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Pacific Northwest National Laboratory
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Soil Sampling to Demonstrate Compliance with Department of Energy Radiological Clearance Requirements for the ALE Unit of the Hanford Reach National Monument

B. G. Fritz
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April 2007

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Pacific Northwest National Laboratory
Richland, Washington 99352

Summary

The Hanford Reach National Monument (HRNM), located along the Columbia River in south central Washington, consists of several units, one of which is the Fitzner/Eberhardt Arid Lands Ecology Reserve (ALE) Unit. This unit is approximately 311 km^2 (120 mi^2) of shrub-steppe habitat located to the south and west of Highway 240. To fulfill internal U. S. Department of Energy (DOE) requirements prior to any radiological clearance of land, DOE must evaluate the potential for residual radioactive contamination on this land and determine compliance with the requirements of DOE Order 5400.5. Authorized Limits for residual radioactive contamination were developed based on the DOE annual exposure limit of 100 mrem to the public using future potential land use scenarios. The DOE Office of Environmental Management (EM) approved these Authorized Limits on March 1, 2004. Historical soil monitoring conducted on ALE indicated soil concentrations of radionuclides were well below the Authorized Limits (Fritz et al. 2003). However, the historical sampling was done at a limited number of sampling locations. Therefore, additional soil sampling was conducted to determine if the concentrations of radionuclides in soil on the ALE Unit were below the Authorized Limits.

Fifty soil samples were collected from the ALE Unit. A software package (Visual Sample Plan) was used to plan the collection such that an adequate number of samples were collected. The number of samples necessary to decide with a high level of confidence (99%) that the soil concentrations of radionuclides on the ALE Unit did not exceed the Authorized Limits was determined to be 31. Additional soil samples were collected from areas suspected to have a potential for accumulation of radionuclides and area where past practices involved the use of radiological materials.

The 50 soil samples collected from the ALE Unit all had concentrations of radionuclides far below the Authorized Limits established by the DOE. Statistical analysis of the results concluded that the Authorized Limits were not exceeded when total uncertainty was considered. The calculated upper tolerance limit for each radionuclide in this study (which represents the value at which 99% of the measurements reside below with a 99% confidence level) was lower than the Authorized Limit for each radionuclide. The maximum observed soil concentrations for the radionuclides included in the Authorized Limits would result in a potential annual dose of 0.14 mrem assuming the most probable use scenario, a recreational visitor. This potential dose is well below the DOE 100-mrem-per-year dose limit for a member of the public.

Spatial analysis of the results indicated no observable statistically significant differences between radionuclide concentrations across the ALE Unit. Furthermore, the results of the biota dose assessment screen, which used the ResRad Biota code, indicated that the concentrations of radionuclides in ALE Unit soil would not result in a dose to terrestrial biota that exceeds the recommended biota dose limit of 0.1 rad per day.

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1.0 Introduction

The Hanford Reach National Monument (HRNM) was created by presidential proclamation in June 2000 (65 FR 37253). It is located along the Columbia River in south central Washington and consists of five distinct units (Figure 1). The largest single unit is the Fitzner/Eberhardt Arid Lands Ecology Reserve (ALE) Unit. This unit is approximately 311 km^2 of shrub-steppe habitat located to the south and west of Highway 240 (Figure 1). To fulfill internal requirements prior to any radiological clearance of land, the U.S. Department of Energy (DOE) must evaluate the potential for residual radioactive contamination on this land and determine compliance with the requirements of DOE Order 5400.5. DOE Order 5400.5 requires that Authorized Limits be developed and submitted to the applicable DOE Headquarters program office for approval. For the Hanford Site, this would be the DOE Office of Environmental Management (EM). The Authorized Limits, based on an annual dose of 100 mrem to the public using future potential land use scenarios, were submitted to DOE-EM on December 22, 2003. DOE-EM approved the requested Authorized Limits on March 1, 2004. Historical soil monitoring conducted on ALE indicated soil concentrations of radionuclides were well below the Authorized Limits (Fritz et al. 2003). However, the historical sampling was done at a limited number of sampling locations. Therefore, additional soil sampling was conducted to determine if the concentrations of radionuclides in soil on the ALE Unit were below the Authorized Limits.

2.0 Methods

The number of samples necessary to decide with a high level of confidence (99%) that the soil concentrations of radionuclides on the ALE Unit did not exceed the Authorized Limits was determined through the use of a computer program, Visual Sample Plan (VSP) (Gilbert et al. 2001; Hassig et al. 2002). This program was developed to provide a tool for selecting the appropriate number and location of environmental samples so that the results of statistical tests performed on data collected via the sampling and analysis plan have the required confidence for decision making. The sampling and analysis plan prepared prior to conducting this sampling provides additional detail about the methodology used to plan and conduct this soil sampling (Fritz et al. 2004).

2.1 Sample Collection

The collection of soil samples was done in accordance with current environmental monitoring soil sampling procedures (PNNL 2004) and with the protocol outlined in the sampling and analysis plan developed prior to sampling (Fritz et al. 2004). The collection of samples consisted of collecting five 10-cm-diameter, 2.5-cm-deep "cookie cutter" samples at each location. These five discreet portions were combined to make one sample at each location. Prior to analysis, each sample was split with a riffle splitter, and half the sample was kept for potential future analysis. The collection of the top 2.5 cm of soil is considered the most conservative approach based on depth distribution studies of radionuclides on the Hanford Site. Based on previous studies, the concentrations of plutonium-239/240 and cesium-137 observed in the top 2.5 cm are higher than the samples collected from lower depths (Price 1991). Price (1991) observed some downward vertical migration of strontium-90; however, the top 2.5 cm contained

the highest concentrations. Therefore, collecting the top 2.5 cm is considered the most conservative sampling approach because it eliminates dilution of the surface concentrations by lower concentration soil below the surface.

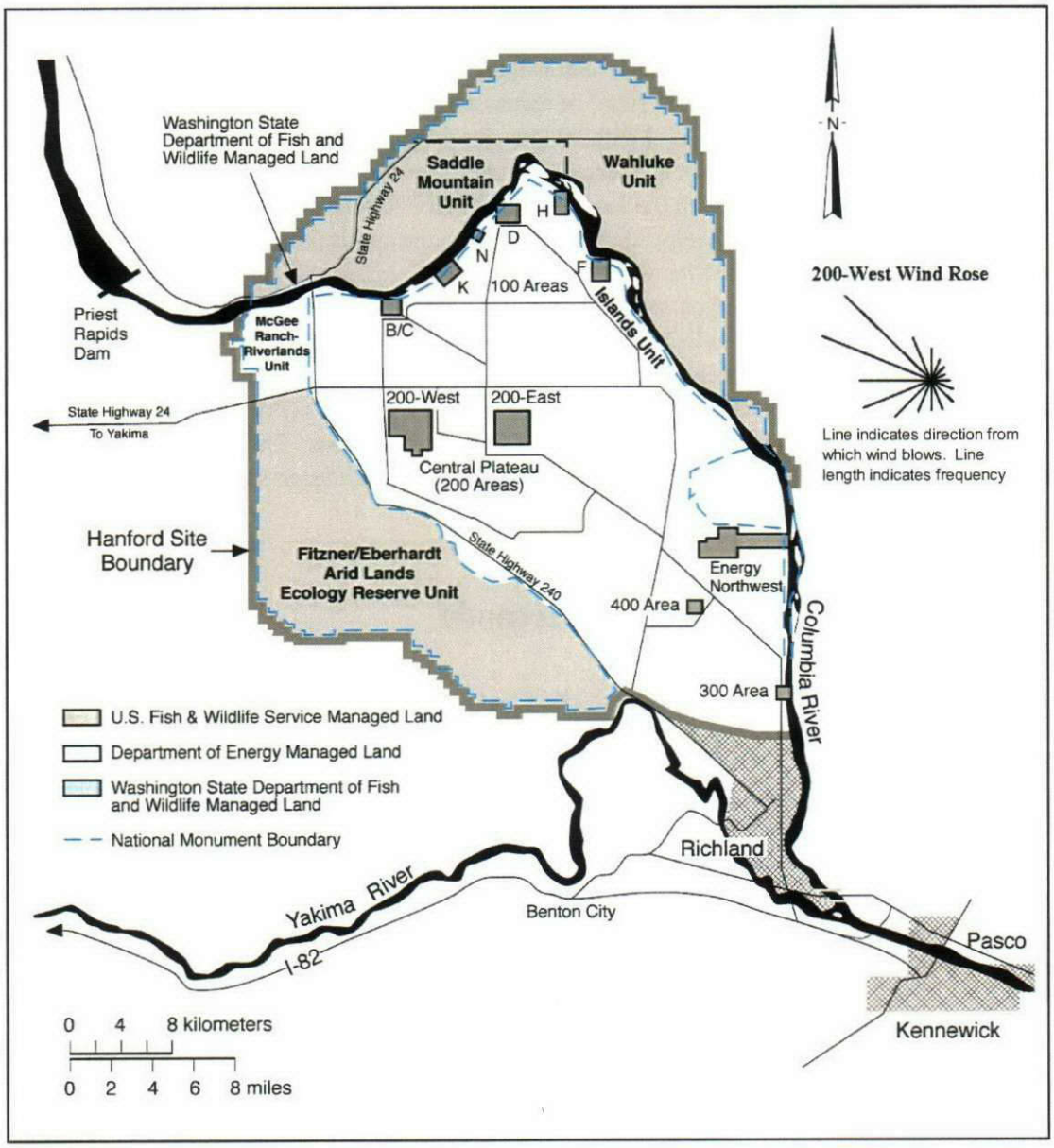

Figure 1. Location of the Fitzner/Eberhardt Arid Lands Ecology Reserve Unit

2.2 Sampling Locations

Results from the VSP program indicated that collection of 31 soil samples across the ALE Unit was necessary to provide a 99% degree of confidence that the ALE Unit complies with the Authorized Limits. The collection of 31 soil samples was expected to provide less than a 1% chance of incorrectly concluding the site had concentrations below the Authorized Limits (Fritz et al. 2004). The 31 soil samples were collected from two distinct portions of ALE – the east and west portions. This was done because previous sampling had identified slightly higher concentrations of plutonium-239/240 on the eastern portion of ALE (Price and Dirkes 1981). These samples were named with an E or W prefix to identify the portion of ALE where they were collected. In addition to the 31 soil samples necessary to satisfy the statistical requirements, additional samples were collected from locations with potential for accumulation of radionuclides such as alluvial deposits, drainage washes, and wind blown sand deposits (Fritz et al. 2004). These locations also included sites at varying elevations to evaluate the potential for an elevation-related bias to the results. Finally, five additional samples were collected from both the ALE HQ lysimeter plot and the Snively lysimeter plot (Figure 2 and Table 1), which in the past had been used for research activities involving small quantities of radionuclides (Fritz et al. 2003).

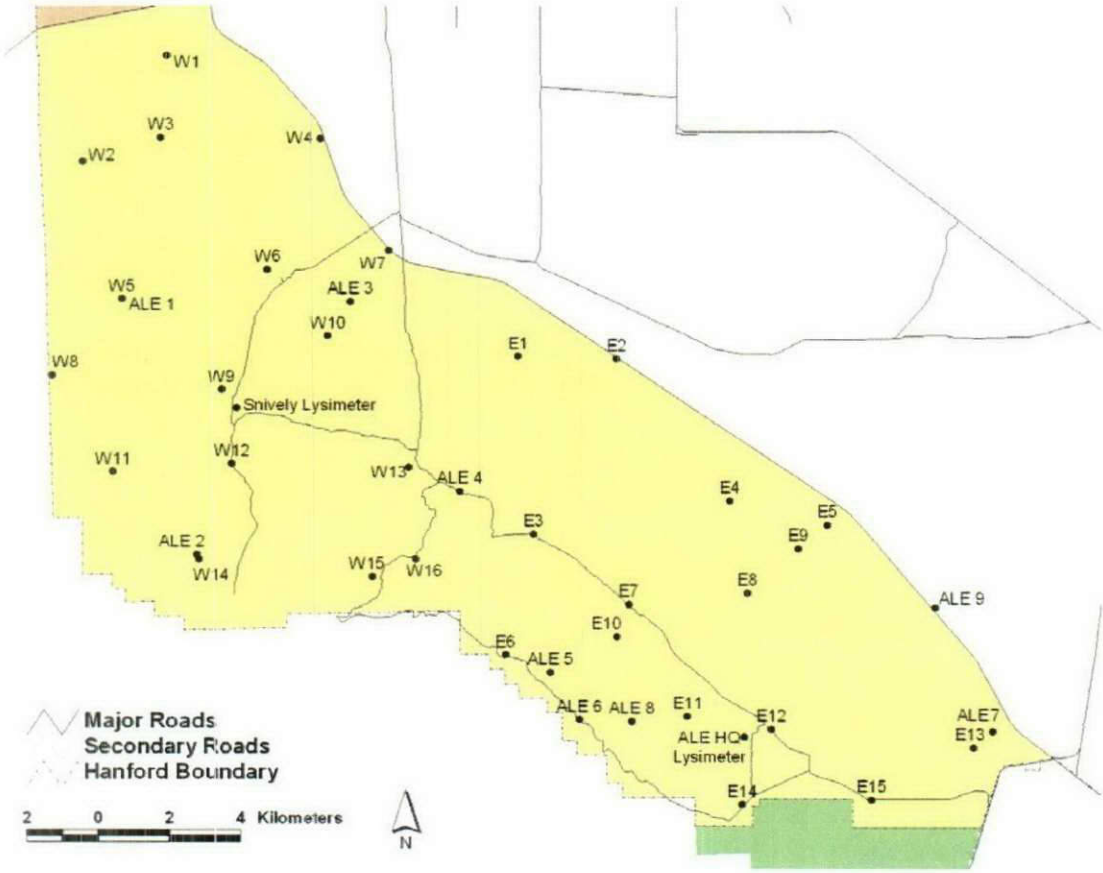

Figure 2. Soil Sampling Locations on the ALE Unit

Table 1. Number of Soil Samples Collected on the ALE Unit of the HRNM

Area	Number of Samples
East ALE random start grid	15
West ALE random start grid	16
Additional ALE samples at selected locations	9
Lower Snively lysimeter Plot	5
ALE Headquarters lysimeter Plot	5
Total Soil Samples	50

The VSP program provided coordinates for 31 randomly selected target sample locations. Due to the lack of roads, rugged terrain, safety considerations, and desire to minimize impacts to sensitive ecological resources on the ALE Unit, samples were not collected exactly at the target locations. All but three samples were collected within 1.6 km (1 mi.) of the pre-determined target location. Based on the Historical Site Assessment (Fritz et al 2003), the source (atmospheric deposition) and site observations, spatial variation at the 1.6 km scale were not anticipated and would not bias the results. The actual sampling locations were recorded with a global positioning device and the elevation of each sample was determined by mapping the sample locations on global information system (GIS) elevation layers. The soil type of each sample was also estimated using GIS soil information and overlaying the sampling locations (Appendix A). Detailed information about each sampling location is included in Appendix A.

Lysimeter plots were used in the past to conduct experiments on uptake of radionuclides by plants. Although the lysimeter plots were determined to be clean by previous investigations (DOE 1996b), there was potential for some residual contamination in soil simply due to the prior use of radioactive materials at the lysimeter plots (Fritz et al. 2003). Five additional soil samples were collected at each of the two lysimeter plots known to have used radionuclides (ALE HQ lysimeter plot and Snively lysimeter plot) (Fritz et al. 2003, 2004). Nine additional samples were collected, in accordance with the sampling plan, from locations that appeared likely to have an increased chance for elevated concentrations in soil (Fritz et al. 2004). These locations included dry creek beds, areas of run-off accumulation, or locations closer to Hanford Site operations.

2.3 Sample Analysis

Sample analyses were conducted by a sub-contracted analytical laboratory. The suite of radionuclides selected for analysis (Table 2) was determined from historical data and the derivation of the Authorized Limits (Fritz et al. 2003; Napier et al. 2004). The analytical methods were adequate to detect concentrations well below the Authorized Limits (Table 2). In some cases, concentrations of additional radionuclides were determined as a result of the analytical procedure. The gamma scan provided results for 23 radioisotopes, an isotopic plutonium analysis provided results for plutonium-238 in addition to plutonium-239/240, and an americium-241 analysis provided results for curium-242 and curium-244. One radionuclide used on the lysimeter plots but not analyzed for was neptunium-237. It was determined in the sampling and analysis plan (Fritz et al. 2004) that follow-up analysis would be warranted to determine the concentrations of neptunium-237 if concentrations of other radionuclides in the lysimeter plot samples were elevated relative to the Authorized Limits and other ALE locations.

Table 2. Approved Authorized Limits and the Contractual Analytical Detection Limits

Radionuclides of Concern	Contractual Analytical Detection Limit (pCi/g)	Authorized Limit (pCi/g)
Cobalt-60	1	11
Cesium-134	1	20
Cesium-137	1	46
Europium-152	1	24
Strontium-90	10	88
Uranium-234	100	2,400
Uranium-235	10	190
Uranium-238	50	770
Plutonium-239/40	25	480
Americium-241[(a)]	10	420
(a) For samples from lysimeter plots only.		

3.0 Results and Discussion

In this section results are compared to the Authorized Limits (Napier and Glines 2004), as well as other soil concentration data (Poston et al. 2005) and reported background concentrations (DOE 1996a). Results are also analyzed for any trends, patterns, or discrepancies that might indicate elevated radionuclide concentrations on the ALE Unit of the HRNM.

3.1 Radiological Results

The results from the 50 soil samples collected on the ALE Unit of the HRNM had very low concentrations of radionuclides. Overall, only 54% of the sample results for the radionuclides of concern had detectable concentrations[1] (Table 3). All of the measured concentrations were well below the Authorized Limits. The sample with the highest overall concentration of radionuclides was collected at location ALE 5, near the Rattlesnake Mountain peak, and had cesium-137 and strontium-90 concentrations that were 1.3% and 0.25% of the respective Authorized Limit. The raw data for the sampling results are included in Appendix B.

3.1.1 Soil Sample Results and Comparison to Authorized Limits

Gamma spectroscopy analyzed for 23 different gamma-emitting radioisotopes, of which 4 were radionuclides of concern as identified by the Authorized Limits. Of these four gamma emitters, only cesium-137 was reported as having detectable concentrations in any of the 50 samples (Appendix B).

[1] If a reported concentration is less than the minimum detectable activity, or if the total analytical error is greater than the reported concentration, then the result is considered to be undetected.

Table 3. Summary Statistics for Radionuclides of Concern Measured in 50 Soil Samples on the ALE Unit of the HRNM

Radionuclides of Concern	Number of Samples Analyzed	Number of Samples with Detectable Concentrations[a]	Nominal Analytical Detection Limit[a] (pCi/g)	Authorized Limit (pCi/g)
Cobalt-60	50	0	0.02	11
Cesium-134	50	0	0.03	20
Cesium-137	50	49	0.02	46
Europium-152	50	0	0.05	24
Strontium-90	50	36	0.04	88
Uranium-234	50	50	0.01	2,400
Uranium-235	50	16	0.008	190
Uranium-238	50	50	0.01	770
Plutonium-239/40	50	48	0.0006	480
Americium-241[b]	10	0	0.004	420
Radionuclides of Concern	**Median Concentration (pCi/g)**	**Average Concentration (pCi/g)**	**Maximum Concentration (pCi/g)**	**Standard Deviation (pCi/g)**
Cobalt-60	0.0017	0.0016	0.018	0.0063
Cesium-134	0.051	0.049	0.087	0.015
Cesium-137	0.14	0.18	0.59	0.13
Europium-152	-0.0073	-0.0068	0.036	0.016
Strontium-90	0.057	0.071	0.22	0.049
Uranium-234	0.15	0.16	0.46	0.067
Uranium-235	0.0052	0.0053	0.013	0.0040
Uranium-238	0.16	0.17	0.49	0.058
Plutonium-239/40	0.0054	0.0070	0.035	0.0067
Americium-241[b]	0.00065	0.0012	0.0036	0.0011

(a) A result is considered detectable if it is larger than the analytical detection limit and the total analytical uncertainty.
(b) Americium-241was only analyzed for in lysimeter plot samples.

Cesium-137 had detectable concentrations in 49 of the 50 samples collected on the ALE Unit. The Authorized Limit for cesium-137 is 46 pCi/g. The maximum cesium-137 concentration observed on ALE (0.59 pCi/g) was 1.3% of the Authorized Limit. The median concentration measured in the samples collected on ALE during this sampling effort was 0.14 pCi/g (Table 3).

Other than cesium-137, the radionuclides of concern measured by gamma spectroscopy were not measured at detectable levels in any of the samples collected on the ALE Unit. Cobalt-60, cesium-134, and europium-152 all had concentrations below the analytical detection limit, and consequently, well below the respective Authorized Limits (Table 3).

In addition to the 4 gamma-emitting radionuclides of concern, the gamma scan analyzed for 19 other radionuclides (see Appendix B). Only beryllium-7 and potassium-40 were consistently observed on the ALE Unit above the analytical detection limit. These are naturally occurring radionuclides and their presence on the ALE Unit in detectable concentrations was expected.

Strontium-90 was measured above the detection limit in 36 of the 50 samples collected across the ALE Unit. The median and maximum strontium-90 concentrations observed were 0.057 and 0.22 pCi/g, respectively (Table 3). The maximum observed strontium-90 concentration was 0.25% of the Authorized Limit (88 pCi/g; Table 3).

Soil samples collected on the ALE Unit were analyzed for three uranium isotopes: uranium-234, uranium-235, and uranium-238. As expected, uranium-234 and uranium-238 had concentrations above the detection limit for all 50 samples, and only 16 of the 50 samples had uranium-235 concentrations above the detection limit (Table 3). This is consistent with historical soil monitoring data, where uranium-235 was detected less often than uranium-234 and uranium-238. The maximum measured concentrations of uranium-234, uranium-235, and uranium-238 were well below the Authorized Limits for the ALE Unit (Table 3). The maximum observed uranium concentrations were less than 1% of the respective Authorized Limits for uranium-234, uranium-235, and uranium-238.

Plutonium-239/240 had detectable concentrations in 48 of 50 samples collected on the ALE Unit (Table 3). The maximum measured soil concentration of plutonium-239/240 (0.035 pCi/g) was only 0.007% of the Authorized Limit. While plutonium-238 is not a contaminant of concern identified in the Authorized Limits, it was analyzed for at the same time as plutonium-239/240. Only 23 of 50 samples had detectable concentrations of plutonium-238. In general, the plutonium-238 concentrations were about 10 times lower than the plutonium-239/240 concentrations.

The samples collected at the lysimeter plots showed no significant differences in concentration relative to the other samples collected on the ALE Unit (Table 4). All radionuclides detected in soil samples from the lysimeter plots were well below the respective Authorized Limits. It was noted that for a few radionuclides with detectable concentrations, the median concentration measured on the Snively lysimeter plot was higher than the median concentration measured across the ALE Unit (Table 4). However, for those radionuclides, the maximum concentrations at Snively lysimeter were lower than the maximum concentrations measured across the ALE Unit. Samples collected at the lysimeter plots were also analyzed for americium-241, curium-242, and curium-244 because americium-241 and curium-242 had been used in past experiments on the lysimeter plots. None of the samples collected on the lysimeter plots had detectable concentrations of americium-241, curium-242, or curium-244. The nominal detection limit for americium-241 is 0.004 pCi/g, which is significantly lower than the 420 pCi/g Authorized Limit established for americium-241 (Table 2).

The results of soil samples collected on the ALE Unit clearly indicate that the concentrations of the radionuclides of concern are well below the Authorized Limits (Figure 3). Cesium-137 was the radionuclide with a measured maximum closest to the applicable Authorized Limit. The maximum cesium-137 concentration (0.59 pCi/g) was only 1.3% of the Authorized Limit (46 pCi/g).

Table 4. Comparison of the Soil Concentrations from Samples Collected at the Lysimeter Plots to the 40 Non-Lysimeter Plot Sampling Locations

Radionuclides of Concern	Median (and maximum) Concentration from 40 ALE Locations (pCi/g)	Median (and maximum) Concentration on ALE HQ Lysimeter Plot (pCi/g)	Median (and maximum) Concentration on Snively Lysimeter Plot (pCi/g)
Cobalt-60[(a)]	0.0015 (0.018)	0.0028 (0.0058)	0.0017 (0.0069)
Cesium-134[(a)]	0.050 (0.071)	0.069 (0.087)	0.050 (0.064)
Cesium-137	0.15 (0.59)	0.051 (0.063)	0.24 (0.33)
Europium-152[(a)]	-0.0062 (0.023)	-0.0083 (0.020)	-0.013 (0.036)
Strontium-90	0.057 (0.22)	0.042 (0.062)	0.077 (0.16)
Uranium-234	0.15 (0.46)	0.14 (0.18)	0.15 (0.15)
Uranium-235	0.0052 (0.013)	0.0043 (0.0091)	0.0065 (0.012)
Uranium-238	0.17 (0.49)	0.14 (0.15)	0.16 (0.17)
Plutonium-239/240	0.0059 (0.035)	0.0015 (0.0020)	0.0066 (0.013)
Americium-241[(a)]	--	0.00086 (0.0021)	0.00044 (0.0036)

(a) No detectable values for these radionuclides in any samples. Detectable concentrations are larger than the analytical detection limit and larger than the total analytical uncertainty.

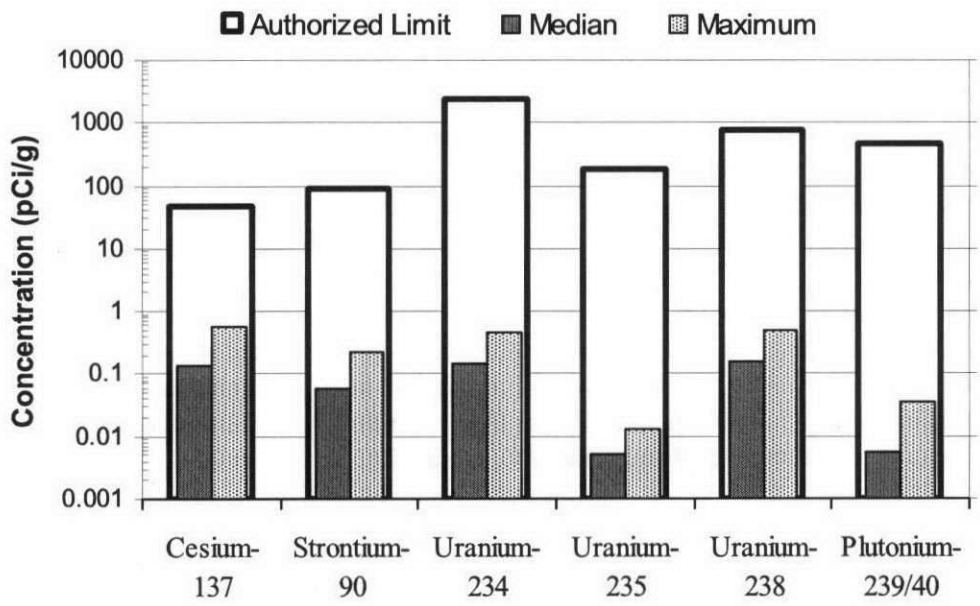

Figure 3. Comparison of Median and Maximum Results to Authorized Limit for Radionuclides with Detectable Concentrations in Soil (Note that the vertical axis is a logarithmic scale).

3.1.2 Statistical Analysis

A statistical analysis of the results was conducted to confirm assumptions made in the sampling design were met and to determine if the potential existed for concentrations of radionuclides to exceed the Authorized Limits when uncertainty was considered. This analysis confirmed that the assumptions were valid and that the number of samples and location of sampling sites was appropriate. In addition, the statistical analysis of the results concluded that the Authorized Limits were not exceeded when total uncertainty was considered. Tolerance limits can be used to statistically determine whether a specified area is contaminated at concentrations greater than the authorized limits. The calculated upper tolerance limit for each radionuclide in this study (which represents the value at which 99% of the measurements reside below with a 99% confidence level) was lower than the Authorized Limit for each radionuclide.

3.1.3 Comparison to Other Data

While the concentrations of radionuclides collected on the ALE Unit were less than the Authorized Limits, a comparison to other relevant data was conducted to further evaluate radionuclide concentrations on the ALE Unit. The data were compared to environmental monitoring data collected on the ALE Unit since 1990, environmental monitoring data collected in the general upwind direction of Hanford, and to the estimated Hanford Site background soil concentrations (DOE 1996a). Environmental surveillance of radionuclide concentrations has been conducted on and around the Hanford Site since the 1940s. For comparison to the results obtained by this sampling effort, recent environmental monitoring data was used. Based on the historical site assessment (Fritz et al. 2003), soil monitoring data since 1990 were deemed the most appropriate to use for comparison. Upwind samples collected at Sunnyside and samples collected from four locations on and around the ALE Unit provided two sets of comparison data. Hanford background soil concentrations, estimated based on the distribution of results from environmental samples on and around the Hanford Site (DOE 1996a), provided a third set of comparison data. The median concentrations measured by this sampling effort were generally lower than available comparison data (Table 5).

The maximum measured concentrations in this study were also similar to the estimated Hanford Site background maximum soil concentrations. The concentrations of radionuclides measured in soil on the ALE Unit had a range of results consistent with the range expected in Hanford Site background soil (Table 5, Figure 4). All results indicate that there is no significant difference in the radionuclide concentrations on the ALE Unit relative to the estimated Hanford Site background soil concentrations or the concentrations measured at an upwind sampling location.

Table 5. Comparison of Results to Other Relevant Data

Radionuclides of Concern	Median Concentration (pCi/g)	Median ALE Concentration Observed Since 1990[a]	Median Upwind Concentration Observed Since 1990[a]	Hanford Site Background Median Concentration[b]
Cobalt-60[c]	0.0017	-0.005	-0.004	0.0013
Cesium-134[c]	0.051	NA	NA	NA
Cesium-137	0.14	0.27	0.4	0.42
Europium-152[c]	-0.0073	NA	NA	NA
Strontium-90	0.057	0.095	0.084	0.081
Uranium-234	0.15	0.11	0.35	NA
Uranium-235	0.0052	0.01	0.014	0.027
Uranium-238	0.16	0.51	0.6	0.68
Plutonium-239/40	0.0054	0.007	0.011	0.0094
Americium-241[c]	0.00065[d]	NA	0.004	NA

NA = Indicates data not available.
(a) Data from HRNM Historical Site Assessment (Fritz et al. 2003) - see Appendix C, Table C.1.
(b) Data from Hanford Site soil background report (DOE 1996a). Maximums are 95% percentile of soil concentration distribution.
(c) No detectable concentrations measured in this study for this isotope.
(d) For samples from lysimeter plots only.

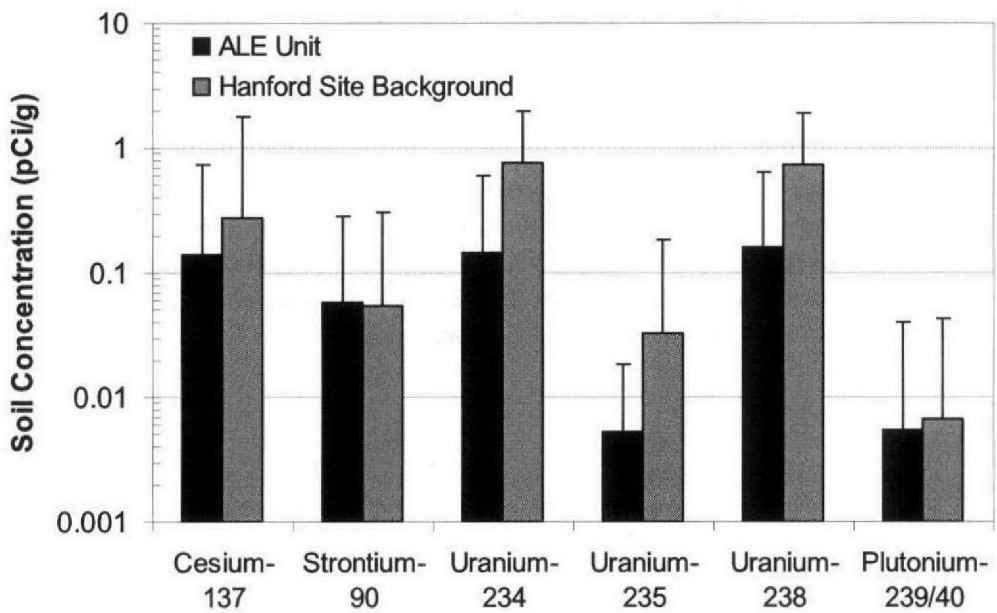

Figure 4. Comparison Between Soil Concentrations Measured on the ALE Unit and Estimated for the Hanford Site Background (DOE 1996a). Solid bars represent median concentrations, lines represent maximum concentrations.

3.1.4 Spatial Analysis

In an effort to glean more information from this sampling effort, the results were analyzed with respect to differences between sampling locations. Results were evaluated for differences that may have been a result of the soil properties at each sampling location, sample location elevation, and differences in precipitation. The soil type for each sample was estimated based on a soil survey of the Hanford Site (Hajek 1966). There were no differences in concentration observed relative to the inferred soil type. Based on an evaluation of plutonium-239/240 concentrations in soil on the ALE Unit (Price and Dirkes 1981), slightly higher concentrations were expected on the eastern portion of the ALE Unit than the western portion. In order to compare the results from the eastern and western portions of the ALE Unit, a statistical comparison of results from the two portions of the ALE Unit was conducted. Results indicate that there were concentrations of plutonium-239/240 on the eastern portion of the ALE Unit that were elevated relative to the western portion (Table 6). However, the difference was not statistically significant (two-sample means t-test, 95% confidence level). This was consistent with the previous study, which also found that the slight differences observed were not statistically significant (Price and Dirkes 1981). Similarly, there were no other radionuclides that had statistically significant differences in concentrations between the eastern and western portions of the ALE Unit. Based on these results, there is no distinct indication of elevated concentrations on one half of the ALE Unit relative to the other half.

In the sampling and analysis plan, elevation was identified as a potential biasing factor to the results. It was suspected that higher elevations could receive more precipitation, thus resulting in more radionuclides being deposited at higher elevations. To evaluate the effect of elevation on the results, measured concentrations were evaluated relative to the elevation of the sampling location. The individual results had too much variability to distinguish any trends in concentrations that resulted from elevation. In order to smooth out the variability, samples collected at the 40 non-lysimeter sampling locations were binned into elevation groups. The average concentrations for these elevation groups indicated that there was a slight increase in concentration at higher elevations for strontium-90, cesium-137, and plutonium-239/240 (Figure 5), although the differences were not statistically significant (two-sample means t-test, 95% confidence level).

The slight correlation between elevation and soil concentration for some radionuclides may be a result of more precipitation at higher elevations. To evaluate the effect of precipitation on soil concentrations, results were evaluated relative to the average annual precipitation at each sampling location. Based on a previous study of the microclimates on ALE, samples were separated into four groups based on the precipitation in that area (Hinds and Thorpe 1969; Hinds et al. 1975; Stone et al. 1983). The four groups were A (less than 18 cm annual precipitation), B (18 to 24 cm annual precipitation), C (24 to 28 cm annual precipitation), and D (greater than 28 cm annual precipitation) (see Appendix A, Figure A.2).

Table 6. Concentrations of Cesium-137, Strontium-90, and Plutonium-239/40 for all 50 Soil Samples Collected on the ALE Unit of the HRNM

Sample Location	Cs-137 Concentration (pCi/g)	Sr-90 Concentration (pCi/g)	Pu-239/40 Concentration (pCi/g)	Sample Location	Cs-137 Concentration (pCi/g)	Sr-90 Concentration (pCi/g)	Pu-239/40 Concentration (pCi/g)
ALE 1	0.0052	0.0000055	-0.000014	ALE HQ Lysimeter 1	0.051	0.042	0.0015
ALE 2	0.050	0.0062	0.0012	ALE HQ Lysimeter 2	0.050	0.051	0.0020
ALE 3	0.075	0.026	0.0038	ALE HQ Lysimeter 3	0.057	0.035	0.0015
ALE 4	0.32	-0.0063	0.014	ALE HQ Lysimeter 4	0.063	0.062	0.0015
ALE 5	0.59	0.22	0.016	ALE HQ Lysimeter 5	0.047	0.020	0.0013
ALE 6	0.28	0.11	0.0087	SNIVELY Lysimeter 1	0.33	0.076	0.013
ALE 7	0.27	0.059	0.0078	SNIVELY Lysimeter 2	0.16	0.043	0.0044
ALE 8	0.11	0.11	0.0033	SNIVELY Lysimeter 3	0.24	0.10	0.0066
ALE 9	0.26	0.13	0.0086	SNIVELY Lysimeter 4	0.27	0.16	0.012
W1	0.22	0.094	0.0076	SNIVELY Lysimeter 5	0.11	0.077	0.0031
W2	0.080	0.040	0.0020	E1	0.12	0.051	0.0061
W3	0.31	0.15	0.011	E2	0.20	0.063	0.0074
W4	0.079	0.14	0.0028	E3	0.11	0.026	0.0090
W5	0.11	0.049	0.0052	E4	0.21	0.056	0.0072
W6	0.43	0.14	0.014	E5	0.38	0.17	0.014
W7	0.11	0.087	0.0068	E6	0.47	0.15	0.035
W8	0.15	0.042	0.0056	E7	0.17	0.059	0.0051
W9	0.13	0.042	0.0058	E8	0.067	0.028	0.0024
W10	0.14	0.039	0.0060	E9	0.086	0.068	0.0023
W11	0.083	0.044	0.0030	E10	0.18	0.094	0.0068
W12	0.10	0.050	0.0032	E11	0.072	0.039	0.0019
W13	0.47	0.078	0.030	E12	0.19	0.044	0.0067
W14	0.14	0.079	0.0047	E13	0.20	0.075	0.0073
W15	0.049	0.018	0.0013	E14	0.16	0.030	0.0045
W16	0.023	0.032	0.00060	E15	0.41	0.14	0.014
West ALE Average	**0.16**	**0.070**	**0.0068**	**East ALE Average**	**0.20**	**0.073**	**0.0086**

Note: Gray highlight denotes result less than analytical detection limit.

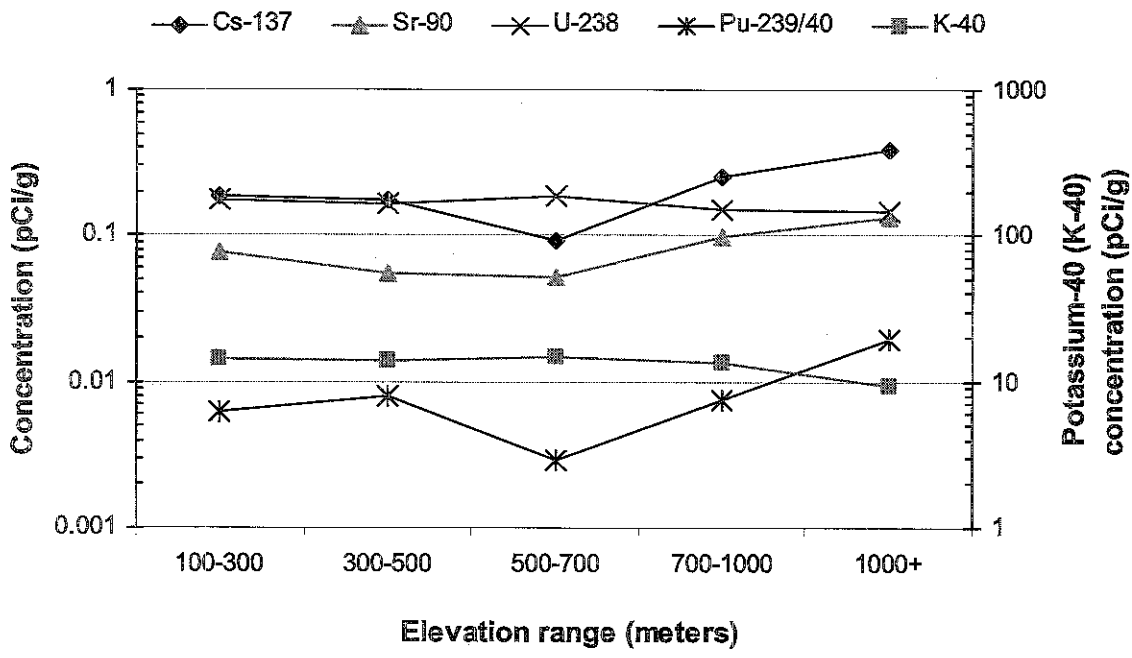

Figure 5. Average Concentrations of Radionuclides at Various Elevations on the ALE Unit

There were no definite relationships between precipitation and soil concentration, but there did appear to be an increase in the average soil concentrations of plutonium-239/40 and cesium-137 between precipitation group B and C (although the difference was not statistically significant). The precipitation groups are essentially a function of elevation, so this is consistent with the slight increase with elevation that was observed.

Of the 50 soil samples collected on the ALE Unit for this study, 9 were at locations selected in the field as having a potential to accumulate radionuclides. The results from these nine locations were similar to concentrations measured at the randomly selected sampling locations. While these nine additional sampling locations were chosen based on a suspected potential for accumulation, it appears that they reflect typical soil concentrations on the ALE Unit.

3.2 Potential Dose Estimates

The soil concentrations measured on the ALE Unit were well below the Authorized Limits. As discussed, these limits were developed based on a 100-mrem-per-year maximum allowable dose rate to members of the public. In order to estimate the doses from the measured soil concentrations, the maximum measured concentration of each radionuclide analyzed in this study was used as input to the DOE-approved computer model RESRAD. A few different scenarios were considered here, but results of this study could be used to evaluate any other scenarios. The modeled doses account for only the radionuclides included in the Authorized Limits, with no attempt to subtract the exposure attributable to background concentrations of radionuclides in soil (Napier et al. 2004).

3.2.1 Recreational Visitor Scenario

The recreational visitor scenario is the scenario that most closely approximates the anticipated usage of the ALE Unit. This scenario assumes a visitor spends 280 hours per year on the ALE Unit and eats game harvested on the ALE Unit (Napier et al. 2004). For the recreational visitor scenario, the dose estimated from the maximum measured ALE soil concentrations is 0.14 mrem per year, or less than 1% of the 100-mrem-annual-dose limit used to establish the Authorized Limits. Cesium-137 is the largest contributor to the estimated dose for the recreational visitor scenario (Table 7).

Table 7. Total Combined Annual Dose (mrem), and the Contribution from Each of the Isotopes Included in the Authorized Limits, for Each of the Three Dose Assessment Scenarios

Isotope	Recreational Visitor	Agricultural Resident	Resident Child
Americium-241	0.00012	0.00087	0.00021
Cobalt-60	0.0076	0.16	0.16
Cesium-134	0.023	0.44	0.44
Cesium-137	0.075	1.3	1.3
Europium-152	0.0070	0.15	0.15
Plutonium-239/40	0.0011	0.0073	0.0011
Strontium-90	0.023	0.26	0.28
Uranium-234	0.0019	0.019	0.032
Uranium-235	0.00036	0.0070	0.0074
Uranium-238	0.0040	0.064	0.075
Total Dose (mrem)	**0.14**	**2.4**	**2.4**

3.2.2 Agricultural Resident Scenario

The agricultural resident scenario assumes a resident who lives year-round on the ALE Unit and produces or harvests most of their food from the ALE Unit. While this is an unlikely event under current and planned future use scenarios, it represents a conceivable maximum future dose scenario. Using RESRAD, the agricultural resident scenario results in an estimated annual dose of 2.4 mrem (Table 7), or less than 3% of the 100-mrem-annual-dose limit used to establish the Authorized Limits. Similar to the recreational visitor scenario, cesium-137 contributes approximately half and strontium-90 about 10% of the combined total dose to the hypothetical agricultural resident.

3.2.3 Resident Child Scenario

An additional potential use scenario was identified during discussions of the evaluation of potential exposure scenarios on the ALE Unit of the HRNM. In the other dose estimates, the exposed individual was assumed to be an adult. In the additional scenario, the exposed individual is modeled as a child (0.5 to 1.5 years old) who resides on the ALE Unit. This scenario was developed based on a theoretical Native American family with children residing on the ALE Unit (Appendix D). Because the RESRAD computer code cannot be used without modification to estimate doses to non-adults, the original code outputs for the agricultural resident have been used as a starting point, and the pathways and exposures

adapted to the scenario of a child residing for 1 year on the ALE Unit (Napier et al. 2004). The child is assumed to ingest 73 grams of soil per year in addition to other uptake mechanisms. The resulting maximum estimated dose to a child is 2.4 mrem per year, or less than 3% of the 100-mrem-annual-dose limit used to establish the Authorized Limits (Appendix D).

3.3 Biota Dose Screening Assessment

To evaluate the soil concentrations observed on the ALE Unit in terms of potential dose to biota, the maximum measured soil concentrations for each radionuclide were used to conduct a Biota Dose Screening Assessment using the RESRAD biota computer code. This code compares the ratio of the radionuclide concentration in soil that would result in a 0.1-rad-per-day dose to terrestrial biota to maximum measured concentrations, then uses the sum of fractions approach to estimate total dose. The assessment was done for the entire ALE Unit, and then separately for each lysimeter plot (Appendix E). The total sum of fractions for dose to biota from the maximum soil concentrations observed on the ALE Unit is 0.037. The total sum of fractions for the ALE HQ and Snively lysimeter plots was 0.014 and 0.029, respectively. The total sum of fractions for each assessment is less than one, meaning the soils evaluated pass the level 1 screen. Passing the level 1 screen indicates that soil concentrations on the ALE Unit should not contribute a dose to terrestrial or riparian biota receptors that exceeds the recommended dose limit.

4.0 Conclusions

The 50 soil samples collected from the ALE Unit of the HRNM, all had concentrations of radionuclides far below the Authorized Limits. The maximum measured concentrations in soil on the ALE Unit were all less than 2% of the respective Authorized Limit. A statistical analysis of the results confirmed that assumptions made in the sampling design were met and that the number of samples and location of sampling sites was appropriate. In addition, the statistical analysis of the results concluded that the Authorized Limits were not exceeded when total uncertainty was considered. The calculated upper tolerance limit for each radionuclide in this study (which represents the value at which 99% of the measurements reside below with a 99% confidence level) was lower than the Authorized Limit for each radionuclide. The concentrations measured were similar to previous environmental monitoring on the ALE Unit and to estimated Hanford Site background soil concentrations. Furthermore, the maximum observed soil concentrations for radionuclides included in the Authorized Limits would result in an annual dose of 0.14 mrem assuming a recreational visitor scenario. The modeled dose for the agricultural resident scenario based on the maximum measured concentrations was 2.4 mrem per year. Similarly, the dose to a resident child on the ALE Unit was modeled to be 2.4 mrem per year. These doses are all well below the 100-mrem-per-year dose limit for a member of the public established by DOE.

Spatial analysis of the results indicated no observable statistically significant differences between radionuclides across the ALE Unit. There were no indications of any increased concentrations of radionuclides in ALE soil relative to upwind locations or Hanford Site background soil concentrations. The concentrations of radionuclides measured in soil on the ALE Unit had a range of results consistent with the range expected in Hanford Site background soil (DOE 1996a). The lysimeter plots had concentrations

of radionuclides similar to concentrations observed across the ALE Unit. The results of the biota dose assessment screen indicated that the levels of radionuclides on the ALE Unit pose no significant health risk to biota on ALE.

5.0 References

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Appendix A

Information About Each Sampling Location

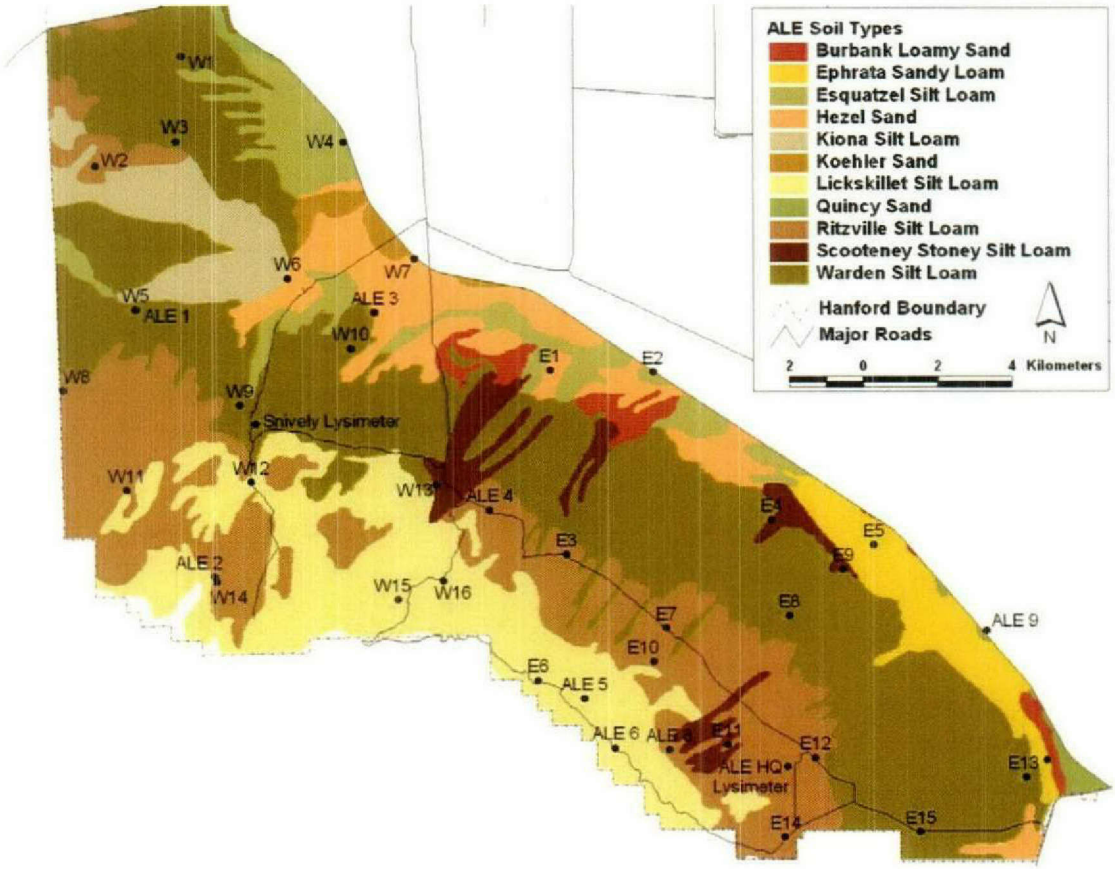

Figure A.1. Types of Soil on the ALE Unit (from Hajek 1966)

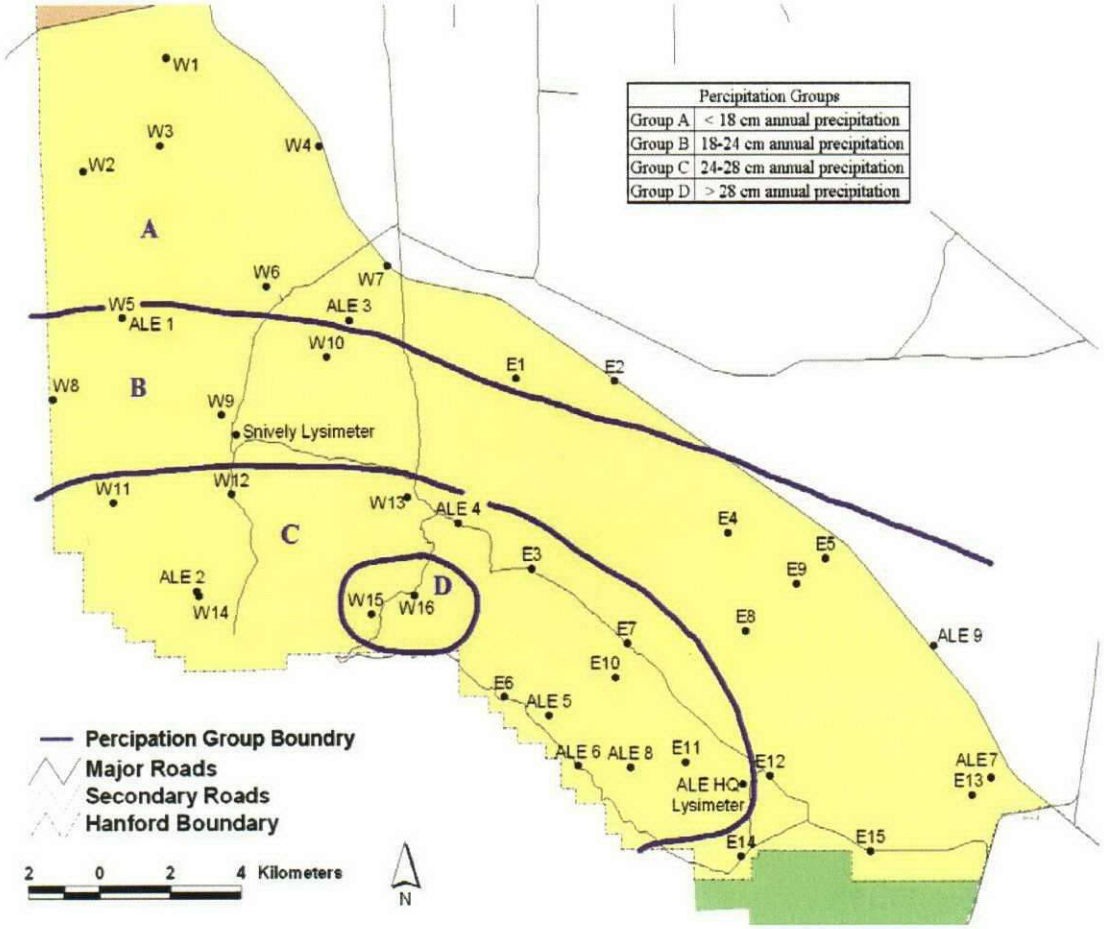

Figure A.2. Precipitation on the ALE Unit (from Stone 1983)

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Stone WA, JM Thorp, OP Gifford, and DJ Hoitink. 1983. *Climatological Summary from the Hanford Area*. PNL-4622, Pacific Northwest Laboratory, Richland, Washington.

Table A.1. Sampling Location Information for Soil Samples Collected on the ALE Unit of the HRNM

Collection date	Sample Name	Sampling Locations (Geodetic)			Sampling Locations (State Plane [Wa S])			Soil Information		Annual Average Precipitation
		Latitude	Longitude	Elevation (m)	Northing	Easting	Elevation (ft)	Soil Type	Soil Texture	
4/13/2004	ALE 1	46.50150	119.76133	262	130106.7	556695.1	860	Warden Silt Loam	Silt Loam	18-24 cm
4/13/2004	ALE 2	46.43678	119.73475	573	122932.8	558804.9	1880	Ritzville Silt Loam	Silt Loam	24-28 cm
4/21/2004	ALE 3	46.50025	119.67782	195	130031.2	563105.9	640	Hezel Sand	Sand	<18 cm
4/21/2004	ALE 4	46.45216	119.63856	323	124718.4	566177.6	1060	Ritzville Silt Loam	Silt Loam	24-28 cm
4/23/2004	ALE 5	46.40654	119.60619	953	119675.7	568721.6	3125	Lickskillet Silt Loam	Silt Loam	24-28 cm
4/23/2004	ALE 6	46.39450	119.59560	1087	118346.8	569551.2	3565	Lickskillet Silt Loam	Silt Loam	24-28 cm
4/23/2004	ALE 7	46.39014	119.44442	128	118006.7	581183.2	420	Ephrata Sandy Loam	Sandy Loam	18-24 cm
4/23/2004	ALE 8	46.39385	119.57659	661	118291.5	571013.9	2170	Ritzville Silt Loam	Silt Loam	24-28 cm
4/23/2004	ALE 9	46.42160	119.46494	158	121482.3	579559.3	520	Quincy Sand	Sand	18-24 cm
4/21/2004	E1	46.48590	119.61674	171	128487.0	567811.7	560	Hezel Sand	Sand	<18 cm
4/16/2004	E2	46.48510	119.58062	162	128429.7	570585.7	530	Esquatzel Silt Loam	Silt Loam	<18 cm
4/16/2004	E3	46.44120	119.61182	326	123523.1	568245.4	1070	Ritzville Silt Loam	Silt Loam	24-28 cm
4/16/2004	E4	46.44898	119.53970	172	124452.7	573776.1	565	Scooteney Stoney Silt Loam	Silt Loam	18-24 cm
4/16/2004	E5	46.44263	119.50407	151	123780.9	576522.2	495	Ephrata Sandy Loam	Sandy Loam	18-24 cm
4/23/2004	E6	46.41101	119.62253	1006	120158.4	567459.8	3300	Lickskillet Silt Loam	Silt Loam	24-28 cm
4/16/2004	E7	46.42332	119.57718	360	121566.4	570930.2	1180	Ritzville Silt Loam	Silt Loam	24-28 cm
4/16/2004	E8	46.42582	119.53373	270	121884.2	574266.3	885	Warden Silt Loam	Silt Loam	18-24 cm
4/23/2004	E9	46.43678	119.51476	168	123120.4	575709.0	550	Scooteney Stoney Silt Loam	Silt Loam	18-24 cm
4/16/2004	E10	46.41525	119.58157	439	120665.5	570603.2	1440	Ritzville Silt Loam	Silt Loam	24-28 cm
4/23/2004	E11	46.39495	119.55619	454	118432.4	572581.2	1490	Ritzville Silt Loam	Silt Loam	24-28 cm
4/23/2004	E12	46.39151	119.52561	349	118078.6	574937.5	1145	Ritzville Silt Loam	Silt Loam	18-24 cm
4/23/2004	E13	46.38612	119.45161	183	117552.6	580636.2	600	Warden Silt Loam	Silt Loam	18-24 cm
4/16/2004	E14	46.37247	119.53640	419	115952.3	574133.5	1375	Ritzville Silt Loam	Silt Loam	18-24 cm
4/16/2004	E15	46.37327	119.48903	287	116086.8	577776.5	940	Warden Silt Loam	Silt Loam	18-24 cm
4/13/2004	W1	46.56234	119.74412	241	136881.4	557951.1	790	Warden Silt Loam	Silt Loam	<18 cm
4/13/2004	W2	46.53604	119.77499	366	133936.0	555611.4	1200	Ritzville Silt Loam	Silt Loam	<18 cm
4/13/2004	W3	46.54185	119.74657	299	134602.2	557785.1	980	Warden Silt Loam	Silt Loam	<18 cm
4/16/2004	W4	46.54122	119.68803	195	134576.8	562275.4	640	Esquatzel Silt Loam	Silt Loam	<18 cm
4/13/2004	W5	46.50150	119.76132	282	130106.7	556695.8	925	Warden Silt Loam	Silt Loam	18-24 cm
4/13/2004	W6	46.50862	119.70805	270	130937.8	560776.4	885	Hezel Sand	Sand	<18 cm
4/21/2004	W7	46.51303	119.66376	194	131463.0	564170.0	635	Hezel Sand	Sand	<18 cm
4/13/2004	W8	46.48234	119.78697	317	127959.0	554746.4	1040	Ritzville Silt Loam	Silt Loam	18-24 cm
4/13/2004	W9	46.47826	119.72530	288	127550.2	559485.7	945	Warden Silt Loam	Silt Loam	18-24 cm
4/21/2004	W10	46.49166	119.68631	223	129069.7	562464.1	730	Warden Silt Loam	Silt Loam	18-24 cm
4/13/2004	W11	46.45795	119.76517	439	125263.5	556445.4	1440	Ritzville Silt Loam	Silt Loam	24-28 cm
4/13/2004	W12	46.45960	119.72181	386	125478.9	559774.2	1265	Lickskillet Silt Loam	Silt Loam	24-28 cm
4/21/2004	W13	46.45835	119.65726	347	125390.9	564733.7	1140	Scooteney Stoney Silt Loam	Silt Loam	24-28 cm
4/13/2004	W14	46.43565	119.73416	573	122807.7	558851.4	1880	Ritzville Silt Loam	Silt Loam	24-28 cm
4/21/2004	W15	46.43091	119.67099	756	122329.9	563711.1	2480	Lickskillet Silt Loam	Silt Loam	<28 cm
4/21/2004	W16	46.43513	119.65497	622	122812.0	564937.2	2040	Lickskillet Silt Loam	Silt Loam	<28 cm
4/23/2004	ALE HQ lysimeter 1	46.38947	119.53530	378	117842.7	574195.0	1240	Ritzville Silt Loam	Silt Loam	24-28 cm
4/23/2004	ALE HQ lysimeter 2	46.38947	119.53530	378	117842.7	574195.0	1240	Ritzville Silt Loam	Silt Loam	24-28 cm
4/23/2004	ALE HQ lysimeter 3	46.38947	119.53530	378	117842.7	574195.0	1240	Ritzville Silt Loam	Silt Loam	24-28 cm
4/23/2004	ALE HQ lysimeter 4	46.38947	119.53530	378	117842.7	574195.0	1240	Ritzville Silt Loam	Silt Loam	24-28 cm
4/23/2004	ALE HQ lysimeter 5	46.38947	119.53530	378	117842.7	574195.0	1240	Ritzville Silt Loam	Silt Loam	24-28 cm
4/21/2004	Snively lysimeter 1	46.47358	119.71989	305	127034.2	559906.3	1000	Warden Silt Loam	Silt Loam	18-24 cm
4/21/2004	Snively lysimeter 2	46.47289	119.72006	305	126957.3	559894.0	1000	Warden Silt Loam	Silt Loam	18-24 cm
4/21/2004	Snively lysimeter 3	46.47263	119.71991	305	126928.5	559905.8	1000	Warden Silt Loam	Silt Loam	18-24 cm
4/21/2004	Snively lysimeter 4	46.47237	119.71976	305	126899.8	559917.6	1000	Warden Silt Loam	Silt Loam	18-24 cm
4/21/2004	Snively lysimeter 5	46.47143	119.72070	305	126794.6	559846.4	1000	Warden Silt Loam	Silt Loam	18-24 cm

Table A.2. Sample Collection Field Notes. Locations with no field notes were collected from areas typical of surroundings, with no distinguishing features or other noteworthy characteristics.

Sample Name	Noteworthy Field Observations
ALE 1	Collected at the outside of a bend in a wash at the base of an eroded mud bank
ALE 2	Collected in the bottom of a wash on a flat bench approximately 100 yards below several eroded banks
ALE 3	Collected near the end of rattlesnake creek at the edge of existing water at the edge of a cut bank
ALE 4	Collected on the edge of 1200 foot road where creek drains out of Rattlesnake Mountain hills
ALE 5	Collected near white pump house partway down face of mountain from an alluvial deposit
ALE 6	Collected from mountain summit- very little soil available, very rocky
ALE 7	Collected from wind blown sand & other dirt in the bottom of a wash close to Yakima River
ALE 8	Collected along power line that runs from ALE HQ up to mountain peak
ALE 9	Collected from wind blown sand along edge of highway 240
E1	*No collection notes recorded*
E2	*No collection notes recorded*
E3	*No collection notes recorded*
E4	*No collection notes recorded*
E5	*No collection notes recorded*
E6	Location very rocky, very little soil, sample collected from a wide area to find enough soil
E7	*No collection notes recorded*
E8	*No collection notes recorded*
E9	*No collection notes recorded*
E10	*No collection notes recorded*
E11	Collected near a dry wash from flat terrain
E12	*No collection notes recorded*
E13	Collected near high-voltage power lines
E14	*No collection notes recorded*
E15	*No collection notes recorded*
W1	Collected on flat plain several hundred yards from a dry creek bed
W2	Collected near a large granite erratic
W3	Collected on a steep hillside near road
W4	*No collection notes recorded*
W5	Collected on top of the cut bank above ALE 1
W6	Collected from a flat bench on hill northwest of Rattlesnake springs
W7	*No collection notes recorded*
W8	Collected near plowed firebreak
W9	*No collection notes recorded*
W10	Collected in a shallow canyon with evidence of erosion from runoff
W11	*No collection notes recorded*
W12	*No collection notes recorded*
W13	Collected from a large, old alluvial deposit
W14	*No collection notes recorded*
W15	Collected from the top of a ridgeline
W16	Collected from an alluvial deposit in a shallow draw
ALE HQ lysimeter 1	Collected from PVC casings on the northwest side of lysimeter
ALE HQ lysimeter 2	Collected from PVC casings on top of lysimeter on the north half
ALE HQ lysimeter 3	Collected from PVC casings on top of lysimeter on the south half
ALE HQ lysimeter 4	Collected from a hole in the middle of the top of the plot
ALE HQ lysimeter 5	Collected from spots across the top of the lysimeter plot
Snively lysimeter 1	Collected from the tops of aluminum tubes in the ground
Snively lysimeter 2	Collected from the tops of aluminum tubes labeled 251 and 225
Snively lysimeter 3	Collected from the base of T posts labeled 242, 256 and 266
Snively lysimeter 4	Collected from 9 8" diameter PVC tubes next to stake 180
Snively lysimeter 5	Collected from around the edge of a hole suspected to have come from excavation

Appendix B

Soil Concentration Results

Table B.1. Summary of Results for Selected Radionuclides and Contaminants of Concern (Shaded cells with italic text denote samples with reported concentrations lower than minimum detectable concentration, i.e., undetected.)

Sample Number	Sample Site Name	Be-7	Co-60	Cs-134	Cs-137	Eu-152	K-40	Sr-90	U-234	U-235	U-238	Pu-238	Pu-239/40
B193K2	ALE 1	*0.00391*	*-0.00232*	*0.0286*	*0.00515*	*0.0141*	10.4	*0.0000055*	0.146	*0.00429*	0.183	*-0.000207*	*-0.000013*
B193K4	ALE 2	*0.0165*	*0.00816*	*0.0595*	0.0502	*-0.0202*	13.4	*0.00622*	0.149	*0.0118*	0.224	*0.0000536*	0.00115
B193P6	ALE 3	*0.021*	*0.00125*	*0.0572*	0.0749	*-0.00534*	12.9	*0.0256*	0.193	*0.00121*	0.168	*-0.000142*	0.00375
B193P8	ALE 4	0.852	*0.00867*	*0.0338*	0.324	*-0.00242*	9.64	*-0.00631*	0.198	0.00805	0.183	*0.000908*	0.0142
B193V2	ALE 5	*-0.154*	*0.0109*	*0.0557*	0.587	*-0.028*	13.2	0.224	0.0858	0.00476	0.108	0.00643	0.0159
B193V4	ALE 6	*0.0743*	*0.00622*	*0.0316*	0.282	*-0.023*	8.69	0.107	0.176	0.0058	0.162	*0.0015*	0.0087
B193V6	ALE 7	*0.0805*	*-0.00423*	*0.052*	0.265	*0.0129*	14	0.0587	0.458	0.00932	0.49	0.00191	0.00784
B193V8	ALE 8	*0.061*	*0.015*	*0.0552*	0.111	*-0.00258*	15.4	0.107	0.164	*0.0109*	0.172	0.00371	0.00332
B193W0	ALE 9	*0.0591*	*-0.00298*	*0.0456*	0.256	*-0.0142*	14.4	0.128	0.105	*-0.00162*	0.0988	*0.000987*	0.00857
B193R0	E1	*0.00976*	*-0.00193*	*0.0476*	0.115	*-0.00629*	15.2	0.0514	0.436	0.0134	0.295	*0.000286*	0.00613
B193M6	E2	*0.121*	*0.00397*	*0.0509*	0.203	*-0.0194*	17.6	0.0632	0.171	*0.00842*	0.176	0.00214	0.00737
B193M8	E3	*0.0798*	*0.000483*	*0.039*	0.106	*0.0128*	14.4	*0.026*	0.166	0.00724	0.187	0.0031	0.00895
B193N0	E4	*-0.0668*	*-0.00154*	*0.038*	0.214	*-0.0135*	14.1	0.0559	0.109	*-0.0023*	0.134	0.000503	0.00716
B193N2	E5	*-0.106*	*-0.00394*	*0.0702*	0.376	*-0.0311*	16.7	0.173	0.153	*0.00435*	0.126	*0.000709*	0.0138
B193W2	E6	*0.144*	*0.00211*	*0.0163*	0.468	*-0.0021*	4.94	0.145	0.138	*0.00365*	0.161	0.000729	0.0353
B193N4	E7	*0.0702*	*0.0123*	*0.0482*	0.166	*0.0234*	15.1	0.059	0.146	*0.00356*	0.129	*0.000124*	0.00512
B193N6	E8	*0.0843*	*-0.00489*	*0.0545*	0.0667	*0.0116*	13.6	*0.0282*	0.113	*0.00471*	0.16	*0.000224*	0.00235
B193W4	E9	*-0.07*	*-0.00511*	*0.058*	0.0863	*-0.0245*	16.1	0.0675	0.145	0.00948	0.161	*-0.0000302*	0.00228
B193N8	E10	*0.00907*	*0.007*	*0.0559*	0.176	*0.000914*	13.7	0.094	0.129	*0.0061*	0.199	0.00247	0.00681
B193W6	E11	*0.148*	*0.00319*	*0.0558*	0.0721	*-0.00948*	18.4	0.0392	0.189	0.009	0.224	0.00208	0.00186
B193W8	E12	*-0.00439*	*-0.00275*	*0.0549*	0.191	*-0.0121*	15.7	0.0439	0.164	*0.00622*	0.183	*0.000807*	0.0067
B193X0	E13	*-0.117*	*-0.00614*	*0.0512*	0.197	*0.00844*	14.7	0.075	0.179	*0.0035*	0.168	0.00474	0.00731
B193P0	E14	*-0.0289*	*-0.00049*	*0.0702*	0.155	*-0.0204*	13.8	*0.0301*	0.159	*0.00836*	0.168	*0.000174*	0.00448
B193P2	E15	*-0.00482*	*0.00393*	*0.0553*	0.412	*-0.0225*	14.5	0.143	0.12	*0.0121*	0.161	0.00113	0.0138
B193K6	W1	*-0.00946*	*0.00499*	*0.0442*	0.218	*-0.0115*	13.4	0.0938	0.125	*-0.00159*	0.129	0.000353	0.00762
B193K8	W2	*-0.0047*	*-0.00522*	*0.0617*	0.0798	*-0.0209*	15.4	0.0401	0.188	0.00713	0.167	*0.0000609*	0.00199
B193L0	W3	*0.2*	*0.00735*	*0.0384*	0.314	*-0.0133*	14.9	0.153	0.11	*0.00308*	0.171	0.00105	0.0112
B193P4	W4	*0.0166*	*0.00254*	*0.0222*	0.0793	*-0.00406*	12.6	0.136	0.137	*-0.00161*	0.141	0.000651	0.00281
B193L2	W5	*0.0363*	*0.00601*	*0.0552*	0.113	*-0.0184*	12.7	0.0485	0.12	0.00554	0.143	0.00475	0.00515
B193L4	W6	*-0.0291*	*0.000305*	*0.0481*	0.425	*0.0149*	14.1	0.144	0.123	*0.00409*	0.117	0.00096	0.0137
B193R2	W7	*0.023*	*0.00101*	*0.0339*	0.114	*-0.0277*	13.2	0.0869	0.128	0.00748	0.116	0.00122	0.00681
B193L6	W8	*0.0281*	*0.0175*	*0.0713*	0.15	*-0.00607*	15.7	*0.0419*	0.219	0.00523	0.219	*0.000217*	0.00558
B193L8	W9	*0.104*	*0.00179*	*0.0137*	0.13	*0.00214*	15.5	*0.0423*	0.177	*0.000766*	0.164	*0.000142*	0.00578
B193R4	W10	*-0.00079*	*-0.00415*	*0.0395*	0.135	*0.00621*	13.9	0.0393	0.104	*0.000717*	0.105	*0.000201*	0.00595
B193M0	W11	*-0.131*	*-0.0087*	*0.043*	0.0825	*0.00623*	12.4	*0.0443*	0.142	*0.0000091*	0.145	*-0.0000303*	0.00299
B193M2	W12	*-0.0721*	*-0.00426*	*0.0583*	0.103	*-0.0349*	14.6	0.0504	0.11	*0.00138*	0.131	0.00215	0.0032
B193R6	W13	*0.0515*	*-0.0197*	*0.0539*	0.466	*0.00432*	14.4	0.0775	0.0897	*0.00258*	0.129	0.0009	0.0298
B193M4	W14	*0.0276*	*0.00493*	*0.0409*	0.141	*-0.0112*	13.9	0.0785	0.134	*0.00847*	0.174	*0.000173*	0.00466
B193R8	W15	*-0.0242*	*0.00436*	*0.0401*	0.0493	*0.00244*	14	*0.0181*	0.145	*0.00518*	0.206	*-0.0000304*	0.00133
B193T0	W16	*0.043*	*0.00202*	*0.0417*	0.0227	*-0.00442*	14.8	*0.0315*	0.162	*0.00578*	0.175	*0.000452*	*0.000598*

Table B.1. (contd)

Sample Number	Sample Site Name	Be-7	Co-60	Cs-134	Cs-137	Eu-152	K-40	Sr-90	U-234	U-235	U-238	Pu-238	Pu-239/40	Am-241
B193X2	ALE HQ Lysimeter 1	*0.128*	*0.00283*	*0.0869*	0.0513	*-0.0201*	15.1	0.0418	0.136	*0.00319*	0.139	*0.000214*	0.00147	*0.000301*
B193X4	ALE HQ Lysimeter 2	*-0.208*	*0.00576*	*0.069*	0.0501	*0.00516*	15.7	0.0509	0.177	0.00907	0.15	0.00434	0.00202	*0.000863*
B193X6	ALE HQ Lysimeter 3	*-0.0846*	*0.00334*	*0.0671*	0.0565	*-0.00831*	15.5	0.0347	0.102	*0.00198*	0.132	*0.0000869*	0.00148	*0.00148*
B193X8	ALE HQ Lysimeter 4	*0.0749*	*-0.000363*	*0.0717*	0.0626	*0.0204*	16	0.0623	0.142	*0.0043*	0.134	0.00297	0.00147	*0.00209*
B193Y0	ALE HQ Lysimeter 5	*0.0178*	*-0.0021*	*0.0458*	0.0472	*-0.0198*	15.6	*0.0196*	0.124	0.00621	0.148	*0.000125*	0.00134	*0.000431*
B193T2	SNIVELY Lysimeter 1	*-0.0684*	*0.00687*	*0.0303*	0.325	*-0.0222*	15.8	0.0762	0.154	0.0124	0.16	0.00164	0.0134	*-0.0000246*
B193T4	SNIVELY Lysimeter 2	*-0.0226*	*0.00535*	*0.0643*	0.16	*0.0111*	15.8	*0.0428*	0.149	*0.00165*	0.164	*0.00128*	0.00439	*0.000444*
B193T6	SNIVELY Lysimeter 3	*0.0984*	*0.000024*	*0.0563*	0.241	*-0.0387*	14.7	0.101	0.149	*0.00652*	0.167	*0.000759*	0.00657	*0.00364*
B193T8	SNIVELY Lysimeter 4	*-0.0395*	*-0.00213*	*0.0381*	0.267	*-0.0133*	14.1	0.163	0.135	*0.000795*	0.156	*0.000768*	0.0123	*0.00356*
B193V0	SNIVELY Lysimeter 5	*0.00458*	*0.00168*	*0.0501*	0.109	*0.0362*	14.7	0.0767	0.149	0.0123	0.15	0.000623	0.00307	*-0.00044*

Table B.2. All Results from Soil Sampling on the ALE Unit of the HRNM for Radionuclides Included in the Authorized Limit

Sample number	Sample Location	Sample Date	Radionculide	Concentration (pCi/g)	Counting Error	Total Analytical Error	Detection Limit	Lab Qualifier
B193K2	ALE 1	13-Apr-04	Co-60	-0.00232	0.0084	0.0084	0.0145	Undetected
B193K2	ALE 1	13-Apr-04	Cs-134	0.0286	0.012	0.012	0.0176	Undetected
B193K2	ALE 1	13-Apr-04	Cs-137	0.00515	0.0085	0.0085	0.0149	Undetected
B193K2	ALE 1	13-Apr-04	Eu-152	0.0141	0.022	0.022	0.0335	Undetected
B193K2	ALE 1	13-Apr-04	Pu-239/240	-0.0000136	0.00031	0.00033	0.000648	Undetected
B193K2	ALE 1	13-Apr-04	Sr-90	0.0000055	0.00033	0.031	0.0614	Undetected
B193K2	ALE 1	13-Apr-04	U-234	0.146	0.031	0.04	0.0158	
B193K2	ALE 1	13-Apr-04	U-235	0.00429	0.0072	0.0073	0.0108	Undetected
B193K2	ALE 1	13-Apr-04	U-238	0.183	0.035	0.046	0.0207	
B193K4	ALE 2	13-Apr-04	Co-60	0.00816	0.011	0.011	0.0196	Undetected
B193K4	ALE 2	13-Apr-04	Cs-134	0.0595	0.021	0.021	0.0248	Undetected
B193K4	ALE 2	13-Apr-04	Cs-137	0.0502	0.019	0.019	0.0182	
B193K4	ALE 2	13-Apr-04	Eu-152	-0.0202	0.023	0.023	0.0378	Undetected
B193K4	ALE 2	13-Apr-04	Pu-239/240	0.00115	0.00073	0.00076	0.000777	
B193K4	ALE 2	13-Apr-04	Sr-90	0.00622	0.035	0.035	0.0679	Undetected
B193K4	ALE 2	13-Apr-04	U-234	0.149	0.029	0.038	0.0232	
B193K4	ALE 2	13-Apr-04	U-235	0.0118	0.01	0.01	0.0134	Undetected
B193K4	ALE 2	13-Apr-04	U-238	0.224	0.034	0.05	0.0225	
B193P6	ALE 3	21-Apr-04	Co-60	0.00125	0.011	0.011	0.0198	Undetected
B193P6	ALE 3	21-Apr-04	Cs-134	0.0572	0.02	0.02	0.0291	Undetected
B193P6	ALE 3	21-Apr-04	Cs-137	0.0749	0.025	0.025	0.0215	
B193P6	ALE 3	21-Apr-04	Eu-152	-0.00534	0.029	0.029	0.0485	Undetected
B193P6	ALE 3	21-Apr-04	Pu-239/240	0.00375	0.0017	0.0025	0.000468	
B193P6	ALE 3	21-Apr-04	Sr-90	0.0256	0.021	0.022	0.0376	Undetected
B193P6	ALE 3	21-Apr-04	U-234	0.193	0.034	0.047	0.0104	
B193P6	ALE 3	21-Apr-04	U-235	0.00121	0.004	0.0041	0.00384	Undetected
B193P6	ALE 3	21-Apr-04	U-238	0.168	0.032	0.042	0.0131	
B193P8	ALE 4	21-Apr-04	Co-60	0.00867	0.017	0.017	0.0315	Undetected
B193P8	ALE 4	21-Apr-04	Cs-134	0.0338	0.022	0.022	0.0351	Undetected
B193P8	ALE 4	21-Apr-04	Cs-137	0.324	0.056	0.056	0.029	
B193P8	ALE 4	21-Apr-04	Eu-152	-0.00242	0.08	0.08	0.0678	Undetected
B193P8	ALE 4	21-Apr-04	Pu-239/240	0.0142	0.0037	0.0043	0.00172	
B193P8	ALE 4	21-Apr-04	Sr-90	-0.00631	0.027	0.027	0.0529	Undetected
B193P8	ALE 4	21-Apr-04	U-234	0.198	0.032	0.046	0.0089	
B193P8	ALE 4	21-Apr-04	U-235	0.00805	0.0068	0.007	0.00328	
B193P8	ALE 4	21-Apr-04	U-238	0.183	0.03	0.043	0.0089	
B193V2	ALE 5	23-Apr-04	Co-60	0.0109	0.014	0.014	0.0265	Undetected
B193V2	ALE 5	23-Apr-04	Cs-134	0.0557	0.021	0.021	0.0313	Undetected
B193V2	ALE 5	23-Apr-04	Cs-137	0.587	0.081	0.081	0.0236	
B193V2	ALE 5	23-Apr-04	Eu-152	-0.028	0.04	0.04	0.058	Undetected
B193V2	ALE 5	23-Apr-04	Pu-239/240	0.0159	0.0029	0.0037	0.00035	
B193V2	ALE 5	23-Apr-04	Sr-90	0.224	0.037	0.051	0.0495	
B193V2	ALE 5	23-Apr-04	U-234	0.0858	0.018	0.023	0.00737	
B193V2	ALE 5	23-Apr-04	U-235	0.00476	0.0045	0.0046	0.00215	
B193V2	ALE 5	23-Apr-04	U-238	0.108	0.019	0.026	0.00953	
B193V4	ALE 6	23-Apr-04	Co-60	0.00622	0.0092	0.0092	0.0168	Undetected
B193V4	ALE 6	23-Apr-04	Cs-134	0.0316	0.018	0.018	0.0201	Undetected
B193V4	ALE 6	23-Apr-04	Cs-137	0.282	0.04	0.04	0.0155	
B193V4	ALE 6	23-Apr-04	Eu-152	-0.023	0.022	0.022	0.0354	Undetected
B193V4	ALE 6	23-Apr-04	Pu-239/240	0.0087	0.0037	0.0039	0.00104	
B193V4	ALE 6	23-Apr-04	Sr-90	0.107	0.03	0.035	0.0451	
B193V4	ALE 6	23-Apr-04	U-234	0.176	0.026	0.039	0.00682	
B193V4	ALE 6	23-Apr-04	U-235	0.0058	0.0052	0.0054	0.00251	
B193V4	ALE 6	23-Apr-04	U-238	0.162	0.025	0.036	0.0086	
B193V6	ALE 7	23-Apr-04	Co-60	-0.00423	0.011	0.011	0.0182	Undetected
B193V6	ALE 7	23-Apr-04	Cs-134	0.052	0.021	0.021	0.0251	Undetected
B193V6	ALE 7	23-Apr-04	Cs-137	0.265	0.04	0.04	0.0198	
B193V6	ALE 7	23-Apr-04	Eu-152	0.0129	0.026	0.026	0.0449	Undetected
B193V6	ALE 7	23-Apr-04	Pu-239/240	0.00784	0.0025	0.0028	0.00143	
B193V6	ALE 7	23-Apr-04	Sr-90	0.0587	0.031	0.033	0.0489	
B193V6	ALE 7	23-Apr-04	U-234	0.458	0.05	0.09	0.00369	
B193V6	ALE 7	23-Apr-04	U-235	0.00932	0.0077	0.0079	0.00369	
B193V6	ALE 7	23-Apr-04	U-238	0.49	0.052	0.095	0.01	
B193V8	ALE 8	23-Apr-04	Co-60	0.015	0.015	0.015	0.0279	Undetected

Table B.2. (contd)

Sample number	Sample Location	Sample Date	Radionculide	Concentration (pCi/g)	Counting Error	Total Analytical Error	Detection Limit	Lab Qualifier
B193V8	ALE 8	23-Apr-04	Cs-134	0.0552	0.021	0.021	0.0335	Undetected
B193V8	ALE 8	23-Apr-04	Cs-137	0.111	0.027	0.027	0.027	
B193V8	ALE 8	23-Apr-04	Eu-152	-0.00258	0.037	0.037	0.0603	Undetected
B193V8	ALE 8	23-Apr-04	Pu-239/240	0.00332	0.0012	0.0013	0.000273	
B193V8	ALE 8	23-Apr-04	Sr-90	0.107	0.031	0.035	0.0436	
B193V8	ALE 8	23-Apr-04	U-234	0.164	0.034	0.044	0.0168	
B193V8	ALE 8	23-Apr-04	U-235	0.0109	0.0099	0.01	0.0115	Undetected
B193V8	ALE 8	23-Apr-04	U-238	0.172	0.034	0.044	0.0145	
B193W0	ALE 9	23-Apr-04	Co-60	-0.00298	0.0092	0.0092	0.0157	Undetected
B193W0	ALE 9	23-Apr-04	Cs-134	0.0456	0.018	0.018	0.0213	Undetected
B193W0	ALE 9	23-Apr-04	Cs-137	0.256	0.036	0.036	0.0158	
B193W0	ALE 9	23-Apr-04	Eu-152	-0.0142	0.021	0.021	0.035	Undetected
B193W0	ALE 9	23-Apr-04	Pu-239/240	0.00857	0.0018	0.0022	0.00025	
B193W0	ALE 9	23-Apr-04	Sr-90	0.128	0.031	0.037	0.0431	
B193W0	ALE 9	23-Apr-04	U-234	0.105	0.022	0.028	0.00959	
B193W0	ALE 9	23-Apr-04	U-235	-0.00162	0.0041	0.0042	0.00959	Undetected
B193W0	ALE 9	23-Apr-04	U-238	0.0988	0.021	0.027	0.00959	
B193R0	ALE E1	21-Apr-04	Co-60	-0.00193	0.01	0.01	0.0172	Undetected
B193R0	ALE E1	21-Apr-04	Cs-134	0.0476	0.016	0.016	0.0227	Undetected
B193R0	ALE E1	21-Apr-04	Cs-137	0.115	0.024	0.024	0.0162	
B193R0	ALE E1	21-Apr-04	Eu-152	-0.00629	0.023	0.023	0.0376	Undetected
B193R0	ALE E1	21-Apr-04	Pu-239/240	0.00613	0.0014	0.0017	0.000581	
B193R0	ALE E1	21-Apr-04	Sr-90	0.0514	0.02	0.022	0.0298	
B193R0	ALE E1	21-Apr-04	U-234	0.436	0.046	0.084	0.0162	
B193R0	ALE E1	21-Apr-04	U-235	0.0134	0.0095	0.0098	0.0107	
B193R0	ALE E1	21-Apr-04	U-238	0.295	0.038	0.061	0.0173	
B193M6	ALE E2	16-Apr-04	Co-60	0.00397	0.015	0.015	0.026	Undetected
B193M6	ALE E2	16-Apr-04	Cs-134	0.0509	0.021	0.021	0.0292	Undetected
B193M6	ALE E2	16-Apr-04	Cs-137	0.203	0.04	0.04	0.0224	
B193M6	ALE E2	16-Apr-04	Eu-152	-0.0194	0.049	0.049	0.0561	Undetected
B193M6	ALE E2	16-Apr-04	Pu-239/240	0.00737	0.0015	0.0018	0.00055	
B193M6	ALE E2	16-Apr-04	Sr-90	0.0632	0.025	0.027	0.0423	
B193M6	ALE E2	16-Apr-04	U-234	0.171	0.039	0.048	0.0198	
B193M6	ALE E2	16-Apr-04	U-235	0.00842	0.0089	0.0091	0.00542	Undetected
B193M6	ALE E2	16-Apr-04	U-238	0.176	0.039	0.049	0.0186	
B193M8	ALE E3	16-Apr-04	Co-60	0.000483	0.013	0.013	0.0226	Undetected
B193M8	ALE E3	16-Apr-04	Cs-134	0.039	0.027	0.027	0.0303	Undetected
B193M8	ALE E3	16-Apr-04	Cs-137	0.106	0.028	0.028	0.0203	
B193M8	ALE E3	16-Apr-04	Eu-152	0.0128	0.029	0.029	0.049	Undetected
B193M8	ALE E3	16-Apr-04	Pu-239/240	0.00895	0.0011	0.0017	0.0000895	
B193M8	ALE E3	16-Apr-04	Sr-90	0.026	0.02	0.021	0.0383	Undetected
B193M8	ALE E3	16-Apr-04	U-234	0.166	0.028	0.039	0.00299	
B193M8	ALE E3	16-Apr-04	U-235	0.00724	0.0062	0.0064	0.00299	
B193M8	ALE E3	16-Apr-04	U-238	0.187	0.029	0.042	0.00624	
B193N0	ALE E4	16-Apr-04	Co-60	-0.00154	0.01	0.01	0.0179	Undetected
B193N0	ALE E4	16-Apr-04	Cs-134	0.038	0.016	0.016	0.0227	Undetected
B193N0	ALE E4	16-Apr-04	Cs-137	0.214	0.033	0.033	0.0163	
B193N0	ALE E4	16-Apr-04	Eu-152	-0.0135	0.024	0.024	0.0397	Undetected
B193N0	ALE E4	16-Apr-04	Pu-239/240	0.00716	0.0016	0.0019	0.000823	
B193N0	ALE E4	16-Apr-04	Sr-90	0.0559	0.023	0.025	0.0407	
B193N0	ALE E4	16-Apr-04	U-234	0.109	0.028	0.034	0.0132	
B193N0	ALE E4	16-Apr-04	U-235	-0.0023	0.0014	0.0015	0.00958	Undetected
B193N0	ALE E4	16-Apr-04	U-238	0.134	0.031	0.038	0.00958	
B193N2	ALE E5	16-Apr-04	Co-60	-0.00394	0.014	0.014	0.0237	Undetected
B193N2	ALE E5	16-Apr-04	Cs-134	0.0702	0.022	0.022	0.0301	Undetected
B193N2	ALE E5	16-Apr-04	Cs-137	0.376	0.058	0.058	0.0202	
B193N2	ALE E5	16-Apr-04	Eu-152	-0.0311	0.031	0.031	0.0493	Undetected
B193N2	ALE E5	16-Apr-04	Pu-239/240	0.0138	0.0035	0.0044	0.00156	
B193N2	ALE E5	16-Apr-04	Sr-90	0.173	0.029	0.04	0.0375	
B193N2	ALE E5	16-Apr-04	U-234	0.153	0.025	0.036	0.00773	
B193N2	ALE E5	16-Apr-04	U-235	0.00435	0.0049	0.005	0.00269	Undetected
B193N2	ALE E5	16-Apr-04	U-238	0.126	0.023	0.031	0.00269	
B193W2	ALE E6	23-Apr-04	Co-60	0.00211	0.0076	0.0076	0.0139	Undetected

Table B.2. (contd)

Sample number	Sample Location	Sample Date	Radionculide	Concentration (pCi/g)	Counting Error	Total Analytical Error	Detection Limit	Lab Qualifier
B193W2	ALE E6	23-Apr-04	Cs-134	0.0163	0.015	0.015	0.0176	Undetected
B193W2	ALE E6	23-Apr-04	Cs-137	0.468	0.061	0.061	0.014	
B193W2	ALE E6	23-Apr-04	Eu-152	-0.0021	0.021	0.021	0.0365	Undetected
B193W2	ALE E6	23-Apr-04	Pu-239/240	0.0353	0.0026	0.0058	0.000361	
B193W2	ALE E6	23-Apr-04	Sr-90	0.145	0.031	0.038	0.0425	
B193W2	ALE E6	23-Apr-04	U-234	0.138	0.032	0.04	0.00471	
B193W2	ALE E6	23-Apr-04	U-235	0.00365	0.0078	0.0078	0.0128	Undetected
B193W2	ALE E6	23-Apr-04	U-238	0.161	0.034	0.043	0.00471	
B193N4	ALE E7	16-Apr-04	Co-60	0.0123	0.014	0.014	0.025	Undetected
B193N4	ALE E7	16-Apr-04	Cs-134	0.0482	0.017	0.017	0.0295	Undetected
B193N4	ALE E7	16-Apr-04	Cs-137	0.166	0.03	0.03	0.0242	
B193N4	ALE E7	16-Apr-04	Eu-152	0.0234	0.048	0.048	0.0558	Undetected
B193N4	ALE E7	16-Apr-04	Pu-239/240	0.00512	0.0013	0.0015	0.000565	
B193N4	ALE E7	16-Apr-04	Sr-90	0.059	0.025	0.027	0.0426	
B193N4	ALE E7	16-Apr-04	U-234	0.146	0.026	0.036	0.00871	
B193N4	ALE E7	16-Apr-04	U-235	0.00356	0.0051	0.0052	0.00631	Undetected
B193N4	ALE E7	16-Apr-04	U-238	0.129	0.024	0.032	0.00302	
B193N6	ALE E8	16-Apr-04	Co-60	-0.00489	0.012	0.012	0.0201	Undetected
B193N6	ALE E8	16-Apr-04	Cs-134	0.0545	0.028	0.028	0.0275	Undetected
B193N6	ALE E8	16-Apr-04	Cs-137	0.0667	0.024	0.024	0.0194	
B193N6	ALE E8	16-Apr-04	Eu-152	0.0116	0.026	0.026	0.0443	Undetected
B193N6	ALE E8	16-Apr-04	Pu-239/240	0.00235	0.00091	0.00098	0.000229	
B193N6	ALE E8	16-Apr-04	Sr-90	0.0282	0.021	0.023	0.0412	Undetected
B193N6	ALE E8	16-Apr-04	U-234	0.113	0.025	0.032	0.00929	
B193N6	ALE E8	16-Apr-04	U-235	0.00471	0.0056	0.0058	0.00342	Undetected
B193N6	ALE E8	16-Apr-04	U-238	0.16	0.029	0.039	0.00342	
B193W4	ALE E9	23-Apr-04	Co-60	-0.00511	0.012	0.012	0.0192	Undetected
B193W4	ALE E9	23-Apr-04	Cs-134	0.058	0.02	0.02	0.0273	Undetected
B193W4	ALE E9	23-Apr-04	Cs-137	0.0863	0.021	0.021	0.0209	
B193W4	ALE E9	23-Apr-04	Eu-152	-0.0245	0.027	0.027	0.0439	Undetected
B193W4	ALE E9	23-Apr-04	Pu-239/240	0.00228	0.0013	0.0013	0.000461	
B193W4	ALE E9	23-Apr-04	Sr-90	0.0675	0.023	0.026	0.0305	
B193W4	ALE E9	23-Apr-04	U-234	0.145	0.026	0.036	0.00815	
B193W4	ALE E9	23-Apr-04	U-235	0.00948	0.0077	0.0079	0.00815	
B193W4	ALE E9	23-Apr-04	U-238	0.161	0.027	0.038	0.00815	
B193N8	ALE E10	16-Apr-04	Co-60	0.007	0.012	0.012	0.0224	Undetected
B193N8	ALE E10	16-Apr-04	Cs-134	0.0559	0.028	0.028	0.0291	Undetected
B193N8	ALE E10	16-Apr-04	Cs-137	0.176	0.033	0.033	0.0199	
B193N8	ALE E10	16-Apr-04	Eu-152	0.000914	0.028	0.028	0.0474	Undetected
B193N8	ALE E10	16-Apr-04	Pu-239/240	0.00681	0.0024	0.0026	0.00141	
B193N8	ALE E10	16-Apr-04	Sr-90	0.094	0.031	0.035	0.0511	
B193N8	ALE E10	16-Apr-04	U-234	0.129	0.026	0.034	0.0165	
B193N8	ALE E10	16-Apr-04	U-235	0.0061	0.0066	0.0067	0.00811	Undetected
B193N8	ALE E10	16-Apr-04	U-238	0.199	0.031	0.045	0.0155	
B193W6	ALE E11	23-Apr-04	Co-60	0.00319	0.017	0.017	0.029	Undetected
B193W6	ALE E11	23-Apr-04	Cs-134	0.0558	0.03	0.03	0.0364	Undetected
B193W6	ALE E11	23-Apr-04	Cs-137	0.0721	0.027	0.027	0.0275	
B193W6	ALE E11	23-Apr-04	Eu-152	-0.00948	0.039	0.039	0.0634	Undetected
B193W6	ALE E11	23-Apr-04	Pu-239/240	0.00186	0.001	0.0011	0.00038	
B193W6	ALE E11	23-Apr-04	Sr-90	0.0392	0.021	0.025	0.0358	
B193W6	ALE E11	23-Apr-04	U-234	0.189	0.031	0.044	0.00964	
B193W6	ALE E11	23-Apr-04	U-235	0.009	0.0075	0.0077	0.00698	
B193W6	ALE E11	23-Apr-04	U-238	0.224	0.034	0.05	0.00848	
B193W8	ALE E12	23-Apr-04	Co-60	-0.00275	0.012	0.012	0.0204	Undetected
B193W8	ALE E12	23-Apr-04	Cs-134	0.0549	0.02	0.02	0.0297	Undetected
B193W8	ALE E12	23-Apr-04	Cs-137	0.191	0.032	0.032	0.0208	
B193W8	ALE E12	23-Apr-04	Eu-152	-0.0121	0.029	0.029	0.048	Undetected
B193W8	ALE E12	23-Apr-04	Pu-239/240	0.0067	0.0018	0.002	0.000323	
B193W8	ALE E12	23-Apr-04	Sr-90	0.0439	0.025	0.027	0.0388	
B193W8	ALE E12	23-Apr-04	U-234	0.164	0.03	0.041	0.0102	
B193W8	ALE E12	23-Apr-04	U-235	0.00622	0.0064	0.0065	0.00353	Undetected
B193W8	ALE E12	23-Apr-04	U-238	0.183	0.031	0.043	0.0112	
B193X0	ALE E13	23-Apr-04	Co-60	-0.00614	0.011	0.011	0.0184	Undetected

Table B.2. (contd)

Sample number	Sample Location	Sample Date	Radionculide	Concentration (pCi/g)	Counting Error	Total Analytical Error	Detection Limit	Lab Qualifier
B193X0	ALE E13	23-Apr-04	Cs-134	0.0512	0.017	0.017	0.024	Undetected
B193X0	ALE E13	23-Apr-04	Cs-137	0.197	0.032	0.032	0.0176	
B193X0	ALE E13	23-Apr-04	Eu-152	0.00844	0.024	0.024	0.0406	Undetected
B193X0	ALE E13	23-Apr-04	Pu-239/240	0.00731	0.0018	0.0021	0.000814	
B193X0	ALE E13	23-Apr-04	Sr-90	0.075	0.026	0.029	0.0365	
B193X0	ALE E13	23-Apr-04	U-234	0.179	0.036	0.047	0.00461	
B193X0	ALE E13	23-Apr-04	U-235	0.0035	0.0059	0.006	0.00461	Undetected
B193X0	ALE E13	23-Apr-04	U-238	0.168	0.034	0.044	0.00962	
B193P0	ALE E14	16-Apr-04	Co-60	-0.000499	0.012	0.012	0.0217	Undetected
B193P0	ALE E14	16-Apr-04	Cs-134	0.0702	0.025	0.025	0.0302	Undetected
B193P0	ALE E14	16-Apr-04	Cs-137	0.155	0.031	0.031	0.0213	
B193P0	ALE E14	16-Apr-04	Eu-152	-0.0204	0.03	0.03	0.0503	Undetected
B193P0	ALE E14	16-Apr-04	Pu-239/240	0.00448	0.0014	0.0015	0.000276	
B193P0	ALE E14	16-Apr-04	Sr-90	0.0301	0.03	0.03	0.0519	Undetected
B193P0	ALE E14	16-Apr-04	U-234	0.159	0.032	0.041	0.0153	
B193P0	ALE E14	16-Apr-04	U-235	0.00836	0.0085	0.0087	0.0105	Undetected
B193P0	ALE E14	16-Apr-04	U-238	0.168	0.033	0.043	0.0187	
B193P2	ALE E15	16-Apr-04	Co-60	0.00393	0.013	0.013	0.0226	Undetected
B193P2	ALE E15	16-Apr-04	Cs-134	0.0553	0.02	0.02	0.0291	Undetected
B193P2	ALE E15	16-Apr-04	Cs-137	0.412	0.063	0.063	0.0214	
B193P2	ALE E15	16-Apr-04	Eu-152	-0.0225	0.03	0.03	0.0482	Undetected
B193P2	ALE E15	16-Apr-04	Pu-239/240	0.0138	0.0026	0.0032	0.000851	
B193P2	ALE E15	16-Apr-04	Sr-90	0.143	0.035	0.042	0.0541	
B193P2	ALE E15	16-Apr-04	U-234	0.12	0.028	0.035	0.0242	
B193P2	ALE E15	16-Apr-04	U-235	0.0121	0.011	0.011	0.0149	Undetected
B193P2	ALE E15	16-Apr-04	U-238	0.161	0.031	0.04	0.0207	
B193K6	ALE W1	13-Apr-04	Co-60	0.00499	0.012	0.012	0.0215	Undetected
B193K6	ALE W1	13-Apr-04	Cs-134	0.0442	0.023	0.023	0.0267	Undetected
B193K6	ALE W1	13-Apr-04	Cs-137	0.218	0.037	0.037	0.0197	
B193K6	ALE W1	13-Apr-04	Eu-152	-0.0115	0.03	0.03	0.0479	Undetected
B193K6	ALE W1	13-Apr-04	Pu-239/240	0.00762	0.0015	0.0019	0.000207	
B193K6	ALE W1	13-Apr-04	Sr-90	0.0938	0.039	0.041	0.0668	
B193K6	ALE W1	13-Apr-04	U-234	0.125	0.027	0.034	0.0224	
B193K6	ALE W1	13-Apr-04	U-235	-0.00159	0.0065	0.0065	0.0138	Undetected
B193K6	ALE W1	13-Apr-04	U-238	0.129	0.026	0.033	0.0151	
B193K8	ALE W2	13-Apr-04	Co-60	-0.00522	0.012	0.012	0.0194	Undetected
B193K8	ALE W2	13-Apr-04	Cs-134	0.0617	0.022	0.022	0.0285	Undetected
B193K8	ALE W2	13-Apr-04	Cs-137	0.0798	0.021	0.021	0.0188	
B193K8	ALE W2	13-Apr-04	Eu-152	-0.0209	0.029	0.029	0.0464	Undetected
B193K8	ALE W2	13-Apr-04	Pu-239/240	0.00199	0.00087	0.00092	0.000246	
B193K8	ALE W2	13-Apr-04	Sr-90	0.0401	0.018	0.019	0.0295	
B193K8	ALE W2	13-Apr-04	U-234	0.188	0.029	0.043	0.00805	
B193K8	ALE W2	13-Apr-04	U-235	0.00713	0.0062	0.0064	0.00296	
B193K8	ALE W2	13-Apr-04	U-238	0.167	0.028	0.039	0.0102	
B193L0	ALE W3	13-Apr-04	Co-60	0.00735	0.013	0.013	0.0228	Undetected
B193L0	ALE W3	13-Apr-04	Cs-134	0.0384	0.02	0.02	0.0276	Undetected
B193L0	ALE W3	13-Apr-04	Cs-137	0.314	0.045	0.045	0.0211	
B193L0	ALE W3	13-Apr-04	Eu-152	-0.0133	0.042	0.042	0.0505	Undetected
B193L0	ALE W3	13-Apr-04	Pu-239/240	0.0112	0.0021	0.0026	0.000721	
B193L0	ALE W3	13-Apr-04	Sr-90	0.153	0.03	0.038	0.039	
B193L0	ALE W3	13-Apr-04	U-234	0.11	0.024	0.03	0.00862	
B193L0	ALE W3	13-Apr-04	U-235	0.00308	0.0047	0.0048	0.00317	Undetected
B193L0	ALE W3	13-Apr-04	U-238	0.171	0.029	0.04	0.0109	
B193P4	ALE W4	16-Apr-04	Co-60	0.00254	0.01	0.01	0.0177	Undetected
B193P4	ALE W4	16-Apr-04	Cs-134	0.0222	0.013	0.013	0.0211	Undetected
B193P4	ALE W4	16-Apr-04	Cs-137	0.0793	0.017	0.017	0.0175	
B193P4	ALE W4	16-Apr-04	Eu-152	-0.00406	0.038	0.038	0.0425	Undetected
B193P4	ALE W4	16-Apr-04	Pu-239/240	0.00281	0.0011	0.0011	0.000263	
B193P4	ALE W4	16-Apr-04	Sr-90	0.136	0.03	0.038	0.0415	
B193P4	ALE W4	16-Apr-04	U-234	0.137	0.035	0.042	0.0314	
B193P4	ALE W4	16-Apr-04	U-235	-0.00161	0.0091	0.0091	0.0193	Undetected
B193P4	ALE W4	16-Apr-04	U-238	0.141	0.032	0.04	0.0211	
B193L2	ALE W5	13-Apr-04	Co-60	0.00601	0.01	0.01	0.0188	Undetected

Table B.2. (contd)

Sample number	Sample Location	Sample Date	Radionculide	Concentration (pCi/g)	Counting Error	Total Analytical Error	Detection Limit	Lab Qualifier
B193L2	ALE W5	13-Apr-04	Cs-134	0.0552	0.023	0.023	0.0271	Undetected
B193L2	ALE W5	13-Apr-04	Cs-137	0.113	0.027	0.027	0.0161	
B193L2	ALE W5	13-Apr-04	Eu-152	-0.0184	0.025	0.025	0.0414	Undetected
B193L2	ALE W5	13-Apr-04	Pu-239/240	0.00515	0.0014	0.0016	0.000259	
B193L2	ALE W5	13-Apr-04	Sr-90	0.0485	0.02	0.022	0.0336	
B193L2	ALE W5	13-Apr-04	U-234	0.12	0.021	0.029	0.00242	
B193L2	ALE W5	13-Apr-04	U-235	0.00554	0.005	0.0052	0.00242	
B193L2	ALE W5	13-Apr-04	U-238	0.143	0.023	0.033	0.00656	
B193L4	ALE W6	13-Apr-04	Co-60	0.000305	0.014	0.014	0.0235	Undetected
B193L4	ALE W6	13-Apr-04	Cs-134	0.0481	0.022	0.022	0.0284	Undetected
B193L4	ALE W6	13-Apr-04	Cs-137	0.425	0.059	0.059	0.0218	
B193L4	ALE W6	13-Apr-04	Eu-152	0.0149	0.031	0.031	0.0518	Undetected
B193L4	ALE W6	13-Apr-04	Pu-239/240	0.0137	0.0021	0.0029	0.000223	
B193L4	ALE W6	13-Apr-04	Sr-90	0.144	0.027	0.035	0.0356	
B193L4	ALE W6	13-Apr-04	U-234	0.123	0.023	0.031	0.0125	
B193L4	ALE W6	13-Apr-04	U-235	0.00409	0.006	0.0061	0.00884	Undetected
B193L4	ALE W6	13-Apr-04	U-238	0.117	0.023	0.03	0.0151	
B193R2	ALE W7	21-Apr-04	Co-60	0.00101	0.01	0.01	0.0174	Undetected
B193R2	ALE W7	21-Apr-04	Cs-134	0.0339	0.015	0.015	0.0206	Undetected
B193R2	ALE W7	21-Apr-04	Cs-137	0.114	0.021	0.021	0.0163	
B193R2	ALE W7	21-Apr-04	Eu-152	-0.0277	0.031	0.031	0.0402	Undetected
B193R2	ALE W7	21-Apr-04	Pu-239/240	0.00681	0.002	0.0022	0.00102	
B193R2	ALE W7	21-Apr-04	Sr-90	0.0869	0.023	0.029	0.0314	
B193R2	ALE W7	21-Apr-04	U-234	0.128	0.023	0.031	0.00976	
B193R2	ALE W7	21-Apr-04	U-235	0.00748	0.0063	0.0065	0.00668	
B193R2	ALE W7	21-Apr-04	U-238	0.116	0.021	0.029	0.00842	
B193L6	ALE W8	13-Apr-04	Co-60	0.0175	0.013	0.013	0.0236	Undetected
B193L6	ALE W8	13-Apr-04	Cs-134	0.0713	0.022	0.022	0.0285	Undetected
B193L6	ALE W8	13-Apr-04	Cs-137	0.15	0.03	0.03	0.0223	
B193L6	ALE W8	13-Apr-04	Eu-152	-0.00607	0.029	0.029	0.0484	Undetected
B193L6	ALE W8	13-Apr-04	Pu-239/240	0.00558	0.0014	0.0016	0.000223	
B193L6	ALE W8	13-Apr-04	Sr-90	0.0419	0.024	0.025	0.0428	Undetected
B193L6	ALE W8	13-Apr-04	U-234	0.219	0.028	0.046	0.0092	
B193L6	ALE W8	13-Apr-04	U-235	0.00523	0.0048	0.005	0.00232	
B193L6	ALE W8	13-Apr-04	U-238	0.219	0.028	0.045	0.00794	
B193L8	ALE W9	13-Apr-04	Co-60	0.00179	0.015	0.015	0.0255	Undetected
B193L8	ALE W9	13-Apr-04	Cs-134	0.0137	0.019	0.019	0.0315	Undetected
B193L8	ALE W9	13-Apr-04	Cs-137	0.13	0.026	0.026	0.0228	
B193L8	ALE W9	13-Apr-04	Eu-152	0.00214	0.052	0.052	0.0576	Undetected
B193L8	ALE W9	13-Apr-04	Pu-239/240	0.00578	0.0011	0.0014	0.000365	
B193L8	ALE W9	13-Apr-04	Sr-90	0.0423	0.025	0.025	0.0425	Undetected
B193L8	ALE W9	13-Apr-04	U-234	0.177	0.03	0.042	0.00874	
B193L8	ALE W9	13-Apr-04	U-235	0.000766	0.0058	0.0059	0.011	Undetected
B193L8	ALE W9	13-Apr-04	U-238	0.164	0.029	0.039	0.011	
B193R4	ALE W10	21-Apr-04	Co-60	-0.00415	0.0098	0.0098	0.0164	Undetected
B193R4	ALE W10	21-Apr-04	Cs-134	0.0395	0.017	0.017	0.022	Undetected
B193R4	ALE W10	21-Apr-04	Cs-137	0.135	0.026	0.026	0.0169	
B193R4	ALE W10	21-Apr-04	Eu-152	0.00621	0.023	0.023	0.0384	Undetected
B193R4	ALE W10	21-Apr-04	Pu-239/240	0.00595	0.0021	0.0029	0.000464	
B193R4	ALE W10	21-Apr-04	Sr-90	0.0393	0.019	0.021	0.0302	
B193R4	ALE W10	21-Apr-04	U-234	0.104	0.023	0.029	0.0085	
B193R4	ALE W10	21-Apr-04	U-235	0.000717	0.0057	0.0057	0.0107	Undetected
B193R4	ALE W10	21-Apr-04	U-238	0.105	0.023	0.029	0.0107	
B193M0	ALE W11	13-Apr-04	Co-60	-0.0087	0.012	0.012	0.0197	Undetected
B193M0	ALE W11	13-Apr-04	Cs-134	0.043	0.021	0.021	0.028	Undetected
B193M0	ALE W11	13-Apr-04	Cs-137	0.0825	0.031	0.031	0.0198	
B193M0	ALE W11	13-Apr-04	Eu-152	0.00623	0.028	0.028	0.0476	Undetected
B193M0	ALE W11	13-Apr-04	Pu-239/240	0.00299	0.0012	0.0013	0.00031	
B193M0	ALE W11	13-Apr-04	Sr-90	0.0443	0.025	0.028	0.0489	Undetected
B193M0	ALE W11	13-Apr-04	U-234	0.142	0.022	0.032	0.0022	
B193M0	ALE W11	13-Apr-04	U-235	0.0000091	0.0033	0.0033	0.00598	Undetected
B193M0	ALE W11	13-Apr-04	U-238	0.145	0.022	0.032	0.0022	
B193M2	ALE W12	13-Apr-04	Co-60	-0.00426	0.014	0.014	0.023	Undetected

Table B.2. (contd)

Sample number	Sample Location	Sample Date	Radionculide	Concentration (pCi/g)	Counting Error	Total Analytical Error	Detection Limit	Lab Qualifier
B193M2	ALE W12	13-Apr-04	Cs-134	0.0583	0.028	0.028	0.0303	Undetected
B193M2	ALE W12	13-Apr-04	Cs-137	0.103	0.023	0.023	0.0219	
B193M2	ALE W12	13-Apr-04	Eu-152	-0.0349	0.034	0.034	0.0499	Undetected
B193M2	ALE W12	13-Apr-04	Pu-239/240	0.0032	0.0011	0.0012	0.000235	
B193M2	ALE W12	13-Apr-04	Sr-90	0.0504	0.022	0.023	0.0372	
B193M2	ALE W12	13-Apr-04	U-234	0.11	0.027	0.033	0.0108	
B193M2	ALE W12	13-Apr-04	U-235	0.00138	0.0059	0.0059	0.0108	Undetected
B193M2	ALE W12	13-Apr-04	U-238	0.131	0.029	0.036	0.0108	
B193R6	ALE W13	21-Apr-04	Co-60	-0.0197	0.013	0.013	0.0193	Undetected
B193R6	ALE W13	21-Apr-04	Cs-134	0.0539	0.021	0.021	0.0272	Undetected
B193R6	ALE W13	21-Apr-04	Cs-137	0.466	0.074	0.074	0.0201	
B193R6	ALE W13	21-Apr-04	Eu-152	0.00432	0.027	0.027	0.0467	Undetected
B193R6	ALE W13	21-Apr-04	Pu-239/240	0.0298	0.0037	0.0056	0.000854	
B193R6	ALE W13	21-Apr-04	Sr-90	0.0775	0.026	0.03	0.04	
B193R6	ALE W13	21-Apr-04	U-234	0.0897	0.02	0.025	0.00285	
B193R6	ALE W13	21-Apr-04	U-235	0.00258	0.0051	0.0052	0.00773	Undetected
B193R6	ALE W13	21-Apr-04	U-238	0.129	0.024	0.032	0.00285	
B193M4	ALE W14	13-Apr-04	Co-60	0.00493	0.011	0.011	0.0198	Undetected
B193M4	ALE W14	13-Apr-04	Cs-134	0.0409	0.016	0.016	0.0254	Undetected
B193M4	ALE W14	13-Apr-04	Cs-137	0.141	0.027	0.027	0.0188	
B193M4	ALE W14	13-Apr-04	Eu-152	-0.0112	0.026	0.026	0.0431	Undetected
B193M4	ALE W14	13-Apr-04	Pu-239/240	0.00466	0.00092	0.0011	0.000122	
B193M4	ALE W14	13-Apr-04	Sr-90	0.0785	0.03	0.033	0.0509	
B193M4	ALE W14	13-Apr-04	U-234	0.134	0.032	0.04	0.0141	
B193M4	ALE W14	13-Apr-04	U-235	0.00847	0.0089	0.0091	0.0102	Undetected
B193M4	ALE W14	13-Apr-04	U-238	0.174	0.036	0.046	0.0124	
B193R8	ALE W15	21-Apr-04	Co-60	0.00436	0.011	0.011	0.0194	Undetected
B193R8	ALE W15	21-Apr-04	Cs-134	0.0401	0.017	0.017	0.0239	Undetected
B193R8	ALE W15	21-Apr-04	Cs-137	0.0493	0.017	0.017	0.0179	
B193R8	ALE W15	21-Apr-04	Eu-152	0.00244	0.025	0.025	0.0427	Undetected
B193R8	ALE W15	21-Apr-04	Pu-239/240	0.00133	0.0011	0.0011	0.000555	
B193R8	ALE W15	21-Apr-04	Sr-90	0.0181	0.02	0.022	0.0372	Undetected
B193R8	ALE W15	21-Apr-04	U-234	0.145	0.023	0.033	0.00624	
B193R8	ALE W15	21-Apr-04	U-235	0.00518	0.0054	0.0055	0.00624	Undetected
B193R8	ALE W15	21-Apr-04	U-238	0.206	0.027	0.043	0.00787	
B193T0	ALE W16	21-Apr-04	Co-60	0.00202	0.011	0.011	0.0196	Undetected
B193T0	ALE W16	21-Apr-04	Cs-134	0.0417	0.018	0.018	0.024	Undetected
B193T0	ALE W16	21-Apr-04	Cs-137	0.0227	0.018	0.018	0.02	
B193T0	ALE W16	21-Apr-04	Eu-152	-0.00442	0.026	0.026	0.0429	Undetected
B193T0	ALE W16	21-Apr-04	Pu-239/240	0.000598	0.0013	0.0022	0.00213	Undetected
B193T0	ALE W16	21-Apr-04	Sr-90	0.0315	0.021	0.024	0.0403	Undetected
B193T0	ALE W16	21-Apr-04	U-234	0.162	0.028	0.039	0.00872	
B193T0	ALE W16	21-Apr-04	U-235	0.00578	0.006	0.0061	0.00632	Undetected
B193T0	ALE W16	21-Apr-04	U-238	0.175	0.028	0.04	0.00768	
B193X2	ALE HQ Lysimeter 1	23-Apr-04	Am-241	0.000301	0.0019	0.0019	0.00444	Undetected
B193X2	ALE HQ Lysimeter 1	23-Apr-04	Co-60	0.00283	0.012	0.012	0.0207	Undetected
B193X2	ALE HQ Lysimeter 1	23-Apr-04	Cs-134	0.0869	0.025	0.025	0.0291	Undetected
B193X2	ALE HQ Lysimeter 1	23-Apr-04	Cs-137	0.0513	0.029	0.029	0.0197	
B193X2	ALE HQ Lysimeter 1	23-Apr-04	Eu-152	-0.0201	0.028	0.028	0.0461	Undetected
B193X2	ALE HQ Lysimeter 1	23-Apr-04	Pu-239/240	0.00147	0.0006	0.00064	0.000407	
B193X2	ALE HQ Lysimeter 1	23-Apr-04	Sr-90	0.0418	0.018	0.02	0.0259	
B193X2	ALE HQ Lysimeter 1	23-Apr-04	U-234	0.136	0.027	0.036	0.0109	
B193X2	ALE HQ Lysimeter 1	23-Apr-04	U-235	0.00319	0.0059	0.006	0.00989	Undetected
B193X2	ALE HQ Lysimeter 1	23-Apr-04	U-238	0.139	0.027	0.036	0.00871	
B193X4	ALE HQ Lysimeter 2	23-Apr-04	Am-241	0.000863	0.0026	0.0026	0.00353	Undetected
B193X4	ALE HQ Lysimeter 2	23-Apr-04	Co-60	0.00576	0.012	0.012	0.0213	Undetected
B193X4	ALE HQ Lysimeter 2	23-Apr-04	Cs-134	0.069	0.026	0.026	0.0297	Undetected
B193X4	ALE HQ Lysimeter 2	23-Apr-04	Cs-137	0.0501	0.022	0.022	0.0229	
B193X4	ALE HQ Lysimeter 2	23-Apr-04	Eu-152	0.00516	0.03	0.03	0.049	Undetected
B193X4	ALE HQ Lysimeter 2	23-Apr-04	Pu-239/240	0.00202	0.001	0.0011	0.000337	
B193X4	ALE HQ Lysimeter 2	23-Apr-04	Sr-90	0.0509	0.022	0.025	0.0325	
B193X4	ALE HQ Lysimeter 2	23-Apr-04	U-234	0.177	0.032	0.043	0.00918	

Table B.2. (contd)

Sample number	Sample Location	Sample Date	Radionculide	Concentration (pCi/g)	Counting Error	Total Analytical Error	Detection Limit	Lab Qualifier
B193X4	ALE HQ Lysimeter 2	23-Apr-04	U-235	0.00907	0.0076	0.0078	0.00362	
B193X4	ALE HQ Lysimeter 2	23-Apr-04	U-238	0.15	0.029	0.038	0.00755	
B193X6	ALE HQ Lysimeter 3	23-Apr-04	Am-241	0.00148	0.0028	0.0029	0.00506	Undetected
B193X6	ALE HQ Lysimeter 3	23-Apr-04	Co-60	0.00334	0.011	0.011	0.0198	Undetected
B193X6	ALE HQ Lysimeter 3	23-Apr-04	Cs-134	0.0671	0.022	0.022	0.0279	Undetected
B193X6	ALE HQ Lysimeter 3	23-Apr-04	Cs-137	0.0565	0.02	0.02	0.0212	
B193X6	ALE HQ Lysimeter 3	23-Apr-04	Eu-152	-0.00831	0.028	0.028	0.0474	Undetected
B193X6	ALE HQ Lysimeter 3	23-Apr-04	Pu-239/240	0.00148	0.00053	0.00058	0.000128	
B193X6	ALE HQ Lysimeter 3	23-Apr-04	Sr-90	0.0347	0.018	0.02	0.0281	
B193X6	ALE HQ Lysimeter 3	23-Apr-04	U-234	0.102	0.027	0.032	0.0112	
B193X6	ALE HQ Lysimeter 3	23-Apr-04	U-235	0.00198	0.006	0.006	0.0112	Undetected
B193X6	ALE HQ Lysimeter 3	23-Apr-04	U-238	0.132	0.03	0.037	0.0112	
B193X8	ALE HQ Lysimeter 4	23-Apr-04	Am-241	0.00209	0.0029	0.003	0.00229	Undetected
B193X8	ALE HQ Lysimeter 4	23-Apr-04	Co-60	-0.000363	0.012	0.012	0.0216	Undetected
B193X8	ALE HQ Lysimeter 4	23-Apr-04	Cs-134	0.0717	0.023	0.023	0.0294	Undetected
B193X8	ALE HQ Lysimeter 4	23-Apr-04	Cs-137	0.0626	0.018	0.018	0.021	
B193X8	ALE HQ Lysimeter 4	23-Apr-04	Eu-152	0.0204	0.029	0.029	0.0503	Undetected
B193X8	ALE HQ Lysimeter 4	23-Apr-04	Pu-239/240	0.00147	0.001	0.0011	0.00105	
B193X8	ALE HQ Lysimeter 4	23-Apr-04	Sr-90	0.0623	0.025	0.028	0.0365	
B193X8	ALE HQ Lysimeter 4	23-Apr-04	U-234	0.142	0.025	0.034	0.0138	
B193X8	ALE HQ Lysimeter 4	23-Apr-04	U-235	0.0043	0.0055	0.0056	0.00719	Undetected
B193X8	ALE HQ Lysimeter 4	23-Apr-04	U-238	0.134	0.023	0.032	0.00719	
B193Y0	ALE HQ Lysimeter 5	23-Apr-04	Am-241	0.000431	0.0017	0.0018	0.00236	Undetected
B193Y0	ALE HQ Lysimeter 5	23-Apr-04	Co-60	-0.0021	0.012	0.012	0.0204	Undetected
B193Y0	ALE HQ Lysimeter 5	23-Apr-04	Cs-134	0.0458	0.023	0.023	0.028	Undetected
B193Y0	ALE HQ Lysimeter 5	23-Apr-04	Cs-137	0.0472	0.019	0.019	0.022	
B193Y0	ALE HQ Lysimeter 5	23-Apr-04	Eu-152	-0.0198	0.029	0.029	0.0469	Undetected
B193Y0	ALE HQ Lysimeter 5	23-Apr-04	Pu-239/240	0.00134	0.00049	0.00053	0.000119	
B193Y0	ALE HQ Lysimeter 5	23-Apr-04	Sr-90	0.0196	0.019	0.021	0.0324	Undetected
B193Y0	ALE HQ Lysimeter 5	23-Apr-04	U-234	0.124	0.023	0.031	0.00264	
B193Y0	ALE HQ Lysimeter 5	23-Apr-04	U-235	0.00621	0.0055	0.0057	0.00264	
B193Y0	ALE HQ Lysimeter 5	23-Apr-04	U-238	0.148	0.024	0.034	0.00264	
B193T2	SNIVELY Lysimeter 1	21-Apr-04	Am-241	-0.0000246	0.0022	0.0022	0.00656	Undetected
B193T2	SNIVELY Lysimeter 1	21-Apr-04	Co-60	0.00687	0.015	0.015	0.0261	Undetected
B193T2	SNIVELY Lysimeter 1	21-Apr-04	Cs-134	0.0303	0.016	0.016	0.0291	Undetected
B193T2	SNIVELY Lysimeter 1	21-Apr-04	Cs-137	0.325	0.049	0.049	0.0237	
B193T2	SNIVELY Lysimeter 1	21-Apr-04	Eu-152	-0.0222	0.05	0.05	0.0584	Undetected
B193T2	SNIVELY Lysimeter 1	21-Apr-04	Pu-239/240	0.0134	0.0035	0.0044	0.00163	
B193T2	SNIVELY Lysimeter 1	21-Apr-04	Sr-90	0.0762	0.024	0.028	0.0366	
B193T2	SNIVELY Lysimeter 1	21-Apr-04	U-234	0.154	0.029	0.039	0.0126	
B193T2	SNIVELY Lysimeter 1	21-Apr-04	U-235	0.0124	0.0084	0.0087	0.00344	
B193T2	SNIVELY Lysimeter 1	21-Apr-04	U-238	0.16	0.029	0.039	0.00991	
B193T4	SNIVELY Lysimeter 2	21-Apr-04	Am-241	0.000444	0.0018	0.0018	0.00239	Undetected
B193T4	SNIVELY Lysimeter 2	21-Apr-04	Co-60	0.00535	0.013	0.013	0.024	Undetected
B193T4	SNIVELY Lysimeter 2	21-Apr-04	Cs-134	0.0643	0.025	0.025	0.0334	Undetected
B193T4	SNIVELY Lysimeter 2	21-Apr-04	Cs-137	0.16	0.035	0.035	0.0257	
B193T4	SNIVELY Lysimeter 2	21-Apr-04	Eu-152	0.0111	0.032	0.032	0.0555	Undetected
B193T4	SNIVELY Lysimeter 2	21-Apr-04	Pu-239/240	0.00439	0.0018	0.0026	0.000479	
B193T4	SNIVELY Lysimeter 2	21-Apr-04	Sr-90	0.0428	0.026	0.027	0.0442	Undetected
B193T4	SNIVELY Lysimeter 2	21-Apr-04	U-234	0.149	0.032	0.041	0.00437	
B193T4	SNIVELY Lysimeter 2	21-Apr-04	U-235	0.00165	0.0046	0.0046	0.00437	Undetected
B193T4	SNIVELY Lysimeter 2	21-Apr-04	U-238	0.164	0.033	0.043	0.00912	
B193T6	SNIVELY Lysimeter 3	21-Apr-04	Am-241	0.00364	0.0043	0.0044	0.00515	Undetected
B193T6	SNIVELY Lysimeter 3	21-Apr-04	Co-60	0.000024	0.012	0.012	0.021	Undetected
B193T6	SNIVELY Lysimeter 3	21-Apr-04	Cs-134	0.0563	0.021	0.021	0.0283	Undetected
B193T6	SNIVELY Lysimeter 3	21-Apr-04	Cs-137	0.241	0.039	0.039	0.0203	
B193T6	SNIVELY Lysimeter 3	21-Apr-04	Eu-152	-0.0387	0.03	0.03	0.0491	Undetected
B193T6	SNIVELY Lysimeter 3	21-Apr-04	Pu-239/240	0.00657	0.0027	0.0034	0.00242	
B193T6	SNIVELY Lysimeter 3	21-Apr-04	Sr-90	0.101	0.027	0.032	0.0408	
B193T6	SNIVELY Lysimeter 3	21-Apr-04	U-234	0.149	0.029	0.038	0.0122	

Table B.2. (contd)

Sample number	Sample Location	Sample Date	Radionculide	Concentration (pCi/g)	Counting Error	Total Analytical Error	Detection Limit	Lab Qualifier
B193T6	SNIVELY Lysimeter 3	21-Apr-04	U-235	0.00652	0.0071	0.0072	0.00899	Undetected
B193T6	SNIVELY Lysimeter 3	21-Apr-04	U-238	0.167	0.03	0.041	0.00899	
B193T8	SNIVELY Lysimeter 4	21-Apr-04	Am-241	0.00356	0.004	0.0041	0.00271	Undetected
B193T8	SNIVELY Lysimeter 4	21-Apr-04	Co-60	-0.00213	0.011	0.011	0.0184	Undetected
B193T8	SNIVELY Lysimeter 4	21-Apr-04	Cs-134	0.0381	0.016	0.016	0.0243	Undetected
B193T8	SNIVELY Lysimeter 4	21-Apr-04	Cs-137	0.267	0.042	0.042	0.0206	
B193T8	SNIVELY Lysimeter 4	21-Apr-04	Eu-152	-0.0133	0.027	0.027	0.0434	Undetected
B193T8	SNIVELY Lysimeter 4	21-Apr-04	Pu-239/240	0.0123	0.0073	0.0077	0.00668	
B193T8	SNIVELY Lysimeter 4	21-Apr-04	Sr-90	0.163	0.042	0.049	0.0655	
B193T8	SNIVELY Lysimeter 4	21-Apr-04	U-234	0.135	0.026	0.035	0.00823	
B193T8	SNIVELY Lysimeter 4	21-Apr-04	U-235	0.000795	0.0034	0.0035	0.00325	Undetected
B193T8	SNIVELY Lysimeter 4	21-Apr-04	U-238	0.156	0.028	0.038	0.00677	
B193V0	SNIVELY Lysimeter 5	21-Apr-04	Am-241	-0.00044	0.004	0.004	0.0044	Undetected
B193V0	SNIVELY Lysimeter 5	21-Apr-04	Co-60	0.00168	0.012	0.012	0.0217	Undetected
B193V0	SNIVELY Lysimeter 5	21-Apr-04	Cs-134	0.0501	0.021	0.021	0.0273	Undetected
B193V0	SNIVELY Lysimeter 5	21-Apr-04	Cs-137	0.109	0.025	0.025	0.0202	
B193V0	SNIVELY Lysimeter 5	21-Apr-04	Eu-152	0.0362	0.046	0.046	0.0539	Undetected
B193V0	SNIVELY Lysimeter 5	21-Apr-04	Pu-239/240	0.00307	0.0011	0.0012	0.000865	
B193V0	SNIVELY Lysimeter 5	21-Apr-04	Sr-90	0.0767	0.034	0.036	0.0561	
B193V0	SNIVELY Lysimeter 5	21-Apr-04	U-234	0.149	0.029	0.039	0.0178	
B193V0	SNIVELY Lysimeter 5	21-Apr-04	U-235	0.0123	0.0091	0.0094	0.0093	
B193V0	SNIVELY Lysimeter 5	21-Apr-04	U-238	0.15	0.029	0.038	0.0152	

Table B.3. Data for All Radionuclides not Included in the Authorized Limits

Raw data for all radionuclides not included in the Authorized Limits

Sample number	Sample Location	Sample Date	Radionculide	Concentration (pCi/g)	Counting Error	Total Analytical Error	Detection Limit	Lab Qualifier
B193K2	ALE 1	13-Apr-04	BALA140	-0.23	0.33	0.33	0.546	Undetected
B193K2	ALE 1	13-Apr-04	Be-7	0.00391	0.11	0.11	0.191	Undetected
B193K2	ALE 1	13-Apr-04	Ce/Pr-144	-0.00834	0.096	0.096	0.162	Undetected
B193K2	ALE 1	13-Apr-04	Ce-141	-0.00694	0.032	0.032	0.0539	Undetected
B193K2	ALE 1	13-Apr-04	Co-58	-0.00237	0.012	0.012	0.0209	Undetected
B193K2	ALE 1	13-Apr-04	Eu-154	0.00933	0.027	0.027	0.0483	Undetected
B193K2	ALE 1	13-Apr-04	Eu-155	0.0298	0.023	0.023	0.0394	Undetected
B193K2	ALE 1	13-Apr-04	Fe-59	-0.00403	0.042	0.042	0.0717	Undetected
B193K2	ALE 1	13-Apr-04	I-131	-0.134	0.78	0.78	1.3	Undetected
B193K2	ALE 1	13-Apr-04	K-40	10.4	1.5	1.5	0.101	
B193K2	ALE 1	13-Apr-04	Mn-54	-0.0000528	0.0087	0.0087	0.0148	Undetected
B193K2	ALE 1	13-Apr-04	Na-22	0.00378	0.0099	0.0099	0.0177	Undetected
B193K2	ALE 1	13-Apr-04	Pu-238	-0.000207	0.00035	0.00036	0.00095	Undetected
B193K2	ALE 1	13-Apr-04	Ru-103	-0.0039	0.015	0.015	0.0261	Undetected
B193K2	ALE 1	13-Apr-04	Ru-106	-0.00508	0.066	0.066	0.115	Undetected
B193K2	ALE 1	13-Apr-04	Sb-125	0.00292	0.018	0.018	0.0313	Undetected
B193K2	ALE 1	13-Apr-04	Zn-65	0.00321	0.027	0.027	0.0389	Undetected
B193K2	ALE 1	13-Apr-04	Zr/Nb-95	-0.0334	0.03	0.03	0.0475	Undetected
B193K4	ALE 2	13-Apr-04	BALA140	-0.56	0.45	0.45	0.695	Undetected
B193K4	ALE 2	13-Apr-04	Be-7	0.0165	0.14	0.14	0.238	Undetected
B193K4	ALE 2	13-Apr-04	Ce/Pr-144	0.0331	0.12	0.12	0.197	Undetected
B193K4	ALE 2	13-Apr-04	Ce-141	-0.034	0.041	0.041	0.066	Undetected
B193K4	ALE 2	13-Apr-04	Co-58	-0.0181	0.016	0.016	0.0246	Undetected
B193K4	ALE 2	13-Apr-04	Eu-154	0.0172	0.034	0.034	0.061	Undetected
B193K4	ALE 2	13-Apr-04	Eu-155	0.0478	0.032	0.032	0.0541	Undetected
B193K4	ALE 2	13-Apr-04	Fe-59	0.0364	0.048	0.048	0.0849	Undetected
B193K4	ALE 2	13-Apr-04	I-131	0.551	0.95	0.95	1.64	Undetected
B193K4	ALE 2	13-Apr-04	K-40	13.4	1.8	1.8	0.144	
B193K4	ALE 2	13-Apr-04	Mn-54	0.00867	0.011	0.011	0.0191	Undetected
B193K4	ALE 2	13-Apr-04	Na-22	0.00614	0.013	0.013	0.0223	Undetected
B193K4	ALE 2	13-Apr-04	Pu-238	0.0000536	0.00017	0.00017	0.000227	Undetected
B193K4	ALE 2	13-Apr-04	Ru-103	-0.00191	0.02	0.02	0.034	Undetected
B193K4	ALE 2	13-Apr-04	Ru-106	0.0251	0.085	0.085	0.147	Undetected
B193K4	ALE 2	13-Apr-04	Sb-125	0.00967	0.024	0.024	0.0409	Undetected
B193K4	ALE 2	13-Apr-04	Zn-65	-0.0229	0.034	0.034	0.0456	Undetected
B193K4	ALE 2	13-Apr-04	Zr/Nb-95	0.0198	0.042	0.042	0.0624	Undetected
B193P6	ALE 3	21-Apr-04	BALA140	-0.498	0.36	0.36	0.535	Undetected
B193P6	ALE 3	21-Apr-04	Be-7	0.021	0.15	0.15	0.257	Undetected
B193P6	ALE 3	21-Apr-04	Ce/Pr-144	-0.0806	0.14	0.14	0.225	Undetected
B193P6	ALE 3	21-Apr-04	Ce-141	-0.0125	0.041	0.041	0.0662	Undetected
B193P6	ALE 3	21-Apr-04	Co-58	-0.0163	0.016	0.016	0.0258	Undetected
B193P6	ALE 3	21-Apr-04	Eu-154	0.0228	0.039	0.039	0.0696	Undetected
B193P6	ALE 3	21-Apr-04	Eu-155	0.0776	0.037	0.037	0.0623	Undetected
B193P6	ALE 3	21-Apr-04	Fe-59	-0.0321	0.05	0.05	0.0826	Undetected
B193P6	ALE 3	21-Apr-04	I-131	-0.185	0.63	0.63	1.07	Undetected
B193P6	ALE 3	21-Apr-04	K-40	12.9	1.8	1.8	0.169	
B193P6	ALE 3	21-Apr-04	Mn-54	-0.000946	0.013	0.013	0.0223	Undetected
B193P6	ALE 3	21-Apr-04	Na-22	0.00832	0.014	0.014	0.0253	Undetected
B193P6	ALE 3	21-Apr-04	Pu-238	-0.000142	0.00069	0.00086	0.00161	Undetected
B193P6	ALE 3	21-Apr-04	Ru-103	-0.00487	0.021	0.021	0.0361	Undetected
B193P6	ALE 3	21-Apr-04	Ru-106	0.109	0.1	0.1	0.183	Undetected
B193P6	ALE 3	21-Apr-04	Sb-125	0.00423	0.028	0.028	0.0476	Undetected
B193P6	ALE 3	21-Apr-04	Zn-65	0.0137	0.037	0.037	0.0555	Undetected
B193P6	ALE 3	21-Apr-04	Zr/Nb-95	-0.0148	0.04	0.04	0.0685	Undetected
B193P8	ALE 4	21-Apr-04	BALA140	-0.375	0.5	0.5	0.809	Undetected
B193P8	ALE 4	21-Apr-04	Be-7	0.852	0.34	0.34	0.33	
B193P8	ALE 4	21-Apr-04	Ce/Pr-144	-0.285	0.2	0.2	0.313	Undetected
B193P8	ALE 4	21-Apr-04	Ce-141	0.0744	0.057	0.057	0.0985	Undetected
B193P8	ALE 4	21-Apr-04	Co-58	0.0163	0.023	0.023	0.0413	Undetected

Table B.3. (contd)

Raw data for all radionuclides not included in the Authorized Limits

Sample number	Sample Location	Sample Date	Radionculide	Concentration (pCi/g)	Counting Error	Total Analytical Error	Detection Limit	Lab Qualifier
B193P8	ALE 4	21-Apr-04	Eu-154	-0.019	0.051	0.051	0.0856	Undetected
B193P8	ALE 4	21-Apr-04	Eu-155	0.0068	0.047	0.047	0.081	Undetected
B193P8	ALE 4	21-Apr-04	Fe-59	-0.0444	0.067	0.067	0.112	Undetected
B193P8	ALE 4	21-Apr-04	I-131	-0.37	0.95	0.95	1.6	Undetected
B193P8	ALE 4	21-Apr-04	K-40	9.64	1.4	1.4	0.239	
B193P8	ALE 4	21-Apr-04	Mn-54	0.004	0.017	0.017	0.0306	Undetected
B193P8	ALE 4	21-Apr-04	Na-22	-0.0061	0.019	0.019	0.0314	Undetected
B193P8	ALE 4	21-Apr-04	Pu-238	0.000908	0.00094	0.00095	0.000636	Undetected
B193P8	ALE 4	21-Apr-04	Ru-103	-0.00549	0.032	0.032	0.0535	Undetected
B193P8	ALE 4	21-Apr-04	Ru-106	-0.0242	0.14	0.14	0.232	Undetected
B193P8	ALE 4	21-Apr-04	Sb-125	0.039	0.041	0.041	0.0723	Undetected
B193P8	ALE 4	21-Apr-04	Zn-65	-0.0757	0.051	0.051	0.0782	Undetected
B193P8	ALE 4	21-Apr-04	Zr/Nb-95	0.0673	0.055	0.055	0.0999	Undetected
B193V2	ALE 5	23-Apr-04	BALA140	-1.23	1.4	1.4	2.26	Undetected
B193V2	ALE 5	23-Apr-04	Be-7	-0.154	0.24	0.24	0.404	Undetected
B193V2	ALE 5	23-Apr-04	Ce/Pr-144	-0.0446	0.16	0.16	0.271	Undetected
B193V2	ALE 5	23-Apr-04	Ce-141	0.0312	0.07	0.07	0.12	Undetected
B193V2	ALE 5	23-Apr-04	Co-58	0.003	0.024	0.024	0.0414	Undetected
B193V2	ALE 5	23-Apr-04	Eu-154	-0.0309	0.047	0.047	0.0775	Undetected
B193V2	ALE 5	23-Apr-04	Eu-155	0.0437	0.038	0.038	0.0643	Undetected
B193V2	ALE 5	23-Apr-04	Fe-59	-0.0143	0.082	0.082	0.14	Undetected
B193V2	ALE 5	23-Apr-04	K-40	13.2	1.7	1.7	0.219	
B193V2	ALE 5	23-Apr-04	Mn-54	-0.00546	0.016	0.016	0.0275	Undetected
B193V2	ALE 5	23-Apr-04	Na-22	-0.0159	0.018	0.018	0.0285	Undetected
B193V2	ALE 5	23-Apr-04	Pu-238	0.00643	0.0019	0.0021	0.000952	
B193V2	ALE 5	23-Apr-04	Ru-103	-0.00837	0.039	0.039	0.0659	Undetected
B193V2	ALE 5	23-Apr-04	Ru-106	-0.0464	0.13	0.13	0.217	Undetected
B193V2	ALE 5	23-Apr-04	Sb-125	0.00707	0.037	0.037	0.0635	Undetected
B193V2	ALE 5	23-Apr-04	Zn-65	-0.00329	0.05	0.05	0.0707	Undetected
B193V2	ALE 5	23-Apr-04	Zr/Nb-95	-0.0025	0.058	0.058	0.0985	Undetected
B193V4	ALE 6	23-Apr-04	BALA140	-0.803	0.7	0.7	1.08	Undetected
B193V4	ALE 6	23-Apr-04	Be-7	0.0743	0.15	0.15	0.267	Undetected
B193V4	ALE 6	23-Apr-04	Ce/Pr-144	-0.0131	0.11	0.11	0.181	Undetected
B193V4	ALE 6	23-Apr-04	Ce-141	0.0303	0.047	0.047	0.0802	Undetected
B193V4	ALE 6	23-Apr-04	Co-58	-0.00146	0.014	0.014	0.0241	Undetected
B193V4	ALE 6	23-Apr-04	Eu-154	-0.0101	0.028	0.028	0.0468	Undetected
B193V4	ALE 6	23-Apr-04	Eu-155	0.0331	0.027	0.027	0.045	Undetected
B193V4	ALE 6	23-Apr-04	Fe-59	0.0056	0.051	0.051	0.0888	Undetected
B193V4	ALE 6	23-Apr-04	K-40	8.69	1.1	1.1	0.116	
B193V4	ALE 6	23-Apr-04	Mn-54	0.00321	0.0097	0.0097	0.0168	Undetected
B193V4	ALE 6	23-Apr-04	Na-22	-0.00213	0.01	0.01	0.0173	Undetected
B193V4	ALE 6	23-Apr-04	Pu-238	0.0015	0.0019	0.0019	0.00282	Undetected
B193V4	ALE 6	23-Apr-04	Ru-103	-0.00279	0.023	0.023	0.0396	Undetected
B193V4	ALE 6	23-Apr-04	Ru-106	0.0349	0.076	0.076	0.135	Undetected
B193V4	ALE 6	23-Apr-04	Sb-125	0.0221	0.022	0.022	0.0393	Undetected
B193V4	ALE 6	23-Apr-04	Zn-65	-0.00611	0.027	0.027	0.0376	Undetected
B193V4	ALE 6	23-Apr-04	Zr/Nb-95	0.0426	0.039	0.039	0.0608	Undetected
B193V6	ALE 7	23-Apr-04	BALA140	-1.56	1	1	1.57	Undetected
B193V6	ALE 7	23-Apr-04	Be-7	0.0805	0.18	0.18	0.316	Undetected
B193V6	ALE 7	23-Apr-04	Ce/Pr-144	-0.034	0.15	0.15	0.238	Undetected
B193V6	ALE 7	23-Apr-04	Ce-141	0.00213	0.071	0.071	0.101	Undetected
B193V6	ALE 7	23-Apr-04	Co-58	-0.0173	0.017	0.017	0.0277	Undetected
B193V6	ALE 7	23-Apr-04	Eu-154	0.0312	0.036	0.036	0.0643	Undetected
B193V6	ALE 7	23-Apr-04	Eu-155	0.079	0.036	0.036	0.0617	Undetected
B193V6	ALE 7	23-Apr-04	Fe-59	0.00876	0.06	0.06	0.104	Undetected
B193V6	ALE 7	23-Apr-04	K-40	14	1.8	1.8	0.153	
B193V6	ALE 7	23-Apr-04	Mn-54	0.00188	0.012	0.012	0.0209	Undetected
B193V6	ALE 7	23-Apr-04	Na-22	0.0112	0.013	0.013	0.0235	Undetected
B193V6	ALE 7	23-Apr-04	Pu-238	0.00191	0.0012	0.0013	0.000526	

Table B.3. (contd)

Raw data for all radionuclides not included in the Authorized Limits

Sample number	Sample Location	Sample Date	Radionculide	Concentration (pCi/g)	Counting Error	Total Analytical Error	Detection Limit	Lab Qualifier
B193V6	ALE 7	23-Apr-04	Ru-103	0.013	0.027	0.027	0.0478	Undetected
B193V6	ALE 7	23-Apr-04	Ru-106	0.0122	0.089	0.089	0.151	Undetected
B193V6	ALE 7	23-Apr-04	Sb-125	0.028	0.027	0.027	0.0462	Undetected
B193V6	ALE 7	23-Apr-04	Zn-65	-0.0281	0.036	0.036	0.048	Undetected
B193V6	ALE 7	23-Apr-04	Zr/Nb-95	0.0357	0.049	0.049	0.0738	Undetected
B193V8	ALE 8	23-Apr-04	BALA140	-1.14	1.2	1.2	1.94	Undetected
B193V8	ALE 8	23-Apr-04	Be-7	0.061	0.23	0.23	0.398	Undetected
B193V8	ALE 8	23-Apr-04	Ce/Pr-144	0.103	0.16	0.16	0.279	Undetected
B193V8	ALE 8	23-Apr-04	Ce-141	0.0713	0.072	0.072	0.124	Undetected
B193V8	ALE 8	23-Apr-04	Co-58	-0.0524	0.025	0.025	0.0366	Undetected
B193V8	ALE 8	23-Apr-04	Eu-154	0.00499	0.048	0.048	0.0827	Undetected
B193V8	ALE 8	23-Apr-04	Eu-155	0.0962	0.041	0.041	0.0674	Undetected
B193V8	ALE 8	23-Apr-04	Fe-59	-0.0489	0.082	0.082	0.135	Undetected
B193V8	ALE 8	23-Apr-04	K-40	15.4	2	2	0.211	
B193V8	ALE 8	23-Apr-04	Mn-54	0.00616	0.016	0.016	0.0278	Undetected
B193V8	ALE 8	23-Apr-04	Na-22	-0.000702	0.018	0.018	0.0304	Undetected
B193V8	ALE 8	23-Apr-04	Pu-238	0.00371	0.0012	0.0013	0.000274	
B193V8	ALE 8	23-Apr-04	Ru-103	-0.0271	0.036	0.036	0.0597	Undetected
B193V8	ALE 8	23-Apr-04	Ru-106	0.0463	0.12	0.12	0.209	Undetected
B193V8	ALE 8	23-Apr-04	Sb-125	-0.0338	0.036	0.036	0.0569	Undetected
B193V8	ALE 8	23-Apr-04	Zn-65	-0.0282	0.05	0.05	0.0677	Undetected
B193V8	ALE 8	23-Apr-04	Zr/Nb-95	0.118	0.069	0.069	0.107	Undetected
B193W0	ALE 9	23-Apr-04	BALA140	-0.816	0.75	0.75	1.2	Undetected
B193W0	ALE 9	23-Apr-04	Be-7	0.0591	0.15	0.15	0.251	Undetected
B193W0	ALE 9	23-Apr-04	Ce/Pr-144	-0.00646	0.11	0.11	0.185	Undetected
B193W0	ALE 9	23-Apr-04	Ce-141	-0.0344	0.047	0.047	0.0775	Undetected
B193W0	ALE 9	23-Apr-04	Co-58	-0.00648	0.015	0.015	0.0257	Undetected
B193W0	ALE 9	23-Apr-04	Eu-154	-0.0239	0.031	0.031	0.0505	Undetected
B193W0	ALE 9	23-Apr-04	Eu-155	0.0526	0.028	0.028	0.0458	Undetected
B193W0	ALE 9	23-Apr-04	Fe-59	-0.0257	0.053	0.053	0.0884	Undetected
B193W0	ALE 9	23-Apr-04	K-40	14.4	1.8	1.8	0.135	
B193W0	ALE 9	23-Apr-04	Mn-54	0.00437	0.0099	0.0099	0.0171	Undetected
B193W0	ALE 9	23-Apr-04	Na-22	-0.00909	0.011	0.011	0.0187	Undetected
B193W0	ALE 9	23-Apr-04	Pu-238	0.000987	0.00076	0.00078	0.000995	Undetected
B193W0	ALE 9	23-Apr-04	Ru-103	-0.00906	0.023	0.023	0.039	Undetected
B193W0	ALE 9	23-Apr-04	Ru-106	0.00784	0.077	0.077	0.134	Undetected
B193W0	ALE 9	23-Apr-04	Sb-125	-0.0112	0.021	0.021	0.0359	Undetected
B193W0	ALE 9	23-Apr-04	Zn-65	-0.0209	0.03	0.03	0.0395	Undetected
B193W0	ALE 9	23-Apr-04	Zr/Nb-95	-0.00829	0.036	0.036	0.0597	Undetected
B193R0	ALE E1	21-Apr-04	BALA140	-0.386	0.29	0.29	0.445	Undetected
B193R0	ALE E1	21-Apr-04	Be-7	0.00976	0.12	0.12	0.201	Undetected
B193R0	ALE E1	21-Apr-04	Ce/Pr-144	-0.0344	0.12	0.12	0.193	Undetected
B193R0	ALE E1	21-Apr-04	Ce-141	-0.00196	0.035	0.035	0.057	Undetected
B193R0	ALE E1	21-Apr-04	Co-58	-0.00164	0.013	0.013	0.0217	Undetected
B193R0	ALE E1	21-Apr-04	Eu-154	0.0112	0.033	0.033	0.0575	Undetected
B193R0	ALE E1	21-Apr-04	Eu-155	0.065	0.027	0.027	0.0443	Undetected
B193R0	ALE E1	21-Apr-04	Fe-59	0.00981	0.041	0.041	0.0702	Undetected
B193R0	ALE E1	21-Apr-04	I-131	-0.021	0.53	0.53	0.905	Undetected
B193R0	ALE E1	21-Apr-04	K-40	15.2	2	2	0.124	
B193R0	ALE E1	21-Apr-04	Mn-54	0.0139	0.011	0.011	0.0184	Undetected
B193R0	ALE E1	21-Apr-04	Na-22	0.0044	0.012	0.012	0.0209	Undetected
B193R0	ALE E1	21-Apr-04	Pu-238	0.000286	0.0005	0.0005	0.000851	Undetected
B193R0	ALE E1	21-Apr-04	Ru-103	-0.0018	0.018	0.018	0.0297	Undetected
B193R0	ALE E1	21-Apr-04	Ru-106	-0.0283	0.08	0.08	0.135	Undetected
B193R0	ALE E1	21-Apr-04	Sb-125	-0.00555	0.022	0.022	0.0376	Undetected
B193R0	ALE E1	21-Apr-04	Zn-65	-0.0135	0.03	0.03	0.0418	Undetected
B193R0	ALE E1	21-Apr-04	Zr/Nb-95	0.0168	0.034	0.034	0.0506	Undetected
B193M6	ALE E2	16-Apr-04	BALA140	-0.47	0.53	0.53	0.854	Undetected
B193M6	ALE E2	16-Apr-04	Be-7	0.121	0.19	0.19	0.321	Undetected

Table B.3. (contd)

Raw data for all radionuclides not included in the Authorized Limits

Sample number	Sample Location	Sample Date	Radionculide	Concentration (pCi/g)	Counting Error	Total Analytical Error	Detection Limit	Lab Qualifier
B193M6	ALE E2	16-Apr-04	Ce/Pr-144	-0.127	0.17	0.17	0.283	Undetected
B193M6	ALE E2	16-Apr-04	Ce-141	0.034	0.052	0.052	0.089	Undetected
B193M6	ALE E2	16-Apr-04	Co-58	0.00582	0.02	0.02	0.0339	Undetected
B193M6	ALE E2	16-Apr-04	Eu-154	0.00624	0.051	0.051	0.0869	Undetected
B193M6	ALE E2	16-Apr-04	Eu-155	0.0534	0.042	0.042	0.0706	Undetected
B193M6	ALE E2	16-Apr-04	Fe-59	0.00108	0.065	0.065	0.111	Undetected
B193M6	ALE E2	16-Apr-04	I-131	-0.367	1.1	1.1	1.85	Undetected
B193M6	ALE E2	16-Apr-04	K-40	17.6	2.4	2.4	0.198	
B193M6	ALE E2	16-Apr-04	Mn-54	0.00257	0.015	0.015	0.0252	Undetected
B193M6	ALE E2	16-Apr-04	Na-22	0.00649	0.018	0.018	0.0317	Undetected
B193M6	ALE E2	16-Apr-04	Pu-238	0.00214	0.00089	0.00094	0.000806	
B193M6	ALE E2	16-Apr-04	Ru-103	0.00403	0.027	0.027	0.0465	Undetected
B193M6	ALE E2	16-Apr-04	Ru-106	-0.0357	0.12	0.12	0.196	Undetected
B193M6	ALE E2	16-Apr-04	Sb-125	-0.0126	0.032	0.032	0.054	Undetected
B193M6	ALE E2	16-Apr-04	Zn-65	0.0644	0.049	0.049	0.0737	Undetected
B193M6	ALE E2	16-Apr-04	Zr/Nb-95	0.11	0.05	0.05	0.0874	Undetected
B193M8	ALE E3	16-Apr-04	BALA140	-0.593	0.5	0.5	0.769	Undetected
B193M8	ALE E3	16-Apr-04	Be-7	0.0798	0.17	0.17	0.298	Undetected
B193M8	ALE E3	16-Apr-04	Ce/Pr-144	-0.0756	0.15	0.15	0.241	Undetected
B193M8	ALE E3	16-Apr-04	Ce-141	-0.00424	0.047	0.047	0.0776	Undetected
B193M8	ALE E3	16-Apr-04	Co-58	-0.0133	0.017	0.017	0.0284	Undetected
B193M8	ALE E3	16-Apr-04	Eu-154	-0.0557	0.045	0.045	0.0715	Undetected
B193M8	ALE E3	16-Apr-04	Eu-155	0.0873	0.039	0.039	0.0666	Undetected
B193M8	ALE E3	16-Apr-04	Fe-59	-0.0191	0.058	0.058	0.0975	Undetected
B193M8	ALE E3	16-Apr-04	I-131	0.194	1	1	1.72	Undetected
B193M8	ALE E3	16-Apr-04	K-40	14.4	2	2	0.2	
B193M8	ALE E3	16-Apr-04	Mn-54	0.00804	0.014	0.014	0.025	Undetected
B193M8	ALE E3	16-Apr-04	Na-22	-0.0218	0.017	0.017	0.0261	Undetected
B193M8	ALE E3	16-Apr-04	Pu-238	0.0031	0.00064	0.00078	0.0000896	
B193M8	ALE E3	16-Apr-04	Ru-103	0.00879	0.024	0.024	0.0421	Undetected
B193M8	ALE E3	16-Apr-04	Ru-106	0.00382	0.11	0.11	0.18	Undetected
B193M8	ALE E3	16-Apr-04	Sb-125	0.00519	0.03	0.03	0.0502	Undetected
B193M8	ALE E3	16-Apr-04	Zn-65	-0.0135	0.04	0.04	0.0564	Undetected
B193M8	ALE E3	16-Apr-04	Zr/Nb-95	0.0501	0.048	0.048	0.0751	Undetected
B193N0	ALE E4	16-Apr-04	BALA140	-0.235	0.34	0.34	0.569	Undetected
B193N0	ALE E4	16-Apr-04	Be-7	-0.0668	0.13	0.13	0.219	Undetected
B193N0	ALE E4	16-Apr-04	Ce/Pr-144	-0.0245	0.11	0.11	0.188	Undetected
B193N0	ALE E4	16-Apr-04	Ce-141	0.00557	0.036	0.036	0.0615	Undetected
B193N0	ALE E4	16-Apr-04	Co-58	-0.0196	0.014	0.014	0.0213	Undetected
B193N0	ALE E4	16-Apr-04	Eu-154	0.00858	0.032	0.032	0.0568	Undetected
B193N0	ALE E4	16-Apr-04	Eu-155	0.0377	0.026	0.026	0.0431	Undetected
B193N0	ALE E4	16-Apr-04	Fe-59	0.00977	0.044	0.044	0.0765	Undetected
B193N0	ALE E4	16-Apr-04	I-131	0.429	0.77	0.77	1.34	Undetected
B193N0	ALE E4	16-Apr-04	K-40	14.1	1.9	1.9	0.132	
B193N0	ALE E4	16-Apr-04	Mn-54	0.0172	0.0099	0.0099	0.0165	
B193N0	ALE E4	16-Apr-04	Na-22	-0.00169	0.012	0.012	0.0206	Undetected
B193N0	ALE E4	16-Apr-04	Pu-238	0.000503	0.00043	0.00044	0.000241	
B193N0	ALE E4	16-Apr-04	Ru-103	-0.0143	0.019	0.019	0.0318	Undetected
B193N0	ALE E4	16-Apr-04	Ru-106	0.0205	0.082	0.082	0.141	Undetected
B193N0	ALE E4	16-Apr-04	Sb-125	-0.00749	0.024	0.024	0.0396	Undetected
B193N0	ALE E4	16-Apr-04	Zn-65	-0.00843	0.03	0.03	0.0432	Undetected
B193N0	ALE E4	16-Apr-04	Zr/Nb-95	0.0113	0.034	0.034	0.0589	Undetected
B193N2	ALE E5	16-Apr-04	BALA140	-0.0545	0.45	0.45	0.666	Undetected
B193N2	ALE E5	16-Apr-04	Be-7	-0.106	0.16	0.16	0.272	Undetected
B193N2	ALE E5	16-Apr-04	Ce/Pr-144	-0.112	0.14	0.14	0.228	Undetected
B193N2	ALE E5	16-Apr-04	Ce-141	-0.0135	0.044	0.044	0.0752	Undetected
B193N2	ALE E5	16-Apr-04	Co-58	-0.00195	0.018	0.018	0.031	Undetected
B193N2	ALE E5	16-Apr-04	Eu-154	-0.0155	0.04	0.04	0.068	Undetected
B193N2	ALE E5	16-Apr-04	Eu-155	0.0213	0.032	0.032	0.055	Undetected

Table B.3. (contd)

Raw data for all radionuclides not included in the Authorized Limits

Sample number	Sample Location	Sample Date	Radionculide	Concentration (pCi/g)	Counting Error	Total Analytical Error	Detection Limit	Lab Qualifier
B193N2	ALE E5	16-Apr-04	Fe-59	-0.0401	0.058	0.058	0.0957	Undetected
B193N2	ALE E5	16-Apr-04	I-131	0.47	0.99	0.99	1.7	Undetected
B193N2	ALE E5	16-Apr-04	K-40	16.7	2.4	2.4	0.18	
B193N2	ALE E5	16-Apr-04	Mn-54	0.0135	0.013	0.013	0.0241	Undetected
B193N2	ALE E5	16-Apr-04	Na-22	-0.00442	0.015	0.015	0.0249	Undetected
B193N2	ALE E5	16-Apr-04	Pu-238	0.000709	0.00085	0.001	0.000577	Undetected
B193N2	ALE E5	16-Apr-04	Ru-103	0.00179	0.025	0.025	0.0424	Undetected
B193N2	ALE E5	16-Apr-04	Ru-106	0.0701	0.1	0.1	0.184	Undetected
B193N2	ALE E5	16-Apr-04	Sb-125	-0.00879	0.029	0.029	0.049	Undetected
B193N2	ALE E5	16-Apr-04	Zn-65	-0.0515	0.045	0.045	0.0592	Undetected
B193N2	ALE E5	16-Apr-04	Zr/Nb-95	0.0212	0.048	0.048	0.0704	Undetected
B193W2	ALE E6	23-Apr-04	BALA140	-0.737	0.71	0.71	1.13	Undetected
B193W2	ALE E6	23-Apr-04	Be-7	0.144	0.14	0.14	0.261	Undetected
B193W2	ALE E6	23-Apr-04	Ce/Pr-144	-0.112	0.11	0.11	0.172	Undetected
B193W2	ALE E6	23-Apr-04	Ce-141	0.0285	0.044	0.044	0.0738	Undetected
B193W2	ALE E6	23-Apr-04	Co-58	-0.00234	0.014	0.014	0.0235	Undetected
B193W2	ALE E6	23-Apr-04	Eu-154	-0.0209	0.024	0.024	0.0392	Undetected
B193W2	ALE E6	23-Apr-04	Eu-155	0.0259	0.025	0.025	0.0441	Undetected
B193W2	ALE E6	23-Apr-04	Fe-59	0.00284	0.043	0.043	0.0752	Undetected
B193W2	ALE E6	23-Apr-04	K-40	4.94	0.67	0.67	0.086	
B193W2	ALE E6	23-Apr-04	Mn-54	0.00992	0.0088	0.0088	0.0161	Undetected
B193W2	ALE E6	23-Apr-04	Na-22	-0.00911	0.0088	0.0088	0.0142	Undetected
B193W2	ALE E6	23-Apr-04	Pu-238	0.000729	0.00038	0.0004	0.000133	
B193W2	ALE E6	23-Apr-04	Ru-103	0.00271	0.023	0.023	0.0407	Undetected
B193W2	ALE E6	23-Apr-04	Ru-106	-0.0449	0.068	0.068	0.112	Undetected
B193W2	ALE E6	23-Apr-04	Sb-125	0.0137	0.021	0.021	0.0363	Undetected
B193W2	ALE E6	23-Apr-04	Zn-65	0.00428	0.023	0.023	0.0343	Undetected
B193W2	ALE E6	23-Apr-04	Zr/Nb-95	0.0195	0.034	0.034	0.0523	Undetected
B193N4	ALE E7	16-Apr-04	BALA140	-0.41	0.58	0.58	0.95	Undetected
B193N4	ALE E7	16-Apr-04	Be-7	0.0702	0.18	0.18	0.313	Undetected
B193N4	ALE E7	16-Apr-04	Ce/Pr-144	-0.0377	0.21	0.21	0.3	Undetected
B193N4	ALE E7	16-Apr-04	Ce-141	0.0311	0.057	0.057	0.0956	Undetected
B193N4	ALE E7	16-Apr-04	Co-58	-0.0174	0.02	0.02	0.0325	Undetected
B193N4	ALE E7	16-Apr-04	Eu-154	-0.0573	0.047	0.047	0.0729	Undetected
B193N4	ALE E7	16-Apr-04	Eu-155	0.0635	0.043	0.043	0.074	Undetected
B193N4	ALE E7	16-Apr-04	Fe-59	0.0487	0.063	0.063	0.111	Undetected
B193N4	ALE E7	16-Apr-04	I-131	-0.0265	1.2	1.2	1.96	Undetected
B193N4	ALE E7	16-Apr-04	K-40	15.1	2.1	2.1	0.201	
B193N4	ALE E7	16-Apr-04	Mn-54	-0.000131	0.015	0.015	0.0247	Undetected
B193N4	ALE E7	16-Apr-04	Na-22	-0.0217	0.017	0.017	0.0265	Undetected
B193N4	ALE E7	16-Apr-04	Pu-238	0.000124	0.00031	0.00031	0.000566	Undetected
B193N4	ALE E7	16-Apr-04	Ru-103	0.0203	0.027	0.027	0.0465	Undetected
B193N4	ALE E7	16-Apr-04	Ru-106	-0.0258	0.11	0.11	0.191	Undetected
B193N4	ALE E7	16-Apr-04	Sb-125	-0.00857	0.032	0.032	0.0529	Undetected
B193N4	ALE E7	16-Apr-04	Zn-65	0.0128	0.044	0.044	0.0643	Undetected
B193N4	ALE E7	16-Apr-04	Zr/Nb-95	0.0514	0.048	0.048	0.0841	Undetected
B193N6	ALE E8	16-Apr-04	BALA140	-0.656	0.44	0.44	0.651	Undetected
B193N6	ALE E8	16-Apr-04	Be-7	0.0843	0.16	0.16	0.269	Undetected
B193N6	ALE E8	16-Apr-04	Ce/Pr-144	-0.0244	0.13	0.13	0.217	Undetected
B193N6	ALE E8	16-Apr-04	Ce-141	-0.0567	0.043	0.043	0.0665	Undetected
B193N6	ALE E8	16-Apr-04	Co-58	-0.0156	0.017	0.017	0.0272	Undetected
B193N6	ALE E8	16-Apr-04	Eu-154	-0.00114	0.037	0.037	0.0642	Undetected
B193N6	ALE E8	16-Apr-04	Eu-155	0.0504	0.034	0.034	0.0585	Undetected
B193N6	ALE E8	16-Apr-04	Fe-59	0.00492	0.049	0.049	0.086	Undetected
B193N6	ALE E8	16-Apr-04	I-131	-0.158	0.88	0.88	1.48	Undetected
B193N6	ALE E8	16-Apr-04	K-40	13.6	1.8	1.8	0.162	
B193N6	ALE E8	16-Apr-04	Mn-54	0.00911	0.012	0.012	0.0215	Undetected
B193N6	ALE E8	16-Apr-04	Na-22	-0.000576	0.014	0.014	0.0234	Undetected
B193N6	ALE E8	16-Apr-04	Pu-238	0.000224	0.00029	0.0003	0.00023	Undetected

Table B.3. (contd)

Raw data for all radionuclides not included in the Authorized Limits

Sample number	Sample Location	Sample Date	Radionculide	Concentration (pCi/g)	Counting Error	Total Analytical Error	Detection Limit	Lab Qualifier
B193N6	ALE E8	16-Apr-04	Ru-103	-0.000688	0.021	0.021	0.0368	Undetected
B193N6	ALE E8	16-Apr-04	Ru-106	0.056	0.098	0.098	0.171	Undetected
B193N6	ALE E8	16-Apr-04	Sb-125	-0.0332	0.026	0.026	0.0413	Undetected
B193N6	ALE E8	16-Apr-04	Zn-65	-0.0106	0.036	0.036	0.0512	Undetected
B193N6	ALE E8	16-Apr-04	Zr/Nb-95	0.012	0.045	0.045	0.0667	Undetected
B193W4	ALE E9	23-Apr-04	BALA140	-1.23	1	1	1.52	Undetected
B193W4	ALE E9	23-Apr-04	Be-7	-0.07	0.18	0.18	0.3	Undetected
B193W4	ALE E9	23-Apr-04	Ce/Pr-144	-0.0377	0.15	0.15	0.231	Undetected
B193W4	ALE E9	23-Apr-04	Ce-141	-0.0261	0.06	0.06	0.098	Undetected
B193W4	ALE E9	23-Apr-04	Co-58	-0.013	0.019	0.019	0.0323	Undetected
B193W4	ALE E9	23-Apr-04	Eu-154	-0.0223	0.039	0.039	0.0639	Undetected
B193W4	ALE E9	23-Apr-04	Eu-155	0.0673	0.031	0.031	0.0515	Undetected
B193W4	ALE E9	23-Apr-04	Fe-59	-0.00831	0.065	0.065	0.112	Undetected
B193W4	ALE E9	23-Apr-04	K-40	16.1	2	2	0.157	
B193W4	ALE E9	23-Apr-04	Mn-54	0.00475	0.012	0.012	0.0211	Undetected
B193W4	ALE E9	23-Apr-04	Na-22	-0.00795	0.014	0.014	0.0235	Undetected
B193W4	ALE E9	23-Apr-04	Pu-238	-0.0000302	0.00048	0.00048	0.00126	Undetected
B193W4	ALE E9	23-Apr-04	Ru-103	0.00295	0.029	0.029	0.0488	Undetected
B193W4	ALE E9	23-Apr-04	Ru-106	0.0481	0.097	0.097	0.168	Undetected
B193W4	ALE E9	23-Apr-04	Sb-125	0.016	0.027	0.027	0.0464	Undetected
B193W4	ALE E9	23-Apr-04	Zn-65	-0.03	0.039	0.039	0.0526	Undetected
B193W4	ALE E9	23-Apr-04	Zr/Nb-95	0.0678	0.052	0.052	0.0787	Undetected
B193N8	ALE E10	16-Apr-04	BALA140	-0.683	0.48	0.48	0.709	Undetected
B193N8	ALE E10	16-Apr-04	Be-7	0.00907	0.17	0.17	0.282	Undetected
B193N8	ALE E10	16-Apr-04	Ce/Pr-144	-0.0573	0.14	0.14	0.23	Undetected
B193N8	ALE E10	16-Apr-04	Ce-141	-0.0116	0.045	0.045	0.074	Undetected
B193N8	ALE E10	16-Apr-04	Co-58	0.0117	0.018	0.018	0.0314	Undetected
B193N8	ALE E10	16-Apr-04	Eu-154	0.00417	0.041	0.041	0.0708	Undetected
B193N8	ALE E10	16-Apr-04	Eu-155	0.0772	0.037	0.037	0.0628	Undetected
B193N8	ALE E10	16-Apr-04	Fe-59	0.0249	0.056	0.056	0.0988	Undetected
B193N8	ALE E10	16-Apr-04	I-131	0.681	1	1	1.8	Undetected
B193N8	ALE E10	16-Apr-04	K-40	13.7	1.9	1.9	0.186	
B193N8	ALE E10	16-Apr-04	Mn-54	0.00836	0.013	0.013	0.023	Undetected
B193N8	ALE E10	16-Apr-04	Na-22	0.00188	0.015	0.015	0.0259	Undetected
B193N8	ALE E10	16-Apr-04	Pu-238	0.00247	0.0014	0.0014	0.000522	
B193N8	ALE E10	16-Apr-04	Ru-103	-0.00409	0.024	0.024	0.0415	Undetected
B193N8	ALE E10	16-Apr-04	Ru-106	0.0482	0.099	0.099	0.174	Undetected
B193N8	ALE E10	16-Apr-04	Sb-125	-0.000315	0.029	0.029	0.0491	Undetected
B193N8	ALE E10	16-Apr-04	Zn-65	0.0116	0.037	0.037	0.0553	Undetected
B193N8	ALE E10	16-Apr-04	Zr/Nb-95	-0.0452	0.044	0.044	0.0716	Undetected
B193W6	ALE E11	23-Apr-04	BALA140	-1.17	1.5	1.5	2.49	Undetected
B193W6	ALE E11	23-Apr-04	Be-7	0.148	0.26	0.26	0.443	Undetected
B193W6	ALE E11	23-Apr-04	Ce/Pr-144	-0.17	0.18	0.18	0.293	Undetected
B193W6	ALE E11	23-Apr-04	Ce-141	0.017	0.078	0.078	0.132	Undetected
B193W6	ALE E11	23-Apr-04	Co-58	-0.0533	0.027	0.027	0.0409	Undetected
B193W6	ALE E11	23-Apr-04	Eu-154	-0.0505	0.048	0.048	0.0778	Undetected
B193W6	ALE E11	23-Apr-04	Eu-155	0.0876	0.043	0.043	0.0711	Undetected
B193W6	ALE E11	23-Apr-04	Fe-59	-0.1	0.087	0.087	0.139	Undetected
B193W6	ALE E11	23-Apr-04	K-40	18.4	2.4	2.4	0.226	
B193W6	ALE E11	23-Apr-04	Mn-54	0.00731	0.018	0.018	0.0304	Undetected
B193W6	ALE E11	23-Apr-04	Na-22	-0.0208	0.018	0.018	0.0286	Undetected
B193W6	ALE E11	23-Apr-04	Pu-238	0.00208	0.0012	0.0013	0.00131	
B193W6	ALE E11	23-Apr-04	Ru-103	-0.00711	0.041	0.041	0.069	Undetected
B193W6	ALE E11	23-Apr-04	Ru-106	0.0463	0.13	0.13	0.224	Undetected
B193W6	ALE E11	23-Apr-04	Sb-125	-0.0108	0.038	0.038	0.063	Undetected
B193W6	ALE E11	23-Apr-04	Zn-65	-0.00522	0.052	0.052	0.073	Undetected
B193W6	ALE E11	23-Apr-04	Zr/Nb-95	0.15	0.075	0.075	0.115	Undetected
B193W8	ALE E12	23-Apr-04	BALA140	-1.34	1	1	1.55	Undetected
B193W8	ALE E12	23-Apr-04	Be-7	-0.00439	0.2	0.2	0.327	Undetected

Table B.3. (contd)

Raw data for all radionuclides not included in the Authorized Limits

Sample number	Sample Location	Sample Date	Radionculide	Concentration (pCi/g)	Counting Error	Total Analytical Error	Detection Limit	Lab Qualifier
B193W8	ALE E12	23-Apr-04	Ce/Pr-144	-0.0662	0.17	0.17	0.247	Undetected
B193W8	ALE E12	23-Apr-04	Ce-141	0.0637	0.065	0.065	0.11	Undetected
B193W8	ALE E12	23-Apr-04	Co-58	-0.00555	0.02	0.02	0.0332	Undetected
B193W8	ALE E12	23-Apr-04	Eu-154	-0.0114	0.036	0.036	0.0602	Undetected
B193W8	ALE E12	23-Apr-04	Eu-155	0.0613	0.033	0.033	0.0561	Undetected
B193W8	ALE E12	23-Apr-04	Fe-59	-0.00986	0.065	0.065	0.11	Undetected
B193W8	ALE E12	23-Apr-04	K-40	15.7	2	2	0.142	
B193W8	ALE E12	23-Apr-04	Mn-54	0.0049	0.013	0.013	0.0229	Undetected
B193W8	ALE E12	23-Apr-04	Na-22	-0.00543	0.013	0.013	0.0221	Undetected
B193W8	ALE E12	23-Apr-04	Pu-238	0.000807	0.00072	0.00073	0.00088	Undetected
B193W8	ALE E12	23-Apr-04	Ru-103	-0.000106	0.03	0.03	0.0507	Undetected
B193W8	ALE E12	23-Apr-04	Ru-106	-0.00124	0.094	0.094	0.162	Undetected
B193W8	ALE E12	23-Apr-04	Sb-125	-0.000637	0.028	0.028	0.0474	Undetected
B193W8	ALE E12	23-Apr-04	Zn-65	-0.0185	0.037	0.037	0.0521	Undetected
B193W8	ALE E12	23-Apr-04	Zr/Nb-95	0.0582	0.057	0.057	0.0856	Undetected
B193X0	ALE E13	23-Apr-04	BALA140	-1.44	0.92	0.92	1.36	Undetected
B193X0	ALE E13	23-Apr-04	Be-7	-0.117	0.17	0.17	0.285	Undetected
B193X0	ALE E13	23-Apr-04	Ce/Pr-144	-0.0289	0.13	0.13	0.219	Undetected
B193X0	ALE E13	23-Apr-04	Ce-141	-0.0191	0.056	0.056	0.0924	Undetected
B193X0	ALE E13	23-Apr-04	Co-58	-0.0152	0.017	0.017	0.0279	Undetected
B193X0	ALE E13	23-Apr-04	Eu-154	-0.00651	0.034	0.034	0.0579	Undetected
B193X0	ALE E13	23-Apr-04	Eu-155	0.0438	0.032	0.032	0.0552	Undetected
B193X0	ALE E13	23-Apr-04	Fe-59	-0.00434	0.061	0.061	0.103	Undetected
B193X0	ALE E13	23-Apr-04	K-40	14.7	1.8	1.8	0.137	
B193X0	ALE E13	23-Apr-04	Mn-54	0.00761	0.012	0.012	0.0202	Undetected
B193X0	ALE E13	23-Apr-04	Na-22	-0.00303	0.012	0.012	0.0212	Undetected
B193X0	ALE E13	23-Apr-04	Pu-238	0.00474	0.0015	0.0017	0.00103	
B193X0	ALE E13	23-Apr-04	Ru-103	0.0177	0.026	0.026	0.045	Undetected
B193X0	ALE E13	23-Apr-04	Ru-106	0.0234	0.088	0.088	0.151	Undetected
B193X0	ALE E13	23-Apr-04	Sb-125	-0.0079	0.024	0.024	0.0399	Undetected
B193X0	ALE E13	23-Apr-04	Zn-65	-0.0114	0.034	0.034	0.0475	Undetected
B193X0	ALE E13	23-Apr-04	Zr/Nb-95	0.0274	0.046	0.046	0.0693	Undetected
B193P0	ALE E14	16-Apr-04	BALA140	-0.647	0.55	0.55	0.852	Undetected
B193P0	ALE E14	16-Apr-04	Be-7	-0.0289	0.18	0.18	0.299	Undetected
B193P0	ALE E14	16-Apr-04	Ce/Pr-144	0.043	0.15	0.15	0.243	Undetected
B193P0	ALE E14	16-Apr-04	Ce-141	-0.00449	0.049	0.049	0.0812	Undetected
B193P0	ALE E14	16-Apr-04	Co-58	-0.0248	0.019	0.019	0.0291	Undetected
B193P0	ALE E14	16-Apr-04	Eu-154	-0.0104	0.037	0.037	0.0637	Undetected
B193P0	ALE E14	16-Apr-04	Eu-155	0.0489	0.033	0.033	0.0557	Undetected
B193P0	ALE E14	16-Apr-04	Fe-59	-0.0524	0.057	0.057	0.0911	Undetected
B193P0	ALE E14	16-Apr-04	I-131	0.689	1.1	1.1	1.9	Undetected
B193P0	ALE E14	16-Apr-04	K-40	13.8	1.9	1.9	0.166	
B193P0	ALE E14	16-Apr-04	Mn-54	0.00575	0.013	0.013	0.0223	Undetected
B193P0	ALE E14	16-Apr-04	Na-22	-0.00407	0.014	0.014	0.0234	Undetected
B193P0	ALE E14	16-Apr-04	Pu-238	0.000174	0.00029	0.00029	0.000277	Undetected
B193P0	ALE E14	16-Apr-04	Ru-103	-0.0109	0.025	0.025	0.0407	Undetected
B193P0	ALE E14	16-Apr-04	Ru-106	0.0218	0.1	0.1	0.18	Undetected
B193P0	ALE E14	16-Apr-04	Sb-125	-0.0021	0.03	0.03	0.0512	Undetected
B193P0	ALE E14	16-Apr-04	Zn-65	-0.0116	0.04	0.04	0.0554	Undetected
B193P0	ALE E14	16-Apr-04	Zr/Nb-95	0.0249	0.053	0.053	0.0777	Undetected
B193P2	ALE E15	16-Apr-04	BALA140	0.408	0.49	0.49	0.81	Undetected
B193P2	ALE E15	16-Apr-04	Be-7	-0.00482	0.17	0.17	0.282	Undetected
B193P2	ALE E15	16-Apr-04	Ce/Pr-144	0.0551	0.14	0.14	0.235	Undetected
B193P2	ALE E15	16-Apr-04	Ce-141	-0.0365	0.046	0.046	0.0763	Undetected
B193P2	ALE E15	16-Apr-04	Co-58	-0.0144	0.017	0.017	0.0277	Undetected
B193P2	ALE E15	16-Apr-04	Eu-154	-0.0027	0.04	0.04	0.0689	Undetected
B193P2	ALE E15	16-Apr-04	Eu-155	0.0642	0.034	0.034	0.0576	Undetected
B193P2	ALE E15	16-Apr-04	Fe-59	-0.00645	0.056	0.056	0.0959	Undetected
B193P2	ALE E15	16-Apr-04	I-131	0.527	1.1	1.1	1.89	Undetected

Table B.3. (contd)

Raw data for all radionuclides not included in the Authorized Limits

Sample number	Sample Location	Sample Date	Radionculide	Concentration (pCi/g)	Counting Error	Total Analytical Error	Detection Limit	Lab Qualifier
B193P2	ALE E15	16-Apr-04	K-40	14.5	2.1	2.1	0.181	
B193P2	ALE E15	16-Apr-04	Mn-54	0.0212	0.014	0.014	0.0248	Undetected
B193P2	ALE E15	16-Apr-04	Na-22	-0.00183	0.015	0.015	0.025	Undetected
B193P2	ALE E15	16-Apr-04	Pu-238	0.00113	0.0008	0.00082	0.000853	
B193P2	ALE E15	16-Apr-04	Ru-103	0.00265	0.024	0.024	0.0409	Undetected
B193P2	ALE E15	16-Apr-04	Ru-106	-0.0433	0.1	0.1	0.171	Undetected
B193P2	ALE E15	16-Apr-04	Sb-125	0.0227	0.03	0.03	0.053	Undetected
B193P2	ALE E15	16-Apr-04	Zn-65	-0.0278	0.039	0.039	0.0533	Undetected
B193P2	ALE E15	16-Apr-04	Zr/Nb-95	0.0296	0.044	0.044	0.0756	Undetected
B193K6	ALE W1	13-Apr-04	BALA140	-0.906	0.54	0.54	0.791	Undetected
B193K6	ALE W1	13-Apr-04	Be-7	-0.00946	0.16	0.16	0.273	Undetected
B193K6	ALE W1	13-Apr-04	Ce/Pr-144	-0.163	0.14	0.14	0.22	Undetected
B193K6	ALE W1	13-Apr-04	Ce-141	0.0355	0.047	0.047	0.0805	Undetected
B193K6	ALE W1	13-Apr-04	Co-58	-0.0131	0.017	0.017	0.0286	Undetected
B193K6	ALE W1	13-Apr-04	Eu-154	-0.02	0.039	0.039	0.0643	Undetected
B193K6	ALE W1	13-Apr-04	Eu-155	0.0637	0.031	0.031	0.0517	Undetected
B193K6	ALE W1	13-Apr-04	Fe-59	-0.0553	0.053	0.053	0.085	Undetected
B193K6	ALE W1	13-Apr-04	I-131	-0.258	1.2	1.2	2	Undetected
B193K6	ALE W1	13-Apr-04	K-40	13.4	1.8	1.8	0.147	
B193K6	ALE W1	13-Apr-04	Mn-54	0.00537	0.012	0.012	0.0214	Undetected
B193K6	ALE W1	13-Apr-04	Na-22	-0.007	0.014	0.014	0.0235	Undetected
B193K6	ALE W1	13-Apr-04	Pu-238	0.000353	0.00034	0.00035	0.000208	
B193K6	ALE W1	13-Apr-04	Ru-103	0.00186	0.024	0.024	0.0414	Undetected
B193K6	ALE W1	13-Apr-04	Ru-106	-0.00214	0.099	0.099	0.169	Undetected
B193K6	ALE W1	13-Apr-04	Sb-125	-0.00356	0.028	0.028	0.0465	Undetected
B193K6	ALE W1	13-Apr-04	Zn-65	-0.0204	0.035	0.035	0.0487	Undetected
B193K6	ALE W1	13-Apr-04	Zr/Nb-95	0.0662	0.045	0.045	0.0713	Undetected
B193K8	ALE W2	13-Apr-04	BALA140	-0.806	0.53	0.53	0.776	Undetected
B193K8	ALE W2	13-Apr-04	Be-7	-0.0047	0.16	0.16	0.264	Undetected
B193K8	ALE W2	13-Apr-04	Ce/Pr-144	0.0501	0.14	0.14	0.234	Undetected
B193K8	ALE W2	13-Apr-04	Ce-141	-0.00102	0.047	0.047	0.0794	Undetected
B193K8	ALE W2	13-Apr-04	Co-58	-0.0136	0.017	0.017	0.0288	Undetected
B193K8	ALE W2	13-Apr-04	Eu-154	-0.00144	0.042	0.042	0.0712	Undetected
B193K8	ALE W2	13-Apr-04	Eu-155	0.0772	0.034	0.034	0.0565	Undetected
B193K8	ALE W2	13-Apr-04	Fe-59	-0.0279	0.053	0.053	0.0891	Undetected
B193K8	ALE W2	13-Apr-04	I-131	-0.472	1.2	1.2	1.95	Undetected
B193K8	ALE W2	13-Apr-04	K-40	15.4	2.2	2.2	0.185	
B193K8	ALE W2	13-Apr-04	Mn-54	0.00363	0.013	0.013	0.0226	Undetected
B193K8	ALE W2	13-Apr-04	Na-22	-0.000696	0.015	0.015	0.0262	Undetected
B193K8	ALE W2	13-Apr-04	Pu-238	0.0000609	0.00018	0.00019	0.000247	Undetected
B193K8	ALE W2	13-Apr-04	Ru-103	0.0133	0.023	0.023	0.0404	Undetected
B193K8	ALE W2	13-Apr-04	Ru-106	-0.0356	0.095	0.095	0.161	Undetected
B193K8	ALE W2	13-Apr-04	Sb-125	0.00256	0.027	0.027	0.0459	Undetected
B193K8	ALE W2	13-Apr-04	Zn-65	0.00572	0.037	0.037	0.0545	Undetected
B193K8	ALE W2	13-Apr-04	Zr/Nb-95	0.0467	0.048	0.048	0.0721	Undetected
B193L0	ALE W3	13-Apr-04	BALA140	-0.95	0.59	0.59	0.892	Undetected
B193L0	ALE W3	13-Apr-04	Be-7	0.2	0.18	0.18	0.314	Undetected
B193L0	ALE W3	13-Apr-04	Ce/Pr-144	-0.166	0.16	0.16	0.268	Undetected
B193L0	ALE W3	13-Apr-04	Ce-141	0.0123	0.053	0.053	0.0897	Undetected
B193L0	ALE W3	13-Apr-04	Co-58	0.000836	0.018	0.018	0.0302	Undetected
B193L0	ALE W3	13-Apr-04	Eu-154	-0.0096	0.043	0.043	0.0724	Undetected
B193L0	ALE W3	13-Apr-04	Eu-155	0.0597	0.04	0.04	0.0668	Undetected
B193L0	ALE W3	13-Apr-04	Fe-59	-0.0163	0.058	0.058	0.0989	Undetected
B193L0	ALE W3	13-Apr-04	I-131	-1.59	1.3	1.3	2.11	Undetected
B193L0	ALE W3	13-Apr-04	K-40	14.9	2.1	2.1	0.183	
B193L0	ALE W3	13-Apr-04	Mn-54	0.0125	0.013	0.013	0.023	Undetected
B193L0	ALE W3	13-Apr-04	Na-22	-0.00455	0.016	0.016	0.0264	Undetected
B193L0	ALE W3	13-Apr-04	Pu-238	0.00105	0.00065	0.00067	0.000266	
B193L0	ALE W3	13-Apr-04	Ru-103	-0.00572	0.026	0.026	0.0429	Undetected

Table B.3. (contd)

Raw data for all radionuclides not included in the Authorized Limits

Sample number	Sample Location	Sample Date	Radionculide	Concentration (pCi/g)	Counting Error	Total Analytical Error	Detection Limit	Lab Qualifier
B193L0	ALE W3	13-Apr-04	Ru-106	-0.0298	0.11	0.11	0.179	Undetected
B193L0	ALE W3	13-Apr-04	Sb-125	0.0378	0.029	0.029	0.051	Undetected
B193L0	ALE W3	13-Apr-04	Zn-65	0.0506	0.042	0.042	0.0635	Undetected
B193L0	ALE W3	13-Apr-04	Zr/Nb-95	0.133	0.052	0.052	0.0791	Undetected
B193P4	ALE W4	16-Apr-04	BALA140	-0.337	0.42	0.42	0.674	Undetected
B193P4	ALE W4	16-Apr-04	Be-7	0.0166	0.14	0.14	0.229	Undetected
B193P4	ALE W4	16-Apr-04	Ce/Pr-144	0.051	0.17	0.17	0.239	Undetected
B193P4	ALE W4	16-Apr-04	Ce-141	0.0387	0.046	0.046	0.0768	Undetected
B193P4	ALE W4	16-Apr-04	Co-58	-0.00678	0.014	0.014	0.024	Undetected
B193P4	ALE W4	16-Apr-04	Eu-154	-0.0284	0.035	0.035	0.056	Undetected
B193P4	ALE W4	16-Apr-04	Eu-155	0.0681	0.035	0.035	0.0596	Undetected
B193P4	ALE W4	16-Apr-04	Fe-59	-0.0342	0.047	0.047	0.0778	Undetected
B193P4	ALE W4	16-Apr-04	I-131	0.274	0.92	0.92	1.57	Undetected
B193P4	ALE W4	16-Apr-04	K-40	12.6	1.7	1.7	0.144	
B193P4	ALE W4	16-Apr-04	Mn-54	0.00462	0.011	0.011	0.0183	Undetected
B193P4	ALE W4	16-Apr-04	Na-22	-0.0102	0.013	0.013	0.0205	Undetected
B193P4	ALE W4	16-Apr-04	Pu-238	0.000651	0.00052	0.00053	0.000264	
B193P4	ALE W4	16-Apr-04	Ru-103	-0.0124	0.02	0.02	0.0328	Undetected
B193P4	ALE W4	16-Apr-04	Ru-106	-0.021	0.088	0.088	0.147	Undetected
B193P4	ALE W4	16-Apr-04	Sb-125	-0.00281	0.025	0.025	0.0414	Undetected
B193P4	ALE W4	16-Apr-04	Zn-65	0.036	0.034	0.034	0.0506	Undetected
B193P4	ALE W4	16-Apr-04	Zr/Nb-95	0.0941	0.038	0.038	0.0669	Undetected
B193L2	ALE W5	13-Apr-04	BALA140	-1.01	0.52	0.52	0.717	Undetected
B193L2	ALE W5	13-Apr-04	Be-7	0.0363	0.15	0.15	0.256	Undetected
B193L2	ALE W5	13-Apr-04	Ce/Pr-144	-0.0777	0.13	0.13	0.208	Undetected
B193L2	ALE W5	13-Apr-04	Ce-141	-0.0171	0.043	0.043	0.0698	Undetected
B193L2	ALE W5	13-Apr-04	Co-58	-0.0048	0.016	0.016	0.0271	Undetected
B193L2	ALE W5	13-Apr-04	Eu-154	0.0281	0.036	0.036	0.065	Undetected
B193L2	ALE W5	13-Apr-04	Eu-155	0.0735	0.034	0.034	0.0581	Undetected
B193L2	ALE W5	13-Apr-04	Fe-59	-0.0208	0.052	0.052	0.0879	Undetected
B193L2	ALE W5	13-Apr-04	I-131	-0.167	1.1	1.1	1.78	Undetected
B193L2	ALE W5	13-Apr-04	K-40	12.7	1.7	1.7	0.157	
B193L2	ALE W5	13-Apr-04	Mn-54	0.00831	0.012	0.012	0.021	Undetected
B193L2	ALE W5	13-Apr-04	Na-22	0.00922	0.013	0.013	0.0237	Undetected
B193L2	ALE W5	13-Apr-04	Pu-238	0.00475	0.0014	0.0016	0.00103	
B193L2	ALE W5	13-Apr-04	Ru-103	-0.0143	0.023	0.023	0.0383	Undetected
B193L2	ALE W5	13-Apr-04	Ru-106	0.0568	0.09	0.09	0.157	Undetected
B193L2	ALE W5	13-Apr-04	Sb-125	-0.0017	0.026	0.026	0.0432	Undetected
B193L2	ALE W5	13-Apr-04	Zn-65	-0.0219	0.036	0.036	0.0497	Undetected
B193L2	ALE W5	13-Apr-04	Zr/Nb-95	0.0403	0.044	0.044	0.0675	Undetected
B193L4	ALE W6	13-Apr-04	BALA140	-0.412	0.58	0.58	0.956	Undetected
B193L4	ALE W6	13-Apr-04	Be-7	-0.0291	0.19	0.19	0.312	Undetected
B193L4	ALE W6	13-Apr-04	Ce/Pr-144	-0.0226	0.15	0.15	0.244	Undetected
B193L4	ALE W6	13-Apr-04	Ce-141	0.0778	0.05	0.05	0.0844	Undetected
B193L4	ALE W6	13-Apr-04	Co-58	-0.0254	0.019	0.019	0.0293	Undetected
B193L4	ALE W6	13-Apr-04	Eu-154	-0.00737	0.04	0.04	0.0689	Undetected
B193L4	ALE W6	13-Apr-04	Eu-155	0.0653	0.048	0.048	0.0534	Undetected
B193L4	ALE W6	13-Apr-04	Fe-59	-0.0467	0.056	0.056	0.0925	Undetected
B193L4	ALE W6	13-Apr-04	I-131	-0.378	1.3	1.3	2.23	Undetected
B193L4	ALE W6	13-Apr-04	K-40	14.1	1.9	1.9	0.165	
B193L4	ALE W6	13-Apr-04	Mn-54	0.0139	0.013	0.013	0.023	Undetected
B193L4	ALE W6	13-Apr-04	Na-22	0.00107	0.015	0.015	0.0252	Undetected
B193L4	ALE W6	13-Apr-04	Pu-238	0.00096	0.00057	0.00059	0.000224	
B193L4	ALE W6	13-Apr-04	Ru-103	0.00855	0.025	0.025	0.0442	Undetected
B193L4	ALE W6	13-Apr-04	Ru-106	-0.0209	0.1	0.1	0.177	Undetected
B193L4	ALE W6	13-Apr-04	Sb-125	0.0222	0.031	0.031	0.0527	Undetected
B193L4	ALE W6	13-Apr-04	Zn-65	0.0242	0.035	0.035	0.0546	Undetected
B193L4	ALE W6	13-Apr-04	Zr/Nb-95	0.022	0.048	0.048	0.0717	Undetected

Table B.3. (contd)

Raw data for all radionuclides not included in the Authorized Limits

Sample number	Sample Location	Sample Date	Radionculide	Concentration (pCi/g)	Counting Error	Total Analytical Error	Detection Limit	Lab Qualifier
B193R2	ALE W7	21-Apr-04	BALA140	-0.18	0.31	0.31	0.506	Undetected
B193R2	ALE W7	21-Apr-04	Be-7	0.023	0.13	0.13	0.213	Undetected
B193R2	ALE W7	21-Apr-04	Ce/Pr-144	-0.181	0.14	0.14	0.224	Undetected
B193R2	ALE W7	21-Apr-04	Ce-141	0.0487	0.04	0.04	0.0667	Undetected
B193R2	ALE W7	21-Apr-04	Co-58	-0.00869	0.013	0.013	0.0215	Undetected
B193R2	ALE W7	21-Apr-04	Eu-154	-0.0267	0.035	0.035	0.0563	Undetected
B193R2	ALE W7	21-Apr-04	Eu-155	0.0519	0.034	0.034	0.0568	Undetected
B193R2	ALE W7	21-Apr-04	Fe-59	-0.0255	0.044	0.044	0.0728	Undetected
B193R2	ALE W7	21-Apr-04	I-131	-0.427	0.58	0.58	0.963	Undetected
B193R2	ALE W7	21-Apr-04	K-40	13.2	1.8	1.8	0.138	
B193R2	ALE W7	21-Apr-04	Mn-54	-0.00262	0.01	0.01	0.0174	Undetected
B193R2	ALE W7	21-Apr-04	Na-22	-0.00982	0.013	0.013	0.0205	Undetected
B193R2	ALE W7	21-Apr-04	Pu-238	0.00122	0.00083	0.00085	0.000375	
B193R2	ALE W7	21-Apr-04	Ru-103	-0.00748	0.018	0.018	0.0304	Undetected
B193R2	ALE W7	21-Apr-04	Ru-106	0.0241	0.081	0.081	0.139	Undetected
B193R2	ALE W7	21-Apr-04	Sb-125	0.0148	0.023	0.023	0.0392	Undetected
B193R2	ALE W7	21-Apr-04	Zn-65	0.00688	0.032	0.032	0.0454	Undetected
B193R2	ALE W7	21-Apr-04	Zr/Nb-95	0.0505	0.033	0.033	0.0584	Undetected
B193L6	ALE W8	13-Apr-04	BALA140	-0.553	0.53	0.53	0.829	Undetected
B193L6	ALE W8	13-Apr-04	Be-7	0.0281	0.16	0.16	0.279	Undetected
B193L6	ALE W8	13-Apr-04	Ce/Pr-144	-0.0177	0.14	0.14	0.235	Undetected
B193L6	ALE W8	13-Apr-04	Ce-141	-0.00431	0.047	0.047	0.0801	Undetected
B193L6	ALE W8	13-Apr-04	Co-58	-0.00815	0.018	0.018	0.0301	Undetected
B193L6	ALE W8	13-Apr-04	Eu-154	0.0113	0.042	0.042	0.0734	Undetected
B193L6	ALE W8	13-Apr-04	Eu-155	0.0642	0.034	0.034	0.0576	Undetected
B193L6	ALE W8	13-Apr-04	Fe-59	0.000628	0.061	0.061	0.105	Undetected
B193L6	ALE W8	13-Apr-04	I-131	-0.345	1.3	1.3	2.09	Undetected
B193L6	ALE W8	13-Apr-04	K-40	15.7	2.3	2.3	0.186	
B193L6	ALE W8	13-Apr-04	Mn-54	-0.0153	0.013	0.013	0.0206	Undetected
B193L6	ALE W8	13-Apr-04	Na-22	0.00444	0.015	0.015	0.0268	Undetected
B193L6	ALE W8	13-Apr-04	Pu-238	0.000217	0.00037	0.00037	0.000607	Undetected
B193L6	ALE W8	13-Apr-04	Ru-103	-0.00776	0.025	0.025	0.0413	Undetected
B193L6	ALE W8	13-Apr-04	Ru-106	-0.0419	0.098	0.098	0.165	Undetected
B193L6	ALE W8	13-Apr-04	Sb-125	-0.0125	0.029	0.029	0.0487	Undetected
B193L6	ALE W8	13-Apr-04	Zn-65	-0.0338	0.042	0.042	0.0564	Undetected
B193L6	ALE W8	13-Apr-04	Zr/Nb-95	0.0445	0.05	0.05	0.0753	Undetected
B193L8	ALE W9	13-Apr-04	BALA140	-1.28	0.66	0.66	0.956	Undetected
B193L8	ALE W9	13-Apr-04	Be-7	0.104	0.19	0.19	0.332	Undetected
B193L8	ALE W9	13-Apr-04	Ce/Pr-144	-0.202	0.18	0.18	0.294	Undetected
B193L8	ALE W9	13-Apr-04	Ce-141	0.0563	0.058	0.058	0.0988	Undetected
B193L8	ALE W9	13-Apr-04	Co-58	-0.0135	0.021	0.021	0.0345	Undetected
B193L8	ALE W9	13-Apr-04	Eu-154	-0.0214	0.047	0.047	0.0772	Undetected
B193L8	ALE W9	13-Apr-04	Eu-155	0.0666	0.043	0.043	0.0716	Undetected
B193L8	ALE W9	13-Apr-04	Fe-59	0.0619	0.066	0.066	0.117	Undetected
B193L8	ALE W9	13-Apr-04	I-131	-0.834	1.5	1.5	2.42	Undetected
B193L8	ALE W9	13-Apr-04	K-40	15.5	2.2	2.2	0.21	
B193L8	ALE W9	13-Apr-04	Mn-54	-0.0032	0.015	0.015	0.0254	Undetected
B193L8	ALE W9	13-Apr-04	Na-22	-0.00797	0.017	0.017	0.0282	Undetected
B193L8	ALE W9	13-Apr-04	Pu-238	0.000142	0.00017	0.00017	0.000135	Undetected
B193L8	ALE W9	13-Apr-04	Ru-103	-0.0105	0.028	0.028	0.0469	Undetected
B193L8	ALE W9	13-Apr-04	Ru-106	-0.00511	0.12	0.12	0.196	Undetected
B193L8	ALE W9	13-Apr-04	Sb-125	0.00492	0.033	0.033	0.056	Undetected
B193L8	ALE W9	13-Apr-04	Zn-65	0.0306	0.049	0.049	0.0716	Undetected
B193L8	ALE W9	13-Apr-04	Zr/Nb-95	0.177	0.061	0.061	0.093	Undetected
B193R4	ALE W10	21-Apr-04	BALA140	-0.617	0.3	0.3	0.416	Undetected
B193R4	ALE W10	21-Apr-04	Be-7	-0.000789	0.12	0.12	0.2	Undetected
B193R4	ALE W10	21-Apr-04	Ce/Pr-144	-0.0967	0.11	0.11	0.187	Undetected
B193R4	ALE W10	21-Apr-04	Ce-141	-0.0122	0.034	0.034	0.0571	Undetected
B193R4	ALE W10	21-Apr-04	Co-58	-0.00449	0.013	0.013	0.0217	Undetected

Table B.3. (contd)

Raw data for all radionuclides not included in the Authorized Limits

Sample number	Sample Location	Sample Date	Radionculide	Concentration (pCi/g)	Counting Error	Total Analytical Error	Detection Limit	Lab Qualifier
B193R4	ALE W10	21-Apr-04	Eu-154	-0.0318	0.034	0.034	0.0545	Undetected
B193R4	ALE W10	21-Apr-04	Eu-155	0.0461	0.027	0.027	0.0459	Undetected
B193R4	ALE W10	21-Apr-04	Fe-59	0.0131	0.041	0.041	0.0726	Undetected
B193R4	ALE W10	21-Apr-04	I-131	0.194	0.53	0.53	0.901	Undetected
B193R4	ALE W10	21-Apr-04	K-40	13.9	2	2	0.141	
B193R4	ALE W10	21-Apr-04	Mn-54	0.00288	0.01	0.01	0.0176	Undetected
B193R4	ALE W10	21-Apr-04	Na-22	-0.0119	0.012	0.012	0.0198	Undetected
B193R4	ALE W10	21-Apr-04	Pu-238	0.000201	0.00049	0.00071	0.000466	Undetected
B193R4	ALE W10	21-Apr-04	Ru-103	0.00961	0.017	0.017	0.0302	Undetected
B193R4	ALE W10	21-Apr-04	Ru-106	0.00673	0.075	0.075	0.13	Undetected
B193R4	ALE W10	21-Apr-04	Sb-125	-0.0141	0.022	0.022	0.0366	Undetected
B193R4	ALE W10	21-Apr-04	Zn-65	-0.0073	0.03	0.03	0.0426	Undetected
B193R4	ALE W10	21-Apr-04	Zr/Nb-95	0.0251	0.038	0.038	0.0563	Undetected
B193M0	ALE W11	13-Apr-04	BALA140	-0.496	0.54	0.54	0.847	Undetected
B193M0	ALE W11	13-Apr-04	Be-7	-0.131	0.16	0.16	0.267	Undetected
B193M0	ALE W11	13-Apr-04	Ce/Pr-144	-0.0133	0.13	0.13	0.219	Undetected
B193M0	ALE W11	13-Apr-04	Ce-141	-0.00783	0.045	0.045	0.0744	Undetected
B193M0	ALE W11	13-Apr-04	Co-58	-0.00547	0.017	0.017	0.0293	Undetected
B193M0	ALE W11	13-Apr-04	Eu-154	0.009	0.037	0.037	0.0667	Undetected
B193M0	ALE W11	13-Apr-04	Eu-155	0.0277	0.035	0.035	0.059	Undetected
B193M0	ALE W11	13-Apr-04	Fe-59	-0.00303	0.054	0.054	0.094	Undetected
B193M0	ALE W11	13-Apr-04	I-131	0.839	1.2	1.2	2.03	Undetected
B193M0	ALE W11	13-Apr-04	K-40	12.4	1.7	1.7	0.19	
B193M0	ALE W11	13-Apr-04	Mn-54	0.0147	0.013	0.013	0.0239	Undetected
B193M0	ALE W11	13-Apr-04	Na-22	0.00519	0.013	0.013	0.0244	Undetected
B193M0	ALE W11	13-Apr-04	Pu-238	-0.0000303	0.00046	0.00046	0.00107	Undetected
B193M0	ALE W11	13-Apr-04	Ru-103	-0.0163	0.024	0.024	0.0403	Undetected
B193M0	ALE W11	13-Apr-04	Ru-106	0.0216	0.1	0.1	0.174	Undetected
B193M0	ALE W11	13-Apr-04	Sb-125	-0.00639	0.027	0.027	0.0459	Undetected
B193M0	ALE W11	13-Apr-04	Zn-65	-0.0313	0.036	0.036	0.0476	Undetected
B193M0	ALE W11	13-Apr-04	Zr/Nb-95	0.0154	0.044	0.044	0.0666	Undetected
B193M2	ALE W12	13-Apr-04	BALA140	-0.807	0.62	0.62	0.958	Undetected
B193M2	ALE W12	13-Apr-04	Be-7	-0.0721	0.18	0.18	0.296	Undetected
B193M2	ALE W12	13-Apr-04	Ce/Pr-144	0.151	0.16	0.16	0.257	Undetected
B193M2	ALE W12	13-Apr-04	Ce-141	0.0127	0.051	0.051	0.0867	Undetected
B193M2	ALE W12	13-Apr-04	Co-58	-0.0255	0.019	0.019	0.03	Undetected
B193M2	ALE W12	13-Apr-04	Eu-154	0.00946	0.041	0.041	0.0724	Undetected
B193M2	ALE W12	13-Apr-04	Eu-155	0.0677	0.034	0.034	0.0564	Undetected
B193M2	ALE W12	13-Apr-04	Fe-59	-0.064	0.061	0.061	0.0981	Undetected
B193M2	ALE W12	13-Apr-04	I-131	-0.227	1.3	1.3	2.24	Undetected
B193M2	ALE W12	13-Apr-04	K-40	14.6	2	2	0.189	
B193M2	ALE W12	13-Apr-04	Mn-54	-0.0000595	0.014	0.014	0.0233	Undetected
B193M2	ALE W12	13-Apr-04	Na-22	0.00366	0.015	0.015	0.0265	Undetected
B193M2	ALE W12	13-Apr-04	Pu-238	0.00215	0.0009	0.00095	0.000641	
B193M2	ALE W12	13-Apr-04	Ru-103	-0.0206	0.027	0.027	0.0443	Undetected
B193M2	ALE W12	13-Apr-04	Ru-106	0.0741	0.11	0.11	0.195	Undetected
B193M2	ALE W12	13-Apr-04	Sb-125	0.00202	0.031	0.031	0.0523	Undetected
B193M2	ALE W12	13-Apr-04	Zn-65	-0.00138	0.041	0.041	0.0601	Undetected
B193M2	ALE W12	13-Apr-04	Zr/Nb-95	0.0225	0.053	0.053	0.0795	Undetected
B193R6	ALE W13	21-Apr-04	BALA140	-0.699	0.36	0.36	0.502	Undetected
B193R6	ALE W13	21-Apr-04	Be-7	0.0515	0.15	0.15	0.262	Undetected
B193R6	ALE W13	21-Apr-04	Ce/Pr-144	-0.13	0.14	0.14	0.218	Undetected
B193R6	ALE W13	21-Apr-04	Ce-141	-0.00801	0.039	0.039	0.0642	Undetected
B193R6	ALE W13	21-Apr-04	Co-58	-0.00706	0.015	0.015	0.026	Undetected
B193R6	ALE W13	21-Apr-04	Eu-154	0.00258	0.036	0.036	0.0625	Undetected
B193R6	ALE W13	21-Apr-04	Eu-155	0.0781	0.036	0.036	0.0607	Undetected
B193R6	ALE W13	21-Apr-04	Fe-59	-0.000255	0.049	0.049	0.0844	Undetected
B193R6	ALE W13	21-Apr-04	I-131	0.561	0.65	0.65	1.13	Undetected
B193R6	ALE W13	21-Apr-04	K-40	14.4	2	2	0.171	

Table B.3. (contd)

Raw data for all radionuclides not included in the Authorized Limits

Sample number	Sample Location	Sample Date	Radionculide	Concentration (pCi/g)	Counting Error	Total Analytical Error	Detection Limit	Lab Qualifier
B193R6	ALE W13	21-Apr-04	Mn-54	0.00104	0.013	0.013	0.0221	Undetected
B193R6	ALE W13	21-Apr-04	Na-22	0.000783	0.013	0.013	0.0227	Undetected
B193R6	ALE W13	21-Apr-04	Pu-238	0.0009	0.00074	0.00075	0.000856	
B193R6	ALE W13	21-Apr-04	Ru-103	0.0077	0.021	0.021	0.0365	Undetected
B193R6	ALE W13	21-Apr-04	Ru-106	0.0467	0.096	0.096	0.167	Undetected
B193R6	ALE W13	21-Apr-04	Sb-125	-0.01	0.028	0.028	0.047	Undetected
B193R6	ALE W13	21-Apr-04	Zn-65	-0.0161	0.035	0.035	0.0496	Undetected
B193R6	ALE W13	21-Apr-04	Zr/Nb-95	0.00594	0.039	0.039	0.0682	Undetected
B193M4	ALE W14	13-Apr-04	BALA140	-0.641	0.55	0.55	0.847	Undetected
B193M4	ALE W14	13-Apr-04	Be-7	0.0276	0.15	0.15	0.264	Undetected
B193M4	ALE W14	13-Apr-04	Ce/Pr-144	-0.139	0.13	0.13	0.2	Undetected
B193M4	ALE W14	13-Apr-04	Ce-141	-0.0258	0.043	0.043	0.0719	Undetected
B193M4	ALE W14	13-Apr-04	Co-58	0.0000571	0.016	0.016	0.0286	Undetected
B193M4	ALE W14	13-Apr-04	Eu-154	0.00346	0.039	0.039	0.0677	Undetected
B193M4	ALE W14	13-Apr-04	Eu-155	0.0422	0.031	0.031	0.0501	Undetected
B193M4	ALE W14	13-Apr-04	Fe-59	-0.0712	0.055	0.055	0.0875	Undetected
B193M4	ALE W14	13-Apr-04	I-131	0.246	1.1	1.1	1.89	Undetected
B193M4	ALE W14	13-Apr-04	K-40	13.9	2	2	0.16	
B193M4	ALE W14	13-Apr-04	Mn-54	0.00673	0.012	0.012	0.0207	Undetected
B193M4	ALE W14	13-Apr-04	Na-22	0.00047	0.014	0.014	0.0247	Undetected
B193M4	ALE W14	13-Apr-04	Pu-238	0.000173	0.00018	0.00018	0.000122	Undetected
B193M4	ALE W14	13-Apr-04	Ru-103	-0.000606	0.022	0.022	0.0378	Undetected
B193M4	ALE W14	13-Apr-04	Ru-106	0.00377	0.091	0.091	0.158	Undetected
B193M4	ALE W14	13-Apr-04	Sb-125	0.00532	0.024	0.024	0.0424	Undetected
B193M4	ALE W14	13-Apr-04	Zn-65	-0.0176	0.033	0.033	0.0464	Undetected
B193M4	ALE W14	13-Apr-04	Zr/Nb-95	0.0125	0.045	0.045	0.0662	Undetected
B193R8	ALE W15	21-Apr-04	BALA140	-0.463	0.31	0.31	0.458	Undetected
B193R8	ALE W15	21-Apr-04	Be-7	-0.0242	0.13	0.13	0.222	Undetected
B193R8	ALE W15	21-Apr-04	Ce/Pr-144	-0.0489	0.13	0.13	0.208	Undetected
B193R8	ALE W15	21-Apr-04	Ce-141	0.00958	0.038	0.038	0.0623	Undetected
B193R8	ALE W15	21-Apr-04	Co-58	-0.0152	0.013	0.013	0.0205	Undetected
B193R8	ALE W15	21-Apr-04	Eu-154	-0.0253	0.033	0.033	0.0543	Undetected
B193R8	ALE W15	21-Apr-04	Eu-155	0.0589	0.029	0.029	0.0477	Undetected
B193R8	ALE W15	21-Apr-04	Fe-59	0.00325	0.044	0.044	0.0747	Undetected
B193R8	ALE W15	21-Apr-04	I-131	0.52	0.58	0.58	1.01	Undetected
B193R8	ALE W15	21-Apr-04	K-40	14	1.9	1.9	0.133	
B193R8	ALE W15	21-Apr-04	Mn-54	0.0214	0.012	0.012	0.0186	
B193R8	ALE W15	21-Apr-04	Na-22	-0.0096	0.012	0.012	0.0198	Undetected
B193R8	ALE W15	21-Apr-04	Pu-238	-0.0000304	0.001	0.001	0.00221	Undetected
B193R8	ALE W15	21-Apr-04	Ru-103	-0.00598	0.019	0.019	0.0318	Undetected
B193R8	ALE W15	21-Apr-04	Ru-106	0.0297	0.086	0.086	0.15	Undetected
B193R8	ALE W15	21-Apr-04	Sb-125	0.0146	0.024	0.024	0.0423	Undetected
B193R8	ALE W15	21-Apr-04	Zn-65	-0.0389	0.034	0.034	0.0431	Undetected
B193R8	ALE W15	21-Apr-04	Zr/Nb-95	0.0546	0.038	0.038	0.0582	Undetected
B193T0	ALE W16	21-Apr-04	BALA140	-0.525	0.35	0.35	0.516	Undetected
B193T0	ALE W16	21-Apr-04	Be-7	0.043	0.13	0.13	0.22	Undetected
B193T0	ALE W16	21-Apr-04	Ce/Pr-144	0.102	0.12	0.12	0.21	Undetected
B193T0	ALE W16	21-Apr-04	Ce-141	0.003	0.037	0.037	0.0631	Undetected
B193T0	ALE W16	21-Apr-04	Co-58	0.00797	0.015	0.015	0.0262	Undetected
B193T0	ALE W16	21-Apr-04	Eu-154	-0.0359	0.036	0.036	0.0577	Undetected
B193T0	ALE W16	21-Apr-04	Eu-155	0.0685	0.032	0.032	0.053	Undetected
B193T0	ALE W16	21-Apr-04	Fe-59	-0.0123	0.046	0.046	0.0787	Undetected
B193T0	ALE W16	21-Apr-04	I-131	0.181	0.62	0.62	1.04	Undetected
B193T0	ALE W16	21-Apr-04	K-40	14.8	2.1	2.1	0.159	
B193T0	ALE W16	21-Apr-04	Mn-54	-0.001	0.012	0.012	0.0198	Undetected
B193T0	ALE W16	21-Apr-04	Na-22	-0.0125	0.013	0.013	0.0212	Undetected
B193T0	ALE W16	21-Apr-04	Pu-238	0.000452	0.00089	0.001	0.00146	Undetected
B193T0	ALE W16	21-Apr-04	Ru-103	0.0121	0.019	0.019	0.0332	Undetected
B193T0	ALE W16	21-Apr-04	Ru-106	0.0761	0.086	0.086	0.154	Undetected

Table B.3. (contd)

Raw data for all radionuclides not included in the Authorized Limits

Sample number	Sample Location	Sample Date	Radionculide	Concentration (pCi/g)	Counting Error	Total Analytical Error	Detection Limit	Lab Qualifier
B193T0	ALE W16	21-Apr-04	Sb-125	0.00872	0.025	0.025	0.0434	Undetected
B193T0	ALE W16	21-Apr-04	Zn-65	-0.0016	0.034	0.034	0.0489	Undetected
B193T0	ALE W16	21-Apr-04	Zr/Nb-95	0.0862	0.041	0.041	0.0647	Undetected
B193X2	ALE HQ Lysimeter 1	23-Apr-04	BALA140	-1.2	1.1	1.1	1.64	Undetected
B193X2	ALE HQ Lysimeter 1	23-Apr-04	Be-7	0.128	0.19	0.19	0.332	Undetected
B193X2	ALE HQ Lysimeter 1	23-Apr-04	Ce/Pr-144	0.0449	0.15	0.15	0.243	Undetected
B193X2	ALE HQ Lysimeter 1	23-Apr-04	Ce-141	0.00543	0.065	0.065	0.107	Undetected
B193X2	ALE HQ Lysimeter 1	23-Apr-04	Cm-242	-0.000513	0.0036	0.0036	0.00376	Undetected
B193X2	ALE HQ Lysimeter 1	23-Apr-04	Cm-244	0.00085	0.0019	0.0019	0.00253	Undetected
B193X2	ALE HQ Lysimeter 1	23-Apr-04	Co-58	-0.026	0.02	0.02	0.031	Undetected
B193X2	ALE HQ Lysimeter 1	23-Apr-04	Eu-154	-0.0129	0.039	0.039	0.0657	Undetected
B193X2	ALE HQ Lysimeter 1	23-Apr-04	Eu-155	0.0714	0.033	0.033	0.0551	Undetected
B193X2	ALE HQ Lysimeter 1	23-Apr-04	Fe-59	-0.0344	0.068	0.068	0.112	Undetected
B193X2	ALE HQ Lysimeter 1	23-Apr-04	K-40	15.1	1.9	1.9	0.16	
B193X2	ALE HQ Lysimeter 1	23-Apr-04	Mn-54	0.00318	0.013	0.013	0.022	Undetected
B193X2	ALE HQ Lysimeter 1	23-Apr-04	Na-22	-0.00459	0.014	0.014	0.0242	Undetected
B193X2	ALE HQ Lysimeter 1	23-Apr-04	Pu-238	0.000214	0.00027	0.00027	0.000408	Undetected
B193X2	ALE HQ Lysimeter 1	23-Apr-04	Ru-103	-0.0166	0.03	0.03	0.0489	Undetected
B193X2	ALE HQ Lysimeter 1	23-Apr-04	Ru-106	-0.0491	0.1	0.1	0.168	Undetected
B193X2	ALE HQ Lysimeter 1	23-Apr-04	Sb-125	0.0394	0.028	0.028	0.0494	Undetected
B193X2	ALE HQ Lysimeter 1	23-Apr-04	Zn-65	-0.000032	0.037	0.037	0.0538	Undetected
B193X2	ALE HQ Lysimeter 1	23-Apr-04	Zr/Nb-95	0.0653	0.053	0.053	0.0815	Undetected
B193X4	ALE HQ Lysimeter 2	23-Apr-04	BALA140	-2.05	1.2	1.2	1.67	Undetected
B193X4	ALE HQ Lysimeter 2	23-Apr-04	Be-7	-0.208	0.2	0.2	0.325	Undetected
B193X4	ALE HQ Lysimeter 2	23-Apr-04	Ce/Pr-144	-0.0128	0.15	0.15	0.249	Undetected
B193X4	ALE HQ Lysimeter 2	23-Apr-04	Ce-141	0.0309	0.067	0.067	0.111	Undetected
B193X4	ALE HQ Lysimeter 2	23-Apr-04	Cm-242	0.00144	0.0039	0.0041	0.00528	Undetected
B193X4	ALE HQ Lysimeter 2	23-Apr-04	Cm-244	0.00123	0.0026	0.0027	0.00356	Undetected
B193X4	ALE HQ Lysimeter 2	23-Apr-04	Co-58	-0.00211	0.021	0.021	0.0349	Undetected
B193X4	ALE HQ Lysimeter 2	23-Apr-04	Eu-154	0.0228	0.039	0.039	0.0698	Undetected
B193X4	ALE HQ Lysimeter 2	23-Apr-04	Eu-155	0.0475	0.033	0.033	0.055	Undetected
B193X4	ALE HQ Lysimeter 2	23-Apr-04	Fe-59	-0.00971	0.069	0.069	0.118	Undetected
B193X4	ALE HQ Lysimeter 2	23-Apr-04	K-40	15.7	2	2	0.165	
B193X4	ALE HQ Lysimeter 2	23-Apr-04	Mn-54	0.0075	0.014	0.014	0.0234	Undetected
B193X4	ALE HQ Lysimeter 2	23-Apr-04	Na-22	0.00855	0.014	0.014	0.0257	Undetected
B193X4	ALE HQ Lysimeter 2	23-Apr-04	Pu-238	0.00434	0.0015	0.0016	0.000338	
B193X4	ALE HQ Lysimeter 2	23-Apr-04	Ru-103	-0.0322	0.031	0.031	0.0493	Undetected
B193X4	ALE HQ Lysimeter 2	23-Apr-04	Ru-106	0.108	0.1	0.1	0.185	Undetected
B193X4	ALE HQ Lysimeter 2	23-Apr-04	Sb-125	0.00957	0.029	0.029	0.0491	Undetected
B193X4	ALE HQ Lysimeter 2	23-Apr-04	Zn-65	-0.0016	0.037	0.037	0.0536	Undetected
B193X4	ALE HQ Lysimeter 2	23-Apr-04	Zr/Nb-95	-0.021	0.058	0.058	0.081	Undetected
B193X6	ALE HQ Lysimeter 3	23-Apr-04	BALA140	0.916	0.95	0.95	1.62	Undetected
B193X6	ALE HQ Lysimeter 3	23-Apr-04	Be-7	-0.0846	0.2	0.2	0.325	Undetected
B193X6	ALE HQ Lysimeter 3	23-Apr-04	Ce/Pr-144	0.0246	0.16	0.16	0.246	Undetected
B193X6	ALE HQ Lysimeter 3	23-Apr-04	Ce-141	0.00642	0.064	0.064	0.107	Undetected
B193X6	ALE HQ Lysimeter 3	23-Apr-04	Cm-242	-0.000514	0.0032	0.0032	0.00326	Undetected
B193X6	ALE HQ Lysimeter 3	23-Apr-04	Cm-244	0.00153	0.0023	0.0023	0.00219	Undetected
B193X6	ALE HQ Lysimeter 3	23-Apr-04	Co-58	-0.0107	0.02	0.02	0.0328	Undetected
B193X6	ALE HQ Lysimeter 3	23-Apr-04	Eu-154	-0.0215	0.037	0.037	0.0603	Undetected
B193X6	ALE HQ Lysimeter 3	23-Apr-04	Eu-155	0.0481	0.033	0.033	0.0555	Undetected
B193X6	ALE HQ Lysimeter 3	23-Apr-04	Fe-59	-0.0141	0.061	0.061	0.105	Undetected
B193X6	ALE HQ Lysimeter 3	23-Apr-04	K-40	15.5	1.9	1.9	0.139	
B193X6	ALE HQ Lysimeter 3	23-Apr-04	Mn-54	0.0216	0.015	0.015	0.0214	
B193X6	ALE HQ Lysimeter 3	23-Apr-04	Na-22	-0.00767	0.013	0.013	0.0223	Undetected
B193X6	ALE HQ Lysimeter 3	23-Apr-04	Pu-238	0.0000869	0.00019	0.00019	0.000348	Undetected
B193X6	ALE HQ Lysimeter 3	23-Apr-04	Ru-103	-0.011	0.03	0.03	0.0494	Undetected
B193X6	ALE HQ Lysimeter 3	23-Apr-04	Ru-106	0.0171	0.096	0.096	0.167	Undetected
B193X6	ALE HQ Lysimeter 3	23-Apr-04	Sb-125	0.0231	0.028	0.028	0.049	Undetected
B193X6	ALE HQ Lysimeter 3	23-Apr-04	Zn-65	-0.0113	0.035	0.035	0.0496	Undetected

Table B.3. (contd)

Raw data for all radionuclides not included in the Authorized Limits

Sample number	Sample Location	Sample Date	Radionculide	Concentration (pCi/g)	Counting Error	Total Analytical Error	Detection Limit	Lab Qualifier
B193X6	ALE HQ Lysimeter 3	23-Apr-04	Zr/Nb-95	0.0734	0.057	0.057	0.0864	Undetected
B193X8	ALE HQ Lysimeter 4	23-Apr-04	BALA140	-1.75	1.1	1.1	1.64	Undetected
B193X8	ALE HQ Lysimeter 4	23-Apr-04	Be-7	0.0749	0.19	0.19	0.34	Undetected
B193X8	ALE HQ Lysimeter 4	23-Apr-04	Ce/Pr-144	-0.0112	0.15	0.15	0.259	Undetected
B193X8	ALE HQ Lysimeter 4	23-Apr-04	Ce-141	0.00852	0.068	0.068	0.114	Undetected
B193X8	ALE HQ Lysimeter 4	23-Apr-04	Cm-242	0.000753	0.0025	0.0028	0.00343	Undetected
B193X8	ALE HQ Lysimeter 4	23-Apr-04	Cm-244	0.00162	0.0024	0.0025	0.00231	Undetected
B193X8	ALE HQ Lysimeter 4	23-Apr-04	Co-58	-0.0241	0.021	0.021	0.0325	Undetected
B193X8	ALE HQ Lysimeter 4	23-Apr-04	Eu-154	-0.0376	0.04	0.04	0.0656	Undetected
B193X8	ALE HQ Lysimeter 4	23-Apr-04	Eu-155	0.0587	0.039	0.039	0.0673	Undetected
B193X8	ALE HQ Lysimeter 4	23-Apr-04	Fe-59	-0.014	0.073	0.073	0.124	Undetected
B193X8	ALE HQ Lysimeter 4	23-Apr-04	K-40	16	2	2	0.166	
B193X8	ALE HQ Lysimeter 4	23-Apr-04	Mn-54	-0.00167	0.014	0.014	0.0234	Undetected
B193X8	ALE HQ Lysimeter 4	23-Apr-04	Na-22	-0.014	0.015	0.015	0.0241	Undetected
B193X8	ALE HQ Lysimeter 4	23-Apr-04	Pu-238	0.00297	0.0013	0.0014	0.000387	
B193X8	ALE HQ Lysimeter 4	23-Apr-04	Ru-103	0.00216	0.031	0.031	0.054	Undetected
B193X8	ALE HQ Lysimeter 4	23-Apr-04	Ru-106	0.0517	0.11	0.11	0.187	Undetected
B193X8	ALE HQ Lysimeter 4	23-Apr-04	Sb-125	0.00232	0.029	0.029	0.0483	Undetected
B193X8	ALE HQ Lysimeter 4	23-Apr-04	Zn-65	0.00231	0.04	0.04	0.058	Undetected
B193X8	ALE HQ Lysimeter 4	23-Apr-04	Zr/Nb-95	0.0653	0.058	0.058	0.089	Undetected
B193Y0	ALE HQ Lysimeter 5	23-Apr-04	BALA140	-0.567	1.2	1.2	1.68	Undetected
B193Y0	ALE HQ Lysimeter 5	23-Apr-04	Be-7	0.0178	0.19	0.19	0.319	Undetected
B193Y0	ALE HQ Lysimeter 5	23-Apr-04	Ce/Pr-144	-0.0643	0.15	0.15	0.256	Undetected
B193Y0	ALE HQ Lysimeter 5	23-Apr-04	Ce-141	0.0286	0.067	0.067	0.112	Undetected
B193Y0	ALE HQ Lysimeter 5	23-Apr-04	Cm-242	0.000792	0.0026	0.0029	0.00354	Undetected
B193Y0	ALE HQ Lysimeter 5	23-Apr-04	Cm-244	-0.0000854	0.0022	0.0022	0.00238	Undetected
B193Y0	ALE HQ Lysimeter 5	23-Apr-04	Co-58	-0.0201	0.02	0.02	0.0319	Undetected
B193Y0	ALE HQ Lysimeter 5	23-Apr-04	Eu-154	-0.00914	0.038	0.038	0.0657	Undetected
B193Y0	ALE HQ Lysimeter 5	23-Apr-04	Eu-155	0.182	0.07	0.07	0.0649	Undetected
B193Y0	ALE HQ Lysimeter 5	23-Apr-04	Fe-59	-0.0561	0.072	0.072	0.118	Undetected
B193Y0	ALE HQ Lysimeter 5	23-Apr-04	K-40	15.6	2	2	0.182	
B193Y0	ALE HQ Lysimeter 5	23-Apr-04	Mn-54	0.00986	0.014	0.014	0.0238	Undetected
B193Y0	ALE HQ Lysimeter 5	23-Apr-04	Na-22	-0.00102	0.014	0.014	0.0244	Undetected
B193Y0	ALE HQ Lysimeter 5	23-Apr-04	Pu-238	0.000125	0.00015	0.00015	0.000119	Undetected
B193Y0	ALE HQ Lysimeter 5	23-Apr-04	Ru-103	-0.0324	0.031	0.031	0.0499	Undetected
B193Y0	ALE HQ Lysimeter 5	23-Apr-04	Ru-106	0.0248	0.1	0.1	0.175	Undetected
B193Y0	ALE HQ Lysimeter 5	23-Apr-04	Sb-125	-0.00372	0.028	0.028	0.0471	Undetected
B193Y0	ALE HQ Lysimeter 5	23-Apr-04	Zn-65	-0.00775	0.039	0.039	0.0542	Undetected
B193Y0	ALE HQ Lysimeter 5	23-Apr-04	Zr/Nb-95	0.0558	0.058	0.058	0.0872	Undetected
B193T2	SNIVELY Lysimeter 1	21-Apr-04	BALA140	0.491	0.48	0.48	0.812	Undetected
B193T2	SNIVELY Lysimeter 1	21-Apr-04	Be-7	-0.0684	0.18	0.18	0.306	Undetected
B193T2	SNIVELY Lysimeter 1	21-Apr-04	Ce/Pr-144	-0.333	0.19	0.19	0.297	Undetected
B193T2	SNIVELY Lysimeter 1	21-Apr-04	Ce-141	0.00336	0.054	0.054	0.0897	Undetected
B193T2	SNIVELY Lysimeter 1	21-Apr-04	Cm-242	0.00262	0.0044	0.0046	0.00425	Undetected
B193T2	SNIVELY Lysimeter 1	21-Apr-04	Cm-244	0.000964	0.0021	0.0021	0.00285	Undetected
B193T2	SNIVELY Lysimeter 1	21-Apr-04	Co-58	-0.0193	0.02	0.02	0.0325	Undetected
B193T2	SNIVELY Lysimeter 1	21-Apr-04	Eu-154	0.00137	0.049	0.049	0.0841	Undetected
B193T2	SNIVELY Lysimeter 1	21-Apr-04	Eu-155	0.037	0.044	0.044	0.0754	Undetected
B193T2	SNIVELY Lysimeter 1	21-Apr-04	Fe-59	-0.0666	0.062	0.062	0.0998	Undetected
B193T2	SNIVELY Lysimeter 1	21-Apr-04	I-131	0.156	0.86	0.86	1.47	Undetected
B193T2	SNIVELY Lysimeter 1	21-Apr-04	K-40	15.8	2.2	2.2	0.199	
B193T2	SNIVELY Lysimeter 1	21-Apr-04	Mn-54	0.0104	0.015	0.015	0.0267	Undetected
B193T2	SNIVELY Lysimeter 1	21-Apr-04	Na-22	-0.000874	0.018	0.018	0.0307	Undetected
B193T2	SNIVELY Lysimeter 1	21-Apr-04	Pu-238	0.00164	0.0013	0.0014	0.000602	
B193T2	SNIVELY Lysimeter 1	21-Apr-04	Ru-103	0.000946	0.027	0.027	0.0457	Undetected
B193T2	SNIVELY Lysimeter 1	21-Apr-04	Ru-106	-0.00352	0.12	0.12	0.196	Undetected
B193T2	SNIVELY Lysimeter 1	21-Apr-04	Sb-125	0.0199	0.035	0.035	0.0598	Undetected
B193T2	SNIVELY Lysimeter 1	21-Apr-04	Zn-65	-0.0324	0.048	0.048	0.0641	Undetected
B193T2	SNIVELY Lysimeter 1	21-Apr-04	Zr/Nb-95	0.0802	0.049	0.049	0.0868	Undetected

Table B.3. (contd)

Raw data for all radionuclides not included in the Authorized Limits

Sample number	Sample Location	Sample Date	Radionculide	Concentration (pCi/g)	Counting Error	Total Analytical Error	Detection Limit	Lab Qualifier
B193T4	SNIVELY Lysimeter 2	21-Apr-04	BALA140	-0.909	0.48	0.48	0.652	Undetected
B193T4	SNIVELY Lysimeter 2	21-Apr-04	Be-7	-0.0226	0.18	0.18	0.302	Undetected
B193T4	SNIVELY Lysimeter 2	21-Apr-04	Ce/Pr-144	0.0141	0.15	0.15	0.255	Undetected
B193T4	SNIVELY Lysimeter 2	21-Apr-04	Ce-141	0.00883	0.045	0.045	0.0751	Undetected
B193T4	SNIVELY Lysimeter 2	21-Apr-04	Cm-242	-0.000517	0.0035	0.0035	0.00361	Undetected
B193T4	SNIVELY Lysimeter 2	21-Apr-04	Cm-244	0.000807	0.0018	0.0018	0.00242	Undetected
B193T4	SNIVELY Lysimeter 2	21-Apr-04	Co-58	-0.0137	0.021	0.021	0.034	Undetected
B193T4	SNIVELY Lysimeter 2	21-Apr-04	Eu-154	-0.011	0.047	0.047	0.0807	Undetected
B193T4	SNIVELY Lysimeter 2	21-Apr-04	Eu-155	0.054	0.038	0.038	0.067	Undetected
B193T4	SNIVELY Lysimeter 2	21-Apr-04	Fe-59	0.0234	0.061	0.061	0.109	Undetected
B193T4	SNIVELY Lysimeter 2	21-Apr-04	I-131	-1.04	0.79	0.79	1.25	Undetected
B193T4	SNIVELY Lysimeter 2	21-Apr-04	K-40	15.8	2.2	2.2	0.206	
B193T4	SNIVELY Lysimeter 2	21-Apr-04	Mn-54	0.000367	0.016	0.016	0.0268	Undetected
B193T4	SNIVELY Lysimeter 2	21-Apr-04	Na-22	-0.00422	0.017	0.017	0.0294	Undetected
B193T4	SNIVELY Lysimeter 2	21-Apr-04	Pu-238	0.00128	0.0011	0.0012	0.00131	Undetected
B193T4	SNIVELY Lysimeter 2	21-Apr-04	Ru-103	0.00269	0.025	0.025	0.0427	Undetected
B193T4	SNIVELY Lysimeter 2	21-Apr-04	Ru-106	-0.0605	0.12	0.12	0.193	Undetected
B193T4	SNIVELY Lysimeter 2	21-Apr-04	Sb-125	0.00505	0.032	0.032	0.0549	Undetected
B193T4	SNIVELY Lysimeter 2	21-Apr-04	Zn-65	0.0165	0.042	0.042	0.0641	Undetected
B193T4	SNIVELY Lysimeter 2	21-Apr-04	Zr/Nb-95	0.0498	0.053	0.053	0.0816	Undetected
B193T6	SNIVELY Lysimeter 3	21-Apr-04	BALA140	-0.962	0.41	0.41	0.511	Undetected
B193T6	SNIVELY Lysimeter 3	21-Apr-04	Be-7	0.0984	0.16	0.16	0.272	Undetected
B193T6	SNIVELY Lysimeter 3	21-Apr-04	Ce/Pr-144	0.0166	0.14	0.14	0.235	Undetected
B193T6	SNIVELY Lysimeter 3	21-Apr-04	Ce-141	0.00715	0.044	0.044	0.0724	Undetected
B193T6	SNIVELY Lysimeter 3	21-Apr-04	Cm-242	-0.000516	0.0042	0.0042	0.00439	Undetected
B193T6	SNIVELY Lysimeter 3	21-Apr-04	Cm-244	-0.0000852	0.0027	0.0027	0.00294	Undetected
B193T6	SNIVELY Lysimeter 3	21-Apr-04	Co-58	-0.0095	0.017	0.017	0.0283	Undetected
B193T6	SNIVELY Lysimeter 3	21-Apr-04	Eu-154	0.00557	0.037	0.037	0.0655	Undetected
B193T6	SNIVELY Lysimeter 3	21-Apr-04	Eu-155	0.0435	0.031	0.031	0.053	Undetected
B193T6	SNIVELY Lysimeter 3	21-Apr-04	Fe-59	-0.00897	0.05	0.05	0.0844	Undetected
B193T6	SNIVELY Lysimeter 3	21-Apr-04	I-131	0.185	0.73	0.73	1.26	Undetected
B193T6	SNIVELY Lysimeter 3	21-Apr-04	K-40	14.7	2	2	0.17	
B193T6	SNIVELY Lysimeter 3	21-Apr-04	Mn-54	-0.00891	0.013	0.013	0.0208	Undetected
B193T6	SNIVELY Lysimeter 3	21-Apr-04	Na-22	0.00175	0.014	0.014	0.0238	Undetected
B193T6	SNIVELY Lysimeter 3	21-Apr-04	Pu-238	0.000759	0.0011	0.0012	0.00166	Undetected
B193T6	SNIVELY Lysimeter 3	21-Apr-04	Ru-103	-0.00148	0.023	0.023	0.0383	Undetected
B193T6	SNIVELY Lysimeter 3	21-Apr-04	Ru-106	-0.0649	0.099	0.099	0.166	Undetected
B193T6	SNIVELY Lysimeter 3	21-Apr-04	Sb-125	0.00338	0.03	0.03	0.0503	Undetected
B193T6	SNIVELY Lysimeter 3	21-Apr-04	Zn-65	-0.00994	0.039	0.039	0.0549	Undetected
B193T6	SNIVELY Lysimeter 3	21-Apr-04	Zr/Nb-95	0.0429	0.043	0.043	0.0655	Undetected
B193T8	SNIVELY Lysimeter 4	21-Apr-04	BALA140	-0.6	0.35	0.35	0.497	Undetected
B193T8	SNIVELY Lysimeter 4	21-Apr-04	Be-7	-0.0395	0.14	0.14	0.228	Undetected
B193T8	SNIVELY Lysimeter 4	21-Apr-04	Ce/Pr-144	-0.0965	0.13	0.13	0.209	Undetected
B193T8	SNIVELY Lysimeter 4	21-Apr-04	Ce-141	-0.0295	0.038	0.038	0.0628	Undetected
B193T8	SNIVELY Lysimeter 4	21-Apr-04	Cm-242	0.000992	0.003	0.0033	0.00409	Undetected
B193T8	SNIVELY Lysimeter 4	21-Apr-04	Cm-244	0.00194	0.0029	0.0029	0.00274	Undetected
B193T8	SNIVELY Lysimeter 4	21-Apr-04	Co-58	0.00201	0.015	0.015	0.0261	Undetected
B193T8	SNIVELY Lysimeter 4	21-Apr-04	Eu-154	-0.0258	0.037	0.037	0.0608	Undetected
B193T8	SNIVELY Lysimeter 4	21-Apr-04	Eu-155	0.0661	0.032	0.032	0.0525	Undetected
B193T8	SNIVELY Lysimeter 4	21-Apr-04	Fe-59	-0.0331	0.047	0.047	0.0765	Undetected
B193T8	SNIVELY Lysimeter 4	21-Apr-04	I-131	-0.123	0.63	0.63	1.05	Undetected
B193T8	SNIVELY Lysimeter 4	21-Apr-04	K-40	14.1	2	2	0.154	
B193T8	SNIVELY Lysimeter 4	21-Apr-04	Mn-54	-0.00241	0.012	0.012	0.0199	Undetected
B193T8	SNIVELY Lysimeter 4	21-Apr-04	Na-22	-0.0088	0.013	0.013	0.0223	Undetected
B193T8	SNIVELY Lysimeter 4	21-Apr-04	Pu-238	0.000768	0.0018	0.0019	0.00247	Undetected
B193T8	SNIVELY Lysimeter 4	21-Apr-04	Ru-103	0.0198	0.02	0.02	0.0353	Undetected
B193T8	SNIVELY Lysimeter 4	21-Apr-04	Ru-106	-0.0274	0.087	0.087	0.149	Undetected
B193T8	SNIVELY Lysimeter 4	21-Apr-04	Sb-125	0.0179	0.025	0.025	0.0447	Undetected

Table B.3. (contd)

Raw data for all radionuclides not included in the Authorized Limits

Sample number	Sample Location	Sample Date	Radionculide	Concentration (pCi/g)	Counting Error	Total Analytical Error	Detection Limit	Lab Qualifier
B193T8	SNIVELY Lysimeter 4	21-Apr-04	Zn-65	-0.0121	0.035	0.035	0.0477	Undetected
B193T8	SNIVELY Lysimeter 4	21-Apr-04	Zr/Nb-95	0.0483	0.04	0.04	0.0621	Undetected
B193V0	SNIVELY Lysimeter 5	21-Apr-04	BALA140	-0.603	0.42	0.42	0.65	Undetected
B193V0	SNIVELY Lysimeter 5	21-Apr-04	Be-7	0.00458	0.16	0.16	0.273	Undetected
B193V0	SNIVELY Lysimeter 5	21-Apr-04	Ce/Pr-144	-0.204	0.17	0.17	0.277	Undetected
B193V0	SNIVELY Lysimeter 5	21-Apr-04	Ce-141	0.0438	0.049	0.049	0.0824	Undetected
B193V0	SNIVELY Lysimeter 5	21-Apr-04	Cm-242	-0.000518	0.0061	0.0061	0.00664	Undetected
B193V0	SNIVELY Lysimeter 5	21-Apr-04	Cm-244	-0.0000855	0.004	0.004	0.00444	Undetected
B193V0	SNIVELY Lysimeter 5	21-Apr-04	Co-58	-0.0221	0.017	0.017	0.0274	Undetected
B193V0	SNIVELY Lysimeter 5	21-Apr-04	Eu-154	-0.00405	0.041	0.041	0.0706	Undetected
B193V0	SNIVELY Lysimeter 5	21-Apr-04	Eu-155	0.0331	0.04	0.04	0.0682	Undetected
B193V0	SNIVELY Lysimeter 5	21-Apr-04	Fe-59	-0.0486	0.055	0.055	0.0896	Undetected
B193V0	SNIVELY Lysimeter 5	21-Apr-04	I-131	0.276	0.77	0.77	1.31	Undetected
B193V0	SNIVELY Lysimeter 5	21-Apr-04	K-40	14.7	2	2	0.185	
B193V0	SNIVELY Lysimeter 5	21-Apr-04	Mn-54	0.00527	0.014	0.014	0.0233	Undetected
B193V0	SNIVELY Lysimeter 5	21-Apr-04	Na-22	0.000986	0.015	0.015	0.0258	Undetected
B193V0	SNIVELY Lysimeter 5	21-Apr-04	Pu-238	0.000623	0.00049	0.0005	0.000253	
B193V0	SNIVELY Lysimeter 5	21-Apr-04	Ru-103	0.00454	0.023	0.023	0.0396	Undetected
B193V0	SNIVELY Lysimeter 5	21-Apr-04	Ru-106	0.0654	0.1	0.1	0.181	Undetected
B193V0	SNIVELY Lysimeter 5	21-Apr-04	Sb-125	-0.00899	0.03	0.03	0.0502	Undetected
B193V0	SNIVELY Lysimeter 5	21-Apr-04	Zn-65	0.0333	0.041	0.041	0.0605	Undetected
B193V0	SNIVELY Lysimeter 5	21-Apr-04	Zr/Nb-95	0.0389	0.042	0.042	0.0739	Undetected

Appendix C

Historical Environmental Monitoring Data Summary

Table C.1. Historical Environmental Monitoring Data Taken from Fritz et al. (2003) (ALE Unit samples collected from Rattlesnake Springs, ALE HQ, Yakima Barricade, and Prosser Barricade environmental monitoring locations.)

ALE Unit Soil Sample Data (pCi/g dry wt)

Period	Data	CO-60	SR-90	CS-137	EU-152	EU-154	EU-155	U
1971-1989	Median	0.003	0.13	0.54	0.15	0.003	0.025	0.29
	Maximum	0.12	1.6	1.6	0.19	0.25	0.089	0.80
	Number of samples	68	67	68	4	31	29	48
	Number detected	19	65	67	4	2	4	47
1990-2001	Median	-0.005	0.095	0.27		-0.017	0.012	
	Maximum	0.0026	0.14	0.42		0.034	0.04	
	Number of samples	9	9	9		9	9	
	Number detected	0	8	9		0	0	
Period	**Data**	**U-234**	**U-235**	**U-238**	**PU**	**PU-238**	**PU-239/240**	**AM-241**
1971-1989	Median		0.027	0.68	0.006	0.001	0.011	0.017
	Maximum		0.28	1.5	0.018	0.011	0.039	0.041
	Number of samples		11	11	12	68	68	7
	Number detected		2	11	12	40	67	2
1990-2001	Median	0.11	0.01	0.51		0.00027	0.007	
	Maximum	0.75	0.19	1.0		0.000506	0.014	
	Number of samples	5	9	9		9	9	
	Number detected	5	3	9		7	9	

Upwind (Sunnyside) Soil Sample Data (pCi/g dry wt)

Period	Data	CO-60	SR-90	CS-137	EU-152	EU-154	EU-155	U
1971-1989	Median	0.003	0.22	0.6		-0.01	0.039	0.29
	Maximum	0.032	1.6	1.5		0.094	0.1	0.47
	Number of samples	14	14	14		9	9	11
	Number detected	2	14	14		0	2	11
1990-2001	Median	-0.004	0.084	0.4		-0.009	0.026	
	Maximum	0.01	0.35	1.2		0.028	0.05	
	Number of samples	6	6	6		6	6	
	Number detected	0	6	6		0	0	
Period	**Data**	**U-234**	**U-235**	**U-238**	**PU**	**PU-238**	**PU-239/240**	**AM-241**
1971-1989	Median		0.077	0.71		0.00027	0.013	0.01
	Maximum		0.11	1		0.0022	0.026	0.034
	Number of samples		4	4		14	14	9
	Number detected		0	4		6	14	1
1990-2001	Median	0.35	0.014	0.6		0.00028	0.011	0.004
	Maximum	0.63	0.03	0.8		0.0062	0.029	0.0066
	Number of samples	4	6	6		6	6	6
	Number detected	4	4	6		3	6	4

Reference

Fritz BG, RL Dirkes, TM Poston, and RW Hanf. 2003. *Historical Site Assessment: Hanford Reach National Monument—Fitzner-Eberhardt Arid Lands Ecology Reserve (ALE), McGee Ranch, Riverlands, and Wahluke Slope.* PNNL-13989, Pacific Northwest National Laboratory, Richland, Washington.

Appendix D

Development and Implementation of a Resident Child Dose Assessment Scenario

Appendix D

Development and Implementation of a Resident Child Dose Assessment Scenario

D.1 Scenario Development

As a result of inquires by interested parties, a third dose assessment scenario was developed in addition to the two scenarios evaluated in determining the Authorized Limits. A hypothetical maximally exposed individual dose is calculated for a child residing with its family on the Fitzner/Eberhardt Arid Lands Ecology Reserve (ALE) Unit. This scenario was developed in response to public concern that the two other scenarios may not address all potential uses; in particular, there was concern that dose to children of a Native American family who reside on the ALE Unit of the Hanford Reach National Monument (HRNM) was not adequately characterized. The key exposure pathways and parameters for the scenarios used to model radiation doses to the maximally exposed individual (i.e., Native American child) are shown in Table D.1. The key parameters for the scenario are consistent with those documented in Napier and Snyder (2002). Additional parameters were established based on consideration of information provided by the Washington State Department of Health (WDOH 1997). Other parameters needed for the RESRAD computer program were selected based on those identified in Napier and Snyder (2002), with some minor modifications to adjust for the input requirements in RESRAD.

For the sake of analysis, it is assumed that one or more families take up residence in the area. Local foods are gathered, prepared, and eaten. The environment is assumed to be similar to that defined by the WDOH (1997), although specific food types and practices may differ. The WDOH (1997) has defined a set of RESRAD input parameters for use in analyses at Hanford; these were used as a starting point for determining the values presented in Table D.1. The advantage of the WDOH set of parameters is that the environmental parameters are all related to the Hanford Site. Consumption of Columbia River water or HRNM groundwater is not considered for the scenario.

An important parameter revised from the WDOH environmental parameters is the mass loading of dust in air for the inhalation pathway. Because the dust in frequented areas such as dirt roads might be enhanced because of mechanical disturbances, an annual average mass loading value of 50 $\mu g/m^3$ is appropriate. This value is approximately three times higher than the annual average concentration of respirable dust measured on and around the Hanford Site (Neitzel et al. 2006).

The child is assumed to be between the ages of 6 months and 1.5 years. This age is old enough that the parents may be comfortable leaving the child briefly unattended on the ground, and old enough that the child will be mobile enough to move around on the ground and potentially put interesting items and/or soil into its mouth. As a result, the soil intake rate is increased to 200 milligrams per day. For a 365-day-per-year resident, this results in 73-grams-per-year intake, as reflected in Table D.1.

Table D.1. Key Parameters Used for the Resident Child Scenario for the ALE Unit of the Hanford Reach National Monument

Pathway Parameters		Child
Cover/Hydrology		
	Irrigation rate, m/y	0.76
Surface Water/ Hydrology		
	Effective watershed, m^2	$1.1x10^9$
External Exposure		
	Years	1
	Time indoors, fraction	0.60
	Time outdoors, fraction	0.20
	Shielding	0.8
	Soil density, g/cc	1.6
Inhalation		
	Breathing rate, m^3/y	1050
	Mass loading, g/m^3	0.000050
	Dust filtration factor	0.4
Soil Ingestion		
	Ingestion rate, g/y	73
Other Ingestion		
	Groundwater, L/y	Not used
	Fruit, vegetable, grain, kg/y	45.6
	Milk, L/y	365

The breathing rate of the child will be lower than that for an adult. The International Commission on Radiological Protection (1974) estimates that 1-year-old children inhale about 2 liters perminute (which converts to 1050 m^3 per year as reflected in Table D.1).

It is also assumed that the child has begun to eat solid foods, and that these foods are produced in the local area. Based on a 1977 USDA Food Consumption Survey (USDA 1977), it is estimated that 1-year-old rural children will eat about 125 grams per day of produce and drink about 1 liter per day of milk. Cows' milk is assumed for this calculation, because cows' milk is one of the readily-obtained outputs from RESRAD. The annualized versions of these values are shown in Table D.1.

The RESRAD code output was abstracted to generate environmental concentrations of contaminants, starting with an initial condition of 100 pCi/gram of each radionuclide, results in soil, air, and food concentrations as shown in Table D.2. These are the concentrations used in the agricultural resident scenario for the ALE location, as described in Napier et al. (2004).

Very young children have different metabolisms than adults. Their gastrointestinal tract does not discriminate against certain chemicals as well as those of adults, and uptake of trace materials such as radionuclides can be higher. In addition, for a given intake, their body mass is smaller, and the energy emitted from decaying radionuclides may be absorbed in a smaller body or organ mass, resulting in a larger dose per unit intake. The U.S. Environmental Protection Agency has evaluated progress made in

understanding these effects, and prepared federal guidance (Eckerman and Ryman 1993) that incorporates many of the age-dependent factors. The ingestion and inhalation dose coefficients used in the RESRAD code for adults are compared to those for 1-year-old children from FGR-13 in Table D.3.

Table D.2. Environmental Concentrations of Radionuclides and Direct Exposure Rates, Normalized to 100 pCi/gram of Soil. Concentrations are at time of consumption and include radioactive decay and in growth during storage.

Radionuclide	Nonleafy Vegetable (pCi/kg)	Milk (pCi/L)	Ground External (mrem/yr)	Air conc. Resuspension (pCi/m^3)
^{241}Am	1.69E+01	1.02E-01	2.97E+00	2.23E-03
^{60}Co	1.33E+03	2.47E+02	8.83E+02	2.23E-03
^{134}Cs	6.67E+02	6.94E+02	4.92E+02	2.23E-03
^{137}Cs	6.67E+02	6.94E+02	2.07E+02	2.23E-03
^{152}Eu	4.19E+01	1.05E+00	4.08E+02	2.23E-03
^{239}Pu	1.69E+01	5.10E-02	1.94E-02	2.23E-03
^{240}Pu	1.69E+01	5.10E-02	9.98E-03	2.23E-03
^{90}Sr	5.00E+03	6.50E+02	1.57E+00	2.23E-03
^{234}U	4.19E+01	3.14E+01	2.65E-02	2.23E-03
^{235}U	4.19E+01	3.14E+01	4.85E+01	2.23E-03
^{238}U	4.19E+01	3.14E+01	9.13E+00	2.23E-03

Table D.3. Radiation Dose Coefficients for Adults and Children (mrem/pCi)

Nuclide	Ingestion Coefficients		Inhalation Coefficients		
	RESRAD Adult	FGR13 1-yr-old	RESRAD Adult	FGR13 1-yr-old	Inhalation Class
^{241}Am	3.64E-03	1.39E-03	4.44E-01	6.57E-01	W/F
^{60}Co	2.69E-05	9.90E-05	2.19E-04	3.17E-04	Y
^{134}Cs	7.33E-05	5.82E-05	4.63E-05	2.73E-05	D
^{137}Cs	5.00E-05	4.58E-05	3.19E-05	2.01E-05	D
^{152}Eu	6.48E-06	2.77E-05	2.21E-04	3.84E-04	W
^{239}Pu	3.54E-03	1.56E-03	4.29E-01	7.53E-01	W/F
^{240}Pu	3.54E-03	1.56E-03	4.29E-01	7.53E-01	W/F
^{90}Sr	1.53E-04	2.68E-04	1.31E-03	1.46E-03	Y
^{234}U	2.83E-04	4.94E-04	1.32E-01	1.07E-01	Y
^{235}U	2.67E-04	4.77E-04	1.23E-01	9.69E-02	Y
^{238}U	2.69E-04	4.47E-04	1.18E-01	9.19E-02	Y

D.2 Estimated Radiation Doses for the Resident Child Scenario

In developing Authorized Limits for the HRNM, radiation doses above background for the identified scenario are developed using a standard concentration (100 pCi/g) of each radionuclide in soil. The results can be normalized to scenario unit dose factors, with units of millirem per year per picocurie per gram of soil (Table D.4). This analysis provides insight to which pathways are important for each radionuclide. For example, some radionuclides contribute a higher dose externally than when inhaled. The normalized radiation doses estimated for the resident child scenario are summarized in Table D.4 for each radionuclide considered in this analysis. The dominant pathway is either external exposure to soils (Co-60, Cs-134, Cs-137, Eu-152, U-235, and U-238) or ingestion (Sr-90); the other radionuclides have a significant inhalation component. For all radionuclides, the adult RESRAD results indicated that the normalized doses are highest at the beginning of the analysis. They decrease monotonically with time through decay and erosion loss. For radionuclides with chain decay ingrowth of progeny over long (thousand-year) periods, the decay ingrowth is also less than the decay and erosion loss. The primary exposure is from contamination of the soil in the immediate vicinity. The maximum soil concentrations for the ALE Unit measured in this study (Table D.5) were used as RESRAD input to estimate the dose to a Native American child according to the scenario described in this appendix. As shown in Table D.5, the maximum estimated dose to a Native American would be 2.44 mrem per year.

Table D.4. Normalized Doses for the Resident Child Scenario (mrem yr^{-1} pCi^{-1} g^{-1})

Nuclide	External	Soil	Plants	Milk	Inhalation	Total
^{241}Am	2.97E-02	1.01E-03	1.07E-02	5.17E-04	1.54E-02	5.73E-02
^{60}Co	8.83E+00	7.23E-05	6.03E-02	8.92E-02	7.42E-06	8.98E+00
^{134}Cs	4.92E+00	4.25E-05	1.77E-02	1.47E-01	6.39E-07	5.09E+00
^{137}Cs	2.07E+00	3.34E-05	1.39E-02	1.16E-01	4.70E-07	2.20E+00
^{152}Eu	4.08E+00	2.02E-05	5.30E-04	1.06E-04	8.98E-06	4.08E+00
^{239}Pu	1.94E-04	1.14E-03	1.20E-02	2.90E-04	1.76E-02	3.13E-02
^{240}Pu	9.98E-05	1.14E-03	1.20E-02	2.90E-04	1.76E-02	3.12E-02
^{90}Sr	1.57E-02	1.96E-04	6.11E-01	6.36E-01	3.42E-05	1.26E+00
^{234}U	2.65E-04	3.61E-04	9.45E-03	5.67E-02	2.50E-03	6.92E-02
^{235}U	4.85E-01	3.48E-04	9.12E-03	5.47E-02	2.27E-03	5.52E-01
^{238}U	9.13E-02	3.26E-04	8.55E-03	5.13E-02	2.15E-03	1.54E-01

D.3 Discussion

It is interesting, and perhaps somewhat unexpected, that the estimated doses to children are about the same as those to adults for the agricultural resident scenario. The ingestion dose coefficients (radiation dose per unit intake) for children for some radionuclides are larger than those for adults, primarily because children's gastrointestinal tracts do not protect against these materials as well. However, for the higher-energy gamma emitters with high uptakes (e.g., ^{137}Cs), the internal dose coefficient is lower, since more of the emitted gamma rays are able to exit the much smaller body of the child before being absorbed

and depositing their energy. Children are assumed to consume much more soil and milk than adults; however, adults consume more of a much wider range of foods, which ultimately results in higher total intakes.

Table D.5. Results of the RESRAD Dose Estimate for the Resident Child Scenario (based on measured soil concentrations)

Radionuclide	ALE Maximum values	
	Soil Concentration (pCi/g) [a]	Total Dose (mrem/yr)
^{241}Am	0.0036	2.1E-04
^{60}Co	0.018	1.6E-01
^{134}Cs	0.087	4.4E-01
^{137}Cs	0.59	1.3E+00
^{152}Eu	0.036	1.5E-01
$^{239/240}Pu$	0.035	1.1E-03
^{90}Sr	0.22	2.8E-01
^{234}U	0.46	3.2E-02
^{235}U	0.013	7.4E-03
^{238}U	0.49	7.5E-02
Combined total dose		2.44

(a) From Table 3 of the main text.

The inhalation dose coefficients for alpha-emitting radionuclides are higher for children than for adults, in part because of the smaller organ mass of the children. However, the child's inhalation rate is substantially smaller than that of an adult, which more than compensates for the increased dose per unit intake.

External doses are assumed to be the same for adults and children. Although it may be argued that children are "closer to the ground" than adults, and the dose coefficients are calculated for a point 1 meter above the soil, the difference in dose rate at different distances from an infinite emitting plane (the way the dose rate factors are modeled) is small, and the total elapsed times of exposure assumed for both the adults and children are the same.

An important supposition in the impetus to estimate doses to children is the belief that a child's increased intake of contaminated soil would result in increased doses. This is not the case. As can be seen from the pathway-specific results in Table D.4, the soil ingestion pathway contributes less than 4% of the dose for any one radionuclide. The soil ingestion rate could be increased by one to two orders of magnitude (factors of 10 to 100) without having a significant impact on the estimated dose.

Because the dose for children and adults from the radionuclide spectrum found at various locations within the ALE Unit of the HRNM is dominated by the external exposure from ^{137}Cs, the primary parameter determining potential future radiation doses is the assumed period of occupancy. Thus, doses may be considered essentially a direct function of the amount of time spent on site. Any type of

residential scenario (farmer, suburban resident, or Native American subsistence lifestyle) would have approximately the same doses, and result in higher doses than any sort of transient scenario (ranger, hunter, or HRNM visitor).

D.4 References

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Appendix E

Results of the Biota Dose Assessment Screening

Table E.1. Biota Dose Screening Results for the ALE Unit of the Hanford Reach National Monument

	Terrestrial Animal							
	Water				Soil			
Nuclide	Concentration (pCi/L)	BCG (pCi/L)	Ratio	Limiting Organism	Concentration (pCi/g)	BCG (pCi/g)	Ratio	Limiting Organism
Co-60	0	1.19E+06	0.00E+00	Yes	0.0175	6.92E+02	2.53E-05	Yes
Cs-134	0	3.26E+05	0.00E+00	Yes	0.0713	1.13E+01	6.31E-03	Yes
Cs-137	0	5.99E+05	0.00E+00	Yes	0.587	2.08E+01	2.83E-02	Yes
Eu-152	0	2.55E+06	0.00E+00	Yes	0.0234	1.52E+03	1.54E-05	Yes
Eu-154	0	2.17E+06	0.00E+00	Yes	0	1.29E+03	0.00E+00	Yes
Eu-155	0	2.71E+07	0.00E+00	Yes	0.0962	1.58E+04	6.07E-06	Yes
Pu-239	0	2.00E+05	0.00E+00	Yes	0.0353	6.11E+03	5.77E-06	Yes
Sr-90	0	5.45E+04	0.00E+00	Yes	0.039	2.25E+01	1.73E-03	Yes
U-234	0	4.04E+05	0.00E+00	Yes	0.458	5.13E+03	8.93E-05	Yes
U-235	0	4.19E+05	0.00E+00	Yes	0.0134	2.77E+03	4.84E-06	Yes
U-238	0	4.06E+05	0.00E+00	Yes	0.49	1.58E+03	3.11E-04	Yes
Summed	-	-	0.00E+00	-	-	-	3.68E-02	-

	Terrestrial Plant							
	Water				Soil			
Nuclide	Concentration (pCi/L)	BCG (pCi/L)	Ratio	Limiting Organism	Concentration (pCi/g)	BCG (pCi/g)	Ratio	Limiting Organism
Co-60	0	1.49E+07	0.00E+00	No	0.0175	6.13E+03	2.86E-06	No
Cs-134	0	2.28E+07	0.00E+00	No	0.0713	1.09E+03	6.56E-05	No
Cs-137	0	4.93E+07	0.00E+00	No	0.587	2.21E+03	2.66E-04	No
Eu-152	0	3.06E+07	0.00E+00	No	0.0234	1.47E+04	1.59E-06	No
Eu-154	0	2.59E+07	0.00E+00	No	0	1.25E+04	0.00E+00	No
Eu-155	0	3.18E+08	0.00E+00	No	0.0962	1.53E+05	6.29E-07	No
Pu-239	0	7.04E+09	0.00E+00	No	0.0353	1.27E+04	2.78E-06	No
Sr-90	0	3.52E+07	0.00E+00	No	0.039	3.58E+03	1.09E-05	No
U-234	0	3.08E+09	0.00E+00	No	0.458	5.16E+04	8.87E-06	No
U-235	0	1.05E+08	0.00E+00	No	0.0134	2.74E+04	4.88E-07	No
U-238	0	4.28E+07	0.00E+00	No	0.49	1.57E+04	3.12E-05	No
Summed	-	-	0.00E+00	-	-	-	3.91E-04	-

Sum of Total Ratio: 3.68E-02
Sum of Water Ratio: 0.00E+00
Sum of Soil Ratio: 3.68E-02

Table E.2. Biota Dose Screening Results for the ALE HQ Lysimeter Plot

	Terrestrial Animal							
	Water				Soil			
Nuclide	Concentration (pCi/L)	BCG (pCi/L)	Ratio	Limiting Organism	Concentration (pCi/g)	BCG (pCi/g)	Ratio	Limiting Organism
Am-241	0	2.02E+05	0.00E+00	Yes	0.00209	3.89E+03	5.37E-07	Yes
Co-60	0	1.19E+06	0.00E+00	Yes	0.00576	6.92E+02	8.33E-06	Yes
Cs-134	0	3.26E+05	0.00E+00	Yes	0.0869	1.13E+01	7.69E-03	Yes
Cs-137	0	5.99E+05	0.00E+00	Yes	0.0626	2.08E+01	3.02E-03	Yes
Eu-152	0	2.55E+06	0.00E+00	Yes	0.0204	1.52E+03	1.34E-05	Yes
Eu-154	0	2.17E+06	0.00E+00	Yes	0.0228	1.29E+03	1.77E-05	Yes
Eu-155	0	2.71E+07	0.00E+00	Yes	0.182	1.58E+04	1.15E-05	Yes
Pu-239	0	2.00E+05	0.00E+00	Yes	0.00202	6.11E+03	3.30E-07	Yes
Sr-90	0	5.45E+04	0.00E+00	Yes	0.0623	2.25E+01	2.77E-03	Yes
U-234	0	4.04E+05	0.00E+00	Yes	0.177	5.13E+03	3.45E-05	Yes
U-235	0	4.19E+05	0.00E+00	Yes	0.00907	2.77E+03	3.27E-06	Yes
U-238	0	4.06E+05	0.00E+00	Yes	0.15	1.58E+03	9.51E-05	Yes
Summed	-	-	0.00E+00	-	-	-	1.37E-02	-

	Terrestrial Plant							
	Water				Soil			
Nuclide	Concentration (pCi/L)	BCG (pCi/L)	Ratio	Limiting Organism	Concentration (pCi/g)	BCG (pCi/g)	Ratio	Limiting Organism
Am-241	0	7.04E+08	0.00E+00	No	0.00209	2.15E+04	9.70E-08	No
Co-60	0	1.49E+07	0.00E+00	No	0.00576	6.13E+03	9.40E-07	No
Cs-134	0	2.28E+07	0.00E+00	No	0.0869	1.09E+03	8.00E-05	No
Cs-137	0	4.93E+07	0.00E+00	No	0.0626	2.21E+03	2.84E-05	No
Eu-152	0	3.06E+07	0.00E+00	No	0.0204	1.47E+04	1.39E-06	No
Eu-154	0	2.59E+07	0.00E+00	No	0.0228	1.25E+04	1.83E-06	No
Eu-155	0	3.18E+08	0.00E+00	No	0.182	1.53E+05	1.19E-06	No
Pu-239	0	7.04E+09	0.00E+00	No	0.00202	1.27E+04	1.59E-07	No
Sr-90	0	3.52E+07	0.00E+00	No	0.0623	3.58E+03	1.74E-05	No
U-234	0	3.08E+09	0.00E+00	No	0.177	5.16E+04	3.43E-06	No
U-235	0	1.05E+08	0.00E+00	No	0.00907	2.74E+04	3.31E-07	No
U-238	0	4.28E+07	0.00E+00	No	0.15	1.57E+04	9.54E-06	No
Summed	-	-	0.00E+00	-	-	-	1.45E-04	-

Sum of Total Ratio: 1.37E-02
Sum of Water Ratio: 0.00E+00
Sum of Soil Ratio: 1.37E-02

Table E.3. Biota Dose Screening Results for the ALE HQ Lysimeter Plot

	Terrestrial Animal							
	Water				Soil			
Nuclide	Concentration (pCi/L)	BCG (pCi/L)	Ratio	Limiting Organism	Concentration (pCi/g)	BCG (pCi/g)	Ratio	Limiting Organism
Am-241	0	2.02E+05	0.00E+00	Yes	0.00364	3.89E+03	9.35E-07	Yes
Co-60	0	1.19E+06	0.00E+00	Yes	0.00687	6.92E+02	9.93E-06	Yes
Cs-134	0	3.26E+05	0.00E+00	Yes	0.0643	1.13E+01	5.69E-03	Yes
Cs-137	0	5.99E+05	0.00E+00	Yes	0.325	2.08E+01	1.57E-02	Yes
Eu-152	0	2.55E+06	0.00E+00	Yes	0.0362	1.52E+03	2.38E-05	Yes
Eu-154	0	2.17E+06	0.00E+00	Yes	0.00557	1.29E+03	4.32E-06	Yes
Eu-155	0	2.71E+07	0.00E+00	Yes	0.0661	1.58E+04	4.17E-06	Yes
Pu-239	0	2.00E+05	0.00E+00	Yes	0.00307	6.11E+03	5.02E-07	Yes
Sr-90	0	5.45E+04	0.00E+00	Yes	0.163	2.25E+01	7.25E-03	Yes
U-234	0	4.04E+05	0.00E+00	Yes	0.154	5.13E+03	3.00E-05	Yes
U-235	0	4.19E+05	0.00E+00	Yes	0.0124	2.77E+03	4.47E-06	Yes
U-238	0	4.06E+05	0.00E+00	Yes	0.167	1.58E+03	1.06E-04	Yes
Summed	-	-	0.00E+00	-	-	-	2.88E-02	-

	Terrestrial Plant							
	Water				Soil			
Nuclide	Concentration (pCi/L)	BCG (pCi/L)	Ratio	Limiting Organism	Concentration (pCi/g)	BCG (pCi/g)	Ratio	Limiting Organism
Am-241	0	7.04E+08	0.00E+00	No	0.00364	2.15E+04	1.69E-07	No
Co-60	0	1.49E+07	0.00E+00	No	0.00687	6.13E+03	1.12E-06	No
Cs-134	0	2.28E+07	0.00E+00	No	0.0643	1.09E+03	5.92E-05	No
Cs-137	0	4.93E+07	0.00E+00	No	0.325	2.21E+03	1.47E-04	No
Eu-152	0	3.06E+07	0.00E+00	No	0.0362	1.47E+04	2.46E-06	No
Eu-154	0	2.59E+07	0.00E+00	No	0.00557	1.25E+04	4.47E-07	No
Eu-155	0	3.18E+08	0.00E+00	No	0.0661	1.53E+05	4.33E-07	No
Pu-239	0	7.04E+09	0.00E+00	No	0.00307	1.27E+04	2.42E-07	No
Sr-90	0	3.52E+07	0.00E+00	No	0.163	3.58E+03	4.56E-05	No
U-234	0	3.08E+09	0.00E+00	No	0.154	5.16E+04	2.98E-06	No
U-235	0	1.05E+08	0.00E+00	No	0.0124	2.74E+04	4.52E-07	No
U-238	0	4.28E+07	0.00E+00	No	0.167	1.57E+04	1.06E-05	No
Summed	-	-	0.00E+00	-	-	-	2.71E-04	-

Sum of Total Ratio: 2.88E-02
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