

Hematite Decommissioning Project	Procedure: HDP-PR-FSS-701, Final Status Survey Plan Development		
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APPENDIX P-4

FSS SAMPLE & MEASUREMENT LOCATIONS & COORDINATES

Survey Area:	LSA 10	Description:	Burial Pits Open Land Area
Survey Unit:	08	Description:	North Eastern Survey Unit in "Area 1"
Survey Type:	FSS	Classification:	Class I

Measurement or Sample ID	Surface or CSM	Type	Start Elevation*	End Elevation*	Northing** (Y Axis)	Easting** (X Axis)	Remarks / Notes
L100801BRS00	Uniform	S	430	427.5	827409.7	865391.0	Root Zone Composite
L100802BES00	Uniform	S	427.5	427.0	827409.7	865391.0	Excavation 6-inch grab
L100803BES00	Uniform	S	428	427.5	827412.8	865379.4	Excavation 6-inch grab
L100804BRS00	Uniform	S	428	426.5	827421.3	865387.9	Root Zone Composite
L100805BES00	Uniform	S	426.5	426.0	827421.3	865387.9	Excavation 6-inch grab
L100806BES00	Uniform	S	428	427.5	827424.4	865376.3	Excavation 6-inch grab
L100807BRS00	Uniform	S	426	421.5	827432.9	865384.8	Root Zone Composite
L100808BES00	Uniform	S	421.5	421.0	827432.9	865384.8	Excavation 6-inch grab
L100809BES00	Uniform	S	424.0	423.5	827427.5	865364.7	Excavation 6-inch grab
L100810BES00	Uniform	S	428.0	427.5	827436.0	865373.2	Excavation 6-inch grab
L100811BRS00	Uniform	S	426.0	422.5	827444.5	865381.7	Root Zone Composite
L100812BES00	Uniform	S	422.5	422.0	827444.5	865381.7	Excavation 6-inch grab
L100813BES00	Uniform	S	428.0	427.5	827447.6	865370.1	Excavation 6-inch grab
L100814BRS00	Uniform	S	426.0	423.5	827456.1	865378.6	Root Zone Composite
L100807BRQ00	Uniform	Q	426.0	421.5	827432.9	865384.8	Root Zone Composite
L100816BUB00	Uniform	B	428.0	427.5	827406.1	865383.8	Biased 6-inch grab
L100817BUB00	Uniform	B	427.5	427.0	827406.1	865383.8	Biased 6-inch grab
L100818BUB00	Uniform	B	428.0	427.5	827408.3	865384.4	Biased 6-inch grab
L100819BUB00	Uniform	B	427.5	427.0	827408.3	865384.4	Biased 6-inch grab
L100820BUB00	Uniform	B	426.0	425.5	827416.2	865385.9	Biased 6-inch grab
L100821BUB00	Uniform	B	425.5	425.0	827416.2	865385.9	Biased 6-inch grab
L100822BUB00	Uniform	B	426.0	425.5	827417.2	865390.4	Biased 6-inch grab
L100823BUB00	Uniform	B	425.5	425.0	827417.2	865390.4	Biased 6-inch grab
L100824BUB00	Uniform	B	424.0	423.5	827418.2	865377.0	Biased 6-inch grab
L100825BUB00	Uniform	B	423.5	423.0	827418.2	865377.0	Biased 6-inch grab
L100826BUB00	Uniform	B	426.0	425.5	827419.4	865384.0	Biased 6-inch grab
L100827BUB00	Uniform	B	425.5	425.0	827419.4	865384.0	Biased 6-inch grab
L100828BUB00	Uniform	B	428.0	427.5	827406.8	865384.2	Biased 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]
 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

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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.	0.06
DCGL _{SOF}	1
LBGR (Mean)	0.05
Shift	0.95
Relative Shift (Δ/σ)	17.03
MARSSIM Table 5.1 (P_r)	1.000000
N	12
N + 20%	14.4
N/2	8
FSS N/2	10
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

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

Survey Unit No.:	LSA 10-08				Survey Unit Description:	Burial Pits Open Land Area South Eastern Survey Unit in "Area 9"						
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						
L100807BRS00	L100807BRQ00	Ra-226	0.923	0.0591	0.907	0.0783	0.915	1.9	0.016	0.269	0.403	N
L100807BRS00	L100807BRQ00	Tc-99	0.194	0.252	0.276	0.237	0.235	25.1	NA	3.552	5.321	NA
L100807BRS00	L100807BRQ00	Th-232	0.77	0.0715	0.817	0.0976	0.794	2.0	0.047	0.283	0.424	N
L100807BRS00	L100807BRQ00	U-234 ¹	0.968	N/A	2.402	N/A	1.685	195.4	1.434	27.649	41.425	N
L100807BRS00	L100807BRQ00	U-235	0.0499	0.182	0.132	0.257	0.091	51.6	NA	7.301	10.939	NA
L100807BRS00	L100807BRQ00	U-238	0.658	0.606	0.671	0.757	0.665	168.8	NA	23.885	35.786	NA

Comments:

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

Performed by: _____

Reviewed by: _____

Date: _____

Date: _____

Quality Record

LSA 10-08 Sys SOF

0.2

0.0

0.1

0.0

0.0

0.0

0.0

0.0

0.0

0.0

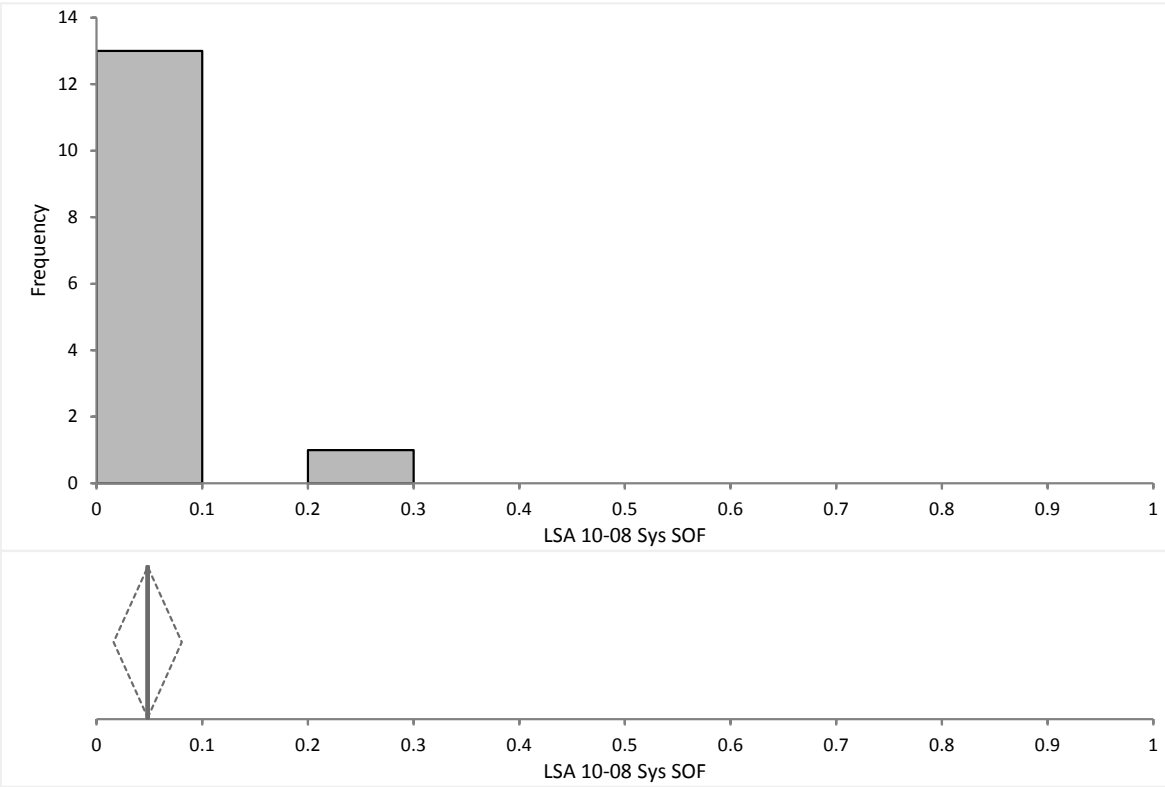
0.0

0.0

0.0

0.0

Descriptives



N		14						
LSA 10-08 Sys SOF	Mean	95% CI	Mean SE	SD	Variance	Skewness	Kurtosis	
	0.05	0.02 to 0.08	0.015	0.06	0.00	3.2	10.67	
LSA 10-08 Sys SOF	Minimum	1st quartile	Median	98.71% CI	3rd quartile	Maximum	IQR	
	0.02	0.02	0.03	0.02 to 0.05	0.05	0.2	0.02	