Joint Base Lewis-McChord, Washington

February 2021

Background

DoD uses and manages operational ranges to support national security objectives and maintain the high state of operational readiness essential to its mission requirements. The Department conducts non-regulatory, proactive, and comprehensive operational range assessments (ORAs) to support the long-term sustainability of these ranges while protecting human health and the environment. The purpose of an ORA is to determine if there is a release or substantial threat of a release of munitions constituents (MC) from an operational range to an off-range area that exceeds an applicable regulatory standard or creates a potential unacceptable risk to human health or the environment.

The Army ORA effort was developed to address DoD requirements detailed in DoD Directive 4715.11 (10 May 2004) and DoD Instruction 4715.14 (15 November 2018). The overall objective of the ORA is to assess operational ranges/range complexes to determine if an off-range MC release or substantial threat of an off-range MC release exists; if an off-range MC release exists, does it exceed an applicable regulatory reporting standard; and if an MC release or substantial threat of a release exists, determine whether it creates a potentially unacceptable risk to off-range human health or the environment. Army ORAs assess potential off-range migration of MC along surface water system and groundwater migration pathways.

Installation Overview

Joint Base Lewis-McChord (JBLM) encompasses 91,330 acres of land in Pierce and Thurston counties and is located along the southeastern shores of the Puget Sound, approximately five miles southwest of Tacoma and seven miles east of Olympia, Washington. Fort Lewis and McChord Air Force Base (AFB) were merged in February 2010 based on 2005 Base Realignment and Closure Act recommendations; thus, both sites are addressed as one installation.

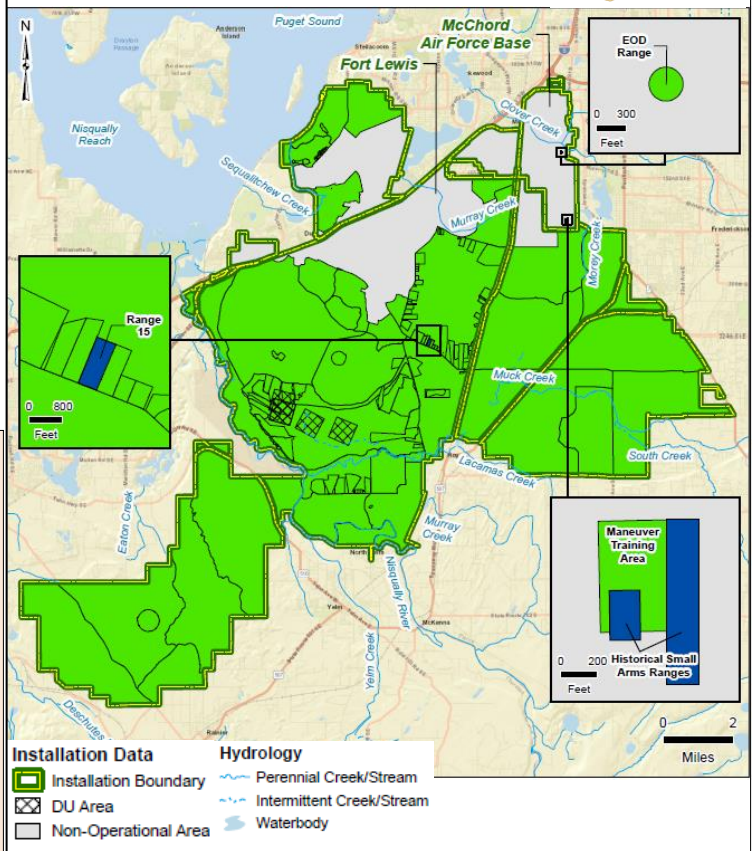
Operational Range Assessment Findings (02/2021)

Based on data evaluated for the updated CSM, the conclusions from the 2014 Periodic Review remain valid. The Basic Assessment determined that no potential MC associated with JBLM's operational ranges are migrating off-range and there are no risks to human and ecological receptors.

Next Steps

JBLM's operational ranges should be included in the FY23-27 cycle of ORAs to meet DoD Policy (DoDI 4715.14) re-assessment requirements.

Map of Range/Range Area



Previous ORA Investigations

The initial 2008 Phase I qualitative assessment for JBLM consisted of collecting, evaluating, and presenting available data to establish if there is an interaction between the on-range sources of munitions constituents of concern (MCOC) and off-range receptors (source/receptor interaction). The 2008 initial Phase I for JBLM only evaluated Fort Lewis as McChord AFB and Fort Lewis were not merged until 2010. During the Phase I assessment, JBLM included a total of 235 operational ranges totaling 84,333 acres.

Munitions use (source), potential migration pathways, and potential off-range human and/or ecological receptors were evaluated for each operational range and were used to determine if a potential source-receptor interaction existed for each relevant pathway identified. Based on this analysis, each operational range was appropriately categorized into a pathway grouping as defined below.

Limited Source

Limited or no known sources of MCOC from current or historical munitions use were identified at 146 operational ranges covering 57,715 acres at Fort Lewis. As no source of MCOC was identified, the source-pathway-receptor interaction was determined to be Unlikely.

Incomplete Pathway

Eleven operational ranges covering 118 acres of Fort Lewis were found to have sources (small arms ranges) of potential MCOC, but no surface water or groundwater migration pathways. Due to the low mobility of metals in soils and the depth to groundwater (greater than 10 feet [ft]), metals were not expected to infiltrate through the soil profile to groundwater. In addition, no surface water bodies are located within the vicinity of these ranges. Because there were no migration pathways identified, the source-pathway-receptor interaction was determined to be Unlikely.

Existing Sampling Data

For 80 operational ranges (69 firing ranges, 7 maneuver training areas, and 4 impact areas), potential MCOC source areas, potential surface water and groundwater migration pathways, and potential human and ecological receptors were identified. However, several sampling investigations have been conducted

Previous ORA Investigations (Continued)

downstream and downgradient of these ranges, as discussed below.

Groundwater monitoring around the Artillery Impact Area (AIA) and the Central Impact Area (CIA) at Fort Lewis has been voluntarily conducted since 1999. In June 1999, November 1999, and April 2000, URS collected groundwater samples from three existing wells north of the CIA, from 10 monitoring wells installed between 1998 and 1999 around the AIA and the CIA, from five springs along the bluff above the Nisqually River, and from two surface water locations (upstream and downstream of the AIA) in Muck Creek as part of a Preliminary Investigation.

Between August 2000 and April 2005, the Fort Lewis Water Program conducted quarterly groundwater sampling from the same 13 monitoring wells around the AIA and CIA and from 5 springs located on the bluff above the Nisqually River that were previously sampled. These samples were analyzed for nitroaromatics/ nitramines, metals, and various inorganic parameters. Additionally, perchlorate sampling was conducted during the November 2000 and November 2002 monitoring events, surface water sampling was conducted during the first five monitoring events, and sediment sampling was conducted. Based on the results of these monitoring activities, it was determined in 2005 that hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) was the only contaminant of concern in the groundwater. The groundwater samples were compared to the Washington Department of Ecology's Cleanup Level and Risk Calculation (CLARC) Method B standard formula value for RDX in groundwater of 0.8 microgram per liter (µg/L) for human health.

In September 2005, the Fort Lewis Compliance Cleanup Program (now Installation Restoration Program) began conducting semi-annual groundwater sampling in accordance with the November 2005 Groundwater Monitoring Plan. This groundwater monitoring was conducted on a voluntary basis by Fort Lewis and, although not required, generally follows applicable U.S. Environmental Protection Agency (USEPA) and Washington State Department of Ecology regulations and guidance. As part of this voluntary program, 13 monitoring wells, 5 springs, and the kitchen sink at the Clear Creek Fish Hatchery (potable water source) were monitored for nitroaromatics/nitramines (USEPA

Previous ORA Investigations (Continued)

Method SW846-8330) and metals (USEPA Method SW846-6020/7000 series). Dissolved metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) were monitored every 2 years during the wet season.

While potential sources, pathways, and receptors were identified, previous sampling data for 75 of the 80 ranges indicated that MC were not migrating off range at concentrations that posed an unacceptable risk to off-range human or ecological receptors. The remaining five operational ranges were identified to have a source of metals and explosives; however, the explosives source was determined to be limited (minimal use of high explosives [HE]) and the pathway for metals migration was determined to be Unlikely. Therefore, all 235 operational ranges were identified as being unlikely to have potential MCOC migrate off range and affect human or ecological receptors and were placed into a periodic review cycle.

The Phase I for McChord AFB identified a potential source of MC (lead and explosives) at the EOD Range that could potentially be transported off range via the groundwater migration pathway at levels that pose an unacceptable risk to off-range human and ecological receptors. Potential receptors were identified as human receptors consuming water from public and private water wells located downgradient and off range. Soil sampling was recommended in the immediate vicinity of the EOD Range to determine if MC concentrations are present in the surface and subsurface. Additionally, it was recommended that existing, downgradient monitoring wells be sampled to further evaluate the potential for MC to migrate off range due to the highly permeable soils.

The purpose of the 2014 Periodic Review for JBLM was to re-evaluate the 2008 Phase I (Fort Lewis) and 2010 Phase I (McChord AFB) and determine whether the source, pathway, and receptor evaluations completed during the initial assessments remained valid.

The 2014 Periodic Review evaluated 229 operational ranges totaling 84,333 acres and all ranges were determined to be Unlikely for the following reasons:

- Limited or no MCOC source identified at 144 operational ranges.

Previous ORA Investigations (Continued)

- A Potential source of MC was identified on 11 operational ranges; however, incomplete migration pathways were identified based on the lack of surface water bodies on installation with the potential to transport MC off range, limited evidence of erosion, soil characteristics, and depth to groundwater (greater than 10 ft below ground surface [bgs]).
- A source of MC and potential migration pathways were identified at 28 operational ranges; however, supplemental sampling data collected as part of the installation's ongoing voluntary monitoring program indicated explosives are present in groundwater on range, but not migrating off the operational range area and interacting with potential human and/or ecological receptors.
    - Supplemental sampling data indicated that explosives concentrations were above regulatory and screening levels along the AIA western boundary (encompasses 46 ranges) from one on-range groundwater well and one on-range spring.
    - No explosives were detected in the sink sample collected from the on-range Clear Creek Fish Hatchery (potable water source of concern), further downgradient and near the installation/operational range boundary.
- Explosives concentrations were below ecological screening levels. As the AIA discharges to the Nisqually River, potential concentrations of explosives are expected to be minimal when compared to the volume of water in the river and are unlikely to adversely affect ecological receptors.
- No changes to the migration pathways were identified.
- While human receptors were identified in the 2008 Phase I as potable well users within 4 miles downgradient, it was determined that the Nisqually River serves as a groundwater discharge boundary; therefore, the only potable water receptor well was identified to be located east of the Nisqually River, the Clear Creek Fish Hatchery.

ORA Basic Assessment (2020)

The re-evaluation of all data contained within the 2014 Periodic Review and an evaluation of updated data gathered during the Basic Assessment indicate that the 210 ORA-eligible operational ranges at JBLM remain Unlikely to have potential MCOC migrate off range and adversely affect human or ecological receptors.

Limited or no source of MCOC was identified at 114 operational ranges. A potential source of MCOC was identified on the remaining 96 operational ranges including 92 firing ranges, 3 non-dudded impact areas (North, Central, and Southern impact areas), and 1 dudded impact area (AIA). Munitions use on the live-fire ranges surrounding the North Impact Area primarily include small caliber munitions. Munitions use on the live-fire ranges surrounding the Central and Southern impact areas, as well as the AIA include small-, medium-, and large-caliber munitions; pyrotechnics; obscurants; demolition materials; and other munitions (i.e., mines, rockets, etc.) that have been historically and/or are currently used for training. Potential MCOC associated with these munitions include metals, explosives, perchlorate, white phosphorus, and uranium.

While a source of MCOC was identified at 18 operational ranges (small arms firing ranges) in the North Fort Area, no drainage features were observed leading from potential source areas to surface water bodies and minimal runoff exits the installation/operational range area due to the relatively flat topography, light drizzle as compared to heavy rainfall/storms, and highly permeable soils. Although the highly permeable soils promote infiltration to groundwater, metals were the only MC from this source area and are not expected to infiltrate through the soil profile to groundwater due to the low mobility of metals in soils and the depth to groundwater; therefore, the source-pathway-receptor interaction was determined to be incomplete.

The remaining 78 operational ranges with a source of MCOC surround the AIA, Central Impact Area (CIA),

ORA Basic Assessment (2020) (continued)

and South Impact Area. Like the source area ranges surrounding the North Impact Area, no drainage features were observed leading from these potential source areas to surface water bodies and minimal runoff exits the installation/operational range area; therefore, the surface water pathway was determined to be incomplete. Although the highly permeable soils promote infiltration to groundwater, metals MC from these source areas are not expected to infiltrate through the soil profile to groundwater due to the low mobility of metals in soils and the depth to groundwater. Furthermore, JBLM has been proactive in conducting annual voluntary monitoring sampling from 1999 to 2017 from wells situated along the AIA and CIA boundaries, five springs located on the bluff above the Nisqually River, and one on-range sink sample collected from the Clear Creek Fish Hatchery.

Based on the Advanced Assessment review of voluntary monitoring data collected from 2013 to 2017, RDX concentrations previously detected above screening levels in one on-range well located along the AIA western boundary and in one on-range spring have decreased to below screening criteria. Additionally, while voluntary annual groundwater sampling conducted by JBLM ceased in 2017, supplemental 2019 analytical data from the on-range springs and on-range sink from Clear Creek Fish Hatchery indicated that RDX is either non-detect or below screening criteria. Dissolved metals results for arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver have consistently been below screening levels. While a potential groundwater migration pathway exists, supplemental sampling results indicate that no MC are migrating off range and concentrations do not pose a potentially unacceptable risk to human and ecological receptors. However, since a potentially complete source-pathway-receptor interaction exists, if annual groundwater monitoring sampling at JBLM does not continue, it is recommended that sampling is conducted during the next ORA to confirm that MCOC are not migrating off range at concentrations that pose a potentially unacceptable risk to receptors.

For more information on JBLM, contact JBLM's Public Affairs Office at https://home.army.mil/lewis-mcchord/index.php/my-Joint-Base-Lewis-Mcchord/all-services/public-affairs
For more information on the DoD Operational Range Assessment Program visit https://www.denix.osd.mil/orap/home/