



FORMER LOWRY AIR FORCE BASE PRIVATIZATION 2 2009 ANNUAL UPDATE

Privatization 2—Background/History: In 2005, the Air Force, CDPHE, LRA, and LAC finalized agreements for the second phase of privatization. The scope included all known remaining soil remediation projects (Outdoor Firing Range, Fire Training Zone, Northwest Neighborhood), investigation of sites identified in the RCRA Facility Assessment (RFA); the first two Five Year Reviews; implementation of a Soils Management Program including construction oversight to identify and handle unknown conditions should they be discovered during redevelopment activities; as well as a number of administrative tasks (such as community involvement support, deed restriction support, submittal of documents to the Administrative Record). To date, LAC has completed all known investigation/remediation scope and continues to perform the ongoing administrative tasks.

Building 753 Investigation: Building 753 was recommended for further investigation in the RFA. A dental hygiene education facility currently used by the Colorado Community College System, the building was investigated for evidence of mercury contamination in July 2009. Prior to the base closure in 1994, the Air Force reportedly used mercury-containing amalgams for dental fillings at this facility. Thirty samples were collected from soils beneath the building to investigate possible releases of mercury, and samples of the building were collected to characterize the materials for future disposal. Mercury concentrations in the soil were all below the CDPHE action level, and mercury was not detected in building materials. CDPHE issued a No Further Action determination for the site.



Building 753

Soils Management: The Soils Management Program, implemented under Privatization 2, provides a mechanism to identify and address any unknown environmental conditions encountered during development in order to minimize impacts. The process includes oversight of all soil-disturbing activities at Lowry, and a framework for responding to a discovery. The associated Asbestos

Characterization and Management Plan is an approved program for responding to asbestos discoveries in soil. All land owners are contractually obligated through Oversight Agreements to notify LAC prior to digging. LAC inspectors logged approximately 3,000 hours of construction oversight this year, primarily in the Great Lawn and East Neighborhood, bringing the total to approximately 46,000 since January 1, 2006. One area containing asbestos in soil was identified in the Great Lawn during 2009 and the regulated removal was performed.

Northwest Neighborhood Asbestos: LAC submitted a Notice of Completion to close out all issues related to the 2003 Compliance Advisories for asbestos in soil on 22 acres in the Northwest Neighborhood within the scope of the privatization. The parcel is located adjacent to 11th Ave and Uinta Way. The Notice and final NFA were approved by CDPHE on September 29, 2009.

Community Involvement: LAC performed community involvement activities on an ongoing basis during 2009, including technical support to landowners and potential buyers; maintaining the information repository/library; submitting technical documents to the Air Force Administrative Record; and implementing the Community Involvement Plan. In addition, LAC updated the Community Involvement Plan to reflect the current make-up of the community and their preferences for receiving information about, and involvement in, the restoration program. In December 2009 the Restoration Advisory Board was formally adjourned due to the status of the program, which is in its final phase, and declining interest from the community. In its place, a number of community involvement activities will be ongoing such as this annual update, a frequently-updated website with technical information about the program, an opt-in list for more information, distribution of project-specific fact sheets as necessary, and updates to neighborhood associations and community meetings when requested (information resources provided below).

Selected Documents:

- Notice of Completion, Northwest Neighborhood, 7/27/09
- Building 753 Sampling Plan, 6/18/09
- Building 753 Report and Request for No Further Action, 9/10/09
- Restoration Advisory Board Adjournment, 12/14/09
- Updated Community Involvement Plan, 12/14/09

For More Information on the Environmental Program Websites:

<http://www.lowryafbcleanup.com/Lowryhome.html>
<http://www.cdphe.state.co.us/hm/lowryafb.htm>
<http://www.lowry.org/ecology/index.htm>
 (Administrative Record) <https://afarpaar.lackland.af.mil/ar/docsearch.aspx>

Information Repositories:

Lowry Assumption, LLC, (303) 972-6633
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FORMER LOWRY AIR FORCE BASE ENVIRONMENTAL PROGRAM 2009 ANNUAL UPDATE



Environmental Program Background: The former Lowry Air Force Base operated for 57 years as a technical training center. The Air Force began environmental investigations at Lowry in 1983. In August 2002, the Air Force privatized cleanup of the groundwater and the landfill, turning management over to the Lowry Redevelopment Authority (LRA) and Lowry Assumption, LLC (LAC). In 2005, the privatization was expanded with agreements to include the remaining soil projects and some administrative functions. Under privatization, the former base landfill was closed; groundwater cleanup implemented and concentrations reduced by over 90%; all known soil investigation and remediation projects completed; and a soils management program implemented to identify and address any environmental conditions discovered during development. The Colorado Department of Public Health and Environment (CDPHE), the U.S. Environmental Protection Agency (EPA), and the cities of Denver and Aurora continue to oversee this work. Additional background information and a summary of the 2009 activities are provided in this update.

QUICK FACTS: 2009 ACTIVITY SUMMARY

PRIVATIZATION 1

Groundwater Investigations:

- Completion of RFA Data Gaps investigations (Thallium re-sample and sump investigation)

Monitoring:

- January—Semiannual Sampling
- July—Semiannual Sampling

Groundwater Corrective Action Injections

193,000 pounds (lbs) of potassium permanganate injected at 580 locations

- May/June—On-base in the Outdoor Firing Range Area; Headquarters Area; Uinta and 10th area; Off-base in the 16th Ave area; On-base at the Building 1432/Outfall Source Area
- September—Off-base in northern plume
- October – Off-base, 12-14th Ave

Trap and Treat Technology

- July—Injection of 2,500 lbs of BOS-100® trap and treat compound in the Source Area Reduction System

Landfill

- January—Operations, Maintenance and monitoring (OM&M) activities including groundwater, surface water, and quarterly cover inspection and soil vapor monitoring.
- March—Site walks were conducted to inspect cover for damage from March 8th grass fire that originated in West-erly Creek Dam wetlands.

PRIVATIZATION 2

On-going Activities:

- Soils Management Program—Performed over 3,000 hours of construction oversight (approximately 46,000 total)
- Facilitated implementation of deed restrictions between CDPHE and property owners
- Submitted documents to Administrative Record
- Provided community with technical support related to environmental issues

Soils Investigations:

- July—Soil and building material sampling for mercury was conducted at Building 753.
- September—LAC received closure on issues related to asbestos in soil in Northwest Neighborhood
- October—LAC received No Further Action (NFA) determination on the Building 753 investigation and all RCRA Facility Assessment (RFA) Soil Issues

Community Involvement Plan Update

- December—Formally adjourned Restoration Advisory Board and updated Community Involvement Plan

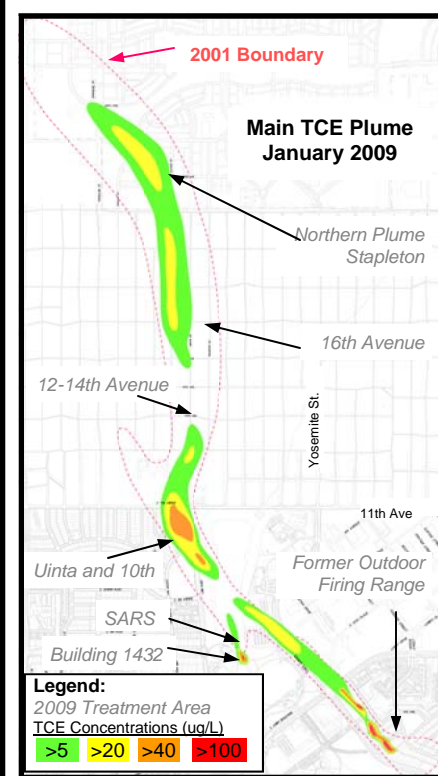
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www.lowryafbcleanup.com
www.cdphe.state.co.us/hm/lowryafb.htm
www.lowry.org/ecology/index.htm

**FORMER LOWRY AIR FORCE BASE
OPERABLE UNIT 5, BASEWIDE GROUNDWATER
2009 ANNUAL UPDATE**



Basewide Groundwater—Operable Unit 5 (OU5) Background/History: There are areas of groundwater contamination at Lowry, known as plumes, containing degreasing solvents, mainly trichloroethylene (TCE). The nature and extent of groundwater contamination, as well as the most effective remediation alternatives, have been studied extensively and a remedy chosen in 2004 (see: Phase 1 Corrective Action Plan [CAP] for Groundwater Cleanup at Lowry). The corrective action program is designed to eliminate contaminants through *in situ* (in place) destruction. This is achieved by injecting oxidizing agents (potassium permanganate) into the groundwater. The remediation began in the fall of 2004 and additional treatments were performed in 2006, 2007, 2008, and 2009. Data through July 2009 show that TCE concentrations in the groundwater continue to decrease and gaps in the plume were observed, indicating that the treatments have been successful.

Monitoring: Groundwater sampling was performed twice in 2009, as scheduled in January and July, to test concentrations of solvents as well as other field conditions in the groundwater. These data were used to evaluate progress of the remediation. In July, at the request of CDPHE, LAC sampled for 1,4-dioxane (a stabilizer used in certain solvents). No 1,4-dioxane was detected above the action level, and CDPHE issued a No Further Action for the compound.

2009 Remediation Activities: During 2009, LAC treated groundwater to further decrease concentrations and reduce mass in remaining higher concentration areas. Through injections at 580 locations, 193,000 lbs of potassium permanganate were pumped into the groundwater. The injections occurred in the following locations, shown at left:

- May/June—On-base areas including the Outdoor Firing Range, Headquarters ([HQ] in Town Center area, not shown on map), Building 1432, and Uinta and 10th; Off-base in the 16th Ave area.
 - September—Off-base in northern plume/Stapleton
 - October – Off-base, 12-14th Avenue
- In addition, a trap-and-treat technology (BOS-100®), which absorbs and then treats contaminants, was used at the Source Area Reduction System (SARS) area.

Evaluation: Remedial progress is evaluated on an on-going basis using data from the monitoring program. Based on these data, the treatment plan is adjusted to address areas of higher concentrations. Additional changes to the monitoring network are made prior to each sampling event following a review of the previous monitoring results.

Results: Treatment and natural processes have contributed to reductions in the Main TCE Plume size and concentration. The figures at left demonstrate that as of January 2009 the highest concentration areas in 2001 (shown in orange, red, and purple) have been reduced to small, discontinuous spots, and the overall size of the plume (defined as areas with TCE concentrations greater than 5 micrograms/liter [ug/L]) has been reduced to approximately 30% of its original size. Concentrations in the Main TCE Plume have decreased by more than 90% overall.

2010 Plan: Remedial Progress Assessment—January–March
Groundwater monitoring—January and July
Indoor Air Study—January
Remediation—Summer/Fall 2010, will be based on January and July 2010 results and tentatively will target recalcitrant areas

- Selected Documents:**
- Carbon Tetrachloride Source Area Remediation Report, 2/6/09
 - Data-Gap Follow-on Reports, 2/27/09 and 5/18/09
 - Groundwater Monitoring Program (GMP) Reports, January 2009, Main Plume 3/12/09; Fire Training Zone and HQ 3/30/09
 - Groundwater Sampling Results for 1,4-dioxane and request for No Further Action, 8/4/09
 - Main Plume GMP Report, July 2009, 9/9/09
 - Cleanup Objectives Report, 7/24/09
 - Injection Work Plans, 5/18/09 and 10/20/09

**FORMER LOWRY AIR FORCE BASE
OPERABLE UNIT 2, LANDFILL ZONE
2009 ANNUAL UPDATE**

Landfill—Operable Unit 2 (OU2) -Background/History—This 70-acre parcel is located on Alameda Avenue, east of Fairmount Drive. From 1949 to 1989 the landfill was used for disposal of municipal waste and construction debris, similar to other dumps of that time. Environmental investigations of the former landfill began in 1983 under the Air Force's Installation Restoration Program with oversight by CDPHE, and input from the cities of Denver and Aurora. The investigations addressed the landfill and areas that could be impacted by it, including Westerly Creek and the wetlands to the north. Samples were collected from soil, groundwater, surface water and sediment and analyzed for a wide range of chemicals/contaminants. The concentrations detected in the samples were similar to those found in other urban settings, and no immediate health risks were identified. LAC closed the Lowry Air Force Base landfill in accordance with State and Federal regulations in 2004 and is currently responsible for the long-term monitoring and maintenance.

Landfill Closure: Operations at the landfill ceased in 1989, and it was closed to meet current regulations, preventing physical contact with the waste materials and preventing run-on water and precipitation from moving through the waste materials. Following the mandated evaluation of alternatives, the selected closure method was to install a low permeability soil cap. The cap was installed in 2004-2005 and the closure approved by CDPHE in 2006. To protect the integrity of the cap, legal covenants are in place to prevent active uses on the property. The approved closure plan includes a 30-year program of monitoring and maintenance to ensure that the cap is performing effectively. Groundwater and surface water are regularly sampled to identify releases from the landfill should they occur. Gas probes were also installed within the landfill and are monitored for methane, a compound often generated in landfills due to the decay of organic materials such as food and yard wastes.

Other Concerns: There have also been questions from community members regarding gross alpha (an indicator analysis for a variety of radionuclides) and uranium detections immediately downgradient of the site. Radionuclides have been studied throughout the environmental program. At the request of CDPHE, in 2006/2007 LAC performed additional study of uranium and other radionuclides in the landfill zone including evaluation by an expert from the Colorado School of Mines. The study confirmed that the landfill, like many places in Colorado, have higher than average levels of background uranium (and thus gross alpha) due to the underlying native rocks and soils. In addition, the study ruled out impacts from any man-made radionuclides. CDPHE approved the study, and issued a No Further Action determination, stating that "the source of elevated uranium is naturally occurring with a source related to the geology of the site." LAC continues to monitor for gross alpha and beta in accordance with the approved post-closure monitoring plan.

2009 Monitoring: Post-closure groundwater and surface water sampling was performed in January and July 2009. Water was analyzed for volatile organics (VOCs), metals, major ions, organic carbon, and gross alpha and beta. Results were compared to applicable standards and statistical evaluation of the groundwater data was performed as required by CDPHE regulations to evaluate whether any releases are occurring from the landfill. All VOCs and metals were below state standards or not detected in either round. Gross alpha, the screening compound, is consistently detected both upgradient and downgradient of the landfill because it indicates the presence of uranium in the underlying bedrock, unrelated to the fill materials. The statistical evaluation identified only 2 of 75 analytes - sodium (January and July) and sulfate (July) - as showing higher concentrations in downgradient wells. These compounds, known as major ions due to their abundance on earth, do not pose a threat to human health or the environment at these levels and will be evaluated in upcoming samples. Monitoring at 27 soil gas points was performed quarterly. The soil vapor points were screened in the field for methane and volatile organics. Under the approved plan, if greater than 1% methane is measured, a confirmation sample is sent to the lab for analysis of methane. No methane was detected above the 1% action level.

2009 Maintenance: Inspections of the landfill cap, surface water conveyance structure, soil vents and gas probes were conducted quarterly. There was no evidence of damage to the gas vents and probes, settlement, damage to the surface water conveyance structure, or burrowing animals impacting the integrity of the cap. An additional inspection was performed following the March 8th grass fire that burned vegetation on 60 percent of the landfill cap. The engineered erosion control mats in portions of the surface water conveyances and drainage berms were melted by the fire; the damaged mats were replaced in June, 2009. Vegetation, which prevents erosion of the cap, was inspected quarterly, and following the fire significant new growth occurred in the burn area. There were no signs of stressed or dying vegetation in the subsequent inspections. Damage to the fences surrounding the landfill caused by trespassing were observed a number of times during the year. Repairs were made and new "Private Property/No Trespassing" signs were added. The cover vegetation was mowed in October.

- Selected Documents:**
- Groundwater, Surface Water and Soil Vapor Monitoring Report, 3/12/09
 - OU2 Fire Damage Technical Assessment and Restoration Report, 8/31/09
 - Groundwater, Surface Water and Soil Vapor Monitoring Report, 9/16/09
 - Post-Closure Operation and Maintenance Report, 11/11/09



Landfill and wetland area following March fire



Repair to landfill drainage swale erosion mat