



MEMO

TO: Savannah River Site Work Group
FROM: Joe Fitzgerald, SC&A
SUBJECT: Discussion Items and Clarifications for February 26th Work Group Meeting
DATE: February 24, 2014

Based on our notes from the February 5, 2014, Work Group meeting, SC&A offers the following discussion and clarification regarding NIOSH's response to SC&A's original findings. These are intended to guide Work Group discussions during the upcoming February 26, 2014, meeting. Given the relatively short time period (several weeks) between recent Work Group discussions, these are meant to reflect SC&A understanding of the NIOSH responses and where we believe additional discussion with the Work Group would be helpful, both during the February 26th conference call, and afterwards. A more definitive and detailed response can be developed at the Work Group's direction.

Neptunium: (NIOSH 1/9/2014 response to SC&A white paper of July 2013)

Findings 1-8: Resolution deferred to SEC Work Group (albeit, for Finding 5, NIOSH agreed it needed to add actual construction trades worker (CTW) instructions for assigning Np dose in OTIB-081; NIOSH only provided conceptual approach during Feb 5th mtg). As noted in SC&A's One Person-One Sample (OPOS) response,¹ SC&A continues to disagree with NIOSH's position that SRS worker bioassay data can be used in its comparison of non-construction worker (NCW) and CTW worker groups at SRS, both from a data adequacy standpoint, as well as statistical validity.

Finding 9: SC&A did not question the use of the I-131 region of interest to calculate Pa-233 exposures. SC&A was questioning the choice of whole body counter geometry to calculate the exposure, as opposed to chest geometry. SC&A reviewed data from several workers in the early 1970s to verify the geometry used and noted that sometimes the chest count geometry was used and not the 40 cm arc geometry. Specifically, Np-237 activities and I-131 activities were often both registered in chest count geometries. SC&A wants to know if those results were discarded by NIOSH, because they were not 40 cm arc geometries. In addition, there are many in-vivo results files where it is not clear which counting geometry was used. SC&A is assuming that NIOSH has taken the counting results from the files that clearly specify that the 40 cm arc geometry was used.

¹ Issued to the SEC Work Group on February 21, 2014.

SC&A agrees that the difference in the interpretation of results from chest counts to 40 cm arc geometry counts is due to the calibration factor used. As NIOSH has apparently used the calibration factor from 40 cm arc geometry, SC&A requests a clarification as to whether any of the chest counts were, in fact, discarded. The use of the correct calibration factor is essential for the correct interpretation of in-vivo monitoring results. It is not clear why NIOSH would not use chest calibration factors for monitoring results that specify the use of chest geometry, and 40 cm arc geometry calibration factors for monitoring results that specify 40 cm-arc geometry. If no specification is available, NIOSH could either discard the results or use the most claimant-favorable geometry. SC&A notes that the intake rate derived for the time period of 1970–1974 was 93.5 dpm/d, while the intake rate immediately before this time, in 1968–1969, was only 1.79 dpm/d.

Finding 10: SC&A has analyzed various results from several workers during the period 1974–1979, when the “second geometry was used” to report in-vivo results. As explained in the SC&A review, all of those reports contained the MDA for Pu and Am, using chest geometry. SC&A questions whether NIOSH has examined the in-vivo results of all SRS workers during this period of time and concluded that the stretcher geometry was actually used in practice. In addition, a clarification is needed as to whether NIOSH has discarded or disregarded the monitoring results that were taken using the chest geometry.

The use of the correct calibration factor is essential for the correct interpretation of in-vivo monitoring results. It would seem that one would use the use chest calibration factors for monitoring results that specify the use of chest geometry, and the stretcher geometry calibration factors for monitoring results that specify the stretcher geometry. Under the circumstances, SC&A requests clarification as to why NIOSH does not merely analyze each one of the existing real monitoring results and apply the correct calibration factor to each result.

Finding 11: SC&A does not agree with NIOSH’s assessment that 86.5 keV photons are unsuitable for estimating Np-237 during the period 1980–1989, when phoswich detectors were used to quantify Am-241 exposures. The following example shows the calculation of Np-237 MDA following an inhalation intake in September 1988, when a phoswich detector was used for chest counts. Phoswich detectors can be used to detect Np-237 86.5 Kev.

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lognormal distribution that comprises the in-vivo data of all workers that had results in a certain time period. In ORAUT-OTIB-0081, the time pattern of intake is assigned to the 50th, 84th and 95th percentiles of the lognormal distribution of all OPOS, as calculated for each worker in a certain year.

The proportion of Np-237 to Pa-233 in each in-vivo monitoring result is independent of the assumed intake pattern of the 50th percentile of the distribution of all workers. For each individual worker, the proportion of Pa-233 depends on the age of the Np-237 source at the time of inhalation and on how long after exposure the worker has been monitored. For inhalation exposures to fresh Np-237 and in-vivo monitoring in a small interval of time after exposure, the amount of Pa-233 will be low and the in-vivo monitoring will underestimate the Np-237 lung or body burden. In addition, in the derivation of OPOS for each worker, in-vivo monitoring results with different proportions of Pa-233 may be used to calculate the MPM.

In its last response, NIOSH noted the following without providing a basis in available documentation or specific examples to demonstrate its point:

In actuality, most Np-237 intakes are more likely to be aged material characteristic of surface contamination on objects that may be aged weeks, months, or longer. Even though Np-237 billets were normally processed approximately 25 days after production, some occasions were longer and residual contamination in the processing line would be expected to be considerably older than the age of the billets.

SC&A suggests that references or examples to substantiate these claims be provided to the Work Group.

Finding 14: See SC&A's response to Finding 13 above.

Finding 15: See SC&A's response to Finding 13 above.

Finding 16: SC&A has always understood that NIOSH was not using I-131/Cr-51 as a surrogate, and was just using the ROI to assign Np doses. However, it will be important for NIOSH to be more explicit about its information regarding specific operations (and campaigns), locations, and times during which workers were potentially exposed to Np. While NIOSH's original source term descriptions have been expanded via more recent data captures and presented (at least, in part) in the form of slides to the Work Group (on Feb 5th), documentation of this final scoping review needs to be made available in a form that can be reviewed by the Work Group and ultimately applied by dose reconstructors.

SC&A has two specific questions of clarification: (1) Has NIOSH quantitatively determined how many workers included in the coworker study were actually working in areas where neptunium exposure was possible? (2) Of the known

neptunium exposures, how many of those workers were actually included in the coworker distribution? And for clarification sake, will the most recent information obtained in the last few onsite data captures be reflected in revised Table 5-1 of OTIB-0081?

Finding 17: See SC&A's response in Finding 16 above. In addition, NIOSH states that the "assumption of equilibrium is reasonable and any uncertainty is accounted for with the minimum factor of 3 uncertainty applied." The minimum GSD of "3" is assigned to account for biological variation and uncertainty in the lognormal distribution and the derived 50th and 84th percentile excretion rates. It is a statistical parameter, and is not suppose to address errors on the equilibrium of the source.

Findings 18 and 19: SC&A agrees with NIOSH that "a factor of ten drop in calculated intake rate is not uncommon in the coworker studies." As stated in the response to Finding 18, "when the MDA of the bioassay method used decreases, the calculated intake rate typically drops as well and by a commensurate amount. In this case, the whole body counting methods improved with time with more and better detectors, leading to a decrease in the MDAs for most radionuclides." However, SC&A notes that instead of dropping with time, the intake rates increased with time. The coworker 50th percentile intake rates for Np-237 for the period January 1, 1968–December 31, 1969, was 1.79 dpm/d, with a GSD of 3.21, while the derived intake rate for 1970–1974 was 93.5 dpm/d, with a GSD of 3.00. Apparently, there was a factor of 50 increase in the intake rate. This discontinuity could only have been caused by incoherent methods in assigning Np-237 exposures (urine excretion rates versus WB results based on I-131 ROI) or due to a huge increase in worker Np-237 exposures. One avenue of inquiry for the Work Group would be to examine the urine results used in the coworker distribution to further evaluate this issue of inconsistent results.

Thorium: (NIOSH 1/16/2014 response to SC&A white paper of September 2013)

Finding 1: Regarding the revised Table 5-1, SC&A's primary concern revolves around the completeness of film badge codes that NIOSH intends to use to assign workers to a given facility, although this may devolve into a question of sufficient accuracy. SC&A has observed temporal gaps in the available dosimetry area codes contained in a preliminary sampling of available claimant files. This is especially apparent in the 1973–1981 period when the primary source of external dosimetry information is the HPRED database. Additionally, SC&A has identified numerous additional dosimetry codes not listed in Table 5-1. Finally it can be observed in Table 5-1 that some dosimetry codes are associated with multiple facilities, which have differing radionuclide assignments.

How does NIOSH propose to assign coworker intakes in cases where dosimetry codes are temporally incomplete, refer to multiple facilities, or cannot be associated with a listed facility in Table 5-1? [Presumably, in cases where there is

uncertainty in the location code, the default assumption of applying all coworker intakes would be applied (i.e. the unknown facility designation). This would likely apply to a large number of unmonitored workers especially in the 1973–1981 timeframe.”]

Finding 2: NIOSH conducted additional research on thorium use at SRS and is proposing to apply a new methodology to bound potential doses due to thorium after January 1, 1990 (i.e., primarily for Bldg 773-A, using an air concentration of 2×10^{-13} $\mu\text{Ci/cc}$). While this approach is described in NIOSH's response to Findings 27–32 of the January 16, 2014, response, NIOSH/ORAUT notes that a report providing “additional rationale for use of the derived air concentration” has yet to be issued, but is intended sometime in the future.

SC&A awaits this additional rationale, so that an informed review can be conducted for the Work Group. One question to be addressed in this follow-up review will be to confirm that Building 773 represented the sole source of thorium exposure potential after 1990.

Finding 3: SC&A has found no specific incidents or incident databases that have not been addressed by NIOSH. We defer to the Work Group for further direction or closure.

Finding 4: Thoron exposure was not addressed fully at the February 5th meeting; SC&A is prepared to discuss further.

Findings 5–16, 19–23: OPOS-related issues for SEC Work Group consideration. As noted in SC&A’s OPOS response, SC&A continues to disagree with NIOSH’s position that SRS worker bioassay data can be used in its comparison of NCW and CTW worker groups at SRS, both from a data adequacy standpoint, as well as statistical validity.

Finding 17: NIOSH agrees with SC&A's finding regarding chelation samples; that the use of chelation samples is technically inappropriate, though likely claimant favorable.

Finding 18: SC&A’s examination of the raw data with reported results above the detection limit shows instances where the same urine sample, counted in different discs, presents inconsistent results. This indicates that the method used for detection of activity was not always reliable; such widely inconsistent results from the same urine sample cannot be trusted.

It is obvious from the data recorded in the laboratory logbooks that the counting data were subject to imprecision. As a result, samples were counted multiple times and the results were averaged, a standard practice to reduce uncertainty. This would be expected, given that many of the results were near the MDA. Use of the averaging technique implies that the site was aware of the consistency issues and took steps to address it by averaging the results.

SC&A derived spreadsheets of the raw data results and divided them into three tables attached here. The first table shows reported results higher than 3 dpm/1.5L (higher than 10 times the MDA of 0.3 dpm/1.5L). The second table shows results between 1 dpm/1.5L and 2.9 dpm/1.5L. The third table shows results between 0.32 dpm/1.5L and 0.99 dpm/1.5L. The green highlighted results are the ones that show inconsistent discs results. The pink highlighted results are the ones in which the report result is not the average of the individual discs results. Most of the workers in this range had DTPA treatment for some specific contamination (i.e., Am-241, Pu or Cm). As the tabulated data below illustrate, there are several inconsistent discs results, even at levels much higher than the MDA. One example consists of the disc results 8.64, 6.79, 2.72, and 15.3, which were averaged to give a report result of 8.4. Other examples are highlighted in Tables 1 and 2, which contain most data in the report range higher than 1 dpm/1.5L. Table 3 contains the most data in the range 0.32–0.99 dpm/1.5L.

Although the range values of uncertainty for the disc results were chosen subjectively, it is important to notice that there were high variations among the same sample disc results for report values more than 10 times the MDA. In addition, as NIOSH pointed out, there are high uncertainties on the reported results near or at the MDA. Despite these uncertainties, thorium intakes were derived based on urine excretion results well below the MDA, as can be seen on Table A-5, page 46 of 96 of ORAUT-OTIB-0081, Revision 2, 2013.

The derivation of coworker intakes based on raw data measurements with this high degree of uncertainty is scientifically questionable and needs to be reviewed further by the Work Group in the context of its SEC evaluation review.

Findings 24–26: Addresses how solubility will be interpreted for workers exposed to thorium compared with that attributed to Am/Cm/Cf bioassay data. Also, how assignment of a trivalent radionuclide dose conversion factor may influence claimant-favorability of lung and bone dose assignments. It is SC&A’s position that in order for a coworker model to be scientifically valid, the data being used should reflect actual exposure potential to the radionuclide of concern.

While SC&A does not dispute how solubility will be addressed, SC&A agrees with the NIOSH proposal from the February 5th meeting to take the thorium workers that they have identified and look to see to what extent they are included in the coworker data (including some assessment of the relative magnitude of the “thorium worker” results to the entire distribution). The purpose of such a review would be further validation that the coworker distribution contains the sample of actual thorium worker data that is available and can be used to bound potential thorium intakes.

Findings 27–32: Embodies new DAC-based approach to assigning thorium doses in the 1990–2007 period (see response to Finding 2).

Table 1: Raw Am/Cm/Cf Results Greater than 3 dpm/1.5L

Ref #	DTPA	Contamination	Bottle Date	Type	dpm/ 1.5L (1)	dpm/ 1.5L (2)	dpm/ 1.5L (3)	dpm/ 1.5L (4)	dpm/ 1.5L (5)	dpm/ 1.5L (6)	dpm/ 1.5L (7)	dpm/ 1.5L (8)	dpm/ 1.5L (9)	dpm/ 1.5L (10)	Report
A1			8/10/1976	8	3.53	4.583									4
1	1/27,29/82	Pu/Am, 1/29/82, wound	1/28/1982		11.502	8.157	7.977								9.2
1			1/29/1982		10.844	10.874									10.7
1			1/30/1982		2.14	3.939	4.316								3.5
2	12/12/1985	Pu/Am/Cm,11/19/8 5, inh	11/22/1985	Follow-up	34.923	42.122	34.644	37.739	44.341	39.355					38.9
2			11/23/1985	Follow-up	16.597	14.791	13.761								15.6
2			12/13/1985	Follow-up	9.65	9.594	8.373	7.819							8.9
2			12/14/1985	Follow-up	2.902	2.563	3.764	3.519							3.2
3	8/23/1979	Am/Cm, 8/23/79, inh	8/14/1979	24 hrs	8.774	10.45	8.104	8.19							27
3			8/23/1979	Special	17.046	17.156									51
3			8/23/1979	Special	8.399	10.603									29
B1			6/5/1974	Routine	40.47	29	29.485	27.8							35
4	5/9/1986	Pu/Am,5/8/86, wound	5/10/1986	Special	777.9	537.5									658
4			5/12/1986	Follow-up	143.7	117.6									131
4			5/12/1986	Follow-up	122	123									122.5
4			5/13/1986	Follow-up	53	22.9									37.9
4			5/14/1986	Follow-up	39.1	50.2									44.6
4			5/14/1986	Follow-up	24.1	17.6									20.8
4			5/15/1986	Follow-up	27.1	20.7									23.9
4			5/16/1986	Follow-up	14.9	15									14.9
4			5/17/1986	Follow-up	8.64	6.79	2.72	15.3							8.4
4			5/18/1986	Follow-up	14.4	17.5									15.9
4			5/18/1986	Follow-up	14.6	9.8									12.2
4			5/19/1986	Follow-up	9.03	13									11
4			5/20/1986	Follow-up	6.21	11.9									9.1
4			5/20/1986	Follow-up	3.66	11.18	6.04	1.79							5.7
4			5/21/1986	Follow-up	12.5	14.8	17.9	30.5							18.9
4			5/22/1986	Follow-up	13.6	9.7									11.6

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4			5/24/1986	Follow-up	2.56	5.15	8.48	8.39							6.1
4			5/24/1986	Follow-up	6.15	5.9									6
4			5/25/1986	Follow-up	1.47	-5.8	6.87	4.3							4.2
4			5/27/1986	Follow-up	5.14	4.49									4.8
4			5/28/1986	Follow-up	14.8	7.68	LIP								11.2
4			5/29/1986	Follow-up	3.63	4.86									4.2
4			5/30/1986	Follow-up	7.3	4.13									5.7
4			5/31/1986	Follow-up	7.97	11.4									9.7
4			6/1/1986	Follow-up	13	8.76									10.9
4			6/2/1986	Follow-up	2.6	3.5									3
4			6/4/1986	Follow-up	5.9	5									5.4
4			6/5/1986	Follow-up	LIP	4.8									4.8
4			6/5/1986	Follow-up	4.1	2.8									3.4
4			6/6/1986	Follow-up	2.22	18.965	14.471	39.637	4.819						13.9
4			6/6/1986	Follow-up	5.96	2.7									4.3
4			6/7/1986	Follow-up	7.075	9.879									8.5
4			6/9/1986	Follow-up	6.923	10.652									8.8
4			6/10/1986	Follow-up	5.304	2.393									3.8
4			6/11/1986	Follow-up	8.438	10.354									9.4
4			6/12/1986	Follow-up	1.05	4.34	2.94								3.6
4			6/16/1986	Follow-up	4.5	5.34									4.9
4			6/20/1986	Follow-up	4.92	3.34									4.1
4			6/27/1986	Follow-up	4.15	3.4									3.8
4			7/1/1986	Follow-up	1.8	4.1									3.3
4			7/3/1986	Follow-up	4.76	0.236	3.2								4
4			7/6/1986	Follow-up	3.6	3.7									3.6
4			7/8/1986	Follow-up	0.695	4.33	3.1								3.7
4			7/9/1986	Follow-up	3.4	4.33	-0.109								3.8
4			7/10/1986	Follow-up	-3.54	2.88									3.2
4			7/15/1986	Follow-up	3.54	-5.52	3.55	0.566							3.5

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4			7/16/1986	Follow-up	3.63	-4.29	3.54								3.6
C1			10/19/1976	Resample	21.142	19.775	19.269								20
5	9/4/1984	Pu/Am, 9/4/84, inh	9/4/1984	Special	10.806	11.013	12.891	12.621							59
5			9/5/1984	Special	1.648	1.776	1.243	1.706							8
5			9/5/1984	Special	0.694	0.794	0.975	0.71							4
5			9/6/1984	Follow-up	0.516	0.366	0.867	0.403	0.495	1.001					3
5			9/6/1984	Special	0.673	0.455	0.651	0.632							3
C2			9/26/1983	Special	2.393	4.956	2.684	-0.032							3.3
D1			5/7/1979	5	35.932	0									72
E1			6/6/1974	Routine	11.961	12.661									12
6	2/8/1988	Pu/Am,2/8/88, inh	2/9/1988	Special Follow-up	16.5	12.7									14.6
6			2/9/1988		9.27	15.8									12.5
6			2/10/1988	Follow-up	10.9	9.23									10.1
6			2/10/1988	Follow-up	8.64	9.85									8.7
F1			1/25/1973	Routine	10.404	9.83									10
7	4/19/1974	Cm,ZrNb, Pu,Ru,Ce,4/11/74	4/12/1974	Special	2320	2180									2300
7			4/12/1974	Special		1260	1360								1250
7			4/13/1974	Special	248	308									250
7			4/13/1974	Special	100	106									100
7			4/14/1974	Special	57	54									55
7			4/14/1974	Special											45
7			4/15/1974	Follow-up	23.958	23.685									40
7			4/16/1974	Follow-up	24.399	22.849									40
7			4/16/1974	Follow-up	16.023	15.488									40
7			4/17/1974	Follow-up	29.968	30.063									30
7			4/18/1974	Follow-up	18.667	17.862									27
7			4/19/1974	Follow-up	14.922	16.35									16
7			4/19/1974	Follow-up	2.582	2.717	2.726	4.574							9.5

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7			4/19/1974	Follow-up	3.265	3.049	3.004	3.184							9.4
7			4/19/1974	Follow-up	2.297	1.166	1.773	1.796	1.866						5.3
7			4/20/1974	Follow-up	23.599	21.727	16.256	16.804							20
7			4/20/1974	Follow-up	15.829	16.833									16
7			4/20/1974	Follow-up	10.363	10.38	8.341	7.87							12
7			4/21/1974	Follow-up	8.23	8.848	8.628	8.252							8.5
7			4/22/1974	28 hr	3.757	3.768	3.266	5.069	0	4.927					4.2
7			4/29/1974	Follow-up	2.525	3.306	2.283								4.2
7			4/30/1974	Follow-up	3.287	3.035									3.2
H1			6/25/1975	Routine	3.57	3.88									3.7
8	9/4/1984	Pu/Am, inh,9/4/34	9/5/1984	Special	18.332	16.321	19.93	19.682							93
8			9/5/1984	Special	12.67	12.309	13.156	11.741							62.3
8			9/5/1984	Special	9.629	10.958	9.3	9.713							49.5
8			9/6/1984	Special	2.558	2.852	2.393	1.776							12
8			9/7/1984	Follow-up	5.13	5.311	5.637	5.667	5.989	5.667	7.392				29
8			9/7/1984	Follow-up	1.447	1.76	1.095	1.212	1.354	1.627					7
8			9/11/1984	Follow-up	4.793	4.424	5.46	4.945	2.931						4.5
8			9/18/1984	Follow-up	2.593	2.564	3.997	3.892							3.2
9		Am/Cm cont. 3/27/75	3/27/1975	Special	3.798	4.496	3.572								4
9			3/27/1975	Special	3.699	5.64	4.02	1.033	4.68						3.6
10		Cm-244 cont. in 11/15/77	11/15/1977	Special	2.54	3.2									8.6
10			11/16/1977	Special	7.94	7.7									7.8
11	4/18/1974	Cm-244,4/18/74	4/18/1974	Special	39.897	32.3									36
11			4/19/1974	24 hr	196.414	185	165.042	177.9							180
11			4/26/1974	24 hr	5.537	4.809	4.884	5.359							5.1
11			5/3/1974	Routine	8.606	8.401									8.5
11			7/24/1974	24 hr	13.608	13.425									14
11			7/24/1974	24 hr	4.856	5.608									5.2
11			10/11/1974	DTPA	3.433	3.713									3.6

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11			1/31/1977	Follow-up	16.76	18.584									17.7
11	1/25/1978	Cm-244/Am-241, 1/25/78	1/26/1978	Special	530.9	478.9									504.6
11			1/26/1978	Special	314.6	422.5									368.4
11			1/26/1978		144.9	118.4	143.2	161.1							140
11			1/27/1978		177.6	165.4	203.6	196.1							190
11			1/28/1978		26.3	27.2	31.7	32.8							30
11			2/1/1978	Follow-up	11.24	10.249	13.56	10.112							11.3
11			2/6/1978	Follow-up	4.42	4.906									4.7
11			2/8/1978	Follow-up	6.55	5.944									6.2
K1			12/4/1975	Special	0.098	2.331	1.626								4
K1			12/5/1975	F Up	0.662	0.929	1.185								9
12			3/1/1973	Special	27.875	24.96									26
12			3/1/1973	Follow-up	4.722	4.559									4.6
12			3/2/1973	Follow-up	3.514	4.071									3.8
12	5/8/1975	Am-241/Pu-239, inh,5/7/75	5/8/1975	Special	4.708	5.031	3.568	4.739							4.5
L1			4/30/1975	F Up	3.32	2.93									3.1
L2			3/1/1973	Special	4.928	4.799									4.9
M1			5/5/1981	Follow-up	22.06	29.904									29.5
13	1/10/1984	Cm-244, 1/10/84	1/11/1984	Follow-up	457.788	452.295	469.291	566.764	471.694	590.06					501.3
13			1/11/1984	Special	197.195	190.506	193.828								291
13			1/12/1984	Follow-up	81.489	62.136	63.136								110.4
13			1/12/1984	Follow-up	35.212	34.393	29.717								33.1
13			1/13/1984		19.349	16.158	20.32	16.402	19.191	16.562					18
13			1/13/1984		4.526	15.007	15.1991								12
13			1/15/1984		7.75	6.41	7.52	8.35	8.656	6.6					7
13			1/15/1984	Follow-up	3.528	4.2	4.03	5.03	3.65	5.28					4.3
14	10/16/1973	Cm-244, inh/skin,10/16/73	10/16/1973	24 hrs	73.8	83.9	59.5	66.1							71
14			10/17/1973	24 hrs	19.1	23									21

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14			10/18/1973	24 hrs	25	24.5	27.2	26.7							26
14			10/24/1973	Follow-up	5.77	6.15									6
14			10/25/1973	Follow-up	8.14	7.05									7.6
14			10/26/1973	Follow-up	3.41	3.27									3.33
14			10/29/1973	Follow-up	6.1	6.77									6.4
14			10/29/1973	Follow-up	5.18	5.11									5.1
14			10/30/1973	Routine	3.21	2.88									3
N1			5/1/1981	Special	11.437	12.381	11.056								11.8
N2			11/5/1986	Follow-up	46.4	45.9									46
N2			11/5/1986	Follow-up	17.2	16.2									16.7
N2			11/5/1986	Follow-up	8.91	7.57									8.2
N2			11/10/1986	Follow-up	2.86	3.82									3.3
P1			9/27/1973	Special	3.94	3.99									4
P2			1/22/1973	Follow-up	0.815	0	0.77	0.255							4
15	1/18/1973	Pu-239/Am-241	1/19/1973	Follow-up	3.93	4.74									4.3
16	10/4/1985	Pu-239/Am-241,inh,10/4/85	10/7/1985	Follow-up	19.574	17.869	22.745	19.028	15.354	19.256					19
16			10/7/1985	Follow-up	8.459	9.03	7.784	8.057	8.725						8.4
16			10/7/1985	Follow-up	3.604	3.855	3.432	3.818							3.7
17	10/18,10/30/74	Cm-244, 4/18/74	4/18/1974	24 hr	43.652	46.3	24.525	22							34
17			4/18/1974	Special	16.043	13.7									15
17			4/24/1974	24 hr	3.867	3.647	3.917	8.561	8.427	8.521					6.2
17			5/9/1974	Follow-up	5.323	5.497									5.4
17			5/22/1974	Follow-up	4.01	3.805	3.024	3.142							3.5
17			5/23/1974	Follow-up	3.307	3.128	3.165	3.514							3.3
17			10/30/1974	DTPA	4.19	5.57									4.9
17	1/25/1978	Cm-244,1/25/78	1/25/1978	Special	44.1	33.3									38.7
17			1/25/1978	Special	34.9	36.5									35.7
17			1/26/1978		191.1	177.9	226.1	228							210

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17			1/26/1978	Follow-up	131.2	156.9									144.3
17			1/26/1978	Follow-up	134.2	134.3									134.4
17			1/27/1978		105.8	107.7	135.6	140.9	0.609	0.828	0.696	0.675			120
17			1/30/1978	Follow-up	31.02	36.05									34.1
17			1/31/1978	Follow-up	24.204	20.01	28.408	36.25							27.2
17			2/8/1978	Follow-up	37.947	36.06	7.6	7.124							22.2
18	4/12,19/74	Cm244, ZrNb95, Pu239,Ru103/106,C e144, 4/11/74	4/12/1974	Special	1040	1130									1000
18			4/12/1974	Special	340	317									340
18			4/13/1974	Special	50	61									50
18			4/14/1974	Special	40	56									40
18			4/15/1974	Follow-up	38.787	34.209									37
18			4/16/1974	Follow-up	62.268	62.029	56.7								62
18			4/16/1974	Follow-up	62.484	60.43	55.2								74
18			4/17/1974	Follow-up	61.942	69.465	1.65								73
18			4/18/1974	Follow-up	21.89	19.012									20
18			4/19/1974	Follow-up	8.086	6.83	7.288	8.981							23
18			4/19/1974	Follow-up	8.162	6.875	5.592	5.726							20
18			4/20/1974	Follow-up	22.194	23.139	23.714	18.956							22
18			4/20/1974	Follow-up	5.596	5.702	20.999	5.746	6.096						5.7
18			4/20/1974	24.5 hrs	6.057	5.789	6.146	5.725							5.9
18			4/21/1974	Follow-up	3.695	4.356									3.3
18			4/22/1974	21 hrs	2.152	3.102	4.89	4.592							3.7
18			4/29/1974	Follow-up	9.06	10.096									9.6
18			4/30/1974	Follow-up	6.688	8.365									7.5
18			5/1/1974	Follow-up	13.925	11.74									12.8
18			5/6/1974	Follow-up	5.962	7.197	7								6.7
18			5/7/1974	Follow-up	7.068	8.91									8
18			5/8/1974	Follow-up	8.308	8.661									8.5
18			5/14/1974	Follow-up	5.716	6.671									6.2

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18			5/15/1974	24 hr	7.32	5.921	6.82	7.868							7
18			5/16/1974	24.5 hrs	3.732	4.083	4.507	3.722							4
19	11/19/1985	Am-241/Pu-239,Cm-244, inh, 11/19/85	11/21/1985	Follow-up	577.393	122.616	518.243	127.96	601.19	560.129					564.2
19			11/23/1985	Follow-up	98.316	109.827	92.192	95.518							99
19			11/24/1985	Follow-up	28.582	33.734	29.234	30.202	34.263	30.056					31
19			11/25/1985	Follow-up	41.145	47.309	39.547	41.262							42.3
19			11/25/1985	Follow-up	26.681	25.602	20.785	22.579							23.9
19			11/25/1985	Follow-up	20.226	26.008	17.735	25.029	29.211	22.325					23.4
19			11/26/1985	Follow-up	251.985	238.789									245.4
19	12/12/1985		12/12/1985	Follow-up	17.789	16.026	14.231								16
19			12/13/1985	Follow-up	7.23	9.174	12.089	10.941							9.9
19			12/13/1985	Follow-up	6.822	5.577	6.128	6.339							6.2
19			12/14/1985	Follow-up	4.242	3.854	3.521	3.57							3.8
20	4/18/1974	Cm-244, 4/18/74	4/18/1974	Special	95.279	101.9									100
20			4/19/1974	24 hr	130.336	126.3	169.404	162.7							150
20			4/24/1974	24 hr follow-up	27.821	30.819	26.708	28.909							28.6
T1			1/10/1975	Routine	3.4	4.07									3.7
21	11/15/1977	Cm-244, 11/15/77	11/7/1977	Special	1.88	2.25									6.2
21			11/22/1977	11	4.58	4.29									4.4
21	12/12/1985	Am-241/Pu-239,Cm-244, inh, 11/19/85	11/20/1985	Follow-up	13.078	12.682	9.762	12.346	8.883	15.802					12.1

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A2			6/8/1978	5	1.14	1.605	1.22	0.58							1.1
1	1/27,29/82	Pu/Am, 1/29/82, wound	1/30/1982		1.04	1.297									1.2
2	12/12/1985	Pu/Am/Cm,11/19/85, inh	12/20/1985	Follow-up	2.61	2.735	2.59	2.29							2.6
B1			5/31/1974	Special	2.54	2.499									2.5
4	5/9/1986	Pu/Am,5/8/86 , wound	5/26/1986	Follow-up	3.58	4.14	1.65	1.95							2.8
4			5/29/1986	Follow-up	3.6	2.26									2.9
4			6/2/1986	Follow-up	2.6	3.5									3
4			6/4/1986	Follow-up	1.3	3.5									2.4
4			6/13/1986	Follow-up	1.05	1.84	0.44								1.1
4			6/14/1986	Follow-up	1.93	0.685	3.44								2
4			6/14/1986	Follow-up	1.49	2.34	0.94								1.6
4			6/16/1986	Follow-up	1.4	3.93	1.17								2.2
4			6/17/1986	Follow-up	1.09	0.982	3.14								2
4			6/18/1986	Follow-up	6.17	2.74	2.44	-0.15							2.8
4			6/19/1986	Follow-up	1.82	1.18	-0.63								1
4			6/22/1986	Follow-up	2.29	2.81									2.5
4			7/12/1986	Follow-up	1.46	1.51									1.5
4			7/20/1986	Follow-up	1.49	1.87	-0.17								1.7
4			7/22/1986	Follow-up	2.52	1.84	-4.12								2.2
4			7/23/1986	Follow-up	2.33	4.04	1.59								2.6
4			7/23/1986	Follow-up	1.4	1.05									1.2
4			7/27/1986	Follow-up	0.47	1.96	-0.83								1.2
4			8/12/1986	Follow-up	1.78	0.982									1.4
C3			5/18/1978	4		0.825	1.36								1.1
C4			12/6/1973	Routine	1.04	1.355									1.2

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5	9/4/1984	Pu/Am, 9/4/84, inh	9/6/1984	Follow-up	0.52	0.366	0.87	0.4	0.5	1					3
5			9/6/1984	Special	0.67	0.455	0.65	0.63							3
5			9/11/1984	Follow-up	1.2	1.125	1.25	1.55							1.3
5			9/13/1984	Follow-up	1.14	1.597									1.4
5			9/18/1984	Follow-up	0.56	1.27	0.94	0.8							1
5			9/21/1984	Follow-up	1.08	0.978	0.97	0.9							1
C5			4/3/1974	Routine	1.55	0.929	0.93								1.1
E2			1/17/1973	Follow Up	1.17	0.857	1.05	0.15							1
E3			7/7/1975	Routine	1.31	1.86									1.6
E1			12/6/1973	Routine	0.94	1.546									1.2
6	2/8/1988	Pu/Am,2/8/88, inh	2/11/1988	Follow-up	1.62	1.14									1.4
27	3/14/1973	Pu-239 in 3/14/73	3/15/1973	Special	1.09	0.737									1.5
H1			3/22/1982	Routine	2.94	1.676									2.3
7	4/19/1974	Cm,ZrNb, Pu,Ru,Ce,4/11/74	5/1/1974	Follow-up	2.47	2.278									2.4
7			5/7/1974	Follow-up	1.36	1.899	1.55	3	2.41	3.08					2.2
7			5/8/1974	Follow-up	1.67	1.639									1.7
8	9/4/1984	Pu/Am, inh,9/4/34	9/11/1984	Follow-up	1.61	1.794	1.65	2.02							1.7
8			9/19/1984	Follow-up	2.43	2.553	2.49	3.35							2.7
9		Am/Cm cont. 3/27/75	3/27/1975	Special	1.86	3.321	2.31								2.5
9			3/28/1975	F Up	2.21	2.82		1.75	1.5						1.4
9			3/28/1975	Special	2.34	2.029	1.69								2
9			3/28/1975	Special	1.52	1.603	1.29								1.5
9			3/31/1975	Special	1.41	1.405	0.82								1.2
28	1/18/1973	Pu-239/Am-241, 1/18/73	1/19/1973	Follow-up	2.12	1.97	1.99	1.97							2
28			1/22/1973	Follow-up	1.5	1.414	1.16	0.81							1.2

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28			1/31/1973	Follow-up	1.09	1.02									1
J1			5/17/1978	4		1.427	0.89								1.2
11	4/18/1974	Cm-244,4/18/74	5/22/1974	Follow-up	1.25	0.948	1.53	1.95							1.4
11			5/24/1974	Follow-up	1.22	1.116	1.28	1.03							1.2
11			5/28/1974	Follow-up	2.18	2.508									2.3
11			10/10/1974	DTPA	2.85	2.519									2.7
11			10/10/1974	DTPA	2.28	2.09									2.2
11			10/11/1974	DTPA	0.53	2.089	2.08								2
11			10/12/1974	DTPA	1.28	1.628									1.4
12			3/1/1973	Follow-up	2.1	3.239									2.7
12			3/2/1973	Follow-up	1.73	2.228	2.49	1.87							2
12			3/6/1973	Follow-up	1.99	1.92									2
12			3/8/1973	Follow-up	1.09	0.471	0.91								1.2
12	5/8/1975	Am-241/Pu-239, inh,5/7/75	5/9/1975	Follow-up	2.43	3.1	2.5	1.31	1.43						2
12			5/10/1975	Follow-up	2.83	1.946									2.1
L3			10/21/1987	Follow-up	1.27	-0.15	1.12								1.2
L1			1/10/1975	Routine	2.81	2.655									2.7
L4			2/26/1973	Routine	1.19	1.742									1.5
L5			3/12/1976	2	1.81	1.59									1.7
L2			3/1/1973	Follow-up	1.76	2.506									2.1
L2			3/2/1973	Follow-up	0.57	0.891	0.94		1.02	0.91					1
M2			6/6/1983	Routine	1.31	0.95	1.39								1.2
M2			6/6/1983	Routine	1.16	1.025	1.11								1.1
M3			4/13/1981	Routine	2.13	1.694									1.9
29	10/25/1979	Pu-239/Am-241, 10/25/79	10/27/1979	Follow-up	1.52	1.529	1.81	1.7							1.7
29			10/28/1979	Follow-up	0.98	1.504	1.8	1.85							1.6
M4			11/18/1978	11	1.4	1.483									1.4

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14	10/16/1973	Cm-244, inh/skin,10/16/73	10/30/1973	Routine	3.21	2.88									3
N2			11/6/1986	Follow-up	2.8	2.9									2.8
N2			11/7/1986	Follow-up	1.44	1.2									1.3
O1		puncture wound Pu-239, 07/10/85	7/11/1985	Follow-up	1.56	1.69	1.92	2.14							1.8
P2			1/19/1973	Follow-up	1.37	0.985	0.99	0.88							1
16	10/4/1985	Pu-239/Am-241,inh,10/4/85	10/6/1985	Follow-up	2.56	3.069	2.7								2.8
16			10/7/1985	Follow-up	1.29	1.065	1.39	1.25							1.2
16			10/8/1985	Follow-up	0.76	0.434	0.31	0.59	0.46	0.31					1.5
17	10/18,10/30/74	Cm-244, 4/18/74	6/14/1974	Follow-up	1.17	1.465									1.3
17			10/30/1974	DTPA	1.84	1.07	1.92	1.44	1.09						1.6
17			10/30/1974	DTPA	1.23	0.94	1.85	1.41							1.4
17			10/31/1974	DTPA	1.82	2.382									2.1
17			10/31/1974	DTPA	1.04	0.857	0.97	1.24							1
17			11/4/1974	Follow-up	1.57	1.855	2.7	2.47							2.1
17			11/5/1974	Follow-up	1.28	0.862	2.14	2.87							1.8
17			11/6/1974	Follow-up	1.3	1.235									1.3
S1			2/14/1973	Follow-up	1.49	1.62									2.6
S2			9/7/1976	9	2.48	2.852	2.76								2.7
18	10/14/1974	Cm244, ZrNb95, Pu239,Ru103/106,Ce144, 4/11/74	10/14/1974	DTPA	1.54	1.696									2
18			10/14/1974	DTPA	1.48	1.28									1.4
18			10/22/1974	DTPA	1.14	0.876									1
19	11/19/1985	Am-241/Pu-239,Cm-244, inh, 11/19/85	12/10/1985	Follow-up	1.23	1.458	1.3	0.99							1.2
19	12/12/1985		12/19/1985	Follow-up	0.96	1.112	1.27	1.46							1.2
S3			3/5/1982	Routine	1.01	1.217	1.73								1.2

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Table 2: Raw Am/Cm/Cf Results between 1 and 3 dpm/1.5L

Ref #	DTPA	Contamination	Bottle Date	Type	dpm/1.5L (1)	dpm/1.5L (2)	dpm/1.5L (3)	dpm/1.5L (4)	dpm/1.5L (5)	dpm/1.5L (6)	dpm/1.5L (7)	dpm/1.5L (8)	dpm/1.5L (9)	dpm/1.5L (10)	Report
S3			3/5/1982	Routine	1.1	1.447	1.15	1.55							1.3
S4			5/2/1974	Routine	1.19	1.025									1.1
20	4/18/1974	Cm-244, 4/18/74	5/7/1974	24 hr	1.11	1.488	2.17	2.04							1.7
20			5/8/1974	24 hr	2.51	1.826	1.86	1.8							2
20			6/12/1974	24 hr	1.02	1.019	1.33	1.33							1.1
21	11/15/1977	Cm-244, 11/15/77	11/15/1977	Special	0.84	0.84									2.5
21			11/17/1977	Special	0.48	0.57									1.6
21			11/21/1977	11	3.58	3.23	1.72								2.8
T2			1/16/1976	Routine	1.37	1.241									1.3
22	12/12/1985	Am-241/Pu-239,Cm-244, inh, 11/19/85	11/26/1985	Follow-up	1.01	0.981	1.04	0.96	1.12						1
22			12/13/1985	Follow-up	1.94	2.149	1.15	1.15							1.6
22			12/14/1985	Follow-up	0.95	1.045	0.95	1.22							1
W1*			8/5/1974	Follow-up	1.37	1.505									1.4
23	7/30/1986	Pu/Am, inh, 7/30/86	8/1/1986	Follow-up	0.84	-0.11	1.73								1.3
24	1/18/1973	Pu,Am	1/19/1973	Follow-up	1.01	0.878	0.58	1.35							1

* Exposed to Pu-238, treated with DTPA in 10/14/74

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Table 3: Raw Am/Cm/Cf Results between 0.32 and 1 dpm/1.5L

Ref #	DTPA	Contamination	Bottle Date	Type	dpm/ 1.5L (1)	dpm/1. 5L (2)	dpm/1. 5L (3)	dpm/1. 5L (4)	dpm/1. 5L (5)	dpm/1. 5L (6)	dpm/1. 5L (7)	dpm/1. 5L (8)	dpm/1. 5L (9)	dpm/1. 5L (10)	Report
A3			3/18/1984	Follow-up	0.775	0.676	0.864	0.961	0.986	0.531					0.8
A2			4/12/1985	Routine	0.588	1.036	0.535	0.123							0.6
A2			11/15/1978	11	0.292	0.643	0.651								0.5
A4			1/26/1978	Special	0.256	0.487									0.4
A5			1/27/1978	Follow-up	0.562	0.71									0.6
A6			4/15/1974	Special	0.38	0.524									0.5
A7			12/5/1988	Routine	-0.08	0.699									0.35
A8			1/27/1978	Follow-up	0.479	0.594	0.511	1							0.6
B2			7/3/1976	7	0.463	0.674	0.307								0.5
B3			2/10/1976	Routine	0.688	0.656									0.7
B4			8/4/1987	Routine	0.387	0.511									0.4
B5			10/3/1988	Routine	0.621	0.079									0.35
B6			7/20/1983	Special	0.511	0.294	0.293								0.4
B7			2/12/1979	12	0.339	0.584	0.562								0.5
B8			9/9/1978	6		0.754	0.861								0.8
B9			12/11/1978	12	0.364										0.4
B10			12/12/1978	12	0.537										0.5
2	12/12/1985	Pu/Am/Cm,11/19/85, inh	12/12/1985	Follow-up	0.496	0.18	0.228	0.507	0.371	0.604					0.4
B11			3/28/1975	Routine	0.422	0.211	0.483								0.4
B12			1/20/1978	1		0.411	0.429								0.4
B13			6/26/1978	Resample	0.445	0.556	0.437								0.5
B14			9/14/1978	6		0.627	0.827	0.416							0.6
3	8/23/1979	Am/Cm, 8/23/79, inh	8/27/1979	Special	0.408	0.534	0.135	0.015							0.4
3			8/28/1979	Special	0.67	0.695	0.85	0.29	0.705	1.04					0.8
3			8/28/1979	Special	0.526	0.714	0.142	0.378							0.4
3			8/29/1979	Special	0.07	0.464	0.71								0.5
4	5/9/1986	Pu/Am,5/8/86 , wound	5/29/1986	Follow-up	0.691	0.738									0.7
4			6/24/1986	Follow-up	1.03	-0.309	0.999	0.575							0.6
4			6/26/1986	Follow-up	-0.837	2	1.06	0.33							0.8

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Table 3: Raw Am/Cm/Cf Results between 0.32 and 1 dpm/1.5L

Ref #	DTPA	Contamination	Bottle Date	Type	dpm/ 1.5L (1)	dpm/1. 5L (2)	dpm/1. 5L (3)	dpm/1. 5L (4)	dpm/1. 5L (5)	dpm/1. 5L (6)	dpm/1. 5L (7)	dpm/1. 5L (8)	dpm/1. 5L (9)	dpm/1. 5L (10)	Report
4			7/2/1986	Follow-up	1.16	0.778	0.213								0.7
4			7/4/1986	Follow-up	0.559	2.71	0.618	16.9							0.6
4			7/5/1986	Follow-up	0.461	0.717									0.6
4			7/6/1986	Follow-up	0.663	0.994									0.8
4			7/10/1986	Follow-up	0.619	0.632	-0.307								0.6
4			7/23/1986	Follow-up	-0.325	0.895	0.308								0.6
B15			6/3/1974	Routine	0.29	0.44									0.4
B16			11/15/1977	Special	0.24	0.92									0.6
B16			11/16/1977	Special	0.44	0.52									0.5
B16			9/29/1978	Follow-up	0.357	0.04	0.656	0.099	1.609	1.423	1.144	0.8			0.8
B17			6/11/1981	Routine	0.933	0.488									0.4
C6			4/2/1975	Routine	0.435	0.534	0.615	1.03							0.7
C7			7/7/1981	Routine	0.622	0	0.79								0.5
C8			6/21/1978	5		0.395	0.532	0.533							0.5
C4			6/3/1974	Special	0.007	0.482	0.31								0.4
C4			6/13/1984	Special	0.633	0.777	0.551								0.6
C9			10/2/1978	Follow-up	0.205	0.178	0.554	0.078	0.31	0.619	0.593				0.4
C10			6/7/1978	5		0.533	0.534	0.775							0.6
C11			7/21/1987	Routine	0.598	0.441									0.5
C12			6/9/1978	5		0.43	0.437								0.4
30	10/25/1979	Am-241,Pu-239, inh,10/25/79	10/26/1979	Follow-up	0.92	0.79									0.9
30			10/27/1979	Follow-up	0.43	0.4	0.537	0.5							0.5
30			10/28/1979	Special	0.37	0.64	0.67	0.33							0.5
C13			6/26/1974	Follow-up	0.388	0.32	0.132								0.4
C14			12/18/1978	12	0.36	0.359	0.269	0.557							0.4
C15			5/24/1978	4		0.859	0.743								0.8
C16			1/2/1979	1	0.14	0.22	0.663	1.786	0.414						0.6
C2			11/17/1978	11	0.315	0.445									0.4
C17			7/13/1987	Routine	0.455	0.358									0.4

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Table 3: Raw Am/Cm/Cf Results between 0.32 and 1 dpm/1.5L

Ref #	DTPA	Contamination	Bottle Date	Type	dpm/ 1.5L (1)	dpm/ 1.5L (2)	dpm/ 1.5L (3)	dpm/ 1.5L (4)	dpm/ 1.5L (5)	dpm/ 1.5L (6)	dpm/ 1.5L (7)	dpm/ 1.5L (8)	dpm/ 1.5L (9)	dpm/ 1.5L (10)	Report
D2			11/4/1980	Routine	0.744	0.84									0.8
D3			4/19/1975	Follow-up	0.333	0.679	1.094	0.806							0.7
D4			5/4/1981	Special	0.429	0.336									0.4
D5			11/1/1978	11	0.927	1.171	0.737								0.9
D6			1/11/1979	1	0.353	0.506	0.34								0.4
D7			6/27/1978	Resample		0	0.481	0.679	0.351						0.4
D8			9/12/1978	6		0.533	0.41								0.5
D9			11/29/1978	11	0.575										0.6
E4			12/15/1988	Routine	0.061	0.673									0.38
E2			1/18/1973	Follow Up	0.727	0.257	0.42	0.189							0.4
E3			12/11/1978	12	0.675	0.94	1.094								0.9
E1			9/10/1973	Routine	0.61	0.95									0.8
E1			12/6/1974	Routine	0.593	0.372									0.5
E1			3/19/1975	Routine	0.358	0.496									0.4
E1			4/4/1975	Special	0.553	1.021	0.292								0.6
E1			4/4/1975	Special	0.328	0.739	0.219								0.4
E1			9/12/1978	6	0.426	0.852	0.332								0.5
6	2/8/1988	Pu/Am,2/8/88, inh	2/10/1988	Follow-up	5.71	0.413	1.05	0.475							0.4
6			2/10/1988	Follow-up	0.889	0.787									0.8
E5			11/16/1978	11		0.721	0.615								0.7
F2			10/3/1978	Term		0.643	0.705								0.7
F3			9/27/1978	6	0.149	0.421	0.691								0.4
F4			9/6/1988	Routine	0.725	0.673									0.7
F5			7/31/1988	Routine	0.274	0.569									0.422
F6			11/17/1978	11		0.876	0.781	1.013							0.9
F7			5/17/1978	4	0.627	0.341	0.96								0.6
F8			10/6/1986	Routine	0.602	0.36									0.5
F9			11/13/1978	11		0.709	0.727	1.152							0.9
27	3/14/1973	Pu-239 in 3/14/73	3/15/1973	Special	0.66	0.317	0.48								0.5
27			3/15/1973	Follow-up	0.326	0.523									0.4

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Table 3: Raw Am/Cm/Cf Results between 0.32 and 1 dpm/1.5L

Ref #	DTPA	Contamination	Bottle Date	Type	dpm/ 1.5L (1)	dpm/ 1.5L (2)	dpm/ 1.5L (3)	dpm/ 1.5L (4)	dpm/ 1.5L (5)	dpm/ 1.5L (6)	dpm/ 1.5L (7)	dpm/ 1.5L (8)	dpm/ 1.5L (9)	dpm/ 1.5L (10)	Report
27			3/15/1973	Follow-up	0.206	0.257									0.4
27			3/18/1973	Follow-up	0.625	0.231									0.4
27			3/18/1973	Follow-up	0.306	0.548									0.4
G1			9/14/1978	6		0.473	0.623	0.421							0.5
G2			1/9/1975	Routine	0.57	0.395									0.5
G2			1/10/1977	1	0.526	0.966	0.557								0.7
G3			1/16/1973	24 hr	0.547	0.266									0.4
G4			11/14/1978	11		0.441	0.395								0.4
G5			9/13/1978	6		0.535	0.435	0.664							0.5
G6			4/15/1976	Spec	0.453	0.38									0.4
G6			9/12/1978	6	0.389	0.325	0.689								0.5
G7			3/3/1976	3	0.323	0.501	0.35								0.4
G8			12/13/1978	12	0.402	0.636									0.5
G8			1/26/1982	Routine	0.372	0.391	0.502								0.4
H2			7/5/1973		0.894	2.13	0.664								0.8
H2			7/5/1973		1.08	2.02	0.387								0.7
H2			7/18/1973	24 hr	0.462										0.5
H3			1/9/1989	Routine	0.699	0.406									0.553
H4			4/20/1976	Spec	0.49	0.229	0.45								0.4
H4			2/28/1977	2	0.312	1.19	0.352								0.6
H4			1/26/1978	Special	0.425	0.434									0.4
H5			7/13/1983	Special	0.278	0.45	0.663								0.5
H6			12/12/1978	12	0.482										0.5
H7			6/8/1978	5		0.537	0.467								0.5
7	4/19/1974	Cm,ZrNb, Pu,Ru,Ce,4/11/74	5/7/1974	Follow-up	0.558	1.253	0.926								0.9
7			5/16/1974	Follow-up	0.842	0.569	1.197	0.816							0.5
7			6/12/1974	Follow-up	0.55	0.51	0.55	0.086	0.38	0.154					0.4
H8			4/30/1981	Special	0.829										0.9
H9			3/21/1975	Routine	0.954	0.952	0.828	0.524							0.8

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Table 3: Raw Am/Cm/Cf Results between 0.32 and 1 dpm/1.5L

Ref #	DTPA	Contamination	Bottle Date	Type	dpm/ 1.5L (1)	dpm/ 1.5L (2)	dpm/ 1.5L (3)	dpm/ 1.5L (4)	dpm/ 1.5L (5)	dpm/ 1.5L (6)	dpm/ 1.5L (7)	dpm/ 1.5L (8)	dpm/ 1.5L (9)	dpm/ 1.5L (10)	Report
H10			1/25/1979	1	0.422	0.447	0.804	0	0.77						0.4
H11			11/27/1978	11		0.569	0.521								0.5
H12			11/6/1980	Routine	0.365	0.367									0.4
H13			12/8/1978	12	0.408	0.69									0.5
H14			4/18/1974	Special	0.569	0.482									0.5
H15			1/10/1979	1	0.553	0.515	0.558	0.447	0.363						0.4
11			4/1/1975	Routine	0.871	0.941	0.546	0.864							0.8
9		Am/Cm cont. 3/27/75	4/1/1975	Special	0.304	1.598	0.684								0.9
J2			1/30/1973	Routine	0.334	0.497									0.4
J3			1/12/1989	Routine	0.048	0.595									0.322
28	1/18/1973	Pu-239/Am-241, 1/18/73	1/23/1973	Follow-up	0.922	0.523	1.047	0.656							0.8
28			1/30/1973	Follow-up	0.471	0.574									0.5
28			2/1/1973	25.5 hr follow-up	0.626	0.471	0.763	0.514							0.6
J4			12/7/1978	Special	0.584										0.6
J4			12/7/1978	Special	0.517										0.5
10		Cm-244 cont. in 11/15/77	11/15/1977	Special	0.24	0.94									0.6
10			11/17/1977	Special	0.16	0.22									0.6
10			11/30/1977	11	0.428										0.4
10			12/1/1977	12	0.428										0.4
J5			10/3/1988	Routine	0.517	0.439									0.478
K2			1/9/1989	Routine	-0.107	0.429									0.32
K3			11/15/1978	11		0.393	0.568	0.298							0.4
K4			11/27/1978	11		0.079	0.984	0.749							0.8
11	4/18/1974	Cm-244,4/18/74	7/29/1974	Follow-up	0.567	1.025	1.587	0.332							0.7
11			7/29/1974	Follow-up	0.343		0.679	0.731		0.536					0.6
11	10/10/1974		10/10/1974	DTPA	0.396	0.527									0.5
11			10/16/1974	DTPA	0.445	0.7									0.6
11			10/16/1974	DTPA	0.356	0.384									0.4
11			10/17/1974	DTPA	0.766	0.516									0.6

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Table 3: Raw Am/Cm/Cf Results between 0.32 and 1 dpm/1.5L

Ref #	DTPA	Contamination	Bottle Date	Type	dpm/ 1.5L (1)	dpm/1. 5L (2)	dpm/1. 5L (3)	dpm/1. 5L (4)	dpm/1. 5L (5)	dpm/1. 5L (6)	dpm/1. 5L (7)	dpm/1. 5L (8)	dpm/1. 5L (9)	dpm/1. 5L (10)	Report
11			10/18/1974	DTPA	0.467	0.364	0.55	0.54							0.5
11			10/19/1974	DTPA	0.451	0.085	0.364	0.418							0.4
11			2/12/1975	Routine	0.295	0.349	0.458								0.4
K5			9/20/1978	6		0.592	0.463								0.5
K6			1/7/1976	Routine	0.378	0.6	0.176								0.4
K1			12/5/1975	F Up	0.662	0.528									0.6
K7			12/5/1988	Routine	-0.146	0.777									0.32
K8			4/30/1981	Special	0.473										0.4
K8			5/1/1981	Follow-up	0.477										0.5
K8			5/6/1981	Follow-up	0.525	0.259	1.003								0.6
K8			5/6/1981	Follow-up	0.379	0.487	0.811								0.6
K8			5/6/1981	Follow-up	0.321	0.369	0.572								0.4
12			3/6/1973	Follow-up	0.754	0.874	0.531	0.694	0.9						0.9
12	5/8/1975	Am-241/Pu-239, inh, 5/7/75	5/9/1975	Follow-up	0.912	0.801									0.9
12			5/11/1975	Follow-up	0.934	0.929									0.9
12			5/14/1975	Follow-up	0.857	0.459	0.681								0.7
[redact]			11/15/1978	11		0.475	0.425								0.4
[redact]			4/25/1979	4	0.856	0.761									0.8
[redact]			8/13/1988	Routine	0.357	0.498									0.42
[redact]			5/17/1978	4		0.454	0.469								0.5
[redact]			8/7/1978	Resample	0.511	0.407									0.4
L5			1/19/1973	Routine	0.591	0.42									0.5
L5			2/26/1973	Routine	1.037	0.788									0.9
L5			6/11/1973	Routine	0	0.523	0.403								0.5
L5			1/6/1974	Routine	0.544	0.774									0.7
L5			2/11/1974	Routine	0.816	0.798									0.8
L5			2/27/1974	24 hr	0.216	0.497	0.379	0.368							0.4
L5			3/1/1974	24 hr	0.327	0.653	0.642	0.287							0.5
L5			1/21/1976	Routine	0.362	0.609	0.487								0.5

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Table 3: Raw Am/Cm/Cf Results between 0.32 and 1 dpm/1.5L

Ref #	DTPA	Contamination	Bottle Date	Type	dpm/ 1.5L (1)	dpm/ 1.5L (2)	dpm/ 1.5L (3)	dpm/ 1.5L (4)	dpm/ 1.5L (5)	dpm/ 1.5L (6)	dpm/ 1.5L (7)	dpm/ 1.5L (8)	dpm/ 1.5L (9)	dpm/ 1.5L (10)	Report
L5			3/21/1978	4	0.297	0.399									0.4
L5			1/24/1973	24 hr	0.506	0.557	0.626	0.934							0.7
L5			1/25/1973	24 hr	0.514	0.403	0.471	0.274							0.4
L5			1/26/1973	24 hr	0.737	0.694	0.643	1.08							0.8
L5			5/17/1977	5	0.38										0.4
L6			4/29/1981	Special	0.679	0.223									0.4
L7			5/1/1981	Special	0.888										0.8
L2			3/2/1973	Follow-up	0.66	0.746	0.728	0.788							0.7
L2			3/6/1973	Follow-up	0.377	0.077	0.394	0.24	0.491	0.403					0.4
L2			5/8/1974	Special	0.382	0.494									0.4
M5			11/27/1978	11	0.509	0.225	0.809								0.5
M6			1/25/1979	1	0.362	0.226	0.331	0.52	0.408						0.4
M7			9/9/1988	Routine	0.475	0.475									0.48
M8			9/6/1988	Routine	0.153	0.569									0.361
M9			8/15/1988	Routine	0.351	0.698									0.525
M10			3/17/1975	Routine	0.526	0.578	0.501								0.5
M11			1/17/1973	Follow Up	0.626	0.454									0.5
M11			1/18/1973	Follow Up	0.737	0.711	0.943	1.217							0.9
M11			2/21/1973	Routine	0.531	0.737	0.617	0.711							0.6
M11			8/13/1973	Routine	0.89	1.17	0.69								0.9
M11			6/27/1978	5		0.759	0.405	0.187	0.861						0.6
M12			11/14/1978	11	0.499	0.31									0.4
M13			4/4/1973	Routine	0.497	0.309									0.4
M14			9/12/1978	6		0.561	0.8								0.7
29	10/25/1979	Pu-239/Am-241, 10/25/79	10/26/1979	Follow-up	0.44	0.697	1.27	1.245							0.9
29			10/29/1979	Follow-up	0.48	0.35	0.29	0.3							0.4
29			10/30/1979	Follow-up	0.37	0.42									0.4
29			10/31/1979	Follow-up	0.144	0.38	0.64								0.4
29			1/11/1979	1	0.482	0.309									0.4
M15			10/1/1988	Routine	-0.018	0.751									0.349

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Table 3: Raw Am/Cm/Cf Results between 0.32 and 1 dpm/1.5L

Ref #	DTPA	Contamination	Bottle Date	Type	dpm/ 1.5L (1)	dpm/1. 5L (2)	dpm/1. 5L (3)	dpm/1. 5L (4)	dpm/1. 5L (5)	dpm/1. 5L (6)	dpm/1. 5L (7)	dpm/1. 5L (8)	dpm/1. 5L (9)	dpm/1. 5L (10)	Report
14	10/16/1973	Cm-244, inh/skin,10/16/73	9/14/1978	6		0.451	0.464								0.5
N3			1/15/1976	Routine	0.463	0.698									0.6
N3			3/8/1976	Resample	0.712	0.579									0.6
N4			10/19/1982	Routine	0.569	0.364	0.231								0.4
O2			9/25/1978	Term		0.634	0.898								0.7
O3			11/13/1978	11		0.839	0.727								0.8
31	7/10/1985	Pu-239, wound, 7/10/85	7/12/1985	Follow-up	0.376	0.322	0.32	0.658	0.427						0.4
O4			5/15/1981	Follow-up	0.467	0.359									0.4
32	3/14/1973	Pu-239, inh,3/14/73	3/15/1973	Follow-up	0.831	0.711	0.386	0.66	0.488						0.6
32			3/15/1973	Follow-up	0.84	0.557	0.463	0.403	0.266	0.35					0.6
32			12/10/1974	Routine	0.338	0.51	0.261								0.4
P3			5/2/1985	Follow-up	0.585	0.498	0.792								0.6
P3			5/2/1985	Follow-up	0.429	0.447	0.479	0.355	0.202						0.4
P1			1/26/1973	Routine	0.231	0.943									0.6
P4			11/16/1978	11		0.471	0.561	0.339							0.4
P5			4/3/1975	Routine	0.379	0.492	0.752	0.437							0.5
P6			3/6/1975	Routine	0.746	0.259	0.614	0.159							0.5
15	1/18/1973	Pu-239/Am-241	1/25/1973	Follow-up	0.548	0.548									0.5
15			1/31/1973	Follow-up	0.643	0.703									0.7
15			2/1/1973	Follow-up	0.668	0.72									0.7
15			2/1/1973	Follow-up	0.463	0.883									0.7
R1			9/25/1978	6		0.467	0.539	0.323							0.4
R2			1/26/1976	Routine	0.626	0.269	0.521								0.5
R3			1/12/1989	Routine	1.455	0.376									0.916
R4			8/11/1988	Routine	0.351	0.334									0.343
R5			1/2/1979	12	0.1321	0.523	0.103	0.506	0.339						0.4
R6			11/8/1978	11	0.414	0.912									0.7
R7			11/27/1978	11		0.396	0.385	0.707	0.511						0.5

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Table 3: Raw Am/Cm/Cf Results between 0.32 and 1 dpm/1.5L

Ref #	DTPA	Contamination	Bottle Date	Type	dpm/ 1.5L (1)	dpm/ 5L (2)	dpm/ 5L (3)	dpm/ 5L (4)	dpm/ 5L (5)	dpm/ 5L (6)	dpm/ 5L (7)	dpm/ 5L (8)	dpm/ 5L (9)	dpm/ 5L (10)	Report
R8			12/30/1986	Follow-up	0.405	0.557									0.5
R9			1/5/1989	Routine	0.491	0.498									0.5
R10			11/27/1978	12	0.404										0.4
16	10/4/1985	Pu-239/Am-241,inh,10/4/85	10/10/1985	Follow-up	0.376	0.252	0.204	0.541	-0.189	0.378	0.229	0.513			0.4
R11			11/13/1978	11	0.432	0.461									0.4
R12			5/1/1981	Follow-up	0.078	0.729	0.136	0.772							0.4
R12			5/1/1981	Follow-up	0.011	0.439	0.066	1.469	0.078						0.5
R13			1/17/1973	Follow Up	0.171	0.514	0.591								0.4
[redact]			1/25/1979	12	0.285	0.562	0.442								0.4
[redact]			3/16/1976	2	0.714		0.782								0.7
[redact]			2/2/1979	12	0.48	0.121	0.617	0.47							0.4
[redact]			1/8/1976	Routine	0.076	0.746	0.295	0.864							0.5
17			6/11/1974	24 hr	0.974	1.076	0.619	0.482							0.8
17			6/12/1974	24 hr	0.666	0.807	0.39	0.66	0.452						0.6
17			6/13/1974	Follow-up	0.563	0.435									0.5
17			6/17/1974	Follow-up	0.614	0.262	0.31	0.871							0.5
17			6/20/1974	Follow-up	0.324	0.664	0.304								0.4
17			6/21/1974	Follow-up	0.406	0.329									0.4
17			7/1/1974	Follow-up	0.609	0.446	0.544	0.77							0.6
17	10/18,10/30/74	Cm-244, 4/18/74	10/31/1974	DTPA	1.09	0.65	0.888	0.939							0.9
17			11/7/1974		0.231	0.322	0.83	0.931							0.6
17			11/8/1974		0.528	0.455	0.804	0.922							0.7
17			11/19/1974	Follow-up	0.312	0.602	1.31	0.528							0.6
17	1/25/1978	Cm-244, 1/25/78	9/11/1978	6	0.362	0.68	0.475								0.5
S1			2/19/1973	Follow-up	0.22	0.36									0.5
S1			2/20/1973	Follow-up	0	0.426	0.954	0.668	0.823	0.686	0.249	0.04	0.687		0.4
S5			9/8/1978	6		0.63	0.75	0.398							0.6
S6			2/5/1974	Routine	0.589	0.651									0.6
S7			9/8/1978	6		0.385	0.409								0.4

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Table 3: Raw Am/Cm/Cf Results between 0.32 and 1 dpm/1.5L

Ref #	DTPA	Contamination	Bottle Date	Type	dpm/ 1.5L (1)	dpm/1. 5L (2)	dpm/1. 5L (3)	dpm/1. 5L (4)	dpm/1. 5L (5)	dpm/1. 5L (6)	dpm/1. 5L (7)	dpm/1. 5L (8)	dpm/1. 5L (9)	dpm/1. 5L (10)	Report
S7			12/28/1978	12	0.771	0.925	0	0.511							0.8
S8			9/11/1978	6	0.306	0.494	0.849								0.5
S8			1/15/1976	Routine	0.311	0.433									0.4
18	4/12,19/1974	Cm244, ZrNb95, Pu239,Ru103/106,Ce144, 4/11/74	6/11/1974	Follow-up	0.437	0.147	0.617								0.4
18			6/14/1974	Follow-up	0.484	0.555									0.5
18			6/27/1974	24 hr follow-up	0.689	0.597	0.311	0.295							0.5
18			6/28/1974	Follow-up	0.53	0.313									0.4
18			6/28/1974	24 hr follow-up	0.077	0.577	0.363	0.414	0.423						0.4
18			7/1/1974	Follow-up	0.228	0.878	0.405								0.5
18			7/3/1974	Follow-up	0.61	0.49									0.6
18			7/10/1974	Follow-up	0.3	0.54									0.4
18	10/14/1974		10/14/1974	DTPA	0.219	0.594									0.4
18			10/15/1974	DTPA	0.651	0.921									0.8
18			10/16/1974	DTPA	0.726	0.963									0.8
18			10/18/1974	DTPA	0.351	0.7	0.601	0.431	0.249						0.5
S9			5/24/1978	4		0.644	0.474								0.6
19	11/19/1985	Am-241/Pu-239,Cm-244, inh, 11/19/85	12/10/1985	Follow-up	1.015	0.412	0.948	0.614	0.416	0.741					0.7
S10			9/12/1978	6	0.672	0.245	0.947	0.419							0.6
S11			11/15/1978	11	1	0.294									0.6
S11			11/14/1978	11		0.563	0.601								0.6
S11			12/11/1978	12	0.406										0.4
S12			6/6/1978	5		0.519	0.504								0.5
T3			11/13/1978	11		0.761	0.564	0.878	0.659						0.7
20	4/18/1974	Cm-244, 4/18/74	6/11/1974	24 hr	0.5252	0.642	0.577	0.568							0.6
20			6/13/1974	Follow-up	0.594	0.387									0.8
21	11/15/1977	Cm-244, 11/15/77	9/28/1978	Follow-up	0.277	0.449	0.087	0.679	0.912	0.321					0.7
21			2/20/1979	2	0.24	0.647	0.692								0.5

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22	12/12/1985	Am-241/Pu-239,Cm-244, inh, 11/19/85	11/23/1985	Special	0.379	0.541									0.5
22			12/26/1985	Follow-up	0.292	0.367	0.394	0.547	0.412	0.244					0.4
W2			11/14/1978	11	0.364	0.572									0.5
23	7/30/1986	Pu/Am, inh, 7/30/86	8/1/1986	Follow-up	1.04	0.827									0.9
23			8/6/1986	Follow-up	0.511	0.46									0.5
23			8/6/1986	Follow-up	0.487	0.281									0.4
W3			10/28/1975	Routine	0.11	0.599	0.44								0.4
W4			6/5/1978	5		0.486	0.366								0.4
W5			11/8/1978	6		0.857	0.818								0.8
24	1/18/1973	Pu,Am	1/22/1973	Follow-up	0.814	1.011									0.9
24			1/23/1973	Follow-up	0.285	0.323	0.961	0.457							0.5
24			1/24/1973	Follow-up	0.725	0.589	0	1.019	1.363	0.249					0.7
24			1/25/1973	Follow-up	0.746	1.131									0.9
25	2/11/1980	Pu-238, inh, 2/11/80	2/11/1980	Special	0.32	0.392	0.56	1.13							0.4
25			2/12/1980	Special	0.99	0.62	0.89	0.911	1.2	0.69	0.9	0.69	0.81		0.8
W6			9/12/1978	6	0.721	0.25	1.067	0.432							0.6
W7			7/15/1983	Special	1.027	0.689	0.69								0.7
26	5/31/1974	Pu, 5/29/74	5/29/1974	Follow-up	0.735	0.533									0.6
26			5/29/1974	Follow-up	0.55	0.419									0.5
26			6/1/1974	Follow-up	0.322	0.729									0.4
26			6/1/1974	Follow-up	0.41	0.284									0.4
W8			12/17/1980	Routine	1.083	0.654	0.533								0.7
W9			11/16/1977	11	0.465	0.455									0.5
W10			9/14/1978	6		0.601	0.728								0.7
W11			11/15/1978	11	0.293	0.381	0.24	0.566							0.4
W12			8/1/1979	2	0.468	0.4	0.534	0.16							0.4
W13			6/6/1978	5		0.571	0.209	0.311	0.752						0.5
W14			2/2/1973	Routine	0.3	0.651									0.5

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