



MARJOL BATTERY SITE OFF-SITE VERIFICATION SAMPLING

Pre-Construction Event

The Off-Site Verification Sampling baseline event was conducted prior to construction by Advanced GeoServices from May 5 to 7, 2008 in accordance with the Revised Final (100%) Design, Sampling and Analysis Plan, Tab 4. The event was conducted as a baseline to which analytical results on samples taken at or near the completion of excavation can be compared. The comparison is used to confirm that remedial activities did not cause off-site soil lead contamination at a statistically significant level.

Post-Construction Event

The Off-Site Verification Sampling post-construction event was conducted from November 16 to 18, 2009 in accordance with the Revised Final (100%) Design, Sampling and Analysis Plan, Tab 4. The event occurred following the excavation of all contaminated areas. The event was conducted to provide data to which analytical results on samples taken as a baseline in May of 2008 can be compared. The comparison is used to confirm that remedial activities did not cause a statistically significant increase of greater than 100 mg/kg in off-site soil lead levels.

Sample Locations

Pre-construction and post-construction sampling was conducted at the following areas:

Property specific information has been removed for privacy reasons

Sample areas were determined by measuring from physical features. An x, y axis was established at each area based on one corner of the sample area, and the location of each sample was documented in reference to this corner. Twenty samples were collected at each area. Sketches of the sample locations are attached.

Sample Collection

Samples were collected from 0 to 2 inch depth with decontaminated stainless steel trowels. The grass plug was removed, and as much dirt as possible from the plug was placed into the sample.



The sample was placed into a new resealable plastic bag. The sample was then prepared at the AGC office trailer by homogenizing in a new disposable aluminum pan using the quartering technique specified in the SAP. The homogenized soil was passed through a decontaminated #10 sieve and collected in a new disposable pan. The sieved sample was homogenized using the quartering technique specified in the SAP, and the sample was transferred to a new resealable plastic bag. Samples to be analyzed by laboratory (i.e., odd-numbered samples) for total lead were split so that one 4-ounce portion of soil was placed in a small new resealable plastic bag for lab analysis, and the remaining sieved sample was archived. The 4-ounce portion of soil was measured using a disposable cup. Samples not intended for lab analysis (i.e., even-numbered samples) were archived.

Decontamination was conducted in accordance with the SAP. Decon water was collected and disposed at the on-site equipment decontamination station during the pre-construction sampling event. During the post-construction sampling event, decon water was disposed in the western most portion of the Containment Area below non-contaminated solidified lifts.

One duplicate soil sample was collected from each area. During the pre-construction sampling event, one equipment blank was collected per day, which is a deviation from the SAP requirements to collect one equipment blank per area. The change in equipment blank collection frequency did not affect the quality of the data as all equipment blanks were non-detect. During the post-construction sampling event, one equipment blank and one MS/MD was collected from each area.

Pre-Construction Sample Analysis

The odd-numbered samples (i.e., ten of the twenty samples) from each area were submitted to Test America, Pittsburgh for analysis for total lead. Validated data are attached.

One sample, SS-3-PRE-15, had a lead concentration of 658 mg/kg. To determine whether this result was representative, on February 26, 2009, two additional samples, SS-3-PRE-15A and SS-3-PRE-15B, were taken from the archived volume of OSV sample SS-3-PRE-15 for total lead analysis. No additional mixing or screening was performed on the subsamples as the original volume was homogenized according to the quartering method in the SAP. Validated data are attached. The results were consistent with the original result for this location.

In addition, the remaining 10 archived samples for OSV SS-3 were prepared in accordance with the SAP and submitted to the laboratory on March 6, 2009. Validated data are attached. The results for these 10 samples were all below 100 mg/kg.

The remaining 10 archived samples for OSV SS-4 were prepared in accordance with the SAP and submitted to the laboratory on November 24, 2009. Validated data are included with the post-construction validated data.



Post-Construction Sample Analysis

The odd-numbered samples (i.e., ten of the twenty samples) from areas SS-1-Post, SS-2-Post, and SS-5-Post were submitted to Test America Pittsburgh for analysis for total lead. All twenty samples from locations SS-3-Post and SS-4-Post were submitted to the laboratory. Validated data is attached.

AGC performed XRF screening on all samples to be analyzed by the laboratory prior to shipment from November 20 to 24, 2009. Four readings from each sample were collected and the results are provided on the attached pre- and post-construction result comparison. The XRF standard log and control chart are included in the attachment.

Conclusions

The pre- and post-construction data were compared using the software program Scout 2008 version 1.0 to perform the calculations. The data were first tested to determine if they had a normal distribution. Of the 5 data sets, the lead results at locations 1 and 5 were normally distributed so a t-test was used for the comparison. For the remaining data sets, the lead results were not normally distributed in either the pre-construction set (location 2) or both the pre- and post-construction data sets (locations 3 and 4). For these data sets, a Wilcoxon-Mann-Whitney test was used for the comparison. The results are presented in the attachment. At all locations, the comparison shows that there was not an increase in soil lead of more than 100 mg/kg at a 95% confidence level. Consequently, no additional off-site sampling is required.



PRE- AND POST-CONSTRUCTION RESULT COMPARISON

**Marjol Battery Site
OSV Sample Result Comparison**

Sample ID	Pre-Construction Lab Result, Total Lead (mg/kg)	Post-Construction Lab Result, Total Lead (mg/kg)	Post XRF Result, Total Lead (mg/kg)
SS-1-POST-01	24.3	22.1	BDL
			BDL
			BDL
			BDL
SS-1-POST-03	24.3	24.4	BDL
			BDL
			BDL
			BDL
SS-1-PRE-03D	20.4	N/A	N/A
SS-1-POST-05	21	21.6	BDL
			BDL
			BDL
			BDL
SS-1-POST-07	27.3	28.5	BDL
			BDL
			BDL
			BDL
SS-1-POST-09	12.8	17.4	BDL
			BDL
			BDL
			BDL
SS-1-POST-11	15.3	16.1	BDL
			BDL
			BDL
			BDL
SS-1-POST-13	23.5	19.1	BDL
			BDL
			BDL
			BDL
SS-1-POST-13D	N/A	19.3	N/A
SS-1-POST-15	17.2	17	BDL
			BDL
			BDL
			BDL
SS-1-POST-17	18.5	18.1	BDL
			BDL
			BDL
			BDL
SS-1-POST-19	18.4	17	BDL
			BDL
			BDL
			BDL

**Marjol Battery Site
OSV Sample Result Comparison**

Sample ID	Pre-Construction Lab Result, Total Lead (mg/kg)	Post-Construction Lab Result, Total Lead (mg/kg)	Post XRF Result, Total Lead (mg/kg)
SS-2-POST-01	23.6	32.6	BDL
			BDL
			BDL
			BDL
SS-2-PRE-01D	23.9		
SS-2-POST-03	33.9	46.3	BDL
			BDL
			BDL
			BDL
SS-2-POST-05	24.4	28.6	BDL
			BDL
			BDL
			BDL
SS-2-POST-07	44.6	39.6	BDL
			BDL
			BDL
			BDL
SS-2-POST-09	25.6	33.3	BDL
			BDL
			BDL
			BDL
SS-2-POST-11	23.9	27.8	BDL
			BDL
			BDL
			BDL
SS-2-POST-11D	N/A	28.1	N/A
SS-2-POST-13	26.2	34.8	BDL
			BDL
			BDL
			BDL
SS-2-POST-15	28.5	31.8	BDL
			BDL
			100
			BDL
SS-2-POST-17	26.5	37.4	73.6
			BDL
			BDL
			BDL
SS-2-POST-19	24	30.2	BDL
			BDL
			BDL
			BDL

**Marjol Battery Site
OSV Sample Result Comparison**

Sample ID	Pre-Construction Lab Result, Total Lead (mg/kg)	Post-Construction Lab Result, Total Lead (mg/kg)	Post XRF Result, Total Lead (mg/kg)
SS-3-POST-01	15.1	16.4	BDL
			BDL
			BDL
			BDL
SS-3-POST-01D	N/A	14.4	N/A
SS-3-POST-02	11.6	14.5	BDL
			BDL
			BDL
			BDL
SS-3-POST-03	70.9	172	192
			137
			159
			194
SS-3-POST-04	18.8	20.2	BDL
			BDL
			BDL
			BDL
SS-3-POST-05	12	13.6	BDL
			BDL
			74.2
			BDL
SS-3-POST-06	13.3	17.2	BDL
			BDL
			BDL
			BDL
SS-3-PRE-06D	13.7	N/A	N/A
SS-3-POST-07	37.4	26.7	BDL
			BDL
			BDL
			BDL
SS-3-POST-08	21.5	18.5	BDL
			BDL
			BDL
			BDL
SS-3-POST-09	13	14	BDL
			BDL
			BDL
			BDL
SS-PRE-09D	11.5	N/A	N/A

**Marjol Battery Site
OSV Sample Result Comparison**

Sample ID	Pre-Construction Lab Result, Total Lead (mg/kg)	Post-Construction Lab Result, Total Lead (mg/kg)	Post XRF Result, Total Lead (mg/kg)
SS-3-POST-10	22.6	51.9	BDL
			73.6
			98.2
			BDL
SS-3-POST-11	62.2	35.9	BDL
			BDL
			BDL
			BDL
SS-3-POST-12	25.1	34.8	BDL
			BDL
			63.5
			BDL
SS-3-POST-13	12	12.6	BDL
			BDL
			BDL
			BDL
SS-3-POST-14	12.2	12.2	BDL
			BDL
			BDL
			BDL
SS-3-POST-15	658	29.4	BDL
			BDL
			BDL
			BDL
SS-3-PRE-15A	642	N/A	N/A
SS-3-PRE-15B	636	N/A	N/A
SS-3-POST-16	22.2	23.4	BDL
			BDL
			BDL
			BDL
SS-3-POST-17	12.7	17	BDL
			BDL
			BDL
			BDL
SS-3-POST-18	11.1	12.6	BDL
			BDL
			BDL
			BDL
SS-3-POST-19	17.1	18.9	BDL
			BDL
			BDL
			BDL
SS-3-POST-20	23.8	89.9	98.2
			93
			92.7
			BDL

**Marjol Battery Site
OSV Sample Result Comparison**

Sample ID	Pre-Construction Lab Result, Total Lead (mg/kg)	Post-Construction Lab Result, Total Lead (mg/kg)	Post XRF Result, Total Lead (mg/kg)
SS-4-POST-01	28.5	27.3	BDL
			BDL
			84.3
			BDL
SS-4-PRE-01D	31.2	N/A	N/A
SS-4-POST-02	35.6	38.6	N/A
SS-4-POST-03	49.4	51.7	BDL
			BDL
			BDL
			68.3
SS-4-POST-04	52	50.3	N/A
SS-4-POST-05	30.3	30.2	70.6
			BDL
			38.2
			BDL
SS-4-POST-06	31.6	35.9	N/A
SS-4-POST-07	56.1	41.1	BDL
			BDL
			BDL
			BDL
SS-4-POST-08	61.1	46.9	N/A
SS-4-POST-09	11.6	15	BDL
			BDL
			BDL
			78.7
SS-4-POST-09D	NA	16.7	BDL
			BDL
			BDL
			BDL
SS-4-POST-10	75.4	135	N/A
SS-4-POST-11	172	178	BDL
			177
			172
			147
SS-4-POST-12	40	24.4	N/A
SS-4-POST-13	131	97.1	105
			BDL
			BDL
			108
SS-4-POST-14	320	145	N/A
SS-4-POST-15	340	781	635
			608
			661
			696

**Marjol Battery Site
OSV Sample Result Comparison**

SS-4-POST-16	128	165	N/A
SS-4-POST-17	193	384	287
			325
			346
			311
SS-4-POST-18	512	371	N/A
SS-4-POST-19	393	363	289
			310
			250
			299
SS-4-POST-20	309	328	N/A

**Marjol Battery Site
OSV Sample Result Comparison**

Sample ID	Pre-Construction Lab Result, Total Lead (mg/kg)	Post-Construction Lab Result, Total Lead (mg/kg)	Post XRF Result, Total Lead (mg/kg)
SS-5-POST-01	36.4	49	BDL
			BDL
			BDL
			BDL
SS-5-POST-03	116	84.7	133
			BDL
			92.8
			132
SS-5-POST-05	65.9	51.4	BDL
			113
			111
			77.5
SS-5-POST-07	53.4	49.2	53.8
			77.9
			94.3
			BDL
SS-5-POST-09	77.2	88.1	BDL
			80.4
			78.7
			BDL
SS-5-POST-11	49.9	35.2	86.9
			BDL
			BDL
			BDL
SS-5-POST-13	73.2	66	94.4
			BDL
			BDL
			BDL
SS-5-POST-15	42.9	28.6	BDL
			BDL
			BDL
			94.3
SS-5-POST-17	64.2	41.1	BDL
			101
			BDL
			BDL
SS-5-PRE-17D	60.9	N/A	N/A
SS-5-POST-19	44.5	39	BDL
			BDL
			BDL
			BDL
SS-5-POST-19D	N/A	41.2	N/A