

# LOWRY GROUNDWATER—REGULATORY PROCESS

The Lowry environmental program is being performed under the regulatory authority of the Colorado Department of Public Health and Environment. As described in the guiding document for groundwater cleanup (*Phase 2 Corrective Action Plan, and amendments*) 5 micrograms per liter is the final cleanup goal for TCE in groundwater and if “it is determined that the standard is not achievable, the Water Quality Control Commission will be petitioned for a Site-Specific Standard”. Detailed information on the Commission process is available at [www.colorado.gov/cdphe/wqcc](http://www.colorado.gov/cdphe/wqcc) and is summarized below.

Informal Pre-Rulemaking Process including October 2013 Notice of Intent to File

January 22, 2014—WQCC Approved Notice of Rulemaking

February 2014 Notice Published in Colorado Register

February 25, 2014—Party Status and Mailing List Status due to WQCC

March 4, 2014—Prehearing Statement (evidence) submittal by LAC

March 25, 2014—Responsive evidence due

April 22, 2014—Prehearing Conference

April 30, 2014—Written comments due from general public to WQCC (Non-Party Status)

May 12, 2014—Rulemaking Hearing

WQCC Deliberations (options to approve concept, request revisions, additional information or terminate process)

Prepare Final Rule and Statement of Basis and Purpose

WQCC approves Final Rule and publishes in Colorado Register

Following approval of Site-Specific Standards, LAC will review the data with respect to the Standards, and, when appropriate, will request regulatory closure. Monitoring will continue until a change or termination of the program is approved by CDPHE.

## Ask the Expert

A synopsis of a conversation with Andrew Ross –Senior Hydrogeologist, Water Quality Control Division.

The **Water Quality Control Commission (WQCC)** is responsible for developing specific state water quality policies in Colorado. LAC is following the process laid out by the Commission for requesting Site-Specific Standards for groundwater.

**Why are there site-specific standards?** Colorado Regulations 41 and 42 provide standards for groundwater that are protective of the groundwater use. The “Basic Standards” in Regulation 41 are based on human consumption over a 70-year life span. Regulation 42 provides “Site-Specific” classifications and standards appropriate for use of the water. It was anticipated when the regulations were enacted that all groundwater in the State would be classified and appropriate standards applied.

**Are there Site-Specific Standards anywhere else?** Yes, the WQCC process has been used to define groundwater well-head protection areas, surface water protection areas and groundwater that is of limited use and quality. There are also other avenues used in Colorado and throughout the country to achieve site-specific standards, including Colorado’s Voluntary Cleanup Program (VCUP); a CDPHE policy for Conditional Closure of Low-Threat Site with Residual Groundwater Contamination; RCRA Alternate Concentration Limits; and CERCLA Waivers. Of the options available, the WQCC process provides the most public involvement.

**Are Site-Specific Standards protective of human health and environment?** Yes, Standards approved must be demonstrated to be protective of human health and environment for the use.

**What is the benefit of the WQCC process?** It provides a public process for the State to make a determination of protectiveness; residual contamination is documented in one place (Reg. 42) and is easy for public and water suppliers to access; the site-specific standard will prevent degradation of the water in the future as the standard will be adjusted, not waived; and the process allows the public to be involved in the WQCC’s evaluation of the standard.

**MORE INFORMATION?** Please visit [www.LowryAFBCleanup.com](http://www.LowryAFBCleanup.com) or call John Yerton 303.972.6633

# FACT SHEET/PRIMER: LOWRY GROUNDWATER PROGRAM

Lowry  
Assumption,  
L.L.C.  
January 2014

**History**—Lowry AFB was established in 1937 with missions including training and airfield operations. In many ways, the activities at Lowry AFB were similar to other communities of the time. A coal-powered steam plant provided heat, gas stations fueled vehicles, municipal waste was taken to a landfill, and machine parts were cleaned with solvents. Material handling and disposal were undertaken according to what were then generally accepted practices. Over the last 30 years, extensive investigation was conducted in accordance with national, state and local regulation. Aside from the ongoing groundwater corrective action discussed here, all other investigations and necessary response actions at the former Air Force Base have been completed and approved by the Colorado Department of Public Health and Environment (CDPHE). In this document we provide background and a summary of the groundwater program, definitions of terms used in the discussion, and a description of the regulatory process.

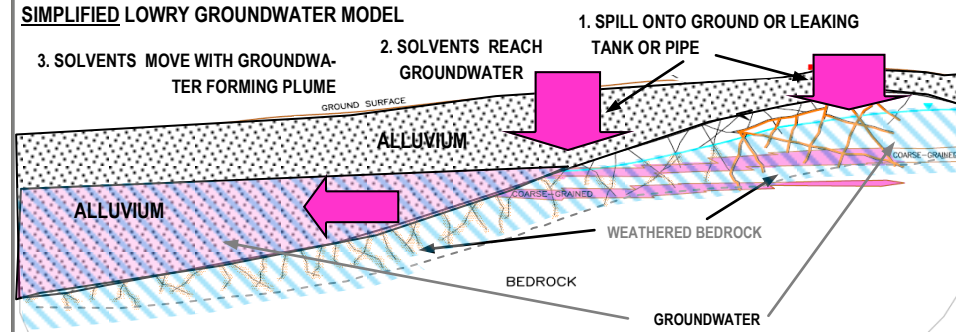
## Lowry Groundwater - Q & A

**What is being cleaned up?** Several areas in groundwater on and near Lowry containing solvents, mainly trichloroethylene (TCE), remaining from Air Force operations.

**Has the clean up been successful?** Yes, about 90% of the original TCE contamination has been removed from the groundwater, resulting in a 78% reduction in maximum TCE concentrations found at the site. Concentrations are below State standards in about 80% of the original plume area.

**How did the solvents get in the groundwater?** Spills and leaks during normal industrial use, from storage tanks, and in pipes allowed the solvents to leak through the ground to the groundwater. (See below)

### SIMPLIFIED LOWRY GROUNDWATER MODEL



**Does anyone drink or use the groundwater?** No, drinking water is provided by Denver Water throughout the area and comes from mountain reservoirs.

**Are there other ways to contact contaminated water?** Through the EPA’s risk assessment process, all potential exposure pathways have been evaluated. Depth to groundwater limits the potential contact, and safeguards are in place to prevent incidental exposures, such as during an excavation. Subslab systems (identical to radon mitigation systems) were required in some areas of Lowry to cut off any possible pathway to indoor air from vapors coming through the soil column. Repeated investigations of indoor air and groundwater north of the base demonstrate that current concentrations are protective of the indoor air pathway.

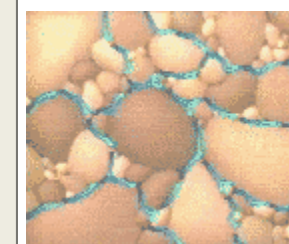
**How long has the cleanup been going on?** Investigations began in approximately 1983 and initial phases of cleanup began in 1995. The program of oxidant (potassium permanganate) injections started in 2004 and ended in 2010.

**Who oversees the remediation?** Colorado Department of Public Health and Environment (CDPHE) regulates the investigation and cleanup.

**How do we know it is working?** Groundwater sampling, known as monitoring, is done to evaluate effectiveness. Initial sampling was done four times a year; 2003 through 2013 it was done twice a year; and going forward sampling will be done annually.

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## Glossary



**Groundwater:** Water occupying the pore space in sediment below the ground surface.

**Alluvium:** loose, unconsolidated (not cemented) soil or sediments deposited by water, found at the surface at Lowry. Alluvium is made up of a variety of materials, including fine particles of silt and clay and larger particles of sand and gravel.

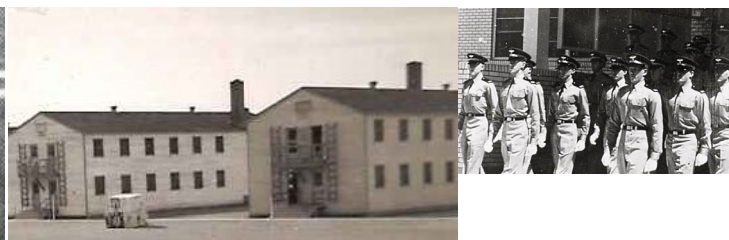
**Bedrock:** Solid rock underlying Lowry, also known as the Denver Formation, composed mainly of sandstone, claystone and siltstone and has a crumbly weathered surface. It is found beneath the alluvium.

**Oxidant Injections:** The aggressive cleanup technology implemented at Lowry starting in 2004, in which the oxidant (potassium permanganate) was injected into the groundwater throughout the entire plume area and into recalcitrant areas repeatedly. Injections were done at 2200 locations and in 13,000 unique depth intervals over the course of the program.

**Plume:** An area with groundwater contamination, originating in a source area and moving with groundwater.

**Solvent:** A class of chemicals commonly used in industry to remove (dissolve) grease. Trichloroethylene (TCE) is a solvent and is the main constituent of the ground water impacted by Air Force activities at Lowry.

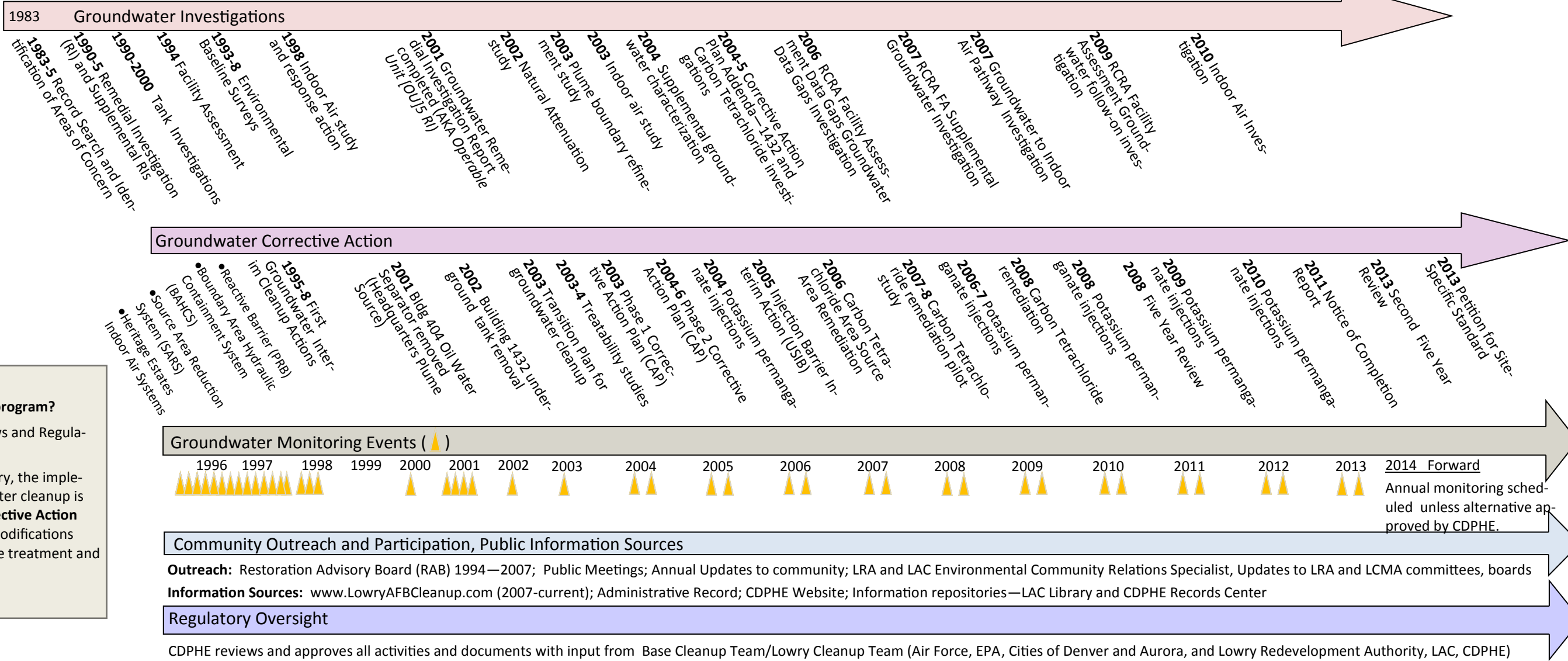




**1938 Air Force Operations 1994**

**History**—Solvents were used for cleaning of weapons and metal parts in Air Force Operations at Lowry. Spills onto the ground, leaking pipes, and leaking underground storage tanks contributed to groundwater contamination. The primary source areas were located in the Outdoor Firing Range (Southeast corner of base); Former Air Force maintenance building 1432 (center of the base); Fire Training Zone (current golf course); and the Headquarters Area (current Town Center)

**Lowry AFB Groundwater Program Summary and Timeline**



**Environmental Cleanup: Q&A**

**What guides the environmental program?**

- National, State, and Local Laws and Regulations
- Decision Documents—at Lowry, the implementation plan for groundwater cleanup is provided in the **Phase 2 Corrective Action Plan (CAP)** and subsequent modifications which adjust and fine tune the treatment and monitoring programs.

**Groundwater Corrective Action:**

