

**FINAL
OPERATIONAL RANGE ASSESSMENT PROGRAM
PHASE I QUALITATIVE ASSESSMENT REPORT
MAKUA MILITARY RESERVATION
O‘AHU, HAWAI‘I**

SEPTEMBER 2009

Prepared for:

UNITED STATES ARMY CORPS OF ENGINEERS, BALTIMORE DISTRICT
P.O. Box 1715
Baltimore, Maryland 21203

and

UNITED STATES ARMY ENVIRONMENTAL COMMAND
Aberdeen Proving Ground, Maryland 21010

Prepared by:

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.
15 Loveton Circle
Sparks, Maryland 21152



EXECUTIVE SUMMARY

The United States (U.S.) Army is conducting qualitative assessments at operational ranges to meet the requirements of Department of Defense policy and to support the U.S. Army Sustainable Range Program. The operational range qualitative assessment (hereinafter referred to as Phase I Assessment) is the first phase of the U.S. Army Operational Range Assessment Program (ORAP). This Phase I Assessment evaluates the operational range area at Makua Military Reservation to assess whether further investigation is needed to determine if potential munitions constituents of concern (MCOC) are or could be migrating off-range at levels that may pose an unacceptable risk to human health or the environment. In conducting the Phase I Assessment, MCOC sources, potential off-range migration pathways, and potential off-range human and ecological receptors are evaluated as appropriate.

Makua Military Reservation is located approximately 38 miles northwest of Honolulu, Hawai'i on the northwest shore of the island of O'ahu, near Ka'ena Point. Makua Military Reservation became an installation when the federal government exercised its option to set aside the land for its continued use, shortly after Hawai'i became a state. Following the excess of approximately 2,350 acres along the current northern border prior to 1994, the installation footprint was reduced to 4,249 acres. Currently, this 4,249-acre site provides a company/platoon battle course and a multipurpose range complex (MPRC) for U.S. Army Pacific Command. However, it should be noted that four of these 4,249 acres compose a Resource Conservation and Recovery Act (RCRA) permitted open burn / open detonation (OB/OD) area. As a RCRA-permitted area, these four acres are excluded from this ORAP assessment.

Primary MCOC source areas identified at Makua Military Reservation consist of current and historical impact areas, as well as maneuver and training areas. In general, MCOC from these primary source areas potentially impact the following source media: (1) soil (e.g., impact berms, impact areas surrounding targets), and (2) surface water / sediment (e.g., direct deposition into streams).

Potential MCOC can be released from source media to groundwater and surface water / sediment via a variety of release mechanisms. Release mechanisms for soil may include leaching from soil to groundwater or soil erosion and runoff to nearby streams. Once potential MCOC are deposited in surface water / sediment, they have the potential to migrate downstream, infiltrate into the shallow groundwater, or be taken up by aquatic plants or animals.

The primary human receptors identified are recreational swimmers and fishermen utilizing muliwai and the coastal waters of the Pacific Ocean directly down gradient of the installation. The primary ecological receptors are down gradient sensitive environments, which provide habitat for a number of special status species.

Multiple investigations have assessed the presence of MCOC in the surface soil, surface water, groundwater, marine resources, and sediment of streams; muliwai; and coastal waters of the Pacific Ocean. The results indicated that MCOC are not present at concentrations of concern in off-range areas. Based on these sampling results, limited quantities of fish in muliwai, a lack of down gradient potable groundwater wells, and the MCOC trapping potential of off-range muliwai on surface water, it has been determined that potential MCOC would not reach off-range human or ecological receptors at levels high enough to pose a viable risk via either surface water or groundwater pathways. As a result, the three operational ranges at Makua Military Reservation are categorized as Unlikely.

Unlikely – Five-Year Review

Three ranges at Makua Military Reservation are categorized as Unlikely, totaling 4,223 acres. These ranges consist of two maneuver and training areas and an impact area. Ranges where, based upon a review of readily available information, there is sufficient evidence to show that there are no known releases or source-receptor interactions off-range that could present an unacceptable risk to human health or the environment are categorized as Unlikely. Ranges categorized as Unlikely are required to be re-evaluated at least every five years. Re-evaluation may occur sooner if significant changes (e.g., change in range operations or site conditions, regulatory changes) occur that affect determinations made during this Phase I Assessment.

Table ES-1 summarizes the Phase I Assessment findings.

Table ES-1: Summary of Findings and Conclusions for Makua Military Reservation

Category	Total Number of Ranges and Acreage	Source(s)	Pathway(s)	Human Receptors	Ecological Receptors	Conclusions and Rationale
Unlikely	three operational ranges; 4,223 acres	Impact area and training areas	Surface water and groundwater – Makua Stream, Kaiahi Gulch, Punapohaku Stream, Kaluakauila Stream, and alluvial aquifer	Recreational swimmers and fishermen utilizing muliwai and Makua Beach	Sensitive environments and special status species inhabiting Makua Beach	Re-evaluate during the five-year review. Determined that potential MCOC would not reach off-range human or ecological receptors at significant levels which pose a viable risk via surface water or groundwater pathways.

ABBREVIATIONS/ACRONYMS

ARID-GEO	Army Range Inventory Database-Geodatabase
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cfs	Cubic Feet per Second
CSM	Conceptual Site Model
DNT	Dinitrotoluene
DoD	Department of Defense
DODI	Department of Defense Instruction
DU	Depleted Uranium
E	Ecological receptors identified. (This refers to range grouping; pathway designation always precedes E designation.)
ESRI	
GW	Groundwater pathway identified. (This refers to range grouping; M designation always precedes GW designation.)
H	Human receptors identified. (This refers to range grouping; pathway designation always precedes H designation.)
HMX	Cyclotetramethylenetetranitramine
ID(L)	Infantry Division Light
LS	Limited Source
M	Munitions used. (This refers to range grouping; M designation always precedes applicable pathway.)
MCL	Maximum Contaminant Level
MCOC	Munitions Constituents of Concern
mg/kg	Milligrams per Kilogram
MPRC	Multipurpose Range Complex
NG	Nitroglycerin
NRC	Nuclear Regulatory Commission
OB/OD	Open Burn / Open Detonation
ORAP	Operational Range Assessment Program
PETN	Pentaerythritoltetranitrate
PRG	Preliminary Remediation Goal
PU	Pathway unlikely or incomplete. (This refers to range grouping; M designation always precedes PU designation.)
RCRA	Resource Conservation and Recovery Act
RDX	Cyclotrimethylenetrinitramine
RFMSS	Range Facility Management Support System
SW	Surface water pathway identified. (This refers to range grouping; M designation always precedes SW designation.)
TNT	Trinitrotoluene
U.S.	United States
USACE	United States Army Corps of Engineers
USACHPPM	United States Army Center for Health Promotion and Preventive Medicine
USAEC	United States Army Environmental Command
USARHAW	United States Army, Hawai‘i
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

WP	White Phosphorus
µg/L	Micrograms per liter