

| | | | |
|--|---|--------------|---------------------------|
| 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 10 | Description: | Burial Pits Open Land Area |
| Survey Unit: | 09 | Description: | South Eastern Survey Unit in "Area 9" |
| 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 |
|--------------------------|----------------|------|------------------|----------------|---------------------|--------------------|---------------------------|
| L100901BES00 | Uniform | S* | 420.4 | 419.9 | 865059.5 | 827780.9 | Excavation 6-inch grab |
| L100902BES00 | Uniform | S* | 417 | 416.5 | 865048.4 | 827769.8 | Excavation 6-inch grab |
| L100903BES00 | Uniform | S* | 420.5 | 420.0 | 865044.4 | 827785.0 | Excavation 6-inch grab |
| L100904BEQ00 | Uniform | Q | 419.6 | 419.1 | 865037.3 | 827758.7 | Excavation 6-inch grab |
| L100904BES00 | Uniform | S* | 419.6 | 419.1 | 865037.3 | 827758.7 | Excavation 6-inch grab |
| L100905BES00 | Uniform | S* | 417.2 | 416.7 | 865033.3 | 827773.9 | Excavation 6-inch grab |
| L100906BES00 | Uniform | S* | 417.2 | 416.7 | 865029.2 | 827789.0 | Excavation 6-inch grab |
| L100907BES00 | Uniform | S* | 421.7 | 421.2 | 865018.1 | 827777.9 | Excavation 6-inch grab |
| L100908BUB00 | Uniform | B | 421.5 | 421.0 | 865023.9 | 827779.2 | Biased 6-inch grab |
| L100909BUB00 | Uniform | B | 421.5 | 421.0 | 865047.0 | 827787.1 | Biased 6-inch grab |
| L100910BUB00 | Uniform | B | 421.5 | 421.0 | 865027.0 | 827782.8 | Biased 6-inch grab |
| L100911BSS00 | Uniform | S | 425 | 421.0 | 865051.2 | 827750.7 | Excavation 6-inch grab |
| L100912BRS00 | Uniform | S | 421.5 | 421.0 | 865051.2 | 827750.7 | Excavation zone composite |
| L100913BRS00 | Uniform | S | 420.7 | 420.2 | 865032.2 | 827755.8 | Excavation zone composite |
| L100914BES00 | Uniform | S | 420.2 | 415.7 | 865032.2 | 827755.8 | Excavation 6-inch grab |
| L100915BSS00 | Uniform | S | 421.5 | 421.0 | 865013.3 | 827760.9 | Excavation 6-inch grab |
| L100916BRS00 | Uniform | S | 421.0 | 416.0 | 865013.3 | 827760.9 | Excavation zone composite |
| L100917BRS00 | Uniform | S | 417.0 | 416.0 | 865046.1 | 827769.7 | Excavation zone composite |
| L100918BES00 | Uniform | S | 416.0 | 415.5 | 865046.1 | 827769.7 | Excavation 6-inch grab |
| L100919BES00 | Uniform | S | 418.1 | 417.6 | 865027.2 | 827774.7 | Excavation 6-inch grab |
| L100920BSS00 | Uniform | S | 420.3 | 419.8 | 865060.0 | 827783.5 | Excavation 6-inch grab |
| L100921BRS00 | Uniform | S | 419.8 | 415.3 | 865060.0 | 827783.5 | Excavation zone composite |
| L100922BRQ00 | Uniform | Q | 420.7 | 416.7 | 865041.0 | 827788.6 | Excavation zone composite |
| L100922BRS00 | Uniform | S | 420.7 | 416.7 | 865041.0 | 827788.6 | Excavation zone composite |
| L100923BES00 | Uniform | S | 416.7 | 416.2 | 865041.0 | 827788.6 | Excavation 6-inch grab |
| L100924BSS00 | Uniform | B | 421.7 | 421.2 | 865012.1 | 827769.4 | Sidewall 6-inch grab |
| L100925BSS00 | Uniform | B | 420.7 | 420.2 | 865021.7 | 827790.0 | Sidewall 6-inch grab |
| L100926BSS00 | Uniform | B | 421.7 | 421.2 | 865037.0 | 827801.7 | Sidewall 6-inch grab |
| L100927BSS00 | Uniform | B | 420.2 | 419.7 | 865057.3 | 827790.0 | Sidewall 6-inch grab |
| L100928BSS00 | Uniform | B | 422.7 | 422.2 | 865065.7 | 827773.1 | Sidewall 6-inch grab |
| L100929BSS00 | Uniform | B | 421.5 | 421.0 | 865055.1 | 827752.6 | Sidewall 6-inch grab |
| L100930BSS00 | Uniform | B | 421.4 | 420.9 | 865035.3 | 827745.5 | Sidewall 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]

*** First round of samples are presented for information only

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

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

Quality Record

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)

Evaluate Final Status Survey Data: LSA-10-09

| Sample ID | Sample Depth (ft) | Type (\otimes = Semi-M, \odot = Q) | TestAmerica Analytical Results Step 8.3.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------|-------------------|--|---|-------------|--------|-----------|-------------------------|------------------|--------|-------------|------|-----------|--------|-------------|-------|-----------|-------------------------|------------------|----------------|-------------|-----|-----------|--------|-------------|-------|-----------|--------|-------------|-------|-----------|----|
| | | | Ra-226 | | | | | | Tc-99 | | | | | Th-232 | | | | | Inferred U-234 | | | | U-235 | | | | U-238 | | | | |
| | | | Result | Uncertainty | MDC | Qualifier | Net Result ^a | Corrected Result | Result | Uncertainty | MDC | Qualifier | Result | Uncertainty | MDC | Qualifier | Net Result ^a | Corrected Result | Result | Uncertainty | MDC | Qualifier | Result | Uncertainty | MDC | Qualifier | Result | Uncertainty | MDC | Qualifier | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| L100901BE500 | 7.80 | S* | 1.2 | 0.17 | 0.0594 | N/A | 0.130 | 0.130 | 0.0739 | 0.074 | 0.05 | 0.21 | U | 1.09 | 0.166 | 0.101 | N/A | 0.090 | 0.090 | 3.308 | NA | NA | NA | 0.179 | 0.15 | 0.253 | U | 1.33 | 0.632 | 0.836 | NA |
| L100902BE500 | 12.20 | S* | 1.37 | 0.29 | 0.196 | N/A | 0.300 | 0.300 | 0.025 | 0.025 | 0.06 | 0.221 | U | 1.24 | 0.279 | 0.122 | NA | 0.240 | 0.240 | 2.894 | NA | NA | NA | 0.158 | 0.249 | 0.624 | U | 0.989 | 0.902 | 2.53 | U |
| L100903BE500 | 8.10 | S* | 1.09 | 0.17 | 0.0796 | N/A | 0.020 | 0.020 | 0.0207 | 0.021 | 0.02 | 0.22 | U | 1.14 | 0.163 | 0.0661 | N/A | 0.140 | 0.140 | 2.79 | NA | NA | NA | 0.123 | 0.16 | 0.281 | U | 0.952 | 0.445 | 1.19 | U |
| L100904BEQ00 | 8.60 | Q | 1.21 | 0.16 | 0.0637 | N/A | 0.140 | 0.140 | 0.0159 | 0.016 | 0.01 | 0.22 | U | 1.19 | 0.19 | 0.118 | N/A | 0.190 | 0.190 | 3.154 | NA | NA | NA | 0.189 | 0.154 | 0.236 | U | 1.44 | 0.64 | 0.819 | NA |
| L100904BE500 | 8.60 | S* | 1.13 | 0.16 | 0.0781 | N/A | 0.060 | 0.060 | -0.008 | 0.000 | 0.04 | 0.227 | U | 1.24 | 0.207 | 0.0928 | N/A | 0.240 | 0.240 | 1.037 | NA | NA | NA | 0.046 | 0.153 | 0.265 | U | 1.68 | 0.737 | 0.896 | NA |
| L100905BE500 | 12.10 | S* | 1.57 | 0.21 | 0.0694 | N/A | 0.500 | 0.500 | -0.021 | 0.000 | 0.04 | 0.224 | U | 1.06 | 0.176 | 0.13 | NA | 0.060 | 0.060 | 1.945 | NA | NA | NA | 0.102 | 0.154 | 0.256 | U | 1.15 | 0.546 | 0.763 | NA |
| L100906BE500 | 12.20 | S* | 1.2 | 0.18 | 0.0733 | N/A | 0.130 | 0.130 | 0.144 | 0.144 | 0.03 | 0.223 | U | 1.08 | 0.189 | 0.144 | N/A | 0.080 | 0.080 | 3.178 | NA | NA | NA | 0.172 | 0.147 | 0.18 | U | 1.25 | 0.777 | 0.969 | NA |
| L100907BE500 | 8.35 | S* | 1.15 | 0.17 | 0.0754 | N/A | 0.080 | 0.080 | 0.105 | 0.105 | 0.04 | 0.221 | U | 1.12 | 0.163 | 0.125 | N/A | 0.120 | 0.120 | 1.791 | NA | NA | NA | 0.089 | 0.145 | 0.25 | U | 1.54 | 0.786 | 0.929 | NA |
| L100908UB00 | 7.70 | B | 1.13 | 0.16 | 0.06 | N/A | 0.060 | 0.060 | -0.016 | 0.000 | 0.02 | 0.224 | U | 1.13 | 0.171 | 0.11 | N/A | 0.130 | 0.130 | 3.372 | NA | NA | NA | 0.1 | 0.128 | 0.242 | U | 1.36 | 0.662 | 0.834 | NA |
| L100909UB00 | 7.70 | B | 1.16 | 0.17 | 0.0716 | N/A | 0.090 | 0.090 | -0.024 | 0.000 | 0.01 | 0.229 | U | 1.1 | 0.172 | 0.107 | N/A | 0.100 | 0.100 | 2.421 | NA | NA | NA | 0.122 | 0.151 | 0.243 | U | 1.02 | 0.345 | 0.912 | NA |
| L100910UB00 | 7.70 | B | 1.26 | 0.2 | 0.0954 | N/A | 0.190 | 0.190 | 0.0259 | 0.026 | 0.09 | 0.24 | U | 1.25 | 0.224 | 0.0814 | N/A | 0.250 | 0.250 | 1.551 | NA | NA | NA | 0.167 | 0.15 | 0.242 | U | 0.822 | 0.417 | 1.2 | U |
| L100911BS500 | 7.70 | S | 1.07 | 0.15 | 0.0669 | N/A | 0.000 | 0.000 | 0.053 | 0.053 | 0.03 | 0.232 | U | 1.14 | 0.165 | 0.0683 | N/A | 0.140 | 0.140 | 3.372 | NA | NA | NA | 0.178 | 0.122 | 0.174 | NA | 1.91 | 0.821 | 0.935 | NA |
| L100912BR500 | 12.20 | S | 0.965 | 0.14 | 0.0695 | N/A | -0.105 | 0.000 | 0.0372 | 0.037 | 0.06 | 0.248 | U | 1.08 | 0.167 | 0.0991 | N/A | 0.080 | 0.080 | 2.421 | NA | NA | NA | 0.126 | 0.119 | 0.174 | U | 1.53 | 0.722 | 0.865 | NA |
| L100913BR500 | 9.30 | S | 1.15 | 0.16 | 0.0678 | N/A | 0.080 | 0.080 | 0.0032 | 0.003 | 0.01 | 0.244 | U | 1.12 | 0.168 | 0.102 | N/A | 0.120 | 0.120 | 1.551 | NA | NA | NA | 0.083 | 0.139 | 0.24 | U | 0.689 | 0.322 | 0.63 | U |
| L100914BE500 | 13.30 | S | 0.982 | 0.14 | 0.0702 | N/A | -0.085 | 0.000 | -0.01 | 0.000 | 0.05 | 0.239 | U | 1.12 | 0.168 | 0.0953 | N/A | 0.120 | 0.120 | 2.643 | NA | NA | NA | 0.141 | 0.131 | 0.216 | U | 1.34 | 0.624 | 0.787 | NA |
| L100915BS500 | 8.60 | S | 1.08 | 0.15 | 0.0604 | N/A | 0.010 | 0.010 | 0.0187 | 0.019 | 0.05 | 0.231 | U | 0.962 | 0.157 | 0.0639 | N/A | -0.038 | 0.000 | 1.980 | NA | NA | NA | 0.101 | 0.117 | 0.171 | U | 1.43 | 0.725 | 0.897 | NA |
| L100916BR500 | 13.10 | S | 0.921 | 0.13 | 0.085 | N/A | -0.149 | 0.000 | -0.003 | 0.000 | 0.05 | 0.242 | U | 1.1 | 0.183 | 0.103 | N/A | 0.100 | 0.100 | 1.100 | NA | NA | NA | 0.052 | 0.128 | 0.214 | U | 1.32 | 0.618 | 0.775 | NA |
| L100917BR500 | 12.70 | S | 1.11 | 0.16 | 0.064 | N/A | 0.040 | 0.040 | 0.104 | 0.104 | 0.03 | 0.236 | U | 0.978 | 0.169 | 0.11 | N/A | -0.024 | 0.000 | 2.551 | NA | NA | NA | 0.137 | 0.164 | 0.215 | U | 1.34 | 0.703 | 0.913 | NA |
| L100918BE500 | 13.20 | S | 1.4 | 0.21 | 0.0892 | N/A | 0.330 | 0.330 | 0.0511 | 0.051 | 0.05 | 0.248 | U | 1.08 | 0.188 | 0.176 | N/A | 0.060 | 0.060 | 2.566 | NA | NA | NA | 0.138 | 0.17 | 0.275 | U | 1.12 | 0.417 | 1.07 | NA |
| L100919BE500 | 11.30 | S | 1.13 | 0.16 | 0.0548 | N/A | 0.060 | 0.060 | 0.0184 | 0.018 | 0.05 | 0.249 | U | 1.13 | 0.173 | 0.0791 | N/A | 0.130 | 0.130 | 2.174 | NA | NA | NA | 0.114 | 0.137 | 0.235 | U | 1.32 | 0.681 | 0.858 | NA |
| L100920BS500 | 9.00 | S | 1.16 | 0.16 | 0.0665 | N/A | 0.090 | 0.090 | 0.0189 | 0.019 | 0.08 | 0.23 | U | 1.02 | 0.155 | 0.124 | N/A | 0.020 | 0.020 | 1.109 | NA | NA | NA | 0.055 | 0.147 | 0.245 | U | 1.01 | 0.333 | 0.817 | NA |
| L100921BR500 | 12.20 | S | 0.864 | 0.14 | 0.0975 | N/A | -0.108 | 0.000 | 0.0324 | 0.032 | 0.04 | 0.243 | U | 1.08 | 0.16 | 0.0755 | N/A | 0.080 | 0.080 | 2.298 | NA | NA | NA | 0.122 | 0.128 | 0.245 | U | 1.18 | 0.685 | 0.855 | NA |
| L100922BR500 | 11.40 | S | 1.12 | 0.16 | 0.0729 | N/A | 0.090 | 0.090 | 0.0078 | 0.008 | 0.02 | 0.242 | U | 0.986 | 0.15 | 0.114 | N/A | -0.014 | 0.000 | 2.064 | NA | NA | NA | 0.112 | 0.14 | 0.231 | U | 0.777 | 0.327 | 0.998 | U |
| L100923BE500 | 11.90 | S | 1.14 | 0.19 | 0.0991 | N/A | 0.070 | 0.070 | 0.0344 | 0.034 | 0.06 | 0.233 | U | 1.05 | 0.211 | 0.144 | N/A | 0.050 | 0.050 | 1.362 | NA | NA | NA | 0.069 | 0.169 | 0.283 | U | 1.11 | 0.7 | 0.952 | NA |
| L100922BRQ00 | 11.40 | Q | 1.15 | 0.17 | 0.0775 | N/A | 0.080 | 0.080 | 0.0072 | 0.007 | 0.01 | 0.241 | U | 1.05 | 0.192 | 0.11 | N/A | 0.050 | 0.050 | 2.557 | NA | NA | NA | 0.138 | 0.181 | 0.251 | U | 1.06 | 0.391 | 0.997 | NA |
| L100924BS500 | 8.25 | B | 1.09 | 0.15 | 0.0554 | N/A | 0.020 | 0.020 | 0.0134 | 0.013 | 0.05 | 0.244 | U | 0.848 | 0.151 | 0.0837 | N/A | -0.152 | 0.000 | 2.977 | NA | NA | NA | 0.158 | 0.146 | 0.228 | U | 1.53 | 0.762 | 0.881 | NA |
| L100925BS500 | 8.91 | B | 0.962 | 0.14 | 0.0673 | N/A | -0.108 | 0.000 | 0.0106 | 0.011 | 0.09 | 0.235 | U | 1.09 | 0.165 | 0.106 | N/A | 0.090 | 0.090 | 1.676 | NA | NA | NA | 0.086 | 0.143 | 0.227 | U | 1.3 | 0.699 | 0.848 | NA |
| L100926BS500 | 7.10 | B | 0.88 | 0.14 | 0.106 | N/A | -0.190 | 0.000 | 0.0294 | 0.029 | 0.05 | 0.233 | U | 1.17 | 0.171 | 0.0626 | N/A | 0.170 | 0.170 | 3.871 | NA | NA | NA | 0.197 | 0.111 | 0.191 | NA | 0.833 | 0.318 | 0.825 | NA |
| L100927BS500 | 8.00 | B | 1.36 | 0.18 | 0.0614 | N/A | 0.290 | 0.290 | 0.0142 | 0.014 | 0.01 | 0.24 | U | 1.04 | 0.167 | 0.132 | N/A | 0.040 | 0.040 | 3.181 | NA | NA | NA | 0.173 | 0.141 | 0.191 | U | 1.19 | 0.59 | 0.811 | NA |
| L100928BS500 | 5.30 | B | 1.03 | 0.17 | 0.087 | N/A | -0.040 | 0.000 | -0.008 | 0.000 | 0.01 | 0.233 | U | 1.01 | 0.189 | 0.124 | N/A | 0.010 | 0.010 | 1.999 | NA | NA | NA | 0.104 | 0.169 | 0.27 | U | 1.32 | 0.691 | 0.81 | NA |
| L100929BS500 | 7.70 | B | 1.1 | 0.16 | 0.0664 | N/A | 0.030 | 0.030 | 0.0052 | 0.005 | 0.04 | 0.237 | U | 1.03 | 0.156 | 0.107 | N/A | 0.030 | 0.030 | 2.078 | NA | NA | NA | 0.106 | 0.142 | 0.237 | U | 1.56 | 0.691 | 0.863 | NA |
| L100930BS500 | 8.60 | B | 1.05 | 0.15 | 0.0681 | N/A | -0.020 | 0.000 | 0.0555 | 0.056 | 0.07 | 0.227 | U | 1.21 | 0.205 | 0.102 | N/A | 0.210 | 0.210 | 2.995 | NA | NA | NA | 0.169 | 0.133 | 0.173 | U | 1.53 | 0.841 | 0.811 | NA |
| Systematic Minimum | | | 0.000 | | | | | | 0.000 | | | | | 0.000 | | | | | 1.100 | | | | 0.000 | | | | 0.000 | | | | |
| Systematic Maximum | | | 0.330 | | | | | | 0.104 | | | | | 0.140 | | | | | 3.372 | | | | 0.178 | | | | 1.910 | | | | |
| Systematic Mean | | | 0.056 | | | | | | 0.029 | | | | | 0.069 | | | | | 2.094 | | | | 0.110 | | | | 1.237 | | | | |
| Systematic Median | | | 0.040 | | | | | | 0.019 | | | | | 0.080 | | | | | 2.174 | | | | 0.114 | | | | 1.320 | | | | |
| Systematic Standard Deviation | | | 0.089 | | | | | | 0.029 | | | | | 0.052 | | | | | 0.668 | | | | 0.037 | | | | 0.317 | | | | |
| Step 8.3.3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Step 8.4.2 | | | With ingrowth, use Ra226 bkg = 1.07 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 10/29/2019 10:52:59 AM 10/29/2019 10:52:59 AM 10/29/2019 10:52:59 AM 10/29/2019 10:52:59 AM 10/29/2019 10:52:59 AM 10/29/2019 10:52:59 AM | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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 (S=Soil, B=Backfill) | Enr. (%) | SOF (Step 8.4.3) | Is Backfill in this Sample? | Is Backfill in Root? | root count | excavation count | surface count |
|--------------|-------------------|------------------------------|-------------|---------------------|--------------------------------|-------------------------|------------|---------------------|---------------|
| | | | | | | | | | |
| L100901BES00 | 7.80 | S* | 2.1 | 0.14 | | | good | | |
| L100902BES00 | 12.20 | S* | 2.5 | 0.30 | | | good | | |
| L100903BES00 | 8.10 | S* | 2.0 | 0.13 | | | good | | |
| L100904BES00 | 9.80 | Q | 1.8 | 0.20 | | | good | | |
| L100904BES00 | 9.60 | S* | 0.5 | 0.17 | | | good | | |
| L100905BES00 | 12.10 | S* | 1.9 | 0.31 | | | good | | |
| L100906BES00 | 12.20 | S* | 2.1 | 0.14 | | | good | | |
| L100907BES00 | 8.35 | S* | 0.9 | 0.13 | | | good | | |
| L100908BES00 | 7.70 | B | 1.2 | 0.12 | | | good | | |
| L100909BES00 | 7.70 | B | 1.9 | 0.12 | | | good | | |
| L100910BES00 | 7.70 | B | 3.1 | 0.26 | | | good | | |
| L100911BES00 | 7.70 | S | 1.5 | 0.13 | | | EXCAVATION | good | 1 |
| L100912BES00 | 12.20 | S | 1.3 | 0.07 | | | EXCAVATION | good | 1 |
| L100913BES00 | 9.30 | S | 1.9 | 0.12 | | | EXCAVATION | good | 1 |
| L100914BES00 | 13.30 | S | 1.7 | 0.08 | | | EXCAVATION | good | 1 |
| L100915BES00 | 8.60 | S | 1.1 | 0.03 | | | EXCAVATION | good | 1 |
| L100916BES00 | 13.10 | S | 0.7 | 0.06 | | | EXCAVATION | good | 1 |
| L100917BES00 | 12.70 | S | 1.6 | 0.05 | | | EXCAVATION | good | 1 |
| L100918BES00 | 13.20 | S | 1.9 | 0.23 | | | EXCAVATION | good | 1 |
| L100919BES00 | 11.30 | S | 1.4 | 0.12 | | | EXCAVATION | good | 1 |
| L100920BES00 | 9.00 | S | 0.9 | 0.07 | | | EXCAVATION | good | 1 |
| L100921BES00 | 12.20 | S | 1.6 | 0.06 | | | EXCAVATION | good | 1 |
| L100922BES00 | 11.40 | S | 2.2 | 0.04 | | | EXCAVATION | good | 1 |
| L100923BES00 | 11.80 | S | 1.0 | 0.06 | | | EXCAVATION | good | 1 |
| L100924BES00 | 11.40 | Q | 2.0 | 0.09 | | | good | | |
| L100925BES00 | 8.25 | B | 1.6 | 0.04 | | | good | | |
| L100926BES00 | 8.91 | B | 1.1 | 0.06 | | | good | | |
| L100927BES00 | 7.10 | B | 3.6 | 0.11 | | | good | | |
| L100928BES00 | 8.00 | B | 2.3 | 0.20 | | | good | | |
| L100929BES00 | 5.30 | B | 1.3 | 0.03 | | | good | | |
| L100930BES00 | 7.70 | B | 1.1 | 0.05 | | | good | | |
| L100930BES00 | 8.80 | B | 1.6 | 0.13 | | | good | | |
| | | | | 13 | | | 0 | 13 | 0 |
| | | | | count tot | | | | | |
| | | | | 0.23 | | | | | |
| | | | | 0.09 | | | | | |
| | | | | 0.07 | | | | | |
| | | | | 0.05 | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

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

Step 8.4.1 DCLGw, Measure To-99, All ESAs

| | |
|--------|-------|
| U-234 | 195.4 |
| U-235 | 51.6 |
| U-238 | 168.8 |
| Th-232 | 2.0 |
| Ra-226 | 1.9 |

| Infer U234 Step 8.3.4 | | | |
|------------------------|------------|-------|-----|
| U-238/U235 | U-234/U235 | U-234 | % |
| 7.4 | 18.5 | 3.3 | 2.1 |
| 6.3 | 18.3 | 2.9 | 2.5 |
| 7.7 | 18.5 | 2.3 | 2.0 |
| 8.5 | 18.7 | 3.2 | 1.8 |
| 36.8 | 22.7 | 1.0 | 0.5 |
| 11.3 | 19.1 | 1.9 | 1.4 |
| 7.3 | 18.5 | 3.2 | 2.1 |
| 17.3 | 20.2 | 1.8 | 0.9 |
| 13.7 | 19.4 | 1.9 | 1.2 |
| 8.4 | 18.6 | 2.3 | 1.9 |
| 4.9 | 18.2 | 3.0 | 3.1 |
| 10.7 | 18.9 | 3.4 | 1.5 |
| 12.1 | 19.2 | 2.4 | 1.3 |
| 8.3 | 18.6 | 1.8 | 1.9 |
| 9.5 | 18.7 | 2.6 | 1.7 |
| 14.2 | 19.6 | 2.0 | 1.1 |
| 25.3 | 21.1 | 1.1 | 0.7 |
| 9.8 | 18.8 | 2.6 | 1.6 |
| 8.1 | 18.6 | 2.6 | 1.9 |
| 11.6 | 19.1 | 2.2 | 1.4 |
| 18.4 | 20.2 | 1.1 | 0.9 |
| 9.7 | 18.8 | 2.3 | 1.6 |
| 7.7 | 18.5 | 2.6 | 2.0 |
| 6.9 | 18.4 | 2.1 | 2.2 |
| 16.2 | 19.9 | 1.4 | 1.0 |
| 9.7 | 18.8 | 3.0 | 1.6 |
| 15.2 | 19.6 | 1.7 | 1.1 |
| 4.2 | 18.1 | 3.6 | 3.6 |
| 6.9 | 18.4 | 3.2 | 2.3 |
| 12.7 | 19.2 | 2.0 | 1.3 |
| 14.7 | 19.6 | 2.1 | 1.1 |
| 9.6 | 18.8 | 3.0 | 1.6 |
| Average Enrichment (%) | | 1.65 | |

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

| |
|---------|
| 4.57488 |
| 11.4289 |
| 5.20762 |
| 4.40499 |
| 6.02355 |
| 4.8823 |
| 3.32601 |
| 5.04145 |
| 4.69284 |
| 4.51847 |
| 4.39982 |
| 3.29668 |
| 3.34398 |
| 4.46268 |
| 4.04915 |
| 3.35162 |
| 4.50956 |
| 4.05030 |
| 5.11340 |
| 4.48179 |
| 4.94062 |
| 4.61555 |
| 4.65165 |
| 4.25723 |
| 5.61942 |
| 4.29529 |
| 4.44922 |
| 3.46232 |
| 3.51189 |
| 5.1889 |
| 4.64522 |
| 3.25915 |

| | | | |
|--|------|------|------|
| Step 8.4.5b | | | |
| weighted SOF _{mean} | | 0.09 | |
| fractions | SS | RS | ES |
| | 0 | 0 | 1 |
| Step 8.4.5c SOF _{mean} Re-use Backfill Material | | | |
| | 0 | | |
| Step 8.4.5e SOF _{mean} Groundwater | | | |
| | 0.16 | | |
| Step 8.4.5g (C=1) | | | |
| SOF _{mean} SU | 0.25 | | PASS |

Step 8.4.6 Calculate the dose contribution for the SU by multiplying SOF_{mean}SU (including contribution from Re-use backfill and Groundwater) by 25 mem.

6.1 mem

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)

[illegible]

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 ($X_{i,ref}$, $Y_{i,SU}$) 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 | 37 | 37 |
| 9574-SS-140910-01-02 | Reference | 0.76 | 1.757 | 15 | 15 |
| 9574-SS-140910-01-03 | Reference | 1.02 | 2.023 | 24 | 24 |
| 9574-SS-140910-01-04 | Reference | 1.02 | 2.018 | 23 | 23 |
| 9574-SS-140910-01-05 | Reference | 1.00 | 2.002 | 20 | 20 |
| 9574-SS-140910-01-07 | Reference | 0.87 | 1.873 | 17 | 17 |
| 9574-SS-140910-01-08 | Reference | 1.04 | 2.040 | 27 | 27 |
| 9574-SS-140910-01-09 | Reference | 0.96 | 1.959 | 19 | 19 |
| 9574-SS-140910-01-10 | Reference | 1.20 | 2.204 | 38 | 38 |
| 9574-SS-140910-01-11 | Reference | 1.01 | 2.007 | 22 | 22 |
| 9574-SS-140910-01-12 | Reference | 1.22 | 2.223 | 39 | 39 |
| 9574-SS-140910-01-13 | Reference | 1.03 | 2.035 | 26 | 26 |
| 9574-SS-140910-01-14 | Reference | 1.00 | 2.005 | 21 | 21 |
| 9574-SS-140910-01-15 | Reference | 0.86 | 1.865 | 16 | 16 |
| 9574-SS-140910-01-16 | Reference | 1.24 | 2.238 | 41 | 41 |
| 9574-SS-140910-01-17 | Reference | 1.19 | 2.185 | 36 | 36 |
| 9574-SS-140910-01-18 | Reference | 1.31 | 2.310 | 43 | 43 |
| 9574-SS-140910-01-20 | Reference | 1.18 | 2.179 | 34 | 34 |
| 9574-SS-140910-01-21 | Reference | 1.06 | 2.064 | 29 | 29 |
| 9574-SS-140910-01-22 | Reference | 1.10 | 2.101 | 30 | 30 |
| 9574-SS-140910-01-23 | Reference | 1.29 | 2.293 | 42 | 42 |
| 9574-SS-140910-01-24 | Reference | 1.34 | 2.339 | 44 | 44 |
| 9574-SS-140910-01-25 | Reference | 1.15 | 2.154 | 33 | 33 |
| 9574-SS-140910-01-26 | Reference | 1.18 | 2.182 | 35 | 35 |
| 9574-SS-140910-01-27 | Reference | 1.23 | 2.227 | 40 | 40 |
| 9574-SS-140910-01-28 | Reference | 1.38 | 2.380 | 45 | 45 |
| 9574-SS-140910-01-29 | Reference | 1.05 | 2.055 | 28 | 28 |
| 9574-SS-140910-01-30 | Reference | 0.94 | 1.941 | 18 | 18 |
| 9574-SS-140910-01-31 | Reference | 1.12 | 2.119 | 31 | 31 |
| 9574-SS-140910-01-32 | Reference | 1.15 | 2.152 | 32 | 32 |
| 9574-SS-140910-01-33 | Reference | 1.03 | 2.028 | 25 | 25 |
| 9574-SS-140910-01-34 | Reference | 0.44 | 1.443 | 14 | 14 |
| L100911BSS00 | Survey Unit | 1.17 | 1.167 | 10 | 0 |
| L100912BRS00 | Survey Unit | 1.07 | 1.073 | 4 | 0 |
| L100913BRS00 | Survey Unit | 1.18 | 1.179 | 11 | 0 |
| L100914BES00 | Survey Unit | 1.10 | 1.101 | 7 | 0 |
| L100915BSS00 | Survey Unit | 1.07 | 1.071 | 3 | 0 |
| L100916BRS00 | Survey Unit | 1.05 | 1.049 | 1 | 0 |
| L100917BRS00 | Survey Unit | 1.10 | 1.100 | 6 | 0 |
| L100918BES00 | Survey Unit | 1.29 | 1.291 | 13 | 0 |
| L100919BES00 | Survey Unit | 1.18 | 1.182 | 12 | 0 |
| L100920BSS00 | Survey Unit | 1.13 | 1.134 | 8 | 0 |
| L100921BRS00 | Survey Unit | 1.07 | 1.070 | 2 | 0 |
| L100922BRQ00 | Survey Unit | 1.10 | 1.100 | 5 | 0 |
| L100922BRS00 | Survey Unit | 1.14 | 1.141 | 9 | 0 |
| Rank Sums | | | | 1035 | 944 |
| # Reference Area Measurements | | | | m | 32 |
| # Survey Unit Measurements | | | | n | 13 |
| Total Number of Measurements Step 8.5.3c | | | | N | 45 |
| (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 | 802 |

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. | 0.05 |
| DCGL _{SOF} | 1 |
| LBGR (Mean) | 0.09 |
| Shift | 0.91 |
| Relative Shift (Δ/σ) | 18.02 |
| MARSSIM Table 5.1 (P_r) | 1.000000 |
| N | 12 |
| N + 20% | 14.4 |
| N/2 | 8 |
| FSS N/2 | 7 |
| Verification Check | ADDITIONAL DATA REVIEW REQUIRED |
| "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 | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|

| | | | | | | | | | | | | |
|------------------|-----------|--|--|--|--------------------------|--|--|--|--|--|--|--|
| Survey Unit No.: | LSA 10-09 | | | | 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 | | | | | | |
| L100904BES00 | L100904BEQ00 | Ra-226 | 1.13 | 0.0781 | 1.21 | 0.0637 | 1.170 | 1.9 | 0.08 | 0.269 | 0.403 | N |
| L100904BES00 | L100904BEQ00 | Tc-99 | -0.00796 | 0.227 | 0.0159 | 0.22 | 0.004 | 25.1 | NA | 3.552 | 5.321 | NA |
| L100904BES00 | L100904BEQ00 | Th-232 | 1.24 | 0.0928 | 1.19 | 0.118 | 1.215 | 2.0 | 0.050 | 0.283 | 0.424 | N |
| L100904BES00 | L100904BEQ00 | U-234 ¹ | 1.037 | N/A | 3.154 | N/A | 2.095 | 195.4 | 2.118 | 27.649 | 41.425 | N |
| L100904BES00 | L100904BEQ00 | U-235 | 0.0456 | 0.265 | 0.169 | 0.236 | 0.107 | 51.6 | NA | 7.301 | 10.939 | NA |
| L100904BES00 | L100904BEQ00 | U-238 | 1.68 | 0.896 | 1.44 | 0.819 | 1.560 | 168.8 | 0.240 | 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: _____

Date: _____

Reviewed by: _____

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 | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|

| | | | | | | | | | | | | |
|------------------|-----------|--|--|--|--------------------------|--|--|--|--|--|--|--|
| Survey Unit No.: | LSA 10-09 | | | | 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 | | | | | | |
| L100922BRS00 | L100922BRQ00 | Ra-226 | 1.12 | 0.0729 | 1.15 | 0.0775 | 1.135 | 1.9 | 0.03 | 0.269 | 0.403 | N |
| L100922BRS00 | L100922BRQ00 | Tc-99 | 0.00775 | 0.242 | 0.00722 | 0.241 | 0.007 | 25.1 | NA | 3.552 | 5.321 | NA |
| L100922BRS00 | L100922BRQ00 | Th-232 | 0.986 | 0.114 | 1.05 | 0.11 | 1.018 | 2.0 | 0.064 | 0.283 | 0.424 | N |
| L100922BRS00 | L100922BRQ00 | U-234 ¹ | 2.064 | N/A | 2.557 | N/A | 2.311 | 195.4 | 0.493 | 27.649 | 41.425 | N |
| L100922BRS00 | L100922BRQ00 | U-235 | 0.112 | 0.231 | 0.138 | 0.251 | 0.125 | 51.6 | NA | 7.301 | 10.939 | NA |
| L100922BRS00 | L100922BRQ00 | U-238 | 0.777 | 0.998 | 1.06 | 0.997 | 0.919 | 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: _____

Date: _____

Reviewed by: _____

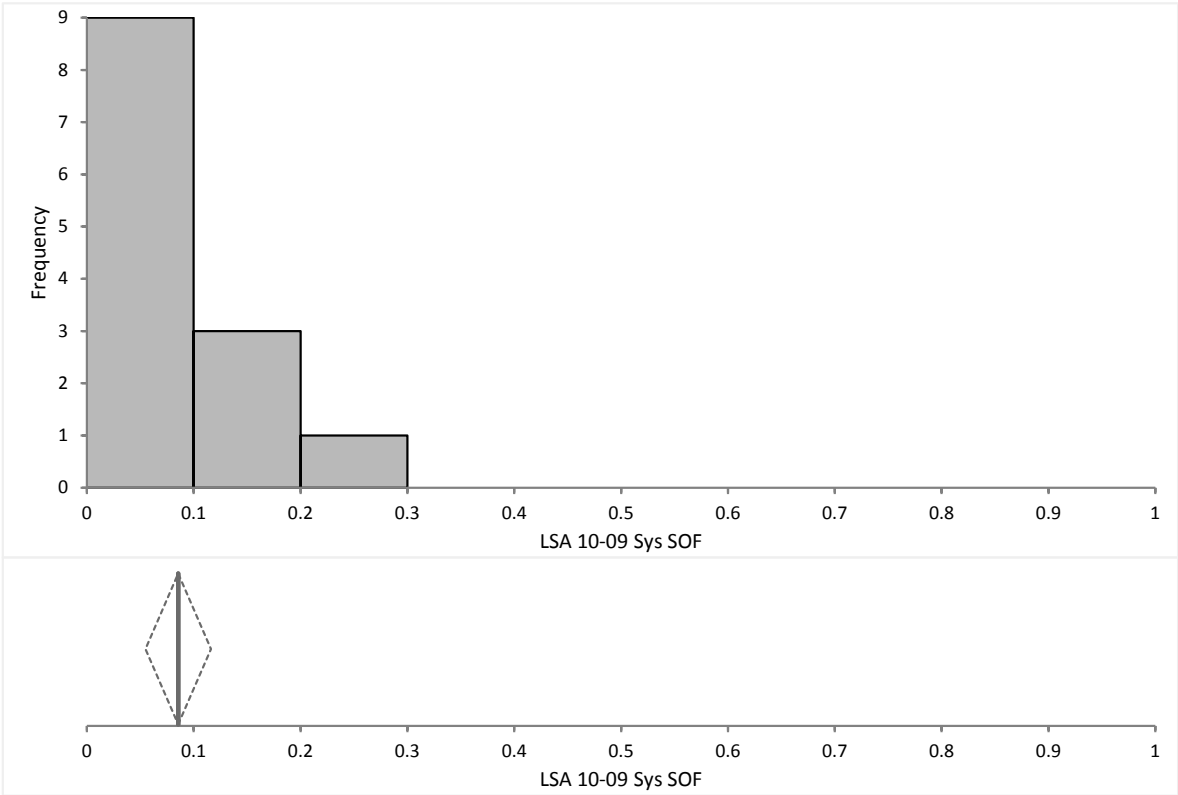
Date: _____

Quality Record

LSA 10-09 Sys SOF

0.1
0.1
0.1
0.1
0.0
0.1
0.0
0.2
0.1
0.1
0.1
0.0
0.1

Descriptives



| | | | | | | | | | |
|-------------------|--|---------|--------------|--------|--------------|------|--------------|----------|----------|
| N | | 13 | | | | | | | |
| | | Mean | 95% CI | | Mean SE | SD | Variance | Skewness | Kurtosis |
| LSA 10-09 Sys SOF | | 0.09 | 0.05 to 0.12 | | 0.014 | 0.05 | 0.00 | 2.0 | 5.10 |
| | | Minimum | 1st quartile | Median | 97.75% CI | | 3rd quartile | Maximum | IQR |
| LSA 10-09 Sys SOF | | 0.03 | 0.06 | 0.07 | 0.05 to 0.12 | | 0.11 | 0.2 | 0.05 |