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

Summary Report - October 2009

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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
$\mu g/m^3$	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

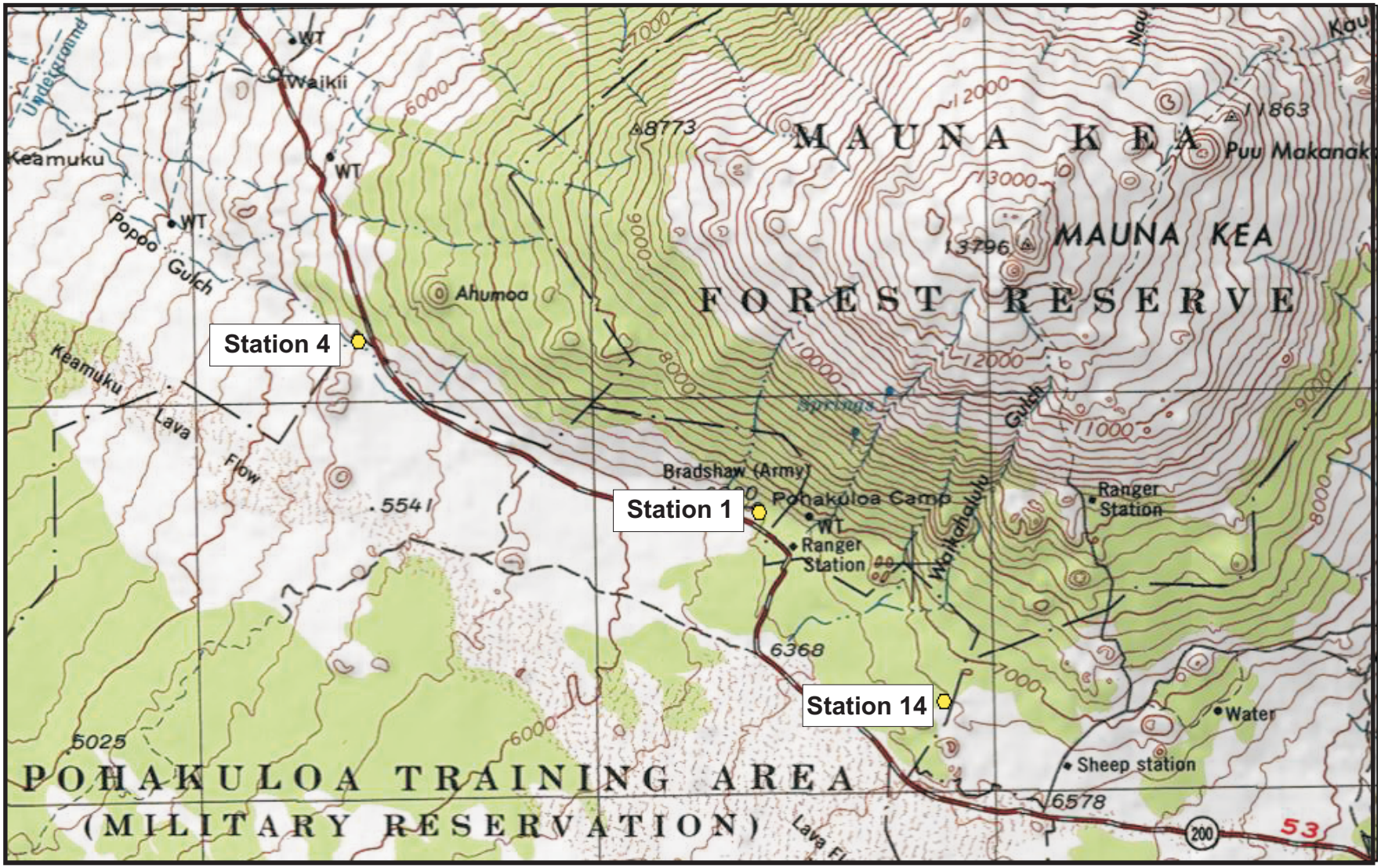
An airborne uranium monitoring project at the U. S. Army's Pohakuloa Training Area (PTA) commenced on 4 February 2009. Portable samplers operating at a nominal 5 liters per minute (lpm) are located at three (3) sites on PTA (Figure 1). The samplers were originally set to collect total suspended particulate 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 artillery and/or mortar firing activity on PTA ranges throughout October, the 72-hour sampling periods were scheduled during that activity.

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.

Sixteen (16) samples were collected and analyzed during October 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 Table 1 and Figures 2 - 4. It should be noted that five of the sample runs were less than 72 hours, i.e., Station 1 (7 - 9 Oct, 62 hrs and 11 - 13 Oct, 55 hours), Station 4 (3 - 5 Oct, 56 hours and 7 - 9 Oct, 51 hours), and Station 14 (11 - 13 Oct, 66 hours).

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 October 2009 are well below both those health guidelines.

TABLE 1

TSP & AIRBORNE URANIUM CONCENTRATIONS
OCTOBER 2009

Station No.	N	TSP Range ($\mu g/m^3$)	U Range* ($\mu g/m^3$)	U Mean* ($\mu g/m^3$)	ACTIVITY
1	6	10.4 - 31.9	0.000011 - 0.000024	0.000016	Artillery/ Mortar fire
4	6	11.6 - 25.3	0.000006 - 0.000011	0.000008	Artillery/ Mortar fire
14	6	2.6 - 11.3	0.000003 - 0.000173	0.000028	Artillery/ Mortar fire

As was the case and noted in previous reports, the total uranium mass found on most filters in October was well above, i.e., in this data set 11 to 590 times, the laboratory's latest determined instrument detection level (IDL) for the ICP-MS method but below the practical reporting level (PRL) of 0.00025 microgram (μg). However, the uranium mass collected on six (6) of the filters at Station 1 and one (1) filter each at Stations 4 and 14 were above the PRL.

The fact that most total 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 a 24-hour airborne uranium concentration of 0.000035 $\mu g/m^3$, a value several orders of magnitude below health effects guidelines. While uranium isotopes ^{234}U and ^{235}U on most filters continued to be undetectable, the 3 Oct 09 filter from Station 14 which had a higher total uranium mass also had a detectable, but not reportable, level of ^{235}U.

FIGURE 2

AIRBORNE URANIUM CONCENTRATIONS
STATION 1

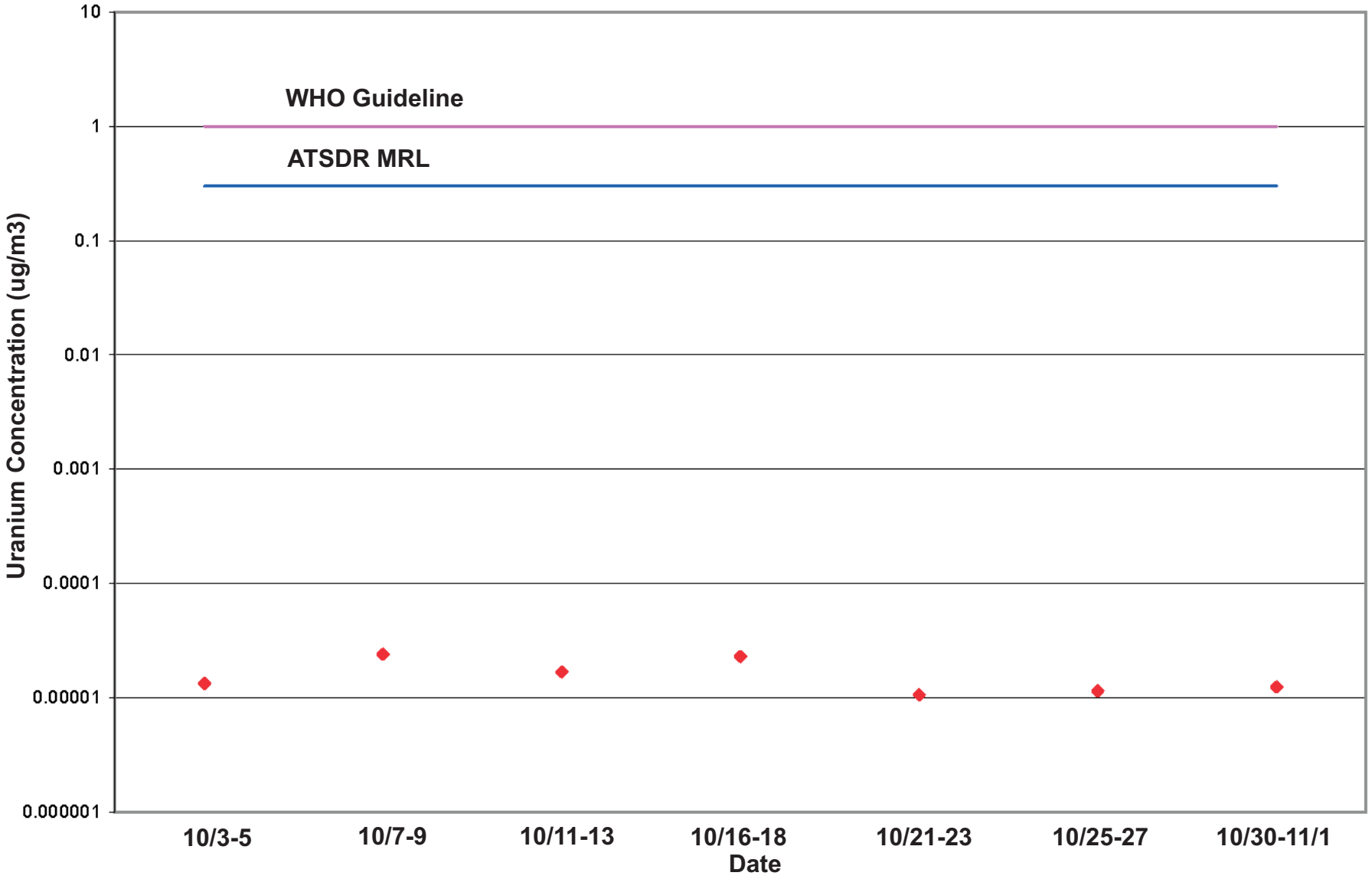


FIGURE 3

AIRBORNE URANIUM CONCENTRATIONS
STATION 4

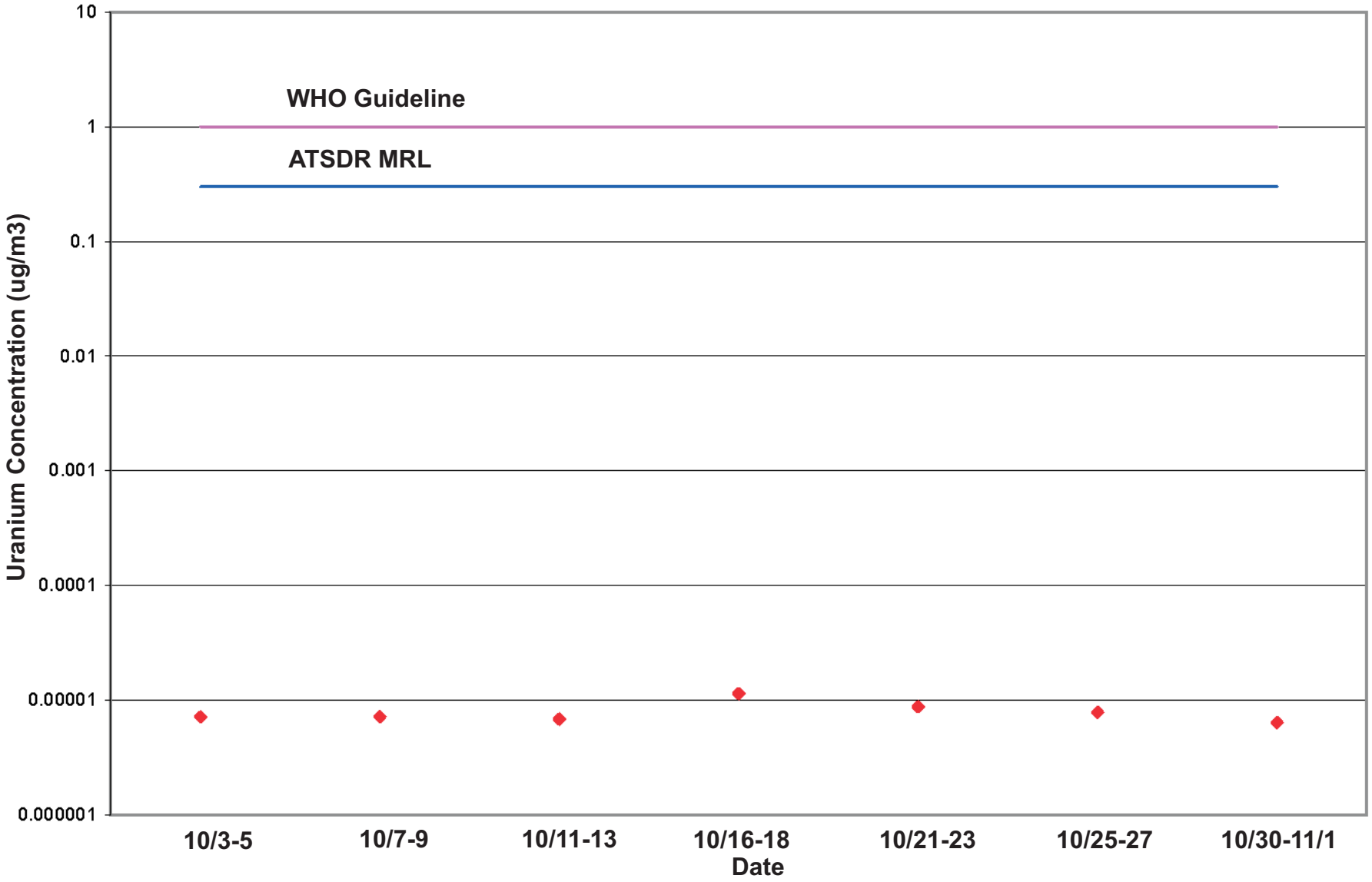


FIGURE 4

AIRBORNE URANIUM CONCENTRATIONS
STATION 14