



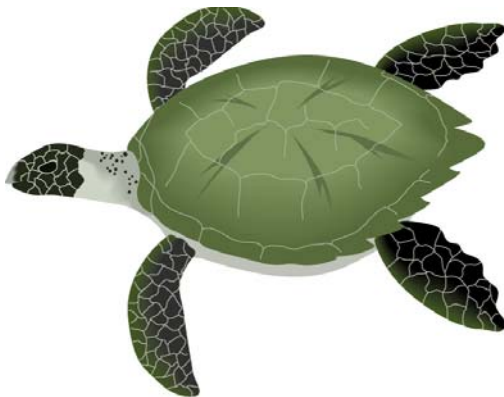
United States Air Force  
15th Airlift Wing  
Environmental Restoration Program

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*Final*  
WORK PLAN

FEASIBILITY STUDY AT  
SITES LF01, LF23, LF24, AND AOC 18,  
BELLOWS AFS AND MCTAB

BELLOWS AIR FORCE STATION  
OAHU, HAWAII



APPENDIX G  
Comparison of AFCEE Reporting Limits  
to Risk-Based Screening Criteria for  
Soil and Groundwater

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## Appendix G

# Comparison of AFCEE Reporting Limits to Risk-Based Screening Criteria

This appendix includes a comparison of AFCEE reporting limits (RLs) to the criteria that may be used to determine whether soil is considered a hazardous material (Table G-1), to evaluate potential contamination in groundwater and interstitial pore water (Table G-2), and to evaluate potential contamination in crab tissue samples (Table G-3) at Sites LF01, LF24, and AOC 18. The AFCEE RLs are those given in the *Air Force Center for Environmental Excellence Quality Assurance Project Plan, Version 3.1 (AFCEE QAPP)* (U.S. Department of the Air Force, AFCEE, August 2001). The analytical methods listed in Tables G-1, G-2, and G-3 are limited to those to be used for samples collected as part of the Feasibility Study (FS) supplemental investigation. If the method detection limit (MDL) is below the screening criterion, the RL is sufficient for quantitative use. If not, other constituent-specific factors (such as potential use at the site, mobility, or toxicity) may be discussed and included on a more qualitative basis.

Table G-1 lists the relevant MDLs, RLs, and screening criteria for toxicity characteristics leaching procedure (TCLP) regulatory analyses of soil samples. The RLs and screening criteria listed for soil are the TCLP regulatory limits (55 FR 11798 - 11877, March 29, 1990); the MDLs listed for soil are estimated MDLs, calculated as one-half the RL for soil for the method listed. As indicated in Table G-1, the TCLP regulatory limit for hazardous waste can be achieved for all target analytes except mercury by using Method SW6010B. The TCLP limit for mercury can be met by using Method SW7471A, as specified in the Project-Specific Field Sampling Plan (FSP) (Appendix B).

Table G-2 lists the relevant MDLs, RLs, and screening criteria for groundwater and surface water samples. The MDLs listed for water samples are actual MDLs from the subcontracted laboratory (Applied Sciences Laboratories, Inc. [ASL]). The screening criteria listed for water are marine chronic ambient water quality criteria (AWQC)<sup>1</sup>. As indicated in Table G-2, marine chronic AWQC can be achieved for all target analytes except lead, silver, and mercury by using Method SW6010B. The marine chronic AWQC for lead, silver, and mercury can be met by using SW7000-series analyses instead of Method SW6010B, as specified in the Project-Specific FSP (Appendix B).

Table G-3 lists the relevant MDLs, RLs, and screening criteria for crab tissue samples. The MDLs listed for crab tissue samples are actual MDLs from the subcontracted laboratory

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<sup>1</sup> Marine chronic AWQC are defined here as the most stringent of State of Hawaii Department of Health (HDOH) Tier 1 action levels (excluding those based on human health risk); Hawaii State Water Quality Standards (Hawaii Administrative Record [HAR] 11-54, April 2000); National Recommended Water Quality Criteria (64 *Federal Register* [FR] 68357-68364, December 10, 1998); or criteria based on lowest observed effects levels (LOELs) or proposed criteria for the protection of aquatic organisms.

(ASL). The screening criteria listed for crab tissue are U.S. Environmental Protection Agency (EPA) Region III Risk-Based Concentrations (RBCs). As indicated in Table G-3, the RBCs can be achieved for all target analytes except mercury by using Method SW6010B. The RBC for mercury can be met by using Method SW7471A, as specified in the Project-Specific FSP (Appendix B).

**TABLE G-1**

Comparison of AFCEE Reporting Limits to Potential Risk-Based Screening Criteria for Soil

*Work Plan for Feasibility Study at Sites LF01, LF23, LF24, and AOC 18, Bellows AFS and MCTAB, Oahu, Hawaii*

Method	Analyte	CAS Number	Units	RL <sup>1</sup>	Screening Criterion <sup>2</sup>	Estimated MDL <sup>3</sup>	Meets Screening Criterion?
SW6010B	Arsenic	7440-38-2	mg/L	5	5	2.5	yes
SW6010B	Barium	7440-39-3	mg/L	100	100	50	yes
SW6010B	Cadmium	7440-43-9	mg/L	1	1	0.5	yes
SW6010B	Chromium	7440-47-3	mg/L	5	5	2.5	yes
SW6010B	Lead	7439-92-1	mg/L	5	5	2.5	yes
SW6010B	Selenium	7782-49-2	mg/L	1	1	0.5	yes
SW6010B	Silver	7440-22-4	mg/L	5	5	2.5	yes
SW7471A	Mercury	7439-97-6	mg/L	0.2	0.2	0.1	yes

**Notes:**

<sup>1</sup> RL for soil by the methods shown are equivalent to the toxicity characteristics leaching procedure (TCLP) limits (55 FR 11798 - 11877, March 29, 1990).

<sup>2</sup> The screening criteria for soil are the TCLP limits (55 FR 11798 - 11877, March 29, 1990).

<sup>3</sup> The estimated MDL will be at or below one-half the RL of the final sample result. MDL shown is for estimation purposes.

**Acronyms and Abbreviations:**

AFCEE	Air Force Center for Environmental Excellence
AFS	Air Force Station
CAS	chemical abstract system
MCTAB	Marine Corps Training Area, Bellows
MDL	method detection limit
mg/L	milligrams per liter
RL	reporting limit
TCLP	toxicity characteristics leaching procedure

**TABLE G-2**

Comparison of AFCEE Reporting Limits to Potential Risk-Based Screening Criteria for Groundwater and Surface Water  
*Work Plan for Feasibility Study at Sites LF01, LF23, LF24, and AOC 18, Bellows AFS and MCTAB, Oahu, Hawaii*

Method	Analyte	CAS Number	Units	RL <sup>1</sup>	Most Conservative Screening Criterion <sup>2</sup>	MDL	Meets Most Conservative Screening Criterion?
SW6010B	Arsenic	7440-38-2	mg/L	0.030	0.036	0.015	yes
SW6010B	Barium	7440-39-3	mg/L	0.050	none	0.025	--
SW6010B	Cadmium	7440-43-9	mg/L	0.005	0.0093	0.003	yes
SW6010B	Chromium	7440-47-3	mg/L	0.01	0.05	0.005	yes
SW6010B	Copper	7440-50-8	mg/L	0.01	0.0031	0.0019	yes
SW7421	Lead	7439-92-1	mg/L	0.005	0.0081	0.003	yes
SW6010B	Nickel	7440-02-0	mg/L	0.02	0.0082	0.004	yes
SW6010B	Selenium	7782-49-2	mg/L	0.03	0.071	0.015	yes
SW7760A	Silver	7440-22-4	mg/L	0.01	0.00095	0.00019	yes
SW7470	Mercury	7439-97-6	mg/L	0.001	0.00094	0.000005	yes

**Notes:**

<sup>1</sup> RL for water by the methods shown from the *Air Force Center for Environmental Excellence Quality Assurance Project Plan, Version 3.1* (AFCEE QAPP) (U.S. Department of the Air Force, AFCEE, August 2001).

<sup>2</sup> The screening levels used for these comparisons are marine chronic ambient water quality criteria (AWQC), which are the most stringent of HDOH Tier 1 action levels (excluding those based on human health risk), State of Hawaii Water Quality Standards [HAR 11-54, April 2000], National Recommended Water Quality Criteria (64 *Federal Register* [FR] 68357068364, December 10, 1998), or criteria based on LOELs or proposed criteria for the protection of aquatic organisms.

Groundwater beneath the site is not used as a drinking water source (the site is makai of the Underground Injection Control Line [UIC]).

**Acronyms and Abbreviations:**

AFCEE	Air Force Center for Environmental Excellence
AFS	Air Force Station
ASL	Analytical Sciences Laboratory, Inc.
AWQC	ambient water quality criteria
CAS	chemical abstract system
FR	Federal Register
HAR	Hawaii Administrative Rules
HDOH	State of Hawaii Department of Health
LOEL	lowest observable effect level
MCTAB	Marine Corps Training Area, Bellows
MDL	method detection limit
mg/L	milligrams per liter
RL	reporting limit
UIC	Underground Injection Control

**TABLE G-3**

Comparison of AFCEE Reporting Limits to Potential Risk-Based Screening Criteria for Crab Tissue

*Work Plan for Feasibility Study at Sites LF01, LF23, LF24, and AOC 18, Bellows AFS and MCTAB, Oahu, Hawaii*

Method	Analyte	CAS Number	Units (wet weight)	RL <sup>1</sup>	Most Conservative Screening Criterion <sup>2</sup>	MDL	Meets Most Conservative Screening Criterion?
SW6010B	Arsenic	7440-38-2	mg/kg	5	0.0021	0.00051	yes
SW6010B	Barium	7440-39-3	mg/kg	1	95	0.5	yes
SW6010B	Cadmium	7440-43-9	mg/kg	0.5	1.4	0.00006	yes
SW6010B	Chromium	7440-47-3	mg/kg	1	4.1	0.00016	yes
SW6010B	Copper	7440-50-8	mg/kg	2	54	0.0005	yes
SW6010B	Lead	7439-92-1	mg/kg	3	--	0.00023	yes
SW6010B	Nickel	7440-02-0	mg/kg	2	27	0.00021	yes
SW6010B	Selenium	7782-49-2	mg/kg	3	6.8	0.00085	yes
SW6010B	Silver	7440-22-4	mg/kg	1	6.9	0.00014	yes
SW7471A	Mercury	7439-97-6	mg/kg	0.1	0.14	0.0000047	yes

**Notes:**

<sup>1</sup> RL for soil by the methods shown from the *Air Force Center for Environmental Excellence Quality Assurance Project Plan, Version 3.1* (AFCEE QAPP) (U.S. Department of the Air Force, AFCEE, August 2001).

<sup>2</sup> The screening criteria for crab tissue are U.S. Environmental Protection Agency (EPA) Region III Risk Based Concentrations (RBCs).

**Acronyms and Abbreviations:**

AFCEE	Air Force Center for Environmental Excellence
AFS	Air Force Station
ASL	Analytical Sciences Laboratory, Inc.
CAS	chemical abstract system
EPA	U.S. Environmental Protection Agency
MCTAB	Marine Corps Training Area, Bellows
MDL	method detection limit
mg/kg	milligrams per kilogram
RBC	Risk Based Concentration
RL	reporting limit