DEFENSE LOGISTICS AGENCY
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IN REPLY
REFER TO DNSC-E

AUG 16 2005

U.S. Nuclear Regulatory Commission
Region 1, Nuclear Materials Safety Branch 2
Division of Nuclear Materials Safety
475 Allendale Road
King of Prussia, PA 19406-1415
ATTN: Betsy Ullrich

MS 16
Q-5

RECEIVED
REGION 1
2005 AUG 18 PM 1:27

Dear Ms.. Ullrich:

Re: License STC-133
Docket: 040-00341

SUBJECT: Request For Additional Information Concerning Application For Amendment To License, Control No. 136268

In reference to your letter of July 20, 2005, the Defense National Stockpile Center (DNSC) submits the enclosed additional information concerning the Final Status Survey Report (FSSR) for portions of the DNSC Scotia depot in Scotia, New York dated December 2004.

Should you have any further questions, please contact me at your convenience.

F. KEVIN REILLY
Director, Directorate of Environmental Management

Attachment

136268

NMSS/RGN1 MATERIALS-002

1. *Section 2.2 states that all areas were considered Class 3 areas, based on the DNSC annual survey results. However your plan dated February 2004, the Outdoor Area was considered a Class 2 Survey area. Provide data which shows why this area was reclassified.*

Response

The statement that all areas were considered class 3 was a mistake. Even though we utilized the simple method for the closure we did meet and exceed the requirements for a class 2 area in that we obtained more samples than required and we scanned 100% of the surface area.

2.a.i. Explain why it is reasonable to combine the results of the three sets of background measurements, considering that the area from which locations 1 through 30 were taken was significantly higher than the other two background areas.

Response

Outside Area 300 is a pad 390 feet by 270 feet in size surrounded by a chain link fence. Its pad consists of macadam with gravel which runs continuously under the fence to the road surfaces on the south and west sides. The area of concern for the radiological survey is an area of 70 feet by 90 feet located in the middle of the storage pad where the radioactive material was stored.

The background survey units were each taken on this pad. The first 30 measurements were taken on this pad just outside the fence on the western side. The second and third sets of 30 measurements were taken within the fence to the east of the actual survey unit. All background measurements were collected on the same continuous pad. There was no indication of different pours of material, different types of rock, or other differences that would account for the differences in background. Therefore the combination of all three background areas was considered reasonable as the large number of sample points would serve to minimize the standard deviation or the variation in the number.

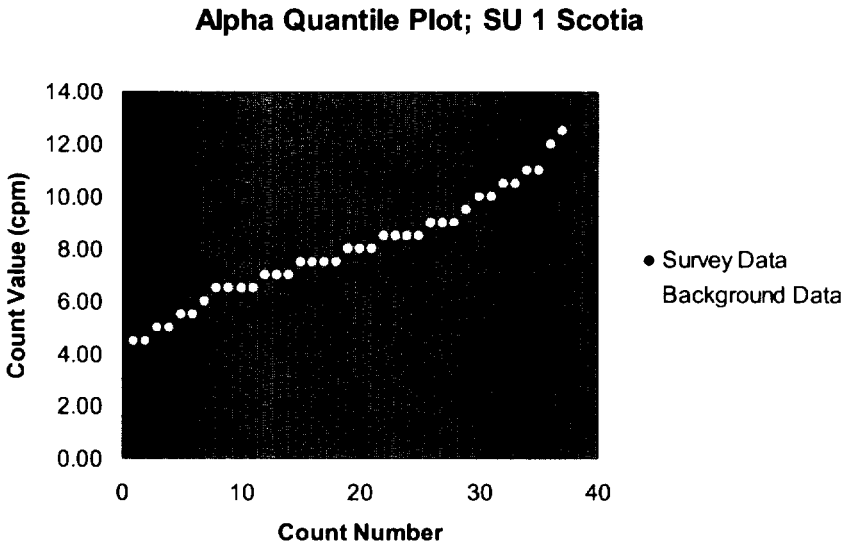
The cause of the difference could be weather related. The background data were collected on August 13, 2003. Surveys began at 0700 with the western location (locations 1-30) and finished at 1230 at the southern location (locations 61-90). The weather for the previous day and during the day the survey was performed was cloudy with thunder storms nearby. It is possible that the data collected from the western area was affected by radon buildup which had dissipated by the time the other areas were surveyed.

2.a.ii. Explain the basis for using the combined number as the "background" and subtracting it from the measurements, rather than using the Alternate Null Hypotheses to demonstrate that the areas are "indistinguishable from background" as recommended in MARSSIM for areas where there is high variability in the background.

Response

Two of the three background areas for OA 300 did not vary from each other as your calculations showed (8.4 cpm and 8.6 cpm respectively). Only the one area to the west of the fence caused a variation. This does not indicate the need for using scenario B as the mechanism of release. The background data sets from the two locations within the fence (locations 31-90) correlate well with the data obtained from the survey unit providing a good indication that there is no residual radioactivity at the site. We did reanalyze the OA 300 survey data eliminating the first 30 data points. This reduces the average alpha background from 9.6 cpm to 8.5 cpm with data ranging from 4.5 – 12 cpm. The average gross count rate in the survey unit was 6.0 cpm and ranged from 1.2 – 10.3 cpm. Using this average to subtract from the survey data does not change the final results.

These two ranges overlap and do not show a significant difference. Below is a quantile plot of the two data sets. Note that the slope of each line is similar and that the two data sets intersect. This indicates that the two data sets are similar and the background data may be used to evaluate the survey unit data. It also clearly points out that there is not residual radioactivity in the survey unit.



2.a.iii. *Explain why Survey Unit 1 measurements were significantly lower than the measurements made in areas which were considered to be unaffected (background areas).*

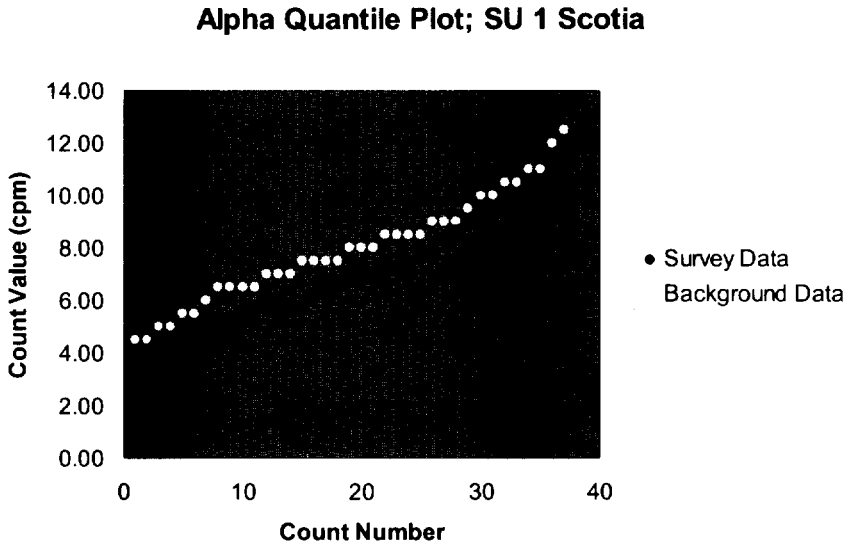
Response

While there is a difference between the averages, we do not agree with that difference as being characterized as significant. As stated in the response above, the pad where the background and survey unit measurements were taken is one continuous pad and therefore made of the same

constituents. This, according to MARSSIM, is ideal for obtaining background measurements. On the surface there is no obvious reason for the differences in the data groups.

The cause of the difference could be weather related. The background data were collected on August 13, 2003. Surveys began at 0700 with the western location (locations 1-30) and finished at 1230 at the southern location (locations 61-90). The weather for the previous day and during the day the survey was performed was cloudy with thunder storms nearby. It is possible that the data collected the background was affected by radon buildup.

The range of the data points from the 2 background survey locations was 4.5 – 12.5 cpm. The range of data points from the survey unit was 1.3 – 10.3 cpm. These two ranges overlap well and do not show a significant difference. Below is a quantile plot of the two data sets. Note that the slope of each line is similar and that the two data sets intersect. This indicates that the two data sets are similar and that there is not residual radioactivity in the survey unit.



2.b *Section 8.0 and Appendix D data show a similar problem, in that the background reference areas are variable, and generally higher than the survey units. Review the background data for the other sets of measurements and areas. State if that background data is or is not able to be used, and submit the basis for those decisions.*

Response

The data for the remaining survey units generally agree well with the background data set. The table below compares the gross counts from each survey unit to the applicable background. The only units with differences are SU 5 and 6 where the survey unit average was less than that of the background data set by several counts. The background for the inside of buildings was obtained from three separate warehouse bays each with the same construction date and material as that of the survey units. Because of the time differences in the surveys (August 2003 for background,

January 2004 for SUs 2 – 4, and June 2004 for SUs 5 and 6) background was verified on each visit to be consistent with previous observations.

Survey Unit	SU Range	SU Average	BKG Range	Bkg Average
SU 2	4.5 – 14 cpm	8.5 cpm	4 – 14.5 cpm	8.5 cpm
SU 3	3 – 13 cpm	7.5 cpm	4 – 14.5 cpm	8.5 cpm
SU 4	6.5 – 15 cpm	11.1 cpm	4 – 14.5 cpm	8.5 cpm
SU 5	2.3 – 8.8 cpm	4.5 cpm	4 – 14.5 cpm	8.5 cpm
SU 6	1.8 – 7.5 cpm	4.3 cpm	4 – 14.5 cpm	8.5 cpm

Survey units 5 and 6 comprise warehouse bays in Building 403 that are constructed similarly and are of the same vintage as each other and the background survey units which were obtained from Building 404. Prior to the survey of Building 403 the cargo doors (4 in each bay) were opened for several hours to obtain light as the building did not have electricity. This opening of the building may have resulted in airing out the structure of built up radon and thus a lowering of the count rate

Since part of the background was obtained in buildings which were built at the same time as Building 403 and are constructed of the same material it is reasonable to utilize these structures as reference area backgrounds. The fact that Building 403 was opened and allowed to ventilate for several hours prior to the survey may account for the lowering of the count rate. Analysis of the survey unit data using the gross counts still results in a value less than the DCGL indicating that no residual radioactivity remains in the survey unit.

3.0 *Figure 5-1, "Static and Swipe Measurement Locations for SU 1 for Open Area 300" does not include a location 022, although Appendix B, SU 1 Alpha Static Measurement Data and SU 1 Beta Static Measurement Data includes measurement results for location 22. Explain which data corresponds to the locations shown.*

Response

Figure 5-1 was incorrect. The grid pattern for SU 1 was established as 7 feet by 30 feet so that a total of 30 measurements were taken in the survey unit. The figure will be corrected to show the correct grid.

4.0 *Figure 5-2, "Static and Swipe Measurement Locations for SUs 2, 3 and 4 in Building 503" does not contain Location 15 in SU-2, SU-3, or SU 4. Figure 5-3, "Static and Swipe Measurement Locations for SUs 5 and 6 in Building 403", does not include location 01 5 for either SU-5 or SU-6. However, data is reported for these locations in both static and swipe surveys. In addition, the diagrams show locations 001 through 031 (excluding 15); however, SU-2 has data only for Locations 1 through 19 (including 15) and SU-3 and 4 each have data for locations 1 though 30 (including 15). Explain which data corresponds to the locations shown.*

Response

Figure 5-2 contained an error in that location 15 was omitted. The figure does contain only 30 measurements which were what was obtained in the survey unit. This same error was propagated in Figure 5-3 since the survey units are similar and the same template was used in the figures. Thus the numbers 16 – 31 on the figure correspond with numbers 15 – 30 on the data sheets. The figures will be corrected.

We appreciate you pointing out that SU 2 data only contained 19 measurements. We mistakenly omitted half of the survey data as it had been placed in a separate folder. We have revised the data sheet to show all the data and have attached it to this response.

5.a *The Figure 5-7 shows samples DSSO-1 through DSSO-10 and samples Bkg-1and Bkg-2. The sample results are for samples DSSO-1 through DSSO-12. Please confirm which sample results correspond to each sample location.*

Response

Sample results DSSO-11 and DSSO-12 are the background sample results.

5.b *Submit a diagram showing the results of the samples, and explain any trend or pattern that may result.*

Response

The diagram is attached. The data is rather consistent and does not provide any trend or pattern.

6.a *In the calculation of the MDA, E = the total efficiency, which is defined as a product of the detector efficiency multiplied by the source efficiency. However, the calculations shown in Appendix **G** use only the value of the detector efficiency. Explain why the source efficiency was not included.*

Response

A source efficiency should have been used in the calculations as well as adjusting the instrument efficiency for the progeny of natural thorium and uranium. When using the weighted instrument efficiency and the source efficiency the MDAs are still less than 50% of the DCGL for the alpha static measurements. Calculations for the new efficiencies and the MDAs are attached.

6.b *The calculations shown in Section 6.1 assume that the background count time is the same as the sample count time. Appendix G states that the background count time and the sample count time for the alpha static measurements were the same, and that count time was 2 minutes. Explain how the results of alpha static measurements, in gross counts per minute (cpm) have two decimal places, as follows: SU 1 Alpha Static Measurement Data, Locations 1 through 10 have results of 10.30, 7.27, 5.77,4.78,4.78, 3.50,2.27. 7.78. 3.28 and 5.77 gross cpm, respectively. These results do not seem reasonable for a 2-minute alpha count.*

Response

The instrument used for the surveys, Eberline E-600, when used in the scaler mode displays its average counts with two decimal points. The instrument works by averaging the count rate over the count time and updates its average every second. This process is established in the software as delivered from the manufacturer.

7.a *Provide addition explanation of the table. Explain what the 'Thorium Content (%)" and "Uranium Content (%)" values represent. (% by mass? % by radionuclide?) Explain if the thorium activity and uranium activity values are total in the ore sample, total per gram, total in that lot, etcetera.*

Response

We assume that the question above is concerning Table 8.5 which lists the inventory of licensed radioactive material at Scotia. The percent content for each of these is percent by mass for the particular lot being sampled. The activity values are total for each lot and are calculated by multiplying the percent by the total weight for the lot in grams. Next the weight in grams is multiplied by the specific activity from 49 CFR 173.435. Therefore the activity levels are for the entire lot.

7.b *It is unclear why there are results of "0" for "total thorium activity (curies)", when there is a value for "torium content (%)". In some of these cases, the same value of the % thorium content may have a value of 0 or some other activity. In other cases, the total thorium activity is given for samples with different values of % thorium content. Example: for a thorium content of 0.0060 %, a total thorium activity of 0.0001 curies is listed in some cases, but in other cases the thorium activity is 0. Example: Samples with thorium content values of 0.01 00%, 0.640%, 0.0120% and 0.01 00% all have listed the same thorium activity of 0.0002 curies. Explain these apparent discrepancies.*

Response

The reason for the zeros is the formatting of the spreadsheet that was used to perform the calculation. The cells were formatted to only show 4 decimal places so anything outside of that was shown as zero. As stated above the calculation of activity involved the weight of the lot as well as the percentage of the radionuclide. Because each lot has a different weight it is not unreasonable to find lots with the same radionuclide percentage but with different activity levels. Since the quantities of thorium are so small adding these to the mix has a minimal effect on the overall ratio of Th/U. With all the previous zero thorium levels changed the Th/U ratio changed from 0.06 to 0.08 with a range of 0.007191 to 0.833. A copy of the recalculated table is attached.

7.c *It appears that the 'Th/U ratio" is the comparison of the thorium activity (curies) divided by the uranium activity (curies). Explain why this ratio was selected for comparison. Table 8-6 has no comparable ratio of results for the soil data. Explain how Table 8-6 demonstrates that the uranium and thorium in the soil are unlikely to result from the ore.*

Response

The ratio of thorium to uranium was used since these are the two radionuclides of concern for the licensed radioactive material stored at the depot. Therefore in order for the soil sample results to be the result of residual radioactivity from the licensed radioactive material the ratio of the two radionuclides of concern should be similar to that in the inventory (Table 8.5).

Table 8.6 has been reproduced below. The average ratio of Th/U for the soil samples was 1.79. This is significantly different from the ratio of the licensed radioactive material (0.0823) and indicates that the quantity of thorium in the soil was greater than the quantity of uranium. For the license radioactive material the opposite was true; the quantity of uranium was greater than the quantity of thorium. This resulted in the lower ratio.

Table 8-6. Soil Sample Alpha Spectroscopy Data

Sample No.	U-234 Conc. (pCi/g)	U-235 Conc. (pCi/g)	U-238 Conc. (pCi/g)	Th-228 Conc. (pCi/g)	Th-230 Conc. (pCi/g)	Th-232 Conc. (pCi/g)	Total Th/U Ratio
DSSO-1	0.49	0.005	0.53	0.38	0.96	0.46	1.76
DSSO-1Dup	0.37	0.85	0.41	0.57	0.02	0.54	0.69
DSSO-2	0.69	0.008	0.71	0.66	1.22	0.69	1.83
DSSO-3	2.19	0.14	2.21	2.73	2.76	2.98	1.87
DSSO-4	2.08	0.16	2.23	2.86	3.02	2.95	1.98
DSSO-5	2.14	0.077	2.31	2.62	2.77	2.71	1.79
DSSO-6	2.25	0.104	2.31	2.9	2.97	2.7	1.84
DSSO-7	2	0.16	1.91	2.52	2.81	2.64	1.96
DSSO-8	1.3	0.072	1.39	1.85	2.56	1.95	2.30
DSSO-9	1.9	0.08	2.14	2.83	2.81	2.83	2.06
DSSO-10	2.04	0.095	1.91	2.1	2.71	1.99	1.68
Average	**1.59**	**0.16**	**1.64**	**2.00**	**2.24**	**2.04**	**1.79**

Below is a similar table showing the results of the background samples. The ratio of thorium to uranium for these samples is also significantly different than those from the lot samples.

Background

	U 234 (pCi/gm)	U 235 (pCi/gm)	U 238 (pCi/gm)	Th 228 (pCi/gm)	Th 230 (pCi/gm)	Th 232 (pCi/gm)	Th/U Ratio
DSSO-11	0.38	0.063	0.5	0.36	0.34	0.45	1.22
DSSO-12	1.36	0.029	1.45	1.33	1.89	1.27	1.58

Therefore, since the ratios of the two radionuclides of concern from the licensed radioactive material and the soil samples are not similar it is concluded that the soil samples do not contain residual radioactivity from licensed operations.

7.d *Given the wide range of results of the thorium/uranium ratios for the ore samples, using the mean value may not appropriate. In addition, the mean value reported includes the 33 samples (of a total of 63 samples collected) which are reported with a value of 0 for the ratio, because of the reported value of 0 thorium activity. Of the 30 samples reported to contain thorium activity, the ratios ranged from 0.02 to 0.83, with an average value of 0.12, compared to the average value of 0.06 when samples reported with a value of "0" are included. Provide a basis for use of a mean value, and inclusion of the "0" values, and submit any revision of this information.*

Response

Use of an average for comparison is standard practice when reviewing two data sets regardless of the variations within the set and is normally one of the first comparisons made. The average provides some normalization and smoothing of the deviations and provides a quick analysis of whether the two data sets are alike or different. Other statistical comparisons can be made, such as the median and standard deviation, however when the average is significantly different then no further comparison is necessary.

As stated above Table 8-5 was recalculated to show all the activities and a ratio for each lot. With all the previous zero thorium levels changed the Th/U ratio changed from 0.06 to 0.08 with a range of 0.007191 to 0.833.

7.e *Explain how the radionuclide content in the ore was determined to be 61% uranium-238 and 38% thorium-232. This is not apparent form Table 8-5. Explain how the total thorium and uranium concentrations of 2.09 picocuries pergram (pCi/g) thorium and 1.1 3 pCi/g uranium were derived. This is not apparent from Table 8-6. Explain how you compared the results of Table 8-5 to Table 8-6, because none of the analyses can be directly compared.*

Response

The calculations showing the percentage of uranium 238 and thorium 232 was provide to the NRC for review as part of the DQO process and determination of the DCGL. We have attached that calculation to this response.

The 2.09 pCi/g of thorium is the average of the averages for the 3 thorium isotopes listed. Likewise the 1.13 pCi/g of uranium is the average of the averages for the 3 uranium isotopes. In recalculating the ratios for the inventory for this response we also recalculated the ratios of the radionuclides using each individual sample rather than averages.

See the response to question 7.c for how the comparison was made between Tables 8-5 and 8-6.

8.0 *In Appendix B, "Static Survey Measurement Data", the alpha static measurement results for SU Oc (locations1 33, 137, 163, 167, 171, 175 and 179), SU1, SU 2b, SU 3a (locations 4 and 6), SU 3b, SU 4b, SU 5, SU 5a, SU 5b1 SU 6, SU 6a, and SU 6b, explain why "gross cpm" results are given in one and two decimal places, given a 2-minute static sample count time as stated in Appendix F. Most of these results are given to the nearest tenth or nearest one-hundredth of a count, which does not seem reasonable given the small number of counts typical of alpha measurements, and the results of most background measurements.*

Response

See response to question 6.b.

9.0 *In Appendix C, "Scan Data", the average of the maximum background readings was used as the "background value for scan data results, instead of the average of the minimum values which would be a conservative estimate. Explain the reason that the maximum values were selected, or submit revised results. In addition, given that the range between the minimum and maximum values differs by nearly a factor of 3, explain how the "hot spot DCGL" of 180 dpm could be detected for alpha scans.*

Response

Use of the minimum values would have been less conservative than use of the maximum values as a lower background results in a lower minimum detectable count rate (MDCR). This was determined to be reasonable since with the maximum background the MDCR for the instrumentation would be the most conservative (highest) and thus the probability of seeing contamination at the DCGL the smallest. Even with using the average maximum value the calculations show that there was a 99.7% probability of being able to detect residual radioactivity at the DCGL.

The detection of the hot spot is a count rate in excess of background. In addition the 180 dpm must be adjusted to account for the size of the detector. In this case the hot spot dpm adjusts to 1,080 dpm. When this is adjusted for the detector efficiency (35%) a count rate of 378 counts above background becomes the critical value. An increase of this value, essentially twice background, is easily detectable by the surveyor.

Weighted Efficiency - Thorium
DNSC Scotia

Weighted Detector Efficiency for Natural Thorium

	Average Energies[1]					
Nuclide	Alpha	Beta	Progeny Equilibrium Fraction	Instrument Efficiency	Surface Efficiency	Weighted E_i
Th-232	4.0		1	0.443	0.25	0.111
Ra-228		0.007	1	0	0.25	0.000
Ac-228		0.377	1	0.15	0.25	0.038
Th-228	5.4		1	0.443	0.25	0.111
Ra-224	5.7		1	0.443	0.25	0.111
Rn-220	6.3		1	0.443	0.25	0.111
Po-216	6.8		1	0.443	0.25	0.111
Pb-212		0.102	1	0.15	0.25	0.038
Bi-212		0.770	0.64	0.15	0.50	0.048
Bi-212	6.3		0.36	0.443	0.25	0.040
Po-212	8.8		0.64	0.443	0.25	0.071
Tl-208		0.557	0.36	0.15	0.50	0.027
					Total efficiency =	0.81
					Contribution to mix=	0.386
					Total weighted instrument efficiency=	**0.31**

[1] Abelquest Table A.2

Minimum Detectable Activity for Alpha Static Measurements for SU0a and SU0b DNSC Scotia Depot

Variables

Alpha	Survey Type
1160	Detector Number
8.5	Background count rate (cpm)
2	Count Time (min)
1.04	Efficiency*
100	Area of Detector (cm^2)

Constants

60	sec/min
2.54	cm/in

Assumptions

Background count time and sample count time are equivalent

Calculate Static MDA

Static MDA = $2.71 + 4.65(B_r \bullet t)^{0.5}/t \bullet E \bullet {}^{A}/_{100}$ (NUREG 1507)

Where:	B_r	Background Countrate
	t	Count Time (min)
	E	Efficiency
	A	Area of detector (cm^2)

Static MDA 16 dpm/100 cm^2

* Total efficiency is calculated using the instrument efficiency and the source efficiency taken from Section 5.3 of NUREG 1507 and ISO 7503-1

Weighted Efficiency - Uranium
DNSC Scotia

Weighted Detector Efficiency for Natural Uranium

Nuclide	Average Energies[1] (MeV) Alpha	Beta	Progeny Equilibrium Fraction	Source Efficiency	Instrument Efficiency	Weighted E_i
U-238	4.2		1	0.25	0.443	0.11
Th-234		0.435	1	0.50	0.15	0.08
Pa-234m		0.819	1	0.50	0.15	0.08
U-234	4.7		1	0.25	0.443	0.11
Th-230	4.65		1	0.25	0.443	0.11
Ra-226	4.8		1	0.25	0.443	0.11
Rn-222	5.49		1	0.25	0.443	0.11
Po-218	6		1	0.25	0.443	0.11
Pb-214		0.219	1	0.25	0.15	0.04
Bi-214		0.632	1	0.50	0.15	0.08
Po-214	7.69		1	0.25	0.443	0.11
Pb-210		0.006	1	0.25	0	0.00
Bi-210		0.389	1	0.25	0.15	0.04
Po-210	5.5		1	0.25	0.443	0.11
				Weighted instrument efficiency=		1.19
				Contribution to mix=		0.61
				Total weighted instrument efficiency=		**0.72**

[1] Abelquest Table 8.2, Table 8.3, and A.2

DNSC Scotia Inventory

material	Th content	U content	Th Activity	U Activity	Total curies	Th/U Ratio
Cb/Ta	0.00008	0.00075	0.000100	0.0024	0.0025	0.041667
Cb/Ta	0.00006	0.00048	0.000032	0.0008	0.000832	0.040451
Cb/Ta	0.00014	0.00047	0.001000	0.0012	0.0022	0.833333
Cb/Ta	0.00006	0.00076	0.000010	0.0004	0.00041	0.023971
Cb/Ta	0.00104	0.00043	0.000700	0.0009	0.0016	0.777778
Cb/Ta	0.00008	0.0005	0.000013	0.0003	0.000313	0.042589
Cb/Ta	0.00031	0.00087	0.000050	0.0004	0.00045	0.123851
Cb/Ta	0.00012	0.00074	0.000100	0.0011	0.0012	0.090909
Cb/Ta	0.00006	0.00054	0.000014	0.0004	0.000414	0.035957
Cb/Ta	0.00008	0.0005	0.000100	0.0013	0.0014	0.076923
Cb/Ta	0.00006	0.005	0.000014	0.0004	0.000414	0.035957
Cb/Ta	0.00008	0.00046	0.000045	0.0008	0.000845	0.055933
Cb/Ta	0.0001	0.00058	0.000200	0.004	0.0042	0.05
Cb/Ta	0.00064	0.00138	0.000200	0.0012	0.0014	0.166667
Cb/Ta	0.00012	0.00067	0.000200	0.0035	0.0037	0.057143
Cb/Ta	0.00005	0.00088	0.000045	0.0026	0.002645	0.017287
Cb/Ta	0.0001	0.00057	0.000200	0.004	0.0042	0.05
Cb/Ta	0.00008	0.0006	0.000029	0.0007	0.000729	0.041093
Cb/Ta	0.0005	0.00107	0.000500	0.0034	0.0039	0.147059
Cb/Ta	0.00006	0.00054	0.000100	0.0038	0.0039	0.026316
Cb/Ta	0.00014	0.0006	0.000300	0.0042	0.0045	0.071429
Cb/Ta	0.00003	0.00057	0.000100	0.004	0.0041	0.025
Cb/Ta	0.00005	0.00059	0.000100	0.0041	0.0042	0.02439
Cb/Ta	0.00058	0.00083	0.001300	0.0058	0.0071	0.224138
Cb/Ta	0.00017	0.00073	0.000100	0.002	0.0021	0.05
Cb/Ta	0.00003	0.00053	0.000005	0.0003	0.000305	0.017968
Cb/Ta	0.0001	0.00059	0.000034	0.0006	0.000634	0.056599
Cb/Ta	0.00004	0.00059	0.000100	0.004	0.0041	0.025
Cb/Ta	0.00006	0.00048	0.000046	0.0012	0.001246	0.038204
Cb/Ta	0.00061	0.00097	0.001200	0.0062	0.0074	0.193548
Cb/Ta	0.00024	0.00108	0.000020	0.0003	0.00032	0.067838
Cb/Ta	0.00004	0.00052	0.000011	0.0005	0.000511	0.021574
Cb/Ta	0.00003	0.00052	0.000008	0.0005	0.000508	0.016181
Cb/Ta	0.00003	0.00132	0.000011	0.0015	0.001511	0.007191
Cb/Ta	0.00012	0.00047	0.000100	0.0014	0.0015	0.071429
Cb/Ta	0.00004	0.00054	0.000011	0.0005	0.000511	0.021574
Cb/Ta	0.00005	0.00141	0.000009	0.0008	0.000809	0.01123
Cb/Ta	0.000022	0.00243	0.000100	0.0042	0.0043	0.02381
Cb/Ta	0.00019	0.00083	0.000100	0.0014	0.0015	0.071429
Cb/Ta	0.00011	0.00077	0.000028	0.0006	0.000628	0.046694
Cb/Ta	0.00015	0.00062	0.000040	0.0005	0.00054	0.080903
Cb/Ta	0.00008	0.00048	0.000048	0.0009	0.000948	0.052825
Cb/Ta	0.00009	0.00081	0.000032	0.0009	0.000932	0.035957
Cb/Ta	0.00017	0.00048	0.000046	0.0004	0.000446	0.114612
Cb/Ta	0.00067	0.00124	0.000200	0.0014	0.0016	0.142857
Cb/Ta	0.00005	0.00085	0.000022	0.0012	0.001222	0.018723
Cb/Ta	0.00005	0.00086	0.000040	0.0022	0.00224	0.018387
Cb/Ta	0.00002	0.0008	0.000003	0.0004	0.000403	0.00849
Cb/Ta	0.00014	0.0009	0.000024	0.0005	0.000524	0.047543
Cb/Ta	0.00007	0.00064	0.000019	0.0006	0.000619	0.031462

DNSC Scotia Inventory

material	Th content	U content	Th Activity	U Activity	Total curies	Th/U Ratio
Cb/Ta	0.0002	0.00088	0.000400	0.0061	0.0065	0.065574
Cb/Ta	0.00012	0.00053	0.000020	0.0003	0.00032	0.067918
Cb/Ta	0.00033	0.00134	0.000200	0.0027	0.0029	0.074074
Cb/Ta	0.00005	0.00047	0.000009	0.0003	0.000309	0.029964
Cb/Ta	0.00008	0.00058	0.000022	0.0005	0.000522	0.043148
Cb/Ta	0.00011	0.00048	0.000047	0.0007	0.000747	0.066706
Cb/Ta	0.00006	0.00047	0.000016	0.0004	0.000416	0.040451
Cb/Ta	0.00014	0.00059	0.000100	0.0015	0.0016	0.066667
Cb/Ta	0.00078	0.00282	0.000900	0.0108	0.0117	0.083333
Cb/Ta	0.00006	0.0005	0.000100	0.0026	0.0027	0.038462
Cb/Ta	0.0008	0.00284	0.000100	0.0016	0.0017	0.0625
Cb/Ta	0.00031	0.00134	0.000100	0.0008	0.0009	0.125
Average	**0.000178**	**0.000882**	**0.000158**	**0.001855**	**0.002013**	**0.082833**

Survey Unit 2
Floor Alpha Static Measurements
DNSC Scotia

Survey Location	Log Date	Log Time	Probe S/N	Log Mode	Channel Type	Reading	Gross/Net	Units	E-600 S/N	SU
2	1/28/2004	7:22:00	1090	Scaler	Alpha	9.50	Gross	cpm	2356	SU 2
3	1/28/2004	7:24:00	1090	Scaler	Alpha	9.50	Gross	cpm	2356	SU 2
6	1/28/2004	7:26:00	1090	Scaler	Alpha	6.50	Gross	cpm	2356	SU 2
7	1/28/2004	7:29:00	1090	Scaler	Alpha	7.50	Gross	cpm	2356	SU 2
10	1/28/2004	7:31:00	1090	Scaler	Alpha	7.53	Gross	cpm	2356	SU 2
11	1/28/2004	7:34:00	1090	Scaler	Alpha	14.00	Gross	cpm	2356	SU 2
14	1/28/2004	7:36:00	1090	Scaler	Alpha	8.98	Gross	cpm	2356	SU 2
15	1/28/2004	7:38:00	1090	Scaler	Alpha	10.00	Gross	cpm	2356	SU 2
18	1/28/2004	7:41:00	1090	Scaler	Alpha	9.00	Gross	cpm	2356	SU 2
19	1/28/2004	7:44:00	1090	Scaler	Alpha	8.00	Gross	cpm	2356	SU 2
22	1/28/2004	7:47:00	1090	Scaler	Alpha	9.00	Gross	cpm	2356	SU 2
23	1/28/2004	7:50:00	1090	Scaler	Alpha	8.00	Gross	cpm	2356	SU 2
26	1/28/2004	8:02:00	1090	Scaler	Alpha	7.50	Gross	cpm	2356	SU 2
27	1/28/2004	8:04:00	1090	Scaler	Alpha	10.50	Gross	cpm	2356	SU 2
30	1/28/2004	8:07:00	1090	Scaler	Alpha	12.50	Gross	cpm	2356	SU 2
31	1/28/2004	8:09:00	1090	Scaler	Alpha	10.50	Gross	cpm	2356	SU 2
34	1/28/2004	8:12:00	1090	Scaler	Alpha	8.50	Gross	cpm	2356	SU 2
35	1/28/2004	8:14:00	1090	Scaler	Alpha	8.00	Gross	cpm	2356	SU 2
38	1/28/2004	8:17:00	1090	Scaler	Alpha	8.43	Gross	cpm	2356	SU 2
364	1/29/2004	10:37:00	1090	Scaler	Alpha	4.50	Gross	cpm	2356	SU 2
366	1/29/2004	10:39:00	1090	Scaler	Alpha	9.50	Gross	cpm	2356	SU 2
368	1/29/2004	10:42:00	1090	Scaler	Alpha	8.50	Gross	cpm	2356	SU 2
371	1/29/2004	10:44:00	1090	Scaler	Alpha	7.50	Gross	cpm	2356	SU 2
374	1/29/2004	10:47:00	1090	Scaler	Alpha	8.50	Gross	cpm	2356	SU 2
375	1/29/2004	10:49:00	1090	Scaler	Alpha	12.00	Gross	cpm	2356	SU 2
378	1/29/2004	10:51:00	1090	Scaler	Alpha	5.14	Gross	cpm	2356	SU 2
379	1/29/2004	10:54:00	1090	Scaler	Alpha	6.50	Gross	cpm	2356	SU 2
382	1/29/2004	10:56:00	1090	Scaler	Alpha	6.99	Gross	cpm	2356	SU 2
383	1/29/2004	10:58:00	1090	Scaler	Alpha	6.00	Gross	cpm	2356	SU 2
					Average	8.57				
					Min	4.50				
					Max	14.00				
					Std Dv	2.08				

DNSC Scotia
SU 0a Alpha Background Static Measurements

Location No.	Log Date	Log Time	Probe S/N	Log Mode	Channel Type	Gross cpm	Survey Unit
31	8/13/2003	8:53:00	1160	Scaler	Alpha	9.50	0a
32	8/13/2003	8:56:00	1160	Scaler	Alpha	9.50	0a
33	8/13/2003	9:04:00	1160	Scaler	Alpha	4.50	0a
34	8/13/2003	9:07:00	1160	Scaler	Alpha	4.50	0a
35	8/13/2003	9:09:00	1160	Scaler	Alpha	7.50	0a
36	8/13/2003	9:12:00	1160	Scaler	Alpha	9.00	0a
37	8/13/2003	9:15:00	1160	Scaler	Alpha	7.00	0a
38	8/13/2003	9:20:00	1160	Scaler	Alpha	9.50	0a
39	8/13/2003	9:23:00	1160	Scaler	Alpha	7.00	0a
40	8/13/2003	9:25:00	1160	Scaler	Alpha	11.00	0a
41	8/13/2003	9:28:00	1160	Scaler	Alpha	10.50	0a
42	8/13/2003	9:31:00	1160	Scaler	Alpha	8.50	0a
43	8/13/2003	9:35:00	1160	Scaler	Alpha	11.00	0a
44	8/13/2003	9:38:00	1160	Scaler	Alpha	5.00	0a
45	8/13/2003	9:40:00	1160	Scaler	Alpha	8.00	0a
46	8/13/2003	9:43:00	1160	Scaler	Alpha	7.00	0a
47	8/13/2003	9:46:00	1160	Scaler	Alpha	12.00	0a
48	8/13/2003	9:49:00	1160	Scaler	Alpha	10.50	0a
49	8/13/2003	9:51:00	1160	Scaler	Alpha	5.50	0a
50	8/13/2003	9:54:00	1160	Scaler	Alpha	10.00	0a
51	8/13/2003	9:57:00	1160	Scaler	Alpha	8.50	0a
52	8/13/2003	10:00:00	1160	Scaler	Alpha	10.00	0a
53	8/13/2003	10:03:00	1160	Scaler	Alpha	6.50	0a
54	8/13/2003	10:06:00	1160	Scaler	Alpha	9.50	0a
55	8/13/2003	10:09:00	1160	Scaler	Alpha	9.50	0a
56	8/13/2003	10:11:00	1160	Scaler	Alpha	8.00	0a
57	8/13/2003	10:14:00	1160	Scaler	Alpha	10.00	0a
58	8/13/2003	10:17:00	1160	Scaler	Alpha	9.50	0a
59	8/13/2003	10:21:00	1160	Scaler	Alpha	8.50	0a
60	8/13/2003	10:23:00	1160	Scaler	Alpha	5.00	0a
61	8/13/2003	10:57:00	1160	Scaler	Alpha	10.00	0a
62	8/13/2003	11:00:00	1160	Scaler	Alpha	6.50	0a
63	8/13/2003	11:02:00	1160	Scaler	Alpha	9.50	0a
64	8/13/2003	11:05:00	1160	Scaler	Alpha	8.50	0a
65	8/13/2003	11:08:00	1160	Scaler	Alpha	10.50	0a
66	8/13/2003	11:11:00	1160	Scaler	Alpha	9.50	0a
67	8/13/2003	11:16:00	1160	Scaler	Alpha	12.50	0a
68	8/13/2003	11:20:00	1160	Scaler	Alpha	6.50	0a
69	8/13/2003	11:22:00	1160	Scaler	Alpha	10.50	0a
70	8/13/2003	11:25:00	1160	Scaler	Alpha	6.50	0a
71	8/13/2003	11:27:00	1160	Scaler	Alpha	8.00	0a
72	8/13/2003	11:30:00	1160	Scaler	Alpha	9.00	0a
73	8/13/2003	11:33:00	1160	Scaler	Alpha	8.50	0a
74	8/13/2003	11:35:00	1160	Scaler	Alpha	9.00	0a
75	8/13/2003	11:38:00	1160	Scaler	Alpha	7.50	0a
76	8/13/2003	11:41:00	1160	Scaler	Alpha	8.50	0a
77	8/13/2003	11:43:00	1160	Scaler	Alpha	10.50	0a
78	8/13/2003	11:46:00	1160	Scaler	Alpha	10.50	0a
79	8/13/2003	11:48:00	1160	Scaler	Alpha	9.00	0a

DNSC Scotia
SU 0a Alpha Background Static Measurements

Location No.	Log Date	Log Time	Probe S/N	Log Mode	Channel Type	Gross cpm	Survey Unit
80	8/13/2003	11:51:00	1160	Scaler	Alpha	9.00	0a
81	8/13/2003	11:54:00	1160	Scaler	Alpha	10.50	0a
82	8/13/2003	11:57:00	1160	Scaler	Alpha	8.50	0a
83	8/13/2003	11:59:00	1160	Scaler	Alpha	5.50	0a
84	8/13/2003	12:02:00	1160	Scaler	Alpha	6.50	0a
85	8/13/2003	12:05:00	1160	Scaler	Alpha	7.50	0a
86	8/13/2003	12:08:00	1160	Scaler	Alpha	9.50	0a
87	8/13/2003	12:10:00	1160	Scaler	Alpha	7.50	0a
88	8/13/2003	12:13:00	1160	Scaler	Alpha	9.50	0a
89	8/13/2003	12:15:00	1160	Scaler	Alpha	7.00	0a
90	8/13/2003	12:18:00	1160	Scaler	Alpha	6.00	0a

Average	8.5
Min	4.5
Max	12.5
Std Dev	1.8
Critical Value	14.0
Count	60