

FINAL

TECHNICAL MEMORANDUM

**Summary of Air Monitoring for the 2008 Prescribed
Range Burns at Schofield Barracks**

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1.0 INTRODUCTION

Cabrera Services, Inc. (CABRERA) conducted air sampling and analysis to evaluate potential airborne emissions of depleted uranium (DU) during prescribed full range burns on 22 August and 27 August, 2008 at Schofield Barracks, Hawaii. The objective of this sampling and analysis was to gather data to evaluate airborne activity concentrations of DU generated by range burning activities in relationship to the health and safety of Schofield Barracks personnel and the general public.

2.0 SAMPLING ACTIVITIES

Air samplers were set up at four locations around the range burn areas to collect both pre-burn (background) and during-burn air samples. Samplers utilized were Hi-Q model CFT-970 high volume samplers set at a collection rate of approximately 50 cubic feet per minute with 8-inch by 10-inch particulate Whatman-41, or equivalent, paper filters. Sampling was conducted in accordance with plans, methods and procedures developed for the first range burn sampling conducted in 2007 (CABRERA2007)*. Samplers were deployed in consultation with USAG-HI Schofield Barracks safety staff to provide coverage in the direction of the typical prevailing wind conditions. Prevailing winds are generally in the West or South-West direction. Sample locations were:

- At an observation tower adjacent to the Schofield Barracks Range Control Facility (PT1 - upwind);
- At the KR-3 Range Control Tower (PT2);
- Off the range firebreak road to the southwest (PT3); and
- Approximately 100-feet off the range firebreak road to the west (PT4).

The locations of the four air samplers around the Schofield Barracks range are shown in Figure 2-1 with the Global Positioning System (GPS) coordinates presented in Table 2-1 UTM Zone 4N. A typical air sampler setup is shown in Figure 2-2.

Sample filters collected before and during the full range burns were sent to ALS Paragon (Paragon) in Fort Collins, Colorado for analysis for Isotopic Uranium by alpha spectroscopy.

The weather conditions during the 22 August burn were mostly sunny, a high temperature of 87° Fahrenheit, and easterly winds of 10 to 15 miles per hour. This burn was terminated prematurely due to an increase in sustained winds above prescription conditions. Air sample collection ran for a shorter duration during this prescribed burn and was terminated between approximately 1448 and 1530. The prescribed burn was rescheduled for the next available date of 27 August. The weather conditions during the 27 August burn were sunny with isolated showers, a high temperature of 90° Fahrenheit, and easterly winds of 10 to 15 mph.

* Technical Memorandum: *Summary of Air Monitoring and Soil /Vegetation Data from the Reference, Test and Full Range Burns at Schofield Barracks*, August 2007. Cabrera Services.

The field visual observations and meteorological data supported the positioning of air sampling equipment to adequately monitor the burn plume direction and associated airborne particulate collection. Local weather station data for the days that the burns occurred are presented as Appendix A. The plumes of smoke generated during the burns are shown in Figures 2-3 and 2-4. Additional burn photographs are presented as Appendix B.

TABLE 2-1: RANGE BURN AIR SAMPLER GPS LOCATIONS

Location	Northing (meters)	Easting (meters)
Point 1 (PT1)	2377499.96	595160.96
Point 2 (PT2)	2376175.53	592262.59
Point 3 (PT3)	2376566.32	591161.37
Point 4 (PT4)	2377409.88	591102.80

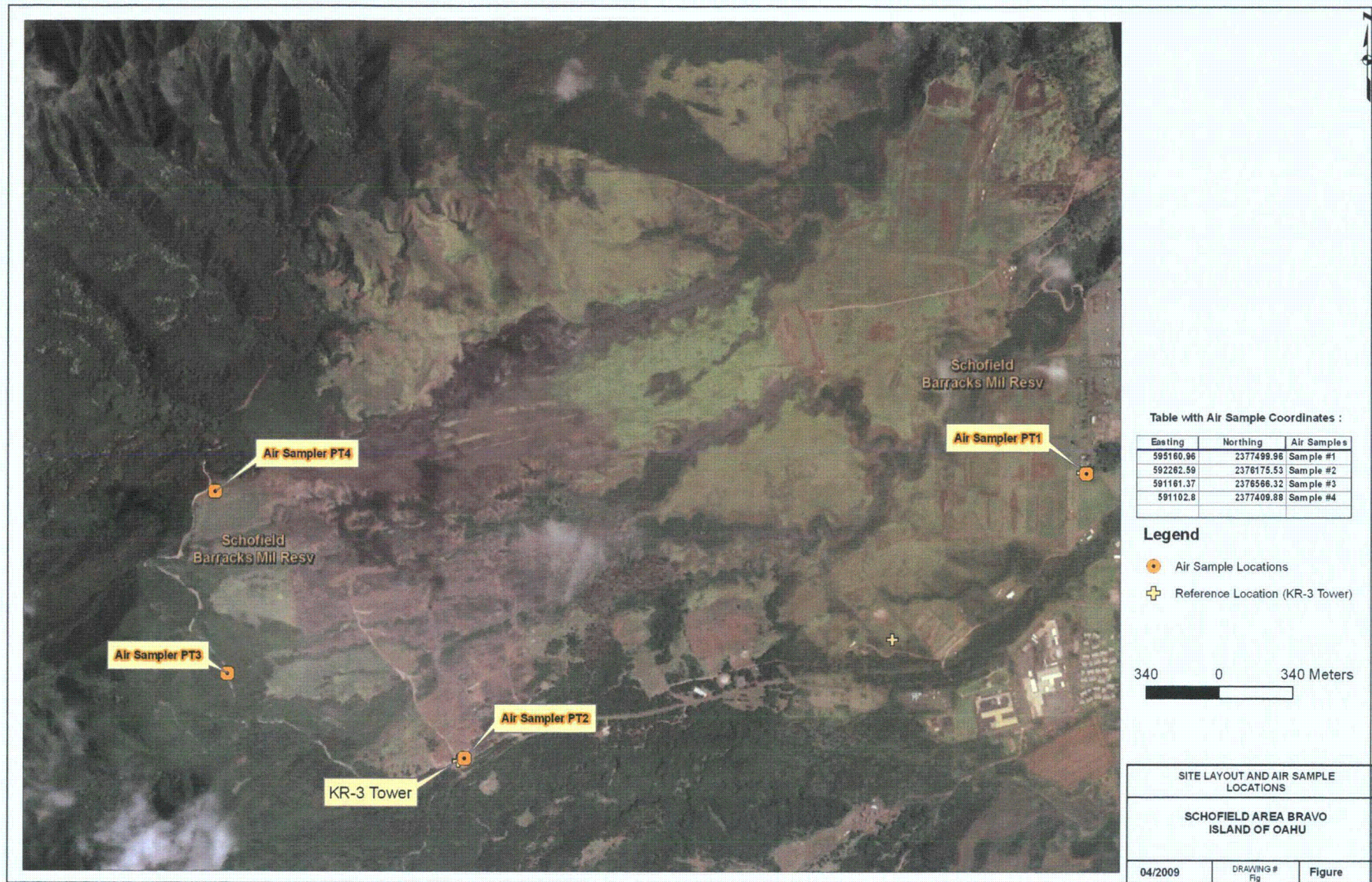


FIGURE 2-1: SCHOFIELD BARRACKS RANGE BURN AIR SAMPLER LOCATIONS



FIGURE 2-2: TYPICAL RANGE BURN AIR SAMPLER SETUP (SAMPLER PT4)



FIGURE 2-3: PRESCRIBED BURN SMOKE PLUME, AUGUST 22, 2008



FIGURE 2-4: PRESCRIBED BURN SMOKE PLUME AUGUST 27, 2008-VIEW FROM KR-3

3.0 AIR SAMPLING RESULTS

Offsite laboratory analysis of air filters was performed by Paragon for Isotopic Uranium (uranium-234 (U-234), uranium-235 (U-235), and uranium-238 (U-238)) by alpha spectroscopy.

Results of the background air sampling performed before the two burns are presented in Table 3-1, and the results of air sampling performed during the two burns are presented in Table 3-2. All detected concentrations of uranium isotopes U-234, U-235, and U-238 were below the project action level of 5E-14 microCuries per milliliter ($\mu\text{Ci/ml}$) established in the Effluent Sampling Plan. This action level was based on 10% of the 10 CFR 20, Appendix B, Table 2¹ air effluent limit for U-234 (5E-14 $\mu\text{Ci/ml}$), which is the most conservative limit for the uranium isotopes that are present in DU.

The air sampling results demonstrate that there is no significant increase in uranium concentrations in air from pre-burn samples to during-burn samples with the majority of the results being below the minimum detectable activity. There are no indications of the presence of DU in the air samples to indicate that airborne uranium is being released during the burns.

Paragon's analytical report is presented as Appendix C.

TABLE 3-1: BACKGROUND AIR SAMPLING RESULTS BY LOCATION
(in $\mu\text{Ci/ml}$)

Sample ID	U-234 Result	U-234 MDA	U-234 Total Error	U-235 Result	U-235 MDA	U-235 Total Error	U-238 Result	U-238 MDA	U-238 Total Error
SB-D1-PT1-BB	4.5E-16	6.5E-16	4.4E-16	5.9E-17	4.5E-16	3.1E-16	-4.7E-17	7.5E-16	2.6E-16
SB-D1-PT2-BB	1.8E-16	6.0E-16	3.1E-16	8.2E-17	2.2E-16	3.1E-16	-1.1E-16	6.0E-16	2.6E-16
SB-D1-PT3-BB	1.1E-17	5.8E-16	2.9E-16	3.4E-17	6.1E-16	3.5E-16	1.2E-16	6.8E-16	3.0E-16
SB-D1-PT4-BB	-1.4E-16	9.2E-16	2.8E-16	-2.4E-17	4.8E-16	3.3E-16	-1.1E-16	7.7E-16	2.8E-16
SB-D2-PT1-BB	-5.2E-18	2.9E-16	1.1E-16	9.8E-17	1.9E-16	1.3E-16	-5.2E-17	3.3E-16	1.1E-16
SB-D2-PT2-BB	7.6E-17	4.0E-16	1.8E-16	1.1E-16	2.0E-16	2.0E-16	-7.0E-17	4.0E-16	1.7E-16
SB-D2-PT3-BB	9.6E-17	4.3E-16	2.0E-16	-1.6E-17	3.4E-16	2.3E-16	5.6E-17	3.9E-16	2.0E-16
SB-D2-PT4-BB	2.9E-16	6.0E-16	3.5E-16	-5.9E-17	5.7E-16	3.3E-16	1.2E-16	6.4E-16	2.8E-16

Notes:

All air sampling results are reported to two significant digits.

Sample ID suffix -BB indicates Before Burn, D1 indicates day 1, D2 indicates day 2

¹ Nuclear Regulatory Commission (NRC) Title 10 Code of Federal Regulations (CFR) Part 20, Appendix B, Table 2

**TABLE 3-2: PRESCRIBED RANGE BURN AIR SAMPLING RESULTS BY
LOCATION
(in $\mu\text{Ci/ml}$)**

Sample ID	U-234 Result	U-234 MDA	U-234 Total Error	U-235 Result	U-235 MDA	U-235 Total Error	U-238 Result	U-238 MDA	U-238 Total Error
SB-D1-PT1-PB	8.8E-17	1.99E-16	1.2E-16	-1.0E-17	1.7E-16	1.2E-16	4.7E-17	1.5E-16	1.0E-16
SB-D1-PT1-PB	1.4E-16	5.6E-16	2.7E-16	3.9E-17	6.2E-16	2.7E-16	1.3 E-16	4.4E-16	2.3E-16
SB-D1-PT2-PB	4.4E-17	1.8E-16	8.7E-17	4.1E-17	1.3E-16	6.9E-17	6.1E-17	8.4E-17	6.7E-17
SB-D1-PT2-PB	1.6E-16	6.2E-16	3.0E-16	-8.7E-17	5.7E-16	2.7E-16	-8.7E-17	6.2E-16	2.2E-16
SB-D1-PT3-PB	3.9E-17	1.3E-16	6.7E-17	8.4E-18	1.4E-16	7.8E-17	-8.4E-18	1.6E-16	6.7E-17
SB-D1-PT3-PB	1.0E-16	4.5E-16	2.6E-16	6.1E-17	4.4E-16	3.1E-16	1.3E-16	5.5E-16	2.7E-16
SB-D1-PT4-PB	6.1E-17	1.1E-16	7.5E-17	3.1E-17	1.3E-16	7.8E-17	5.0E-17	1.4E-16	7.5E-17
SB-D1-PT4-PB	1.6E-17	5.1E-16	2.0E-16	1.0E-16	4.6E-16	2.1E-16	1.3E-16	4.9E-16	2.4E-16
SB-D2-PT1-PB	7.6E-17	1.1E-16	7.6E-17	-4.8E-18	9.3E-16	6.4E-17	2.6E-17	7.8E-17	5.5E-17
SB-D2-PT1-PB	3.0E-17	2.4E-16	9.7E-17	-4.7E-17	2.6E-16	1.1E-16	8.0E-17	1.9E-16	1.1E-16
SB-D2-PT2-PB	1.4E-16	1.2E-16	1.0E-16	-4.8E-18	9.6E-16	6.5E-17	5.8E-17	1.2E-16	7.2E-17
SB-D2-PT2-PB	4.2E-17	2.4E-16	1.0E-16	4.6E-17	2.1E-16	1.2E-16	1.2E-16	2.0E-16	1.3E-16
SB-D2-PT3-PB	-4.8E-18	1.6E-16	5.5E-17	1.9E-17	1.2E-16	6.0E-17	1.9E-16	7.2E-17	1.1E-16
SB-D2-PT3-PB	7.0E-17	2.4E-16	1.2E-16	9.9E-17	2.3E-16	1.3E-16	8.3E-18	2.4E-16	9.1E-17
SB-D2-PT4-PB	3.6E-17	1.2E-16	6.2E-17	7.2E-18	1.3E-16	7.2E-17	9.6E-18	1.4E-16	6.2E-17
SB-D2-PT4-PB	1.7E-16	1.6E-16	1.4E-16	5.3E-17	1.6E-16	1.1E-16	2.0E-17	2.0E-16	9.4E-17

Notes:

All air sampling results are reported to two significant digits.
Sample ID suffix -PB indicates during Prescribed Burn

4.0 QUALITY CONTROL

Project plan and CABRERA internal procedures were followed for the collection, handling, and transfer of samples to ALS Paragon. ALS Paragon procedures were followed to ensure sample laboratory quality control, including sample receipt, preparations, counting, data verification, and reporting. Method blanks and laboratory control spikes performed by ALS Paragon were within limits. A total of six trip blanks/sample blanks were analyzed by ALS Paragon along with the air samples. A trip blank is a sample of analyte-free media taken from the laboratory to the sampling site and returned to the laboratory unopened. Trip blanks are used to document contamination attributable to shipping and field handling procedures. Analytical results for the six trip blanks were below laboratory detection limits. Paragon's analytical report is presented as Appendix C.

5.0 CONCLUSIONS

All airborne data results for the prescribed range burns were less than the project action limit of 10% of the 10 CFR 20, Appendix B, Table 2 airborne effluent limit for U-234, the most conservative limit for uranium isotopes present in DU. The sampling results indicate that range burn activities do not endanger the health and safety of Schofield Barracks personnel or the general public