



INTER-OFFICE MEMORANDUM

Date: May 15, 2015 HEM-15-MEMO-042

To: Brian Miller, FSS Manager
Ellen Jakub, FSS Data Manager

From: W. Clark Evers, Radiation Safety Officer

Cc: Steven A. Grice

Subject: Radium Ingrowth Background

During review of the Survey Area Release Record for Land Survey Area 10, Survey Units 01 and 02 (LSA 10-01 and LSA 10-02), it was noted that none of the results for radium-226 (Ra-226) were positive after the background was subtracted. The value for background for Ra-226 with a 21 day ingrowth is 1.47 picoCuries per gram (pCi/g). This value is the mean of the data set obtained for DO-08-003, the Hematite Radiological Characterization Report (HRCR). The data set, with the 21 day ingrowth, is presented in Table 2 of Attachment 8 of HEM-10-80. The samples were taken and analyzed in 2005; Paragon Analytics performed the analyses.

A review of the data set for the LSAs associated with Area 1 (10-01, 10-02, 10-03, 10-04, and 10-12) was performed. Table 1 presents the results for Ra-226 from Area 1 with a 21 day ingrowth period with sorted values for ease of reference. A total of 8 of the 72 samples taken had values above 1.47 pCi/g. The mean of the data set was 1.21 pCi/g. It was determined that the value of 1.47 pCi/g may not be a good representation of background.

HDP-RPT-FSS-301, *Off-Site Borrow Soil Analysis 2112 Horine Road, Festus, Missouri*, was created due to the NRC questioning the methodology and conclusions of HEM-14-31. HDP staff prepared HEM-14-31, *Hematite Decommissioning Project: Radiological Testing of Backfill Soil from an Off-site Borrow Location*, to inform the U.S. Nuclear Regulatory Commission (NRC) of the measures that HDP was using for radiological testing of backfill soil brought to HDP from off-site borrow locations. HDP made the decision to collect additional samples and perform statistical analyses on the results of the borrow materials to demonstrate radiological compliance of the soils originating from the 2112 Horine Road location. The intent was also to develop a statistically acceptable methodology for use in assessing soil at other potential offsite borrow locations.

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The radiological data that was used in HEM-14-31 was based on samples collected over a period of years for varying purposes and utilizing differing counting methodologies. To normalize analytical methods and laboratories, HDP made the decision to collect an entirely new set of data for these analyses. The Westinghouse HDP collected and analyzed soil samples from sites used to establish background soil concentrations for the HRCR. HDP collected new soil samples at 8 sample points at each of the two locations previously specified in the HRCR. Each sample location was sampled in 3 foot intervals to a depth of at least 6 feet, or until refusal was met. A total of 32 samples were taken from the two reference areas.

All the samples were analyzed for Tc-99 by ICP-MS, isotopic uranium by alpha spectroscopy, and gamma spectroscopy both with and without radium ingrowth. The same laboratory, Test America, also performs these analyses for FSS samples. The decision has been made to use the mean of the HDP-RPT-FSS-301 Ra-226 data set for 21 day ingrowth samples. Table 2 presents the HDP-RPT-FSS-301 data set for Ra-226 with 21 day ingrowth; this mean is 1.07 pCi/g. For Area 1, 53 of the 72 sample results are above this value. The unknown ingrowth value of 0.9 pCi/g for Ra-226 will be retained, as this value is conservative compared to HDP-RPT-FSS-301 data set (0.99 pCi/g). The value for subtracting background for Th-232 (1.0 pCi/g) has also been retained, since the HDP-RPT-FSS-301 data set is very close to this value.

For these reasons, please use a Radium ingrowth background of 1.07 pCi/g for evaluation of Final Status Survey samples effective immediately.

Attachments:


Table 1 – Area 1 Ra-226 21-day ingrowth results

Table 2 – HDP-RPT-FSS-301 Ra-226 21-day ingrowth results

Owner/Author:



W. Clark Evers
RSO

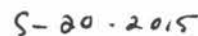


Date

Reviewed & Approved By:



Steven A. Grice
FSS Task Manager



Date

Table 1 – Area 1 Ra-226 Results (21-day ingrowth)

Sample ID	Result (pCi/g)	Uncertainty (pCi/g)	MDA (pCi/g)
L10-02-12-B-E-S-00	0.734	0.107	0.041
L10-01-12-B-E-S-00	0.763	0.14	0.148
L10-04-09-B-E-S-00	0.782	0.13	0.059
L10-02-11-B-E-Q-00	0.812	0.125	0.059
L10-12-02-B-E-S-00	0.904	0.16	0.094
L10-04-05-B-E-S-00	0.929	0.147	0.074
L10-04-08-B-E-Q-00	0.931	0.136	0.067
L10-02-10-B-E-S-00	0.941	0.151	0.086
L10-12-01-B-E-S-00	0.949	0.136	0.06
L10-02-13-B-E-B-00	0.953	0.173	0.101
L10-02-11-B-E-S-00	0.956	0.154	0.074
L10-04-03-B-E-S-00	0.981	0.139	0.061
L10-04-02-B-E-S-00	0.983	0.14	0.061
L10-04-08-B-E-S-00	0.997	0.144	0.068
L10-02-01-B-S-S-00	0.998	0.146	0.067
L10-01-01-B-S-S-00	1.01	0.17	0.087
L10-01-11-B-R-S-00	1.03	0.155	0.081
L10-02-09-B-E-S-00	1.03	0.167	0.083
L10-04-01-B-R-S-00	1.06	0.163	0.07
L10-01-05-B-R-S-00	1.08	0.164	0.068
L10-04-04-B-R-S-00	1.08	0.154	0.06
L10-02-02-B-R-S-00	1.11	0.172	0.083
L10-12-06-B-E-S-00	1.12	0.172	0.076
L10-03-06-B-E-S-00	1.13	0.163	0.075
L10-01-08-B-E-S-00	1.14	0.161	0.071
L10-04-06-B-E-S-00	1.14	0.156	0.06
L10-01-04-B-S-S-00	1.16	0.17	0.075
L10-02-04-B-S-S-00	1.16	0.181	0.055
L10-02-08-B-E-S-00	1.16	0.159	0.066
L10-04-07-B-E-S-00	1.16	0.177	0.06
L10-12-04-B-E-S-00	1.16	0.17	0.079
L10-02-07-B-E-S-00	1.17	0.211	0.134
L10-01-07-B-R-S-00	1.2	0.167	0.07
L10-04-14-B-E-B-00	1.2	0.188	0.099
L10-01-10-B-E-S-00	1.21	0.197	0.103

L10-01-15-B-S-S-00	1.21	0.178	0.09
L10-02-05-B-R-S-00	1.21	0.165	0.067
L10-03-09-B-E-S-00	1.21	0.164	0.064
L10-03-08-B-R-S-00	1.23	0.185	0.087
L10-01-09-B-R-S-00	1.24	0.179	0.079
L10-04-11-B-E-S-00	1.25	0.198	0.101
L10-12-05-B-R-S-00	1.25	0.185	0.077
L10-12-12-B-E-S-00	1.25	0.171	0.07
L10-04-10-B-R-S-00	1.26	0.182	0.075
L10-01-02-B-R-S-00	1.27	0.179	0.078
L10-01-18-B-E-B-00	1.27	0.199	0.099
L10-01-16-B-R-S-00	1.3	0.181	0.067
L10-04-12-B-E-S-00	1.3	0.19	0.081
L10-03-04-B-E-S-00	1.31	0.193	0.094
L10-03-07-B-E-S-00	1.32	0.187	0.086
L10-12-14-B-E-B-00	1.33	0.185	0.077
L10-12-08-B-R-S-00	1.34	0.177	0.06
L10-12-13-B-E-B-00	1.34	0.217	0.107
L10-03-07-B-E-Q-00	1.35	0.197	0.085
L10-12-10-B-R-S-00	1.35	0.221	0.121
L10-12-03-B-E-S-00	1.39	0.192	0.087
L10-01-14-B-E-S-00	1.4	0.183	0.074
L10-01-13-B-E-Q-00	1.4	0.219	0.121
L10-03-12-B-E-B-00	1.41	0.183	0.085
L10-12-07-B-E-Q-00	1.43	0.214	0.093
L10-03-03-B-E-S-00	1.44	0.201	0.085
L10-04-13-B-E-B-00	1.44	0.199	0.08
L10-03-05-B-E-S-00	1.46	0.215	0.087
L10-01-13-B-E-S-00	1.47	0.2	0.069
L10-03-01-B-E-S-00	1.5	0.21	0.093
L10-12-07-B-E-S-00	1.53	0.204	0.083
L10-12-09-B-E-S-00	1.6	0.247	0.115
L10-03-13-B-E-B-00	1.61	0.242	0.109
L10-03-02-B-E-S-00	1.62	0.241	0.113
L10-03-10-B-E-B-00	1.63	0.244	0.111
L10-12-11-B-E-S-00	1.63	0.208	0.078
L10-03-11-B-E-B-00	1.8	0.243	0.098

Table 2 – HDP-RPT-FSS-301 Ra-226 Data Set (21-day ingrowth)

Reference Area Results			
Sample ID	Radium-226 (pCi/g) 21 Day Ingrowth (pCi/g)		
	Result	Error	MDC
9574-SS-140910-01-01	1.15	0.164	0.0678
9574-SS-140910-01-02	0.719	0.103	0.0447
9574-SS-140910-01-03	1.04	0.166	0.0772
9574-SS-140910-01-04	1.01	0.138	0.0513
9574-SS-140910-01-05	0.995	0.16	0.0848
9574-SS-140910-01-07	0.858	0.133	0.0642
9574-SS-140910-01-08	1.03	0.143	0.064
9574-SS-140910-01-09	1.08	0.169	0.0702
9574-SS-140910-01-10	1.17	0.174	0.0772
9574-SS-140910-01-11	0.972	0.136	0.0838
9574-SS-140910-01-12	1.22	0.184	0.0858
9574-SS-140910-01-13	1.02	0.14	0.0759
9574-SS-140910-01-14	1.05	0.146	0.0605
9574-SS-140910-01-15	0.805	0.121	0.0579
9574-SS-140910-01-16	1.32	0.201	0.0904
9574-SS-140910-01-17	1.19	0.165	0.0698
9574-SS-140910-01-18	1.34	0.193	0.0845
9574-SS-140910-01-20	1.26	0.206	0.109
9574-SS-140910-01-21	1.07	0.156	0.0738
9574-SS-140910-01-22	0.922	0.131	0.0573
9574-SS-140910-01-23	1.13	0.17	0.0835
9574-SS-140910-01-24	1.2	0.165	0.0649
9574-SS-140910-01-25	1.23	0.164	0.0653
9574-SS-140910-01-26	1.08	0.159	0.079
9574-SS-140910-01-27	1.31	0.185	0.0818
9574-SS-140910-01-28	1.28	0.188	0.089
9574-SS-140910-01-29	1.08	0.154	0.0808
9574-SS-140910-01-30	0.96	0.161	0.0864
9574-SS-140910-01-31	1.06	0.146	0.0498
9574-SS-140910-01-32	1.06	0.157	0.0709
9574-SS-140910-01-33	1.03	0.147	0.0689
9574-SS-140910-01-34	0.618	0.0993	0.04