

Hematite Decommissioning Project	Procedure: HDP-PR-FSS-701, Final Status Survey Plan Development	
	Revision: 10	Appendix P-4 Page 1 of 1

**APPENDIX P-4
FSS SAMPLE & MEASUREMENT LOCATIONS & COORDINATES**

Survey Area:	LSA 03	Description:	Plant Open Land Area
Survey Unit:	02	Description:	West of Site Pond in "Area 5"
Survey Type:	FSS	Classification:	Class 2

Measurement or Sample ID	Surface or CSM	Type	Start Elevation*	End Elevation*	Northing** (Y Axis)	Easting** (X Axis)	Remarks / Notes
L03-02-01-P-S-S-00	Uniform	S	427.4	426.9	864144	826693	Surface 6-inch grab
L03-02-02-P-R-S-00	Uniform	S	426.9	422.5	864144	826693	Root 5-foot composite
L03-02-04-P-S-S-00	Uniform	S	427.6	427.1	864089	826662	Surface 6-inch grab
L03-02-05-P-R-S-00	Uniform	S	427.1	422.7	864089	826662	Root 5-foot composite
L03-02-07-P-S-S-00	Uniform	S	428.0	427.5	864035	826693	Surface 6-inch grab
L03-02-08-P-R-S-00	Uniform	S	427.5	423.1	864035	826693	Root 5-foot composite
L03-02-10-P-S-S-00	Uniform	S	430.1	429.6	863980	826662	Surface 6-inch grab
L03-02-11-P-R-S-00	Uniform	S	429.6	425.2	863980	826662	Root 5-foot composite
L03-02-13-P-S-S-00	Uniform	S	429.4	428.9	863980	826724	Surface 6-inch grab
L03-02-14-P-R-S-00	Uniform	S	428.9	424.5	863980	826724	Root 5-foot composite
L03-02-16-P-S-S-00	Uniform	S	430.6	430.2	863926	826693	Surface 6-inch grab
L03-02-17-P-R-S-00	Uniform	S	430.2	425.7	863926	826693	Root 5-foot composite
L03-02-19-P-S-S-00	Uniform	S	429.4	428.9	863926	826756	Surface 6-inch grab
L03-02-20-P-R-S-00	Uniform	S	428.9	424.5	863926	826756	Root 5-foot composite
L03-02-22-P-S-S-00	Uniform	S	431.4	430.9	863871	826724	Surface 6-inch grab
L03-02-23-P-R-S-00	Uniform	S	430.9	426.5	863871	826724	Root 5-foot composite
L03-02-11-P-R-Q-00	Uniform	Q	429.6	425.2	863980	826662	Root 5-foot composite
L03-02-19-P-S-Q-00	Uniform	Q	429.4	428.9	863926	826756	Surface 6-inch grab
L03-02-25-P-S-B-00	Uniform	B	427.4	426.9	864173	826679	Surface 6-inch grab
L03-02-26-P-S-B-00	Uniform	B	429.4	428.9	863924	826763	Surface 6-inch grab

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

*Elevations are in feet above mean sea level.
 ** Missouri - East State Plane Coordinates [North American Datum (NAD) 1983] (Open Land Area) OR
 Distance in feet from lower left corner of the surface (Structures); each surface has it's own (X,Y) = (0,0); OR
 For piping the distance from the beginning of the survey unit.
 Surface: Floor = F; Wall = W; Ceiling = C; Roof = R
 CSM: Three-Layer (Surface-Root-Deep) or Uniform
 Type: Systematic = S, Biased = B; QC =Q; Investigation = I

HDP-PR-FSS-721 Final Status Survey Data Evaluation
Steps 8.3 Preliminary Data Review and 8.4 Calculation of the Sum-of-Fractions (SOF)

Sample ID	Sample Depth (ft)	Type (Systematic, Bias, QC)	TestAmerica Analytical Results																												
			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
L03-02-01-P-S-S-00	0.00	S	1.360	0.187	0.067	NA	0.290	0.290	0.096	0.096	0.031	0.211	U	1.070	0.162	0.121	NA	0.070	0.070	0.071	NA	NA	NA	0.002	0.152	0.259	U	0.875	0.333	0.899	U
L03-02-02-P-R-S-00	0.50	S	1.090	0.151	0.066	NA	0.020	0.020	0.069	0.069	0.033	0.221	U	1.030	0.148	0.085	NA	0.030	0.030	1.405	NA	NA	NA	0.073	0.131	0.240	U	0.915	0.293	0.815	NA
L03-02-04-P-S-S-00	0.00	S	1.250	0.176	0.070	NA	0.180	0.180	0.105	0.105	0.032	0.218	U	0.995	0.166	0.123	NA	-0.005	0.000	2.136	NA	NA	NA	0.112	0.151	0.248	U	1.320	0.543	0.818	NA
L03-02-05-P-R-S-00	0.50	S	1.560	0.204	0.082	NA	0.490	0.490	0.054	0.054	0.044	0.264	U	1.400	0.217	0.114	NA	0.400	0.400	0.941	NA	NA	NA	0.041	0.093	0.276	U	1.510	0.573	0.866	NA
L03-02-07-P-S-S-00	0.00	S	1.170	0.161	0.067	NA	0.100	0.100	0.059	0.059	0.054	0.206	U	1.090	0.192	0.110	NA	0.090	0.090	3.054	NA	NA	NA	0.167	0.123	0.173	U	0.975	0.310	0.774	NA
L03-02-08-P-R-S-00	0.50	S	1.360	0.198	0.075	NA	0.290	0.290	0.054	0.054	0.014	0.262	U	1.310	0.223	0.141	NA	0.310	0.310	3.625	NA	NA	NA	0.199	0.198	0.247	U	1.070	0.386	1.060	NA
L03-02-10-P-S-S-00	0.00	S	1.220	0.167	0.067	NA	0.150	0.150	0.084	0.084	0.028	0.213	U	1.280	0.216	0.100	NA	0.280	0.280	1.293	NA	NA	NA	0.068	0.135	0.238	U	0.751	0.294	0.860	U
L03-02-11-P-R-S-00	0.50	S	1.270	0.169	0.052	NA	0.200	0.200	0.034	0.034	0.035	0.236	U	1.200	0.178	0.114	NA	0.200	0.200	2.368	NA	NA	NA	0.125	0.153	0.236	U	1.320	0.553	0.845	NA
L03-02-13-P-S-S-00	0.00	S	1.140	0.177	0.088	NA	0.070	0.070	0.048	0.048	0.075	0.225	U	1.420	0.278	0.142	NA	0.420	0.420	3.031	NA	NA	NA	0.160	0.162	0.280	U	1.670	0.660	0.992	NA
L03-02-14-P-R-S-00	0.50	S	1.270	0.172	0.066	NA	0.200	0.200	-0.001	0.000	0.051	0.219	U	1.100	0.171	0.124	NA	0.100	0.100	0.750	NA	NA	NA	0.031	0.143	0.220	U	1.520	0.587	0.884	NA
L03-02-16-P-S-S-00	0.00	S	1.130	0.170	0.079	NA	0.060	0.060	0.090	0.090	0.073	0.234	U	1.190	0.195	0.128	NA	0.190	0.190	5.236	NA	NA	NA	0.289	0.162	0.198	NA	0.862	0.339	0.978	U
L03-02-17-P-R-S-00	0.50	S	1.250	0.164	0.062	NA	0.180	0.180	0.061	0.061	0.062	0.234	U	1.240	0.194	0.134	NA	0.240	0.240	1.897	NA	NA	NA	0.102	0.142	0.243	U	0.856	0.296	0.801	NA
L03-02-19-P-S-S-00	0.00	S	1.040	0.148	0.068	NA	-0.030	0.000	0.213	0.213	0.163	0.240	U	0.997	0.156	0.088	NA	-0.003	0.000	3.133	NA	NA	NA	0.163	0.114	0.164	U	1.960	0.650	0.795	NA
L03-02-20-P-R-S-00	0.50	S	1.330	0.193	0.085	NA	0.260	0.260	0.041	0.041	0.022	0.233	U	1.310	0.203	0.119	NA	0.310	0.310	0.741	NA	NA	NA	0.033	0.169	0.284	U	1.110	0.338	0.887	NA
L03-02-22-P-S-S-00	0.00	S	1.090	0.155	0.069	NA	0.020	0.020	0.141	0.141	0.044	0.212	U	1.060	0.160	0.084	NA	0.060	0.060	2.103	NA	NA	NA	0.111	0.147	0.249	U	1.160	0.332	0.889	NA
L03-02-23-P-R-S-00	0.50	S	1.210	0.174	0.070	NA	0.140	0.140	0.009	0.009	0.031	0.221	U	1.220	0.185	0.167	NA	0.220	0.220	1.926	NA	NA	NA	0.099	0.145	0.240	U	1.350	0.601	0.919	NA
L03-02-11-P-S-Q-00	0.50	Q	1.260	0.166	0.069	NA	0.190	0.190	-0.001	0.000	0.025	0.233	U	1.230	0.181	0.093	NA	0.230	0.230	3.529	NA	NA	NA	0.191	0.119	0.173	NA	1.450	0.553	0.838	NA
L03-02-19-P-R-Q-00	0.00	Q	1.030	0.149	0.070	NA	-0.040	0.000	0.346	0.346	0.146	0.234	NA	1.070	0.165	0.131	NA	0.070	0.070	1.859	NA	NA	NA	0.090	0.150	0.249	U	1.830	0.587	0.850	NA
L03-02-25-P-S-B-00	0.00	B	1.010	0.159	0.079	NA	-0.060	0.000	0.022	0.022	0.117	0.222	U	0.978	0.203	0.114	NA	-0.022	0.000	2.962	NA	NA	NA	0.158	0.160	0.251	U	1.490	0.602	0.905	NA
L03-02-26-P-S-B-00	0.00	B	0.908	0.131	0.061	NA	-0.162	0.000	0.265	0.265	0.106	0.257	NA	0.935	0.139	0.082	NA	-0.065	0.000	2.473	NA	NA	NA	0.133	0.102	0.160	U	1.120	0.480	0.735	NA
Systematic Minimum					0.000					0.000										0.071				0.002						0.751	
Systematic Maximum					0.490					0.213										5.236				0.289						1.960	
Systematic Mean					0.166					0.072										2.107				0.111						1.202	
Systematic Median					0.165					0.060										2.014				0.107						1.135	
Systematic Standard Deviation					0.127					0.051										1.302				0.073						0.341	
			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.

HDP-PR-FSS-721 Final Status Survey Data Evaluation
Steps 8.3 Preliminary Data Review and 8.4 Calculation of the Sum-of-Fractions (SOF)

Sample ID	Sample Depth (ft)	Type (Systematic, Bias, QC)	Enr.	SOF _N	Root Stratum SOF Verification (unexcavated/not backfilled only)				
			Enrichment (%)	SOF _N	Is Sample in the Root Stratum?	Is ROOT Sample SOF ^ 0.5?	root count	excavation count	surface count
L03-02-01-P-S-S-00	0.00	S	0.1	0.20	SURFACE	good			1
L03-02-02-P-R-S-00	0.50	S	1.3	0.04	ROOT	good	1		
L03-02-04-P-S-S-00	0.00	S	1.4	0.12	SURFACE	good			1
L03-02-05-P-R-S-00	0.50	S	0.5	0.47	ROOT	good	1		
L03-02-07-P-S-S-00	0.00	S	2.6	0.12	SURFACE	good			1
L03-02-08-P-R-S-00	0.50	S	2.9	0.34	ROOT	good	1		
L03-02-10-P-S-S-00	0.00	S	1.4	0.23	SURFACE	good			1
L03-02-11-P-R-S-00	0.50	S	1.5	0.23	ROOT	good	1		
L03-02-13-P-S-S-00	0.00	S	1.5	0.28	SURFACE	good			1
L03-02-14-P-R-S-00	0.50	S	0.4	0.17	ROOT	good	1		
L03-02-16-P-S-S-00	0.00	S	5.0	0.17	SURFACE	good			1
L03-02-17-P-R-S-00	0.50	S	1.9	0.23	ROOT	good	1		
L03-02-19-P-S-S-00	0.00	S	1.3	0.04	SURFACE	good			1
L03-02-20-P-R-S-00	0.50	S	0.5	0.30	ROOT	good	1		
L03-02-22-P-S-S-00	0.00	S	1.5	0.07	SURFACE	good			1
L03-02-23-P-R-S-00	0.50	S	1.2	0.20	ROOT	good	1		
L03-02-11-P-S-Q-00	0.50	Q	2.1	0.25		good			
L03-02-19-P-R-Q-00	0.00	Q	0.8	0.07		good			
L03-02-25-P-S-B-00	0.00	B	1.7	0.03		good			
L03-02-26-P-S-B-00	0.00	B	1.9	0.03		good			
			1.6	0.04					
				0.47					
				0.20					
				0.20					
				0.11					
			Average Enrichment (%)						
					16	8	0	8	
					count tot				

MDC
0.18
0.12
0.14
0.15
0.12
0.15
0.13
0.13
0.16
0.14
0.14
0.14
0.11
0.16
0.12
0.16
0.12
0.15
0.14
0.11

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} 0.20

fractions	SS	RS	ES
	0.5	0.5	0

SOF_{MEAN} Re-use Backfill Material

0.17 Stockpile 8b

SOF_{MEAN} Groundwater

0.16

SOF <=1

SOF_{MEAN, SU} 0.53 PASS

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

13.3 mrem

Infer U234			
U-238/U235	U-234/U235	U-234	% Enrichment
568.2	46.3	0.1	0.1
12.5	19.2	1.4	1.3
11.8	19.1	2.1	1.4
36.5	22.7	0.9	0.5
5.8	18.3	3.1	2.6
5.4	18.2	3.6	2.9
11.1	19.1	1.3	1.4
10.6	18.9	2.4	1.5
10.4	18.9	3.0	1.5
49.0	24.2	0.7	0.4
3.0	18.1	5.2	5.0
8.4	18.6	1.9	1.9
12.0	19.2	3.1	1.3
34.0	22.7	0.7	0.5
10.5	18.9	2.1	1.5
13.6	19.4	1.9	1.2
7.6	18.5	3.5	2.1
20.2	20.6	1.9	0.8
9.4	18.7	3.0	1.7
8.4	18.6	2.5	1.9

Average Enrichment (%) 1.56

Infer U-234 MDC using U-235 MDC * ratio of U-234:U-235 @ that sample's enrichment
12.00
4.61
4.73
6.27
3.16
4.50
4.54
4.47
5.31
5.32
3.59
4.52
3.15
6.46
4.72
4.65
3.20
5.12
4.71
2.98

HDP-PR-FSS-721 Final Status Survey Data Evaluation
Steps 8.3 Preliminary Data Review and 8.4 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
0.290	0.096	0.070	0.071	0.002	0.875
-	-	-	-	-	-
0.180	0.105	0.000	2.136	0.112	1.320
-	-	-	-	-	-
0.100	0.059	0.090	3.054	0.167	0.975
-	-	-	-	-	-
0.150	0.084	0.280	1.293	0.068	0.751
-	-	-	-	-	-
0.070	0.048	0.420	3.031	0.160	1.670
-	-	-	-	-	-
0.060	0.090	0.190	5.236	0.289	0.862
-	-	-	-	-	-
0.000	0.213	0.000	3.133	0.163	1.960
-	-	-	-	-	-
0.020	0.141	0.060	2.103	0.111	1.160
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
0.109	0.105	0.139	2.507	0.134	1.197
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
-	-	-	-	-	-
0.020	0.069	0.030	1.405	0.073	0.915
-	-	-	-	-	-
0.490	0.054	0.400	0.941	0.041	1.510
-	-	-	-	-	-
0.290	0.054	0.310	3.625	0.199	1.070
-	-	-	-	-	-
0.200	0.034	0.200	2.368	0.125	1.320
-	-	-	-	-	-
0.200	0.000	0.100	0.750	0.031	1.520
-	-	-	-	-	-
0.180	0.061	0.240	1.897	0.102	0.856
-	-	-	-	-	-
0.260	0.041	0.310	0.741	0.033	1.110
-	-	-	-	-	-
0.140	0.009	0.220	1.926	0.099	1.350
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
0.223	0.040	0.226	1.707	0.088	1.206
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
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
0.000	0.000	0.000	0.000	0.000	0.000

HDP-PR-FSS-721 Final Status Survey Data Evaluation
 Step 8.5 Performance of Statistical Tests

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	46	46
9574-SS-140910-01-02	Reference	1.18	2.179	37	37
9574-SS-140910-01-03	Reference	1.06	2.064	32	32
9574-SS-140910-01-04	Reference	1.10	2.101	33	33
9574-SS-140910-01-05	Reference	1.29	2.293	45	45
9574-SS-140910-01-07	Reference	1.34	2.339	47	47
9574-SS-140910-01-08	Reference	1.15	2.154	36	36
9574-SS-140910-01-09	Reference	1.18	2.182	38	38
9574-SS-140910-01-10	Reference	1.23	2.227	43	43
9574-SS-140910-01-11	Reference	1.38	2.380	48	48
9574-SS-140910-01-12	Reference	1.05	2.055	31	31
9574-SS-140910-01-13	Reference	0.94	1.941	21	21
9574-SS-140910-01-14	Reference	1.12	2.119	34	34
9574-SS-140910-01-15	Reference	1.15	2.152	35	35
9574-SS-140910-01-16	Reference	1.03	2.028	28	28
9574-SS-140910-01-17	Reference	0.44	1.443	16	16
9574-SS-140910-01-18	Reference	1.19	2.188	40	40
9574-SS-140910-01-20	Reference	0.76	1.757	18	18
9574-SS-140910-01-21	Reference	1.02	2.023	27	27
9574-SS-140910-01-22	Reference	1.02	2.018	26	26
9574-SS-140910-01-23	Reference	1.00	2.002	23	23
9574-SS-140910-01-24	Reference	0.87	1.873	20	20
9574-SS-140910-01-25	Reference	1.04	2.040	30	30
9574-SS-140910-01-26	Reference	0.96	1.959	22	22
9574-SS-140910-01-27	Reference	1.20	2.204	41	41
9574-SS-140910-01-28	Reference	1.01	2.007	25	25
9574-SS-140910-01-29	Reference	1.22	2.223	42	42
9574-SS-140910-01-30	Reference	1.03	2.035	29	29
9574-SS-140910-01-31	Reference	1.00	2.005	24	24
9574-SS-140910-01-32	Reference	0.86	1.865	19	19
9574-SS-140910-01-33	Reference	1.24	2.238	44	44
9574-SS-140910-01-34	Reference	1.19	2.185	39	39
L03-02-01-P-S-S-00	Survey Unit	1.26	1.260	8	0
L03-02-02-P-R-S-00	Survey Unit	1.11	1.105	2	0
L03-02-04-P-S-S-00	Survey Unit	1.18	1.180	4	0
L03-02-05-P-R-S-00	Survey Unit	1.54	1.538	17	0
L03-02-07-P-S-S-00	Survey Unit	1.19	1.188	5	0
L03-02-08-P-R-S-00	Survey Unit	1.40	1.402	15	0
L03-02-10-P-S-S-00	Survey Unit	1.30	1.298	12	0
L03-02-11-P-R-S-00	Survey Unit	1.29	1.292	10	0
L03-02-13-P-S-S-00	Survey Unit	1.34	1.340	13	0
L03-02-14-P-R-S-00	Survey Unit	1.23	1.232	7	0
L03-02-16-P-S-S-00	Survey Unit	1.23	1.231	6	0
L03-02-17-P-R-S-00	Survey Unit	1.30	1.297	11	0
L03-02-19-P-S-S-00	Survey Unit	1.09	1.085	1	0
L03-02-20-P-R-S-00	Survey Unit	1.37	1.368	14	0
L03-02-22-P-S-S-00	Survey Unit	1.13	1.129	3	0
L03-02-23-P-R-S-00	Survey Unit	1.27	1.267	9	0
Rank Sums				1176	1039
# Reference Area Measurements				m	32
# Survey Unit Measurements				n	16
Total Number of Measurements				N	48
(1-α) percentile of a standard normal distribution (MARSSIM Pg. I-10)				z	1.645
WRS Critical Value (MARSSIM Pg. I-10, Eq. I.1)				CV	860

Min adjusted bkg SOF:
1.44

No WRS test necessary
 No WRS test necessary
 No WRS test necessary
 Perform WRS test
 No WRS test necessary
 No WRS test necessary
 No WRS test necessary
 No WRS test necessary
 No WRS test necessary
 No WRS test necessary
 No WRS test necessary
 No WRS test necessary
 No WRS test necessary
 No WRS test necessary
 No WRS test necessary
 No WRS test necessary
 No WRS test necessary

W_r

$\alpha = 0.05$

TEST: **PASS**

HDP-PR-FSS-701 Final Status Survey Plan Development
Appendix P-1 Step 8. Calculate the Number of Samples in the Statistical Survey Population

Uniform DCGL Criteria Evaluation	
N/2 Value Verification	
Isotope(s)	SOF (Ra/Tc/Th/Iso U)
St. Dev.	0.11
DCGL _{SOF}	1
LBGR (Mean)	0.20
Shift	0.80
Relative Shift (Δ/σ)	6.96
MARSSIM Table 5.1 (P_r)	1.000000
N	12
N + 20%	14.4
N/2	8
FSS N/2	8
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, $\alpha = 0.05, \beta = 0.10$

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

Hematite Decommissioning Project	Procedure: HDP-PR-FSS-703, Final Status Survey Quality Control							Revision: 2	Page 1 of 1
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**FORM HDP-PR-FSS-703-1
FIELD DUPLICATE SAMPLE ASSESSMENT**

Survey Unit No.:	LSA 03-02				Survey Unit Description:	Class 2 Survey Unit West of Site Pond in "Area 5"						
Sample ID	Field Duplicate Sample ID	Radionuclide	Sample (pCi/g)		Field Duplicate Sample (pCi/g)		Average Activity (\bar{x}) (pCi/g)	Nuclide DCGL (pCi/g)	Statistic ²	Warning Limit	Control Limit	Statistic Exceeds Limit? (Y/N)
			Activity (x _i)	MDC	Activity (x _i)	MDC						
L03-02-11-P-R-S-00	L03-02-11-P-S-Q-00	Ra-226	1.270	0.0519	1.260	0.069	1.265	1.9	0.01	0.269	0.403	N
L03-02-11-P-R-S-00	L03-02-11-P-S-Q-00	Tc-99	0.0344	0.236	-0.0014	0.233	0.0165	25.1	NA	3.552	5.321	NA
L03-02-11-P-R-S-00	L03-02-11-P-S-Q-00	Th-232	1.2	0.114	1.230	0.093	1.215	2.0	0.030	0.283	0.424	N
L03-02-11-P-R-S-00	L03-02-11-P-S-Q-00	U-234 ¹	2.368	NA	3.529	NA	2.949	195.4	1.161	27.649	41.425	N
L03-02-11-P-R-S-00	L03-02-11-P-S-Q-00	U-235	0.125	0.236	0.191	0.173	0.158	51.6	NA	7.301	10.939	NA
L03-02-11-P-R-S-00	L03-02-11-P-S-Q-00	U-238	1.32	0.845	1.45	0.838	1.385	168.8	0.13	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: Thomas Yardy _____

Reviewed by: Clark Evers _____

Date: _____

Date: _____

Quality Record

Hematite Decommissioning Project	Procedure: HDP-PR-FSS-703, Final Status Survey Quality Control							Revision: 2	Page 1 of 1
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**FORM HDP-PR-FSS-703-1
FIELD DUPLICATE SAMPLE ASSESSMENT**

Survey Unit No.:	LSA 03-02				Survey Unit Description:	Class 2 Survey Unit West of Site Pond in "Area 5"						
Sample ID	Field Duplicate Sample ID	Radionuclide	Sample (pCi/g)		Field Duplicate Sample (pCi/g)		Average Activity (\bar{x}) (pCi/g)	Nuclide DCGL (pCi/g)	Statistic ²	Warning Limit	Control Limit	Statistic Exceeds Limit? (Y/N)
			Activity (x _i)	MDC	Activity (x _i)	MDC						
L03-02-19-P-S-S-00	L03-02-19-P-R-Q-00	Ra-226	1.04	0.0682	1.03	0.0695	1.035	1.9	0.01	0.269	0.403	N
L03-02-19-P-S-S-00	L03-02-19-P-R-Q-00	Tc-99	0.213	0.24	0.346	0.234	0.2795	25.1	NA	3.552	5.321	NA
L03-02-19-P-S-S-00	L03-02-19-P-R-Q-00	Th-232	0.997	0.088	1.07	0.131	1.034	2.0	0.073	0.283	0.424	N
L03-02-19-P-S-S-00	L03-02-19-P-R-Q-00	U-234 ¹	3.133	NA	1.859	NA	2.496	195.4	1.274	27.649	41.425	N
L03-02-19-P-S-S-00	L03-02-19-P-R-Q-00	U-235	0.163	0.164	0.0904	0.249	0.127	51.6	NA	7.301	10.939	NA
L03-02-19-P-S-S-00	L03-02-19-P-R-Q-00	U-238	1.96	0.795	1.83	0.85	1.895	168.8	0.13	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: Thomas Yardy _____

Reviewed by: Clark Evers _____

Date: _____

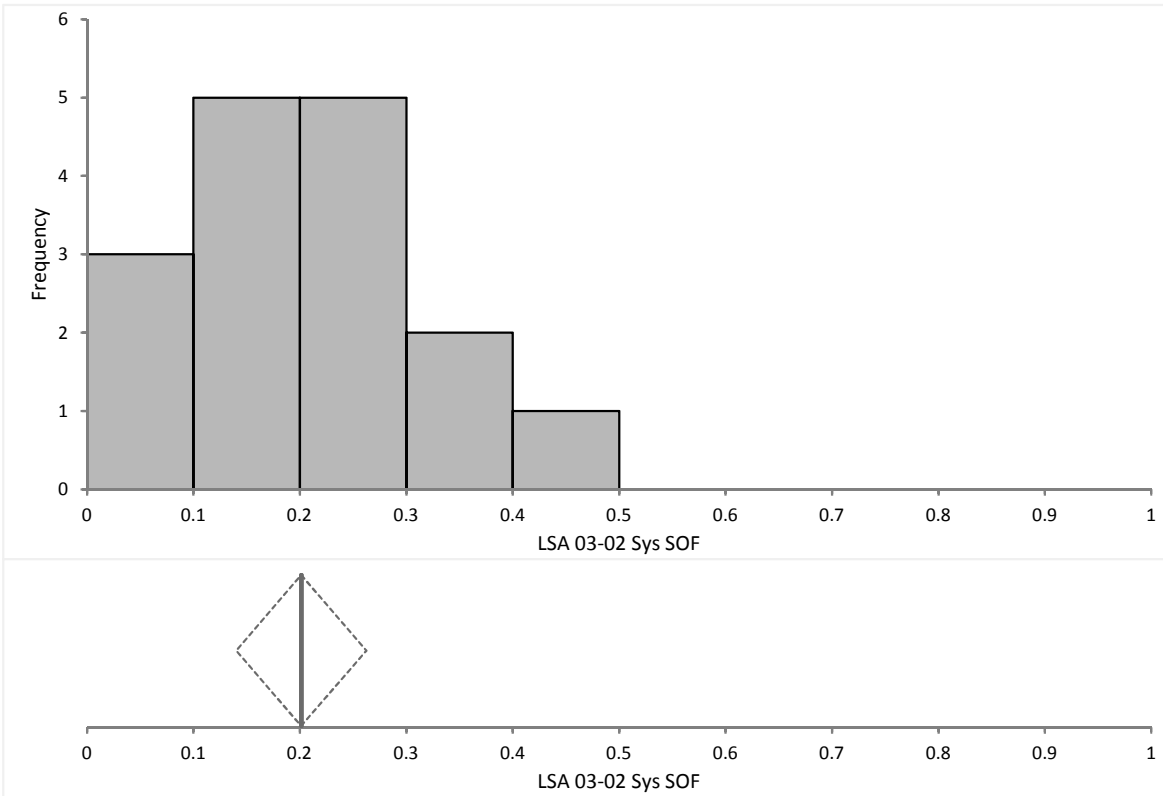
Date: _____

Quality Record

LSA 03-02 Sys SOF

0.2
0.0
0.1
0.5
0.1
0.3
0.2
0.2
0.3
0.2
0.2
0.2
0.0
0.3
0.1
0.2

Descriptives



N | 16

	Mean	95% CI	Mean SE	SD	Variance	Skewness	Kurtosis
LSA 03-02 Sys SOF	0.20	0.14 to 0.26	0.029	0.11	0.01	0.6	0.79
	Minimum	1st quartile	Median	97.87% CI	3rd quartile	Maximum	IQR
LSA 03-02 Sys SOF	0.04	0.12	0.20	0.12 to 0.28	0.26	0.5	0.14