



## Nevada Offsites

# Salmon, Mississippi, Site

*This fact sheet provides information about the Salmon, Mississippi, Site.*

*This site is managed by the Mississippi Forestry Commission and the U.S. Department of Energy Office of Legacy Management.*

## Site Description and History

The Salmon, Mississippi, Site, also called the Tatum Dome Test Site, is a 1,470-acre tract of land in Lamar County, Mississippi, 21 miles southwest of Hattiesburg. The nearest town is Purvis, about 10 miles east of the site.

The site is in a forested region known as the long-leaf pine belt of the Gulf Coastal Plain. Elevations in the area range from about 240 to 350 feet above sea level. The site overlies a salt formation called the Tatum Salt Dome. Land around the Salmon site has residential, industrial, and commercial use, although no one lives within the boundary of the site itself.

The U.S. Atomic Energy Commission (AEC), a predecessor agency of the U.S. Department of Energy (DOE), and the U.S. Department of Defense (DOD) conducted two underground nuclear tests at the site under the designation of Project Dribble, part of a larger program known as the Vela Uniform program. Two gas explosive tests, designated Project Miracle Play, were also conducted at the site.

The Vela Uniform program was part of a DOD research and development program intended to improve the capability of detecting, monitoring, and identifying underground nuclear detonations. As part of the Vela Uniform program, nuclear tests were conducted near Fallon, Nevada (Project Shoal), on Amchitka Island, Alaska (Project Long Shot), and near Hattiesburg, Mississippi (Projects Salmon and Sterling).

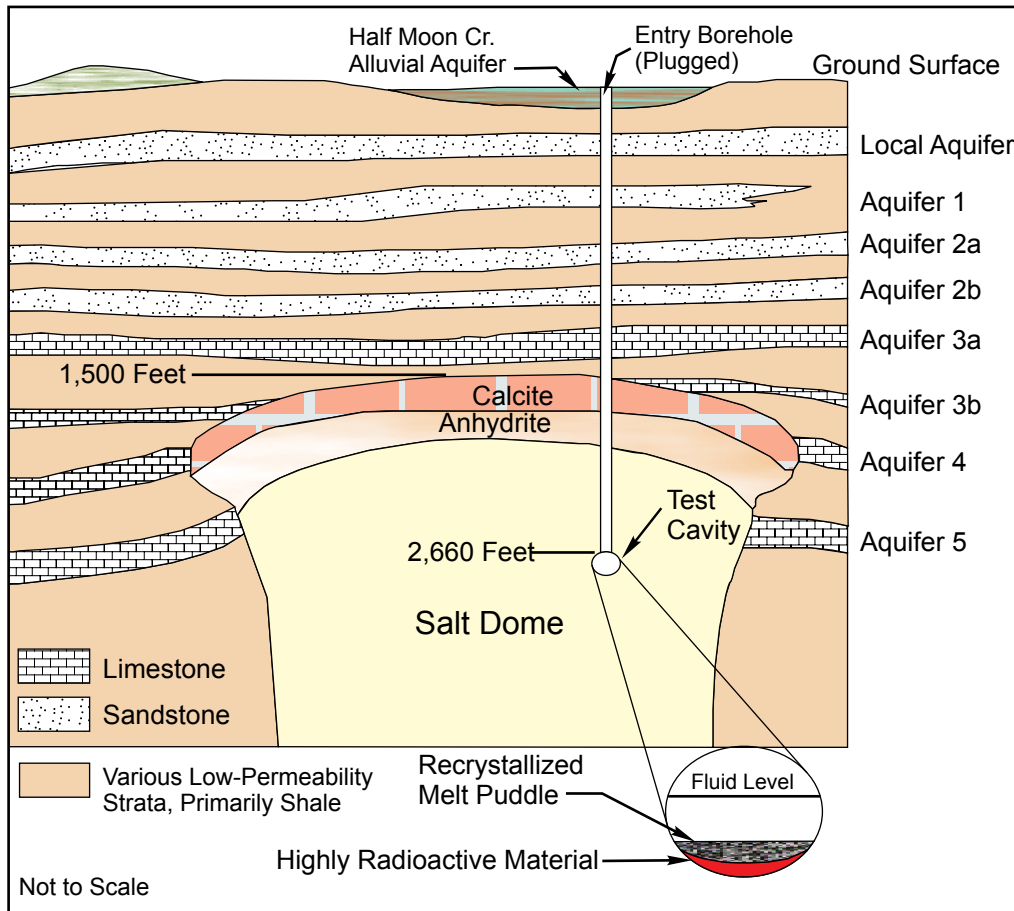
Projects Salmon and Sterling were designed to evaluate the country's ability to effectively interpret seismic signals from detonations in a salt medium (the Tatum Salt Dome). This was important in determining our ability to recognize if the testing treaty was being followed. The Salmon and Sterling tests were the second and fourth nuclear tests in the program. The Salmon test took place on October 22, 1964, at a depth of 2,700 feet below ground surface, which is approximately



*Location of the Salmon, Mississippi, Site*

1,200 feet below the top of the salt dome. This 5.3-kiloton-yield test created an underground test cavity at the depth of the detonation. The second, smaller test, Sterling, conducted on December 3, 1966, consisted of a 380-ton-yield nuclear device suspended in the cavity created by the Salmon test.

Two methane-oxygen explosions were conducted in the Salmon cavity—one (called the Diode Tube) on February 2, 1969, and the other (called the Humid Water) on April 19, 1970. Each test had a yield of approximately 315 tons.



*Cross Section of Salmon, Mississippi, Site*

The salt dome fully contained all of the products of the detonations, and no radionuclides were released to the surface. Radioactive fission products and other materials generated during the tests are entrained in the glass-like material left behind by the detonation and in the salt near the cavity. Following each of the tests, re-entry holes were drilled into the test cavity to collect scientific data and to emplace devices. These drilling operations generated waste, which included contaminated drill cuttings and drilling fluids. In addition, support operations generated other contaminated materials. Test site support activities required fuel, electricity, sanitation, waste storage, waste disposal, and the use of hazardous materials.

## Site Conditions

Site cleanup and decommissioning activities began in 1971. Contaminated buildings and equipment were shipped to the Nevada National Security Site (formerly Nevada Test Site) for disposal; contaminated soils, slurried with fresh water, and other liquid materials were disposed of in the underground test cavity. Liquid wastes from the Salmon re-entry operations were injected into a deep brine aquifer (known as Aquifer 5) for disposal. Liquid wastes from the Sterling re-entry operations were solidified and shipped to Oak Ridge, Tennessee, for burial. Miscellaneous sanitary wastes were buried onsite in shallow pits excavated for soils to replace contaminated soils. These pits were subsequently covered with clean soil and graded. A high water table elevation

prevented complete excavation and removal of contamination at ground zero, and the shallow mud pit less than 100 meters away. The mud pit excavation was backfilled with clean soil and reseeded.

Cleanup and decommissioning activities officially ended June 30, 1972, the same day the AEC site lease with the original landowner expired. A new 10-year lease agreement gave DOE exclusive rights to regulate and control subsurface penetration and allowed continued site access to conduct monitoring activities. The lease was later renewed for a second 10-year period. During the 1972 to 1992 lease period, the site was used as a private timber plantation.

Radioactivity remains in the rubble in the test cavity that is within the salt structure. The salt is nearly impermeable and has little or no capacity to transmit water. Therefore, the salt structure provides geologic isolation to prevent the radioactivity from migrating.

Shortly after the creation of DOE's Environmental Management program in 1989, concerned citizens, the State of Mississippi, and congressional leaders raised questions about the site. When DOE acquired the site in 1992, the agency initiated a series of studies to verify site conditions and investigate whether residual contamination remained that had not been detected in previous investigations. The studies were completed and issued in the *Salmon Site Remedial Investigation Report* (DOE/NV-494-Vol.1/Rev. 1, 1999).

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Results confirmed that decommissioning of the surface resulted in conditions protective of human health and the environment. Analysis showed that the detonation products were not migrating. Further, the deep aquifer was not a source of exposure.

Soil samples collected during the remedial investigation indicated that some residual contamination exceeded levels considered suitable for unrestricted use, particularly in the vicinity of surface ground zero. However, the human health risk assessment concluded that recreational visitors and workers in the area (e.g., park rangers) would not be subject to unacceptable risks. Furthermore, the assessment indicated that at least 95 percent of the residual site risk is due to naturally occurring radioactive material and not site-related contamination.

In 2010, DOE transferred surface ownership of the Salmon site to the State of Mississippi so that the site could be used as a wildlife refuge and working demonstration forest. DOE retains the rights to the subsurface of the Salmon site property and will continue the monitoring of surface water and groundwater to ensure protection of public health and the environment.

## Institutional Controls

Institutional controls are in place to ensure protection of human health and the environment. DOE has placed a deed restriction on the land parcel, which prohibits excavation, drilling, or removal of material without prior approval from DOE. Angle drilling from outside the property boundary to within the property boundary is also prohibited.

## Long-Term Hydrologic Monitoring Program

Since 1972, surface water and groundwater have been monitored annually at the Salmon site as part of a Long-Term Hydrologic Monitoring Program. In 2014, the sampling interval was changed to every 18 months, to capture possible seasonal variations. Water samples are collected for analysis of signature radionuclides from the nuclear detonations. Monitoring wells near areas of buried drilling fluids are also sampled for organic compounds and metals that may remain entrained in pockets of the buried material. The State of Mississippi participates in the DOE sampling program and is onsite during sampling events.

## Regulatory Setting

The State of Mississippi holds title to the Salmon site surface real estate; however, DOE owns the subsurface real estate, including mineral rights, and is responsible for the radioactive and other hazardous materials generated by DOE and predecessor agencies at the site. DOE possesses the radioactive material at the Salmon site under the authority of the Atomic Energy Act of 1954 (Title 42 *United States Code* [USC], Section 2011, et seq.).

## Legacy Management Activities

The DOE Office of Legacy Management (LM) has responsibility for developing and implementing a site-specific Long-Term Surveillance and Maintenance Plan for the site and for establishing and maintaining institutional controls. LM-scheduled monitoring of groundwater and surface water is ongoing to verify that concentrations of near-surface contaminants are decreasing as expected. Additional responsibilities include managing site records, implementing and managing existing agreements and programs with regulatory agencies, and responding to stakeholder inquiries.

## Contacts

Documents related to the Salmon site are available on the LM website at <https://www.lm.doe.gov/salmon/Sites.aspx>.

For more information about LM activities at the Salmon site, contact:

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