

**AIRBORNE URANIUM MONITORING
U. S. ARMY POHAKULOA TRAINING AREA
ISLAND OF HAWAII**

Summary Report - July 2009

**Contract No. W9128A-04-D-0019
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Prepared for

**U. S. Army Corps of Engineers
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ACRONYMS AND ABBREVIATIONS

| | |
|-------------------|--|
| ATSDR | Agency for Toxic Substances and Disease Registry |
| EPA | U. S. Environmental Protection Agency |
| ICP-MS | inductively coupled mass spectrometry |
| IDL | instrument detection limit |
| lpm | liters per minute |
| µg | micrograms |
| µg/m ³ | micrograms per cubic meter |
| MRL | minimal risk level |
| N | number of samples |
| ppm | parts per million |
| PRL | practical reporting limit |
| PTA | Pohakuloa Training Area |
| TSP | total suspended particulate matter |
| U | uranium |
| ²³⁸ U | uranium-238 isotope |
| ²³⁴ U | uranium-234 isotope |
| ²³⁵ U | uranium-235 isotope |
| WHO | World Health Organization |

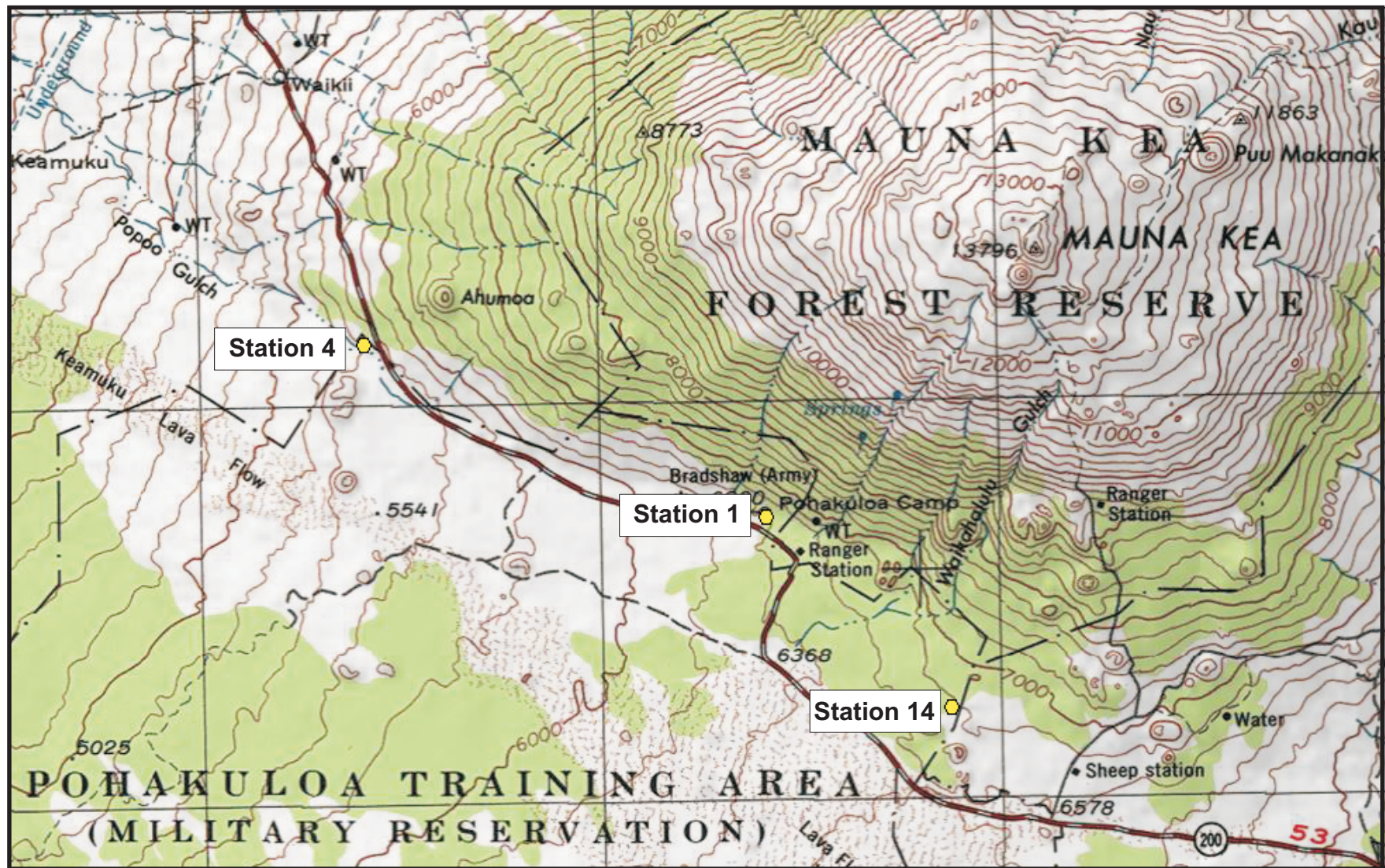
INTRODUCTION

An airborne uranium monitoring project at the U. S. Army's Pohakuloa Training Area (PTA) commenced on 4 February 2009. Portable samplers operating at a nominal 5 liters per minute (lpm) are located at three (3) sites on PTA (Figure 1). The samplers were originally set to collect total suspended particulate matter (TSP) from midnight to midnight on sample days. However, due to the very low uranium content of the TSP samples, the run time was increased to 72 hours on 19 Apr 09 and has continued at that rate in an effort to raise the collected uranium mass above the practical reporting level (PRL). Since there was 155 mm artillery firing on PTA ranges during the first three weeks of July, the 72-hour sampling periods were scheduled to capture as many of those days as possible.

The 47-mm Teflon filters with the collected TSP are sent to laboratories for gravimetric and then uranium analysis. The analysis method for uranium is inductively coupled plasma - mass spectrometry (ICP-MS), a method capable of detecting uranium down to the picogram (10^{-12} gram) level.

Eighteen (18) 72-hour samples were collected and analyzed during July 2009, and the results are presented herein.

FIGURE 1
MONITORING SITES



RESULTS AND DISCUSSION

The analysis results for each of the three (3) monitoring stations are summarized in Tables 1 and Figures 2 - 4. The 6-8 July 2009 filters had been successfully processed with the June 2009 samples. The gravimetric analysis of the remainder of the July 2009 filters was carried out normally, but the subsequent chemical analysis at the second laboratory was compromised by uranium contamination during the extraction process thereby invalidating those samples. This was discovered when the method blank result indicated the presence of uranium. The laboratory has instituted additional quality control procedures to prevent a recurrence of this event.

The figures also indicate the World Health Organization (WHO) and U. S. Agency for Toxic Substances and Disease Registry (ATSDR) guidelines for uranium exposure protection. The WHO guideline is an annual average while the ATSDR guideline is based on chronic exposure (365 days or longer) to highly soluble uranium compounds. The total uranium concentrations found at PTA in the 6 - 8 July 2009 period are well below both those health guidelines.

TABLE 1
TSP & AIRBORNE URANIUM CONCENTRATIONS
JULY 2009

| Station No. | N | TSP Range ($\mu\text{g}/\text{m}^3$) | U Range* ($\mu\text{g}/\text{m}^3$) | U Mean* ($\mu\text{g}/\text{m}^3$) | ACTIVITY |
|-------------|---|--|---------------------------------------|--------------------------------------|------------------|
| 1 | 5 | 6.3 - 18.7 | 0.000008 | 0.000008 | 155 mm artillery |
| 4 | 5 | 5.2 - 19.2 | 0.000007 | 0.000007 | 155 mm artillery |
| 14 | 5 | 1.5 - 5.0 | 0.000002 | 0.000002 | 155 mm artillery |

* Based on the single 72-hr average value at each station measured during the 6-8 Jul 09 period.

As noted in previous reports, the total uranium mass found on each filter was well above, e.g., in this data set 9 to 36 times, the laboratory's latest determined instrument detection level (IDL) for the ICP-MS method. Despite the extended sampling time of 72 hours, the collected uranium mass remained below the practical reporting level (PRL).

The fact that the measured uranium values continue to be less than the PRL remains significant from a public health perspective. At a nominal sampler flow rate of 5 lpm, the laboratory's PRL of 0.00025 microgram (μg) corresponds to an airborne uranium concentration of 0.000035 $\mu\text{g}/\text{m}^3$, a value several orders of magnitude below health effects guidelines. Uranium isotopes ^{234}U and ^{235}U continue to be undetectable.

FIGURE 2

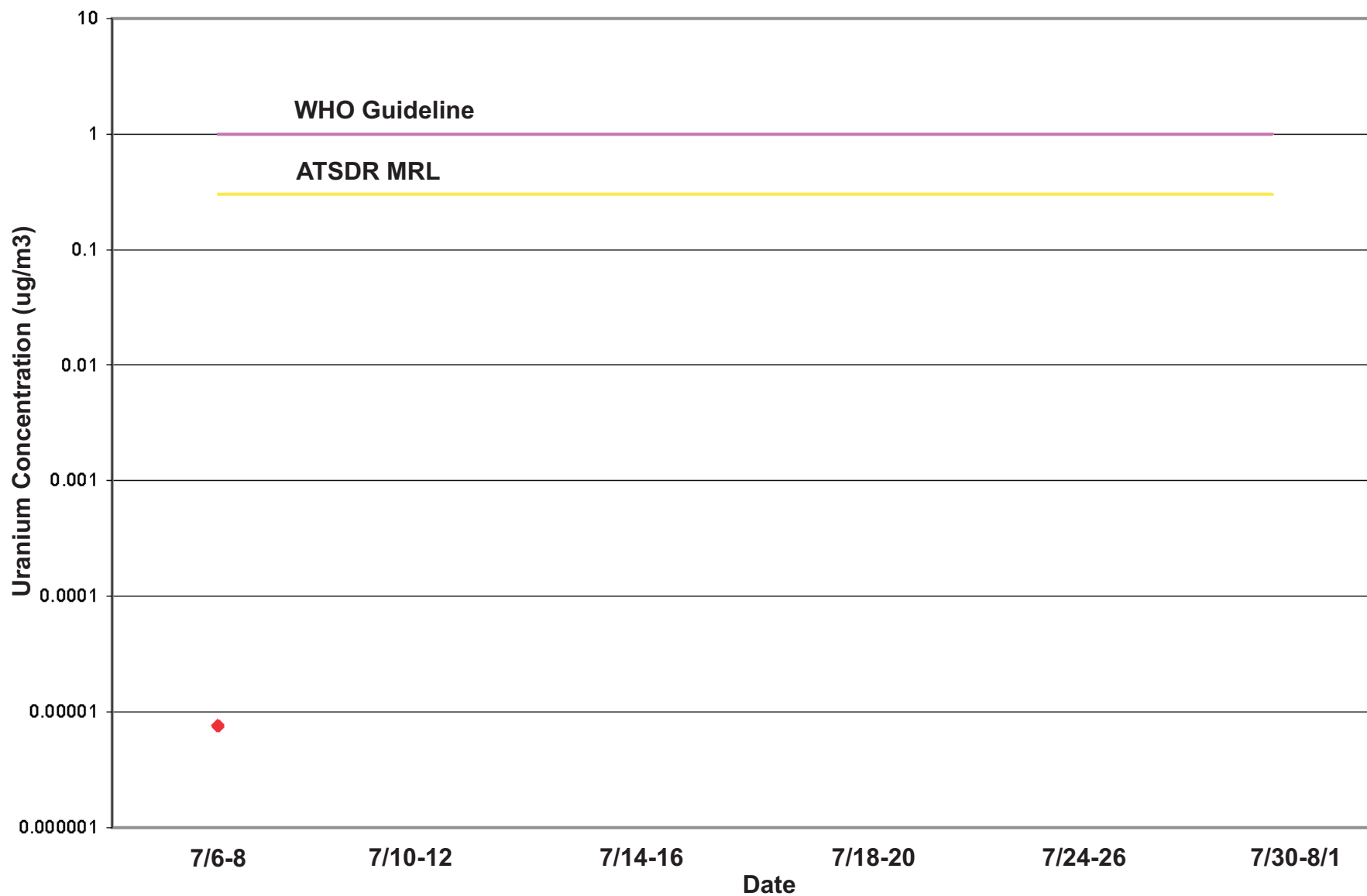
AIRBORNE URANIUM CONCENTRATIONS
STATION 1

FIGURE 3

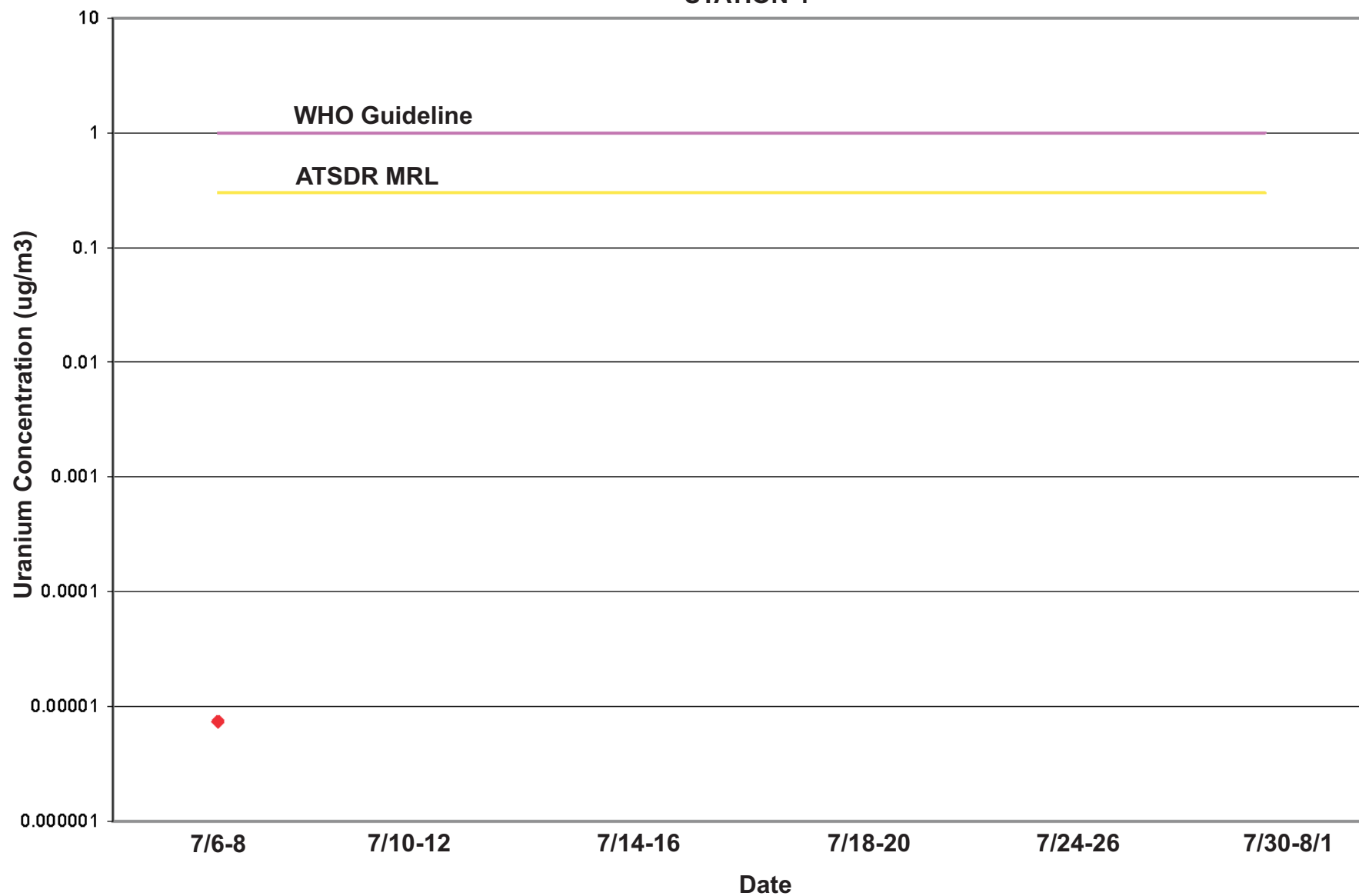
AIRBORNE URANIUM CONCENTRATIONS
STATION 4

FIGURE 4

AIRBORNE URANIUM CONCENTRATIONS
STATION 14