APPENDIX P-4

FSS SAMPLE & MEASUREMENT LOCATIONS & COORDINATES

Survey Area: LSA 10 **Description:** Burial Pits Open Land Area

Survey Unit: 04 **Description:** East Central 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
L10-04-01-B-R-S-00	Uniform	S	422.6	422.5	865318.0	827508.5	Root 1-inch composite
L10-04-02-B-E-S-00	Uniform	S	422.5	422.0	865318.0	827508.5	Excavation 6-inch grab
L10-04-03-B-E-S-00	Uniform	S	423.9	423.4	865277.4	827485.1	Excavation 6-inch grab
L10-04-04-B-R-S-00	Uniform	S	423.2	422.9	865277.4	827532.0	Root 4-inch composite
L10-04-05-B-E-S-00	Uniform	S	422.9	422.4	865277.4	827532.0	Excavation 6-inch grab
L10-04-06-B-E-S-00	Uniform	S	423.1	422.6	865236.7	827414.7	Excavation 6-inch grab
L10-04-07-B-E-S-00	Uniform	S	425.1	424.6	865236.7	827461.6	Excavation 6-inch grab
L10-04-08-B-E-S-00	Uniform	S	423.1	422.6	865236.7	827508.5	Excavation 6-inch grab
L10-04-09-B-E-S-00	Uniform	S	421.5	421.0	865236.7	827555.5	Excavation 6-inch grab
L10-04-10-B-R-S-00	Uniform	S	427.4	427.3	865196.0	827438.2	Root 1-inch composite
L10-04-11-B-E-S-00	Uniform	S	427.3	426.8	865196.0	827438.2	Excavation 6-inch grab
L10-04-12-B-E-S-00	Uniform	S	426.0	425.5	865196.0	827485.1	Excavation 6-inch grab
L10-04-08-B-E-Q-00	Uniform	Q	423.1	422.6	865236.7	827508.5	Excavation 6-inch grab
L10-04-13-B-E-B-00	Uniform	B	423.6	423.1	865233.2	827402.5	Excavation 6-inch grab
L10-04-14-B-E-B-00	Uniform	B	427.3	426.8	865192.4	827440.8	Excavation 6-inch grab
L10-04-15-B-E-B-00	Uniform	B	423.4	422.9	865263.8	827442.4	Excavation 6-inch grab
L10-04-16-B-E-B-00	Uniform	B	420.4	419.9	865304.6	827471.1	Excavation 6-inch grab

*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

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

Quality Record

Sample ID	Sample Start Depth (ft)	Type (Systematic, Biased, QC)	TestAmerica Analytical Results																								Enr.	SOF_N	Root Stratum SOF Verification (unexcavated/not backfilled only)					MDC SOF
			Ra-226						Tc-99					Th-232					Inferred U-234				U-235				U-238								
			Result	Uncertainty	MDC	Qualifier	Net Result*	Corrected Result	Result	Corrected Result	Uncertainty	MDC	Qualifier	Result	Uncertainty	MDC	Qualifier	Net Result**	Corrected Result	Result	Uncertainty	MDC	Qualifier	Result	Uncertainty	MDC	Qualifier	Result	Uncertainty	MDC	Qualifier	Enrichment (%)		Is Sample in the Root Stratum?	Is ROOT Sample SOF > 0.5?	root count	excavation count	surface count	
L10-04-01-B-R-S-00	4.81	S	1.060	0.163	0.070	NA	-0.010	0.000	0.133	0.133	0.062	0.260	U	0.814	0.160	0.131	NA	-0.186	0.000	1.775	NA	NA	NA	0.095	0.157	0.284	U	0.887	0.319	0.883	NA	1.7	0.02	ROOT	good	1			0.15
L10-04-02-B-E-S-00	4.92	S	0.983	0.140	0.061	NA	-0.087	0.000	0.135	0.135	0.117	0.249	U	0.870	0.142	0.067	NA	-0.130	0.000	2.325	NA	NA	NA	0.124	0.121	0.194	U	1.120	0.461	0.702	NA	1.7	0.03	EXCAVATION	good		1		0.10
L10-04-03-B-E-S-00	5.12	S	0.981	0.139	0.061	NA	-0.089	0.000	0.644	0.644	0.198	0.230	NA	0.939	0.154	0.104	NA	-0.061	0.000	5.132	NA	NA	NA	0.282	0.166	0.199	NA	1.430	0.554	0.836	NA	3.0	0.07	EXCAVATION	good		1		0.12
L10-04-04-B-R-S-00	4.62	S	1.080	0.154	0.060	NA	0.010	0.010	1.320	1.320	0.191	0.234	NA	0.827	0.164	0.119	NA	-0.173	0.000	2.557	NA	NA	NA	0.137	0.136	0.195	U	1.180	0.596	0.791	NA	1.8	0.08	ROOT	good	1			0.13
L10-04-05-B-E-S-00	4.92	S	0.929	0.147	0.074	NA	-0.141	0.000	1.140	1.140	0.186	0.236	NA	0.731	0.141	0.161	NA	-0.269	0.000	4.239	NA	NA	NA	0.234	0.146	0.261	U	0.927	0.328	0.860	NA	3.8	0.08	EXCAVATION	good		1		0.16
L10-04-06-B-E-S-00	8.58	S	1.140	0.156	0.060	NA	0.070	0.070	0.181	0.181	0.017	0.268	U	1.190	0.197	0.086	NA	0.190	0.190	5.959	NA	NA	NA	0.328	0.146	0.221	NA	1.580	0.344	0.807	NA	3.2	0.19	EXCAVATION	good		1		0.11
L10-04-07-B-E-S-00	5.57	S	1.160	0.177	0.060	NA	0.090	0.090	0.278	0.278	0.115	0.255	NA	1.110	0.197	0.052	NA	0.110	0.110	0.270	NA	NA	NA	0.006	0.016	0.312	U	0.952	0.356	0.977	U	0.1	0.12	EXCAVATION	good		1		0.15
L10-04-08-B-E-S-00	6.35	S	0.997	0.144	0.068	NA	-0.073	0.000	1.720	1.720	0.238	0.228	NA	0.864	0.160	0.107	NA	-0.136	0.000	2.837	NA	NA	NA	0.152	0.148	0.233	U	1.340	0.504	0.753	NA	1.8	0.09	EXCAVATION	good		1		0.13
L10-04-09-B-E-S-00	6.74	S	0.782	0.130	0.059	NA	-0.288	0.000	7.860	7.860	0.750	0.256	NA	0.816	0.149	0.090	NA	-0.184	0.000	3.068	NA	NA	NA	0.165	0.147	0.238	U	1.350	0.715	0.908	NA	1.9	0.34	EXCAVATION	good		1		0.12
L10-04-10-B-R-S-00	4.8	S	1.260	0.182	0.075	NA	0.190	0.190	0.013	0.013	0.037	0.231	U	1.230	0.191	0.102	NA	0.230	0.230	5.760	NA	NA	NA	0.304	0.167	0.270	NA	3.150	0.577	1.070	NA	1.5	0.27	ROOT	good	1			0.14
L10-04-11-B-E-S-00	4.92	S	1.250	0.198	0.101	NA	0.180	0.180	0.022	0.022	0.062	0.236	U	1.120	0.217	0.129	NA	0.120	0.120	3.731	NA	NA	NA	0.185	0.199	0.335	U	3.210	1.060	1.200	NA	0.9	0.20	EXCAVATION	good		1		0.18
L10-04-12-B-E-S-00	5.04	S	1.300	0.190	0.081	NA	0.230	0.230	0.011	0.011	0.077	0.260	U	1.190	0.219	0.100	NA	0.190	0.190	3.145	NA	NA	NA	0.172	0.174	0.274	U	1.030	0.417	1.060	U	2.6	0.24	EXCAVATION	good		1		0.14
L10-04-08-B-E-Q-00	6.35	Q	0.931	0.136	0.067	NA	-0.139	0.000	1.350	1.350	0.171	0.230	NA	0.830	0.147	0.065	NA	-0.170	0.000	2.979	NA	NA	NA	0.162	0.152	0.193	U	1.110	0.323	0.807	NA	2.3	0.08		good				0.10
L10-04-13-B-E-B-00	8.5	B	1.440	0.199	0.080	NA	0.370	0.370	-0.040	0.000	0.040	0.243	U	1.340	0.235	0.125	NA	0.340	0.340	101.012	NA	NA	NA	5.570	0.664	0.355	NA	24.400	3.010	1.630	NA	3.5	1.13		good				0.16
L10-04-14-B-E-B-00	4.89	B	1.200	0.188	0.099	NA	0.130	0.130	0.110	0.110	0.059	0.215	U	1.160	0.197	0.129	NA	0.160	0.160	26.367	NA	NA	NA	1.160	0.252	0.305	NA	42.400	4.990	2.080	NA	0.5	0.56		good				0.18
L10-04-15-B-E-B-00	6.808	B	0.734	0.101	0.035	NA	-0.336	0.000	0.195	0.195	0.128	0.185	NA	0.495	0.096	0.057	NA	-0.505	0.000	1.556	NA	NA	NA	0.083	0.102	0.171	U	0.805	0.226	0.591	NA	1.6	0.02		good				0.08
L10-04-16-B-E-B-00	8.046	B	1.160	0.154	0.056	NA	0.090	0.090	0.589	0.589	0.127	0.231	NA	1.030	0.153	0.082	NA	0.030	0.030	6.154	NA	NA	NA	0.336	0.153	0.229	NA	2.050	0.595	0.846	NA	2.5	0.14		good				0.11
Systematic Minimum			0.000						0.011					0.000						0.270				0.006				0.887				**2.0**	0.02						
Systematic Maximum			0.230						7.860					0.230						5.959				0.328				3.210					0.34			12	3	9	0	
Systematic Mean			0.064						1.121					0.070						3.400				0.182				1.513					0.14			count tot				
Systematic Median			0.005						0.230					0.000						3.107				0.169				1.260					0.11							
Systematic Standard Deviation			0.088						2.200					0.092						1.671				0.093				0.808				Average Enrichment (%)	0.10						
			With ingrowth, use Ra226 bkg =					1.07						Th232 bkg =				1.0																						

NOTES:
Gross results in units of pCi/g
* Background with ingrowth (1.07 pCi/g) subtracted from gross result
**Background (1.0 pCi/g) subtracted from gross result
U Qualifier: Result is less than the sample detection limit.
All uncertainty values are reported at the 2-sigma confidence level.

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
0.000	0.133	0.000	1.775	0.095	0.887
-	-	-	-	-	-
-	-	-	-	-	-
0.010	1.320	0.000	2.557	0.137	1.180
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
0.190	0.013	0.230	5.760	0.304	3.150
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
0.067	**0.489**	**0.077**	**3.364**	**0.179**	**1.739**

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	0.135	0	2.3245	0.124	1.12
0	0.644	0	5.1316	0.282	1.43
-	-	-	-	-	-
0	1.14	0	4.239	0.234	0.927
0.07	0.181	0.19	5.9588	0.328	1.580
0.09	0.278	0.11	0.27	0.00583	0.952
0	1.72	0	2.8371	0.152	1.340
0	7.86	0	3.0681	0.165	1.350
-	-	-	-	-	-
0.18	0.0221	0.12	3.7307	0.185	3.210
0.23	0.0106	0.19	3.1452	0.172	1.030
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
0.063	**1.332**	**0.068**	**3.412**	**0.183**	**1.438**

Use corrected net results for all DE calcs.

$DCLG_W$, Measure Tc-99, All SEAs

	Uniform
U-234	195.4
U-235	51.6
U-238	168.8
Tc-99	25.1
Th-232	2.0
Ra-226	1.9

weighted SOF_{MEAN} **0.14**

	SS	RS	ES
fractions	0	0.25	0.75

SOF_{MEAN} Re-use Backfill Material

0 Offsite backfill

SOF_{MEAN} Groundwater
0.16

EMC Investigation SOF
0.141474833

SOF_{TOT} (<=1)

$SOF_{MEAN, SU}$	0.44	**PASS**

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

11 mrem

Infer U234			
U-238/U235	**U-234/U235**	**U-234**	**%**
9.4	18.7	1.8	1.7
9.0	18.7	2.3	1.7
5.1	18.2	5.1	3.0
8.6	18.7	2.6	1.8
4.0	18.1	4.2	3.8
4.8	18.2	6.0	3.2
163.3	46.3	0.3	0.1
8.8	18.7	2.8	1.8
8.2	18.6	3.1	1.9
10.4	18.9	5.8	1.5
17.4	20.2	3.7	0.9
6.0	18.3	3.1	2.6
6.9	18.4	3.0	2.3
4.4	18.1	101.0	3.5
36.6	22.7	26.4	0.5
9.7	18.8	1.6	1.6
6.1	18.3	6.2	2.5
	Average Enrichment (%)		**2.00**

using U-235 MDC * ratio of U-234:U-235 @ that sample's enrichment
5.323883954
3.636737631
3.621228573
3.639714822
4.728161369
4.014909893
14.45026814
4.348992582
4.425492553
5.11553937
6.755540914
5.01030423
3.548666526
6.437937826
6.932760984
3.22147092
4.194255118

Elevated Measurement Comparison

Sample ID	Sample Depth (ft)	Type (Systematic, Bias, QC)	TestAmerica Analytical Results																												SOF
			Ra-226						Tc-99					Th-232						U-234				U-235				U-238				
			Result	Uncertainty	MDC	Qualifier	Net Result*	Corrected Result	Result	Corrected Result	Uncertainty	MDC	Qualifier	Result	Uncertainty	MDC	Qualifier	Net Result**	Corrected Result	Result	Uncertainty	MDC	Qualifier	Result	Uncertainty	MDC	Qualifier	Result	Uncertainty	MDC	Qualifier	
L10-04-13-B-E-B-00	0	B	1.44	0.20	0.08	NA	0.37	0.37	-0.04	0.00	0.04	0.24	U	1.34	0.24	0.13	NA	0.34	0.34	101.01	NA	NA	NA	5.57	0.66	0.36	NA	24.40	3.01	1.63	NA	1.13
			With ingrowth, use Ra226 bkg =					1.07						Th232 bkg =		1.0																

NOTES:
Gross results in units of pCi/g
* Background with ingrowth (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.

	L10-04-13	Step 1	Step 2	L10-04-13	Step 3 L10-04-13
	$DCGL_{EMC}$	"clean" systematic samples δ_i	L10-04-13 τ_i	$t_i - \delta_i$	f_{elev}
Ra-226	11.59	0.064	0.37	0.306	0.026
Tc-99	860.93	1.121	0.00	-1.121	-0.001
Th-232	8.4	0.070	0.34	0.270	0.032
U-234	3829.8	3.400	101.01	97.612	0.025
U-235	170.28	0.182	5.57	5.388	0.032
U-238	844	1.513	24.40	22.887	0.027

Step 4 f_{EMC} = 0.141

Step 5 Summed elevated radioactivity fractions for the SU = 0.141 = $f_{EMC,TOT}$

Step 6 Total SOF for the SU = 0.445 PASS Step 7

weighted SOF_{MEAN} 0.14
SOF_{MEAN} Re-use Backfill Material (stockpile 5&6) 0
SOF_{MEAN} Groundwater 0.16

Bounding sample = L10-04-06-B-E-S-00 Bounded by the SU boundary.

Need area from GIS. 30 m^2

$DCLG_W$, Uniform, Measure Tc-99, All SEAs

	Uniform
U-234	195.4
U-235	51.6
U-238	168.8
Tc-99	25.1
Th-232	2.0
Ra-226	1.9

Uniform Stratum

	Elevated Measurement Area (m^2)									
Radionuclide	**153,375**	**10,000**	**3,000**	**1,000**	**300**	**100**	**30**	**10**	**3**	**1**
U-234	1.0	1.2	1.3	1.3	4.0	9.3	19.6	34.3	70.5	132.8
U-235	1.0	1.1	1.1	1.1	1.9	2.5	3.3	4.7	9.6	20.5
U-238	1.0	1.1	1.3	1.3	2.5	3.6	5.0	7.2	14.9	31.6
Tc-99	1.0	1.0	1.0	1.0	3.4	10.3	34.3	102.9	342.7	1,027
Th-232	1.0	1.0	1.0	1.0	2.1	3.0	4.2	6.1	12.9	28.9
Ra-226	1.0	1.1	1.1	1.1	2.5	4.1	6.1	9.1	19.3	43.4

Elevated Measurement Investigation:

Step 1 δ_i = average concentration of systematic "clean" samples for each "elevated" nuclide (Use corrected net results.)

Step 2 τ_i = average concentration of elevated sample(s) for each ROC

Step 3 f_{elev} = elevated radioactivity fraction $\frac{\tau_i - \delta_i}{DCGL_{EMC}}$

Step 4 Sum all f_{elev} (all ROCs in the elevated area) = f_{EMC} if applicable

Step 5 Sum all f_{EMC} (all elevated areas in the SU) = $f_{EMC,TOT}$ if applicable

Step 6 Sum $f_{EMC,TOT}$ and $\mathbf{SOF_{MEAN,SU}}$ (use total SOF SU (including GW, BF, etc.)

Step 7 Is Total SOF from Step 6 <1? If so PASS, if not, continue with Corrective Actions for FSS failure.

WRS TEST						
SAMPLE ID	**AREA (Reference, Survey Unit)**	**Gross SOF ($X_{i,ref}$, $Y_{i,SU,gross}$)**	**ADJUSTED SOF (Z_i)**	**RANKS**	**REFERENCE AREA RANKS**	
9574-SS-140910-01-01	Reference	1.31	2.310	42	42	
9574-SS-140910-01-02	Reference	1.18	2.179	33	33	
9574-SS-140910-01-03	Reference	1.06	2.064	28	28	
9574-SS-140910-01-04	Reference	1.10	2.101	29	29	
9574-SS-140910-01-05	Reference	1.29	2.293	41	41	
9574-SS-140910-01-07	Reference	1.34	2.339	43	43	
9574-SS-140910-01-08	Reference	1.15	2.154	32	32	
9574-SS-140910-01-09	Reference	1.18	2.182	34	34	
9574-SS-140910-01-10	Reference	1.23	2.227	39	39	
9574-SS-140910-01-11	Reference	1.38	2.380	44	44	
9574-SS-140910-01-12	Reference	1.05	2.055	27	27	
9574-SS-140910-01-13	Reference	0.94	1.941	17	17	
9574-SS-140910-01-14	Reference	1.12	2.119	30	30	
9574-SS-140910-01-15	Reference	1.15	2.152	31	31	
9574-SS-140910-01-16	Reference	1.03	2.028	24	24	
9574-SS-140910-01-17	Reference	0.44	1.443	13	13	
9574-SS-140910-01-18	Reference	1.19	2.188	36	36	
9574-SS-140910-01-20	Reference	0.76	1.757	14	14	
9574-SS-140910-01-21	Reference	1.02	2.023	23	23	
9574-SS-140910-01-22	Reference	1.02	2.018	22	22	
9574-SS-140910-01-23	Reference	1.00	2.002	19	19	
9574-SS-140910-01-24	Reference	0.87	1.873	16	16	
9574-SS-140910-01-25	Reference	1.04	2.040	26	26	
9574-SS-140910-01-26	Reference	0.96	1.959	18	18	
9574-SS-140910-01-27	Reference	1.20	2.204	37	37	
9574-SS-140910-01-28	Reference	1.01	2.007	21	21	
9574-SS-140910-01-29	Reference	1.22	2.223	38	38	
9574-SS-140910-01-30	Reference	1.03	2.035	25	25	
9574-SS-140910-01-31	Reference	1.00	2.005	20	20	
9574-SS-140910-01-32	Reference	0.86	1.865	15	15	
9574-SS-140910-01-33	Reference	1.24	2.238	40	40	Min adjusted bkg SOF: 1.44
9574-SS-140910-01-34	Reference	1.19	2.185	35	35	
L10-04-01-B-R-S-00	Survey Unit	0.99	0.986	3	0	No WRS test necessary
L10-04-02-B-E-S-00	Survey Unit	0.98	0.979	2	0	No WRS test necessary
L10-04-03-B-E-S-00	Survey Unit	1.05	1.052	5	0	No WRS test necessary
L10-04-04-B-R-S-00	Survey Unit	1.06	1.057	6	0	No WRS test necessary
L10-04-05-B-E-S-00	Survey Unit	0.93	0.932	1	0	No WRS test necessary
L10-04-06-B-E-S-00	Survey Unit	1.25	1.248	9	0	No WRS test necessary
L10-04-07-B-E-S-00	Survey Unit	1.18	1.184	8	0	No WRS test necessary
L10-04-08-B-E-S-00	Survey Unit	1.05	1.051	4	0	No WRS test necessary
L10-04-09-B-E-S-00	Survey Unit	1.16	1.160	7	0	No WRS test necessary
L10-04-10-B-R-S-00	Survey Unit	1.33	1.333	12	0	No WRS test necessary
L10-04-11-B-E-S-00	Survey Unit	1.26	1.260	10	0	No WRS test necessary
L10-04-12-B-E-S-00	Survey Unit	1.31	1.305	11	0	No WRS test necessary
			Rank Sums	990	912	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	α = 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*

Retrospective Sample Size Verification

Uniform DCGL Criteria Evaluation	
N/2 Value Verification	
Isotope(s)	**SOF (Ra/Tc/Th/Iso U)**
St. Dev.	0.10
$DCGL_{SOF}$	1
LBGR (Mean)	0.14
Shift	0.86
Relative Shift (Δ/σ)	8.38
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

Δ/σ	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, α = 0.05, β = 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

FORM HDP-PR-FSS-703-1
FIELD DUPLICATE SAMPLE ASSESSMENT

Survey Unit No.:	LSA 10-04				Survey Unit Description:		East Central Survey Unit (North Burial Pits)					
			Sample (pCi/g)		Field Duplicate Sample (pCi/g)		Average Activity ($\bar{x}$)	Nuclide DCGL				Statistic Exceeds Limit?
Sample ID	Field Duplicate Sample ID	Radionuclide	Activity (x_i)	MDC	Activity (x_i)	MDC	(pCi/g)	(pCi/g)	Statistic[2]	Warning Limit	Control Limit	(Y/N)
L10-04-08-B-E-S-00	L10-04-08-B-E-Q-00	Ra-226	0.997	0.0676	0.931	0.0669	0.964	1.9	0.066	0.269	0.403	N
L10-04-08-B-E-S-00	L10-04-08-B-E-Q-00	Tc-99	1.72	0.228	1.35	0.23	1.535	25.1	0.37	3.552	5.321	N
L10-04-08-B-E-S-00	L10-04-08-B-E-Q-00	Th-232	0.864	0.107	0.830	0.0651	0.847	2.0	0.034	0.283	0.424	N
L10-04-08-B-E-S-00	L10-04-08-B-E-Q-00	U-234[1]	2.837	NA	2.979	NA	2.908	195.4	0.142	27.649	41.425	N
L10-04-08-B-E-S-00	L10-04-08-B-E-Q-00	U-235	0.152	0.233	0.162	0.193	0.157	51.6	NA	7.301	10.939	NA
L10-04-08-B-E-S-00	L10-04-08-B-E-Q-00	U-238	1.34	0.753	1.11	0.807	1.225	168.8	0.23	23.885	35.786	N

Comments:
1. U-234 is inferred, no MDC available.
2. Duplicate assessment is not necessary if the result of either sample is < MDC.

Performed by: Ellen C. Jakub

Reviewed by: Brian A. Miller

Date: 04/13/2015

Date: #########

Quality Record

LSA 10-04 Sys SOF

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

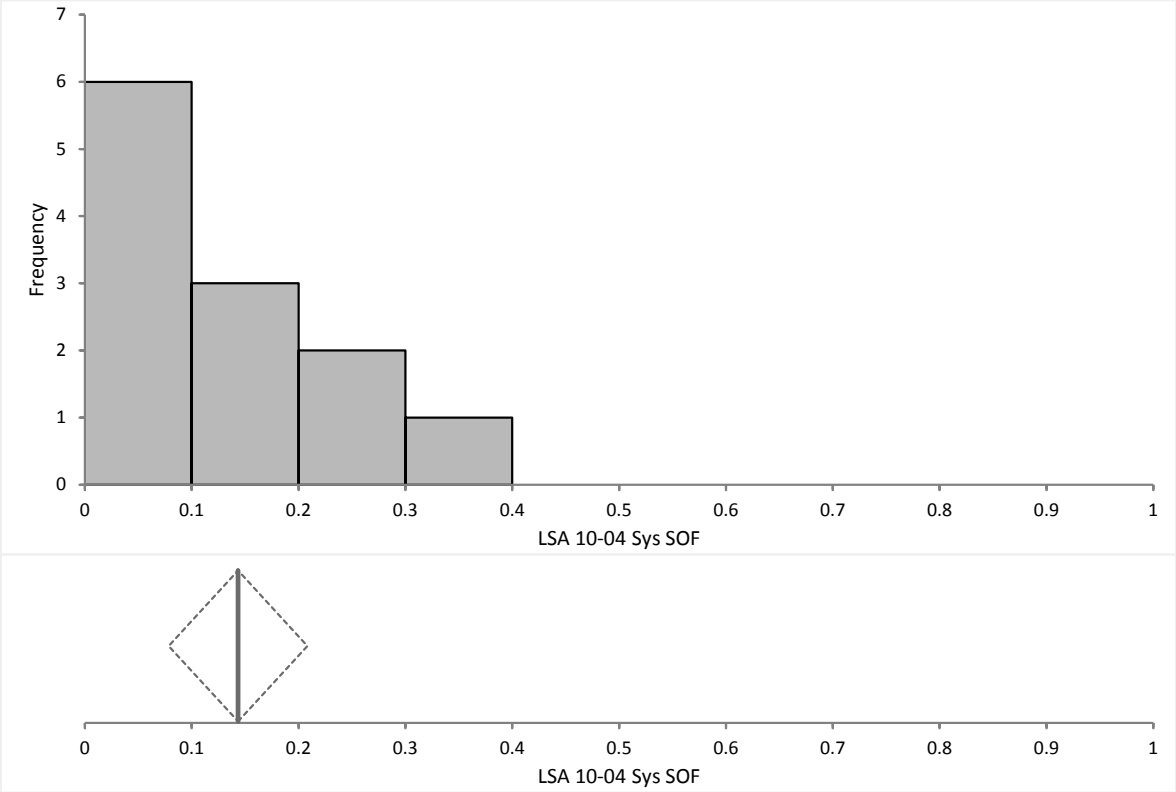
Distribution: LSA 10-04 Sys SOF

Analyse-it v4.65.2

SOFn Only A1:A13

Last updated 25 October 2016 at 16:23 by W. Clark Evers

Descriptives



	N
	12

	Mean	95% CI	Mean SE	SD	Variance	Skewness	Kurtosis
LSA 10-04 Sys SOF	0.14	0.08 to 0.21	0.029	0.10	0.01	0.6	-0.65

	Minimum	1st quartile	Median	96.14% CI	3rd quartile	Maximum	IQR
LSA 10-04 Sys SOF	0.0	0.07	0.11	0.07 to 0.24	0.22	0.3	0.15