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

Summary Report - June 2009

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Prepared for

U. S. Army Corps of Engineers
Honolulu District
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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
$\mu g/m^3$	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

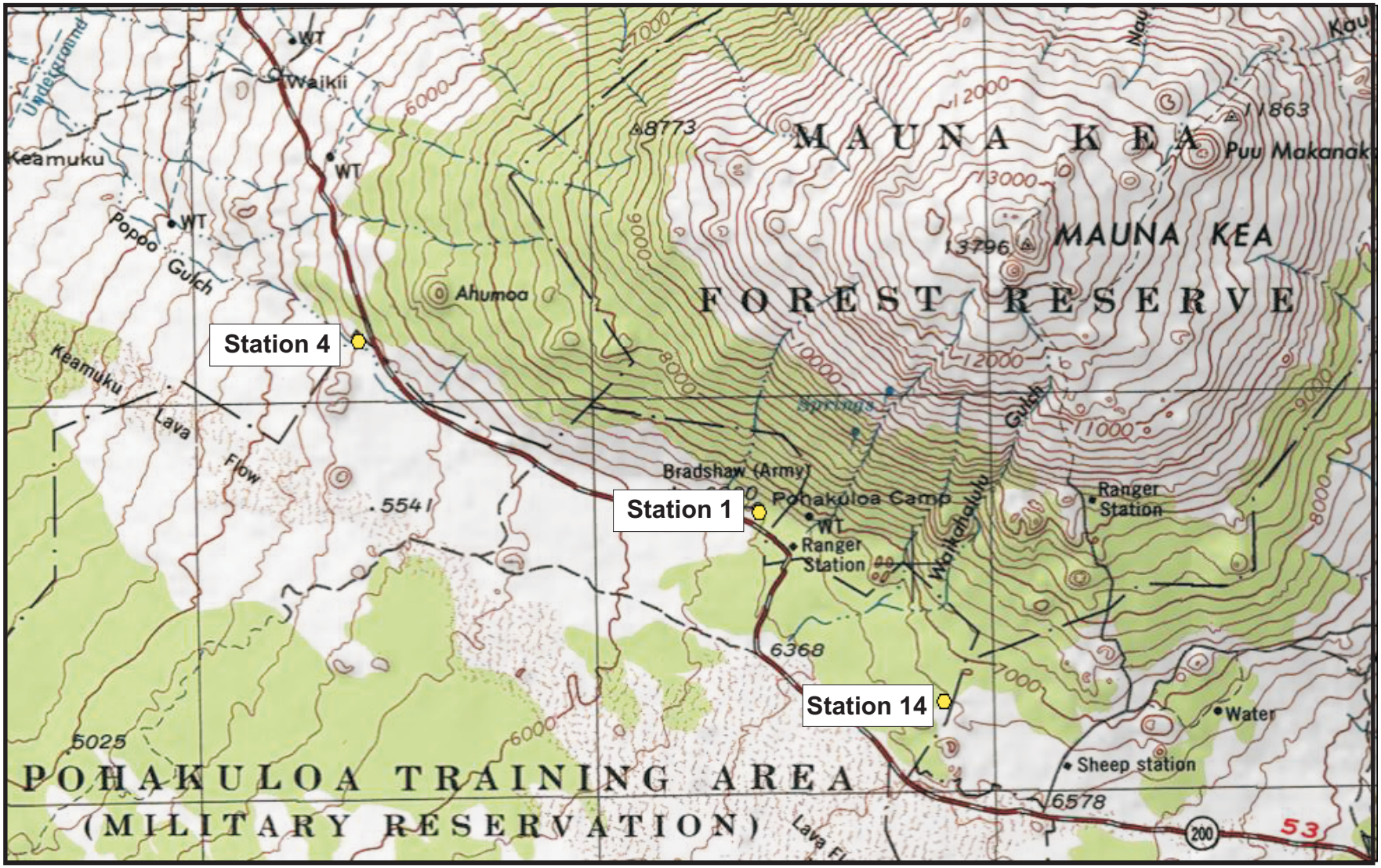
An airborne uranium monitoring project at the U. S. Army's Pohakuloa Training Area (PTA) commenced on 4 February 2009. Portable samplers operating at a nominal 5 liters per minute (lpm) are located at three (3) sites on PTA (Figure 1). The samplers were originally set to collect total suspended particulate 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 no heavy weapons firing activity on PTA ranges in June, each 72-hour sampling period commenced in accordance with EPA's published once-every-six-days schedule.

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 June 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 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. It is clear that the uranium concentrations found at PTA in June 2009 are well below both those health guidelines.

TABLE 1

TSP & AIRBORNE URANIUM CONCENTRATIONS
JUNE 2009

Station No.	N	TSP Range (µg/m³)	U Range (µg/m³)	U Mean (µg/m³)	ACTIVITY
1	5	4.3 - 21.9	0.000007 - 0.000010	0.000009	No heavy weapons activity
4	5	8.2 - 14.7	0.000005 - 0.000008	0.000006	No heavy weapons activity
14	5	2.0 - 11.1	0.000002 - 0.000006	0.000004	No heavy weapons activity

As noted in previous reports, the total uranium mass found on each filter was well above, e.g., in this data set 11 to 59 times, the laboratory's latest determined instrument detection level (IDL) for the ICP-MS method. Despite the extended sampling time of 72 hours, most samples of collected uranium mass remained below the practical reporting level (PRL).

One 72-hour sample at Station 1 did reach 102% of the PRL, and the average of all samples was 57% of the PRL, a 9% increase over the May 09 data. The fact that most total uranium levels remain below the PRL despite the extended sampling time is likely due to the very low concentrations being measured and the uncertainty associated with the analytical method at such low levels.

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 $\mu g/m^3$, a value several orders of magnitude below health effects guidelines. Uranium isotopes ^{234}U and ^{235}U continue to be undetectable.

FIGURE 2

24-HOUR URANIUM CONCENTRATIONS
STATION 1

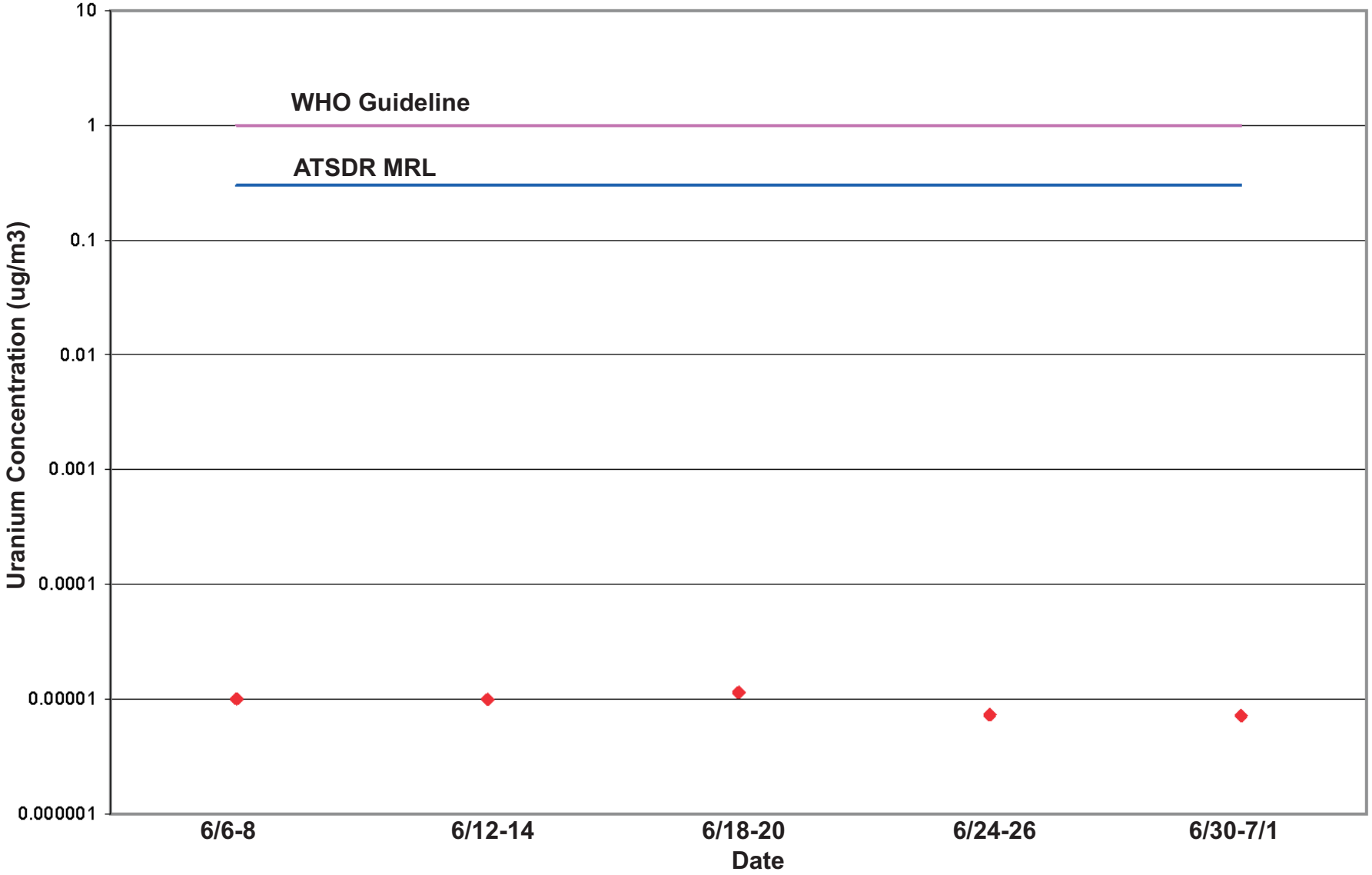


FIGURE 3

AIRBORNE URANIUM CONCENTRATIONS
STATION 4

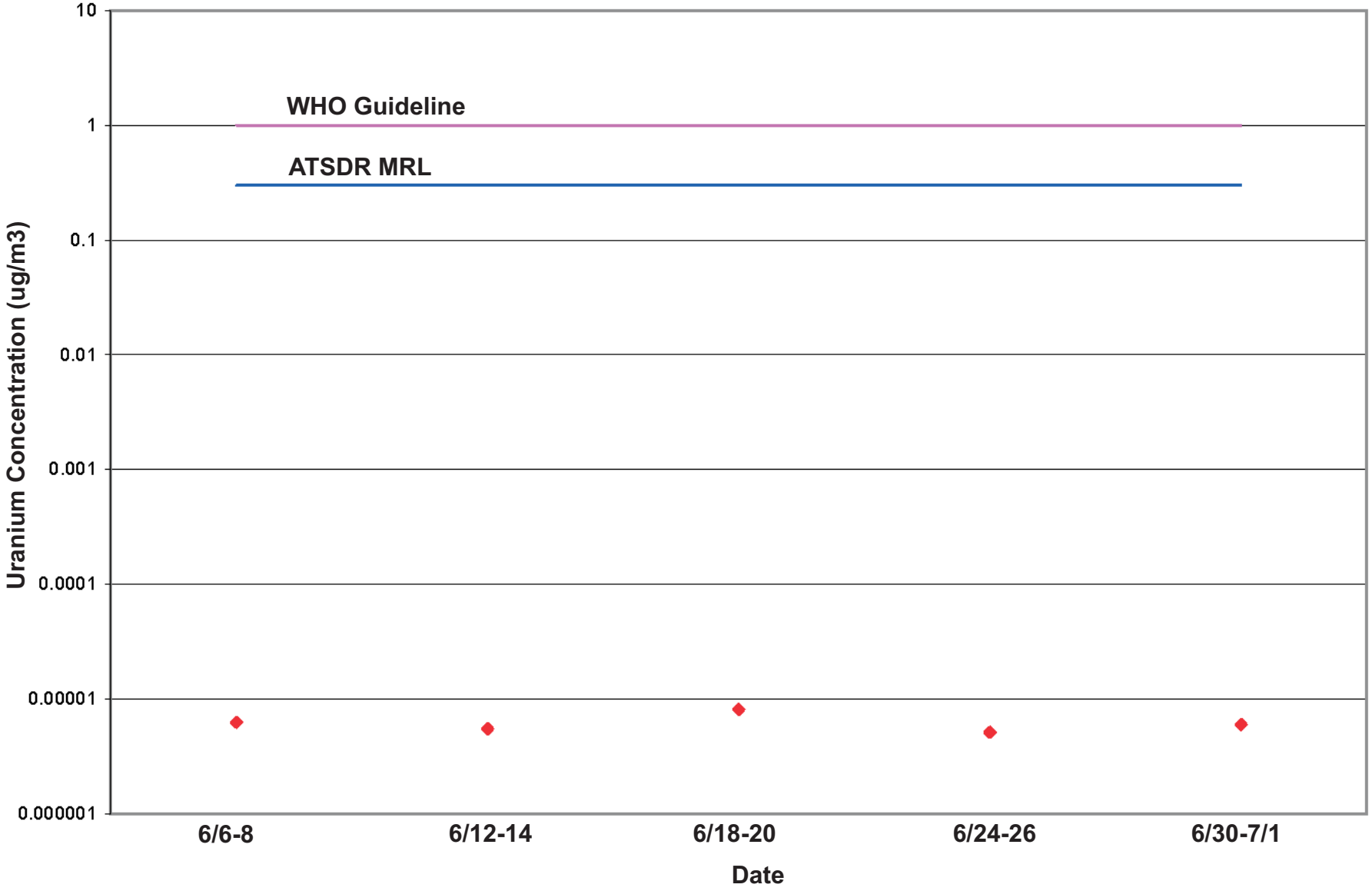


FIGURE 4

AIRBORNE URANIUM CONCENTRATIONS
STATION 14