



## Rio Blanco, Colorado, Site

### A Nevada Offsite

This fact sheet provides information about the **Rio Blanco, Colorado, Site**. Long-Term stewardship responsibilities for this site are managed by the **U.S. Department of Energy Office of Legacy Management**.

### Site Information and History

The Rio Blanco site is located in the Piceance Basin of northwestern Colorado at an elevation of 6,600 feet above sea level, approximately 52 miles north-northeast of the city of Grand Junction. The Piceance Basin is a geologic structure that contains significant hydrocarbon reserves.

On May 17, 1973, the U.S. Atomic Energy Commission (AEC), the predecessor agency of the U.S. Department of Energy (DOE), detonated three nuclear devices nearly simultaneously in a single emplacement well at depths of 5,840; 6,230; and 6,690 feet at the Rio Blanco site. The test was conducted in low-permeability, gas-bearing sandstones at the base of the Fort Union Formation and the upper portion of the Williams Fork Formation. This was the third and final natural gas reservoir stimulation test in the Plowshare Program, which was designed to develop peaceful uses for nuclear energy. The two previous tests were Project Gasbuggy in New Mexico and Project Rulison in Colorado. The AEC conducted the test in partnership with CER Geonuclear Corporation and Continental Oil Company (Conoco).

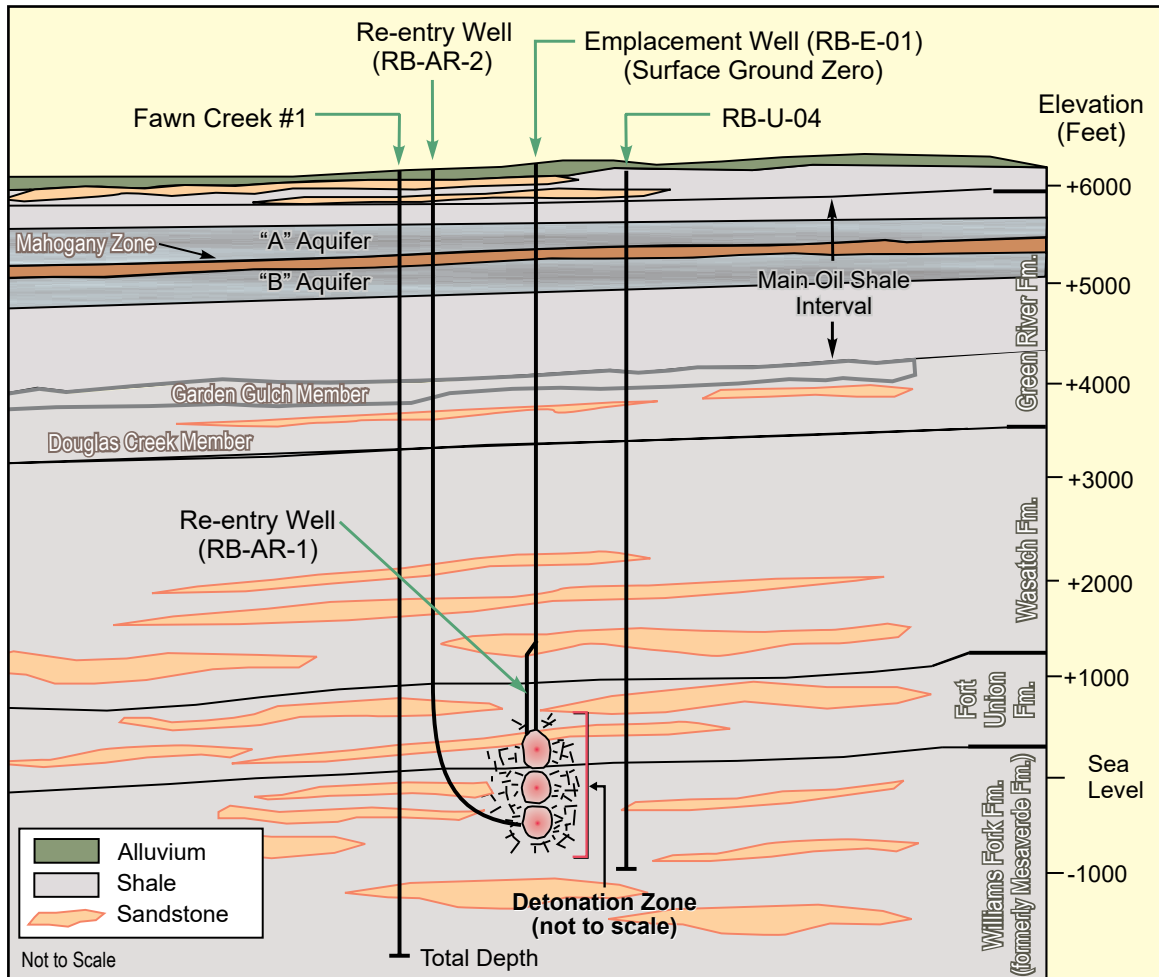
The purpose of the Rio Blanco test was to stimulate the flow of natural gas in low-permeability geologic formations. The detonations produced extremely high temperatures that vaporized a volume of rock, temporarily creating a cavity at each depth. The fractured rock above each cavity collapsed shortly after the detonation, forming a rubble-filled cavity and a collapse chimney that extends above each detonation point. It was expected that the collapse chimneys created by the detonation would be connected, allowing for improved

gas production from the fractured rock surrounding each collapse chimney.

Two re-entry wells were drilled into separate collapse chimneys created by the detonation and tested to determine the success of the test at improving natural gas production. The first re-entry well (RB-AR-1) was a sidetrack hole off the emplacement hole (RB-E-01) that was drilled into the upper chimney. The well produced 97.7 million cubic feet of natural gas over 28 days of testing that took place in two separate tests from November 1973 through February 1974. The second re-entry well (RB-AR-2) was drilled into the lower chimney and it was tested to determine the success of the detonations at creating a continuous chimney. The well produced 27 million cubic feet of natural gas over seven days of testing that took place in December 1974. The gas produced during the production tests was flared to the atmosphere, and samples of the gas and water were analyzed to determine the degree to which radioactivity levels changed as testing progressed. All releases during drilling and testing were monitored by the U.S. Environmental Protection Agency (EPA) National Environmental Respiratory Center and the Colorado Department of Health to protect workers at the site, the public, and the environment. As expected, the radioactivity levels decreased throughout the testing as gas from the chimney region was produced, burned, and replenished by uncontaminated gas from the surrounding formation. The testing confirmed that the chimneys created by the three detonations were not interconnected and that fracturing from the detonation did not extend outward as far as predicted.

### Surface Conditions

AEC began decommissioning and cleanup of the site in May 1976. Structures used during the test were removed and liquid waste generated during the test and site decommissioning were injected into the Fawn Creek Government Well #1 (Fawn Creek #1). The emplacement



Generalized Cross Section of the Rio Blanco, Colorado, Site

well (RB-E-01), wells RB-AR-1, RB-AR-2, and RB-U-04, and wells not planned for long-term monitoring were plugged and abandoned during the cleanup that was completed in November 1976. The Fawn Creek #1 well was shut in 1977 and in June 1986 the well was plugged and abandoned.

A corrective action investigation and risk assessment were completed in 2002. It was concluded in the final investigation report that no corrective actions were required and that no surface use restrictions should be placed on the site. The Colorado Department of Public Health and Environment (CDPHE) reviewed and approved the report in 2003.

## Subsurface Conditions

The detonations took place in the upper Williams Fork and lower Fort Union Formations, which are composed of shale and claystone with interbedded fluvio-deltaic sandstone lenses. These formations are characterized as having very low-permeability, so test-related radionuclides are not expected to travel far from the source area. The only aquifers identified in the area are present in the surficial alluvium and the underlying Green River Formation. The base of the Green River Formation is about 3,000 feet above the depth of the detonations.

## Long-Term Hydrologic Monitoring Program

EPA monitored groundwater and surface water annually at and near the Rio Blanco site from 1972 until 2008 as part of its Long-Term Hydrologic Monitoring Program. In 2008, the DOE Office of Legacy Management (LM) assumed responsibility for the monitoring program at the site. No radioactive contamination associated with the underground nuclear test has been detected in any samples since monitoring began.

## Land Use and Institutional Controls

The principal land uses in the area are livestock grazing and recreation; oil and gas leases exist for the area surrounding the site.

AEC withdrew 360 acres of land from the public domain in 1972. Public Land Order 7582 was issued in September 2003 to renew the withdrawal for 50 years. This Public Land Order withdraws 200 acres of public land from surface entry and mining, and also withdraws 160 acres of reserved federal mineral interests from mining — all subject to valid and existing rights. The U.S. Bureau of Land Management maintains jurisdiction over the surface management of the

200 acres and the remaining 160 acres are privately owned. Written permission is required from DOE before a mineral lease or interests are exercised within the 360-acre withdrawal that include portions of sections 10, 11, 14, and 15, Township 3 South, Range 98 West of the 6th Principal Meridian.

A monument at Surface Ground Zero provides details of the underground nuclear test and states that no excavation, drilling and/or removal of subsurface material to a true vertical depth of 1500 ft is permitted within a radius of 100 ft of this surface location, nor any similar excavation, drilling and/or removal of subsurface materials between the true vertical depths of 1500 ft and 7500 ft is permitted within a 600 ft radius of this surface location.

## Regulatory Setting

The federal government holds title to, and DOE is responsible for, radioactive and other hazardous materials generated at the Rio Blanco site. Regulatory oversight involves collaboration with CDPHE and Colorado Oil and Gas Conservation Commission. LM maintains responsibility for long-term management of the site and is committed to the protection of human health and the environment.

## Legacy Management Activities

LM monitors the Rio Blanco site to ensure conditions at the site continue to be protective of human health and the environment. The monitoring includes annual site inspections and annual sampling of surface water and groundwater near the site. Results obtained from these activities are summarized in annual monitoring reports for the site.



## CONTACT INFORMATION

### IN CASE OF AN EMERGENCY AT THE SITE, CONTACT 911.

Site-specific documents related to the **Rio Blanco, Colorado, Site**, are available on the LM website at [www.energy.gov/lm/rio-blanco-colorado-site](http://www.energy.gov/lm/rio-blanco-colorado-site)

For more information about LM activities at the **Rio Blanco, Colorado, Site**, contact:

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