



# Salmon, Mississippi, Site

## FACT SHEET

*This fact sheet provides information about the Salmon, Mississippi, Site.  
This site is managed by 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, a predecessor agency of the U.S. Department of Energy (DOE), and the U.S. Department of Defense 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 Department of Defense 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 seismic signals from detonations in a salt medium (the Tatum Salt Dome). 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 1,200 feet below the top of the salt dome. This 5.3-kiloton-yield test created an underground test cavity approximately 110 feet in diameter 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



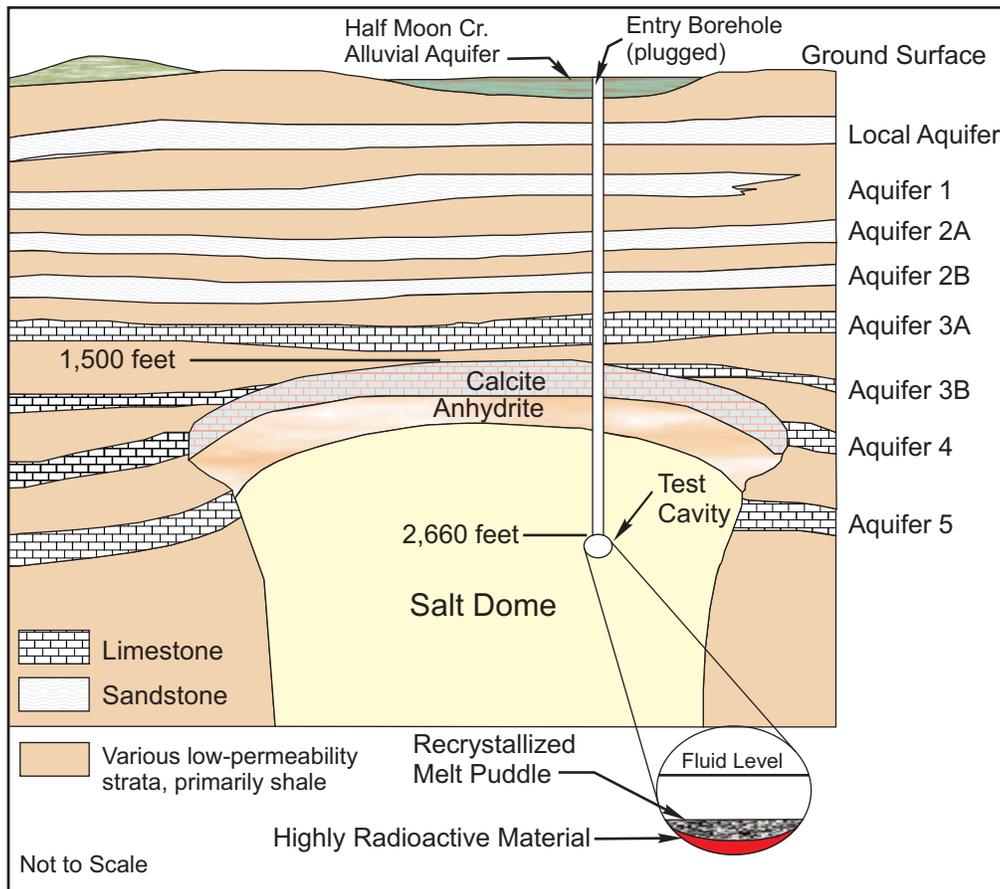
Location of Salmon, Mississippi, Site

February 2, 1969, and the other (called the Humid Water) on April 19, 1970. Each test had a yield of approximately 315 tons.

The salt dome fully contained all of the tests, and no radionuclides were released to the surface. Radioactive fission products and other materials generated during the tests are contained in the test cavity and in the salt near the cavity. Following each of the tests, reentry 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

The 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,



*Cross Section of Salmon, Mississippi, Site*

slurried with fresh water, and other liquid materials were disposed of in the underground test cavity. Liquid wastes from the Salmon reentry operations were injected into a deep brine aquifer (known as Aquifer 5) for disposal. Liquid wastes from the Sterling reentry 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 in the shallow mouse hole at ground zero (now under the existing monument) and the shallow mud pit less than 100 meters away. The mouse hole was filled with clean soil and covered with concrete, and the mud pit excavation was backfilled with clean soil and reseeded.

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

Radioactivity remains in the test cavity that is deep within the salt structure. The salt is nearly impermeable

and has little or no capacity to transmit water. Therefore, the assumption is that the salt structure provides sufficient 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). Results confirmed that decommissioning of the surface resulted in conditions protective of human health and the environment, that neither the test cavity nor the deep aquifer was leaking, and that wastes disposed of there were adequately contained. The human health risk assessment indicated that the only unacceptable risks would be through using the site in a residential scenario. Recreational visitors and workers in the area (e.g., park rangers) would not be subject to unacceptable risks. At least 95 percent of the risk in all three scenarios is due to naturally occurring radioactive material. The residential scenario risk was higher than risk from the other two scenarios due to the added

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pathway of ingestion of produce grown in site soil, particularly produce grown within 100 meters of ground zero.

The no-action alternative was selected from the remediation alternatives considered for radioactive waste injected into Aquifer 5. Modeling showed that the wastes would decay to levels below U.S. Environmental Protection Agency (EPA) or State of Mississippi standards in about 210 years. Aquifer 5 has a groundwater flow rate of less than 10 feet per year.

Results of the alluvial aquifer transport model predict that at the end of 100 years, the maximum detected concentration per contaminant (in 1999) will naturally attenuate by more than 99 percent to concentrations significantly less than applicable standards.

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 scheduled 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 the public 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. Water samples are collected for analysis of signature radionuclides from the nuclear detonations. A few groundwater samples are analyzed for organic compounds and certain metals that remain buried in pockets of residual drilling mud. The State of Mississippi oversees the sampling process.

## **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.). The State of Mississippi enforces numerous surface water standards developed by EPA pursuant to the Clean Water Act (Title 33 USC Section 1251 et seq.) for use as water quality standards in the state.

## **Legacy Management Activities**

DOE's 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 accepting the transfer of records and real property, 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 <http://www.lm.doe.gov/salmon/Sites.aspx>.

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

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