-16	6.85E-21	2.09E-25	6.38E-30

TRINITY MICROCURIES/SQ METER
 MR/HR AT H+12 HOURS = 1.000
 FRACTION OF REFRACTORIES PRESENT = 0.500
 RELAXATION LENGTH = 0.16 GM/SQCM
 BOMB FRACTION PER SQ. METER = 2.937E-13

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DEBRIS DECAY FROM 1 TO 21 HOURS

	ZERO TIME	1.00E+00	2.00E+00	3.00E+00	4.00E+00	6.00E+00	9.00E+00	1.20E+01	1.50E+01	1.80E+01	2.10E+01
ND147	9.98E-06	1.88E-01	1.93E-01	1.93E-01	1.92E-01	1.91E-01	1.90E-01	1.88E-01	1.87E-01	1.85E-01	1.84E-01
ND149	1.76E+01	1.20E+01	8.16E+00	5.56E+00	3.76E+00	1.75E+00	5.49E-01	1.73E-01	5.46E-02	1.72E-02	5.43E-03
PM149	2.45E-03	1.92E-01	3.18E-01	4.03E-01	4.56E-01	5.13E-01	5.33E-01	5.23E-01	5.09E-01	4.89E-01	4.73E-01
PM150	2.11E-01	1.63E-01	1.27E-01	9.77E-02	7.55E-02	4.53E-02	2.10E-02	9.70E-03	4.50E-03	2.08E-03	9.63E-04
ND151	8.36E+01	2.61E+00	8.17E-02	2.55E-03	7.99E-05	7.80E-08	2.38E-12	7.28E-17	2.22E-21	6.75E-26	2.07E-30
PM151	5.30E-02	6.19E-01	6.23E-01	6.08E-01	5.93E-01	5.63E-01	5.22E-01	4.85E-01	4.52E-01	4.18E-01	3.88E-01
PM152	1.38E+02	1.35E-01	1.32E-04	1.29E-07	1.26E-10	1.20E-16	1.12E-25	1.04E-34	9.73E-44	9.09E-53	8.45E-62
SM153	1.96E-01	1.93E-01	1.90E-01	1.87E-01	1.85E-01	1.79E-01	1.72E-01	1.64E-01	1.57E-01	1.50E-01	1.44E-01
SM155	1.23E+01	2.02E+00	3.31E-01	5.41E-02	8.87E-03	2.39E-04	1.05E-06	4.64E-09	2.05E-11	9.11E-14	2.24E-16
EU155	9.03E-06	2.57E-04	2.98E-04	3.05E-04	3.06E-04	3.06E-04	3.06E-04	3.06E-04	3.06E-04	3.06E-04	3.06E-04
SM156	2.51E-01	2.33E-01	2.16E-01	2.01E-01	1.87E-01	1.61E-01	1.29E-01	1.04E-01	8.31E-02	6.65E-02	5.32E-02
EU156	7.34E-04	1.20E-03	1.63E-03	2.02E-03	2.39E-03	3.05E-03	3.88E-03	4.49E-03	5.03E-03	5.43E-03	5.72E-03
EU157	3.80E-02	1.26E-01	1.20E-01	1.15E-01	1.10E-01	1.00E-01	8.75E-02	7.64E-02	6.65E-02	5.79E-02	5.05E-02
EU158	1.62E+00	6.55E-01	2.65E-01	1.07E-01	4.35E-02	7.11E-03	4.74E-04	3.14E-05	2.09E-06	1.39E-07	9.20E-09
EU159	1.95E+00	1.94E-01	1.92E-02	1.91E-03	1.89E-04	1.86E-06	1.82E-09	1.78E-12	1.73E-15	1.69E-18	1.66E-21
GD159	8.35E-03	3.66E-02	3.80E-02	3.69E-02	3.55E-02	3.29E-02	2.93E-02	2.61E-02	2.32E-02	2.07E-02	1.85E-02
6 TB161	1.13E-04	8.12E-04	8.06E-04	8.04E-04	8.01E-04	7.93E-04	7.85E-04	7.74E-04	7.64E-04	7.56E-04	7.45E-04
TOTAL	1.51E+04	2.84E+03	9.77E+02	5.55E+02	3.99E+02	2.70E+02	1.90E+02	1.49E+02	1.23E+02	1.05E+02	9.11E+01

TRINITY MICROCURIES/SQ METER
 MR/HR AT H+12 HOURS = 1.000
 FRACTION OF REFRACTORIES PRESENT = 0.500
 RELAXATION LENGTH = 0.16 GM/SQCM
 BOMB FRACTION PER SQ. METER = 2.937E-13

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DEBRIS DECAY FROM 1 TO 300 DAYS

ZERO TIME 1.00E+00 2.00E+00 5.00E+00 1.00E+01 2.00E+01 3.00E+01 5.00E+01 1.00E+02 2.00E+02 3.00E+02

*BE 7	1.96E-07	1.93E-07	1.91E-07	1.84E-07	1.72E-07	1.51E-07	1.33E-07	1.02E-07	5.34E-08	1.45E-08	3.95E-09
*NA 24	2.95E-02	9.73E-03	3.21E-03	1.15E-04	4.50E-07	6.88E-12	1.05E-16	2.44E-26	0.	0.	0.
*MN 54	1.34E-05	1.33E-05	1.33E-05	1.31E-05	1.29E-05	1.27E-05	1.25E-05	1.19E-05	1.06E-05	8.43E-06	6.72E-06
*FE 55	2.37E-05	2.37E-05	2.37E-05	2.36E-05	2.36E-05	2.34E-05	2.32E-05	2.29E-05	2.20E-05	2.05E-05	1.90E-05
*FE 59	1.97E-05	1.94E-05	1.91E-05	1.83E-05	1.69E-05	1.45E-05	1.24E-05	9.14E-06	4.24E-06	9.05E-07	1.94E-07
*CO 57	2.40E-05	2.40E-05	2.39E-05	2.39E-05	2.35E-05	2.28E-05	2.22E-05	2.12E-05	1.87E-05	1.44E-05	1.12E-05
*CO 58	2.79E-02	2.76E-02	2.74E-02	2.65E-02	2.53E-02	2.30E-02	2.08E-02	1.71E-02	1.06E-02	3.99E-03	1.51E-03
*CO 60	1.00E-04	1.00E-04	1.00E-04	1.00E-04	9.97E-05	9.97E-05	9.91E-05	9.85E-05	9.61E-05	9.32E-05	8.96E-05
*CU 64	1.54E+00	4.19E-01	1.14E-01	2.33E-03	3.49E-06	7.93E-12	1.80E-17	9.24E-29	0.	0.	0.
*CU 67	6.94E-05	5.29E-05	4.04E-05	1.80E-05	4.68E-06	3.16E-07	2.13E-08	9.67E-11	1.35E-16	0.	0.
W181	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W185	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W187	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W188	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
AU198	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
AU199	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
PB203	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
U237	1.60E+00	1.44E+00	1.30E+00	9.58E-01	5.73E-01	2.05E-01	7.36E-02	9.41E-03	5.55E-05	1.93E-09	6.68E-14
*U240	8.82E-01	2.72E-01	8.34E-02	2.42E-03	6.64E-06	4.99E-11	3.75E-16	2.12E-26	0.	0.	0.
*NP239	1.33E-02	2.04E+01	1.52E+01	6.26E+00	1.43E+00	7.49E-02	3.92E-03	1.08E-05	4.23E-12	1.01E-21	1.01E-21
*NP240M	1.40E-03	2.73E-01	8.40E-02	2.43E-03	6.69E-06	5.04E-11	3.78E-16	2.13E-26	0.	0.	0.
AM241	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
CM242	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
GE 77	5.91E-03	3.72E-03	8.51E-04	1.03E-05	6.54E-09	2.65E-15	1.07E-21	1.74E-34	0.	0.	0.
AS 77	6.10E-05	9.01E-03	6.52E-03	1.89E-03	2.21E-04	3.00E-06	4.07E-08	7.50E-12	3.48E-21	7.46E-40	1.60E-58
SE 77M	2.41E-09	2.71E-05	1.95E-05	5.66E-06	6.61E-07	8.99E-09	1.22E-10	2.25E-14	1.04E-23	2.23E-42	4.81E-61
AS 78	1.72E-02	1.53E-04	4.48E-09	3.78E-23	0.	0.	0.	0.	0.	0.	0.
BR 82	4.26E-04	2.66E-04	1.66E-04	4.04E-05	3.83E-06	3.44E-08	3.09E-10	2.49E-14	1.45E-24	4.99E-45	1.70E-65
BR 83	3.19E-01	8.40E-03	8.45E-06	8.58E-15	8.76E-30	0.	0.	0.	0.	0.	0.
KR 83M	1.65E-05	3.68E-02	4.17E-05	3.75E-14	3.85E-29	0.	0.	0.	0.	0.	0.
KR 85M	2.95E-03	1.69E-01	3.84E-03	4.56E-08	2.81E-16	1.07E-32	4.05E-49	0.	0.	0.	0.
KR 85	3.05E-06	8.02E-05	8.18E-05	8.18E-05	8.18E-05	8.18E-05	8.18E-05	8.14E-05	8.06E-05	7.90E-05	7.78E-05
KR 87	4.35E+01	8.59E-05	1.70E-10	1.32E-27	0.	0.	0.	0.	0.	0.	0.
KR 88	2.42E+01	6.37E-02	1.67E-04	3.04E-12	3.82E-25	0.	0.	0.	0.	0.	0.
RB 88	6.16E+00	7.10E-02	1.87E-04	3.40E-12	4.26E-25	0.	0.	0.	0.	0.	0.
SR 89	2.45E-06	7.35E-02	7.24E-02	6.96E-02	6.53E-02	5.70E-02	4.98E-02	3.84E-02	1.96E-02	5.16E-03	1.36E-03
SR 90	4.81E-06	4.94E-04	4.94E-04	4.94E-04	4.94E-04	4.94E-04	4.94E-04	4.94E-04	4.90E-04	4.90E-04	4.85E-04
Y 90	7.13E-12	1.13E-04	2.00E-04	3.60E-04	4.59E-04	4.90E-04	4.94E-04	4.94E-04	4.90E-04	4.90E-04	4.85E-04
SR 91	6.03E-01	2.16E+00	3.87E-01	2.22E-03	4.06E-07	1.38E-14	4.66E-22	5.31E-37	0.	0.	0.

TRINITY MICROCURIES/SQ METER
 MR/HR AT H+12 HOURS = 1.000
 FRACTION OF REFRACTORIES PRESENT = 0.500
 RELAXATION LENGTH = 0.16 GM/SQCM
 BOMB FRACTION PER SQ. METER = 2.937E-13

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DEBRIS DECAY FROM 1 TO 300 DAYS

ZERO TIME 1.00E+00 2.00E+00 5.00E+00 1.00E+01 2.00E+01 3.00E+01 5.00E+01 1.00E+02 2.00E+02 3.00E+02

Y 91M	4.06E-05	1.40E+00	2.49E-01	1.43E-03	2.63E-07	8.87E-15	3.00E-22	3.43E-37	0.	0.	0.
Y 91	1.66E-08	6.63E-02	7.85E-02	7.85E-02	7.39E-02	6.56E-02	5.84E-02	4.63E-02	2.56E-02	7.89E-03	2.42E-03
SR 92	4.67E+00	5.82E-02	1.25E-04	1.26E-12	5.91E-26	0.	0.	0.	0.	0.	0.
Y 92	2.15E-01	6.10E-01	6.77E-03	5.21E-09	3.04E-19	1.04E-39	3.56E-60	0.	0.	0.	0.
Y 93	2.62E-01	1.77E+00	3.45E-01	2.59E-03	7.46E-07	6.16E-14	5.09E-21	3.47E-35	0.	0.	0.
ZR 95	5.48E-04	6.85E-02	6.78E-02	6.56E-02	6.23E-02	5.58E-02	5.02E-02	4.06E-02	2.38E-02	8.20E-03	2.81E-03
NB 95M	1.17E-11	2.32E-04	4.23E-04	8.08E-04	1.09E-03	1.15E-03	1.06E-03	8.61E-04	5.05E-04	1.74E-04	5.99E-05
NB 95	6.11E-11	1.32E-03	2.62E-03	6.27E-03	1.17E-02	2.01E-02	2.60E-02	3.22E-02	3.10E-02	1.49E-02	5.72E-03
ZR 97	1.47E+00	2.50E+00	9.40E-01	4.98E-02	3.74E-04	2.10E-08	1.18E-12	3.74E-21	2.11E-42	0.	0.
NB 97M	7.55E-03	2.40E+00	9.02E-01	4.80E-02	3.59E-04	2.02E-08	1.14E-12	3.59E-21	2.03E-42	0.	0.
NB 97	7.35E-01	2.51E+00	9.42E-01	5.00E-02	3.76E-04	2.27E-08	1.27E-12	4.04E-21	2.27E-42	0.	0.
MO 99	4.80E-03	1.56E+00	1.22E+00	5.78E-01	1.67E-01	1.40E-02	1.16E-03	8.13E-06	3.30E-11	5.44E-22	8.96E-33
TC 99M	4.46E-08	1.37E+00	1.16E+00	5.53E-01	1.60E-01	1.33E-02	1.11E-03	7.76E-06	3.15E-11	5.20E-22	8.56E-33
RU103	1.28E-04	2.92E-01	2.86E-01	2.72E-01	2.50E-01	2.09E-01	1.76E-01	1.24E-01	5.15E-02	8.95E-03	1.56E-03
RH103M	8.54E-09	2.92E-01	2.87E-01	2.73E-01	2.50E-01	2.09E-01	1.76E-01	1.24E-01	5.16E-02	8.95E-03	1.56E-03
RU105	1.11E+00	1.06E+00	2.49E-02	3.28E-07	2.40E-15	1.28E-31	6.85E-48	0.	0.	0.	0.
RH105M	7.29E-03	1.06E+00	2.50E-02	3.29E-07	2.40E-15	1.29E-31	6.87E-48	0.	0.	0.	0.
RH105	1.20E-08	3.83E+00	2.50E+00	6.23E-01	6.14E-02	5.97E-04	5.80E-06	5.48E-10	4.75E-20	3.57E-40	2.68E-60
RU106	1.05E-03	1.99E-02	1.98E-02	1.97E-02	1.95E-02	1.92E-02	1.87E-02	1.81E-02	1.64E-02	1.36E-02	1.13E-02
RH106	1.13E-05	1.99E-02	1.98E-02	1.97E-02	1.95E-02	1.92E-02	1.87E-02	1.81E-02	1.64E-02	1.36E-02	1.13E-02
PD109	1.86E-02	4.73E-01	1.38E-01	3.42E-03	7.20E-06	3.21E-11	1.43E-16	2.83E-27	0.	0.	0.
AG109M	1.07E-04	4.73E-01	1.38E-01	3.42E-03	7.24E-06	3.21E-11	1.43E-16	2.83E-27	0.	0.	0.
PD111M	2.05E+00	9.93E-02	4.83E-03	5.54E-07	1.50E-13	1.09E-26	8.02E-40	0.	0.	0.	0.
PD111	7.29E-01	8.02E-02	3.88E-03	4.46E-07	1.21E-13	8.79E-27	6.44E-40	0.	0.	0.	0.
AG111M	5.79E-03	1.05E-01	5.10E-03	5.86E-07	1.58E-13	1.16E-26	8.48E-40	0.	0.	0.	0.
AG111	2.06E-09	5.69E-02	5.47E-02	4.16E-02	2.62E-02	1.04E-02	4.13E-03	6.50E-04	6.40E-06	6.20E-10	6.01E-14
PD112	3.84E-01	1.74E-01	7.89E-02	7.33E-03	1.39E-04	5.06E-08	1.84E-11	2.41E-18	1.52E-35	0.	0.
AG112	1.16E-05	2.03E-01	9.31E-02	8.64E-03	1.65E-04	5.97E-08	2.17E-11	2.86E-18	1.79E-35	0.	0.
AG113	2.91E-03	3.07E-02	1.33E-03	1.08E-07	1.65E-14	3.87E-28	9.03E-42	0.	0.	0.	0.
CD115M	6.74E-09	1.95E-04	1.92E-04	1.83E-04	1.69E-04	1.43E-04	1.22E-04	8.84E-05	3.95E-05	7.86E-06	1.57E-06
CD115	2.61E-06	3.92E-02	2.87E-02	1.13E-02	2.39E-03	1.07E-04	4.76E-06	9.49E-09	1.68E-15	5.25E-29	1.64E-42
IN115M	3.25E-11	4.14E-02	3.14E-02	1.24E-02	2.61E-03	1.17E-04	5.19E-06	1.03E-08	1.83E-15	5.74E-29	1.79E-42
CD117	5.73E-02	1.25E-03	1.21E-06	1.13E-15	1.01E-30	0.	0.	0.	0.	0.	0.
IN117M	2.75E-06	5.18E-03	6.00E-06	5.79E-15	5.14E-30	0.	0.	0.	0.	0.	0.
IN117	1.11E-10	3.42E-03	4.05E-06	3.92E-15	3.48E-30	0.	0.	0.	0.	0.	0.
SN121	1.17E-03	6.67E-02	3.60E-02	5.67E-03	2.60E-04	5.50E-07	1.16E-09	5.16E-15	2.16E-28	0.	0.
SN123	6.50E-06	6.80E-04	6.74E-04	6.62E-04	6.44E-04	6.08E-04	5.77E-04	5.16E-04	3.91E-04	2.25E-04	1.29E-04
SN125	1.85E-02	1.72E-02	1.60E-02	1.28E-02	8.83E-03	4.23E-03	2.02E-03	4.63E-04	1.16E-05	7.28E-09	4.56E-12
SB125	1.11E-04	1.23E-04	1.35E-04	1.64E-04	2.02E-04	2.44E-04	2.63E-04	2.74E-04	2.69E-04	2.51E-04	2.34E-04
SB126	3.22E-03	3.04E-03	2.88E-03	2.44E-03	1.85E-03	1.06E-03	6.11E-04	2.01E-04	1.26E-05	6.11E-08	1.23E-08

TRINITY MICROCURIES/SQ METER
 MR/HR AT H+12 HOURS = 1.000
 FRACTION OF REFRACTORIES PRESENT = 0.500
 RELAXATION LENGTH = 0.16 GM/SQCM
 BOMB FRACTION PER SQ. METER = 2.937E-13

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DEBRIS DECAY FROM 1 TO 300 DAYS

ZERO TIME 1.00E+00 2.00E+00 5.00E+00 1.00E+01 2.00E+01 3.00E+01 5.00E+01 1.00E+02 2.00E+02 3.00E+02

SN127	3.28E+00	1.19E-03	4.32E-07	2.06E-17	1.29E-34	0.	0.	0.	0.	0.	0.
SB127	3.83E-02	1.57E-01	1.32E-01	7.68E-02	3.15E-02	5.26E-03	8.79E-04	2.46E-05	3.20E-09	5.47E-17	9.31E-25
TE127M	3.10E-10	2.40E-04	4.39E-04	8.52E-04	1.18E-03	1.30E-03	1.25E-03	1.11E-03	8.10E-04	4.28E-04	2.26E-04
TE127	2.16E-02	1.13E-01	1.10E-01	6.73E-02	2.85E-02	5.84E-03	2.00E-03	1.12E-03	8.00E-04	4.23E-04	2.24E-04
SB128	9.50E-01	1.62E-01	2.56E-02	9.98E-05	9.68E-09	9.08E-17	8.54E-25	7.53E-41	0.	0.	0.
SB129	5.25E+00	2.68E-01	5.61E-03	5.10E-08	2.03E-16	3.20E-33	5.06E-50	0.	0.	0.	0.
TE129M	9.91E-08	1.04E-02	1.04E-02	9.85E-03	8.91E-03	7.26E-03	5.90E-03	3.93E-03	1.42E-03	1.85E-04	2.40E-05
TE129	3.78E+00	3.15E-01	1.31E-02	6.31E-03	5.69E-03	4.64E-03	3.79E-03	2.52E-03	9.09E-04	1.19E-04	1.54E-05
I130	2.76E-02	7.20E-03	1.89E-03	3.37E-05	4.12E-08	6.13E-14	9.15E-20	2.04E-31	0.	0.	0.
TE131M	1.11E-04	3.88E-01	2.23E-01	4.22E-02	2.64E-03	1.03E-05	4.03E-08	6.14E-13	5.58E-25	0.	0.
TE131	1.02E+02	7.07E-02	4.06E-02	7.71E-03	4.81E-04	1.88E-06	7.34E-09	1.12E-13	1.02E-25	0.	0.
I131	1.48E-02	8.01E-01	7.57E-01	6.08E-01	4.00E-01	1.69E-01	7.15E-02	1.28E-02	1.73E-04	3.14E-08	5.73E-12
XE131M	4.03E-11	3.71E-04	7.04E-04	1.47E-03	2.10E-03	2.08E-03	1.54E-03	6.37E-04	4.25E-05	1.27E-07	3.58E-10
TE132	1.09E+00	2.16E+00	1.74E+00	9.16E-01	3.16E-01	3.74E-02	4.44E-03	6.23E-05	1.46E-09	7.98E-19	4.35E-28
I132	2.67E+00	2.22E+00	1.79E+00	9.43E-01	3.26E-01	3.86E-02	4.57E-03	6.42E-05	1.50E-09	8.18E-19	4.48E-28
I133	1.09E+00	6.07E+00	2.74E+00	2.54E-01	4.85E-03	1.76E-06	6.37E-10	8.39E-17	5.27E-34	0.	0.
XE133M	4.64E-08	5.73E-02	6.79E-02	3.98E-02	9.35E-03	4.39E-04	2.04E-05	4.43E-08	9.70E-15	4.64E-28	2.22E-41
XE133	8.10E-07	1.10E+00	1.48E+00	1.32E+00	7.20E-01	1.95E-01	5.23E-02	3.77E-03	5.25E-06	1.02E-11	1.98E-17
I135	1.87E+01	3.06E+00	2.55E-01	1.48E-04	6.02E-10	9.95E-21	1.64E-31	4.44E-53	0.	0.	0.
XE135M	2.07E-03	9.52E-01	7.96E-02	4.63E-05	1.88E-10	3.10E-21	5.10E-32	1.39E-53	0.	0.	0.
XE135	2.16E+00	8.23E+00	2.01E+00	1.15E-02	1.41E-06	1.98E-14	2.78E-22	5.49E-38	0.	0.	0.
CS136	1.48E-02	1.40E-02	1.33E-02	1.13E-02	8.69E-03	5.10E-03	3.00E-03	1.03E-03	7.16E-05	3.45E-07	1.67E-09
CS137	9.36E-05	1.01E-03	1.01E-03	1.01E-03	1.01E-03	1.01E-03	1.01E-03	1.01E-03	1.00E-03	9.97E-04	9.92E-04
BA137M	1.97E-07	9.41E-04	9.41E-04	9.41E-04	9.41E-04	9.41E-04	9.41E-04	9.41E-04	9.36E-04	9.30E-04	9.24E-04
BA139	1.28E+01	1.37E-03	8.08E-09	1.66E-24	0.	0.	0.	0.	0.	0.	0.
BA140	1.05E-01	6.18E-01	5.88E-01	4.99E-01	3.80E-01	2.21E-01	1.29E-01	4.36E-02	2.91E-03	1.30E-05	5.73E-08
LA140	2.49E-07	2.15E-01	3.46E-01	4.79E-01	4.26E-01	2.55E-01	1.48E-01	5.04E-02	3.35E-03	1.49E-05	6.63E-08
LA141	1.40E+00	5.57E-01	7.81E-03	2.16E-08	1.18E-17	3.53E-36	1.05E-54	0.	0.	0.	0.
CE141	1.73E-07	1.92E-01	1.91E-01	1.79E-01	1.61E-01	1.30E-01	1.05E-01	6.83E-02	2.35E-02	2.76E-03	3.25E-04
LA142	7.11E+00	1.56E-03	3.02E-08	2.22E-22	0.	0.	0.	0.	0.	0.	0.
CE143	4.31E-02	1.77E+00	1.07E+00	2.36E-01	1.90E-02	1.23E-04	7.93E-07	3.32E-11	3.75E-22	0.	0.
PR143	1.26E-08	1.13E-01	1.76E-01	2.28E-01	1.95E-01	1.19E-01	7.18E-02	2.59E-02	2.08E-03	1.32E-05	8.36E-08
CE144	1.72E-03	1.23E-02	1.23E-02	1.22E-02	1.20E-02	1.17E-02	1.15E-02	1.09E-02	9.65E-03	7.56E-03	5.94E-03
PR144	4.72E-07	1.23E-02	1.23E-02	1.22E-02	1.20E-02	1.17E-02	1.15E-02	1.09E-02	9.65E-03	7.56E-03	5.94E-03
PR145	7.45E-02	7.62E-01	4.71E-02	1.12E-05	1.02E-11	8.44E-24	7.00E-36	0.	0.	0.	0.
ND147	9.98E-06	1.68E-01	1.58E-01	1.31E-01	9.57E-02	5.14E-02	2.74E-02	7.88E-03	3.45E-04	6.73E-07	1.31E-09
PM147	2.77E-14	1.25E-04	2.43E-04	5.55E-04	9.60E-04	1.46E-03	1.73E-03	1.93E-03	1.95E-03	1.81E-03	1.69E-03
ND149	1.76E+01	1.70E-03	1.65E-07	1.50E-19	1.29E-39	0.	0.	0.	0.	0.	0.
PM149	2.45E-03	4.53E-01	3.32E-01	1.30E-01	2.70E-02	1.18E-03	5.13E-05	9.76E-08	1.54E-14	3.80E-28	9.46E-42
PM150	2.11E-01	4.46E-04	9.40E-07	8.83E-15	3.69E-28	0.	0.	0.	0.	0.	0.

TRINITY MICROCURIES/SQ METER
 MR/HR AT H+12 HOURS = 1.000
 FRACTION OF REFRACTORIES PRESENT = 0.500
 RELAXATION LENGTH = 0.16 GM/SQCM
 BOMB FRACTION PER SQ. METER = 2.937E-13

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DEBRIS DECAY FROM 1 TO 300 DAYS

	ZERO TIME	1.00E+00	2.00E+00	5.00E+00	1.00E+01	2.00E+01	3.00E+01	5.00E+01	1.00E+02	2.00E+02	3.00E+02
PM151	5.30E-02	3.61E-01	1.99E-01	3.35E-02	1.72E-03	4.52E-06	1.19E-08	8.21E-14	1.03E-26	0.	0.
SM153	1.96E-01	1.38E-01	9.66E-02	3.34E-02	5.67E-03	1.65E-04	4.79E-06	4.03E-09	8.31E-17	3.54E-32	1.50E-47
SM156	2.51E-01	4.28E-02	7.30E-03	3.60E-05	5.18E-09	1.06E-16	2.20E-24	9.35E-40	0.	0.	0.
EU155	9.03E-06	3.06E-04	3.05E-04	3.05E-04	3.05E-04	3.03E-04	3.02E-04	3.00E-04	2.94E-04	2.82E-04	2.71E-04
EU156	7.34E-04	5.97E-03	6.62E-03	5.93E-03	4.71E-03	2.96E-03	1.87E-03	7.41E-04	7.34E-05	7.23E-07	7.12E-09
EU157	3.80E-02	4.40E-02	1.48E-02	5.55E-04	2.33E-06	4.11E-11	7.27E-16	2.26E-25	0.	0.	0.
GD159	8.35E-03	1.64E-02	6.54E-03	4.08E-04	4.01E-06	3.89E-10	3.77E-14	3.54E-22	3.02E-42	0.	0.
TB161	1.13E-04	7.37E-04	6.65E-04	4.92E-04	2.98E-04	1.09E-04	3.99E-05	5.35E-06	3.54E-08	1.53E-12	6.65E-17
TOTAL	2.72E+02	7.98E+01	4.17E+01	1.64E+01	6.43E+00	2.29E+00	1.34E+00	7.22E-01	3.09E-01	1.10E-01	5.76E-02

TRINITY MICROCURIES/SQ METER
 MR/HR AT H+12 HOURS = 1.000
 FRACTION OF REFRACTORIES PRESENT = 0.500
 RELAXATION LENGTH = 0.16 GM/SQCM
 BOMB FRACTION PER SQ. METER = 2.937E-13

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DEBRIS DECAY FROM 1 TO 50 YEARS

	ZERO TIME	1.00E+00	1.50E+00	2.00E+00	3.50E+00	5.00E+00	7.00E+00	1.00E+01	2.00E+01	3.50E+01	5.00E+01
*BE 7	1.96E-07	1.69E-09	1.57E-10	1.46E-11	1.17E-14	9.40E-18	7.03E-22	4.51E-28	0.	0.	0.
*MN 54	1.34E-05	5.78E-06	3.81E-06	2.50E-06	7.16E-07	2.04E-07	3.84E-08	3.14E-09	7.38E-13	2.67E-18	9.66E-24
*FE 59	1.97E-05	7.12E-08	4.27E-09	2.57E-10	5.58E-14	1.20E-17	1.57E-22	7.36E-30	0.	0.	0.
*CO 57	2.40E-05	9.47E-06	5.93E-06	3.72E-06	9.17E-07	2.26E-07	3.49E-09	2.12E-09	1.85E-13	1.52E-19	0.
*CO 58	2.79E-02	8.01E-04	1.36E-04	2.30E-05	1.12E-07	5.46E-10	4.50E-13	1.07E-17	4.08E-33	0.	0.
*CO 60	1.00E-04	8.78E-05	8.19E-05	7.65E-05	6.29E-05	5.17E-05	3.97E-05	2.68E-05	7.18E-06	9.97E-07	1.38E-07
W181	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W185	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
W188	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
AM241	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
CM242	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
KR 85	3.05E-06	7.59E-05	7.35E-05	7.11E-05	6.49E-05	5.86E-05	5.15E-05	4.25E-05	2.24E-05	8.57E-06	3.27E-06
SR 89	2.45E-06	5.74E-04	5.02E-05	4.41E-06	2.97E-09	2.00E-12	1.18E-16	5.38E-23	3.91E-44	0.	0.
SR 90	4.81E-06	4.81E-04	4.76E-04	4.72E-04	4.55E-04	4.37E-04	4.16E-04	3.86E-04	3.02E-04	2.09E-04	1.44E-04
Y 90	7.13E-12	4.81E-04	4.76E-04	4.72E-04	4.55E-04	4.37E-04	4.16E-04	3.86E-04	3.02E-04	2.09E-04	1.44E-04
Y 91	1.66E-08	1.12E-03	1.30E-04	1.52E-05	2.38E-08	3.73E-11	6.82E-15	1.68E-20	3.39E-39	0.	0.
ZR 95	5.48E-04	1.41E-03	2.01E-04	2.86E-05	8.34E-08	2.43E-10	1.00E-13	8.49E-19	1.04E-35	0.	0.
NB 95M	1.17E-11	2.98E-05	4.25E-06	6.08E-07	1.77E-09	5.14E-12	2.13E-15	1.80E-20	2.20E-37	0.	0.
NB 95	6.11E-11	3.03E-03	4.35E-04	6.20E-05	1.80E-07	5.22E-10	2.18E-13	1.84E-18	2.25E-35	0.	0.
RU103	1.28E-04	4.97E-04	2.04E-05	8.37E-07	5.71E-11	3.92E-15	1.10E-20	5.17E-29	0.	0.	0.
RH103M	8.54E-09	4.98E-04	2.04E-05	8.37E-07	5.72E-11	3.92E-15	1.10E-20	5.18E-29	0.	0.	0.
RU106	1.05E-03	9.97E-03	7.06E-03	5.00E-03	1.78E-03	6.32E-04	1.59E-04	2.01E-05	2.03E-08	6.53E-13	2.10E-17
RH106	1.13E-05	9.97E-03	7.06E-03	5.00E-03	1.78E-03	6.32E-04	1.59E-04	2.01E-05	2.03E-08	6.53E-13	2.10E-17
SN123	6.50E-06	9.00E-05	3.27E-05	1.19E-05	5.69E-07	2.73E-08	4.76E-10	1.10E-12	1.76E-21	1.13E-34	7.28E-48
SB125	1.11E-04	2.23E-04	1.96E-04	1.73E-04	1.18E-04	8.01E-05	4.79E-05	2.21E-05	1.70E-06	3.62E-08	7.72E-10
TE125M	2.99E-12	9.12E-05	8.10E-05	7.14E-05	4.87E-05	3.31E-05	1.98E-05	9.17E-06	7.04E-07	1.50E-08	3.19E-10
TE127M	3.10E-10	1.48E-04	4.64E-05	1.45E-05	4.47E-07	1.37E-08	1.32E-10	1.24E-13	1.02E-23	7.63E-39	5.68E-54
TE127	2.16E-02	1.47E-04	4.59E-05	1.44E-05	4.41E-07	1.36E-08	1.30E-10	1.23E-13	1.01E-23	7.52E-39	5.63E-54
CS137	9.36E-05	9.86E-04	9.75E-04	9.64E-04	9.30E-04	8.96E-04	8.57E-04	8.01E-04	6.33E-04	4.50E-04	3.18E-04
BA137M	1.97E-07	9.24E-04	9.13E-04	9.02E-04	8.68E-04	8.40E-04	8.01E-04	7.51E-04	5.94E-04	4.20E-04	2.98E-04
CE141	1.73E-07	7.48E-05	1.50E-06	3.02E-08	2.46E-13	2.00E-18	3.29E-25	2.18E-35	0.	0.	0.
CE144	1.72E-03	5.06E-03	3.25E-03	2.07E-03	5.45E-04	1.43E-04	2.41E-05	1.66E-06	2.24E-10	3.51E-16	5.47E-22
PR144	4.72E-07	5.06E-03	3.25E-03	2.07E-03	5.45E-04	1.43E-04	2.41E-05	1.66E-06	2.24E-10	3.51E-16	5.47E-22
PM147	2.77E-14	1.61E-03	1.41E-03	1.23E-03	8.30E-04	5.58E-04	3.28E-04	1.49E-04	1.06E-05	2.00E-07	3.78E-09
EU155	9.03E-06	2.64E-04	2.46E-04	2.29E-04	1.84E-04	1.48E-04	1.10E-04	7.12E-05	1.66E-05	1.87E-06	2.11E-07
TOTAL	5.33E-02	4.37E-02	2.67E-02	1.90E-02	8.67E-03	5.09E-03	3.45E-03	2.69E-03	1.89E-03	1.30E-03	9.07E-04

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