

**Attachment 7**

**Final Status Survey Final Report Volume 2, Chapter 8**

**Data Summary Report for Off-site Borrow Material  
(HDP-RPT-FSS-112)**

48 Total Pages

**Westinghouse Electric Company LLC, Hematite Decommissioning Project**

**Docket No. 070-00036**



## Final Status Survey Report

### Hematite Decommissioning Project

#### Final Status Survey Final Report Volume 2, Chapter 8

**TITLE:** Data Summary Report for Off-Site Borrow Material

**REVISION:** 0

**EFFECTIVE DATE:** AUG 29 2016

#### Approvals:

Author:

Kenneth E. Pallagi  
Kenneth E. Pallagi

08-29-2016  
Date

Reviewed By:

Gay M. Russell  
Gay M. Russell

08-29-2016  
Date

Owner/Manager:

W. Clark Evers  
W. Clark Evers

8/29/16  
Date

## Table of Contents

<b>1.0</b>	<b>INTRODUCTION.....</b>	<b>1</b>
<b>2.0</b>	<b>REPORT BACKGROUND.....</b>	<b>1</b>
<b>3.0</b>	<b>SOIL DESCRIPTION .....</b>	<b>1</b>
<b>4.0</b>	<b>OFF-SITE BORROW MATERIAL CRITERIA .....</b>	<b>1</b>
<b>5.0</b>	<b>BACKGROUND DETERMINATION .....</b>	<b>1</b>
<b>6.0</b>	<b>OFF-SITE BORROW SAMPLING.....</b>	<b>2</b>
6.1	Horine .....	2
6.2	Husky .....	2
6.3	Prudent.....	2
6.4	Off-site Borrow Sample Results.....	2
<b>7.0</b>	<b>STATISTICAL ANALYSES .....</b>	<b>3</b>
7.1	Background Distinguishability .....	3
7.2	Box plots .....	4
7.3	Wilcoxon Rank Sum (WRS) Tests.....	4
7.4	Quantile Tests .....	5
7.5	Number of Samples.....	6
<b>8.0</b>	<b>CONCLUSION .....</b>	<b>6</b>
Appendix A – Box Plots .....		A-1
Appendix B – WRS Tests .....		B-1
Appendix C – Quantile Tests .....		C-1

### LIST OF TABLES

Table 6-1	Off-site Borrow Sample Results Summary .....	3
Table 5-1	Background Locations Sample Results.....	7
Table 6-2	Horine Location Sample Results .....	8
Table 6-3	Husky Location Sample Results.....	9
Table 6-4	Prudent Location Sample Results.....	10

### LIST OF FIGURES

Figure 5-1	Sample Background Locations.....	11
Figure 6-1	Off-site Borrow Location .....	12
Figure 6-2	Horine Sample Locations .....	13
Figure 6-3	Husky Sample Locations.....	14
Figure 6-4	Prudent Sample Locations.....	15

### LIST OF ACRONYMS AND SYMBOLS

DP	Decommissioning Plan
FSSFR	Final Status Survey Final Report
HDP	Hematite Decommissioning Project
HRCR	Hematite Radiological Characterization Report
LBGR	Lower Bound of the Grey Area
NRC	U.S. Nuclear Regulatory Commission
Ra	Radium
Tc	Technetium
Th	Thorium
WRS	Wilcoxon Rank Sum
U	Uranium

## 1.0 INTRODUCTION

The purpose of this document, Final Status Survey Final Report (FSSFR) Volume 2, Chapter 8, *Data Summary Report for Off-site Borrow*, is to provide the data summary for Combined Reuse Stockpile 4-7 to demonstrate that it met the criteria to be used as backfill material at the Hematite Decommissioning Project (HDP).

## 2.0 REPORT BACKGROUND

FSSFR Volume 2, Chapter 1, Revision 1, *Reuse Soil and Off-site Borrow Material Overview* {ML16152A752}, Section 8.0 provides a history of the reports submitted to, and the communications with, the Nuclear Regulatory Commission (NRC) regarding the demonstration of acceptability of off-site borrow material as a source of backfill material for HDP. This report, FSSFR Volume 2, Chapter 8, provides a data summary of the radiological testing and the analyses performed of backfill soil brought to HDP from off-site borrow locations.

## 3.0 SOIL DESCRIPTION

Borrow soils are native, non-radiologically impacted soils excavated from off-site locations and transported to the HDP site via trucks.

## 4.0 OFF-SITE BORROW MATERIAL CRITERIA

In the HDP Decommissioning Plan (DP), in regards to utilization of off-site borrow material as backfill the DP states:

DP Section 8.8 – *“Additional off-site backfill material will be imported from an approved off-site source(s), as needed, and tested to ensure it meets site cover requirements for radiological and chemical constituents.”*

DP Section 14.4.4.1.6.2 – *“Upon completion of backfill, no further FSS samples or measurements are necessary. This is because 1) soil obtained from an approved off-site borrow location was previously tested and determined to be non-impacted, or 2) soil originating from the Site.....”*

The off-site borrow material criteria is therefore that the sample results indicate that the radioactivity within the off-site borrow is indistinguishable from background by successfully passing the statistical tests.

## 5.0 BACKGROUND DETERMINATION

The original radiological data that was used to establish background radioactivity for both Final Status Survey purposes and assessment of off-site borrow material was based on samples collected over a period of years for varying purposes and while utilizing differing counting methodologies, as documented in the HDP Radiological Characterization Report (HRCR){ML092870496}. To normalize the analytical methods and different laboratories used for the original background determination, HDP made the decision to collect a new set of data for background determination by sampling at the same locations with the same number of samples as used in the HRCR.

Figure 5-1 indicates the locations where the samples for the background reference area were taken. The two locations are each approximately a mile from the HDP site (as identified in Figure 5-1). The HRCR indicated that at each site 8 samples were taken.

Soil sampling was performed in accordance with site procedure HDP-PR-EM-004, *Soil Sampling*. Each sample location was sampled in 3 foot intervals to a depth of at least 6 feet, or until refusal was met. Refusal was encountered at one sample location at the background reference area location east of the HDP site, resulting in a total of 34 background samples for the new data set. Table 5-1 contains the sample results for the background (reference area) determination.

## 6.0 OFF-SITE BORROW SAMPLING

HDP has utilized three off-site locations to supply backfill material. The three off-site locations were sampled and analyzed with the sample results reviewed to confirm that they demonstrate the soil at the off-site locations were indistinguishable from background. Figure 6-1 shows the three off-site borrow source locations relative to the location of HDP.

Soil sampling was performed at all three locations in accordance with site procedure HDP-PR-EM-004, *Soil Sampling*. Random location generating software was utilized to select the sample locations. Each sample location was sampled in 3 foot intervals to a depth of at least 6 feet, or until refusal was met.

### 6.1 Horine

The first location designated the "Horine" location is at 2112 Horine Road, Festus, MO. This source of borrow material is located 3.7 miles northeast of the HDP site. The soil from the Horine Road location was used within Root and Deep Stratum. Figure 6-2 shows the sample locations at the Horine location. Thirty two (32) samples were attempted to be taken at the Horine location. Refusal was encountered at one sample location at the Horine backfill site, resulting in a total of 31 samples taken. Table 6-1 contains the sample results for the background (reference area) determination.

### 6.2 Husky

The second location designated as the "Husky" location is at 2970 Husky Road, Festus, MO. This source of borrow material is located 8.28 miles southeast of the HDP site. The Husky location provided topsoil used in the Surface Stratum for the project. Figure 6-3 shows the sample locations at the Husky location. Twenty (20) samples were taken at the Husky location.

### 6.3 Prudent

The third location designated as the "Prudent" location is operated by Prudent Technologies, Inc., and is located on an un-named service road near the intersection of Old Highway A, and Jefferson Place in Festus, MO. This source of borrow material is located 2.68 miles northeast of the HDP site. The Prudent location provided topsoil and deep backfill for the HDP and was used in the Surface, Root and Deep Stratum. Figure

6-4 shows the sample locations at the Prudent location. Thirty two (32) samples were taken at this site.

#### 6.4 Off-Site Borrow Sample Results

All off-site samples were analyzed for Tc-99 by ICP-MS, isotopic uranium by alpha spectroscopy, and gamma spectroscopy both with and without radium ingrowth. Gamma spectroscopy results from the final counting (after 21 day ingrowth) are presented for thorium and radium. The following table summarizes the analytical results of the soil sample analyses.

**Table 6-1**  
**Off-Site Borrow Sample Results Summary**

Tc-99				Ra-226 21 Day Ingrowth				Th-232 Final Count			
Horine Borrow	Husky Borrow	Prudent Borrow	Reference	Horine Borrow	Husky Borrow	Prudent Borrow	Reference	Horine Borrow	Husky Borrow	Prudent Borrow	Reference
Average				Average				Average			
0.021	-0.096	-0.030	0.044	1.051	0.974	1.006	1.071	1.176	0.852	1.077	1.017
St Dev				St Dev				St Dev			
0.013	0.032	0.096	0.058	0.121	0.219	0.123	0.168	0.131	0.277	0.102	0.219
Min				Min				Min			
-0.005	-0.132	-0.174	-0.014	0.721	0.531	0.780	0.618	0.788	0.253	0.928	0.225
Max				Max				Max			
0.045	-0.028	0.099	0.205	1.270	1.300	1.240	1.340	1.340	1.150	1.330	1.390

U-234 Alpha Spec				U-235 Alpha Spec				U-238 Alpha Spec			
Horine Borrow	Husky Borrow	Prudent Borrow	Reference	Horine Borrow	Husky Borrow	Prudent Borrow	Reference	Horine Borrow	Husky Borrow	Prudent Borrow	Reference
Average				Average				Average			
0.611	0.706	0.562	0.707	0.028	0.093	0.104	0.035	0.656	0.684	0.614	0.738
St Dev				St Dev				St Dev			
0.206	0.103	0.110	0.235	0.020	0.038	0.047	0.025	0.251	0.105	0.109	0.180
Min				Min				Min			
0.389	0.558	0.387	0.345	-0.002	0.041	0.012	-0.003	0.354	0.426	0.389	0.379
Max				Max				Max			
1.520	0.986	0.969	1.160	0.092	0.177	0.229	0.099	1.800	0.838	0.828	0.997

Table 6-2 contains the sample results for the Horine location. Table 6-3 contains the sample results for the Husky location. Table 6-4 contains the sample results for the Prudent location.

#### 7.0 STATISTICAL ANALYSES

Statistical analyses was performed to compare the laboratory data for Ra-226, Th-232, U-234, and U-238 from the samples obtained from the off-site borrow locations to the data for background reference area soil. Analyses included two-sample hypothesis testing using the Quantile and Wilcoxon Rank Sum (WRS) tests. A statistical analysis was not performed on Tc-99 as all sample results were non-detects (this is expected as Tc-99 is not a naturally occurring nuclide), nor U-235 as the large majority of sample results were non-detects (23 of 32 reference results were non-detect, 78 of 83 borrow results were non-detect).

### 7.1 Background Distinguishability

The Kruskal-Wallis test was performed on the reference area data set to determine variability in background. The results of the tests indicate that all four isotopes have significant differences among the means at a 95% confidence level.

The concentration level that is indistinguishable from background was then calculated utilizing the methodology presented in NUREG-1505, *A Nonparametric Statistical Methodology for the Design and Analysis of Final Status Decommissioning Surveys*, Section 13.3, *Establishing the Concentration Level that is Indistinguishable*. The default value of  $3\omega$  was calculated and used for the WRS tests. The concentrations relating to the value of  $3\omega$  for each of the radionuclides follow:

Ra-226 – 0.18 pCi/g

Th-232 – 0.12 pCi/g

U-234 – 0.59 pCi/g

U-238 – 0.37 pCi/g

### 7.2 Box Plots

Box plots for each radionuclide have been prepared to graphically display the data. The boxes illustrate data that range from the lower quartile to the upper quartile. The box plots depict the background reference area soil data and off-site borrow location data through five-number summaries: lower quartile (25th percentile of the data), median (50th percentile of the data), and upper quartile (75th percentile of the data). The box plots display differences between the two data populations without assuming an underlying statistical distribution. The off-site borrow location data is reflected on the left side of the box plot and the background reference area data is on the right side of the box plot. The box plots are located in Appendix B of this report.

### 7.3 Wilcoxon Rank Sum (WRS) Tests

WRS tests were performed for each radionuclide in accordance with Section 6.3 of NUREG-1505. Scenario B of the test was used, with a null hypothesis that the median concentration of radioactivity in the borrow material and in the reference area is less than the lower boundary of the gray region (LBGR). The value of  $3\omega$  was used for each radionuclide as the LBGR and the width of the gray region is the mean of reference area plus  $3\omega$ . The Type I error rate,  $\alpha_w = \alpha/2$  was set at 0.025 (0.05/2). The power,  $1-\beta$ , was set at 0.1.

The critical value for the WRS test was calculated using the following formula from Table A.4 of NUREG-1505. Please note that the roles of  $m$  and  $n$  are reversed in the formula in Table A.4 for Scenario B in NUREG-1505. The calculation critical value for the Horine Road location is presented below:

$$\text{Critical Value} = \frac{n(m + n + 1)}{2} + z\sqrt{mn(m + n + 1)/12} = 1135$$



## Equation 7-1

Where,

$n$  = number of adjusted survey units measurements = 31

$m$  = number of reference area measurements = 32

$z$  = percentile of a standard normal distribution for 0.025 = 1.96

The critical values for the Husky and the Prudent locations were calculated as 634 and 1186, respectively.

The WRS tests concluded that the median concentration of radioactivity in the borrow material and in the reference area is less than the LBGR for all radionuclides since the sum of the ranks for the borrow materials were less than the critical value. Appendix B presents the WRS tests.

#### 7.4 Quantile Tests

Quantile Tests were performed for each radionuclide to detect differences between the borrow materials and reference area that consist of a shift to higher values in a fraction of the borrow population.

Table A.7 of NUREG-1505 provides values of  $r$ ,  $q$  and  $\alpha_Q$  for associated  $m$ ,  $n$ , and  $\alpha_Q$ . In the test, if  $q$  or more of the  $r$  results are from the borrow data set, then the null hypothesis is rejected and the borrow materials would fail the Quantile Test.

The value for  $\alpha_Q$  is calculated in the same manner as the WRS test above. The value for  $\alpha_Q$  is 0.025. For the Horine facility, the values for  $m$  and  $n$  are 32, and 31, respectively. Table A.7b provides values of  $r = 5$ ,  $q = 5$ , and  $\alpha_Q = 0.02$  for  $m = 30$  and  $n = 30$ . None of the rankings have five of the highest five rankings originating from the borrow area. Per section 7.2 of NUREG-1505, other entries from Table A.7b were checked for the test. For  $m = 30$  and  $n = 25$ , values of  $r = 7$ ,  $q = 6$ , and  $\alpha_Q = 0.029$  are obtained. For  $m = 25$  and  $n = 30$ , values of  $r = 6$ ,  $q = 6$ , and  $\alpha_Q = 0.02$  are obtained. For  $m = 35$  and  $n = 35$ , values of  $r = 5$ ,  $q = 5$ , and  $\alpha_Q = 0.027$  are obtained.

For the Husky facility, the values for  $m$  and  $n$  are 32, and 20, respectively. Table A.7b provides values of  $r = 4$ ,  $q = 4$ , and  $\alpha_Q = 0.021$  for  $m = 30$  and  $n = 20$ . None of the rankings have four of the highest four rankings originating from the borrow area. Per section 7.2 of NUREG-1505, other entries from Table A.7b were checked for the test. For  $m = 25$  and  $n = 20$ , values of  $r = 7$ ,  $q = 6$ , and  $\alpha_Q = 0.023$  are obtained. For  $m = 30$  and  $n = 25$ , values of  $r = 7$ ,  $q = 6$ , and  $\alpha_Q = 0.029$  are obtained. For  $m = 35$  and  $n = 20$ , values of  $r = 6$ ,  $q = 5$ , and  $\alpha_Q = 0.02$  are obtained.

For the Prudent facility, the values for  $m$  and  $n$  are 32, and 32, respectively. Table A.7b provides values of  $r = 5$ ,  $q = 5$ , and  $\alpha_Q = 0.026$  for  $m = 30$  and  $n = 30$ . None of the rankings have five of the highest five rankings originating from the borrow area. Per section 7.2 of NUREG-1505, other entries from Table A.7b were checked for the test. For  $m = 30$  and  $n = 25$ , values of  $r = 7$ ,  $q = 6$ , and  $\alpha_Q = 0.029$  are obtained. For  $m = 25$

and  $n = 30$ , values of  $r = 6$ ,  $q = 6$ , and  $\alpha_Q = 0.02$  are obtained. For  $m = 35$  and  $n = 35$ , values of  $r = 5$ ,  $q = 5$ , and  $\alpha_Q = 0.027$  are obtained.

None of the rankings have any  $q$  of the highest  $r$  rankings originating from the borrow area for these  $r$  and  $q$  values. The null hypothesis is not rejected, and the borrow materials pass the Quantile Test. Appendix C contains the ranked borrow and reference sample results.

## 7.5 Number of Samples

Per NRC correspondence dated 10/08/15, the relative shift calculation that should be utilized for required number of samples from the borrow areas is:

$$\frac{\Delta}{\sigma} = \frac{(UBGR - LBGR)}{\sigma}$$

Equation 7-2

Which simplifies to:

$$\frac{\Delta}{\sigma} = \frac{(\text{mean of the reference area})}{\sigma}$$

Equation 7-3

Where  $\sigma$  equals the standard deviation of the reference area.

The following are the calculations of the relative shift:

Ra-226:	$1.071/0.168 = 6.375$
Th-232:	$1.017/0.219 = 4.64$
U-234:	$0.707/0.235 = 3.01$
U-238:	$0.738/0.180 = 4.1$

Utilizing Table A.2B from NUREG-1505 and using 0.025 for  $\alpha$  and 0.1 for  $\beta$ , the following number of samples are required from the reference area and each borrow location:

Ra-226	– 9
Th-232	– 9
U-234	– 10
U-238	– 9

Since the fewest numbers of samples taken from any borrow location and the reference area is 20, the number of samples is sufficient.

## 8.0 CONCLUSION

The statistical test outcomes for both the WRS and Quantile tests for all radionuclides analyzed (Th-232, Ra-226, U-234 and U-238) passed. Therefore the soil from the three offsite borrow locations is representative native Missouri soil and is suitable for backfill material at the HDP site.

**Table 5-1**  
**Background Locations Sample Results**

Reference Area Results																			
Sample ID	Sample Date	Technetium-99 (pCi/g)			Radium-226 (pCi/g) 21 Day			Thorium-232 (pCi/g) (Ac-228)			Uranium-234 (pCi/g) Alpha			Uranium-235 (pCi/g) Alpha			Uranium-238 (pCi/g) Alpha		
		Result	Error	MDC	Result	Error	MDC	Result	Error	MDC	Result	Error	MDC	Result	Error	MDC	Result	Error	MDC
9574-SS-140910-01-01	9/10/2014	0.06	0.0254	0.228	1.15	0.164	0.0678	1.15	0.178	0.133	0.671	0.181	0.0502	0.0223	0.0395	0.0713	0.724	0.189	0.0501
9574-SS-140910-01-02	9/10/2014	0.0451	0.143	0.212	0.719	0.103	0.0447	0.749	0.12	0.0896	0.353	0.129	0.0505	0.0112	0.0281	0.0629	0.379	0.135	0.0676
9574-SS-140910-01-03	9/10/2014	0.0272	0.116	0.214	1.04	0.166	0.0772	0.936	0.183	0.145	0.518	0.164	0.0617	0.0148	0.0296	0.0444	0.723	0.195	0.0356
9574-SS-140910-01-04	9/10/2014	0.00489	0.161	0.222	1.01	0.138	0.0513	0.962	0.171	0.0901	0.39	0.138	0.0344	0.0143	0.0286	0.0428	0.591	0.172	0.0595
9574-SS-140910-01-05	9/10/2014	0.000801	0.00339	0.2	0.995	0.16	0.0848	0.948	0.178	0.0908	0.345	0.163	0.0834	0	0.00855	0.0684	0.421	0.179	0.0549
9574-SS-140910-01-07	9/10/2014	0.0923	0.17	0.209	0.858	0.133	0.0642	0.831	0.15	0.11	0.512	0.16	0.0349	0.038	0.0508	0.0752	0.453	0.15	0.0348
9574-SS-140910-01-08	9/10/2014	0.205	0.439	0.213	1.03	0.143	0.064	0.979	0.139	0.0868	0.832	0.21	0.0748	0	0.00539	0.0431	0.632	0.179	0.0525
9574-SS-140910-01-09	9/10/2014	0.186	0.235	0.226	1.08	0.169	0.0702	0.768	0.188	0.184	0.484	0.159	0.0554	0.0426	0.0529	0.0689	0.493	0.161	0.0631
9574-SS-140910-01-10	9/10/2014	0.0546	0.129	0.22	1.17	0.174	0.0772	1.16	0.191	0.143	0.571	0.169	0.0644	0.0343	0.0497	0.0801	0.757	0.196	0.0339
9574-SS-140910-01-11	9/10/2014	0.0506	0.165	0.22	0.972	0.136	0.0838	0.977	0.142	0.0792	0.606	0.174	0.0587	0.0281	0.0398	0.0422	0.575	0.168	0.0338
9574-SS-140910-01-12	9/10/2014	0.0186	0.0775	0.221	1.22	0.184	0.0858	1.14	0.21	0.139	0.747	0.199	0.0541	0.0564	0.0596	0.0673	0.997	0.233	0.0356
9574-SS-140910-01-13	9/10/2014	0.196	0.214	0.228	1.02	0.14	0.0759	0.978	0.157	0.0959	0.724	0.198	0.0368	0.0458	0.053	0.0458	0.744	0.201	0.0557
9574-SS-140910-01-14	9/10/2014	0.0705	0.0929	0.214	1.05	0.146	0.0605	0.889	0.156	0.0802	0.705	0.193	0.0614	0.0294	0.0417	0.0441	0.607	0.178	0.0671
9574-SS-140910-01-15	9/10/2014	0.0174	0.0329	0.226	0.805	0.121	0.0579	0.871	0.14	0.11	0.434	0.145	0.0583	-0.00262	0.00524	0.0636	0.594	0.171	0.0336
9574-SS-140910-01-16	9/10/2014	0.000929	0.0403	0.232	1.32	0.201	0.0904	1.07	0.189	0.153	0.513	0.152	0.0537	0.049	0.0518	0.0585	0.835	0.198	0.0309
9574-SS-140910-01-17	9/10/2014	0.00743	0.045	0.225	1.19	0.165	0.0698	1.1	0.179	0.129	0.639	0.183	0.0619	0.0241	0.0427	0.077	0.844	0.213	0.0357
9574-SS-140910-01-18	9/10/2014	-0.00742	0.0464	0.212	1.34	0.193	0.0845	1.19	0.2	0.117	0.808	0.2	0.0618	0.038	0.0472	0.0615	0.745	0.191	0.0493
9574-SS-140910-01-20	9/11/2014	-0.0141	0.0477	0.205	1.26	0.206	0.109	1.01	0.197	0.176	1.12	0.241	0.0571	0.0683	0.0614	0.041	0.71	0.187	0.0499
9574-SS-140910-01-21	9/11/2014	0.0192	0.0727	0.234	1.07	0.156	0.0738	0.982	0.153	0.124	1.04	0.232	0.0504	0.0276	0.039	0.0413	0.705	0.187	0.0503
9574-SS-140910-01-22	9/11/2014	0.0451	0.0593	0.229	0.922	0.131	0.0573	1.21	0.17	0.106	0.829	0.215	0.0646	0.0126	0.0315	0.0705	0.981	0.236	0.0372
9574-SS-140910-01-23	9/11/2014	0.0064	0.0542	0.229	1.13	0.17	0.0835	1.37	0.229	0.115	1.14	0.254	0.0553	0.0728	0.0681	0.0688	0.994	0.235	0.0364
9574-SS-140910-01-24	9/11/2014	0.112	0.132	0.231	1.2	0.165	0.0649	1.39	0.221	0.131	1.09	0.247	0.0546	0.0243	0.043	0.0776	0.992	0.234	0.0545
9574-SS-140910-01-25	9/11/2014	0.0568	0.11	0.242	1.23	0.164	0.0653	0.99	0.156	0.126	0.887	0.216	0.0526	0.0691	0.0647	0.0654	0.959	0.226	0.0703
9574-SS-140910-01-26	9/11/2014	0.0376	0.147	0.228	1.08	0.159	0.079	1.21	0.179	0.106	0.73	0.219	0.078	0.0187	0.0374	0.056	0.764	0.223	0.0449
9574-SS-140910-01-27	9/11/2014	0.00356	0.0663	0.237	1.31	0.185	0.0818	1.05	0.163	0.11	1.16	0.255	0.0357	0.0592	0.0594	0.0444	0.956	0.228	0.0616
9574-SS-140910-01-28	9/11/2014	0.00967	0.0958	0.23	1.28	0.188	0.089	1.39	0.201	0.131	0.871	0.217	0.0545	0.0595	0.0597	0.0447	0.895	0.22	0.0358
9574-SS-140910-01-29	9/11/2014	0.0735	0.0242	0.245	1.08	0.154	0.0808	0.955	0.16	0.146	0.842	0.208	0.0587	0.0114	0.0286	0.064	0.708	0.189	0.0513
9574-SS-140910-01-30	9/11/2014	0.0154	0.0133	0.23	0.96	0.161	0.0864	0.851	0.166	0.156	0.744	0.196	0.0349	0.0723	0.065	0.0434	0.787	0.203	0.0528
9574-SS-140910-01-31	9/11/2014	-0.00068	0.0573	0.225	1.06	0.146	0.0498	1.1	0.159	0.089	0.572	0.17	0.0695	0.0992	0.0754	0.0425	0.986	0.228	0.0517
9574-SS-140910-01-32	9/11/2014	0.000231	0.0252	0.231	1.06	0.157	0.0709	1.17	0.177	0.0776	0.598	0.174	0.0602	0.0576	0.0578	0.0432	0.758	0.198	0.06
9574-SS-140910-01-33	9/11/2014	0.007	0.0391	0.233	1.03	0.147	0.0689	0.954	0.153	0.119	0.772	0.196	0.0504	0.0138	0.0276	0.0413	0.828	0.203	0.0331
9574-SS-140910-01-34	9/11/2014	0.00142	0.0793	0.202	0.618	0.0993	0.04	0.225	0.0848	0.0991	0.389	0.138	0.0524	0.0143	0.0287	0.043	0.494	0.156	0.0345

Average
0.044
St Dev
0.058
Min
-0.014
Max
0.205

Average
1.071
St Dev
0.168
Min
0.618
Max
1.340

Average
1.017
St Dev
0.219
Min
0.225
Max
1.390

Average
0.707
St Dev
0.235
Min
0.345
Max
1.160

Average
0.035
St Dev
0.025
Min
-0.003
Max
0.099

Average
0.738
St Dev
0.180
Min
0.379
Max
0.997

**Table 6-2**  
**Horine Location Sample Results**

Horine Borrow Area Results																			
Sample ID	Sample Date	Technetium-99 (pCi/g)			Radium-226 (pCi/g) 21 Day Ingrowth			Thorium-232 (pCi/g) (Ac-228) Final Count			Uranium-234 (pCi/g) Alpha Spec			Uranium-235 (pCi/g) Alpha Spec			Uranium-238 (pCi/g) Alpha Spec		
		Result	Error	MDC	Result	Error	MDC	Result	Error	MDC	Result	Error	MDC	Result	Error	MDC	Result	Error	MDC
9498-RU-140903-31-01	9/5/2014	0.0204	0.0317	0.208	1.1	0.163	0.0784	1.09	0.166	0.0909	0.498	0.163	0.0784	0.0273	0.0431	0.0687	0.518	0.165	0.0551
9498-RU-140903-31-02	9/5/2014	0.0429	0.0695	0.201	1.15	0.171	0.0796	1.31	0.201	0.0655	0.539	0.157	0.0585	0.0256	0.0363	0.0384	0.573	0.161	0.0467
9498-RU-140903-32-01	9/3/2014	0.0283	0.0258	0.213	1.23	0.202	0.102	0.932	0.201	0.256	0.746	0.19	0.0611	0.0401	0.0464	0.0401	0.739	0.189	0.0321
9498-RU-140903-32-02	9/3/2014	0.0309	0.0799	0.216	1.14	0.16	0.0691	1.12	0.166	0.108	0.82	0.214	0.0567	0.0126	0.0316	0.0706	0.796	0.21	0.0373
9498-RU-140903-41-01	9/4/2014	0.033	0.0371	0.207	1.22	0.189	0.078	1.31	0.211	0.126	0.59	0.169	0.0571	0	0.00513	0.0411	0.446	0.146	0.057
9498-RU-140903-41-02	9/4/2014	0.0141	0.0107	0.199	0.721	0.111	0.058	0.788	0.144	0.0969	0.408	0.14	0.0579	0.0139	0.0278	0.0416	0.61	0.173	0.0507
9498-RU-140903-42-01	9/4/2014	0.0214	0.0448	0.214	1.03	0.16	0.0737	1.31	0.244	0.118	0.504	0.157	0.0512	0.028	0.0396	0.042	0.557	0.166	0.0583
9498-RU-140903-42-02	9/4/2014	0.00993	0.0444	0.211	0.862	0.127	0.0642	1.04	0.15	0.102	0.508	0.154	0.0685	0.0263	0.0373	0.0395	0.505	0.152	0.0481
9498-RU-140903-43-01	9/4/2014	0.0295	0.0201	0.219	0.99	0.168	0.0906	1.26	0.199	0.0729	0.481	0.152	0.063	0.0525	0.0555	0.0627	0.561	0.165	0.0503
9498-RU-140903-43-02	9/4/2014	-0.00493	0.0175	0.224	0.948	0.136	0.0619	1.22	0.189	0.105	0.577	0.17	0.0687	0.0254	0.04	0.0637	0.703	0.188	0.0583
9498-RU-140903-44-01	9/4/2014	0.00535	0.0606	0.214	0.931	0.172	0.113	1.22	0.206	0.156	0.432	0.141	0.0552	0.0265	0.0375	0.0397	0.601	0.168	0.0551
9498-RU-140903-44-02	9/4/2014	-0.00295	0.0407	0.211	0.946	0.137	0.064	1.14	0.173	0.113	0.596	0.175	0.0534	0.0146	0.0292	0.0438	0.48	0.155	0.0351
9498-RU-140903-51-01	9/4/2014	0.018	0.0835	0.206	1.08	0.171	0.0784	0.812	0.183	0.188	0.585	0.161	0.0303	0.0251	0.0356	0.0377	0.796	0.191	0.0302
9498-RU-140903-51-02	9/4/2014	0.0258	0.0575	0.219	0.929	0.14	0.0735	1.18	0.192	0.107	0.434	0.144	0.0626	0.0137	0.0274	0.0411	0.472	0.149	0.0329
9498-RU-140903-52-01	9/3/2014	-0.00488	0.0198	0.212	1.08	0.178	0.0973	1.27	0.21	0.11	0.554	0.166	0.0517	0.0539	0.0569	0.0643	0.601	0.173	0.034
9498-RU-140903-52-02	9/3/2014	0.0276	0.0883	0.204	1.09	0.167	0.0792	1.19	0.199	0.104	0.606	0.173	0.0713	0.0111	0.0279	0.0624	0.646	0.177	0.05
9498-RU-140903-61-01	9/4/2014	0.0229	0.0273	0.214	1.18	0.171	0.0782	1.21	0.185	0.12	0.538	0.158	0.0595	0.0391	0.0452	0.0391	0.583	0.164	0.0476
9498-RU-140903-61-02	9/4/2014	0.0151	0.0181	0.21	0.846	0.12	0.0741	1.26	0.182	0.101	0.547	0.167	0.0657	0.0144	0.0287	0.0431	0.47	0.153	0.0524
9498-RU-140903-62-01	9/5/2014	0.022	0.0632	0.209	1.27	0.18	0.0801	1.19	0.178	0.117	0.577	0.186	0.0721	0.0658	0.0696	0.0786	0.731	0.211	0.063
9498-RU-140903-62-02	9/5/2014	0.0171	0.044	0.204	1.08	0.152	0.0646	1.14	0.177	0.119	0.773	0.201	0.0702	0	0.00536	0.0429	0.757	0.197	0.0344
9498-RU-140903-63-01	9/3/2014	0.0448	0.0815	0.216	1.17	0.185	0.0886	1.26	0.221	0.113	0.788	0.197	0.0619	0.0381	0.0473	0.0616	0.76	0.193	0.0326
9498-RU-140903-63-02	9/3/2014	0.0254	0.0635	0.215	1.13	0.162	0.0706	1.13	0.195	0.137	0.69	0.188	0.0649	0.0426	0.0493	0.0426	0.922	0.219	0.0342
9498-RU-140903-71-01	9/3/2014	0.0262	0.0231	0.213	1.07	0.176	0.103	1.2	0.233	0.12	1.52	0.423	0.178	0.0917	0.114	0.148	1.8	0.46	0.0785
9498-RU-140903-71-02	9/3/2014	0.0223	0.0957	0.21	0.964	0.141	0.0939	1.23	0.183	0.1	0.508	0.152	0.0629	0.0361	0.0448	0.0584	0.605	0.166	0.0468
9498-RU-140903-81-01	9/4/2014	0.0217	0.0251	0.222	1.02	0.153	0.0754	1.26	0.194	0.108	0.426	0.136	0.0304	-0.00236	0.00473	0.0574	0.354	0.123	0.0303
9498-RU-140903-82-01	9/5/2014	0.0265	0.0256	0.209	1.05	0.163	0.0753	1.17	0.183	0.137	0.687	0.179	0.0312	0.0235	0.037	0.059	0.499	0.15	0.0312
9498-RU-140903-82-02	9/5/2014	0.00615	0.0365	0.212	0.988	0.147	0.0706	1.21	0.181	0.109	0.5	0.151	0.0587	0	0.00481	0.0385	0.472	0.145	0.0469
9498-RU-140903-91-01	9/4/2014	0.0172	0.0316	0.208	1.15	0.175	0.0796	1.34	0.21	0.114	0.754	0.195	0.0717	0.0388	0.0482	0.0628	0.619	0.174	0.0332
9498-RU-140903-91-02	9/4/2014	0.0426	0.0227	0.213	1.05	0.172	0.0888	1.23	0.211	0.0863	0.643	0.178	0.0742	0.0221	0.0391	0.0706	0.776	0.196	0.0665
9498-RU-140903-92-01	9/5/2014	0.0127	0.0946	0.223	1.14	0.162	0.0692	1.23	0.186	0.115	0.713	0.21	0.0732	0.0142	0.0357	0.0798	0.844	0.229	0.0422
9498-RU-140903-92-02	9/5/2014	0.0224	0.0233	0.208	1.04	0.155	0.0724	1.21	0.175	0.0821	0.389	0.134	0.0552	0.0397	0.046	0.0397	0.55	0.16	0.0483

Average
0.021
St Dev
0.013
Min
-0.005
Max
0.045

Average
1.051
St Dev
0.121
Min
0.721
Max
1.270

Average
1.176
St Dev
0.131
Min
0.788
Max
1.340

Average
0.611
St Dev
0.206
Min
0.389
Max
1.520

Average
0.028
St Dev
0.020
Min
-0.002
Max
0.092

Average
0.656
St Dev
0.251
Min
0.354
Max
1.800

**Table 6-3**  
**Husky Location Sample Results****Husky Borrow Area Topsoil Results**

Sample ID	Sample Date	Technetium-99 (pCi/g)			Radium-226 (pCi/g) 21 Day Ingrowth			Thorium-232 (pCi/g) (Ac-228) Final Count			Uranium-234 (pCi/g) Alpha Spec			Uranium-235 (pCi/g) Alpha Spec			Uranium-238 (pCi/g) Alpha Spec		
		Result	Error	MDC	Result	Error	MDC	Result	Error	MDC	Result	Error	MDC	Result	Error	MDC	Result	Error	MDC
0411-SS-141210-00-01	12/10/2014	-0.0628	0.0271	0.236	1.165	0.18	0.0908	1.131	0.206	0.116	0.838	0.153	0.0402	0.0407	0.134	0.237	0.697	0.137	0.0357
0411-SS-141210-00-02	12/10/2014	-0.0755	0.0663	0.238	0.991	0.149	0.0663	0.883	0.147	0.115	0.683	0.136	0.0442	0.0478	0.121	0.236	0.735	0.141	0.0164
0411-SS-141210-00-03	12/10/2014	-0.105	0.0379	0.231	1.11	0.174	0.0873	1.05	0.173	0.133	0.724	0.139	0.0569	0.114	0.156	0.246	0.785	0.144	0.0447
0411-SS-141210-00-04	12/10/2014	-0.0776	0.0523	0.227	0.99	0.165	0.0875	0.921	0.177	0.0891	0.753	0.144	0.0675	0.16	0.165	0.269	0.812	0.148	0.0346
0411-SS-141210-00-05	12/10/2014	-0.0956	0.0527	0.233	1.08	0.15	0.0619	0.939	0.142	0.103	0.763	0.142	0.0292	0.0731	0.11	0.209	0.756	0.141	0.0291
0411-SS-141210-00-06	12/10/2014	-0.0282	0.0368	0.239	1.3	0.211	0.114	1.15	0.211	0.132	0.618	0.124	0.0432	0.145	0.136	0.219	0.74	0.137	0.0275
0411-SS-141210-00-07	12/10/2014	-0.0336	0.0645	0.243	1.13	0.16	0.0697	1.09	0.16	0.0273	0.598	0.121	0.0425	0.0475	0.12	0.23	0.738	0.137	0.0497
0411-SS-141210-00-08	12/10/2014	-0.0712	0.012	0.225	1.11	0.154	0.0546	1.05	0.177	0.138	0.713	0.136	0.0342	0.107	0.127	0.201	0.714	0.136	0.0287
0411-SS-141210-00-09	12/10/2014	-0.126	0.0576	0.226	1.11	0.18	0.0936	0.929	0.179	0.136	0.651	0.129	0.0489	0.177	0.133	0.177	0.73	0.137	0.0436
0411-SS-141210-00-10	12/10/2014	-0.12	0.0332	0.218	0.743	0.106	0.0428	0.563	0.117	0.0636	0.681	0.125	0.0294	0.0809	0.0991	0.151	0.624	0.119	0.033
0411-SS-141210-00-11	12/10/2014	-0.132	0.0207	0.226	1.11	0.176	0.0739	1.07	0.206	0.159	0.986	0.165	0.0337	0.117	0.133	0.246	0.728	0.137	0.0337
0411-SS-141210-00-12	12/10/2014	-0.115	0.0384	0.229	0.797	0.117	0.0539	0.723	0.12	0.0906	0.709	0.133	0.0426	0.0941	0.0772	0.211	0.581	0.118	0.0323
0411-SS-141210-00-13	12/10/2014	-0.118	0.0354	0.241	0.988	0.156	0.079	0.945	0.153	0.0858	0.654	0.127	0.0363	0.0997	0.143	0.215	0.838	0.148	0.056
0411-SS-141210-00-14	12/10/2014	-0.117	0.034	0.229	1.05	0.174	0.09	0.943	0.186	0.147	0.7	0.13	0.0311	0.108	0.155	0.25	0.637	0.122	0.0141
0411-SS-141210-00-15	12/10/2014	-0.129	0.0249	0.236	1.17	0.163	0.0588	1.03	0.164	0.122	0.872	0.157	0.0405	0.0858	0.127	0.242	0.728	0.141	0.0405
0411-SS-141210-00-16	12/10/2014	-0.131	0.0524	0.199	0.543	0.092	0.0262	0.326	0.0761	0.0404	0.651	0.127	0.0402	0.0533	0.0717	0.142	0.573	0.119	0.0483
0411-SS-141210-00-17	12/10/2014	-0.0678	0.0668	0.206	0.531	0.0821	0.0389	0.307	0.0699	0.0785	0.598	0.12	0.0365	0.0678	0.0691	0.102	0.478	0.106	0.0364
0411-SS-141210-00-18	12/10/2014	-0.0794	0.0616	0.198	0.591	0.0943	0.0388	0.253	0.0705	0.104	0.558	0.114	0.0406	0.0747	0.0771	0.135	0.426	0.0963	0.0141
0411-SS-141210-00-19	12/10/2014	-0.117	0.0522	0.219	0.988	0.183	0.11	0.948	0.208	0.148	0.747	0.136	0.0269	0.0603	0.137	0.253	0.707	0.132	0.0358
0411-SS-141210-00-20	12/10/2014	-0.122	0.0292	0.215	0.973	0.138	0.0584	0.794	0.148	0.105	0.62	0.123	0.0443	0.0994	0.126	0.175	0.662	0.126	0.0266

Average
-0.096
St Dev
0.032
Min
-0.132
Max
-0.028

Average
0.974
St Dev
0.219
Min
0.531
Max
1.300

Average
0.852
St Dev
0.277
Min
0.253
Max
1.150

Average
0.706
St Dev
0.103
Min
0.558
Max
0.986

Average
0.093
St Dev
0.038
Min
0.041
Max
0.177

Average
0.684
St Dev
0.105
Min
0.426
Max
0.838

**Table 6-3**  
**Prudent Location Sample Results**

Prudent Borrow Area Results																			
Sample ID	Sample Date	Technetium-99 (pCi/g)			Radium-226 (pCi/g) 21 Day Ingrowth			Thorium-232 (pCi/g) (Ac-228) Final Count			Uranium-234 (pCi/g) Alpha Spec			Uranium-235 (pCi/g) Alpha Spec			Uranium-238 (pCi/g) Alpha Spec		
		Result	Error	MDC	Result	Error	MDC	Result	Error	MDC	Result	Error	MDC	Result	Error	MDC	Result	Error	MDC
2886-SS-150923-01-01	9/23/2015	-0.112	0.0805	0.219	0.987	0.171	0.0883	1.19	0.204	0.162	0.54	0.155	0.067	0.049	0.13	0.221	0.673	0.173	0.0559
2886-SS-150923-01-02	9/23/2015	-0.111	0.0405	0.221	0.924	0.131	0.0561	1.06	0.161	0.096	0.473	0.151	0.0711	0.0676	0.126	0.226	0.748	0.193	0.0669
2886-SS-150923-01-03	9/23/2015	-0.128	0.178	0.217	1.13	0.155	0.0592	0.949	0.161	0.104	0.562	0.16	0.0535	0.119	0.153	0.251	0.563	0.16	0.0468
2886-SS-150923-01-04	9/23/2015	-0.165	0.0498	0.233	1.1	0.179	0.0778	1.12	0.212	0.189	0.387	0.132	0.0695	0.0991	0.162	0.237	0.626	0.169	0.058
2886-SS-150923-01-05	9/23/2015	-0.143	0.0492	0.225	1.17	0.158	0.0643	1.23	0.204	0.113	0.652	0.172	0.0648	0.136	0.139	0.202	0.538	0.155	0.068
2886-SS-150923-01-06	9/23/2015	-0.15	0.046	0.223	0.9	0.142	0.0498	1.14	0.203	0.141	0.431	0.146	0.0791	0.122	0.147	0.265	0.74	0.192	0.0577
2886-SS-150923-01-07	9/23/2015	-0.139	0.0556	0.218	1.11	0.154	0.0605	1.09	0.166	0.12	0.642	0.171	0.0576	0.135	0.152	0.239	0.594	0.163	0.046
2886-SS-150923-01-08	9/23/2015	-0.12	0.0562	0.213	1.24	0.175	0.0751	1.21	0.193	0.133	0.452	0.141	0.061	0.0124	0.12	0.257	0.602	0.164	0.0567
2886-SS-150923-01-09	9/23/2015	-0.117	0.0631	0.233	0.921	0.162	0.0908	1.12	0.206	0.125	0.562	0.164	0.0699	0.132	0.142	0.232	0.718	0.187	0.056
2886-SS-150923-01-10	9/23/2015	-0.163	0.0624	0.227	1.15	0.184	0.1	1.13	0.192	0.152	0.427	0.141	0.0857	0.124	0.164	0.273	0.689	0.179	0.0754
2886-SS-150923-01-11	9/23/2015	-0.146	0.0679	0.211	1.17	0.169	0.0729	1.33	0.216	0.0901	0.684	0.179	0.0594	0.0874	0.15	0.25	0.538	0.157	0.0542
2886-SS-150923-01-12	9/23/2015	-0.162	0.0614	0.217	1.01	0.145	0.0594	0.976	0.154	0.12	0.614	0.167	0.0578	0.0889	0.146	0.232	0.592	0.164	0.0576
2886-SS-150923-01-13	9/23/2015	-0.174	0.0506	0.224	1.06	0.16	0.0468	1.01	0.189	0.152	0.523	0.155	0.0547	0.0238	0.0379	0.239	0.763	0.191	0.0546
2886-SS-150923-01-14	9/23/2015	0.0505	0.00833	0.22	1.08	0.159	0.0798	1.1	0.168	0.104	0.513	0.151	0.065	0.12	0.126	0.223	0.606	0.165	0.057
2886-SS-150923-01-15	9/23/2015	0.0726	0.0405	0.215	0.957	0.147	0.0682	1.12	0.19	0.0799	0.684	0.183	0.066	0.229	0.143	0.237	0.395	0.136	0.0561
2886-SS-150923-01-16	9/23/2015	0.0203	0.023	0.219	1.19	0.199	0.095	0.968	0.189	0.127	0.465	0.146	0.0705	0.0788	0.129	0.216	0.588	0.165	0.0703
2886-SS-150923-01-17	9/23/2015	0.0597	0.0279	0.219	1.17	0.174	0.0816	1.21	0.214	0.113	0.476	0.146	0.0709	0.185	0.155	0.266	0.612	0.165	0.0566
2886-SS-150923-01-18	9/23/2015	0.0356	0.0449	0.213	1.06	0.153	0.0666	0.981	0.171	0.0998	0.482	0.144	0.0449	0.117	0.132	0.219	0.589	0.16	0.0448
2886-SS-150923-01-19	9/23/2015	0.0572	0.0125	0.219	1.06	0.149	0.0645	1.17	0.191	0.113	0.618	0.17	0.0548	0.094	0.14	0.232	0.768	0.191	0.0316
2886-SS-150923-01-20	9/23/2015	0.0643	0.0315	0.221	0.923	0.134	0.0678	1.03	0.161	0.0918	0.529	0.155	0.0745	0.0656	0.138	0.227	0.439	0.138	0.0522
2886-SS-150923-01-21	9/23/2015	0.0452	0.0237	0.216	1.07	0.162	0.0674	1.17	0.229	0.141	0.456	0.14	0.0453	0.0803	0.145	0.241	0.624	0.166	0.0452
2886-SS-150923-01-22	9/23/2015	0.0544	0.0764	0.213	0.888	0.124	0.0505	0.963	0.149	0.0867	0.587	0.164	0.069	0.118	0.122	0.214	0.828	0.196	0.0461
2886-SS-150923-01-23	9/23/2015	0.0304	0.0507	0.215	0.928	0.138	0.0702	1.06	0.197	0.105	0.594	0.16	0.055	0.146	0.178	0.266	0.579	0.157	0.0289
2886-SS-150923-01-24	9/23/2015	0.048	0.0439	0.22	0.78	0.132	0.0797	1.19	0.193	0.101	0.969	0.213	0.03	0.0746	0.0759	0.228	0.758	0.185	0.0299
2886-SS-150923-01-25	9/23/2015	0.0292	0.0452	0.212	0.963	0.141	0.0677	0.987	0.158	0.138	0.587	0.172	0.0874	0.144	0.155	0.174	0.389	0.139	0.0844
2886-SS-150923-01-26	9/23/2015	0.0322	0.06	0.215	0.884	0.136	0.0666	0.928	0.154	0.0928	0.509	0.154	0.079	0.112	0.127	0.217	0.565	0.162	0.07
2886-SS-150923-01-27	9/23/2015	0.0988	0.0641	0.229	0.903	0.13	0.0559	1.02	0.162	0.0871	0.651	0.175	0.0638	0.0868	0.108	0.144	0.509	0.152	0.0475
2886-SS-150923-01-28	9/23/2015	0.0637	0.041	0.24	0.813	0.125	0.0678	1.08	0.166	0.0843	0.513	0.15	0.0568	0.0929	0.131	0.219	0.688	0.177	0.0644
2886-SS-150923-01-29	9/23/2015	0.0267	0.0576	0.219	0.972	0.154	0.0803	0.955	0.15	0.102	0.557	0.156	0.0511	0.0444	0.121	0.225	0.564	0.157	0.0558
2886-SS-150923-01-30	9/23/2015	0.0282	0.0429	0.211	0.959	0.134	0.0695	0.968	0.15	0.0867	0.559	0.163	0.0563	0.195	0.139	0.236	0.625	0.173	0.0492
2886-SS-150923-01-31	9/23/2015	0.0309	0.0484	0.222	0.795	0.128	0.0682	1.05	0.205	0.105	0.625	0.171	0.0634	0.102	0.119	0.223	0.702	0.181	0.0472
2886-SS-150923-01-32	9/23/2015	0.0308	0.0216	0.225	0.935	0.137	0.0586	0.964	0.162	0.11	0.666	0.178	0.0553	0.044	0.107	0.202	0.446	0.143	0.0319

Average
-0.030
St Dev
0.096
Min
-0.174
Max
0.099

Average
1.006
St Dev
0.123
Min
0.780
Max
1.240

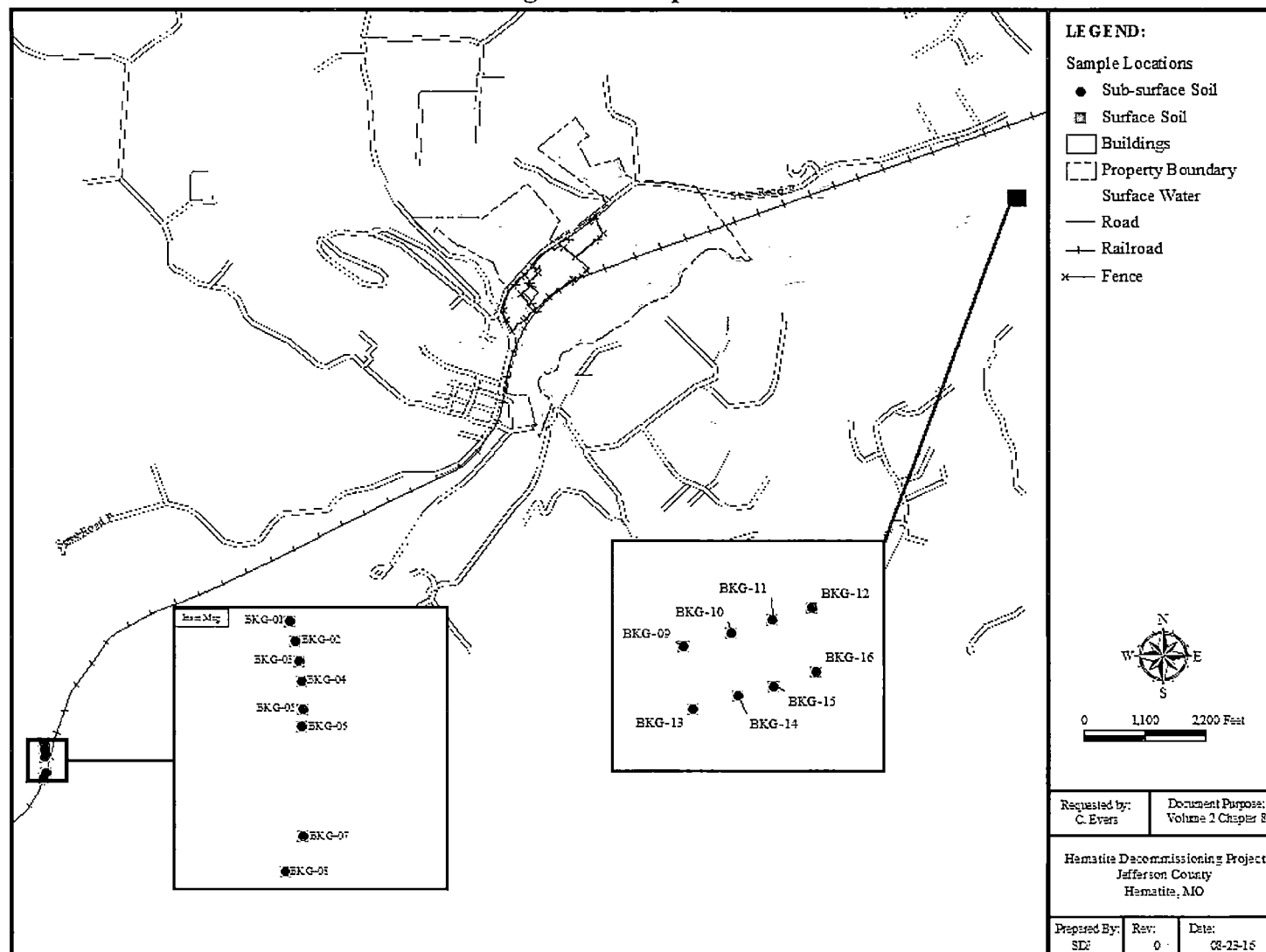
Average
1.077
St Dev
0.102
Min
0.928
Max
1.330

Average
0.562
St Dev
0.110
Min
0.387
Max
0.969

Average
0.104
St Dev
0.047
Min
0.012
Max
0.229

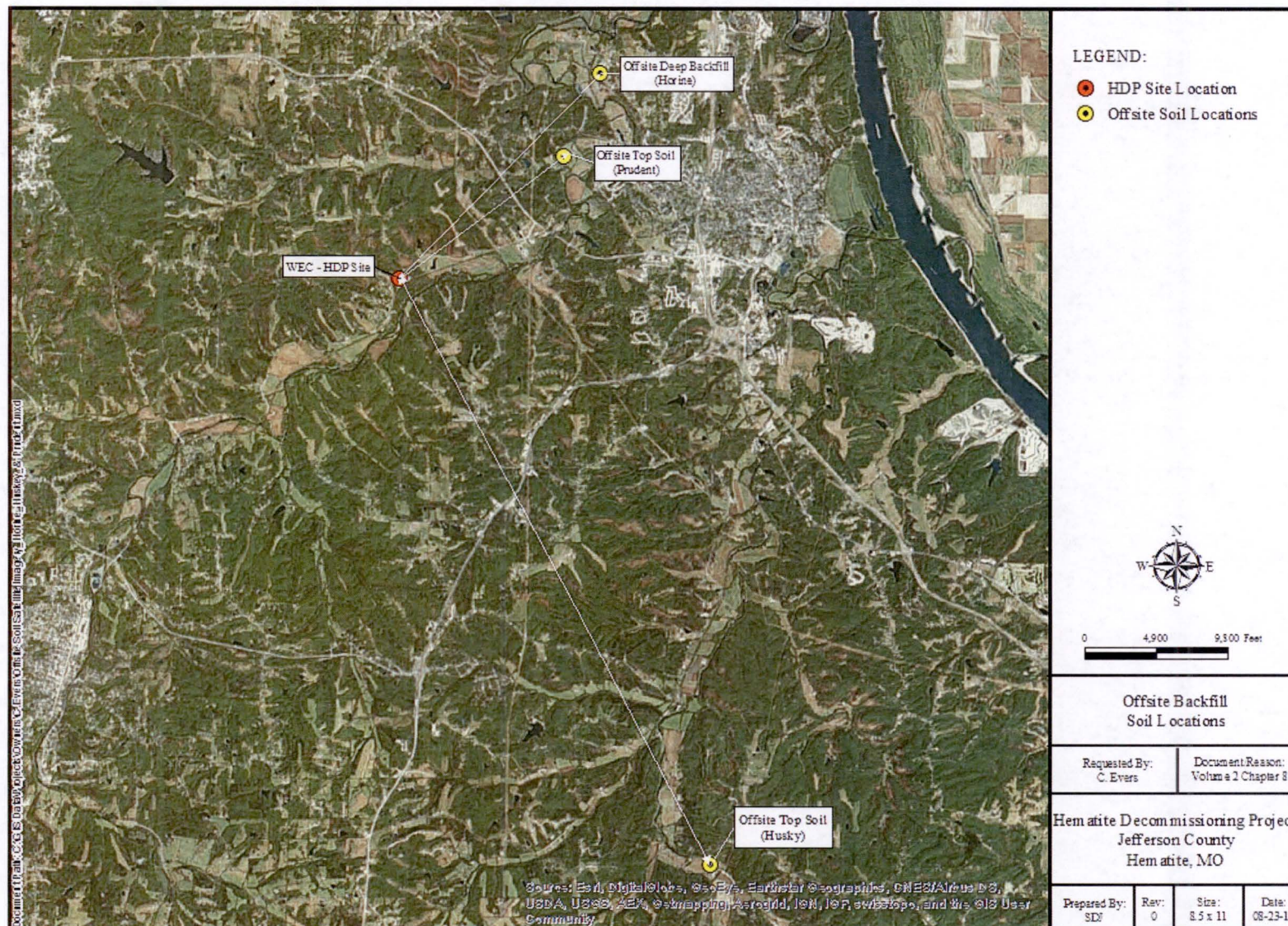
Average
0.614
St Dev
0.109
Min
0.389
Max
0.828

**Figure 5-1**  
**Background Sample Locations**



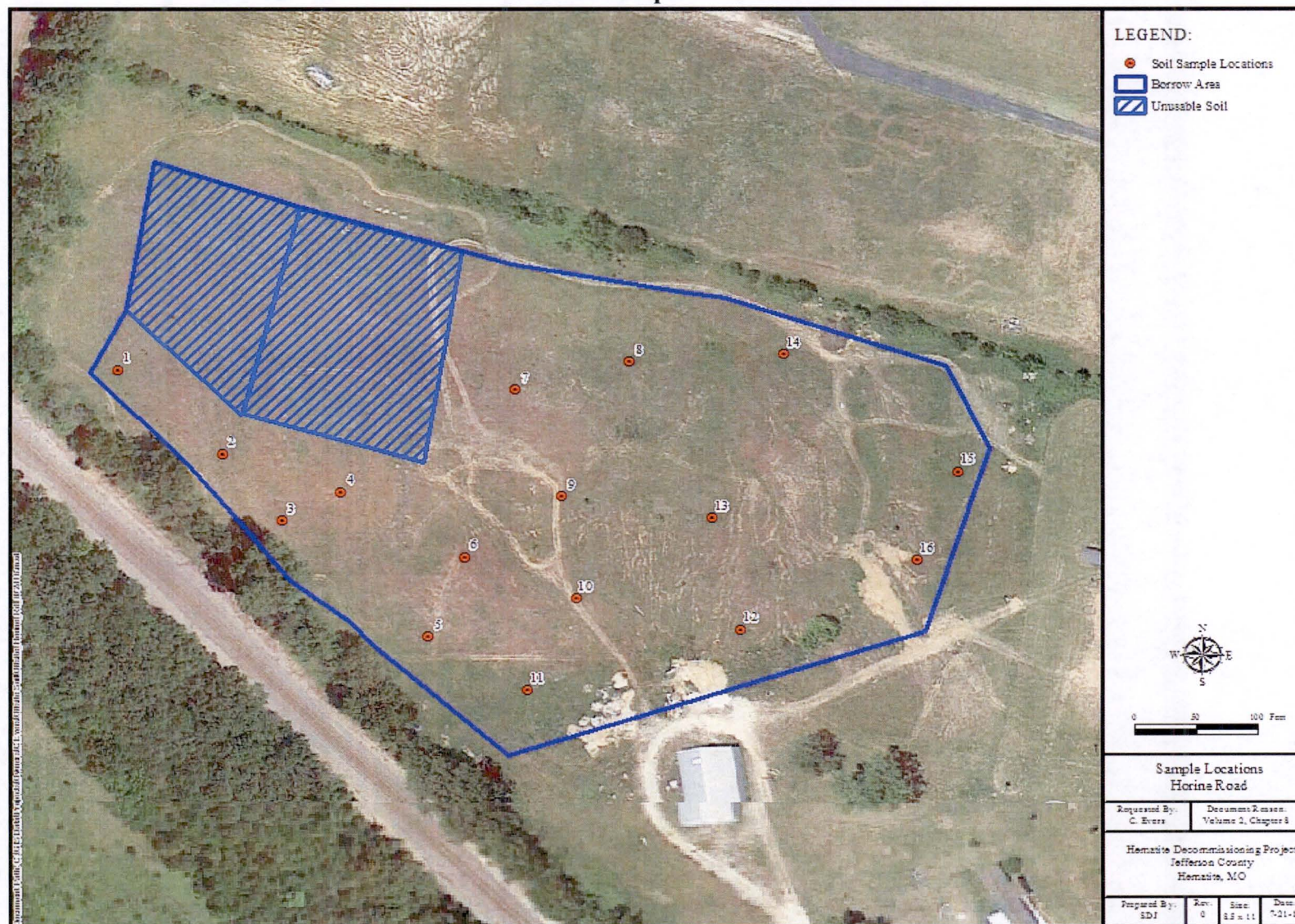


**Figure 6-1**  
**Off-Site Borrow Locations**





**Figure 6-2**  
**Horine Sample Locations**



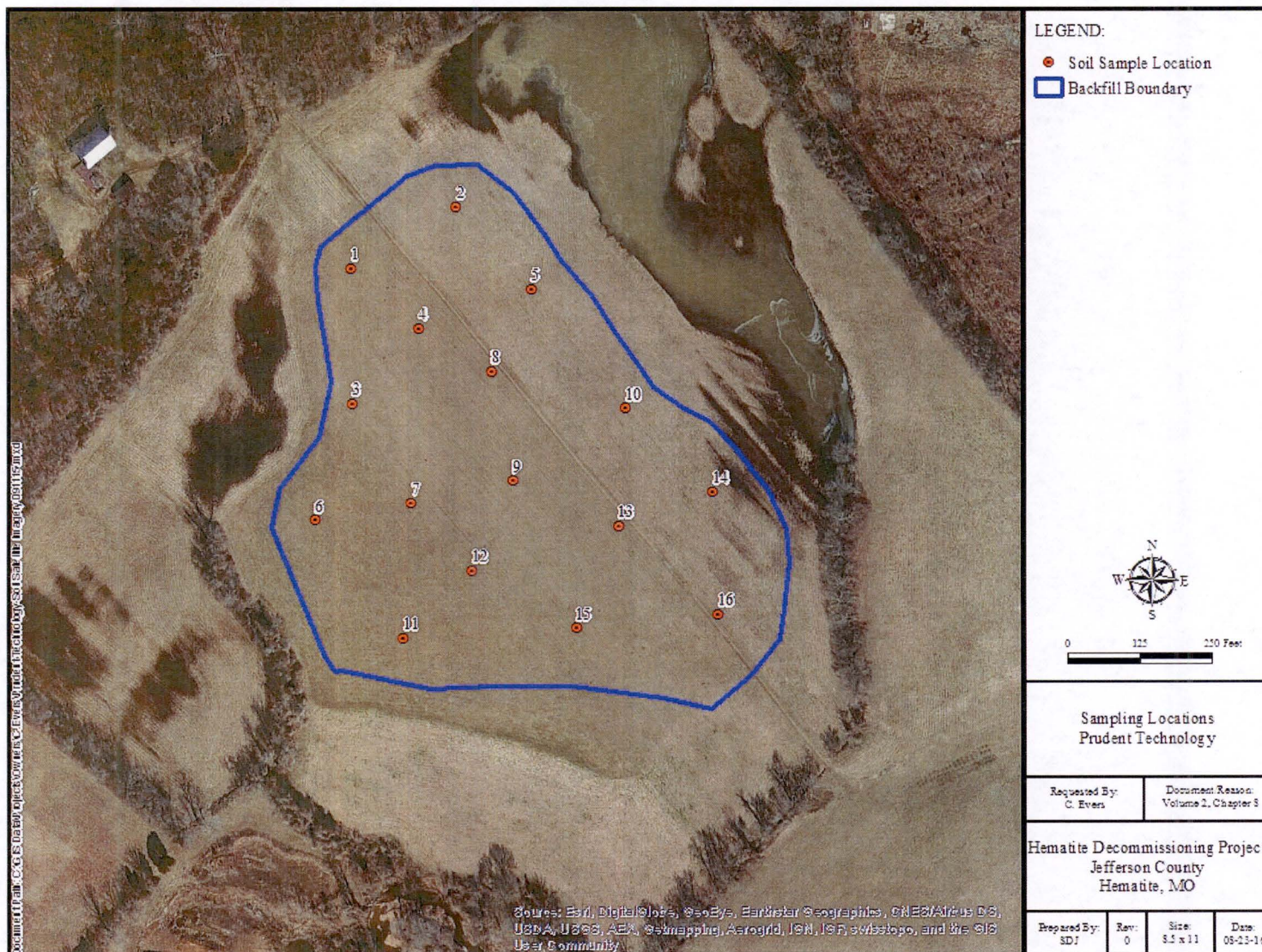


**Figure 6-3**  
**Husky Sample Locations**





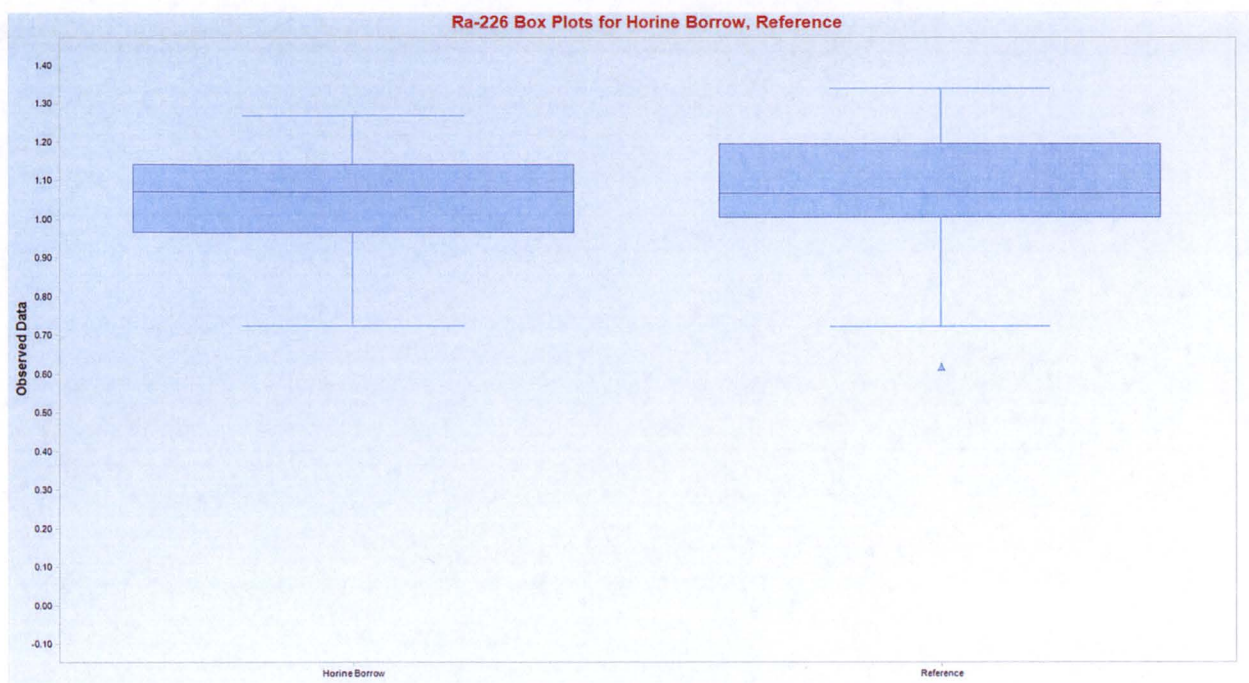
**Figure 6-3**  
**Prudent Sample Locations**



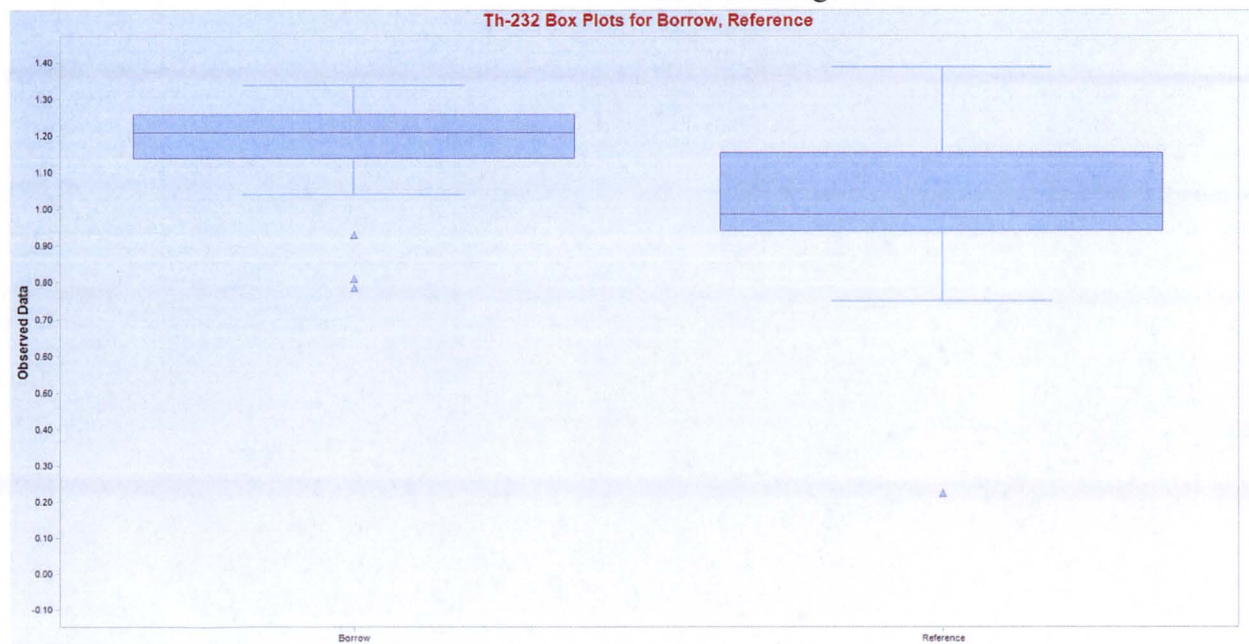


## Appendix A Box Plots

### Ra-226 - Horine versus Background

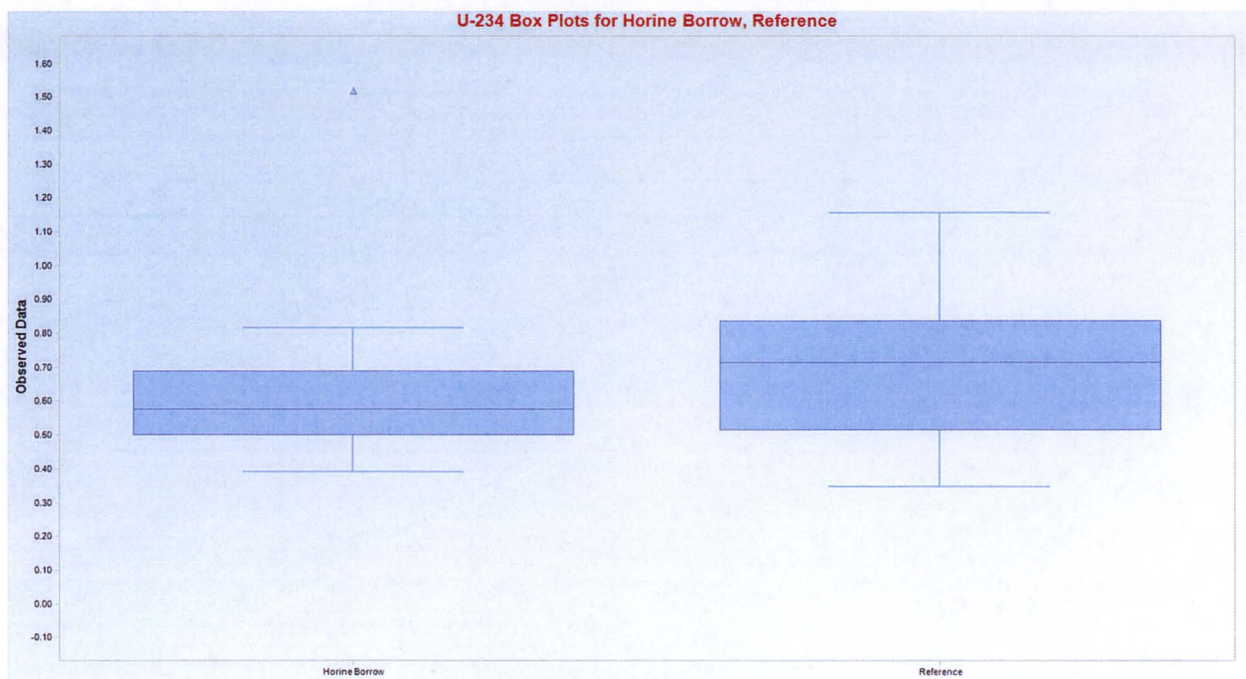


### Th-232 - Horine versus Background

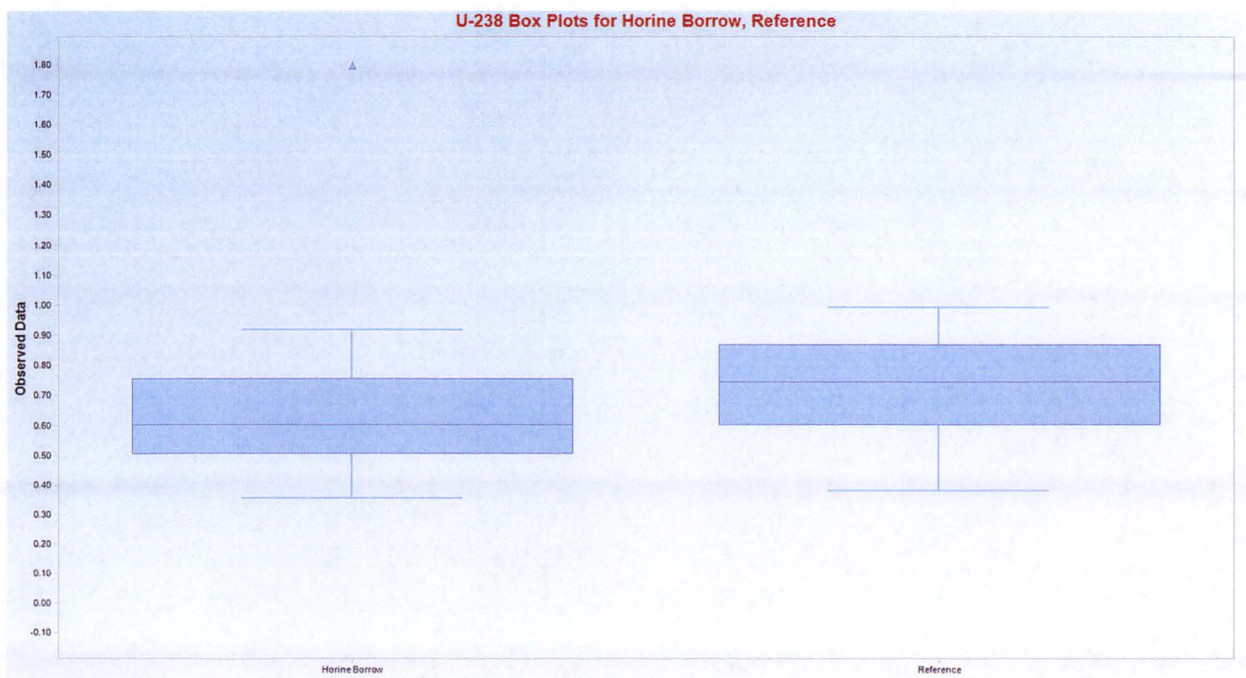


## Appendix A Box Plots

### U-234 - Horine versus Background



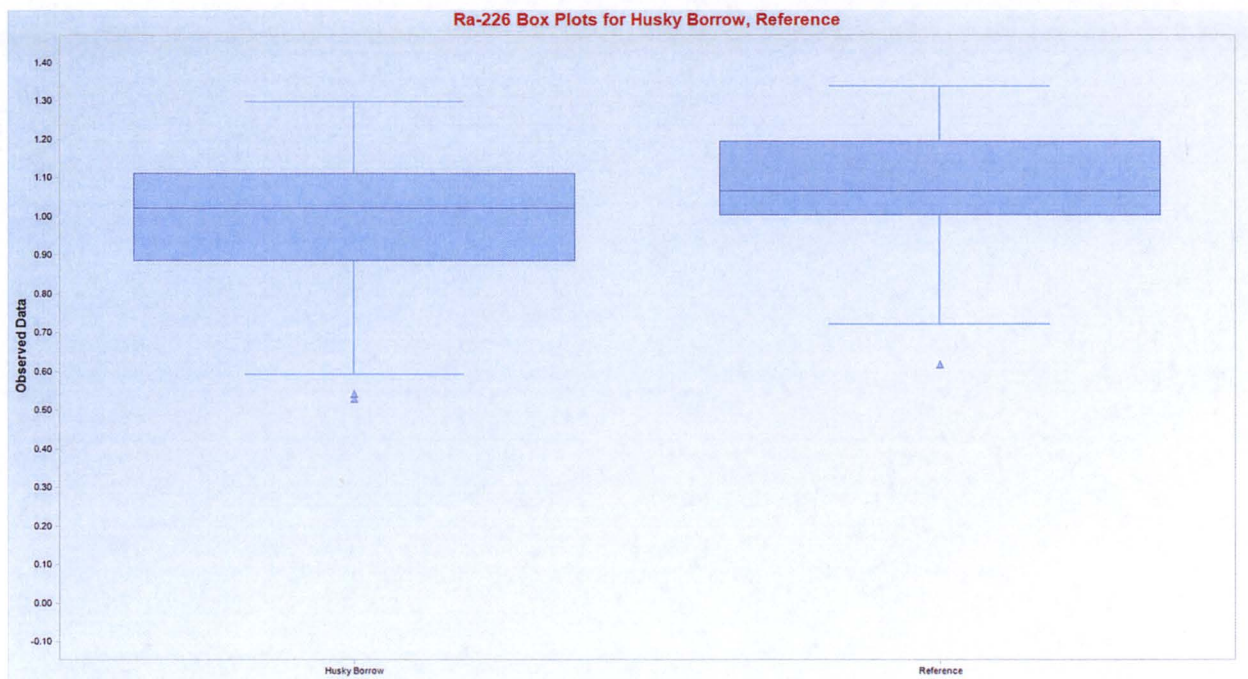
### U-238 – Horine versus Background



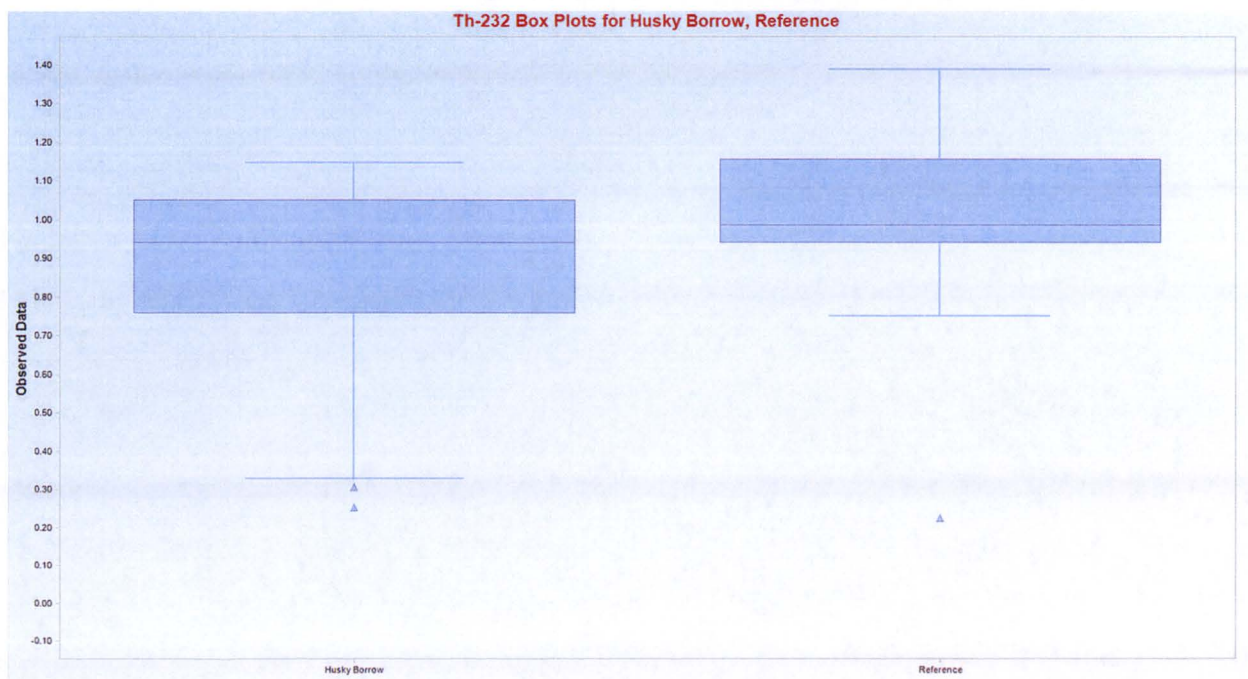


## Appendix A Box Plots

### Ra-226 - Husky versus Background

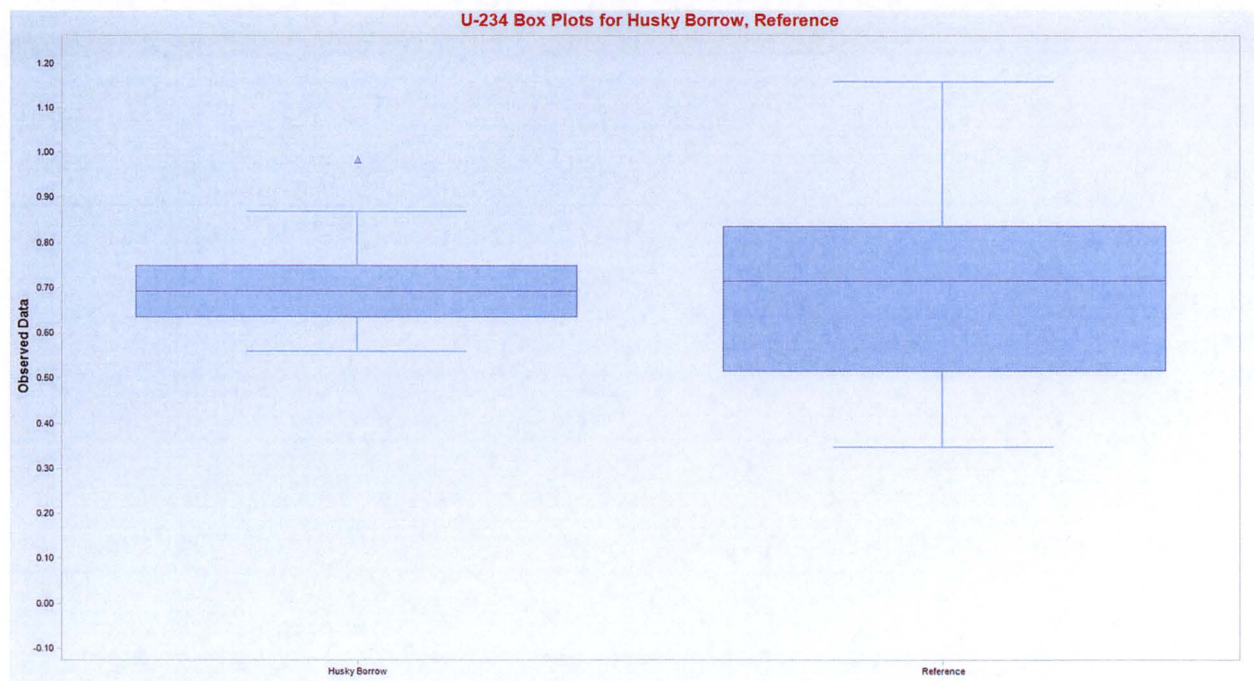


### Th-232 - Husky versus Background

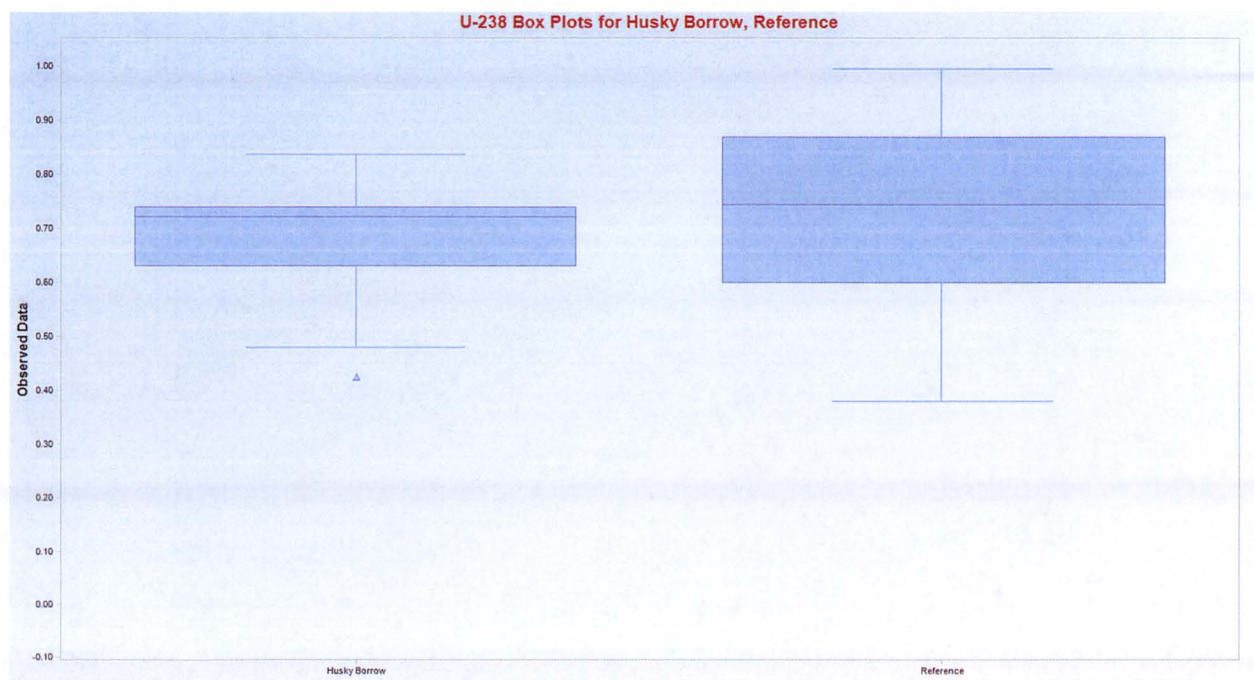


## Appendix A Box Plots

### U-234 - Husky versus Background



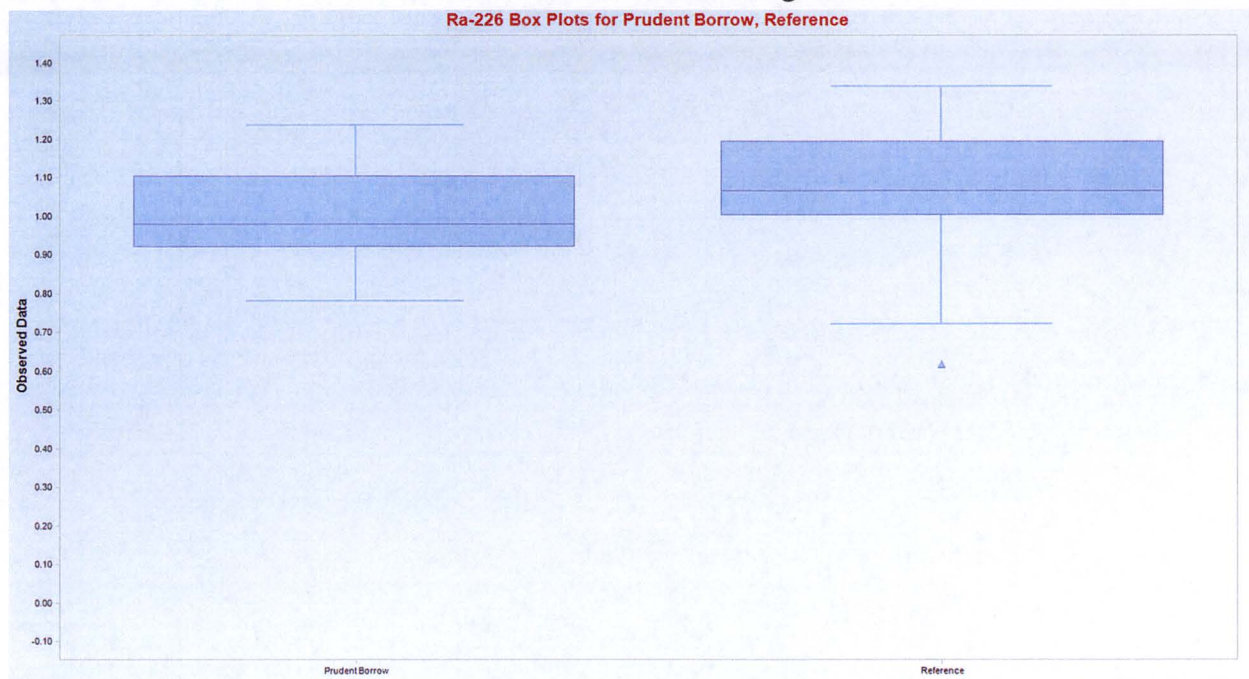
### U-238 – Husky versus Background



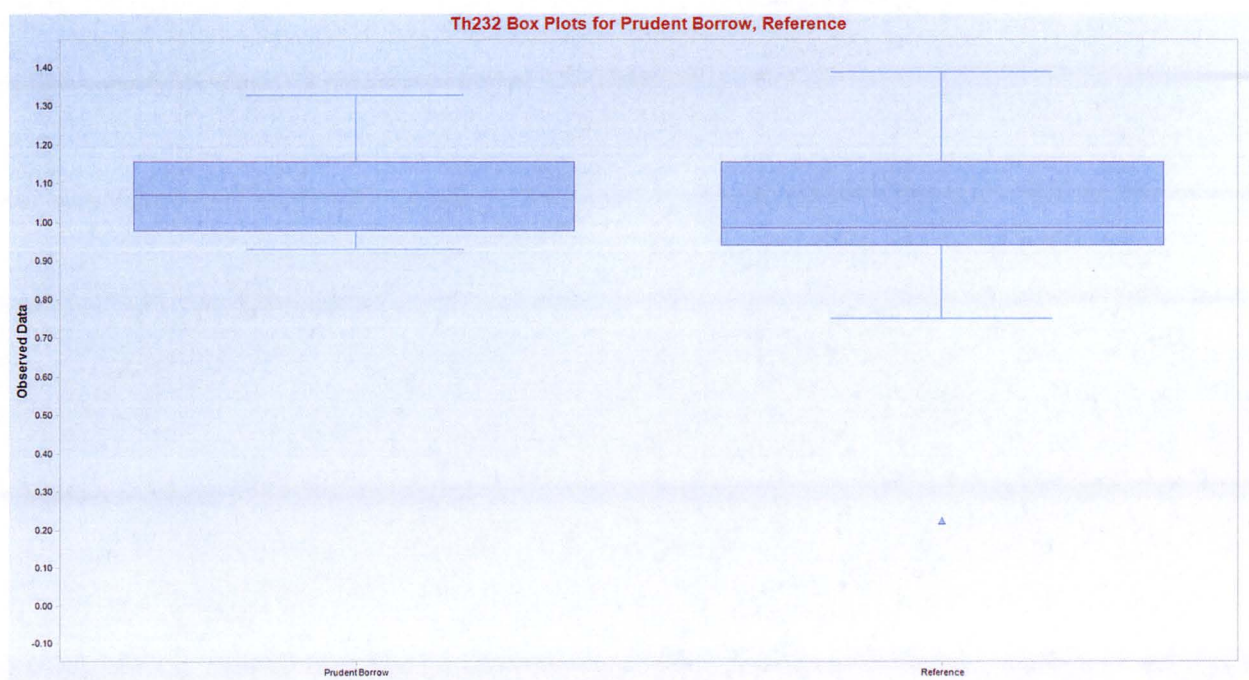


## Appendix A Box Plots

### Ra-226 - Prudent versus Background



### Th-232 - Prudent versus Background



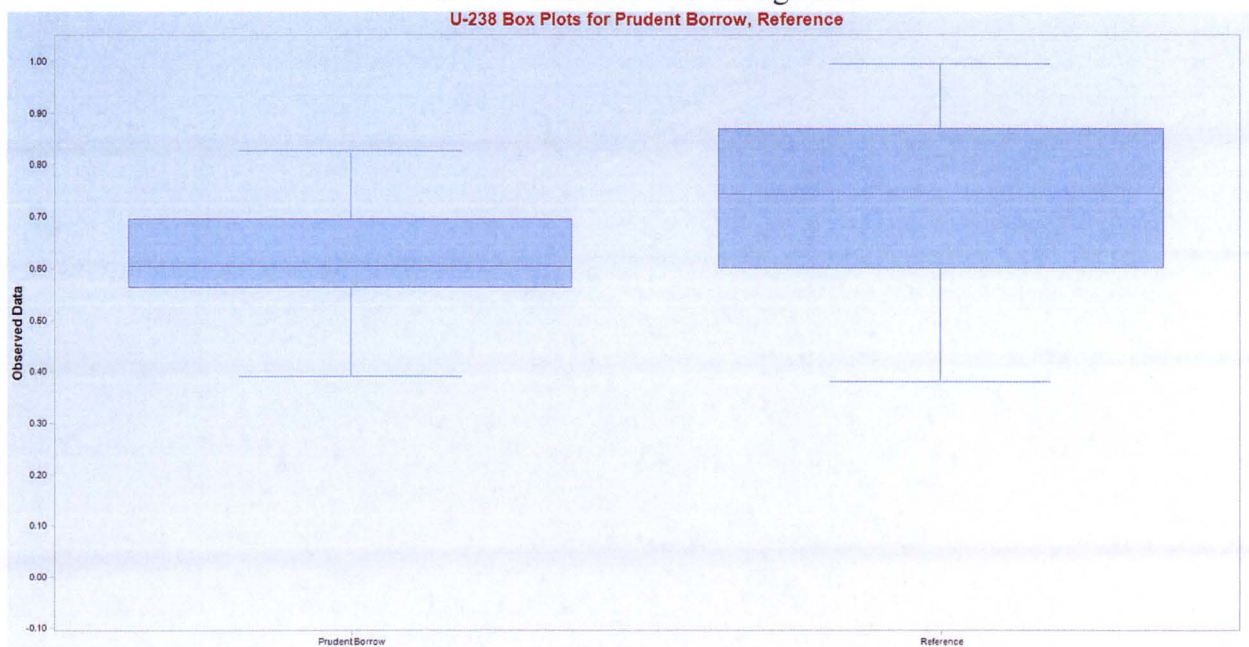


**Appendix A**  
**Box Plots**

**U-234 - Prudent versus Background**



**U-238 - Prudent versus Background**



**Appendix B**  
**WRS Tests**

LBGR = 0.18

Horine - Radium-226					
Sample ID	Concentration (pCi/g)	Area	Adjusted Concentration	Ranks	Borrow Ranks
9574-SS-140910-01-01	1.15	R	1.15	53	0
9574-SS-140910-01-02	0.719	R	0.719	5	0
9574-SS-140910-01-03	1.04	R	1.04	41.5	0
9574-SS-140910-01-04	1.01	R	1.01	37	0
9574-SS-140910-01-05	0.995	R	0.995	35	0
9574-SS-140910-01-07	0.858	R	0.858	16	0
9574-SS-140910-01-08	1.03	R	1.03	39.5	0
9574-SS-140910-01-09	1.08	R	1.08	49	0
9574-SS-140910-01-10	1.17	R	1.17	54	0
9574-SS-140910-01-11	0.972	R	0.972	33	0
9574-SS-140910-01-12	1.22	R	1.22	57	0
9574-SS-140910-01-13	1.02	R	1.02	38	0
9574-SS-140910-01-14	1.05	R	1.05	43.5	0
9574-SS-140910-01-15	0.805	R	0.805	11	0
9574-SS-140910-01-16	1.32	R	1.32	62	0
9574-SS-140910-01-17	1.19	R	1.19	55	0
9574-SS-140910-01-18	1.34	R	1.34	63	0
9574-SS-140910-01-20	1.26	R	1.26	59	0
9574-SS-140910-01-21	1.07	R	1.07	47	0
9574-SS-140910-01-22	0.922	R	0.922	26	0
9574-SS-140910-01-23	1.13	R	1.13	52	0
9574-SS-140910-01-24	1.2	R	1.2	56	0
9574-SS-140910-01-25	1.23	R	1.23	58	0
9574-SS-140910-01-26	1.08	R	1.08	49	0
9574-SS-140910-01-27	1.31	R	1.31	61	0
9574-SS-140910-01-28	1.28	R	1.28	60	0
9574-SS-140910-01-29	1.08	R	1.08	49	0
9574-SS-140910-01-30	0.96	R	0.96	29	0
9574-SS-140910-01-31	1.06	R	1.06	45.5	0
9574-SS-140910-01-32	1.06	R	1.06	45.5	0
9574-SS-140910-01-33	1.03	R	1.03	39.5	0
9574-SS-140910-01-34	0.618	R	0.618	2	0
9498-RU-140903-31-01	1.1	S	0.92	25	25
9498-RU-140903-31-02	1.15	S	0.97	31.5	31.5
9498-RU-140903-32-01	1.23	S	1.05	43.5	43.5
9498-RU-140903-32-02	1.14	S	0.96	29	29
9498-RU-140903-41-01	1.22	S	1.04	41.5	41.5
9498-RU-140903-41-02	0.721	S	0.541	1	1
9498-RU-140903-42-01	1.03	S	0.85	15	15
9498-RU-140903-42-02	0.862	S	0.682	4	4
9498-RU-140903-43-01	0.99	S	0.81	13	13
9498-RU-140903-43-02	0.948	S	0.768	9	9
9498-RU-140903-44-01	0.931	S	0.751	7	7
9498-RU-140903-44-02	0.946	S	0.766	8	8
9498-RU-140903-51-01	1.08	S	0.9	22	22
9498-RU-140903-51-02	0.929	S	0.749	6	6
9498-RU-140903-52-01	1.08	S	0.9	22	22
9498-RU-140903-52-02	1.09	S	0.91	24	24
9498-RU-140903-61-01	1.18	S	1	36	36
9498-RU-140903-61-02	0.846	S	0.666	3	3
9498-RU-140903-62-01	1.27	S	1.09	51	51
9498-RU-140903-62-02	1.08	S	0.9	22	22
9498-RU-140903-63-01	1.17	S	0.99	34	34
9498-RU-140903-63-02	1.13	S	0.95	27	27
9498-RU-140903-71-01	1.07	S	0.89	20	20
9498-RU-140903-71-02	0.964	S	0.784	10	10
9498-RU-140903-81-01	1.02	S	0.84	14	14
9498-RU-140903-82-01	1.05	S	0.87	18.5	18.5
9498-RU-140903-82-02	0.988	S	0.808	12	12
9498-RU-140903-91-01	1.15	S	0.97	31.5	31.5
9498-RU-140903-91-02	1.05	S	0.87	18.5	18.5
9498-RU-140903-92-01	1.14	S	0.96	29	29
9498-RU-140903-92-02	1.04	S	0.86	17	17
			Sum =	2016	645

m 32  
n 31  
 $\alpha$  1.96  
Critical Value 1135

**Appendix B**  
**WRS Tests**

LBGR = 0.12

Horine - Thorium-232					
Sample ID	Concentration (pCi/g)	Area	Adjusted Concentration	Ranks	Borrow Ranks
9574-SS-140910-01-01	1.15	R	1.15	50.5	0
9574-SS-140910-01-02	0.749	R	0.749	4	0
9574-SS-140910-01-03	0.936	R	0.936	12	0
9574-SS-140910-01-04	0.962	R	0.962	16	0
9574-SS-140910-01-05	0.948	R	0.948	13	0
9574-SS-140910-01-07	0.831	R	0.831	7	0
9574-SS-140910-01-08	0.979	R	0.979	20	0
9574-SS-140910-01-09	0.768	R	0.768	5	0
9574-SS-140910-01-10	1.16	R	1.16	52	0
9574-SS-140910-01-11	0.977	R	0.977	18	0
9574-SS-140910-01-12	1.14	R	1.14	47	0
9574-SS-140910-01-13	0.978	R	0.978	19	0
9574-SS-140910-01-14	0.889	R	0.889	10	0
9574-SS-140910-01-15	0.871	R	0.871	9	0
9574-SS-140910-01-16	1.07	R	1.07	34	0
9574-SS-140910-01-17	1.1	R	1.1	39.5	0
9574-SS-140910-01-18	1.19	R	1.19	55.5	0
9574-SS-140910-01-20	1.01	R	1.01	25.5	0
9574-SS-140910-01-21	0.982	R	0.982	21	0
9574-SS-140910-01-22	1.21	R	1.21	58.5	0
9574-SS-140910-01-23	1.37	R	1.37	61	0
9574-SS-140910-01-24	1.39	R	1.39	62.5	0
9574-SS-140910-01-25	0.99	R	0.99	22	0
9574-SS-140910-01-26	1.21	R	1.21	58.5	0
9574-SS-140910-01-27	1.05	R	1.05	29.5	0
9574-SS-140910-01-28	1.39	R	1.39	62.5	0
9574-SS-140910-01-29	0.955	R	0.955	15	0
9574-SS-140910-01-30	0.851	R	0.851	8	0
9574-SS-140910-01-31	1.1	R	1.1	39.5	0
9574-SS-140910-01-32	1.17	R	1.17	53	0
9574-SS-140910-01-33	0.954	R	0.954	14	0
9574-SS-140910-01-34	0.225	R	0.225	1	0
9498-RU-140903-31-01	1.09	S	0.97	17	17
9498-RU-140903-31-02	1.31	S	1.19	55.5	55.5
9498-RU-140903-32-01	0.932	S	0.812	6	6
9498-RU-140903-32-02	1.12	S	1	23	23
9498-RU-140903-41-01	1.31	S	1.19	55.5	55.5
9498-RU-140903-41-02	0.788	S	0.668	2	2
9498-RU-140903-42-01	1.31	S	1.19	55.5	55.5
9498-RU-140903-42-02	1.04	S	0.92	11	11
9498-RU-140903-43-01	1.26	S	1.14	48	48
9498-RU-140903-43-02	1.22	S	1.1	39.5	39.5
9498-RU-140903-44-01	1.22	S	1.1	39.5	39.5
9498-RU-140903-44-02	1.14	S	1.02	26.5	26.5
9498-RU-140903-51-01	0.812	S	0.692	3	3
9498-RU-140903-51-02	1.18	S	1.06	30	30
9498-RU-140903-52-01	1.27	S	1.15	50.5	50.5
9498-RU-140903-52-02	1.19	S	1.07	32	32
9498-RU-140903-61-01	1.21	S	1.09	36	36
9498-RU-140903-61-02	1.26	S	1.14	48	48
9498-RU-140903-62-01	1.19	S	1.07	32	32
9498-RU-140903-62-02	1.14	S	1.02	26.5	26.5
9498-RU-140903-63-01	1.26	S	1.14	48	48
9498-RU-140903-63-02	1.13	S	1.01	24.5	24.5
9498-RU-140903-71-01	1.2	S	1.08	34	34
9498-RU-140903-71-02	1.23	S	1.11	43	43
9498-RU-140903-81-01	1.26	S	1.14	48	48
9498-RU-140903-82-01	1.17	S	1.05	28.5	28.5
9498-RU-140903-82-02	1.21	S	1.09	36	36
9498-RU-140903-91-01	1.34	S	1.22	60	60
9498-RU-140903-91-02	1.23	S	1.11	43	43
9498-RU-140903-92-01	1.23	S	1.11	43	43
9498-RU-140903-92-02	1.21	S	1.09	36	36
Sum =				2024	1081

m 32  
n 31  
 $\alpha$  1.96  
Critical Value 1135

**Appendix B**  
**WRS Tests**

LBGR = 0.59

Horine - Uranium-234					
Sample ID	Concentration (pCi/g)	Area	Adjusted Concentration	Ranks	Borrow Ranks
9574-SS-140910-01-01	0.671	R	0.671	45	0
9574-SS-140910-01-02	0.353	R	0.353	32	0
9574-SS-140910-01-03	0.518	R	0.518	39	0
9574-SS-140910-01-04	0.39	R	0.39	34	0
9574-SS-140910-01-05	0.345	R	0.345	31	0
9574-SS-140910-01-07	0.512	R	0.512	37	0
9574-SS-140910-01-08	0.832	R	0.832	54	0
9574-SS-140910-01-09	0.484	R	0.484	36	0
9574-SS-140910-01-10	0.571	R	0.571	40	0
9574-SS-140910-01-11	0.606	R	0.606	43	0
9574-SS-140910-01-12	0.747	R	0.747	50	0
9574-SS-140910-01-13	0.724	R	0.724	47	0
9574-SS-140910-01-14	0.705	R	0.705	46	0
9574-SS-140910-01-15	0.434	R	0.434	35	0
9574-SS-140910-01-16	0.513	R	0.513	38	0
9574-SS-140910-01-17	0.639	R	0.639	44	0
9574-SS-140910-01-18	0.808	R	0.808	52	0
9574-SS-140910-01-20	1.12	R	1.12	61	0
9574-SS-140910-01-21	1.04	R	1.04	59	0
9574-SS-140910-01-22	0.829	R	0.829	53	0
9574-SS-140910-01-23	1.14	R	1.14	62	0
9574-SS-140910-01-24	1.09	R	1.09	60	0
9574-SS-140910-01-25	0.887	R	0.887	57	0
9574-SS-140910-01-26	0.73	R	0.73	48	0
9574-SS-140910-01-27	1.16	R	1.16	63	0
9574-SS-140910-01-28	0.871	R	0.871	56	0
9574-SS-140910-01-29	0.842	R	0.842	55	0
9574-SS-140910-01-30	0.744	R	0.744	49	0
9574-SS-140910-01-31	0.572	R	0.572	41	0
9574-SS-140910-01-32	0.598	R	0.598	42	0
9574-SS-140910-01-33	0.772	R	0.772	51	0
9574-SS-140910-01-34	0.389	R	0.389	33	0
9498-RU-140903-31-01	0.498	S	-0.092	7	7
9498-RU-140903-31-02	0.539	S	-0.051	13	13
9498-RU-140903-32-01	0.746	S	0.156	26	26
9498-RU-140903-32-02	0.82	S	0.23	30	30
9498-RU-140903-41-01	0.59	S	0	19	19
9498-RU-140903-41-02	0.408	S	-0.182	2	2
9498-RU-140903-42-01	0.504	S	-0.086	9	9
9498-RU-140903-42-02	0.508	S	-0.082	10.5	10.5
9498-RU-140903-43-01	0.481	S	-0.109	6	6
9498-RU-140903-43-02	0.577	S	-0.013	16.5	16.5
9498-RU-140903-44-01	0.432	S	-0.158	4	4
9498-RU-140903-44-02	0.596	S	0.006	20	20
9498-RU-140903-51-01	0.585	S	-0.005	18	18
9498-RU-140903-51-02	0.434	S	-0.156	5	5
9498-RU-140903-52-01	0.554	S	-0.036	15	15
9498-RU-140903-52-02	0.606	S	0.016	21	21
9498-RU-140903-61-01	0.538	S	-0.052	12	12
9498-RU-140903-61-02	0.547	S	-0.043	14	14
9498-RU-140903-62-01	0.577	S	-0.013	16.5	16.5
9498-RU-140903-62-02	0.773	S	0.183	28	28
9498-RU-140903-63-01	0.788	S	0.198	29	29
9498-RU-140903-63-02	0.69	S	0.1	24	24
9498-RU-140903-71-01	1.52	S	0.93	58	58
9498-RU-140903-71-02	0.508	S	-0.082	10.5	10.5
9498-RU-140903-81-01	0.426	S	-0.164	3	3
9498-RU-140903-82-01	0.687	S	0.097	23	23
9498-RU-140903-82-02	0.5	S	-0.09	8	8
9498-RU-140903-91-01	0.754	S	0.164	27	27
9498-RU-140903-91-02	0.643	S	0.053	22	22
9498-RU-140903-92-01	0.713	S	0.123	25	25
9498-RU-140903-92-02	0.389	S	-0.201	1	1
			Sum =	2016	523

m 32  
n 31  
 $\alpha$  1.96  
Critical Value 1135

**Appendix B**  
**WRS Tests**

LBGR = 0.37

Horine - Uranium-238					
Sample ID	Concentration (pCi/g)	Area	Adjusted Concentration	Ranks	Borrow Ranks
9574-SS-140910-01-01	0.724	R	0.724	45	0
9574-SS-140910-01-02	0.379	R	0.379	24	0
9574-SS-140910-01-03	0.723	R	0.723	44	0
9574-SS-140910-01-04	0.591	R	0.591	37	0
9574-SS-140910-01-05	0.421	R	0.421	28	0
9574-SS-140910-01-07	0.453	R	0.453	31	0
9574-SS-140910-01-08	0.632	R	0.632	40	0
9574-SS-140910-01-09	0.493	R	0.493	33	0
9574-SS-140910-01-10	0.757	R	0.757	48	0
9574-SS-140910-01-11	0.575	R	0.575	36	0
9574-SS-140910-01-12	0.997	R	0.997	62	0
9574-SS-140910-01-13	0.744	R	0.744	46	0
9574-SS-140910-01-14	0.607	R	0.607	39	0
9574-SS-140910-01-15	0.594	R	0.594	38	0
9574-SS-140910-01-16	0.835	R	0.835	53	0
9574-SS-140910-01-17	0.844	R	0.844	54	0
9574-SS-140910-01-18	0.745	R	0.745	47	0
9574-SS-140910-01-20	0.71	R	0.71	43	0
9574-SS-140910-01-21	0.705	R	0.705	41	0
9574-SS-140910-01-22	0.981	R	0.981	58	0
9574-SS-140910-01-23	0.994	R	0.994	61	0
9574-SS-140910-01-24	0.992	R	0.992	60	0
9574-SS-140910-01-25	0.959	R	0.959	57	0
9574-SS-140910-01-26	0.764	R	0.764	50	0
9574-SS-140910-01-27	0.956	R	0.956	56	0
9574-SS-140910-01-28	0.895	R	0.895	55	0
9574-SS-140910-01-29	0.708	R	0.708	42	0
9574-SS-140910-01-30	0.787	R	0.787	51	0
9574-SS-140910-01-31	0.986	R	0.986	59	0
9574-SS-140910-01-32	0.758	R	0.758	49	0
9574-SS-140910-01-33	0.828	R	0.828	52	0
9574-SS-140910-01-34	0.494	R	0.494	34	0
9498-RU-140903-31-01	0.518	S	0.148	9	9
9498-RU-140903-31-02	0.573	S	0.203	13	13
9498-RU-140903-32-01	0.739	S	0.369	23	23
9498-RU-140903-32-02	0.796	S	0.426	29.5	29.5
9498-RU-140903-41-01	0.446	S	0.076	2	2
9498-RU-140903-41-02	0.61	S	0.24	18	18
9498-RU-140903-42-01	0.557	S	0.187	11	11
9498-RU-140903-42-02	0.505	S	0.135	8	8
9498-RU-140903-43-01	0.561	S	0.191	12	12
9498-RU-140903-43-02	0.703	S	0.333	21	21
9498-RU-140903-44-01	0.601	S	0.231	15.5	15.5
9498-RU-140903-44-02	0.48	S	0.11	6	6
9498-RU-140903-51-01	0.796	S	0.426	29.5	29.5
9498-RU-140903-51-02	0.472	S	0.102	4.5	4.5
9498-RU-140903-52-01	0.601	S	0.231	15.5	15.5
9498-RU-140903-52-02	0.646	S	0.276	20	20
9498-RU-140903-61-01	0.583	S	0.213	14	14
9498-RU-140903-61-02	0.47	S	0.1	3	3
9498-RU-140903-62-01	0.731	S	0.361	22	22
9498-RU-140903-62-02	0.757	S	0.387	25	25
9498-RU-140903-63-01	0.76	S	0.39	26	26
9498-RU-140903-63-02	0.922	S	0.552	35	35
9498-RU-140903-71-01	1.8	S	1.43	63	63
9498-RU-140903-71-02	0.605	S	0.235	17	17
9498-RU-140903-81-01	0.354	S	-0.016	1	1
9498-RU-140903-82-01	0.499	S	0.129	7	7
9498-RU-140903-82-02	0.472	S	0.102	4.5	4.5
9498-RU-140903-91-01	0.619	S	0.249	19	19
9498-RU-140903-91-02	0.776	S	0.406	27	27
9498-RU-140903-92-01	0.844	S	0.474	32	32
9498-RU-140903-92-02	0.55	S	0.18	10	10
			Sum =	2016	543

m 32  
n 31  
 $\alpha$  1.96  
Critical Value 1135

**Appendix B**  
**WRS Tests**

LBGR = 0.18

Husky - Radium-226					
Sample ID	Concentration (pCi/g)	Area	Adjusted Concentration	Ranks	Borrow Ranks
9574-SS-140910-01-01	1.15	R	1.15	42	0
9574-SS-140910-01-02	0.719	R	0.719	7	0
9574-SS-140910-01-03	1.04	R	1.04	32	0
9574-SS-140910-01-04	1.01	R	1.01	28	0
9574-SS-140910-01-05	0.995	R	0.995	27	0
9574-SS-140910-01-07	0.858	R	0.858	14	0
9574-SS-140910-01-08	1.03	R	1.03	30.5	0
9574-SS-140910-01-09	1.08	R	1.08	38	0
9574-SS-140910-01-10	1.17	R	1.17	43	0
9574-SS-140910-01-11	0.972	R	0.972	24	0
9574-SS-140910-01-12	1.22	R	1.22	46	0
9574-SS-140910-01-13	1.02	R	1.02	29	0
9574-SS-140910-01-14	1.05	R	1.05	33	0
9574-SS-140910-01-15	0.805	R	0.805	9	0
9574-SS-140910-01-16	1.32	R	1.32	51	0
9574-SS-140910-01-17	1.19	R	1.19	44	0
9574-SS-140910-01-18	1.34	R	1.34	52	0
9574-SS-140910-01-20	1.26	R	1.26	48	0
9574-SS-140910-01-21	1.07	R	1.07	36	0
9574-SS-140910-01-22	0.922	R	0.922	17	0
9574-SS-140910-01-23	1.13	R	1.13	41	0
9574-SS-140910-01-24	1.2	R	1.2	45	0
9574-SS-140910-01-25	1.23	R	1.23	47	0
9574-SS-140910-01-26	1.08	R	1.08	38	0
9574-SS-140910-01-27	1.31	R	1.31	50	0
9574-SS-140910-01-28	1.28	R	1.28	49	0
9574-SS-140910-01-29	1.08	R	1.08	38	0
9574-SS-140910-01-30	0.96	R	0.96	23	0
9574-SS-140910-01-31	1.06	R	1.06	34.5	0
9574-SS-140910-01-32	1.06	R	1.06	34.5	0
9574-SS-140910-01-33	1.03	R	1.03	30.5	0
9574-SS-140910-01-34	0.618	R	0.618	6	0
0411-SS-141210-00-01	1.165	S	0.985	25	25
0411-SS-141210-00-02	0.991	S	0.811	13	13
0411-SS-141210-00-03	1.11	S	0.93	19.5	19.5
0411-SS-141210-00-04	0.99	S	0.81	12	12
0411-SS-141210-00-05	1.08	S	0.9	16	16
0411-SS-141210-00-06	1.3	S	1.12	40	40
0411-SS-141210-00-07	1.13	S	0.95	22	22
0411-SS-141210-00-08	1.11	S	0.93	19.5	19.5
0411-SS-141210-00-09	1.11	S	0.93	19.5	19.5
0411-SS-141210-00-10	0.743	S	0.563	4	4
0411-SS-141210-00-11	1.11	S	0.93	19.5	19.5
0411-SS-141210-00-12	0.797	S	0.617	5	5
0411-SS-141210-00-13	0.988	S	0.808	10.5	10.5
0411-SS-141210-00-14	1.05	S	0.87	15	15
0411-SS-141210-00-15	1.17	S	0.99	26	26
0411-SS-141210-00-16	0.543	S	0.363	2	2
0411-SS-141210-00-17	0.531	S	0.351	1	1
0411-SS-141210-00-18	0.591	S	0.411	3	3
0411-SS-141210-00-19	0.988	S	0.808	10.5	10.5
0411-SS-141210-00-20	0.973	S	0.793	8	8
Sum =				1378	291

m 32  
n 20  
 $\alpha$  1.96  
Critical Value 634

## Appendix B WRS Tests

LBGR = 0.12

Husky - Thorium-232					
Sample ID	Concentration (pCi/g)	Area	Adjusted Concentration	Ranks	Borrow Ranks
9574-SS-140910-01-01	1.15	R	1.15	44	0
9574-SS-140910-01-02	0.749	R	0.749	8	0
9574-SS-140910-01-03	0.936	R	0.936	24	0
9574-SS-140910-01-04	0.962	R	0.962	29	0
9574-SS-140910-01-05	0.948	R	0.948	25	0
9574-SS-140910-01-07	0.831	R	0.831	17	0
9574-SS-140910-01-08	0.979	R	0.979	33	0
9574-SS-140910-01-09	0.768	R	0.768	10	0
9574-SS-140910-01-10	1.16	R	1.16	45	0
9574-SS-140910-01-11	0.977	R	0.977	31	0
9574-SS-140910-01-12	1.14	R	1.14	43	0
9574-SS-140910-01-13	0.978	R	0.978	32	0
9574-SS-140910-01-14	0.889	R	0.889	20	0
9574-SS-140910-01-15	0.871	R	0.871	19	0
9574-SS-140910-01-16	1.07	R	1.07	40	0
9574-SS-140910-01-17	1.1	R	1.1	41.5	0
9574-SS-140910-01-18	1.19	R	1.19	47	0
9574-SS-140910-01-20	1.01	R	1.01	36	0
9574-SS-140910-01-21	0.982	R	0.982	34	0
9574-SS-140910-01-22	1.21	R	1.21	48.5	0
9574-SS-140910-01-23	1.37	R	1.37	50	0
9574-SS-140910-01-24	1.39	R	1.39	51.5	0
9574-SS-140910-01-25	0.99	R	0.99	35	0
9574-SS-140910-01-26	1.21	R	1.21	48.5	0
9574-SS-140910-01-27	1.05	R	1.05	39	0
9574-SS-140910-01-28	1.39	R	1.39	51.5	0
9574-SS-140910-01-29	0.955	R	0.955	28	0
9574-SS-140910-01-30	0.851	R	0.851	18	0
9574-SS-140910-01-31	1.1	R	1.1	41.5	0
9574-SS-140910-01-32	1.17	R	1.17	46	0
9574-SS-140910-01-33	0.954	R	0.954	27	0
9574-SS-140910-01-34	0.225	R	0.225	4	0
0411-SS-141210-00-01	1.131	S	1.011	37	37
0411-SS-141210-00-02	0.883	S	0.763	9	9
0411-SS-141210-00-03	1.05	S	0.93	22.5	22.5
0411-SS-141210-00-04	0.921	S	0.801	11	11
0411-SS-141210-00-05	0.939	S	0.819	13	13
0411-SS-141210-00-06	1.15	S	1.03	38	38
0411-SS-141210-00-07	1.09	S	0.97	30	30
0411-SS-141210-00-08	1.05	S	0.93	22.5	22.5
0411-SS-141210-00-09	0.929	S	0.809	12	12
0411-SS-141210-00-10	0.563	S	0.443	5	5
0411-SS-141210-00-11	1.07	S	0.95	26	26
0411-SS-141210-00-12	0.723	S	0.603	6	6
0411-SS-141210-00-13	0.945	S	0.825	15	15
0411-SS-141210-00-14	0.943	S	0.823	14	14
0411-SS-141210-00-15	1.03	S	0.91	21	21
0411-SS-141210-00-16	0.326	S	0.206	3	3
0411-SS-141210-00-17	0.307	S	0.187	2	2
0411-SS-141210-00-18	0.253	S	0.133	1	1
0411-SS-141210-00-19	0.948	S	0.828	16	16
0411-SS-141210-00-20	0.794	S	0.674	7	7
Sum =				1378	311

m            32  
n            20  
α            1.96  
Critical Value    634

## Appendix B WRS Tests

LBGR = 0.59

Husky - Uranium-234					
Sample ID	Concentration (pCi/g)	Area	Adjusted Concentration	Ranks	Borrow Ranks
9574-SS-140910-01-01	0.671	R	0.671	35	0
9574-SS-140910-01-02	0.353	R	0.353	21	0
9574-SS-140910-01-03	0.518	R	0.518	29	0
9574-SS-140910-01-04	0.39	R	0.39	23	0
9574-SS-140910-01-05	0.345	R	0.345	20	0
9574-SS-140910-01-07	0.512	R	0.512	27	0
9574-SS-140910-01-08	0.832	R	0.832	44	0
9574-SS-140910-01-09	0.484	R	0.484	26	0
9574-SS-140910-01-10	0.571	R	0.571	30	0
9574-SS-140910-01-11	0.606	R	0.606	33	0
9574-SS-140910-01-12	0.747	R	0.747	40	0
9574-SS-140910-01-13	0.724	R	0.724	37	0
9574-SS-140910-01-14	0.705	R	0.705	36	0
9574-SS-140910-01-15	0.434	R	0.434	25	0
9574-SS-140910-01-16	0.513	R	0.513	28	0
9574-SS-140910-01-17	0.639	R	0.639	34	0
9574-SS-140910-01-18	0.808	R	0.808	42	0
9574-SS-140910-01-20	1.12	R	1.12	50	0
9574-SS-140910-01-21	1.04	R	1.04	48	0
9574-SS-140910-01-22	0.829	R	0.829	43	0
9574-SS-140910-01-23	1.14	R	1.14	51	0
9574-SS-140910-01-24	1.09	R	1.09	49	0
9574-SS-140910-01-25	0.887	R	0.887	47	0
9574-SS-140910-01-26	0.73	R	0.73	38	0
9574-SS-140910-01-27	1.16	R	1.16	52	0
9574-SS-140910-01-28	0.871	R	0.871	46	0
9574-SS-140910-01-29	0.842	R	0.842	45	0
9574-SS-140910-01-30	0.744	R	0.744	39	0
9574-SS-140910-01-31	0.572	R	0.572	31	0
9574-SS-140910-01-32	0.598	R	0.598	32	0
9574-SS-140910-01-33	0.772	R	0.772	41	0
9574-SS-140910-01-34	0.389	R	0.389	22	0
0411-SS-141210-00-01	0.838	S	0.248	18	18
0411-SS-141210-00-02	0.683	S	0.093	10	10
0411-SS-141210-00-03	0.724	S	0.134	14	14
0411-SS-141210-00-04	0.753	S	0.163	16	16
0411-SS-141210-00-05	0.763	S	0.173	17	17
0411-SS-141210-00-06	0.618	S	0.028	4	4
0411-SS-141210-00-07	0.598	S	0.008	2.5	2.5
0411-SS-141210-00-08	0.713	S	0.123	13	13
0411-SS-141210-00-09	0.651	S	0.061	6.5	6.5
0411-SS-141210-00-10	0.681	S	0.091	9	9
0411-SS-141210-00-11	0.986	S	0.396	24	24
0411-SS-141210-00-12	0.709	S	0.119	12	12
0411-SS-141210-00-13	0.654	S	0.064	8	8
0411-SS-141210-00-14	0.7	S	0.11	11	11
0411-SS-141210-00-15	0.872	S	0.282	19	19
0411-SS-141210-00-16	0.651	S	0.061	6.5	6.5
0411-SS-141210-00-17	0.598	S	0.008	2.5	2.5
0411-SS-141210-00-18	0.558	S	-0.032	1	1
0411-SS-141210-00-19	0.747	S	0.157	15	15
0411-SS-141210-00-20	0.62	S	0.03	5	5
Sum =				1378	214

m 32  
n 20  
 $\alpha$  1.96  
Critical Value 634



**Appendix B**  
**WRS Tests**

LBGR = 0.37

Husky - Uranium-238					
Sample ID	Concentration (pCi/g)	Area	Adjusted Concentration	Ranks	Borrow Ranks
9574-SS-140910-01-01	0.724	R	0.724	35	0
9574-SS-140910-01-02	0.379	R	0.379	17	0
9574-SS-140910-01-03	0.723	R	0.723	34	0
9574-SS-140910-01-04	0.591	R	0.591	27	0
9574-SS-140910-01-05	0.421	R	0.421	20	0
9574-SS-140910-01-07	0.453	R	0.453	22	0
9574-SS-140910-01-08	0.632	R	0.632	30	0
9574-SS-140910-01-09	0.493	R	0.493	24	0
9574-SS-140910-01-10	0.757	R	0.757	38	0
9574-SS-140910-01-11	0.575	R	0.575	26	0
9574-SS-140910-01-12	0.997	R	0.997	52	0
9574-SS-140910-01-13	0.744	R	0.744	36	0
9574-SS-140910-01-14	0.607	R	0.607	29	0
9574-SS-140910-01-15	0.594	R	0.594	28	0
9574-SS-140910-01-16	0.835	R	0.835	43	0
9574-SS-140910-01-17	0.844	R	0.844	44	0
9574-SS-140910-01-18	0.745	R	0.745	37	0
9574-SS-140910-01-20	0.71	R	0.71	33	0
9574-SS-140910-01-21	0.705	R	0.705	31	0
9574-SS-140910-01-22	0.981	R	0.981	48	0
9574-SS-140910-01-23	0.994	R	0.994	51	0
9574-SS-140910-01-24	0.992	R	0.992	50	0
9574-SS-140910-01-25	0.959	R	0.959	47	0
9574-SS-140910-01-26	0.764	R	0.764	40	0
9574-SS-140910-01-27	0.956	R	0.956	46	0
9574-SS-140910-01-28	0.895	R	0.895	45	0
9574-SS-140910-01-29	0.708	R	0.708	32	0
9574-SS-140910-01-30	0.787	R	0.787	41	0
9574-SS-140910-01-31	0.986	R	0.986	49	0
9574-SS-140910-01-32	0.758	R	0.758	39	0
9574-SS-140910-01-33	0.828	R	0.828	42	0
9574-SS-140910-01-34	0.494	R	0.494	25	0
0411-SS-141210-00-01	0.697	S	0.327	8	8
0411-SS-141210-00-02	0.735	S	0.365	14	14
0411-SS-141210-00-03	0.785	S	0.415	19	19
0411-SS-141210-00-04	0.812	S	0.442	21	21
0411-SS-141210-00-05	0.756	S	0.386	18	18
0411-SS-141210-00-06	0.74	S	0.37	16	16
0411-SS-141210-00-07	0.738	S	0.368	15	15
0411-SS-141210-00-08	0.714	S	0.344	10	10
0411-SS-141210-00-09	0.73	S	0.36	13	13
0411-SS-141210-00-10	0.624	S	0.254	5	5
0411-SS-141210-00-11	0.728	S	0.358	11.5	11.5
0411-SS-141210-00-12	0.581	S	0.211	4	4
0411-SS-141210-00-13	0.838	S	0.468	23	23
0411-SS-141210-00-14	0.637	S	0.267	6	6
0411-SS-141210-00-15	0.728	S	0.358	11.5	11.5
0411-SS-141210-00-16	0.573	S	0.203	3	3
0411-SS-141210-00-17	0.478	S	0.108	2	2
0411-SS-141210-00-18	0.426	S	0.056	1	1
0411-SS-141210-00-19	0.707	S	0.337	9	9
0411-SS-141210-00-20	0.662	S	0.292	7	7
Sum =				1378	217

m 32  
n 20  
 $\alpha$  1.96  
Critical Value 634

## Appendix B WRS Tests

LBGR = 0.18

Prudent - Radium-226					
Sample ID	Concentration (pCi/g)	Area	Adjusted Concentration	Ranks	Borrow Ranks
9574-SS-140910-01-01	1.15	R	1.15	54	0
9574-SS-140910-01-02	0.719	R	0.719	7	0
9574-SS-140910-01-03	1.04	R	1.04	44	0
9574-SS-140910-01-04	1.01	R	1.01	39.5	0
9574-SS-140910-01-05	0.995	R	0.995	38	0
9574-SS-140910-01-07	0.858	R	0.858	22	0
9574-SS-140910-01-08	1.03	R	1.03	42.5	0
9574-SS-140910-01-09	1.08	R	1.08	51	0
9574-SS-140910-01-10	1.17	R	1.17	55	0
9574-SS-140910-01-11	0.972	R	0.972	34	0
9574-SS-140910-01-12	1.22	R	1.22	58	0
9574-SS-140910-01-13	1.02	R	1.02	41	0
9574-SS-140910-01-14	1.05	R	1.05	45	0
9574-SS-140910-01-15	0.805	R	0.805	19	0
9574-SS-140910-01-16	1.32	R	1.32	63	0
9574-SS-140910-01-17	1.19	R	1.19	56	0
9574-SS-140910-01-18	1.34	R	1.34	64	0
9574-SS-140910-01-20	1.26	R	1.26	60	0
9574-SS-140910-01-21	1.07	R	1.07	49	0
9574-SS-140910-01-22	0.922	R	0.922	29	0
9574-SS-140910-01-23	1.13	R	1.13	53	0
9574-SS-140910-01-24	1.2	R	1.2	57	0
9574-SS-140910-01-25	1.23	R	1.23	59	0
9574-SS-140910-01-26	1.08	R	1.08	51	0
9574-SS-140910-01-27	1.31	R	1.31	62	0
9574-SS-140910-01-28	1.28	R	1.28	61	0
9574-SS-140910-01-29	1.08	R	1.08	51	0
9574-SS-140910-01-30	0.96	R	0.96	32	0
9574-SS-140910-01-31	1.06	R	1.06	47	0
9574-SS-140910-01-32	1.06	R	1.06	47	0
9574-SS-140910-01-33	1.03	R	1.03	42.5	0
9574-SS-140910-01-34	0.618	R	0.618	3	0
2886-SS-150923-01-01	0.987	S	0.807	20	20
2886-SS-150923-01-02	0.924	S	0.744	12	12
2886-SS-150923-01-03	1.13	S	0.95	31	31
2886-SS-150923-01-04	1.1	S	0.92	28	28
2886-SS-150923-01-05	1.17	S	0.99	36	36
2886-SS-150923-01-06	0.9	S	0.72	8	8
2886-SS-150923-01-07	1.11	S	0.93	30	30
2886-SS-150923-01-08	1.24	S	1.06	47	47
2886-SS-150923-01-09	0.921	S	0.741	10	10
2886-SS-150923-01-10	1.15	S	0.97	33	33
2886-SS-150923-01-11	1.17	S	0.99	36	36
2886-SS-150923-01-12	1.01	S	0.83	21	21
2886-SS-150923-01-13	1.06	S	0.88	24	24
2886-SS-150923-01-14	1.08	S	0.9	27	27
2886-SS-150923-01-15	0.957	S	0.777	15	15
2886-SS-150923-01-16	1.19	S	1.01	39.5	39.5
2886-SS-150923-01-17	1.17	S	0.99	36	36
2886-SS-150923-01-18	1.06	S	0.88	24	24
2886-SS-150923-01-19	1.06	S	0.88	24	24
2886-SS-150923-01-20	0.923	S	0.743	11	11
2886-SS-150923-01-21	1.07	S	0.89	26	26
2886-SS-150923-01-22	0.888	S	0.708	6	6
2886-SS-150923-01-23	0.928	S	0.748	13	13
2886-SS-150923-01-24	0.78	S	0.6	1	1
2886-SS-150923-01-25	0.963	S	0.783	17	17
2886-SS-150923-01-26	0.884	S	0.704	5	5
2886-SS-150923-01-27	0.903	S	0.723	9	9
2886-SS-150923-01-28	0.813	S	0.633	4	4
2886-SS-150923-01-29	0.972	S	0.792	18	18
2886-SS-150923-01-30	0.959	S	0.779	16	16
2886-SS-150923-01-31	0.795	S	0.615	2	2
2886-SS-150923-01-32	0.935	S	0.755	14	14
			Sum =	2080	643.5

m 32  
n 32  
α 1.96  
Critical Value 1186

**Appendix B**  
**WRS Tests**

LBGR = 0.12

Prudent - Thorium-232					
Sample ID	Concentration (pCi/g)	Area	Adjusted Concentration	Ranks	Borrow Ranks
9574-SS-140910-01-01	1.15	R	1.15	55	0
9574-SS-140910-01-02	0.749	R	0.749	2	0
9574-SS-140910-01-03	0.936	R	0.936	22	0
9574-SS-140910-01-04	0.962	R	0.962	29	0
9574-SS-140910-01-05	0.948	R	0.948	25	0
9574-SS-140910-01-07	0.831	R	0.831	6	0
9574-SS-140910-01-08	0.979	R	0.979	33	0
9574-SS-140910-01-09	0.768	R	0.768	3	0
9574-SS-140910-01-10	1.16	R	1.16	56	0
9574-SS-140910-01-11	0.977	R	0.977	31	0
9574-SS-140910-01-12	1.14	R	1.14	54	0
9574-SS-140910-01-13	0.978	R	0.978	32	0
9574-SS-140910-01-14	0.889	R	0.889	17	0
9574-SS-140910-01-15	0.871	R	0.871	16	0
9574-SS-140910-01-16	1.07	R	1.07	49	0
9574-SS-140910-01-17	1.1	R	1.1	51.5	0
9574-SS-140910-01-18	1.19	R	1.19	58	0
9574-SS-140910-01-20	1.01	R	1.01	41.5	0
9574-SS-140910-01-21	0.982	R	0.982	35	0
9574-SS-140910-01-22	1.21	R	1.21	60	0
9574-SS-140910-01-23	1.37	R	1.37	62	0
9574-SS-140910-01-24	1.39	R	1.39	63.5	0
9574-SS-140910-01-25	0.99	R	0.99	36	0
9574-SS-140910-01-26	1.21	R	1.21	60	0
9574-SS-140910-01-27	1.05	R	1.05	46	0
9574-SS-140910-01-28	1.39	R	1.39	63.5	0
9574-SS-140910-01-29	0.955	R	0.955	27	0
9574-SS-140910-01-30	0.851	R	0.851	12	0
9574-SS-140910-01-31	1.1	R	1.1	51.5	0
9574-SS-140910-01-32	1.17	R	1.17	57	0
9574-SS-140910-01-33	0.954	R	0.954	26	0
9574-SS-140910-01-34	0.225	R	0.225	1	0
2886-SS-150923-01-01	1.19	S	1.07	47	47
2886-SS-150923-01-02	1.06	S	0.94	23.5	23.5
2886-SS-150923-01-03	0.949	S	0.829	5	5
2886-SS-150923-01-04	1.12	S	1	38	38
2886-SS-150923-01-05	1.23	S	1.11	53	53
2886-SS-150923-01-06	1.14	S	1.02	42	42
2886-SS-150923-01-07	1.09	S	0.97	30	30
2886-SS-150923-01-08	1.21	S	1.09	49.5	49.5
2886-SS-150923-01-09	1.12	S	1	38	38
2886-SS-150923-01-10	1.13	S	1.01	40.5	40.5
2886-SS-150923-01-11	1.33	S	1.21	60	60
2886-SS-150923-01-12	0.976	S	0.856	13	13
2886-SS-150923-01-13	1.01	S	0.89	18	18
2886-SS-150923-01-14	1.1	S	0.98	34	34
2886-SS-150923-01-15	1.12	S	1	38	38
2886-SS-150923-01-16	0.968	S	0.848	10.5	10.5
2886-SS-150923-01-17	1.21	S	1.09	49.5	49.5
2886-SS-150923-01-18	0.981	S	0.861	14	14
2886-SS-150923-01-19	1.17	S	1.05	44	44
2886-SS-150923-01-20	1.03	S	0.91	20	20
2886-SS-150923-01-21	1.17	S	1.05	44	44
2886-SS-150923-01-22	0.963	S	0.843	8	8
2886-SS-150923-01-23	1.06	S	0.94	23.5	23.5
2886-SS-150923-01-24	1.19	S	1.07	47	47
2886-SS-150923-01-25	0.987	S	0.867	15	15
2886-SS-150923-01-26	0.928	S	0.808	4	4
2886-SS-150923-01-27	1.02	S	0.9	19	19
2886-SS-150923-01-28	1.08	S	0.96	28	28
2886-SS-150923-01-29	0.955	S	0.835	7	7
2886-SS-150923-01-30	0.968	S	0.848	10.5	10.5
2886-SS-150923-01-31	1.05	S	0.93	21	21
2886-SS-150923-01-32	0.964	S	0.844	9	9
Sum =				2085	903.5

m 32  
n 32  
 $\alpha$  1.96  
Critical Value 1186

**Appendix B**  
**WRS Tests**

LBGR = 0.59

Prudent - Uranium-234					
Sample ID	Concentration (pCi/g)	Area	Adjusted Concentration	Ranks	Borrow Ranks
9574-SS-140910-01-01	0.671	R	0.671	47	0
9574-SS-140910-01-02	0.353	R	0.353	33	0
9574-SS-140910-01-03	0.518	R	0.518	41	0
9574-SS-140910-01-04	0.39	R	0.39	36	0
9574-SS-140910-01-05	0.345	R	0.345	32	0
9574-SS-140910-01-07	0.512	R	0.512	39	0
9574-SS-140910-01-08	0.832	R	0.832	56	0
9574-SS-140910-01-09	0.484	R	0.484	38	0
9574-SS-140910-01-10	0.571	R	0.571	42	0
9574-SS-140910-01-11	0.606	R	0.606	45	0
9574-SS-140910-01-12	0.747	R	0.747	52	0
9574-SS-140910-01-13	0.724	R	0.724	49	0
9574-SS-140910-01-14	0.705	R	0.705	48	0
9574-SS-140910-01-15	0.434	R	0.434	37	0
9574-SS-140910-01-16	0.513	R	0.513	40	0
9574-SS-140910-01-17	0.639	R	0.639	46	0
9574-SS-140910-01-18	0.808	R	0.808	54	0
9574-SS-140910-01-20	1.12	R	1.12	62	0
9574-SS-140910-01-21	1.04	R	1.04	60	0
9574-SS-140910-01-22	0.829	R	0.829	55	0
9574-SS-140910-01-23	1.14	R	1.14	63	0
9574-SS-140910-01-24	1.09	R	1.09	61	0
9574-SS-140910-01-25	0.887	R	0.887	59	0
9574-SS-140910-01-26	0.73	R	0.73	50	0
9574-SS-140910-01-27	1.16	R	1.16	64	0
9574-SS-140910-01-28	0.871	R	0.871	58	0
9574-SS-140910-01-29	0.842	R	0.842	57	0
9574-SS-140910-01-30	0.744	R	0.744	51	0
9574-SS-140910-01-31	0.572	R	0.572	43	0
9574-SS-140910-01-32	0.598	R	0.598	44	0
9574-SS-140910-01-33	0.772	R	0.772	53	0
9574-SS-140910-01-34	0.389	R	0.389	35	0
2886-SS-150923-01-01	0.54	S	-0.05	15	15
2886-SS-150923-01-02	0.473	S	-0.117	7	7
2886-SS-150923-01-03	0.562	S	-0.028	18.5	18.5
2886-SS-150923-01-04	0.387	S	-0.203	1	1
2886-SS-150923-01-05	0.652	S	0.062	28	28
2886-SS-150923-01-06	0.431	S	-0.159	3	3
2886-SS-150923-01-07	0.642	S	0.052	26	26
2886-SS-150923-01-08	0.452	S	-0.138	4	4
2886-SS-150923-01-09	0.562	S	-0.028	18.5	18.5
2886-SS-150923-01-10	0.427	S	-0.163	2	2
2886-SS-150923-01-11	0.684	S	0.094	30.5	30.5
2886-SS-150923-01-12	0.614	S	0.024	23	23
2886-SS-150923-01-13	0.523	S	-0.067	13	13
2886-SS-150923-01-14	0.513	S	-0.077	11.5	11.5
2886-SS-150923-01-15	0.684	S	0.094	30.5	30.5
2886-SS-150923-01-16	0.465	S	-0.125	6	6
2886-SS-150923-01-17	0.476	S	-0.114	8	8
2886-SS-150923-01-18	0.482	S	-0.108	9	9
2886-SS-150923-01-19	0.618	S	0.028	24	24
2886-SS-150923-01-20	0.529	S	-0.061	14	14
2886-SS-150923-01-21	0.456	S	-0.134	5	5
2886-SS-150923-01-22	0.587	S	-0.003	20.5	20.5
2886-SS-150923-01-23	0.594	S	0.004	22	22
2886-SS-150923-01-24	0.969	S	0.379	34	34
2886-SS-150923-01-25	0.587	S	-0.003	20.5	20.5
2886-SS-150923-01-26	0.509	S	-0.081	10	10
2886-SS-150923-01-27	0.651	S	0.061	27	27
2886-SS-150923-01-28	0.513	S	-0.077	11.5	11.5
2886-SS-150923-01-29	0.557	S	-0.033	16	16
2886-SS-150923-01-30	0.559	S	-0.031	17	17
2886-SS-150923-01-31	0.625	S	0.035	25	25
2886-SS-150923-01-32	0.666	S	0.076	29	29
Sum =				2080	530

m 32  
n 32  
 $\alpha$  1.96  
Critical Value 1186

## Appendix B WRS Tests

LBGR = 0.37

Prudent - Uranium-238					
Sample ID	Concentration (pCi/g)	Area	Adjusted Concentration	Ranks	Borrow Ranks
9574-SS-140910-01-01	0.724	R	0.724	47	0
9574-SS-140910-01-02	0.379	R	0.379	29	0
9574-SS-140910-01-03	0.723	R	0.723	46	0
9574-SS-140910-01-04	0.591	R	0.591	39	0
9574-SS-140910-01-05	0.421	R	0.421	33	0
9574-SS-140910-01-07	0.453	R	0.453	34	0
9574-SS-140910-01-08	0.632	R	0.632	42	0
9574-SS-140910-01-09	0.493	R	0.493	36	0
9574-SS-140910-01-10	0.757	R	0.757	50	0
9574-SS-140910-01-11	0.575	R	0.575	38	0
9574-SS-140910-01-12	0.997	R	0.997	64	0
9574-SS-140910-01-13	0.744	R	0.744	48	0
9574-SS-140910-01-14	0.607	R	0.607	41	0
9574-SS-140910-01-15	0.594	R	0.594	40	0
9574-SS-140910-01-16	0.835	R	0.835	55	0
9574-SS-140910-01-17	0.844	R	0.844	56	0
9574-SS-140910-01-18	0.745	R	0.745	49	0
9574-SS-140910-01-20	0.71	R	0.71	45	0
9574-SS-140910-01-21	0.705	R	0.705	43	0
9574-SS-140910-01-22	0.981	R	0.981	60	0
9574-SS-140910-01-23	0.994	R	0.994	63	0
9574-SS-140910-01-24	0.992	R	0.992	62	0
9574-SS-140910-01-25	0.959	R	0.959	59	0
9574-SS-140910-01-26	0.764	R	0.764	52	0
9574-SS-140910-01-27	0.956	R	0.956	58	0
9574-SS-140910-01-28	0.895	R	0.895	57	0
9574-SS-140910-01-29	0.708	R	0.708	44	0
9574-SS-140910-01-30	0.787	R	0.787	53	0
9574-SS-140910-01-31	0.986	R	0.986	61	0
9574-SS-140910-01-32	0.758	R	0.758	51	0
9574-SS-140910-01-33	0.828	R	0.828	54	0
9574-SS-140910-01-34	0.494	R	0.494	37	0
2886-SS-150923-01-01	0.673	S	0.303	22	22
2886-SS-150923-01-02	0.748	S	0.378	28	28
2886-SS-150923-01-03	0.563	S	0.193	8	8
2886-SS-150923-01-04	0.626	S	0.256	21	21
2886-SS-150923-01-05	0.538	S	0.168	6.5	6.5
2886-SS-150923-01-06	0.74	S	0.37	27	27
2886-SS-150923-01-07	0.594	S	0.224	15	15
2886-SS-150923-01-08	0.602	S	0.232	16	16
2886-SS-150923-01-09	0.718	S	0.348	26	26
2886-SS-150923-01-10	0.689	S	0.319	24	24
2886-SS-150923-01-11	0.538	S	0.168	6.5	6.5
2886-SS-150923-01-12	0.592	S	0.222	14	14
2886-SS-150923-01-13	0.763	S	0.393	31	31
2886-SS-150923-01-14	0.606	S	0.236	17	17
2886-SS-150923-01-15	0.395	S	0.025	2	2
2886-SS-150923-01-16	0.588	S	0.218	12	12
2886-SS-150923-01-17	0.612	S	0.242	18	18
2886-SS-150923-01-18	0.589	S	0.219	13	13
2886-SS-150923-01-19	0.768	S	0.398	32	32
2886-SS-150923-01-20	0.439	S	0.069	3	3
2886-SS-150923-01-21	0.624	S	0.254	19	19
2886-SS-150923-01-22	0.828	S	0.458	35	35
2886-SS-150923-01-23	0.579	S	0.209	11	11
2886-SS-150923-01-24	0.758	S	0.388	30	30
2886-SS-150923-01-25	0.389	S	0.019	1	1
2886-SS-150923-01-26	0.565	S	0.195	10	10
2886-SS-150923-01-27	0.509	S	0.139	5	5
2886-SS-150923-01-28	0.688	S	0.318	23	23
2886-SS-150923-01-29	0.564	S	0.194	9	9
2886-SS-150923-01-30	0.625	S	0.255	20	20
2886-SS-150923-01-31	0.702	S	0.332	25	25
2886-SS-150923-01-32	0.446	S	0.076	4	4
			Sum =	2080	534

m 32  
n 32  
 $\alpha$  1.96  
Critical Value 1186

### Appendix C Quantile Tests

Horine - Radium-226				
Sample ID	Concentration (pCi/g)	Area	Adjusted Concentration	Ranks
9498-RU-140903-41-02	0.721 S		0.541	1
9574-SS-140910-01-34	0.618 R		0.618	2
9498-RU-140903-61-02	0.846 S		0.666	3
9498-RU-140903-42-02	0.862 S		0.682	4
9574-SS-140910-01-02	0.719 R		0.719	5
9498-RU-140903-51-02	0.929 S		0.749	6
9498-RU-140903-44-01	0.931 S		0.751	7
9498-RU-140903-44-02	0.946 S		0.766	8
9498-RU-140903-43-02	0.948 S		0.768	9
9498-RU-140903-71-02	0.964 S		0.784	10
9574-SS-140910-01-15	0.805 R		0.805	11
9498-RU-140903-82-02	0.988 S		0.808	12
9498-RU-140903-43-01	0.99 S		0.81	13
9498-RU-140903-81-01	1.02 S		0.84	14
9498-RU-140903-42-01	1.03 S		0.85	15
9574-SS-140910-01-07	0.858 R		0.858	16
9498-RU-140903-92-02	1.04 S		0.86	17
9498-RU-140903-82-01	1.05 S		0.87	18.5
9498-RU-140903-91-02	1.05 S		0.87	18.5
9498-RU-140903-71-01	1.07 S		0.89	20
9498-RU-140903-51-01	1.08 S		0.9	22
9498-RU-140903-52-01	1.08 S		0.9	22
9498-RU-140903-62-02	1.08 S		0.9	22
9498-RU-140903-52-02	1.09 S		0.91	24
9498-RU-140903-31-01	1.1 S		0.92	25
9574-SS-140910-01-22	0.922 R		0.922	26
9498-RU-140903-63-02	1.13 S		0.95	27
9574-SS-140910-01-30	0.96 R		0.96	29
9498-RU-140903-32-02	1.14 S		0.96	29
9498-RU-140903-92-01	1.14 S		0.96	29
9498-RU-140903-31-02	1.15 S		0.97	31.5
9498-RU-140903-91-01	1.15 S		0.97	31.5
9574-SS-140910-01-11	0.972 R		0.972	33
9498-RU-140903-63-01	1.17 S		0.99	34
9574-SS-140910-01-05	0.995 R		0.995	35
9498-RU-140903-61-01	1.18 S		1	36
9574-SS-140910-01-04	1.01 R		1.01	37
9574-SS-140910-01-13	1.02 R		1.02	38
9574-SS-140910-01-08	1.03 R		1.03	39.5
9574-SS-140910-01-33	1.03 R		1.03	39.5
9574-SS-140910-01-03	1.04 R		1.04	41.5
9498-RU-140903-41-01	1.22 S		1.04	41.5
9574-SS-140910-01-14	1.05 R		1.05	43.5
9498-RU-140903-32-01	1.23 S		1.05	43.5
9574-SS-140910-01-31	1.06 R		1.06	45.5
9574-SS-140910-01-32	1.06 R		1.06	45.5
9574-SS-140910-01-21	1.07 R		1.07	47
9574-SS-140910-01-09	1.08 R		1.08	49
9574-SS-140910-01-26	1.08 R		1.08	49
9574-SS-140910-01-29	1.08 R		1.08	49
9498-RU-140903-62-01	1.27 S		1.09	51
9574-SS-140910-01-23	1.13 R		1.13	52
9574-SS-140910-01-01	1.15 R		1.15	53
9574-SS-140910-01-10	1.17 R		1.17	54
9574-SS-140910-01-17	1.19 R		1.19	55
9574-SS-140910-01-24	1.2 R		1.2	56
9574-SS-140910-01-12	1.22 R		1.22	57
9574-SS-140910-01-25	1.23 R		1.23	58
9574-SS-140910-01-20	1.26 R		1.26	59
9574-SS-140910-01-28	1.28 R		1.28	60
9574-SS-140910-01-27	1.31 R		1.31	61
9574-SS-140910-01-16	1.32 R		1.32	62
9574-SS-140910-01-18	1.34 R		1.34	63

**Appendix C**  
**Quantile Tests**

Horine - Thorium-232				
Sample ID	Concentration (pCi/g)	Area	Adjusted Concentration	Ranks
9574-SS-140910-01-34	0.225 R		0.225	1
9498-RU-140903-41-02	0.788 S		0.668	2
9498-RU-140903-51-01	0.812 S		0.692	3
9574-SS-140910-01-02	0.749 R		0.749	4
9574-SS-140910-01-09	0.768 R		0.768	5
9498-RU-140903-32-01	0.932 S		0.812	6
9574-SS-140910-01-07	0.831 R		0.831	7
9574-SS-140910-01-30	0.851 R		0.851	8
9574-SS-140910-01-15	0.871 R		0.871	9
9574-SS-140910-01-14	0.889 R		0.889	10
9498-RU-140903-42-02	1.04 S		0.92	11
9574-SS-140910-01-03	0.936 R		0.936	12
9574-SS-140910-01-05	0.948 R		0.948	13
9574-SS-140910-01-33	0.954 R		0.954	14
9574-SS-140910-01-29	0.955 R		0.955	15
9574-SS-140910-01-04	0.962 R		0.962	16
9498-RU-140903-31-01	1.09 S		0.97	17
9574-SS-140910-01-11	0.977 R		0.977	18
9574-SS-140910-01-13	0.978 R		0.978	19
9574-SS-140910-01-08	0.979 R		0.979	20
9574-SS-140910-01-21	0.982 R		0.982	21
9574-SS-140910-01-25	0.99 R		0.99	22
9498-RU-140903-32-02	1.12 S		1	23
9498-RU-140903-63-02	1.13 S		1.01	24.5
9574-SS-140910-01-20	1.01 R		1.01	25.5
9498-RU-140903-44-02	1.14 S		1.02	26.5
9498-RU-140903-62-02	1.14 S		1.02	26.5
9498-RU-140903-82-01	1.17 S		1.05	28.5
9574-SS-140910-01-27	1.05 R		1.05	29.5
9498-RU-140903-51-02	1.18 S		1.06	30
9498-RU-140903-52-02	1.19 S		1.07	32
9498-RU-140903-62-01	1.19 S		1.07	32
9574-SS-140910-01-16	1.07 R		1.07	34
9498-RU-140903-71-01	1.2 S		1.08	34
9498-RU-140903-61-01	1.21 S		1.09	36
9498-RU-140903-82-02	1.21 S		1.09	36
9498-RU-140903-92-02	1.21 S		1.09	36
9574-SS-140910-01-17	1.1 R		1.1	39.5
9574-SS-140910-01-31	1.1 R		1.1	39.5
9498-RU-140903-43-02	1.22 S		1.1	39.5
9498-RU-140903-44-01	1.22 S		1.1	39.5
9498-RU-140903-71-02	1.23 S		1.11	43
9498-RU-140903-91-02	1.23 S		1.11	43
9498-RU-140903-92-01	1.23 S		1.11	43
9574-SS-140910-01-12	1.14 R		1.14	47
9498-RU-140903-43-01	1.26 S		1.14	48
9498-RU-140903-61-02	1.26 S		1.14	48
9498-RU-140903-63-01	1.26 S		1.14	48
9498-RU-140903-81-01	1.26 S		1.14	48
9574-SS-140910-01-01	1.15 R		1.15	50.5
9498-RU-140903-52-01	1.27 S		1.15	50.5
9574-SS-140910-01-10	1.16 R		1.16	52
9574-SS-140910-01-32	1.17 R		1.17	53
9574-SS-140910-01-18	1.19 R		1.19	55.5
9498-RU-140903-31-02	1.31 S		1.19	55.5
9498-RU-140903-41-01	1.31 S		1.19	55.5
9498-RU-140903-42-01	1.31 S		1.19	55.5
9574-SS-140910-01-22	1.21 R		1.21	58.5
9574-SS-140910-01-26	1.21 R		1.21	58.5
9498-RU-140903-91-01	1.34 S		1.22	60
9574-SS-140910-01-23	1.37 R		1.37	61
9574-SS-140910-01-24	1.39 R		1.39	62.5
9574-SS-140910-01-28	1.39 R		1.39	62.5

**Appendix C**  
**Quantile Tests**

Horine - Uranium-234				
Sample ID	Concentration (pCi/g)	Area	Adjusted Concentration	Ranks
9498-RU-140903-92-02	0.389 S		-0.201	1
9498-RU-140903-41-02	0.408 S		-0.182	2
9498-RU-140903-81-01	0.426 S		-0.164	3
9498-RU-140903-44-01	0.432 S		-0.158	4
9498-RU-140903-51-02	0.434 S		-0.156	5
9498-RU-140903-43-01	0.481 S		-0.109	6
9498-RU-140903-31-01	0.498 S		-0.092	7
9498-RU-140903-82-02	0.5 S		-0.09	8
9498-RU-140903-42-01	0.504 S		-0.086	9
9498-RU-140903-42-02	0.508 S		-0.082	10.5
9498-RU-140903-71-02	0.508 S		-0.082	10.5
9498-RU-140903-61-01	0.538 S		-0.052	12
9498-RU-140903-31-02	0.539 S		-0.051	13
9498-RU-140903-61-02	0.547 S		-0.043	14
9498-RU-140903-52-01	0.554 S		-0.036	15
9498-RU-140903-43-02	0.577 S		-0.013	16.5
9498-RU-140903-62-01	0.577 S		-0.013	16.5
9498-RU-140903-51-01	0.585 S		-0.005	18
9498-RU-140903-41-01	0.59 S		0	19
9498-RU-140903-44-02	0.596 S		0.006	20
9498-RU-140903-52-02	0.606 S		0.016	21
9498-RU-140903-91-02	0.643 S		0.053	22
9498-RU-140903-82-01	0.687 S		0.097	23
9498-RU-140903-63-02	0.69 S		0.1	24
9498-RU-140903-92-01	0.713 S		0.123	25
9498-RU-140903-32-01	0.746 S		0.156	26
9498-RU-140903-91-01	0.754 S		0.164	27
9498-RU-140903-62-02	0.773 S		0.183	28
9498-RU-140903-63-01	0.788 S		0.198	29
9498-RU-140903-32-02	0.82 S		0.23	30
9574-SS-140910-01-05	0.345 R		0.345	31
9574-SS-140910-01-02	0.353 R		0.353	32
9574-SS-140910-01-34	0.389 R		0.389	33
9574-SS-140910-01-04	0.39 R		0.39	34
9574-SS-140910-01-15	0.434 R		0.434	35
9574-SS-140910-01-09	0.484 R		0.484	36
9574-SS-140910-01-07	0.512 R		0.512	37
9574-SS-140910-01-16	0.513 R		0.513	38
9574-SS-140910-01-03	0.518 R		0.518	39
9574-SS-140910-01-10	0.571 R		0.571	40
9574-SS-140910-01-31	0.572 R		0.572	41
9574-SS-140910-01-32	0.598 R		0.598	42
9574-SS-140910-01-11	0.606 R		0.606	43
9574-SS-140910-01-17	0.639 R		0.639	44
9574-SS-140910-01-01	0.671 R		0.671	45
9574-SS-140910-01-14	0.705 R		0.705	46
9574-SS-140910-01-13	0.724 R		0.724	47
9574-SS-140910-01-26	0.73 R		0.73	48
9574-SS-140910-01-30	0.744 R		0.744	49
9574-SS-140910-01-12	0.747 R		0.747	50
9574-SS-140910-01-33	0.772 R		0.772	51
9574-SS-140910-01-18	0.808 R		0.808	52
9574-SS-140910-01-22	0.829 R		0.829	53
9574-SS-140910-01-08	0.832 R		0.832	54
9574-SS-140910-01-29	0.842 R		0.842	55
9574-SS-140910-01-28	0.871 R		0.871	56
9574-SS-140910-01-25	0.887 R		0.887	57
9498-RU-140903-71-01	1.52 S		0.93	58
9574-SS-140910-01-21	1.04 R		1.04	59
9574-SS-140910-01-24	1.09 R		1.09	60
9574-SS-140910-01-20	1.12 R		1.12	61
9574-SS-140910-01-23	1.14 R		1.14	62
9574-SS-140910-01-27	1.16 R		1.16	63



**Appendix C**  
**Quantile Tests**

Horine - Uranium-238				
Sample ID	Concentration (pCi/g)	Area	Adjusted Concentration	Ranks
9498-RU-140903-81-01	0.354 S		-0.016	1
9498-RU-140903-41-01	0.446 S		0.076	2
9498-RU-140903-61-02	0.47 S		0.1	3
9498-RU-140903-51-02	0.472 S		0.102	4.5
9498-RU-140903-82-02	0.472 S		0.102	4.5
9498-RU-140903-44-02	0.48 S		0.11	6
9498-RU-140903-82-01	0.499 S		0.129	7
9498-RU-140903-42-02	0.505 S		0.135	8
9498-RU-140903-31-01	0.518 S		0.148	9
9498-RU-140903-92-02	0.55 S		0.18	10
9498-RU-140903-42-01	0.557 S		0.187	11
9498-RU-140903-43-01	0.561 S		0.191	12
9498-RU-140903-31-02	0.573 S		0.203	13
9498-RU-140903-61-01	0.583 S		0.213	14
9498-RU-140903-44-01	0.601 S		0.231	15.5
9498-RU-140903-52-01	0.601 S		0.231	15.5
9498-RU-140903-71-02	0.605 S		0.235	17
9498-RU-140903-41-02	0.61 S		0.24	18
9498-RU-140903-91-01	0.619 S		0.249	19
9498-RU-140903-52-02	0.646 S		0.276	20
9498-RU-140903-43-02	0.703 S		0.333	21
9498-RU-140903-62-01	0.731 S		0.361	22
9498-RU-140903-32-01	0.739 S		0.369	23
9574-SS-140910-01-02	0.379 R		0.379	24
9498-RU-140903-62-02	0.757 S		0.387	25
9498-RU-140903-63-01	0.76 S		0.39	26
9498-RU-140903-91-02	0.776 S		0.406	27
9574-SS-140910-01-05	0.421 R		0.421	28
9498-RU-140903-32-02	0.796 S		0.426	29.5
9498-RU-140903-51-01	0.796 S		0.426	29.5
9574-SS-140910-01-07	0.453 R		0.453	31
9498-RU-140903-92-01	0.844 S		0.474	32
9574-SS-140910-01-09	0.493 R		0.493	33
9574-SS-140910-01-34	0.494 R		0.494	34
9498-RU-140903-63-02	0.922 S		0.552	35
9574-SS-140910-01-11	0.575 R		0.575	36
9574-SS-140910-01-04	0.591 R		0.591	37
9574-SS-140910-01-15	0.594 R		0.594	38
9574-SS-140910-01-14	0.607 R		0.607	39
9574-SS-140910-01-08	0.632 R		0.632	40
9574-SS-140910-01-21	0.705 R		0.705	41
9574-SS-140910-01-29	0.708 R		0.708	42
9574-SS-140910-01-20	0.71 R		0.71	43
9574-SS-140910-01-03	0.723 R		0.723	44
9574-SS-140910-01-01	0.724 R		0.724	45
9574-SS-140910-01-13	0.744 R		0.744	46
9574-SS-140910-01-18	0.745 R		0.745	47
9574-SS-140910-01-10	0.757 R		0.757	48
9574-SS-140910-01-32	0.758 R		0.758	49
9574-SS-140910-01-26	0.764 R		0.764	50
9574-SS-140910-01-30	0.787 R		0.787	51
9574-SS-140910-01-33	0.828 R		0.828	52
9574-SS-140910-01-16	0.835 R		0.835	53
9574-SS-140910-01-17	0.844 R		0.844	54
9574-SS-140910-01-28	0.895 R		0.895	55
9574-SS-140910-01-27	0.956 R		0.956	56
9574-SS-140910-01-25	0.959 R		0.959	57
9574-SS-140910-01-22	0.981 R		0.981	58
9574-SS-140910-01-31	0.986 R		0.986	59
9574-SS-140910-01-24	0.992 R		0.992	60
9574-SS-140910-01-23	0.994 R		0.994	61
9574-SS-140910-01-12	0.997 R		0.997	62
9498-RU-140903-71-01	1.8 S		1.43	63

**Appendix C**  
**Quantile Tests**

Husky - Radium-226				
Sample ID	Concentration (pCi/g)	Area	Adjusted Concentration	Ranks
0411-SS-141210-00-17	0.531 S		0.351	1
0411-SS-141210-00-16	0.543 S		0.363	2
0411-SS-141210-00-18	0.591 S		0.411	3
0411-SS-141210-00-10	0.743 S		0.563	4
0411-SS-141210-00-12	0.797 S		0.617	5
9574-SS-140910-01-34	0.618 R		0.618	6
9574-SS-140910-01-02	0.719 R		0.719	7
0411-SS-141210-00-20	0.973 S		0.793	8
9574-SS-140910-01-15	0.805 R		0.805	9
0411-SS-141210-00-13	0.988 S		0.808	10.5
0411-SS-141210-00-19	0.988 S		0.808	10.5
0411-SS-141210-00-04	0.99 S		0.81	12
0411-SS-141210-00-02	0.991 S		0.811	13
9574-SS-140910-01-07	0.858 R		0.858	14
0411-SS-141210-00-14	1.05 S		0.87	15
0411-SS-141210-00-05	1.08 S		0.9	16
9574-SS-140910-01-22	0.922 R		0.922	17
0411-SS-141210-00-03	1.11 S		0.93	19.5
0411-SS-141210-00-08	1.11 S		0.93	19.5
0411-SS-141210-00-09	1.11 S		0.93	19.5
0411-SS-141210-00-11	1.11 S		0.93	19.5
0411-SS-141210-00-07	1.13 S		0.95	22
9574-SS-140910-01-30	0.96 R		0.96	23
9574-SS-140910-01-11	0.972 R		0.972	24
0411-SS-141210-00-01	1.165 S		0.985	25
0411-SS-141210-00-15	1.17 S		0.99	26
9574-SS-140910-01-05	0.995 R		0.995	27
9574-SS-140910-01-04	1.01 R		1.01	28
9574-SS-140910-01-13	1.02 R		1.02	29
9574-SS-140910-01-08	1.03 R		1.03	30.5
9574-SS-140910-01-33	1.03 R		1.03	30.5
9574-SS-140910-01-03	1.04 R		1.04	32
9574-SS-140910-01-14	1.05 R		1.05	33
9574-SS-140910-01-31	1.06 R		1.06	34.5
9574-SS-140910-01-32	1.06 R		1.06	34.5
9574-SS-140910-01-21	1.07 R		1.07	36
9574-SS-140910-01-09	1.08 R		1.08	38
9574-SS-140910-01-26	1.08 R		1.08	38
9574-SS-140910-01-29	1.08 R		1.08	38
0411-SS-141210-00-06	1.3 S		1.12	40
9574-SS-140910-01-23	1.13 R		1.13	41
9574-SS-140910-01-01	1.15 R		1.15	42
9574-SS-140910-01-10	1.17 R		1.17	43
9574-SS-140910-01-17	1.19 R		1.19	44
9574-SS-140910-01-24	1.2 R		1.2	45
9574-SS-140910-01-12	1.22 R		1.22	46
9574-SS-140910-01-25	1.23 R		1.23	47
9574-SS-140910-01-20	1.26 R		1.26	48
9574-SS-140910-01-28	1.28 R		1.28	49
9574-SS-140910-01-27	1.31 R		1.31	50
9574-SS-140910-01-16	1.32 R		1.32	51
9574-SS-140910-01-18	1.34 R		1.34	52

### Appendix C Quantile Tests

Husky - Thorium-232				
Sample ID	Concentration (pCi/g)	Area	Adjusted Concentration	Ranks
0411-SS-141210-00-18	0.253 S		0.133	1
0411-SS-141210-00-17	0.307 S		0.187	2
0411-SS-141210-00-16	0.326 S		0.206	3
9574-SS-140910-01-34	0.225 R		0.225	4
0411-SS-141210-00-10	0.563 S		0.443	5
0411-SS-141210-00-12	0.723 S		0.603	6
0411-SS-141210-00-20	0.794 S		0.674	7
9574-SS-140910-01-02	0.749 R		0.749	8
0411-SS-141210-00-02	0.883 S		0.763	9
9574-SS-140910-01-09	0.768 R		0.768	10
0411-SS-141210-00-04	0.921 S		0.801	11
0411-SS-141210-00-09	0.929 S		0.809	12
0411-SS-141210-00-05	0.939 S		0.819	13
0411-SS-141210-00-14	0.943 S		0.823	14
0411-SS-141210-00-13	0.945 S		0.825	15
0411-SS-141210-00-19	0.948 S		0.828	16
9574-SS-140910-01-07	0.831 R		0.831	17
9574-SS-140910-01-30	0.851 R		0.851	18
9574-SS-140910-01-15	0.871 R		0.871	19
9574-SS-140910-01-14	0.889 R		0.889	20
0411-SS-141210-00-15	1.03 S		0.91	21
0411-SS-141210-00-03	1.05 S		0.93	22.5
0411-SS-141210-00-08	1.05 S		0.93	22.5
9574-SS-140910-01-03	0.936 R		0.936	24
9574-SS-140910-01-05	0.948 R		0.948	25
0411-SS-141210-00-11	1.07 S		0.95	26
9574-SS-140910-01-33	0.954 R		0.954	27
9574-SS-140910-01-29	0.955 R		0.955	28
9574-SS-140910-01-04	0.962 R		0.962	29
0411-SS-141210-00-07	1.09 S		0.97	30
9574-SS-140910-01-11	0.977 R		0.977	31
9574-SS-140910-01-13	0.978 R		0.978	32
9574-SS-140910-01-08	0.979 R		0.979	33
9574-SS-140910-01-21	0.982 R		0.982	34
9574-SS-140910-01-25	0.99 R		0.99	35
9574-SS-140910-01-20	1.01 R		1.01	36
0411-SS-141210-00-01	1.131 S		1.011	37
0411-SS-141210-00-06	1.15 S		1.03	38
9574-SS-140910-01-27	1.05 R		1.05	39
9574-SS-140910-01-16	1.07 R		1.07	40
9574-SS-140910-01-17	1.1 R		1.1	41.5
9574-SS-140910-01-31	1.1 R		1.1	41.5
9574-SS-140910-01-12	1.14 R		1.14	43
9574-SS-140910-01-01	1.15 R		1.15	44
9574-SS-140910-01-10	1.16 R		1.16	45
9574-SS-140910-01-32	1.17 R		1.17	46
9574-SS-140910-01-18	1.19 R		1.19	47
9574-SS-140910-01-22	1.21 R		1.21	48.5
9574-SS-140910-01-26	1.21 R		1.21	48.5
9574-SS-140910-01-23	1.37 R		1.37	50
9574-SS-140910-01-24	1.39 R		1.39	51.5
9574-SS-140910-01-28	1.39 R		1.39	51.5

### Appendix C Quantile Tests

Husky - Uranium-234				
Sample ID	Concentration (pCi/g)	Area	Adjusted Concentration	Ranks
0411-SS-141210-00-18	0.558 S		-0.032	1
0411-SS-141210-00-07	0.598 S		0.008	2.5
0411-SS-141210-00-17	0.598 S		0.008	2.5
0411-SS-141210-00-06	0.618 S		0.028	4
0411-SS-141210-00-20	0.62 S		0.03	5
0411-SS-141210-00-09	0.651 S		0.061	6.5
0411-SS-141210-00-16	0.651 S		0.061	6.5
0411-SS-141210-00-13	0.654 S		0.064	8
0411-SS-141210-00-10	0.681 S		0.091	9
0411-SS-141210-00-02	0.683 S		0.093	10
0411-SS-141210-00-14	0.7 S		0.11	11
0411-SS-141210-00-12	0.709 S		0.119	12
0411-SS-141210-00-08	0.713 S		0.123	13
0411-SS-141210-00-03	0.724 S		0.134	14
0411-SS-141210-00-19	0.747 S		0.157	15
0411-SS-141210-00-04	0.753 S		0.163	16
0411-SS-141210-00-05	0.763 S		0.173	17
0411-SS-141210-00-01	0.838 S		0.248	18
0411-SS-141210-00-15	0.872 S		0.282	19
9574-SS-140910-01-05	0.345 R		0.345	20
9574-SS-140910-01-02	0.353 R		0.353	21
9574-SS-140910-01-34	0.389 R		0.389	22
9574-SS-140910-01-04	0.39 R		0.39	23
0411-SS-141210-00-11	0.986 S		0.396	24
9574-SS-140910-01-15	0.434 R		0.434	25
9574-SS-140910-01-09	0.484 R		0.484	26
9574-SS-140910-01-07	0.512 R		0.512	27
9574-SS-140910-01-16	0.513 R		0.513	28
9574-SS-140910-01-03	0.518 R		0.518	29
9574-SS-140910-01-10	0.571 R		0.571	30
9574-SS-140910-01-31	0.572 R		0.572	31
9574-SS-140910-01-32	0.598 R		0.598	32
9574-SS-140910-01-11	0.606 R		0.606	33
9574-SS-140910-01-17	0.639 R		0.639	34
9574-SS-140910-01-01	0.671 R		0.671	35
9574-SS-140910-01-14	0.705 R		0.705	36
9574-SS-140910-01-13	0.724 R		0.724	37
9574-SS-140910-01-26	0.73 R		0.73	38
9574-SS-140910-01-30	0.744 R		0.744	39
9574-SS-140910-01-12	0.747 R		0.747	40
9574-SS-140910-01-33	0.772 R		0.772	41
9574-SS-140910-01-18	0.808 R		0.808	42
9574-SS-140910-01-22	0.829 R		0.829	43
9574-SS-140910-01-08	0.832 R		0.832	44
9574-SS-140910-01-29	0.842 R		0.842	45
9574-SS-140910-01-28	0.871 R		0.871	46
9574-SS-140910-01-25	0.887 R		0.887	47
9574-SS-140910-01-21	1.04 R		1.04	48
9574-SS-140910-01-24	1.09 R		1.09	49
9574-SS-140910-01-20	1.12 R		1.12	50
9574-SS-140910-01-23	1.14 R		1.14	51
9574-SS-140910-01-27	1.16 R		1.16	52

**Appendix C**  
**Quantile Tests**

Husky - Uranium-238				
Sample ID	Concentration (pCi/g)	Area	Adjusted Concentration	Ranks
0411-SS-141210-00-18	0.426 S		0.056	1
0411-SS-141210-00-17	0.478 S		0.108	2
0411-SS-141210-00-16	0.573 S		0.203	3
0411-SS-141210-00-12	0.581 S		0.211	4
0411-SS-141210-00-10	0.624 S		0.254	5
0411-SS-141210-00-14	0.637 S		0.267	6
0411-SS-141210-00-20	0.662 S		0.292	7
0411-SS-141210-00-01	0.697 S		0.327	8
0411-SS-141210-00-19	0.707 S		0.337	9
0411-SS-141210-00-08	0.714 S		0.344	10
0411-SS-141210-00-11	0.728 S		0.358	11.5
0411-SS-141210-00-15	0.728 S		0.358	11.5
0411-SS-141210-00-09	0.73 S		0.36	13
0411-SS-141210-00-02	0.735 S		0.365	14
0411-SS-141210-00-07	0.738 S		0.368	15
0411-SS-141210-00-06	0.74 S		0.37	16
9574-SS-140910-01-02	0.379 R		0.379	17
0411-SS-141210-00-05	0.756 S		0.386	18
0411-SS-141210-00-03	0.785 S		0.415	19
9574-SS-140910-01-05	0.421 R		0.421	20
0411-SS-141210-00-04	0.812 S		0.442	21
9574-SS-140910-01-07	0.453 R		0.453	22
0411-SS-141210-00-13	0.838 S		0.468	23
9574-SS-140910-01-09	0.493 R		0.493	24
9574-SS-140910-01-34	0.494 R		0.494	25
9574-SS-140910-01-11	0.575 R		0.575	26
9574-SS-140910-01-04	0.591 R		0.591	27
9574-SS-140910-01-15	0.594 R		0.594	28
9574-SS-140910-01-14	0.607 R		0.607	29
9574-SS-140910-01-08	0.632 R		0.632	30
9574-SS-140910-01-21	0.705 R		0.705	31
9574-SS-140910-01-29	0.708 R		0.708	32
9574-SS-140910-01-20	0.71 R		0.71	33
9574-SS-140910-01-03	0.723 R		0.723	34
9574-SS-140910-01-01	0.724 R		0.724	35
9574-SS-140910-01-13	0.744 R		0.744	36
9574-SS-140910-01-18	0.745 R		0.745	37
9574-SS-140910-01-10	0.757 R		0.757	38
9574-SS-140910-01-32	0.758 R		0.758	39
9574-SS-140910-01-26	0.764 R		0.764	40
9574-SS-140910-01-30	0.787 R		0.787	41
9574-SS-140910-01-33	0.828 R		0.828	42
9574-SS-140910-01-16	0.835 R		0.835	43
9574-SS-140910-01-17	0.844 R		0.844	44
9574-SS-140910-01-28	0.895 R		0.895	45
9574-SS-140910-01-27	0.956 R		0.956	46
9574-SS-140910-01-25	0.959 R		0.959	47
9574-SS-140910-01-22	0.981 R		0.981	48
9574-SS-140910-01-31	0.986 R		0.986	49
9574-SS-140910-01-24	0.992 R		0.992	50
9574-SS-140910-01-23	0.994 R		0.994	51
9574-SS-140910-01-12	0.997 R		0.997	52

### Appendix C Quantile Tests

Prudent - Radium-226				
Sample ID	Concentration (pCi/g)	Area	Adjusted Concentration	Ranks
2886-SS-150923-01-24	0.78 S		0.6	1
2886-SS-150923-01-31	0.795 S		0.615	2
9574-SS-140910-01-34	0.618 R		0.618	3
2886-SS-150923-01-28	0.813 S		0.633	4
2886-SS-150923-01-26	0.884 S		0.704	5
2886-SS-150923-01-22	0.888 S		0.708	6
9574-SS-140910-01-02	0.719 R		0.719	7
2886-SS-150923-01-06	0.9 S		0.72	8
2886-SS-150923-01-27	0.903 S		0.723	9
2886-SS-150923-01-09	0.921 S		0.741	10
2886-SS-150923-01-20	0.923 S		0.743	11
2886-SS-150923-01-02	0.924 S		0.744	12
2886-SS-150923-01-23	0.928 S		0.748	13
2886-SS-150923-01-32	0.935 S		0.755	14
2886-SS-150923-01-15	0.957 S		0.777	15
2886-SS-150923-01-30	0.959 S		0.779	16
2886-SS-150923-01-25	0.963 S		0.783	17
2886-SS-150923-01-29	0.972 S		0.792	18
9574-SS-140910-01-15	0.805 R		0.805	19
2886-SS-150923-01-01	0.987 S		0.807	20
2886-SS-150923-01-12	1.01 S		0.83	21
9574-SS-140910-01-07	0.858 R		0.858	22
2886-SS-150923-01-13	1.06 S		0.88	24
2886-SS-150923-01-18	1.06 S		0.88	24
2886-SS-150923-01-19	1.06 S		0.88	24
2886-SS-150923-01-21	1.07 S		0.89	26
2886-SS-150923-01-14	1.08 S		0.9	27
2886-SS-150923-01-04	1.1 S		0.92	28
9574-SS-140910-01-22	0.922 R		0.922	29
2886-SS-150923-01-07	1.11 S		0.93	30
2886-SS-150923-01-03	1.13 S		0.95	31
9574-SS-140910-01-30	0.96 R		0.96	32
2886-SS-150923-01-10	1.15 S		0.97	33
9574-SS-140910-01-11	0.972 R		0.972	34
2886-SS-150923-01-05	1.17 S		0.99	36
2886-SS-150923-01-11	1.17 S		0.99	36
2886-SS-150923-01-17	1.17 S		0.99	36
9574-SS-140910-01-05	0.995 R		0.995	38
9574-SS-140910-01-04	1.01 R		1.01	39.5
2886-SS-150923-01-16	1.19 S		1.01	39.5
9574-SS-140910-01-13	1.02 R		1.02	41
9574-SS-140910-01-08	1.03 R		1.03	42.5
9574-SS-140910-01-33	1.03 R		1.03	42.5
9574-SS-140910-01-03	1.04 R		1.04	44
9574-SS-140910-01-14	1.05 R		1.05	45
9574-SS-140910-01-31	1.06 R		1.06	47
9574-SS-140910-01-32	1.06 R		1.06	47
2886-SS-150923-01-08	1.24 S		1.06	47
9574-SS-140910-01-21	1.07 R		1.07	49
9574-SS-140910-01-09	1.08 R		1.08	51
9574-SS-140910-01-26	1.08 R		1.08	51
9574-SS-140910-01-29	1.08 R		1.08	51
9574-SS-140910-01-23	1.13 R		1.13	53
9574-SS-140910-01-01	1.15 R		1.15	54
9574-SS-140910-01-10	1.17 R		1.17	55
9574-SS-140910-01-17	1.19 R		1.19	56
9574-SS-140910-01-24	1.2 R		1.2	57
9574-SS-140910-01-12	1.22 R		1.22	58
9574-SS-140910-01-25	1.23 R		1.23	59
9574-SS-140910-01-20	1.26 R		1.26	60
9574-SS-140910-01-28	1.28 R		1.28	61
9574-SS-140910-01-27	1.31 R		1.31	62
9574-SS-140910-01-16	1.32 R		1.32	63
9574-SS-140910-01-18	1.34 R		1.34	64

### Appendix C Quantile Tests

Prudent - Thorium-232				
Sample ID	Concentration (pCi/g)	Area	Adjusted Concentration	Ranks
9574-SS-140910-01-34	0.225 R		0.225	1
9574-SS-140910-01-02	0.749 R		0.749	2
9574-SS-140910-01-09	0.768 R		0.768	3
2886-SS-150923-01-26	0.928 S		0.808	4
2886-SS-150923-01-03	0.949 S		0.829	5
9574-SS-140910-01-07	0.831 R		0.831	6
2886-SS-150923-01-29	0.955 S		0.835	7
2886-SS-150923-01-22	0.963 S		0.843	8
2886-SS-150923-01-32	0.964 S		0.844	9
2886-SS-150923-01-16	0.968 S		0.848	10.5
2886-SS-150923-01-30	0.968 S		0.848	10.5
9574-SS-140910-01-30	0.851 R		0.851	12
2886-SS-150923-01-12	0.976 S		0.856	13
2886-SS-150923-01-18	0.981 S		0.861	14
2886-SS-150923-01-25	0.987 S		0.867	15
9574-SS-140910-01-15	0.871 R		0.871	16
9574-SS-140910-01-14	0.889 R		0.889	17
2886-SS-150923-01-13	1.01 S		0.89	18
2886-SS-150923-01-27	1.02 S		0.9	19
2886-SS-150923-01-20	1.03 S		0.91	20
2886-SS-150923-01-31	1.05 S		0.93	21
9574-SS-140910-01-03	0.936 R		0.936	22
2886-SS-150923-01-02	1.06 S		0.94	23.5
2886-SS-150923-01-23	1.06 S		0.94	23.5
9574-SS-140910-01-05	0.948 R		0.948	25
9574-SS-140910-01-33	0.954 R		0.954	26
9574-SS-140910-01-29	0.955 R		0.955	27
2886-SS-150923-01-28	1.08 S		0.96	28
9574-SS-140910-01-04	0.962 R		0.962	29
2886-SS-150923-01-07	1.09 S		0.97	30
9574-SS-140910-01-11	0.977 R		0.977	31
9574-SS-140910-01-13	0.978 R		0.978	32
9574-SS-140910-01-08	0.979 R		0.979	33
2886-SS-150923-01-14	1.1 S		0.98	34
9574-SS-140910-01-21	0.982 R		0.982	35
9574-SS-140910-01-25	0.99 R		0.99	36
2886-SS-150923-01-04	1.12 S		1	38
2886-SS-150923-01-09	1.12 S		1	38
2886-SS-150923-01-15	1.12 S		1	38
2886-SS-150923-01-10	1.13 S		1.01	40.5
9574-SS-140910-01-20	1.01 R		1.01	41.5
2886-SS-150923-01-06	1.14 S		1.02	42
2886-SS-150923-01-19	1.17 S		1.05	44
2886-SS-150923-01-21	1.17 S		1.05	44
9574-SS-140910-01-27	1.05 R		1.05	46
2886-SS-150923-01-01	1.19 S		1.07	47
2886-SS-150923-01-24	1.19 S		1.07	47
9574-SS-140910-01-16	1.07 R		1.07	49
2886-SS-150923-01-08	1.21 S		1.09	49.5
2886-SS-150923-01-17	1.21 S		1.09	49.5
9574-SS-140910-01-17	1.1 R		1.1	51.5
9574-SS-140910-01-31	1.1 R		1.1	51.5
2886-SS-150923-01-05	1.23 S		1.11	53
9574-SS-140910-01-12	1.14 R		1.14	54
9574-SS-140910-01-01	1.15 R		1.15	55
9574-SS-140910-01-10	1.16 R		1.16	56
9574-SS-140910-01-32	1.17 R		1.17	57
9574-SS-140910-01-18	1.19 R		1.19	58
9574-SS-140910-01-22	1.21 R		1.21	60
9574-SS-140910-01-26	1.21 R		1.21	60
2886-SS-150923-01-11	1.33 S		1.21	60
9574-SS-140910-01-23	1.37 R		1.37	62
9574-SS-140910-01-24	1.39 R		1.39	63.5
9574-SS-140910-01-28	1.39 R		1.39	63.5

### Appendix C Quantile Tests

Prudent - Uranium-234				
Sample ID	Concentration (pCi/g)	Area	Adjusted Concentration	Ranks
2886-SS-150923-01-04	0.387 S		-0.203	1
2886-SS-150923-01-10	0.427 S		-0.163	2
2886-SS-150923-01-06	0.431 S		-0.159	3
2886-SS-150923-01-08	0.452 S		-0.138	4
2886-SS-150923-01-21	0.456 S		-0.134	5
2886-SS-150923-01-16	0.465 S		-0.125	6
2886-SS-150923-01-02	0.473 S		-0.117	7
2886-SS-150923-01-17	0.476 S		-0.114	8
2886-SS-150923-01-18	0.482 S		-0.108	9
2886-SS-150923-01-26	0.509 S		-0.081	10
2886-SS-150923-01-14	0.513 S		-0.077	11.5
2886-SS-150923-01-28	0.513 S		-0.077	11.5
2886-SS-150923-01-13	0.523 S		-0.067	13
2886-SS-150923-01-20	0.529 S		-0.061	14
2886-SS-150923-01-01	0.54 S		-0.05	15
2886-SS-150923-01-29	0.557 S		-0.033	16
2886-SS-150923-01-30	0.559 S		-0.031	17
2886-SS-150923-01-03	0.562 S		-0.028	18.5
2886-SS-150923-01-09	0.562 S		-0.028	18.5
2886-SS-150923-01-22	0.587 S		-0.003	20.5
2886-SS-150923-01-25	0.587 S		-0.003	20.5
2886-SS-150923-01-23	0.594 S		0.004	22
2886-SS-150923-01-12	0.614 S		0.024	23
2886-SS-150923-01-19	0.618 S		0.028	24
2886-SS-150923-01-31	0.625 S		0.035	25
2886-SS-150923-01-07	0.642 S		0.052	26
2886-SS-150923-01-27	0.651 S		0.061	27
2886-SS-150923-01-05	0.652 S		0.062	28
2886-SS-150923-01-32	0.666 S		0.076	29
2886-SS-150923-01-11	0.684 S		0.094	30.5
2886-SS-150923-01-15	0.684 S		0.094	30.5
9574-SS-140910-01-05	0.345 R		0.345	32
9574-SS-140910-01-02	0.353 R		0.353	33
2886-SS-150923-01-24	0.969 S		0.379	34
9574-SS-140910-01-34	0.389 R		0.389	35
9574-SS-140910-01-04	0.39 R		0.39	36
9574-SS-140910-01-15	0.434 R		0.434	37
9574-SS-140910-01-09	0.484 R		0.484	38
9574-SS-140910-01-07	0.512 R		0.512	39
9574-SS-140910-01-16	0.513 R		0.513	40
9574-SS-140910-01-03	0.518 R		0.518	41
9574-SS-140910-01-10	0.571 R		0.571	42
9574-SS-140910-01-31	0.572 R		0.572	43
9574-SS-140910-01-32	0.598 R		0.598	44
9574-SS-140910-01-11	0.606 R		0.606	45
9574-SS-140910-01-17	0.639 R		0.639	46
9574-SS-140910-01-01	0.671 R		0.671	47
9574-SS-140910-01-14	0.705 R		0.705	48
9574-SS-140910-01-13	0.724 R		0.724	49
9574-SS-140910-01-26	0.73 R		0.73	50
9574-SS-140910-01-30	0.744 R		0.744	51
9574-SS-140910-01-12	0.747 R		0.747	52
9574-SS-140910-01-33	0.772 R		0.772	53
9574-SS-140910-01-18	0.808 R		0.808	54
9574-SS-140910-01-22	0.829 R		0.829	55
9574-SS-140910-01-08	0.832 R		0.832	56
9574-SS-140910-01-29	0.842 R		0.842	57
9574-SS-140910-01-28	0.871 R		0.871	58
9574-SS-140910-01-25	0.887 R		0.887	59
9574-SS-140910-01-21	1.04 R		1.04	60
9574-SS-140910-01-24	1.09 R		1.09	61
9574-SS-140910-01-20	1.12 R		1.12	62
9574-SS-140910-01-23	1.14 R		1.14	63
9574-SS-140910-01-27	1.16 R		1.16	64



**Appendix C**  
**Quantile Tests**

Prudent - Uranium-238				
Sample ID	Concentration (pCi/g)	Area	Adjusted Concentration	Ranks
2886-SS-150923-01-25	0.389 S		0.019	1
2886-SS-150923-01-15	0.395 S		0.025	2
2886-SS-150923-01-20	0.439 S		0.069	3
2886-SS-150923-01-32	0.446 S		0.076	4
2886-SS-150923-01-27	0.509 S		0.139	5
2886-SS-150923-01-05	0.538 S		0.168	6.5
2886-SS-150923-01-11	0.538 S		0.168	6.5
2886-SS-150923-01-03	0.563 S		0.193	8
2886-SS-150923-01-29	0.564 S		0.194	9
2886-SS-150923-01-26	0.565 S		0.195	10
2886-SS-150923-01-23	0.579 S		0.209	11
2886-SS-150923-01-16	0.588 S		0.218	12
2886-SS-150923-01-18	0.589 S		0.219	13
2886-SS-150923-01-12	0.592 S		0.222	14
2886-SS-150923-01-07	0.594 S		0.224	15
2886-SS-150923-01-08	0.602 S		0.232	16
2886-SS-150923-01-14	0.606 S		0.236	17
2886-SS-150923-01-17	0.612 S		0.242	18
2886-SS-150923-01-21	0.624 S		0.254	19
2886-SS-150923-01-30	0.625 S		0.255	20
2886-SS-150923-01-04	0.626 S		0.256	21
2886-SS-150923-01-01	0.673 S		0.303	22
2886-SS-150923-01-28	0.688 S		0.318	23
2886-SS-150923-01-10	0.689 S		0.319	24
2886-SS-150923-01-31	0.702 S		0.332	25
2886-SS-150923-01-09	0.718 S		0.348	26
2886-SS-150923-01-06	0.74 S		0.37	27
2886-SS-150923-01-02	0.748 S		0.378	28
9574-SS-140910-01-02	0.379 R		0.379	29
2886-SS-150923-01-24	0.758 S		0.388	30
2886-SS-150923-01-13	0.763 S		0.393	31
2886-SS-150923-01-19	0.768 S		0.398	32
9574-SS-140910-01-05	0.421 R		0.421	33
9574-SS-140910-01-07	0.453 R		0.453	34
2886-SS-150923-01-22	0.828 S		0.458	35
9574-SS-140910-01-09	0.493 R		0.493	36
9574-SS-140910-01-34	0.494 R		0.494	37
9574-SS-140910-01-11	0.575 R		0.575	38
9574-SS-140910-01-04	0.591 R		0.591	39
9574-SS-140910-01-15	0.594 R		0.594	40
9574-SS-140910-01-14	0.607 R		0.607	41
9574-SS-140910-01-08	0.632 R		0.632	42
9574-SS-140910-01-21	0.705 R		0.705	43
9574-SS-140910-01-29	0.708 R		0.708	44
9574-SS-140910-01-20	0.71 R		0.71	45
9574-SS-140910-01-03	0.723 R		0.723	46
9574-SS-140910-01-01	0.724 R		0.724	47
9574-SS-140910-01-13	0.744 R		0.744	48
9574-SS-140910-01-18	0.745 R		0.745	49
9574-SS-140910-01-10	0.757 R		0.757	50
9574-SS-140910-01-32	0.758 R		0.758	51
9574-SS-140910-01-26	0.764 R		0.764	52
9574-SS-140910-01-30	0.787 R		0.787	53
9574-SS-140910-01-33	0.828 R		0.828	54
9574-SS-140910-01-16	0.835 R		0.835	55
9574-SS-140910-01-17	0.844 R		0.844	56
9574-SS-140910-01-28	0.895 R		0.895	57
9574-SS-140910-01-27	0.956 R		0.956	58
9574-SS-140910-01-25	0.959 R		0.959	59
9574-SS-140910-01-22	0.981 R		0.981	60
9574-SS-140910-01-31	0.986 R		0.986	61
9574-SS-140910-01-24	0.992 R		0.992	62
9574-SS-140910-01-23	0.994 R		0.994	63
9574-SS-140910-01-12	0.997 R		0.997	64

**APPENDIX C**  
Memo HEM-13-MEMO-099



INTER-OFFICE MEMORANDUM

Date: May 5, 2014 HEM-13-MEMO-099, Revision 2

To: James Mobley, Operations Manager

From: W. Clark Evers, Interim RSO *WCE*  
Scott Zoller, Radiological Engineer *SZ*

Cc: Gay Fussell, Deputy Project Director  
James Miller, Environmental Manager

Subject: Radiological Requirements for the Handling of Re-Use Soils During Development of Stockpile 8

This memorandum is provided to ensure effective communication for the processing, transfer, and storage of re-use soils. These requirements have been developed based on our experiences handling re-use soils (i.e., soils associated with Stockpiles 1 – 7) and from ongoing discussions with Radiological Engineering, Operations, and Environmental groups. We are anticipating the development of a new re-use stockpile in the OU1 Stockpile Area (footprint where Stockpiles 2, 5, and 6 were formerly located) and have produced these requirements to ensure this material maintains its integrity as re-use soils using good Health Physics practices and the requirements of HDP-PR-FSS-710, *Final Status Surveys and Radiological Sampling of Re-Use Soil*.

**General Requirements**

The following general requirements will ensure the segregation and integrity during transfer, handling, and storage of re-use soils:

- Truck Bed Wash-Down if Used to Transfer both Waste Material & Re-Use Soils  
If a dump truck has been used to transport waste material or soil, the bed, tires, and other potentially contaminated surfaces should be washed to a visibly clean condition prior to transporting re-use soils. Washing efforts should be performed to reduce the likelihood of materials with elevated amounts of radioactivity being placed at the Stockpile Area, thus reducing segregation and re-handling materials at the Stockpile Area.
- Consolidation Bins and Excavation Stockpile Areas: Clean-out & Perform Confirmatory Surveys Prior to Storing Re-Use Soils  
If a waste consolidation bin slated for storage of potential re-use soils has previously held waste materials, the bin should be cleaned to eliminate the potential for re-use soil contamination. Cleaning should be performed to reduce the likelihood of materials with elevated amounts of radioactivity being placed at the Stockpile Area, thus reducing segregation and re-handling materials at the Stockpile Area.

## APPENDIX C

### Memo HEM-13-MEMO-099

HEM-13-MEMO-099, Revision 2  
May 5, 2014  
Page 2 of 5

- Compliance with established HDP-FSS Policies & Procedures for Re-Use Soils Remains

The procedures and methods for the characterization and segregation of re-use soils are still governed by the policy, HDP-PO-FSS-701, *Final Status Survey Program* and the procedure HDP-PR-FSS-710, *FSS & Radiological Sampling Material* will need to either go through the box counter (or equivalent), or be surveyed/sampled after excavation in full accordance with the established methods described in section 14.3.2.3 of the Hematite Decommissioning Plan.

#### Specific Requirements

Experience with re-use soils has resulted in the development of three classes of materials. These are those from burial pit areas (high potential for discrete high activity items), those from areas where radioactive materials have been previously stored (medium potential for discrete high activity items), and the balance of the site (low potential for discrete high activity items). The locations of these areas are shown in the figure below.



Specific requirements pertaining to these three area types are as follows:

#### 1. Re-Use Materials From Areas with High Potential for Discrete High-Activity Items

This material is generated from remediation activities associated with former burial pits.

**Characterization Method:** Potential re-use soil will be subject to a 100% Gamma Walkover Survey (GWS) prior to excavation of each layer of soil to a maximum depth of 12 inches (6-inches in NCS Controlled Areas). The bulk soil sampling of re-use materials and use of the box counter (or equivalent) still applies, as described in HDP-PR-FSS-710.

**APPENDIX C**  
**Memo HEM-13-MEMO-099**

HEM-13-MEMO-099, Revision 2  
May 5, 2014  
Page 3 of 5

---

The potential re-use soil may then be stockpiled with other potential re-use soil from High and Medium Potential Areas and consolidated for re-survey. HP Technicians will perform a GWS of the exposed surface of the stockpiled soil using Final Status Survey methodology. Operations will then remove a nominal 3-inch layer of soil. This process will be repeated as necessary until all potential re-use soil within the consolidated stockpile has been evaluated.

**2. Re-Use Materials From Areas with Medium Potential for Discrete High-Activity Items**

This material is generated from remediation activities associated with surface soils from radioactive material storage areas, and other areas that have been determined to have a potential for containing non-soil, high activity materials (e.g., fuel pellets, or other discrete items of high activity).

Characterization Method: Potential re-use soil will be subject to a 100% GWS prior to excavation of each layer of soil to a maximum depth of 12 inches (6-inches in NCS Controlled Areas). The bulk soil sampling of re-use materials and use of the box counter (or equivalent) still applies, as described in HDP-PR-FSS-710.

The potential re-use soil may then be stockpiled with other potential re-use soil from High and Medium Potential Areas and consolidated for re-survey. HP Technicians will then perform a GWS of the exposed surface of the stockpiled soil using Final Status Survey methodology. Operations will then remove a nominal 3-inch layer of soil. This process will be repeated as necessary until all potential re-use soil within the consolidated stockpile has been evaluated. Only the top 12 inch layer of soil from Medium Potential Areas will be handled in this manner; after removal of the top 12 inch layer, the area will be designated as a Low Potential Area.

**3. Re-Use Materials with Low Potential for Discrete High-Activity Items**

Examples of this material include native soils excavated to expose piping systems, native soils excavated to remediate VOCs, areas after removal of the top 12 inches of surface soils from radioactive material storage areas (e.g. Medium Potential Areas), and other remediation work in areas other than what is described in Paragraph 1 above.

Characterization Method: Potential re-use soil will be subject to a 100% GWS prior to excavation of each layer of soil to a maximum depth of 12 inches (6-inches in NCS Controlled Areas). The bulk soil sampling of re-use materials and use of the box counter (or equivalent) still applies, as described in HDP-PR-FSS-710.

The potential re-use soil may then be stockpiled (with other potential re-use soil from Low Potential Areas) and consolidated for re-survey. HP Technicians will then perform a GWS of the exposed surface of the stockpiled soil using Final Status Survey methodology. Operations will then remove a nominal 6-inch layer of soil. This process will be repeated as necessary until all potential re-use soil within the consolidated stockpile has been evaluated.

**APPENDIX C**  
Memo HEM-13-MEMO-099

HEM-13-MEMO-099, Revision 2  
May 5, 2014  
Page 4 of 5

**Special Considerations for Handling Re-Use Materials at the OU1 Stockpile Area**

Potential re-use soil destined for the Low Potential stockpile (6 inch layers) can be conservatively added to the High and Medium Potential stockpile (3 inch layers) due to any accidental comingling or potential cross contamination. However, potential re-use soil destined for the High and Medium Potential stockpiles (3 inch layers), or re-use soil that has been re-surveyed and verified free of high activity discrete items SHALL be placed back into the High and Medium Potential Stockpile (3 inch layers) if there is any indication of accidental comingling or potential cross contamination. Best Management Practices should be used to ensure proper isolation and control form separate soil stockpiles.

Removal of the surveyed lens of the materials will be monitored or controlled during removal by Operators, Laborers, or Health Physics. Monitoring or control of the removal depth (e.g. nominal 3 or 6 inch layer as appropriate) may be performed using GPS-enabled grade control devices, marked stakes, or dowels. Alternatively, the soil layer may be removed and placed into a temporary staging area, and the post-removal elevation of the excavation can be measured and compared to the pre-removal elevation to determine that the intended thickness of the layer was not exceeded before combining the surveyed soil in the temporary staging area with a larger stockpile of surveyed soil. If more than the nominal intended thickness is removed or clumping greater than the nominal thickness is observed, the soil exceeding the nominal intended thickness shall be broken or chopped as necessary, and spread out over the surface to be surveyed with the next layer of soil.

APPENDIX C  
Memo HEM-13-MEMO-099

~~Westinghouse Proprietary Class 2~~

HEM-13-MEMO-099, Revision 2  
May 5, 2014  
Page 5 of 5

Attachment 1 – Re-Use Flow Chart

