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

## Summary Report - March 2010

**Contract No. W9128A-04-D-0019**
**Task Order 0040**

**Prepared for**

**U. S. Army Corps of Engineers**
**Honolulu District**
**Fort Shafter, Hawaii**

**and**

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## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ATSDR | Agency for Toxic Substances and Disease Registry |
| BDL | below instrument detection level |
| EPA | U. S. Environmental Protection Agency |
| ICP-MS | inductively coupled mass spectrometry |
| IDL | instrument detection limit |
| lpm | liters per minute |
| μg | micrograms |
| $\mu g/m^3$ | 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

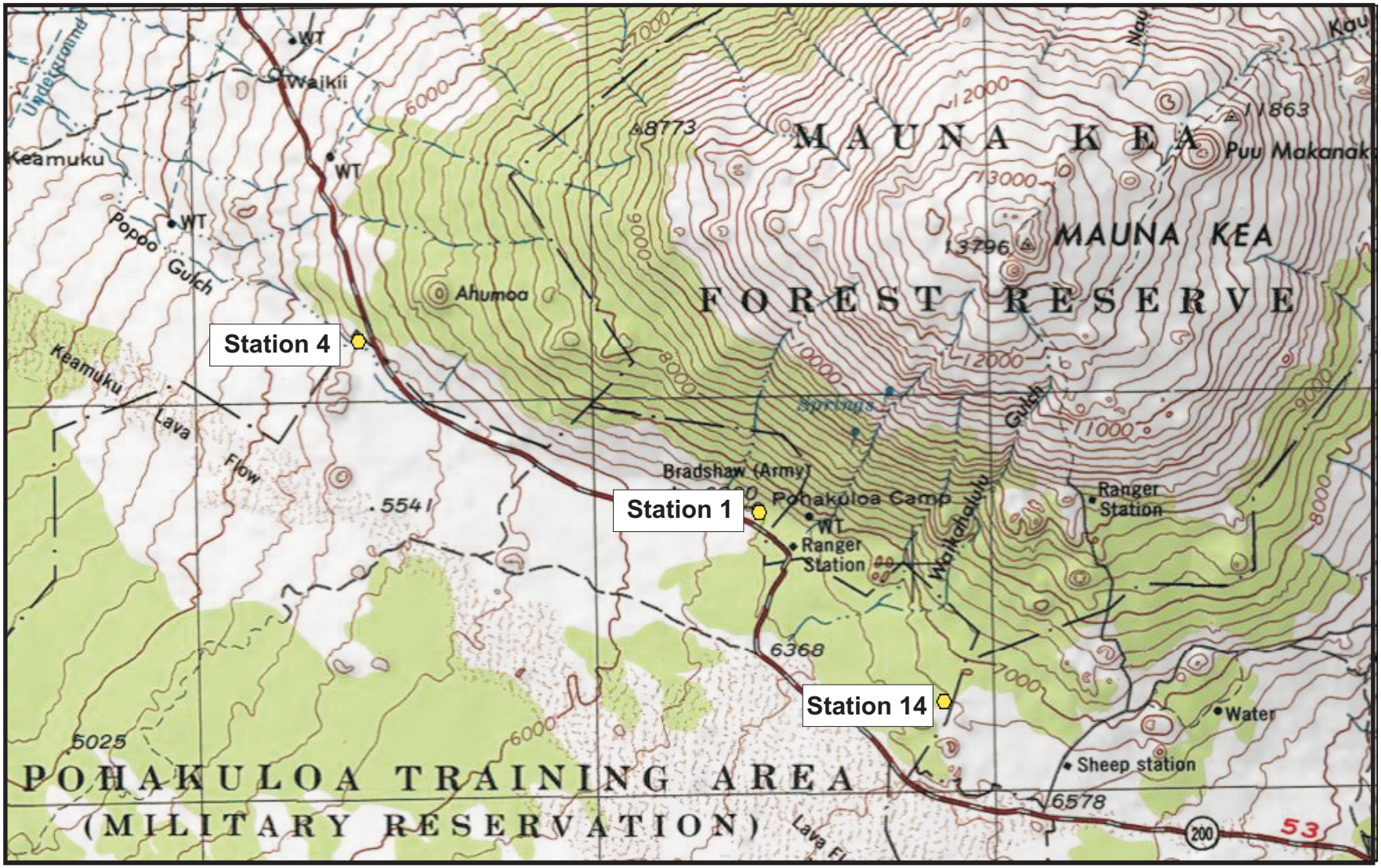
An airborne uranium monitoring project at the U. S. Army's Pohakuloa Training Area (PTA) commenced on 4 March 2009. Portable samplers operating at a nominal 5 liters per minute (lpm) are located at three (3) sites on PTA (Figure 1). The samplers were originally set to collect total suspended particulate 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). There was no heavy weapons firing activity on PTA ranges during March.

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.

Fifteen (15) samples were collected and analyzed during March 2010, 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 Table 1 and Figures 2 - 4.

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 airborne uranium concentrations found at PTA in March 2010 are well below both those health guidelines.

**TABLE 1**

**TSP & AIRBORNE URANIUM CONCENTRATIONS**
**MARCH 2010**

| Station No. | N | TSP Range ($\mu g/m^3$) | U Range* ($\mu g/m^3$) | U Mean* ($\mu g/m^3$) | ACTIVITY |
|---|---|---|---|---|---|
| 1 | 5 | 13.5 - 111 | 0.000009 - 0.000025 | 0.000014 | No heavy weapons activity |
| 4 | 5 | 14.8 - 103 | 0.000006 - 0.000058 | 0.000020 | No heavy weapons activity |
| 14 | 5 | 3.0 - 20.4 | 0.000000* - 0.000137 | 0.000031 | No heavy weapons activity |

* Below instrument detection level (BDL)

The total uranium mass found on all filters in March was above, i.e., 3 to 40 times, the laboratory's latest determined instrument detection level (IDL) for the ICP-MS method. Six (6) of the 15 filters contained total uranium above the practical reporting limit (PRL) of 0.00025 microgram (μg). Uranium isotopes $^{234}$U and $^{235}$U were undetectable.

Strong (>20 mph hourly average) southeasterly winds during the 10 - 12 March period contributed to elevated TSP levels at Stations 1 and 4 (52 and 103 μg/m$^3$, respectively), with a concomitant increase in airborne uranium concentrations as well. An elevated uranium level at Station 14 occurred during the 15 - 17 March period, but this was associated with a low TSP concentration, i.e., 6.8 μg/m$^3$, concentration. These "elevated" uranium levels were nevertheless well below the WHO and EPA health effects guidelines. A period of strong (>20 mph hourly average) southeasterly winds on 29 March was the likely cause of a high TSP (111 μg/m$^3$) concentration at Station 1 for the 27 - 29 March period, but the uranium level remained "typical", i.e., 0.000013 μg/m$^3$.

Total uranium values in the vicinity of the PRL are significant in determining the potential for public health impacts. At a nominal sampler flow rate of 5 lpm, the laboratory's PRL of 0.00025 microgram (μg) corresponds to a 24-hour airborne uranium concentration of <u>0.000035 μg/m$^3$</u>, a value several orders of magnitude below health effects guidelines.

FIGURE 2

AIRBORNE URANIUM CONCENTRATIONS
STATION 1

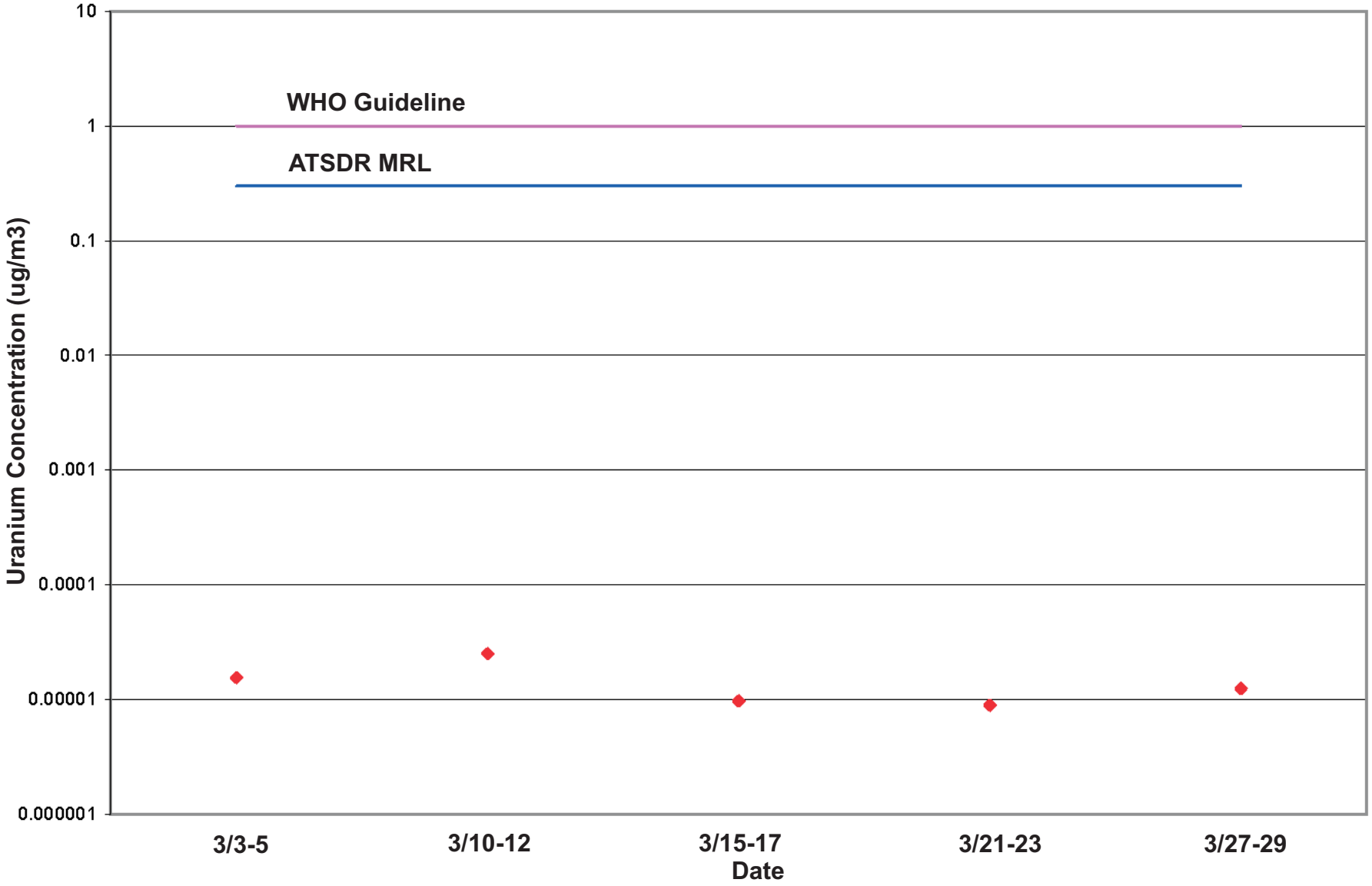


FIGURE 3

AIRBORNE URANIUM CONCENTRATIONS
STATION 4

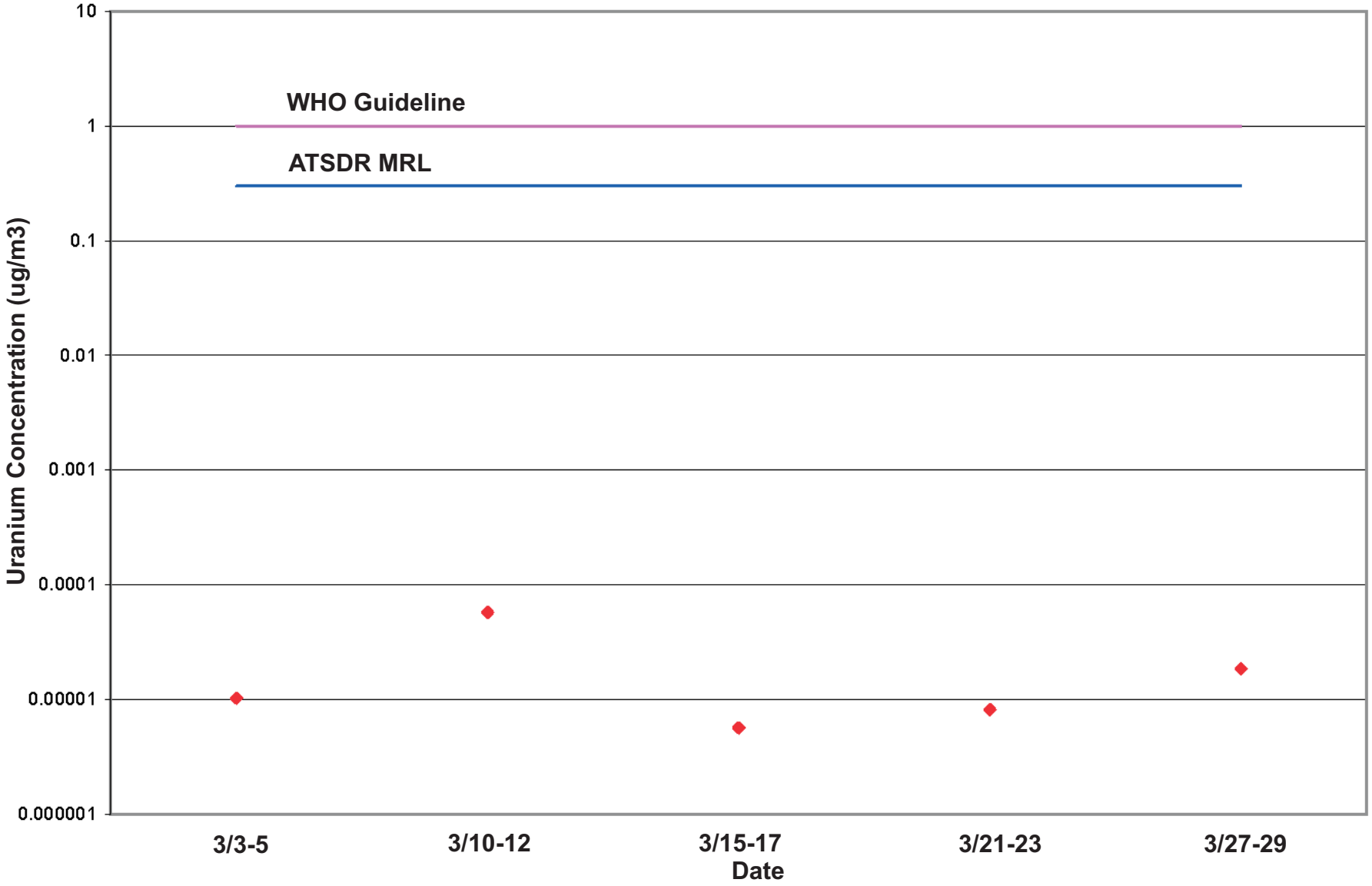


FIGURE 4

AIRBORNE URANIUM CONCENTRATIONS
STATION 14