

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:	BSA 02	Description:	Plant Open Land Area
Survey Unit:	01	Description:	Subsurface Soil Below Bldg 230
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
B02-01-01-P-S-S-00	Surface	S	434.5	434.0	141	43	Surface 6-inch grab
B02-01-02-P-R-S-00	Root	S	434.0	429.6	141	43	Root 4.4-ft composite
B02-01-03-P-E-S-00	Excavation	S	429.6	429.1	141	43	Excavation 6-inch grab
B02-01-04-P-S-S-00	Surface	S	434.5	434.0	141	118	Surface 6-inch grab
B02-01-05-P-R-S-00	Root	S	434.0	429.6	141	118	Root 4.4-ft composite
B02-01-06-P-E-S-00	Excavation	S	429.6	429.1	141	118	Excavation 6-inch grab
B02-01-07-P-S-S-00	Surface	S	434.5	434.0	141	194	Surface 6-inch grab
B02-01-08-P-R-S-00	Root	S	434.0	429.6	141	194	Root 4.4-ft composite
B02-01-09-P-E-S-00	Excavation	S	429.6	429.1	141	194	Excavation 6-inch grab
B02-01-10-P-S-S-00	Surface	S	434.5	434.0	76	6	Surface 6-inch grab
B02-01-11-P-R-S-00	Root	S	434.0	429.6	76	6	Root 4.4-ft composite
B02-01-12-P-E-S-00	Excavation	S	429.6	429.1	76	6	Excavation 6-inch grab
B02-01-13-P-S-S-00	Surface	S	434.5	434.0	76	81	Surface 6-inch grab
B02-01-14-P-R-S-00	Root	S	434.0	429.6	76	81	Root 4.4-ft composite
B02-01-15-P-E-S-00	Excavation	S	429.6	429.1	76	81	Excavation 6-inch grab
B02-01-16-P-S-S-00	Surface	S	434.5	434.0	76	156	Surface 6-inch grab
B02-01-17-P-R-S-00	Root	S	434.0	429.6	76	156	Root 4.4-ft composite
B02-01-18-P-E-S-00	Excavation	S	429.6	429.1	76	156	Excavation 6-inch grab
B02-01-19-P-S-S-00	Surface	S	434.5	434.0	11	43	Surface 6-inch grab
B02-01-20-P-R-S-00	Root	S	434.0	429.6	11	43	Root 4.4-ft composite
B02-01-21-P-E-S-00	Excavation	S	429.6	429.1	11	43	Excavation 6-inch grab
B02-01-22-P-S-S-00	Surface	S	434.5	434.0	11	118	Surface 6-inch grab
B02-01-23-P-R-S-00	Root	S	434.0	429.6	11	118	Root 4.4-ft composite
B02-01-24-P-S-S-00	Excavation	S	429.6	429.1	11	118	Excavation 6-inch grab
B02-01-02-P-S-Q-00	Root	Q	434.0	429.6	141	43	Root 4.4-ft composite
B02-01-10-P-S-Q-00	Surface	Q	434.5	434.0	76	6	Surface 6-inch grab
B02-01-25-P-S-B-00	Surface	B	434.5	434.0	65	10	Biased 6-inch grab

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

*X and Y coordinates originate from southwest corner of floor surface (Bldg 230)

Surface: Floor = F; Wall = W; Ceiling = C; Roof = R

CSM: Three-Layer (Surface-Root-Excavation) or Uniform DCGLs used

Type: Systematic = S, Biased = B; QC = Q; Investigation = I

Quality Record

Steps 8.3 Preliminary Data Review and 8.4 Calculation of the Sum-of-Fractions (SOF)

Evaluate Final Status Survey Data: BSA-02-01

Test/Analyte Analytical Results Step B.3.2																																	
Sample ID		Sample Depth (m)	Type (S = stratified, B = bulk, Q = Q)	Te-226					Te-99					Th-232					Inferred U-234					U-235					U-238				
				Result	Uncertainty	MDC	Qualifier	Net Result	Corrected Result	Uncertainty	MDC	Qualifier	Net Result	Corrected Result	Uncertainty	MDC	Qualifier	Net Result	Corrected Result	Uncertainty	MDC	Qualifier	Net Result	Corrected Result	Uncertainty	MDC	Qualifier	Net Result	Corrected Result	Uncertainty	MDC	Qualifier	
B02-01-01-P-S-Q	0.00	0.166	0.04	0.0261	N/A	-0.904	0.000	-0.026	0.000	0.01	0.184	U	0.11	0.033	0.0586	N/A	-0.890	0.000	0.630	N/A	N/A	0.035	0.044	0.0817	U	0.125	0.095	0.308	U	0.132	0.430	0.862	N/A
B02-01-01-P-S-Q	0.50	0.15	0.03	0.0237	N/A	-0.840	0.000	0.111	0.111	0.00	0.209	U	0.01	0.045	0.066	N/A	-0.910	0.010	0.768	N/A	N/A	0.09	0.07	0.121	U	0.132	0.430	0.862	N/A	0.135	0.662	0.892	N/A
B02-01-03-P-S-Q	0.00	0.105	0.05	0.0596	N/A	-0.020	0.000	-0.509	0.000	0.02	0.208	U	0.18	0.072	0.117	N/A	0.080	0.080	2.800	N/A	N/A	0.154	0.156	0.22	U	0.756	0.291	0.844	U	0.756	0.291	0.844	U
B02-01-04-P-S-Q	0.00	0.123	0.03	0.0246	N/A	-0.947	0.000	-0.118	0.010	0.02	0.17	U	0.053	0.026	0.0621	U	-0.947	0.000	0.194	N/A	N/A	0.01	0.018	0.0692	U	0.176	0.093	0.282	U	0.176	0.093	0.282	U
B02-01-05-P-S-Q	0.50	0.793	0.12	0.0514	N/A	-2.777	0.000	-0.012	0.012	0.04	0.197	U	0.82	0.141	0.113	N/A	-0.180	0.000	2.366	N/A	N/A	0.13	0.077	0.133	U	0.698	0.507	0.675	N/A	0.698	0.507	0.675	N/A
B02-01-05-P-S-Q	0.50	0.793	0.12	0.0514	N/A	-2.777	0.000	-0.012	0.012	0.04	0.197	U	0.82	0.141	0.113	N/A	-0.180	0.000	2.366	N/A	N/A	0.13	0.077	0.133	U	0.698	0.507	0.675	N/A	0.698	0.507	0.675	N/A
B02-01-07-P-S-Q	0.00	0.124	0.03	0.0215	N/A	-0.946	0.000	-0.087	0.003	0.05	0.175	U	0.057	0.033	0.0554	N/A	-0.943	0.000	0.300	N/A	N/A	0.015	0.032	0.0681	U	0.244	0.175	0.256	U	0.244	0.175	0.256	U
B02-01-08-P-S-Q	0.50	0.796	0.13	0.0705	N/A	-2.774	0.000	-0.047	0.050	0.02	0.208	U	0.88	0.139	0.0635	N/A	-0.120	0.000	1.345	N/A	N/A	0.071	0.119	0.196	U	0.71	0.278	0.688	N/A	0.71	0.278	0.688	N/A
B02-01-08-P-S-Q	0.50	0.796	0.13	0.0705	N/A	-2.774	0.000	-0.047	0.050	0.02	0.208	U	0.88	0.139	0.0635	N/A	-0.120	0.000	1.345	N/A	N/A	0.071	0.119	0.196	U	0.71	0.278	0.688	N/A	0.71	0.278	0.688	N/A
B02-01-10-P-S-Q	0.00	0.162	0.04	0.0291	N/A	-0.908	0.000	-0.019	0.010	0.03	0.179	U	0.069	0.033	0.0447	N/A	-0.931	0.000	0.704	N/A	N/A	0.039	0.043	0.0721	U	0.135	0.108	0.297	U	0.135	0.108	0.297	U
B02-01-11-P-S-Q	0.50	0.15	0.05	0.0679	N/A	-0.220	0.020	-0.001	0.001	0.01	0.199	U	0.979	0.181	0.123	N/A	-0.921	0.020	1.249	N/A	N/A	0.066	0.135	0.225	U	0.756	0.291	0.844	U	0.756	0.291	0.844	U
B02-01-11-P-S-Q	0.50	0.15	0.05	0.0679	N/A	-0.220	0.020	-0.001	0.001	0.01	0.199	U	0.979	0.181	0.123	N/A	-0.921	0.020	1.249	N/A	N/A	0.066	0.135	0.225	U	0.756	0.291	0.844	U	0.756	0.291	0.844	U
B02-01-13-P-S-Q	0.00	0.164	0.04	0.024	N/A	-0.906	0.000	-0.015	0.000	0.02	0.193	U	0.093	0.03	0.0548	N/A	-0.907	0.000	0.339	N/A	N/A	0.018	0.039	0.0833	U	0.195	0.167	0.283	U	0.195	0.167	0.283	U
B02-01-14-P-S-Q	0.50	0.934	0.13	0.0609	N/A	-1.316	0.000	-0.044	0.040	0.04	0.218	U	0.992	0.154	0.103	N/A	-0.904	0.000	0.705	N/A	N/A	0.099	0.122	0.217	U	1.22	0.449	0.746	N/A	1.22	0.449	0.746	N/A
B02-01-16-P-S-Q	0.00	0.15	0.03	0.0263	N/A	-0.907	0.000	-0.012	0.009	0.01	0.194	U	0.09	0.039	0.054	N/A	-0.908	0.000	0.241	N/A	N/A	0.02	0.024	0.049	U	0.143	0.106	0.274	U	0.143	0.106	0.274	U
B02-01-16-P-S-Q	0.00	0.2	0.04	0.0282	N/A	-0.870	0.000	-0.047	0.003	0.03	0.176	U	0.112	0.044	0.0484	N/A	-0.888	0.000	1.135	N/A	N/A	0.063	0.051	0.0825	U	0.181	0.164	0.274	U	0.181	0.164	0.274	U
B02-01-17-P-S-Q	0.50	0.642	0.1	0.0492	N/A	-0.428	0.000	-0.023	0.002	0.04	0.179	U	0.611	0.109	0.079	N/A	-0.389	0.000	2.094	N/A	N/A	0.113	0.082	0.136	U	0.884	0.371	0.568	N/A	0.884	0.371	0.568	N/A
B02-01-19-P-S-Q	0.00	0.14	0.03	0.0237	N/A	-0.840	0.000	-0.012	0.009	0.01	0.194	U	0.09	0.039	0.054	N/A	-0.908	0.000	0.241	N/A	N/A	0.02	0.024	0.049	U	0.143	0.106	0.274	U	0.143	0.106	0.274	U
B02-01-19-P-S-Q	0.00	0.131	0.03	0.025	N/A	-0.939	0.000	-0.005	0.000	0.044	0.180	0.000	0.091	0.041	0.0406	N/A	-0.909	0.000	0.676	N/A	N/A	0.037	0.043	0.0725	U	0.083	0.105	0.314	U	0.083	0.105	0.314	U
B02-01-20-P-S-Q	0.50	0.84	0.12	0.0592	N/A	-0.230	0.020	0.0519	0.052	0.060	0.201	0.000	0.98	0.146	0.0917	N/A	-0.920	0.020	2.562	N/A	N/A	0.139	0.133	0.17	U	1	0.453	0.702	N/A	1	0.453	0.702	N/A
B02-01-22-P-S-Q	0.00	0.177	0.07	0.0784	N/A	-0.100	0.000	-0.100	0.000	0.031	0.213	0.000	0.248	0.052	0.0505	N/A	-0.985	0.000	0.985	N/A	N/A	0.067	0.158	0.241	U	0.795	0.321	0.61	U	0.795	0.321	0.61	U
B02-01-22-P-S-Q	0.00	0.285	0.05	0.0292	N/A	-0.785	0.000	-0.288	0.288	0.042	0.182	N/A	0.248	0.052	0.0505	N/A	-0.752	0.000	1.182	N/A	N/A	0.065	0.074	0.106	U	0.286	0.141	0.376	U	0.286	0.141	0.376	U
B02-01-23-P-S-Q	0.50	0.976	0.14	0.0645	N/A	-0.094	0.000	-0.044	0.044	0.048	0.214	N/A	0.949	0.161	0.105	N/A	-0.951	0.000	0.853	N/A	N/A	0.039	0.087	0.182	U	1.05	0.475	0.728	N/A	1.05	0.475	0.728	N/A
B02-01-23-P-S-Q	0.50	1.25	0.17	0.0715	N/A	-0.180	0.000	-0.033	0.040	0.042	0.212	U	1.17	0.183	0.116	N/A	-0.950	0.170	2.729	N/A	N/A	0.091	0.185	0.251	U	0.917	0.388	0.833	N/A	0.917	0.388	0.833	N/A
B02-01-02-P-H-Q	0.00	0.576	0.1	0.0766	N/A	-0.494	0.000	0.1445	0.015	0.003	0.201	U	0.652	0.118	0.075	N/A	-0.338	0.000	1.931	N/A	N/A	0.103	0.098	0.183	U	0.987	0.442	0.635	N/A	0.987	0.442	0.635	N/A
B02-01-10-P-S-Q	0.00	0.229	0.05	0.028	N/A	-0.841	0.000	-0.013	0.000	0.003	0.192	U	0.082	0.042	0.0712	N/A	-0.918	0.000	1.04	N/A	N/A	0.005	0.038	0.0996	U	0.126	0.132	0.388	U	0.126	0.132	0.388	U
B02-01-20-P-S-Q	0.50	0.811	0.14	0.0665	N/A	-0.159	0.000	-0.0228	0.023	0.003	0.228	U	1.08	0.174	0.114	N/A	-0.960	0.060	2.532	N/A	N/A	0.139	0.156	0.227	U	0.734	0.365	0.709	U	0.734	0.365	0.709	U
Systemic Minimum									0.000					0.000					0.194					0.000					0.083				
Systemic Maximum									0.180					0.230					2.800					0.154					1.430				
Systemic Mean									0.062					0.054					0.447					0.077					0.481				
Systemic Median									0.000					0.000					0.779					0.000					0.000				
Systematic Standard Deviation									0.055					0.107					0.779					0.043					0.042				
Step B.4.2																																	
With ingrowth, use R4226 box = 1.01																																	
Th-232 box = 1.0																																	

* Background with ingrowth (1.07 pCi/g) subtracted from gross results.

**Background (1.0 pCi/g) subtracted from gross result.

All uncertainty values are reported at the 2-sigma confidence level.

Ave Conc. Ra-226, SS 0.000	Ave Conc. Tc-99, SS 0.000	Ave Conc. Th-232, SS 0.000	Ave Conc. U-234, SS 0.630	Ave Conc. U-238, SS 0.035	Ave Conc. U-235, SS 0.125
-	-	-	-	-	-
0.000	0.000	0.000	0.194	0.010	0.176
-	-	-	-	-	-
0.000	0.083	0.000	0.300	0.015	0.244
-	-	-	-	-	-
0.000	0.000	0.000	0.704	0.039	0.135
-	-	-	-	-	-
0.000	0.000	0.000	0.339	0.018	0.195
-	-	-	-	-	-
0.000	0.000	0.000	1.135	0.063	0.181
-	-	-	-	-	-
0.000	0.000	0.000	0.676	0.037	0.083
-	-	-	-	-	-
0.000	0.288	0.000	1.182	0.065	0.286
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
0.000	0.046	0.000	0.645	0.035	0.178

Use corrected net results for all DE calcs 721 Sec. 8.4.2

MOC Score Step 8.1.0
0.06
0.12
0.13
0.06
0.11
0.13
0.06
0.12
0.15
0.05
0.14
0.16
0.06
0.13
0.13
0.06
0.09
0.11
0.05
0.11
0.14
0.06
0.12
0.15
0.11
0.07
0.15

Step 8.4.5b

weight	SO _F	MEAN
		0.05

fractions

	SS	RS	ES
	0.3333333333	0.3333333333	0.3333333333

Step 8.4.5c SO_FMEAN Re-use Backfill Material

	0
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Step 8.4.5d SO_FMEAN Groundwater

	0.16
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Step 8.4.5g (c=1)

SO _F	MEAN, SU
	0.21

PASS

Infer U-234 MDC using U-235 MDC * ratio of U-234/U-235 @ that sample's enrichment

1.747193
4.18442
4.0362
1.39547
2.42264
4.48272
1.352
3.73012
4.70976
1.30528
4.29108
4.68676
1.58203
5.24079
3.30981
1.48543
2.52041
3.88402
1.32198
3.13306
4.48128
1.92231
4.17807
4.72859
3.43053
2.10721
4.91816

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, 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	0.111	0.010	1.768	0.090	1.320
-	-	-	-	-	-
-	-	-	-	-	-
0.000	0.012	0.000	2.368	0.130	0.698
-	-	-	-	-	-
-	-	-	-	-	-
0.000	0.050	0.000	1.345	0.071	0.710
-	-	-	-	-	-
-	-	-	-	-	-
0.000	0.001	0.000	1.249	0.066	0.756
-	-	-	-	-	-
-	-	-	-	-	-
0.000	0.040	0.000	0.709	0.029	1.220
-	-	-	-	-	-
-	-	-	-	-	-
0.000	0.002	0.000	2.094	0.113	0.884
-	-	-	-	-	-
-	-	-	-	-	-
0.000	0.052	0.000	2.562	0.139	1.000
-	-	-	-	-	-
-	-	-	-	-	-
0.000	0.464	0.000	0.853	0.039	1.050
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
0.000	0.992	0.001	1.618	0.985	0.955
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	0.08	2.7999	0.154	0.756
-	-	-	-	-	-
-	-	-	-	-	-
0.1	0	0.23	1.9834	0.104	1.14
-	-	-	-	-	-
-	-	-	-	-	-
0.07	0.0613	0.14	1.6484	0.0875	0.86
-	-	-	-	-	-
-	-	-	-	-	-
0.17	0.0494	0.22	1.9101	0.0985	1.35
-	-	-	-	-	-
-	-	-	-	-	-
0.03	0.0092	0.06	2.6525	0.14	1.43
-	-	-	-	-	-
-	-	-	-	-	-
0	0.0075	0.06	1.9894	0.105	1.09
-	-	-	-	-	-
-	-	-	-	-	-
0.1	0	0.15	1.7944	0.0965	0.795
-	-	-	-	-	-
-	-	-	-	-	-
0.18	0.0403	0.17	1.72	0.0913	0.927
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
0.081	0.021	0.139	2.062	0.110	1.044

Step 8.5 Performance of Statistical Tests

WRS TEST					
SAMPLE ID	AREA (Reference, Survey Unit)	Gross SOF ($X_{i,ref}$, $Y_{i,SU}$) Step 8.5.3a	ADJUSTED SOF (Z_i) Step 8.5.3b	RANKS Step 8.5.3d	REFERENCE AREA RANKS
9574-SS-140910-01-01	Reference	1.19	2.188	48	48
9574-SS-140910-01-02	Reference	0.76	1.757	26	26
9574-SS-140910-01-03	Reference	1.02	2.023	35	35
9574-SS-140910-01-04	Reference	1.02	2.018	34	34
9574-SS-140910-01-05	Reference	1.00	2.002	31	31
9574-SS-140910-01-07	Reference	0.87	1.873	28	28
9574-SS-140910-01-08	Reference	1.04	2.040	38	38
9574-SS-140910-01-09	Reference	0.96	1.959	30	30
9574-SS-140910-01-10	Reference	1.20	2.204	49	49
9574-SS-140910-01-11	Reference	1.01	2.007	33	33
9574-SS-140910-01-12	Reference	1.22	2.223	50	50
9574-SS-140910-01-13	Reference	1.03	2.035	37	37
9574-SS-140910-01-14	Reference	1.00	2.005	32	32
9574-SS-140910-01-15	Reference	0.86	1.865	27	27
9574-SS-140910-01-16	Reference	1.24	2.238	52	52
9574-SS-140910-01-17	Reference	1.19	2.185	47	47
9574-SS-140910-01-18	Reference	1.31	2.310	54	54
9574-SS-140910-01-20	Reference	1.18	2.179	45	45
9574-SS-140910-01-21	Reference	1.06	2.064	40	40
9574-SS-140910-01-22	Reference	1.10	2.101	41	41
9574-SS-140910-01-23	Reference	1.29	2.293	53	53
9574-SS-140910-01-24	Reference	1.34	2.339	55	55
9574-SS-140910-01-25	Reference	1.15	2.154	44	44
9574-SS-140910-01-26	Reference	1.18	2.182	46	46
9574-SS-140910-01-27	Reference	1.23	2.227	51	51
9574-SS-140910-01-28	Reference	1.38	2.380	56	56
9574-SS-140910-01-29	Reference	1.05	2.055	39	39
9574-SS-140910-01-30	Reference	0.94	1.941	29	29
9574-SS-140910-01-31	Reference	1.12	2.119	42	42
9574-SS-140910-01-32	Reference	1.15	2.152	43	43
9574-SS-140910-01-33	Reference	1.03	2.028	36	36
9574-SS-140910-01-34	Reference	0.44	1.443	25	25
B02-01-01-P-S-S-00	Survey Unit	0.15	0.147	6	0
B02-01-02-P-R-S-00	Survey Unit	1.07	1.070	16	0
B02-01-03-P-E-S-00	Survey Unit	1.11	1.114	18	0
B02-01-04-P-S-S-00	Survey Unit	0.09	0.094	1	0
B02-01-05-P-R-S-00	Survey Unit	0.85	0.847	10	0
B02-01-06-P-E-S-00	Survey Unit	1.25	1.250	22	0
B02-01-07-P-S-S-00	Survey Unit	0.10	0.100	2	0
B02-01-08-P-R-S-00	Survey Unit	0.87	0.873	11	0
B02-01-09-P-E-S-00	Survey Unit	1.19	1.188	20	0
B02-01-10-P-S-S-00	Survey Unit	0.13	0.125	4	0
B02-01-11-P-R-S-00	Survey Unit	1.05	1.054	15	0
B02-01-12-P-E-S-00	Survey Unit	1.28	1.284	24	0
B02-01-13-P-S-S-00	Survey Unit	0.14	0.136	5	0
B02-01-14-P-R-S-00	Survey Unit	1.00	1.003	13	0
B02-01-15-P-E-S-00	Survey Unit	1.13	1.134	19	0
B02-01-16-P-S-S-00	Survey Unit	0.17	0.169	7	0
B02-01-17-P-R-S-00	Survey Unit	0.66	0.662	9	0
B02-01-18-P-E-S-00	Survey Unit	1.10	1.102	17	0
B02-01-19-P-S-S-00	Survey Unit	0.12	0.119	3	0
B02-01-20-P-R-S-00	Survey Unit	0.96	0.956	12	0
B02-01-21-P-E-S-00	Survey Unit	1.21	1.207	21	0
B02-01-22-P-S-S-00	Survey Unit	0.29	0.294	8	0
B02-01-23-P-R-S-00	Survey Unit	1.02	1.018	14	0
B02-01-24-P-S-S-00	Survey Unit	1.26	1.261	23	0
Rank Sums				1596	1296
# Reference Area Measurements				m	32
# Survey Unit Measurements				n	24
Total Number of Measurements Step 8.5.3c				N	56
(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	1012

Step 8.5.1

Min adjusted bkg SOF
1.44

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TEST: **PASS** Step 8.5.3f

HDP-PR-FSS-701 Final Status Survey Plan Development

Appendix B.1 Step 8 Calculate the Number of Samples in the Statistical Population

Uniform DCGL Criteria Evaluation	
N/2 Value Verification	
Isotope(s)	SOF (Ra/Tc/Th/Iso U)
St. Dev.	0.07
DCGL _{SOF}	1
LBGR (Mean)	0.05
Shift	0.95
Relative Shift (Δ/σ)	13.89
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		

FORM HDP-PR-FSS-703-1 FIELD DUPLICATE SAMPLE ASSESSMENT												
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Survey Unit No.:	BSA 02-01				Survey Unit Description:	Subsurface Soil Below Bldg 230						
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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						
B02-01-02-P-R-S-00	B02-01-02-P-R-Q-00	Ra-226	1.03	0.0642	0.576	0.0766	0.803	1.9	0.454	0.269	0.403	Y
B02-01-02-P-R-S-00	B02-01-02-P-R-Q-00	Tc-99	0.111	0.209	0.0145	0.192	0.063	25.1	NA	3.552	5.321	NA
B02-01-02-P-R-S-00	B02-01-02-P-R-Q-00	Th-232	1.01	0.096	0.662	0.075	0.836	2.0	0.348	0.283	0.424	Y
B02-01-02-P-R-S-00	B02-01-02-P-R-Q-00	U-234 ¹	1.768	N/A	1.931	N/A	1.849	195.4	0.163	27.649	41.425	N
B02-01-02-P-R-S-00	B02-01-02-P-R-Q-00	U-235	0.0902	0.214	0.103	0.183	0.097	51.6	NA	7.301	10.939	NA
B02-01-02-P-R-S-00	B02-01-02-P-R-Q-00	U-238	1.32	0.682	0.967	0.635	1.144	168.8	0.353	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

Date:

Reviewed by: Clark Evers

Date:

Quality Record

Hematite Decommissioning Project	Procedure: HDP-PR-FSS-703, Final Status Survey Quality Control											
								Revision: 2		Page 1 of 1		

FORM HDP-PR-FSS-703-1 FIELD DUPLICATE SAMPLE ASSESSMENT												
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Survey Unit No.:	BSA 02-01				Survey Unit Description:	Subsurface Soil Below Bldg 230						
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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						
B02-01-10-P-S-S-00	B02-01-10-P-S-Q-00	Ra-226	0.162	0.0291	0.229	0.028	0.196	1.9	0.067	0.269	0.403	N
B02-01-10-P-S-S-00	B02-01-10-P-S-Q-00	Tc-99	-0.0192	0.179	-0.0134	0.192	-0.016	25.1	NA	3.552	5.321	NA
B02-01-10-P-S-S-00	B02-01-10-P-S-Q-00	Th-232	0.0694	0.0447	0.0819	0.0712	0.076	2.0	0.013	0.283	0.424	N
B02-01-10-P-S-S-00	B02-01-10-P-S-Q-00	U-234 ¹	0.704	N/A	0.104	N/A	0.404	195.4	0.600	27.649	41.425	N
B02-01-10-P-S-S-00	B02-01-10-P-S-Q-00	U-235	0.0389	0.0721	0.00477	0.0996	0.022	51.6	NA	7.301	10.939	NA
B02-01-10-P-S-S-00	B02-01-10-P-S-Q-00	U-238	0.135	0.297	0.126	0.388	0.131	168.8	NA	23.885	35.786	NA

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

Date:

Reviewed by: Clark Evers

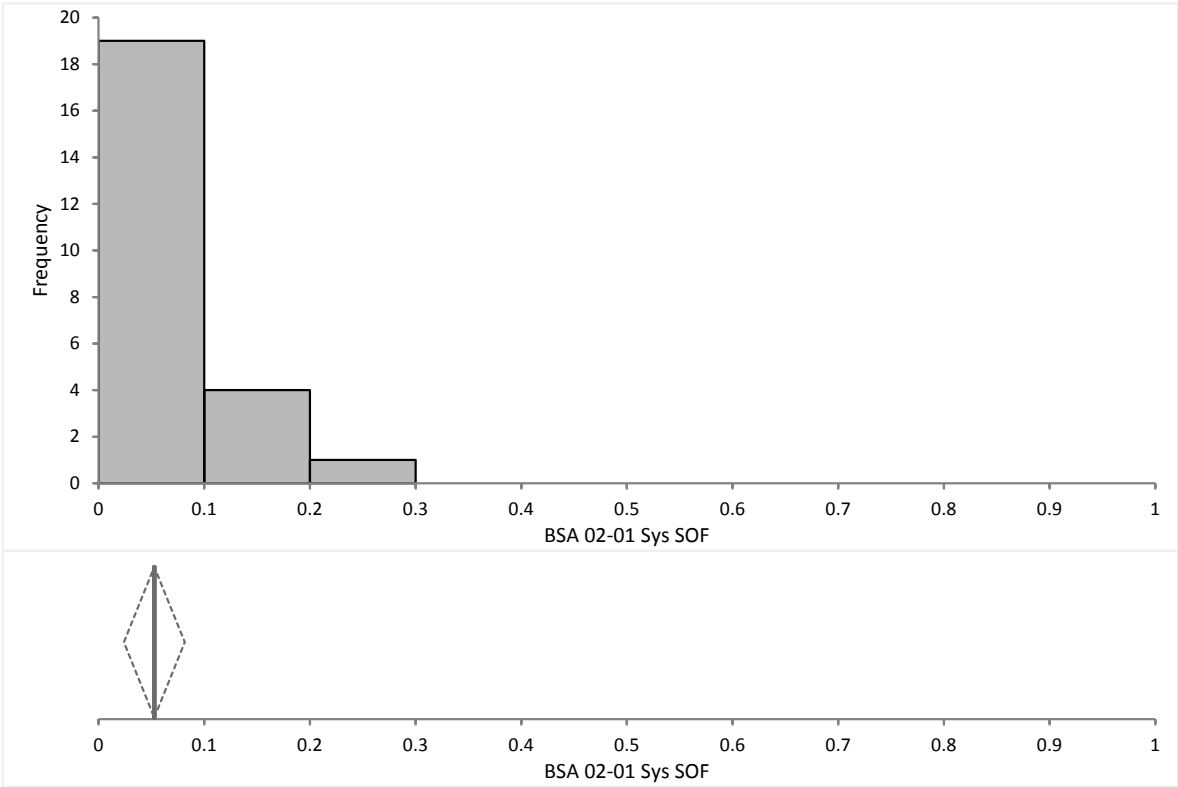
Date:

Quality Record

BSA 02-01 Sys SOF

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0.2

Descriptives



N		24						
		Mean	95% CI	Mean SE	SD	Variance	Skewness	Kurtosis
BSA 02-01 Sys SOF		0.05	0.02 to 0.08	0.014	0.07	0.00	1.5	1.00
		Minimum	1st quartile	Median	97.73% CI	3rd quartile	Maximum	IQR
BSA 02-01 Sys SOF		0.002	0.01	0.02	0.01 to 0.06	0.07	0.2	0.06