Societal Dose (0-500 miles) – mean value

	total	early (1)	early (2)	chronic
30 days (chronic-n)	571,000	22,100	21,300	549,000
90 days (chronic-n)	586,000	20,000	19,300	566,000
1 year (chronic-n)	595,000	17,900	17,300	577,000

Total = .995 · early (1) + .005 · early (2) + chronic

Do a check: .995 · 22,100 + .005 · 21,300 + 549,000 = 571,096 ✓

.995 · 20,000 + .005 · 19,300 + 566,000 = 585,996 ✓

.995 · 17,900 + .005 · 17,300 + 577,000 = 594,897 ✓

E-15

11/3/99

Understand better the small increase in societal dose in going from 30 days to 1 year. (for 0-500 miles)

Revise chrnc1_n.inp to print additional breakdown of societal dose for 0-500 miles =>
Add output TYPEQOUT003 for 0 to 500 miles. =>
chrnc1n1.inp

Rerun 3 cases:

30 days — atmos 7b.
early 299
chrnc1n1
METSUR
SURSIT } → best b1.out

90 days — atmos 7c → best c1.out

1 year — atmos 7d → best d1.out

	total	early (1)	early (2)	chronic	checked against chronic 1_n
30 days (chronic1n1)	571,000	22,100	21,300	549,000	✓
90 days (chronic1n1)	586,000	20,000	19,300	566,000	✓
1 year (chronic1n1)	595,000	17,900	17,300	577,000	✓

0-805 km		30 days	90 days	1 yr
	total	549,000 ✓	566,000 ✓	577,000 ✓
	direct exp	516,000	533,000	546,000
	ingestion	25,200	24,900	24,500
	decon (city)	7,850	7,430	6,440
	decon (farm)	301	294	259
		549,351 ✓	565,624 ✓	577,199 ✓

Direct exposure is the one that has the counter-intuitive trend.

		30 days	90 days	1 yr
	direct exp	516,000	533,000	546,000
✳ →	groundshine	514,000	531,000	544,000
* →	resuspension	1620	1,650	1,630

Calculation of direct exposure in chronic module:

- land is immediately habitable
- land will be habitable after decontamination
- land will be habitable after decontamination and interdiction.

Immediately habitable

projected individual dose (0-5 yrs) < 4 rem

Habitable after decontamination

1) DF = 3 and decontamination period = 60 days
2) DF = 15 and decontamination period = 120 days

Habitable after decontamination and interdiction

DF = 15 and decontamination period = 120 days and

1) interdiction period = 1 yr
2) interdiction period = 5 yr
3) interdiction period = 30 yr

Land is condemned if it is not habitable or if the total cost to restore it to habitable is more than the land's value.

I went through the detailed MACCS output.
I found the following item that might be helpful:
Peak dose found on spatial grid (under chronc).

I tabulated the info for 30 days and 1 year.
I found:

- peak doses that exceeded .05 Sv
- larger peak doses at 1 year than at 30 days.

11/4/99

Investigation of why 0-500 miles CHRONC dose goes from 549,000 Sv (30 days) to 577,000 Sv (1 year).

577,000/549,000 = 1.0510018

CHRONC

interval (km)		Peak dose found on spatial grid (Sv)		Ratio of 1 year dose 30 day dose	
		30 days (atmos7b)	1 year (atmos7d)		
0	0.2	0.00000	0.00000		
0.2	0.5	0.00260	0.00627	2.412	
0.5	1.2	0.00163	0.00155	0.951	
1.2	1.6	0.00016	0.00015	0.949	
1.6	2.1	0.00002	0.00002	0.951	
2.1	3.2	0.00000	0.00000	0.950	
3.2	4	0.00368	0.00371	1.008	
4	4.8	0.00309	0.00319	1.032	
4.8	5.6	0.00478	0.00494	1.033	
5.6	8.1	0.02490	0.02530	1.016	
8.1	11.3	0.04570	0.05910	1.293	
11.3	16.1	0.04950	0.05710	1.154	
16.1	20.9	0.05380	0.05670	1.054	
20.9	25.8	0.04970	0.05000	1.006	
25.8	32.2	0.04590	0.04690	1.022	
32.2	40.2	0.06890	0.07290	1.058	
40.2	48.3	0.07930	0.08190	1.033	
48.3	64.4	0.09710	0.09800	1.009	
64.4	80.5	0.12700	0.13500	1.063	
80.5	113	0.13200	0.13300	1.008	
113	161	0.12300	0.12400	1.008	
161	241	0.09690	0.10300	1.063	avg. =
241	322	0.08370	0.08640	1.032	1.066402
322	563	0.08680	0.09020	1.039	
563	805	0.06020	0.06810	1.131	
805	1609	0.01550	0.01470	0.948	

I went through the inventory data in atmos 7b and atmos 7d (30 days and 1 year, respectively).

The only isotopic inventories that were higher at 1 year than at 30 days were for Pu-238 and Am-241

	(atmos 7b) 30 days	(atmos 7d) 1 year
Pu-238	1.70 E 16	1.78 E 16
Am-241	1.08 E 16	1.20 E 16

Revise atmos 7d to use Pu-238 and Am-241 inventories at 30 days ⇒

atmos 7d → atmos 7d2

atmos 7d2
early 299
Chrnc In1
MET SUR
SURSIT
} besrd2.out

		(atmos 7d) 1/year	(atmos 7d) (less Pu-238 and Am-241) 1/year
0-805 km	total	577,000	577,000 ✓
	direct exp	546,000	546,000 ✓
	ingestion	24,500	24,500 ✓
	decon (early)	6,440	6,440 ✓
	decon (farm)	259	259 ✓

Also, peak dose on spatial grid was exactly the same

=> Reducing Pu-238 and Am-241 inventories had no effect (as expected)