

APPENDIX P-4

FSS SAMPLE & MEASUREMENT LOCATIONS & COORDINATES

Survey Area:	LSA 10	Description:	Burial Pits Open Land Area
Survey Unit:	12	Description:	Southeast Survey Unit (North Burial Pit)
Survey Type:	FSS	Classification:	Class 1

Measurement or Sample ID	Surface or CSM	Type	Start Elevation*	End Elevation*	Northing** (Y Axis)	Easting** (X Axis)	Remarks / Notes
L10-12-01-B-E-S-00	Three-Layer	S	422.0	421.6	865201.7	827536.0	Excavation 6-inch grab
L10-12-02-B-E-S-00	Three-Layer	S	422.4	421.9	865201.7	827582.6	Excavation 6-inch grab
L10-12-03-B-E-S-00	Three-Layer	S	424.9	424.4	865161.4	827512.7	Excavation 6-inch grab
L10-12-04-B-E-S-00	Three-Layer	S	423.1	422.6	865161.4	827559.3	Excavation 6-inch grab
L10-12-05-B-R-S-00	Three-Layer	S	425.0	424.0	865161.4	827605.9	Root 12-inch composite
L10-12-06-B-E-S-00	Three-Layer	S	424.0	423.5	865161.4	827605.9	Excavation 6-inch grab
L10-12-07-B-E-S-00	Three-Layer	S	426.4	425.9	865121.0	827536.0	Excavation 6-inch grab
L10-12-08-B-R-S-00	Three-Layer	S	426.4	425.6	865121.0	827582.6	Root 10-inch composite
L10-12-09-B-E-S-00	Three-Layer	S	425.6	425.1	865121.0	827582.6	Excavation 6-inch grab
L10-12-10-B-R-S-00	Three-Layer	S	425.4	424.4	865121.0	827629.2	Root 12-inch composite
L10-12-11-B-E-S-00	Three-Layer	S	424.4	423.9	865121.0	827629.2	Excavation 6-inch grab
L10-12-12-B-E-S-00	Three-Layer	S	426.8	426.3	865080.6	827559.3	Excavation 6-inch grab
L10-12-07-B-E-Q-00	Three-Layer	Q	426.4	425.9	865121.0	827536.0	Excavation 6-inch grab
L10-12-13-B-E-B-00	Three-Layer	B	427.4	426.9	865065.4	827560.4	Excavation 6-inch grab
L10-12-14-B-E-B-00	Three-Layer	B	426.4	425.9	865094.0	827531.8	Excavation 6-inch grab
L10-12-15-B-E-B-00	Three-Layer	B	424.1	423.6	865117.4	827586.0	Excavation 6-inch grab
L10-12-16-B-E-B-00	Three-Layer	B	422.5	422.0	865165.2	827580.8	Excavation 6-inch grab

Green shaded samples are the samples at each sample location (station), for use in the WRS test.

*Elevations are in feet above mean sea level.
 ** Missouri - East State Plane Coordinates [North American Datum (NAD) 1983]
 Surface: Floor = F; Wall = W; Ceiling = C; Roof = R
 CSM: Three-Layer (Surface-Root-Excavation) or Uniform Stratum DCGLs used
 Type: Systematic = S, Biased = B; QC = Q; Investigation = I

HDP-PR-FSS-721 Final Status Survey Data Evaluation
Preliminary Data Review and Calculation of the Sum-of-Fractions (SOF)

Sample ID	Sample Start Depth (ft)	Type (Systematic Bias, CI)	TestAmerica Analytical Results																													
			Ra-226						Th-99						Th-232						Inferred U-234				U-235				U-238			
			Result	Uncertainty	MDC	Qualifier	Net Result**	Corrected Result	Result	Uncertainty	MDC	Qualifier	Result	Uncertainty	MDC	Qualifier	Net Result**	Corrected Result	Result	Uncertainty	MDC	Qualifier	Result	Uncertainty	MDC	Qualifier	Result	Uncertainty	MDC	Qualifier	Result	Uncertainty
L10-12-01-B-E-S-00	7.6	S	0.949	0.136	0.060	NA	-0.121	0.000	4.200	4.200	0.527	0.231	NA	1.010	0.160	0.112	NA	0.010	0.010	1.079	NA	NA	NA	0.052	0.141	0.251	U	1.130	0.539	0.836	NA	
L10-12-02-B-E-S-00	6.05	S	0.904	0.160	0.094	NA	-0.166	0.000	19.100	19.100	1.840	0.218	NA	1.080	0.198	0.107	NA	0.080	0.080	2.043	NA	NA	NA	0.109	0.166	0.264	U	0.990	0.588	0.932	NA	
L10-12-03-B-E-S-00	6.39	S	1.390	0.192	0.087	NA	0.320	0.320	0.267	0.267	0.160	0.220	NA	1.470	0.224	0.129	NA	0.470	0.470	1.290	NA	NA	NA	-0.023	0.169	0.285	U	1.250	0.284	1.060	NA	
L10-12-04-B-E-S-00	7.03	S	1.160	0.170	0.079	NA	0.090	0.090	4.420	4.420	0.507	0.221	NA	1.410	0.233	0.095	NA	0.410	0.410	2.725	NA	NA	NA	0.146	0.155	0.269	U	1.290	0.610	0.943	NA	
L10-12-05-B-R-S-00	3.94	S	1.250	0.185	0.077	NA	0.180	0.180	2.420	2.420	0.405	0.225	NA	1.120	0.178	0.139	NA	0.120	0.120	5.595	NA	NA	NA	0.308	0.151	0.197	NA	1.480	0.360	0.903	NA	
L10-12-06-B-E-S-00	4.92	S	1.120	0.172	0.076	NA	0.050	0.050	1.530	1.530	0.324	0.223	NA	0.981	0.183	0.156	NA	-0.019	0.000	1.733	NA	NA	NA	0.093	0.162	0.205	U	0.790	0.429	1.190	U	
L10-12-07-B-E-S-00	5.38	S	1.530	0.204	0.083	NA	0.460	0.460	0.066	0.066	0.078	0.213	U	1.310	0.187	0.110	NA	0.310	0.310	2.138	NA	NA	NA	0.115	0.167	0.275	U	0.956	0.316	0.886	NA	
L10-12-08-B-R-S-00	4.09	S	1.340	0.177	0.080	NA	0.270	0.270	0.041	0.041	0.021	0.263	U	1.170	0.181	0.133	NA	0.170	0.170	3.978	NA	NA	NA	0.214	0.165	0.214	NA	0.988	0.317	0.866	NA	
L10-12-09-B-E-S-00	4.92	S	1.600	0.247	0.115	NA	0.530	0.530	0.117	0.117	0.157	0.248	U	1.300	0.234	0.170	NA	0.300	0.300	1.629	NA	NA	NA	0.088	0.177	0.317	U	0.674	0.366	1.100	U	
L10-12-10-B-R-S-00	3.95	S	1.350	0.221	0.121	NA	0.280	0.280	0.216	0.216	0.053	0.225	U	1.270	0.214	0.079	NA	0.270	0.270	4.171	NA	NA	NA	0.229	0.191	0.221	NA	1.210	0.657	1.030	NA	
L10-12-11-B-E-S-00	4.92	S	1.630	0.208	0.078	NA	0.560	0.560	0.050	0.050	0.096	0.235	U	1.400	0.210	0.112	NA	0.400	0.400	1.791	NA	NA	NA	0.091	0.166	0.274	U	1.280	0.577	0.895	NA	
L10-12-12-B-E-S-00	5.94	S	1.250	0.171	0.070	NA	0.180	0.180	0.127	0.127	0.164	0.223	U	1.170	0.168	0.089	NA	0.170	0.170	2.427	NA	NA	NA	0.132	0.145	0.242	U	0.908	0.306	0.880	NA	
L10-12-07-B-E-Q-00	5.38	Q	1.430	0.214	0.093	NA	0.360	0.360	0.023	0.023	0.078	0.206	U	1.290	0.209	0.200	NA	0.290	0.290	2.025	NA	NA	NA	0.102	0.188	0.313	U	1.580	0.910	1.140	NA	
L10-12-13-B-E-B-00	5.49	B	1.340	0.217	0.107	NA	0.270	0.270	0.375	0.375	0.169	0.261	NA	1.410	0.230	0.154	NA	0.410	0.410	2.454	NA	NA	NA	0.132	0.209	0.329	U	1.090	0.403	1.110	U	
L10-12-14-B-E-B-00	6.36	B	1.330	0.185	0.077	NA	0.260	0.260	0.024	0.024	0.027	0.257	U	1.300	0.188	0.115	NA	0.300	0.300	1.216	NA	NA	NA	0.056	0.160	0.269	U	1.650	0.594	0.883	NA	
L10-12-15-B-E-B-00	6.21	B	1.460	0.192	0.068	NA	0.390	0.390	-0.073	0.000	0.019	0.216	U	1.290	0.191	0.118	NA	0.290	0.290	1.219	NA	NA	NA	0.064	0.141	0.254	U	0.746	0.314	0.993	U	
L10-12-16-B-E-B-00	6.88	B	1.010	0.136	0.050	NA	-0.060	0.000	5.010	5.010	0.584	0.217	NA	0.962	0.163	0.084	NA	-0.038	0.000	1.370	NA	NA	NA	0.073	0.119	0.199	U	0.706	0.266	0.685	NA	
Systematic Minimum			0.000						0.041						0.000						1.079				-0.031				0.674			
Systematic Maximum			0.560						19.100						0.470						5.595				0.308				1.460			
Systematic Mean			0.243						2.719						0.228						2.639				0.129				1.070			
Systematic Median			0.225						0.242						0.220						2.091				0.112				1.060			
Systematic Standard Deviation			0.196						5.411						0.158						1.351				0.089				0.236			
With ingrowth, use Ra226 bkg =			1.07						Th232 bkg =						1.0																	

NOTES:

- Gross results in units of pCi/g.
- * With ingrowth, background (1.07 pCi/g) subtracted from gross result.
- **Background (1.0 pCi/g) subtracted from gross result.
- U qualifier: A normal, non-detected result (result less than MDC).
- All uncertainty values are reported at the 2-sigma confidence level.

HDP-PR-FSS-721 Final Status Survey Data Evaluation
 Preliminary Data Review and Calculation of the Sum-of-Fractions (SOF)

Sample ID	Sample Start Depth (ft)	Type (Systematic Bias, QC)	Enrichment (%)	SOF	Root Stratum SOF Verification (unexcavated/not backfilled only)			MDC SOF
					In Sample in the Root Stratum	In ROOT Stratum SOF > MDC SOF	root count	
L10-12-01-B-E-S-00	7.60	S	0.7	0.52	EXCAVATION	good		0.04
L10-12-02-B-E-S-00	6.05	S	1.7	0.28	EXCAVATION	good		0.05
L10-12-03-B-E-S-00	6.39	S	0.7	0.16	EXCAVATION	good		0.05
L10-12-04-B-E-S-00	7.03	S	1.9	0.16	EXCAVATION	good		0.04
L10-12-05-B-R-S-00	3.94	S	3.2	0.26	ROOT	good	1	0.14
L10-12-06-B-E-S-00	4.92	S	1.9	0.03	EXCAVATION	good		0.05
L10-12-07-B-E-S-00	5.38	S	1.9	0.15	EXCAVATION	good		0.05
L10-12-08-B-R-S-00	4.09	S	3.6	0.24	ROOT	good	1	0.13
L10-12-09-B-E-S-00	4.92	S	2.0	0.16	EXCAVATION	good		0.07
L10-12-10-B-R-S-00	3.95	S	2.9	0.30	ROOT	good	1	0.13
L10-12-11-B-E-S-00	4.92	S	1.1	0.19	EXCAVATION	good		0.05
L10-12-12-B-E-S-00	5.94	S	2.3	0.07	EXCAVATION	good		0.04
L10-12-07-B-E-Q-00	5.38	Q	1.0	0.13	EXCAVATION	good		0.07
L10-12-13-B-E-B-00	5.49	B	1.9	0.14	EXCAVATION	good		0.06
L10-12-14-B-E-B-00	6.36	B	0.6	0.11	EXCAVATION	good		0.05
L10-12-15-B-E-B-00	6.21	B	1.4	0.13	EXCAVATION	good		0.05
L10-12-16-B-E-B-00	6.88	B	1.6	0.07	EXCAVATION	good		0.03
			2.0	0.03				
				0.30				
				0.17				
				0.16				
				0.05				

11 3 9 0
 count tot Use number of stations (sample locations) for divisor.
 DP Sec. 14.1.5.2

Use corrected net results for all DE calcs.

	DCLC ₉₉ Measure Tc-99, All SEAs		
	Surface	Root	Excavation
U-234	508.5	235.6	872.4
U-235	102.3	64.1	208.1
U-238	297.6	183.3	551.1
Tc-99	151	30.1	74.0
Th-232	4.7	2.0	5.2
Ra-226	5.0	2.1	5.4

weighted SOF_{MEAN} 0.19

fractions	SS	RS	ES
	0	0.273	0.8181818

SOF_{MEAN} Re-use Backfill Material
 0 Off-Site Backfill

SOF_{MEAN} Groundwater
 0.16

Grouted pipe dose to be added if applicable.

SOF_{TOT} <= 1
 SOF_{MEAN, SU} 0.35 PASS

Calculate the dose contribution for the SU by multiplying SOF_{MEAN, SU} from Re-use backfill and Groundwater) by 25 mrem.
 8.7 mrem

Infer U234			
U-238/U235 Ratio	U-234/U235 Ratio	U-234	% Enrichment
21.9	21.0	1.1	0.7
9.1	18.7	2.0	1.7
27.4	27.0	-0.7	0.72
8.5	18.7	2.7	1.8
4.7	18.2	5.6	3.2
8.5	18.6	1.7	1.9
8.3	18.6	2.1	1.9
4.2	18.1	3.9	3.6
7.7	18.5	1.6	2.0
5.3	18.2	4.2	2.9
14.0	19.6	1.8	1.1
6.9	18.4	2.4	2.3
15.5	19.9	2.0	1.0
8.3	18.6	2.5	1.9
29.5	21.8	1.2	0.6
11.7	19.1	1.2	1.4
9.7	18.8	1.4	1.6

Average Enrichment (%) 1.99

Column SOF	SOF	Sum of Column SOF
L10-12-01-B-E-S-00	0.06	0.06
L10-12-02-B-E-S-00	0.28	0.28
L10-12-03-B-E-S-00	0.16	0.16
L10-12-04-B-E-S-00	0.16	0.16
L10-12-05-B-R-S-00	0.26	0.30
L10-12-06-B-E-S-00	0.03	0.15
L10-12-07-B-E-S-00	0.15	0.15
L10-12-08-B-R-S-00	0.24	0.40
L10-12-09-B-E-S-00	0.16	0.16
L10-12-10-B-R-S-00	0.30	0.49
L10-12-11-B-E-S-00	0.19	0.19
L10-12-12-B-E-S-00	0.07	0.07

Negative U-235 result; set enrichment to natural uranium.

using U-235 MDC * ratio of U-234/U-235 @ that sample's enrichment
 5.281
 4.949
 5.973
 5.021
 3.579
 3.812
 5.113
 3.879
 5.875
 4.026
 5.370
 4.450
 6.214
 6.118
 5.854
 4.844
 3.749

HDP-PR-FSS-721 Final Status Survey Data Evaluation
Preliminary Data Review and Calculation of the Sum-of-Fractions (SOF)

Ave Conc. Ra-226, SS	Ave Conc. Tc-99, SS	Ave Conc. Th-232, SS	Ave Conc. U-234, SS	Ave Conc. U-235, SS	Ave Conc. U-238, SS
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
0.000	0.000	0.000	0.000	0.000	0.000
Ave Conc. Ra-226, RS	Ave Conc. Tc-99, RS	Ave Conc. Th-232, RS	Ave Conc. U-234, RS	Ave Conc. U-235, RS	Ave Conc. U-238, RS
-	-	-	-	-	-
-	-	-	-	-	-
0.180	2.420	0.120	5.595	0.308	1.460
-	-	-	-	-	-
0.270	0.041	0.170	3.879	0.214	0.898
-	-	-	-	-	-
0.280	0.216	0.270	4.171	0.229	1.210
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
0.243	0.892	0.187	4.549	0.250	1.189
Ave Conc. Ra-226, ES	Ave Conc. Tc-99, ES	Ave Conc. Th-232, ES	Ave Conc. U-234, ES	Ave Conc. U-235, ES	Ave Conc. U-238, ES
0	4.2	0.01	1.0794	0.0515	1.13
0	19.1	0.08	2.0433	0.109	0.99
0.330	0.267	0.470	1.25	-0.0311	1.25
0.09	4.42	0.41	2.7251	0.146	1.28
-	-	-	-	-	-
0.050	1.53	0.000	1.733	0.0932	0.79
0.46	0.0661	0.31	2.1384	0.115	0.956
-	-	-	-	-	-
0.53	0.117	0.3	1.629	0.0879	0.674
0.56	0.0503	0.4	1.7914	0.0914	1.28
0.180	0.127	0.170	2.4271	0.132	0.908
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
0.243	3.320	0.239	1.869	0.088	1.030

**HDP-PR-FSS-721 Final Status Survey Data Evaluation
Performance of Statistical Tests**

WRS TEST							
SAMPLE ID	AREA (Reference, Survey Unit)	Gross SOF ($X_{i,ref}$, $Y_{i,su}$)	ADJUSTED SOF (Z_i)	RANKS	REFERENCE AREA RANKS		
9574-SS-140910-01-01	Reference	1.13	2.130	36	36		
9574-SS-140910-01-02	Reference	0.72	1.721	14	14		
9574-SS-140910-01-03	Reference	0.97	1.970	23	23		
9574-SS-140910-01-04	Reference	0.97	1.967	22	22		
9574-SS-140910-01-05	Reference	0.95	1.952	20	20		
9574-SS-140910-01-07	Reference	0.83	1.829	16	16		
9574-SS-140910-01-08	Reference	0.99	1.987	26	26		
9574-SS-140910-01-09	Reference	0.90	1.904	18	18		
9574-SS-140910-01-10	Reference	1.14	2.144	37	37		
9574-SS-140910-01-11	Reference	0.96	1.958	21	21		
9574-SS-140910-01-12	Reference	1.16	2.160	39	39		
9574-SS-140910-01-13	Reference	0.98	1.9826	25	25		
9574-SS-140910-01-14	Reference	0.95	1.9513	19	19		
9574-SS-140910-01-15	Reference	0.82	1.824	15	15		
9574-SS-140910-01-16	Reference	1.17	2.171	40	40		
9574-SS-140910-01-17	Reference	1.12	2.124	34	34		
9574-SS-140910-01-18	Reference	1.24	2.241	42	42		
9574-SS-140910-01-20	Reference	1.11	2.115	33	33		
9574-SS-140910-01-21	Reference	1.01	2.009	28	28		
9574-SS-140910-01-22	Reference	1.05	2.053	29	29		
9574-SS-140910-01-23	Reference	1.23	2.234	41	41		
9574-SS-140910-01-24	Reference	1.28	2.277	43	43		
9574-SS-140910-01-25	Reference	1.09	2.091	31	31		
9574-SS-140910-01-26	Reference	1.13	2.127	35	35		
9574-SS-140910-01-27	Reference	1.16	2.160	38	38		
9574-SS-140910-01-28	Reference	1.31	2.314	44	44		
9574-SS-140910-01-29	Reference	1.00	1.999	27	27		
9574-SS-140910-01-30	Reference	0.89	1.891	17	17		
9574-SS-140910-01-31	Reference	1.06	2.064	30	30		
9574-SS-140910-01-32	Reference	1.10	2.097	32	32		
9574-SS-140910-01-33	Reference	0.98	1.975	24	24		
9574-SS-140910-01-34	Reference	0.41	1.411	8	8		
L10-12-01-B-E-S-00	Survey Unit	1.11	1.108	2	0	No WRS test necessary	EXCAVATION
L10-12-02-B-E-S-00	Survey Unit	1.62	1.621	13	0	Perform WRS test	EXCAVATION
L10-12-03-B-E-S-00	Survey Unit	1.42	1.417	9	0	Perform WRS test	EXCAVATION
L10-12-04-B-E-S-00	Survey Unit	1.43	1.425	10	0	Perform WRS test	EXCAVATION
L10-12-05-B-R-S-00	Survey Unit	1.27	1.272	5	0	No WRS test necessary	ROOT
L10-12-06-B-E-S-00	Survey Unit	1.09	1.088	1	0	No WRS test necessary	EXCAVATION
L10-12-07-B-E-S-00	Survey Unit	1.40	1.402	7	0	No WRS test necessary	EXCAVATION
L10-12-08-B-R-S-00	Survey Unit	1.25	1.249	4	0	No WRS test necessary	ROOT
L10-12-09-B-E-S-00	Survey Unit	1.43	1.428	11	0	Perform WRS test	EXCAVATION
L10-12-10-B-R-S-00	Survey Unit	1.31	1.313	6	0	No WRS test necessary	ROOT
L10-12-11-B-E-S-00	Survey Unit	1.49	1.494	12	0	Perform WRS test	EXCAVATION
L10-12-12-B-E-S-00	Survey Unit	1.20	1.202	3	0	No WRS test necessary	EXCAVATION
Rank Sums				990	907	W_r	
# Reference Area Measurements				m	32		
# Survey Unit Measurements				n	12		
Total Number of Measurements				N	44		
(1-α) percentile of a standard normal distribution (MARSSIM Pg. I-10)				z	1.645		$\alpha = 0.05$
WRS Critical Value (MARSSIM Pg. I-10, Eq. I.1)				CV	783		

TEST: **PASS**

HDP-PR-FSS-721 Final Status Survey Data Evaluation
Performance of Statistical Tests

Background Soil Locations - Surface and Sub-Surface Soil - Statistical and Analytical Sample Results

Surface and Sub-Surface - Background Soil - Analytical Results

Sample ID	Ra-226 w/ 21-Day Ingrowth			Th-232			U-234*			U-235*			U-238*			SOF
	(pCi/g)			(pCi/g)			(pCi/g)			(pCi/g)			(pCi/g)			
	Conc.	Error	MDC	Conc.	Error	MDC	Conc.	Error	MDC	Conc.	Error	MDC	Conc.	Error	MDC	
9574-SS-140910-01-01	1.150	0.164	0.068	1.150	0.178	0.133	0.671	0.181	0.050	0.022	0.040	0.071	0.724	0.189	0.050	1.13
9574-SS-140910-01-02	0.719	0.103	0.045	0.749	0.120	0.090	0.353	0.129	0.051	0.011	0.028	0.063	0.379	0.135	0.068	0.72
9574-SS-140910-01-03	1.040	0.166	0.077	0.936	0.183	0.145	0.518	0.164	0.062	0.015	0.030	0.044	0.723	0.195	0.036	0.97
9574-SS-140910-01-04	1.010	0.138	0.051	0.962	0.171	0.090	0.390	0.138	0.034	0.014	0.029	0.043	0.591	0.172	0.060	0.97
9574-SS-140910-01-05	0.995	0.160	0.085	0.948	0.178	0.091	0.345	0.163	0.083	0.000	0.009	0.068	0.421	0.179	0.055	0.95
9574-SS-140910-01-07	0.858	0.133	0.064	0.831	0.150	0.110	0.512	0.160	0.035	0.038	0.051	0.075	0.453	0.150	0.035	0.83
9574-SS-140910-01-08	1.030	0.143	0.064	0.979	0.139	0.087	0.832	0.210	0.075	0.000	0.005	0.043	0.632	0.179	0.053	0.99
9574-SS-140910-01-09	1.080	0.169	0.070	0.768	0.188	0.184	0.484	0.159	0.055	0.043	0.053	0.069	0.493	0.161	0.063	0.90
9574-SS-140910-01-10	1.170	0.174	0.077	1.160	0.191	0.143	0.571	0.169	0.064	0.034	0.050	0.080	0.757	0.196	0.034	1.14
9574-SS-140910-01-11	0.972	0.136	0.084	0.977	0.142	0.079	0.606	0.174	0.059	0.028	0.040	0.042	0.575	0.168	0.034	0.96
9574-SS-140910-01-12	1.220	0.184	0.086	1.140	0.210	0.139	0.747	0.199	0.054	0.056	0.060	0.067	0.997	0.233	0.036	1.16
9574-SS-140910-01-13	1.020	0.140	0.076	0.978	0.157	0.096	0.724	0.198	0.037	0.046	0.053	0.046	0.744	0.201	0.056	0.98
9574-SS-140910-01-14	1.050	0.146	0.061	0.889	0.156	0.080	0.705	0.193	0.061	0.029	0.042	0.044	0.607	0.178	0.067	0.95
9574-SS-140910-01-15	0.805	0.121	0.058	0.871	0.140	0.110	0.434	0.145	0.058	-0.003	0.005	0.064	0.594	0.171	0.034	0.82
9574-SS-140910-01-16	1.320	0.201	0.090	1.070	0.189	0.153	0.513	0.152	0.054	0.049	0.052	0.059	0.835	0.198	0.031	1.17
9574-SS-140910-01-17	1.190	0.165	0.070	1.100	0.179	0.129	0.639	0.183	0.062	0.024	0.043	0.077	0.844	0.213	0.036	1.12
Min	0.72			0.75			0.35			0.00			0.38			0.72
Max	1.32						1.16			0.83			1.00			
Mean	1.04			0.97			0.57			0.03			0.65			
Stdev	0.16			0.13			0.15			0.02			0.17			

Use Root DCGLs.

Sub-Surface

Sample ID	Ra-226 w/ 21-Day Ingrowth			Th-232			U-234*			U-235*			U-238*			SOF
	(pCi/g)			(pCi/g)			(pCi/g)			(pCi/g)			(pCi/g)			
	Conc.	Error	MDC	Conc.	Error	MDC	Conc.	Error	MDC	Conc.	Error	MDC	Conc.	Error	MDC	
9574-SS-140910-01-18	1.340	0.193	0.085	1.190	0.200	0.117	0.808	0.200	0.062	0.038	0.047	0.062	0.745	0.191	0.049	1.24
9574-SS-140910-01-20	1.260	0.206	0.109	1.010	0.197	0.176	1.120	0.241	0.057	0.068	0.061	0.041	0.710	0.187	0.050	1.11
9574-SS-140910-01-21	1.070	0.156	0.074	0.982	0.153	0.124	1.040	0.232	0.050	0.028	0.039	0.041	0.705	0.187	0.050	1.01
9574-SS-140910-01-22	0.922	0.131	0.057	1.210	0.170	0.106	0.829	0.215	0.065	0.013	0.032	0.071	0.981	0.236	0.037	1.05
9574-SS-140910-01-23	1.130	0.170	0.084	1.370	0.229	0.115	1.140	0.254	0.055	0.073	0.068	0.069	0.994	0.235	0.036	1.23
9574-SS-140910-01-24	1.200	0.165	0.065	1.390	0.221	0.131	1.090	0.247	0.055	0.024	0.043	0.078	0.992	0.234	0.055	1.28
9574-SS-140910-01-25	1.230	0.164	0.065	0.990	0.156	0.126	0.887	0.216	0.053	0.069	0.065	0.065	0.959	0.226	0.070	1.09
9574-SS-140910-01-26	1.080	0.159	0.079	1.210	0.179	0.106	0.730	0.219	0.078	0.019	0.037	0.056	0.764	0.223	0.045	1.13
9574-SS-140910-01-27	1.310	0.185	0.082	1.050	0.163	0.110	1.160	0.255	0.036	0.059	0.059	0.044	0.956	0.228	0.062	1.16
9574-SS-140910-01-28	1.280	0.188	0.089	1.390	0.201	0.131	0.871	0.217	0.055	0.060	0.060	0.045	0.895	0.220	0.036	1.31
9574-SS-140910-01-29	1.080	0.154	0.081	0.955	0.160	0.146	0.842	0.208	0.059	0.011	0.029	0.064	0.708	0.189	0.051	1.00
9574-SS-140910-01-30	0.960	0.161	0.086	0.851	0.166	0.156	0.744	0.196	0.035	0.072	0.065	0.043	0.787	0.203	0.053	0.89
9574-SS-140910-01-31	1.060	0.146	0.050	1.100	0.159	0.089	0.572	0.170	0.070	0.099	0.075	0.043	0.986	0.228	0.052	1.06
9574-SS-140910-01-32	1.060	0.157	0.071	1.170	0.177	0.078	0.598	0.174	0.060	0.058	0.058	0.043	0.758	0.198	0.060	1.10
9574-SS-140910-01-33	1.030	0.147	0.069	0.954	0.153	0.119	0.772	0.196	0.050	0.014	0.028	0.041	0.828	0.203	0.033	0.98
9574-SS-140910-01-34	0.618	0.099	0.040	0.225	0.085	0.099	0.389	0.138	0.052	0.014	0.029	0.043	0.494	0.156	0.035	0.41
Min	0.62			0.23			0.39			0.01			0.49			0.41
Max	1.34			1.39			1.16			0.992			0.994			
Mean	1.10			1.07			0.85			0.04			0.83			
Stdev	0.18			0.28			0.22			0.03			0.14			

Use Root DCGLs.

	DCGL _w , Measure Tc-99, All SEAs		
	Surface	Root	Excavation
U-234	508.5	235.6	872.4
U-235	102.3	64.1	208.1
U-238	297.6	183.3	551.1
Tc-99	151	30.1	74
Th-232	4.7	2	5.2
Ra-226	5	2.1	5.4

No Tc-99 expected in background area.

* alpha spectroscopy results.

Dataset Min = 0.618 0.225 0.345 -0.00262 0.379

**HDP-PR-FSS-721 Final Status Survey Data Evaluation
Retrospective Sample Size Verification**

Stratum DCGL Criteria Evaluation	
N/2 Value Verification	
Isotope(s)	SOF (Ra/Tc/Th/Iso U)
St. Dev.	0.09
DCGL _{SOF}	1
LBGR (Mean)	0.17
Shift	0.83
Relative Shift ($\Delta\sigma$)	9.50
MARSSIM Table 5.1 (P_r)	1.000000
N	12
N + 20%	14.4
N/2	8
FSS N/2	9
Verification Check	SUFFICIENT MEASUREMENTS
"N/2" Corresponds to the number of survey unit measurement locations required for the WRS Test	

MARSSIM Table 5.1

$\Delta\sigma$	P_r
0.1	0.528182
0.2	0.556223
0.3	0.583985
0.4	0.611335
0.5	0.638143
0.6	0.664290
0.7	0.689665
0.8	0.714167
0.9	0.737710
1.0	0.760217
1.1	0.781627
1.2	0.801892
1.3	0.820978
1.4	0.838864
1.5	0.855541
1.6	0.871014
1.7	0.885299
1.8	0.898420
1.9	0.910413
2.0	0.921319
2.25	0.944167
2.5	0.961428
2.75	0.974067
3.0	0.983039
3.5	0.993329
4.0	0.997658
4.01	1.000000

MARSSIM Table 5.2, $\alpha = 0.05$, $\beta = 0.10$

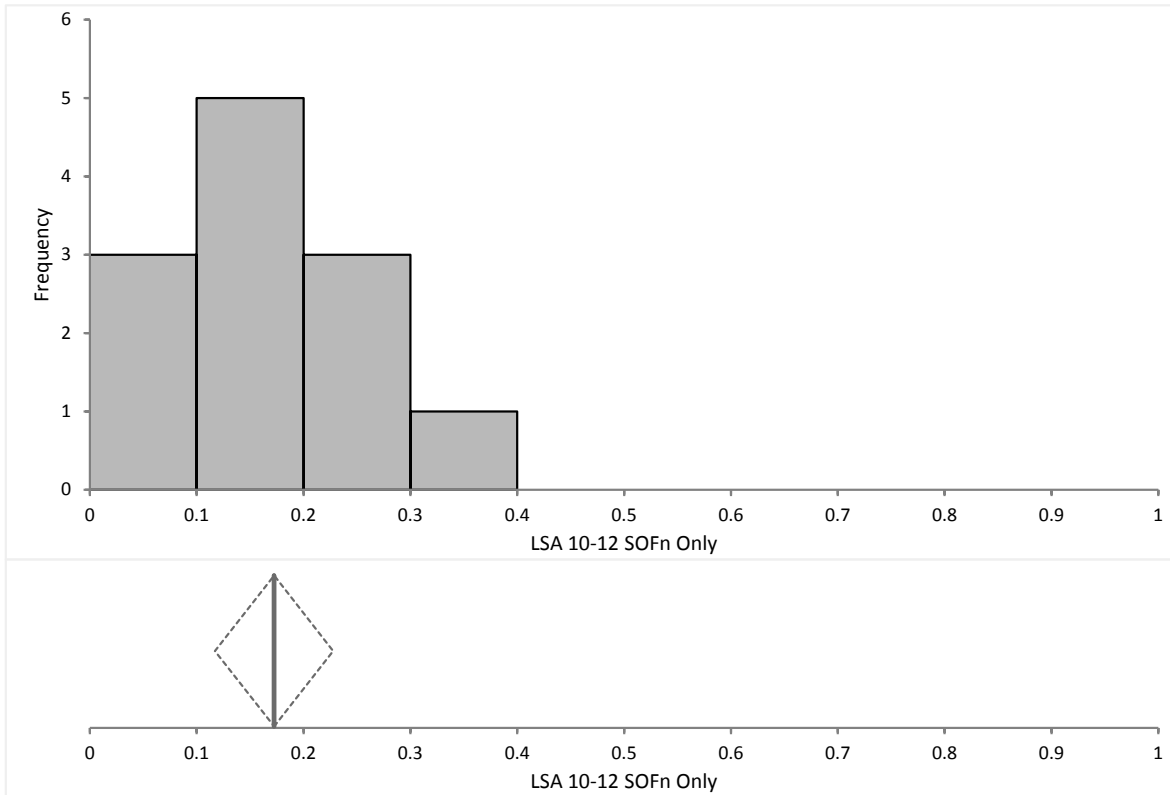
α (or β)	$Z_{1-\alpha}$ (or $Z_{1-\beta}$)
0.005	2.576
0.01	2.326
0.015	2.241
0.025	1.960
0.05	1.645
0.10	1.282
0.15	1.036
0.2	0.842
0.25	0.674
0.30	0.524

α
 β

LSA 10-12 SOFn Only

0.1
0.3
0.2
0.2
0.3
0.0
0.2
0.2
0.2
0.3
0.2
0.1

Descriptives



N | 12

	Mean	95% CI	Mean SE	SD	Variance	Skewness	Kurtosis
LSA 10-12 SOFn Only	0.17	0.12 to 0.23	0.025	0.09	0.01	-0.1	-0.96
	Minimum	1st quartile	Median	96.14% CI	3rd quartile	Maximum	IQR
LSA 10-12 SOFn Only	0.0	0.11	0.16	0.07 to 0.26	0.25	0.3	0.15