



FINAL STATUS SURVEY DATA PACKAGE

Gate 21A Area Survey Unit 21A-01 Lake City Army Ammunition Plant Area 10 Sand Pile Removal Action

INTRODUCTION

Cabrera Services, Inc. (CABRERA) has prepared this final status survey (FSS) data report for Survey Unit (SU) 21A-01 of the Lake City Army Ammunition Plant (LCAAP) Area 10 Sand Piles Removal Action Project. Consistent with the *Area 10 Final Status Survey Plan (FSSP)*, which is Appendix B of the *Area 10 Removal Action Work Plan* (CABRERA, 2008b), the derived concentration guideline level (DCGL) applicable to residual soil at this project site is equivalent to the Nuclear Regulatory Commission (NRC) unrestricted release criterion of 35 picocuries per gram (pCi/g) total uranium specified in the Army's Nuclear Materials License (No. SUC-1380). Assuming the activity percentages for depleted uranium (DU) of 15.55% uranium-234 (^{234}U), 1.07% uranium-235 (^{235}U), and 83.38% uranium-238 (^{238}U), this equates to a ^{238}U soil concentration of 29.2 pCi/g. This soil DCGL will be used to compare individual sample results based on detection and quantification of the surrogate radionuclide, thorium-234 (^{234}Th), via gamma spectroscopy.

RESULTS

Summary of GWS Results

As shown in Figure 1, the gamma walkover survey (GWS) gross count rates measured during field instrument for the detection of low energy radiation (FIDLER) scanning were all below the screening value of 15,500 counts per minute (cpm).

Figure 2 is a normal probability plot that compares the actual count rates in the SU versus expected Z-scores for those values if they followed a standard normal distribution. The purpose of these plots is to test the final GWS data for outliers. If the data fall on a generally straight line, then the data are assumed to be part of the same distribution. Outliers or anomalies indicative of contamination would result in singular points at the extremes of the data set or as lines of differing slopes on the normal probability plot. While some lines of differing slope are present, they represent different background levels rather than contamination based on the magnitude of the count rates detected. Based on the GWS results, no residual DU was detected at 21A-01.

Summary of FSS Sample Results

A summary of the off-site gamma spectroscopy analyses for soil samples collected from this SU is provided below. The complete set of results is provided in Table 1. All individual ^{234}Th results presented in Table 1 were less than the DCGL of 29.2 pCi/g ^{238}U . All applicable QC requirements for the off-site laboratory were met during the analysis of samples from this SU.

SUMMARY AND CONCLUSION

The data for SU 21A-01 presented herein indicate that the residual soil in this SU satisfies the requirements for radiological release in accordance with the *FSSP* (CABRERA, 2008b).



Summary Statistics for ^{234}Th in Final Status Survey Samples at 21A-01

| Survey Unit | Number of Samples | Average | Standard Deviation | Median | Minimum | Maximum |
|-------------|-------------------|---------|--------------------|--------|---------|---------|
| 21A-01 | 15 | 2.09 | 0.49 | 1.96 | 1.50 | 2.94 |

pCi/g = picocuries per gram

Figure 1. Final Posting Plot of GWS and Systematic Sample Data - 21A-01

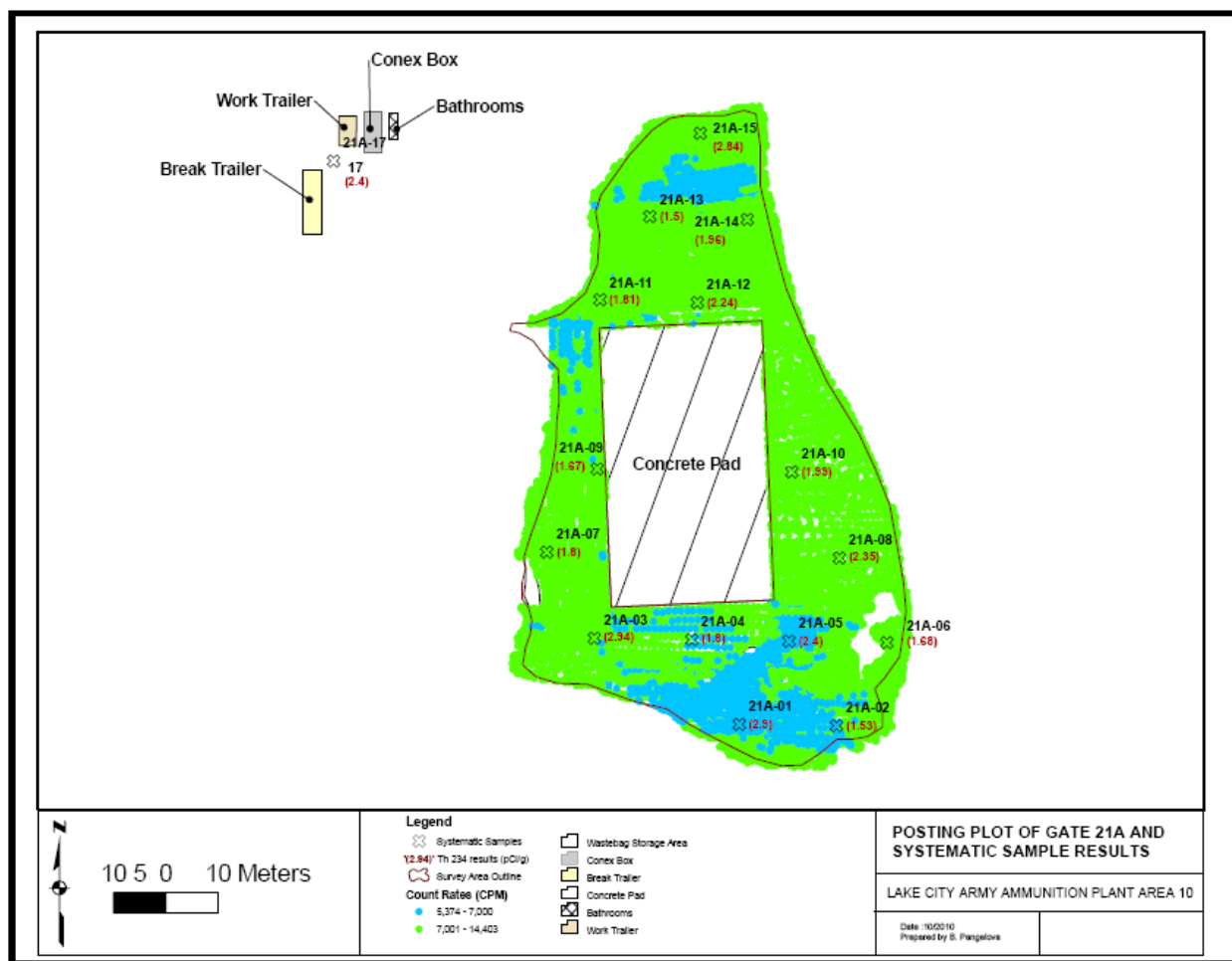




Figure 2. Normal Probability Plot of 21A-01 GWS Data

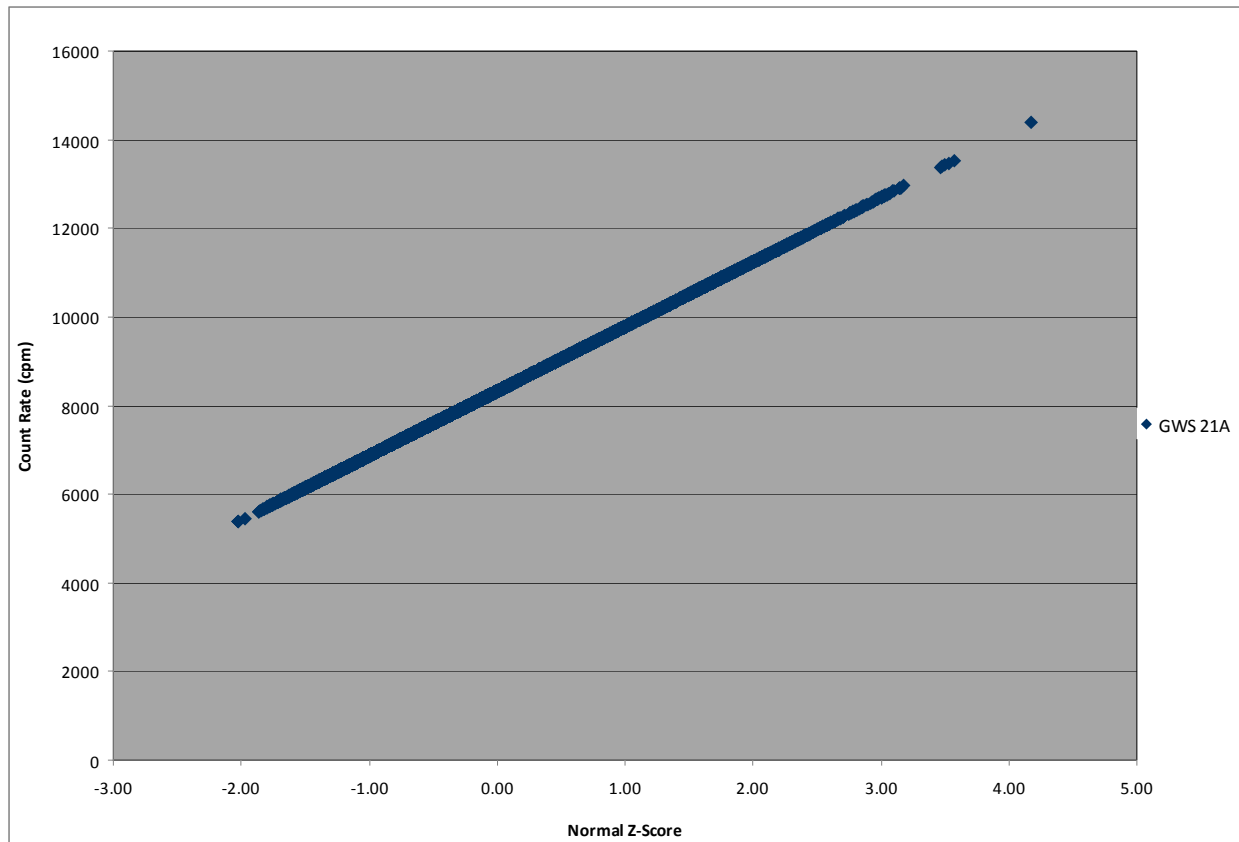




Table 1. Analytical Results for 21A-01 FSS Samples

| Sample ID | Northing | Easting | FIDLER Post Sample Collection (cpm) | Date/Time of Sample Collection | | ²³⁴ Th Result (pCi/g) ^d | Total Propagated Uncertainty (pCi/g) | Minimum Detectable Activity ^e (pCi/g) |
|---------------------|-----------|-----------|---|-----------------------------------|------------|--|---|---|
| 21A-01 | 1063210.2 | 2858420.0 | 9,361 | 8/22/2010 | 4:45:00 PM | 2.9 | 1.1 | 1.7 |
| 21A-02 | 1063210.2 | 2858481.2 | 9,968 | 8/22/2010 | 4:57:00 PM | 1.53 | 0.88 | 1.4 |
| 21A-03 | 1063263.1 | 2858328.3 | 10,290 | 8/22/2010 | 4:10:00 PM | 2.94 | 0.84 | 1.23 |
| 21A-04 | 1063263.1 | 2858389.5 | 11,750 | 8/22/2010 | 4:40:00 PM | 1.8 | 1 | 1.6 |
| 21A-05 | 1063263.1 | 2858450.6 | 6,148 ^c | 8/22/2010 | 4:27:00 PM | 2.4 | 1.4 | 2.2 |
| 21A-06 | 1063263.1 | 2858511.7 | 11,951 | 8/22/2010 | 5:05:00 PM | 1.68 | 0.99 | 1.58 |
| 21A-07 | 1063316.1 | 2858297.8 | 11,944 | 8/22/2010 | 4:00:00 PM | 1.8 | 1.1 | 1.7 |
| 21A-08 | 1063316.1 | 2858481.2 | 10,582 | 8/22/2010 | 5:10:00 PM | 2.35 | 0.85 | 1.66 |
| 21A-09 | 1063368.1 | 2858328.3 | 10,406 | 8/22/2010 | 3:50:00 PM | 1.67 | 0.84 | 1.42 |
| 21A-10 | 1063369.0 | 2858450.6 | 10,632 | 8/22/2010 | 5:24:00 PM | 1.99 | 0.94 | 1.47 |
| 21A-11 | 1063474.9 | 2858328.3 | 9,388 | 8/22/2010 | 3:34:00 PM | 1.81 | 0.65 | 1 |
| 21A-12 | 1063474.9 | 2858389.5 | 11,369 | 8/22/2010 | 3:20:00 PM | 2.24 | 0.77 | 1.32 |
| 21A-13 | 1063527.8 | 2858358.9 | 11,069 | 8/22/2010 | 3:10:00 PM | 1.5 | 0.77 | 1.22 |
| 21A-14 | 1063527.8 | 2858420.0 | 9,829 | 8/22/2010 | 3:00:00 PM | 1.96 | 0.84 | 1.3 |
| 21A-15 | 1063580.8 | 2858389.5 | 9,814 | 8/22/2010 | 2:38:00 PM | 2.84 | 0.92 | 1.53 |
| 21A-16 ^a | 1063263.1 | 2858511.7 | 11,951 | 8/22/2010 | 5:08:00 PM | 3.6 | 1.1 | 1.7 |
| 21A-17 ^b | 1063551.8 | 2858157.0 | 9,846 | 8/22/2010 | 5:40:00 PM | 2.4 | 1.2 | 2 |

cpm = counts per minute; ²³⁴Th = thorium-234

pCi/g = picocuries per gram

^a Sample 21A-16 is a field duplicate of 21A-06.

^b Sample 21A-17 is from a non-impacted (i.e., background location) near the support trailers.

^c The location from which sample 21A-05 was collected contained standing water after the sample material was removed.

^d ²³⁴Th results were compared to the DCGL of 29.2 pCi/g uranium-238.

^e Minimum Detectable Activity is defined as the smallest amount of activity that can be quantified for comparison with regulatory limits.