

Long-Term Surveillance and Maintenance Plan for the Salmon, Mississippi, Site

November 2022

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Abbreviations

AEC	U.S. Atomic Energy Commission
AIP	agreement in principle
AOC	area of concern
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
³⁶ Cl	chlorine-36
DOE	U.S. Department of Energy
EM	Office of Environmental Management
ft	feet
IC	institutional control
LM	Office of Legacy Management
LTS&M Plan	Long-Term Surveillance and Maintenance Plan
MCL	maximum contaminant level
MDEQ	Mississippi Department of Environmental Quality
MDOH	Mississippi Department of Health
MFC	Mississippi Forestry Commission
mg/L	milligrams per liter
µg/L	micrograms per liter
MOU	memorandum of understanding
msl	mean sea level
OU	operable unit
PL	Public Law
RI	Remedial Investigation
SA	source area
SGZ	surface ground zero
TCE	trichloroethene
USC	<i>United States Code</i>
VEP	Voluntary Evaluation Program
VOC	volatile organic compound

1.0 Introduction

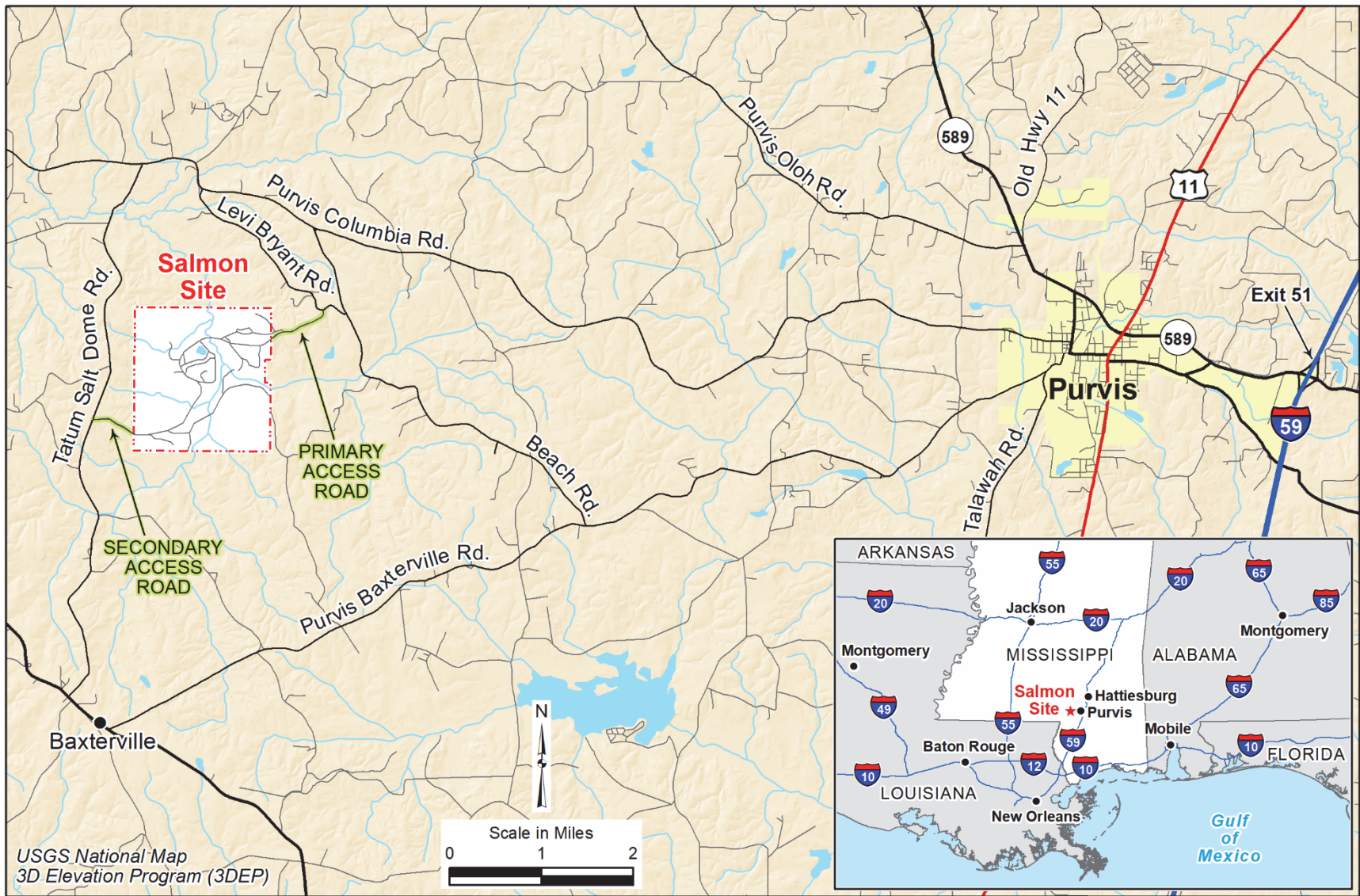
The U.S. Department of Energy (DOE) Office of Legacy Management (LM) prepared this Long-Term Surveillance and Maintenance Plan (LTS&M Plan) for the Salmon, Mississippi, Site (the Salmon site) to describe LM's plan and policy for future site activities.

The Salmon site consists of 1470 acres in Lamar County, Mississippi, approximately 10 miles west of Purvis, Mississippi, and about 21 miles southwest of Hattiesburg, Mississippi (Figure 1). The site is located over a large subsurface salt formation referred to as the Tatum Salt Dome. Two nuclear tests (Project Dribble) and two gas explosive tests (Project Miracle Play) were conducted in the salt dome between 1964 and 1970. Salmon, the first nuclear test, was conducted on October 22, 1964, and created a cavity approximately 2700 feet (ft) below ground surface (bgs). The second nuclear test, Sterling, was conducted on December 3, 1966. The Sterling test and the two gas explosions—Diode Tube on February 2, 1969, and Humid Water on April 19, 1970—were all conducted in the cavity created by the Salmon test. The four explosions were conducted as part of the U.S. Atomic Energy Commission's (AEC's)¹ Vela Uniform program. Testing at the site ended in 1970 after the second gas detonation. The tests resulted in residual contamination and postdetonation features that require long-term oversight.

The State of Mississippi (the state) owns the surface real estate at the site, and the deed to the property includes certain restrictions related to subsurface penetration. The state is the surface operator; the Mississippi Forestry Commission (MFC) is its agent. The federal government owns the monitoring wells, the monument at surface ground zero (SGZ), and the subsurface real estate, including minerals and contamination remaining from underground tests. LM has responsibility for the long-term surveillance of the subsurface real estate, shares right-of-entry easements with the state, and retains rights related to subsurface monitoring.

This plan incorporates recommendations from previous surveillance plans as well as closure, completion, site investigation, and monitoring reports. It supersedes all previous plans that describe monitoring at the Salmon site. This plan will be reviewed every 3 years and will be updated as needed.

¹ AEC was a predecessor agency to DOE.



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Abbreviations:

Hwy = highway; Rd = road; USGS = U.S. Geological Survey

Figure 1. Regional Location Map for the Salmon Site

1.1 Purpose

This LTS&M Plan documents LM's operational plan for long-term stewardship of the site. Long-term stewardship refers to the performance of all activities necessary to protect human health and the environment following cleanup, disposal, and stabilization at a site. The purpose of this LTS&M Plan includes the following:

- Communicate the operational plan for managing the site to stakeholders (this includes the Mississippi Department of Health [MDOH])
- Summarize site information, including underground nuclear testing and status of environmental restoration activities (Sections 2.1 through 2.4)
- Document the institutional controls (IC)s and land use for the site (Section 2.5)
- Describe current site features and activities, including the environmental monitoring plan (Sections 3.1 through 3.5)
- Provide the process for evaluating and reporting site-specific information (Section 3.6)
- Inform the public of the process for maintaining site records (Section 3.7)
- Summarize current LM commitments and requirements at the site (Section 3.8)

1.2 Regulatory Framework

Surface and subsurface contamination resulted from the underground nuclear tests, posttest drilling, and nonnuclear tests performed at the Salmon site. DOE maintains responsibility for residual radioactive material at the site under authority of the Atomic Energy Act of 1954, as amended under Title 42 *United States Code* Section 2011 et seq. (42 USC 2011 et seq.). The site was decommissioned in 1972 under Atomic Energy Act authority by AEC. A Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) preliminary assessment of the site was completed in 1988 (DOE 1988). The score for the Salmon site was not high enough for inclusion on the CERCLA National Priorities List, and the conclusion was that the site posed only a limited threat to the environment.

The Mississippi Department of Environmental Quality (MDEQ) issued a draft administrative order to DOE (MDEQ 1990) stipulating that a Remedial Investigation (RI) work plan be prepared and executed to address their concerns. Site conditions were reevaluated in the 1990s through DOE's Office of Environmental Management (EM) under DOE's CERCLA authority (DOE 1992, DOE 1995). DOE work at the site was conducted with state oversight consistent with the terms of two agreements in principle (AIPs) that were effective from October 1995 to June 2005 (AIP 2000). The AIPs included state involvement of both MDEQ and MDOH. While site investigations were conducted using DOE's CERCLA authority, the site was not included in any formal regulatory program, and the state did not have formal regulatory authority. The state did conduct its own monitoring activities at the site and served in a review capacity for technical reports generated by DOE.

DOE applied for the Mississippi Uncontrolled Site Voluntary Evaluation Program (VEP) in 2004. The VEP allowed DOE to receive expedited attention and evaluation of site information by MDEQ. DOE submitted a final completion report and long-term stewardship plan to the state in August 2005 (DOE 2005b), indicating that future site activities would be limited to long-term

stewardship. The report was approved by MDEQ in October 2005. Historically, both MDEQ and MDOH have been informed of site activities and have reviewed site-related documents. MDEQ involvement, along with participation in the VEP, decreased following acceptance of the completion report and site transition to LM. MDOH is currently the primary oversight agency for the Salmon site, and DOE is not currently enrolled in the VEP.

The future land use for the Salmon site is dictated by the National Defense Authorization Act for Fiscal Year 1997 (Public Law [PL] 104-201). This law requires that the State of Mississippi use the conveyed property as a wildlife refuge and working demonstration forest designated as the Jamie Whitten Forest Management Area.

1.3 Roles and Responsibilities

1.3.1 U.S. Department of Energy

In December 2003, DOE formally established LM to manage DOE's responsibilities at sites having impacts associated with World War II and the Cold War. LM's mission includes implementing long-term surveillance and maintenance at those sites to ensure sustainable protection of public health, safety, and the environment. LM is responsible for implementing long-term surveillance and maintenance plans for former underground nuclear test sites located outside of the Nevada National Security Site (formerly the Nevada Test Site). Before being managed by LM, legacy contamination at the Salmon site was the responsibility of EM. The site was transferred to LM on October 1, 2006. LM is ultimately responsible for ensuring that the residual contamination at the Salmon site is managed in a manner that is protective of human health and the environment.

LM's current responsibilities at the site include groundwater monitoring, reporting monitoring results, and responding to public inquiries. LM owns the monitoring well system and site monument. LM retained right of access when the site was transferred to the State of Mississippi and coordinates access with MFC. LM provides funding to MDOH for independent quarterly sampling activities at the site.

1.3.2 Mississippi Department of Health

MDOH and MDEQ shared a regulatory role during the 1990 RI through issuance of the completion report in 2005. Following transfer of the site from EM to LM in 2006, MDOH assumed the role of the main regulatory contact for the State of Mississippi.

MDOH currently observes monitoring conducted by LM at the Salmon site and independently conducts sampling and reporting. MDOH samples selected wells each quarter and publishes the results in an annual report. MDOH activities at the site are funded through grants from LM.

1.3.3 Mississippi Forestry Commission

MFC has managed the surface of the Salmon site since it was transferred to the state in 2005. MFC's stated goal for the area is to convert and cultivate site vegetation so the tract can become a working demonstration forest representing a typical southern coastal pine forest ecosystem. MFC partners with organizations such as Mississippi State University Extension Service, Southern Mississippi University College of Nursing, and Wildlife Mississippi, all of which use the site for research and education purposes (MFC 2012).

MFC's responsibilities include managing timber harvesting in accordance with their timber management plan. As the landowner, MFC is responsible for most site maintenance, and proceeds from timber sales are used to finance the maintenance of roads, fences, and gates. LM may provide additional funds to MFC for mowing and clearing services for the pads surrounding the LM monitoring wells. MFC is also responsible for ensuring that surface land use restrictions described in the deed transfer are maintained.¹ If any drilling, excavation, or removal of material is proposed within the site boundary, permission must be obtained from LM before any of these activities can occur.

1.3.4 Weyerhaeuser

Weyerhaeuser, a real estate investment trust company with a business focus on timberlands, owns adjacent lands west of the site and provides alternative access through the western access gate. LM has an access agreement in place that allows use of that access road; Weyerhaeuser must be contacted to access the site through the western gate (Mississippi 2017). This gate is typically used if weather or poor road conditions prevent site access via the main northeast entrance.

2.0 Salmon Site Information

2.1 Physical Setting

The Salmon site is in a major regional geologic province called the Mississippi Embayment, which is part of the Atlantic and Gulf Coastal Plain Groundwater Region. The Pearl River Basin is within the Mississippi Embayment and encompasses the Salmon site. To the south, east, and west, the basin is bounded by low hills. The Pearl River, with a total drainage area of 8760 miles, flows into the Gulf of Mexico. Three streams (Half Moon, Hickory Hollow, and Grantham Creeks) are part of the Pearl River Drainage and drain the Salmon site (DOE 1999). The region is characterized by narrow, flat-topped ridges and intervening valleys that trend predominantly in a south-southeast direction toward the Gulf of Mexico (DOE 1999).

The Salmon site is partially fenced and is surrounded by privately owned parcels of land. Although the site is inactive and posted to prevent trespassing, local hunters often use the site for access to hunting leases adjacent to the Salmon site (DOE 2005b). Nearby areas of urban development include Lumberton, Hattiesburg, and Purvis. All of these communities use land for residential, commercial, and industrial purposes. The timber, cattle, and oil industries dominate the local economy.

Lamar County is in the Gulf Coastal Region and contains a large amount of forested land. Rodents (squirrels, rats, mice), other smaller mammals (rabbits, raccoons, possums), and larger mammals (bears, panthers, and deer) currently reside in the forested areas.

¹ Lamar County, Mississippi, Chancery Clerk, 2010 Quitclaim Deed: "Any and all future users/purchasers of this land should inform themselves of the requirements of the regulations and ascertain the amount and nature of contamination on this described property." (LCMCC 2010)

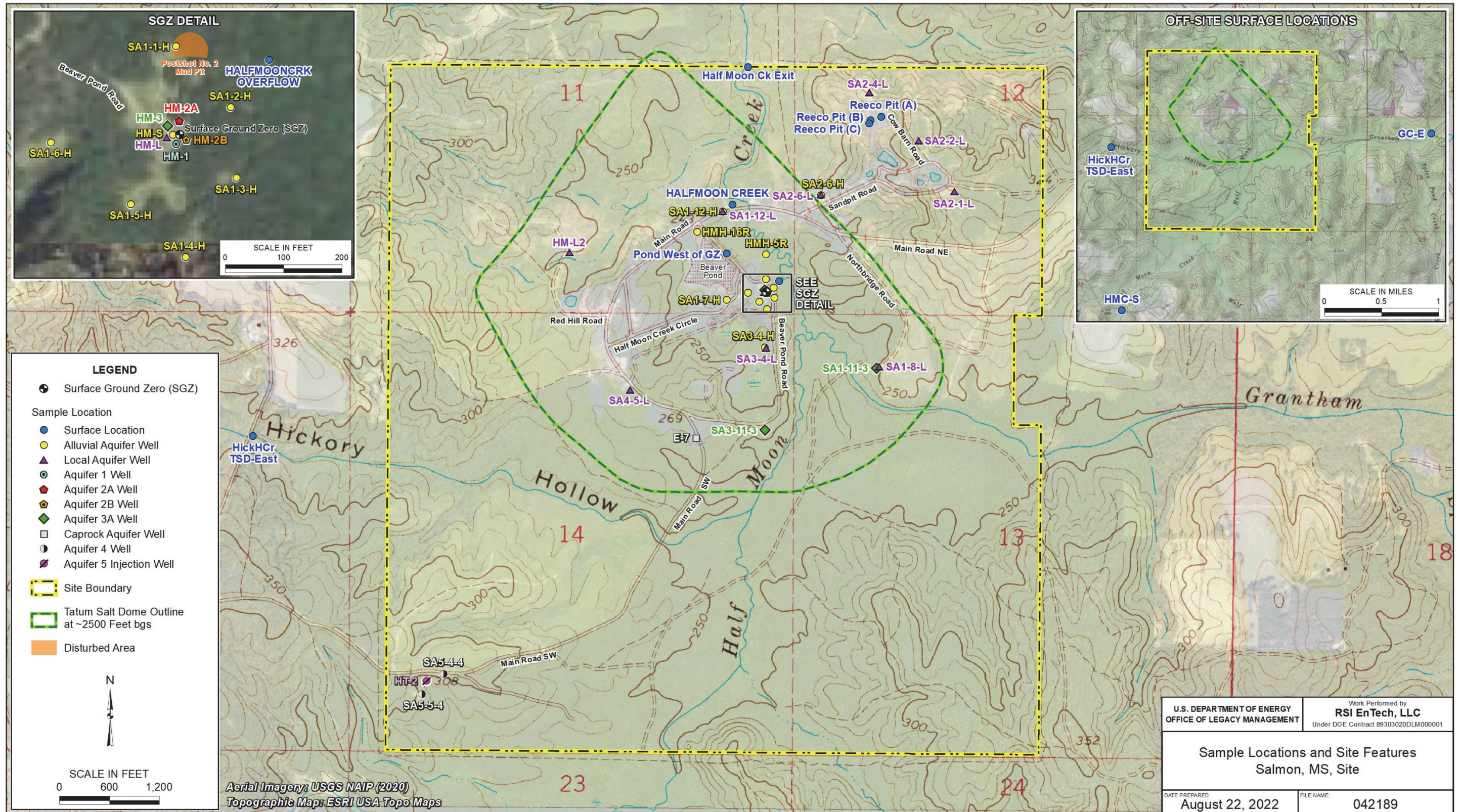
The climate in the Salmon site area is humid subtropical, with hot summers and mild winters. Records for the Hattiesburg area indicate that annual rainfall averages about 59 inches, with December being the wettest month (average 6.38 inches) and October being the driest (average 3.04 inches) (SRCC 2018). Rainfall events of more than 14 inches in a 24-hour period have been recorded at the site. This amount of rainfall is generally coincident with late summer or autumn hurricanes (AEC 1971). Snowfall is rare. January is the coldest month, with an average high temperature of about 60 degrees and an average low of about 38 degrees. July and August are the hottest months, with average high and low temperatures of about 92 and 71 degrees, respectively. Winds exceeding 100 miles per hour have been recorded when hurricanes and tornadoes pass through the area; thunderstorms are common throughout the year (AEC 1971).

2.2 Operational History

The Salmon site (Figure 1) was acquired by the Tatum family in 1891 and used for timber production; it also was explored for oil, natural gas, salt, and sulfur production, but none of these commodities could be economically extracted. AEC leased the land from the Tatum family in 1961 and prepared to conduct nuclear testing at the site (Burke 2012). Over the course of AEC test operations and later remedial efforts, there have been several land transfers and property agreements. A detailed timeline of real estate transfers is presented in Appendix A.

Between 1964 and 1970, AEC conducted a series of nuclear and nonnuclear underground detonations in the Tatum Salt Dome beneath the site to study seismic signatures. Figure 2 shows the lateral extent of the salt dome projected to the surface from a depth of about 2500 ft bgs. Two nuclear tests (Project Dribble) were conducted in the salt dome as part of the Vela Uniform program, the purpose of which was to develop the technological capability to detect and identify underground and underwater nuclear detonations. The Salmon nuclear test was conducted in October 1964 at a depth of 2710 ft bgs (Figure 3). The Sterling nuclear test of December 1966 was conducted in the cavity created by the Salmon test, as were the Diode Tube (February 2, 1969) and Humid Water (April 19, 1970) gas explosion tests. No radioactivity was released to the surface during the four tests. Residual radioactivity from Project Dribble is contained within the cavity walls and the cavity itself. The plasticity and impermeability of the surrounding salt formation provide sufficient geologic isolation to prevent migration of contaminants.

Reentry holes were drilled into the detonation cavity to collect scientific information and determine the effects of each explosion. These drilling operations generated the largest volume of waste at the site, including radioactively contaminated drill cuttings and drilling fluids. Test site support operations required fuel, electricity, sanitation, waste storage, waste disposal, and the use of hazardous materials and resulted in the generation of nonradioactive waste. Waste materials were temporarily disposed of in several mud pits and burial pits across the site.



Abbreviations:
 GZ = ground zero; NE = northeast; SW = southwest; USGS = U.S. Geological Survey

Figure 2. Salmon Site Features and Monitoring Locations

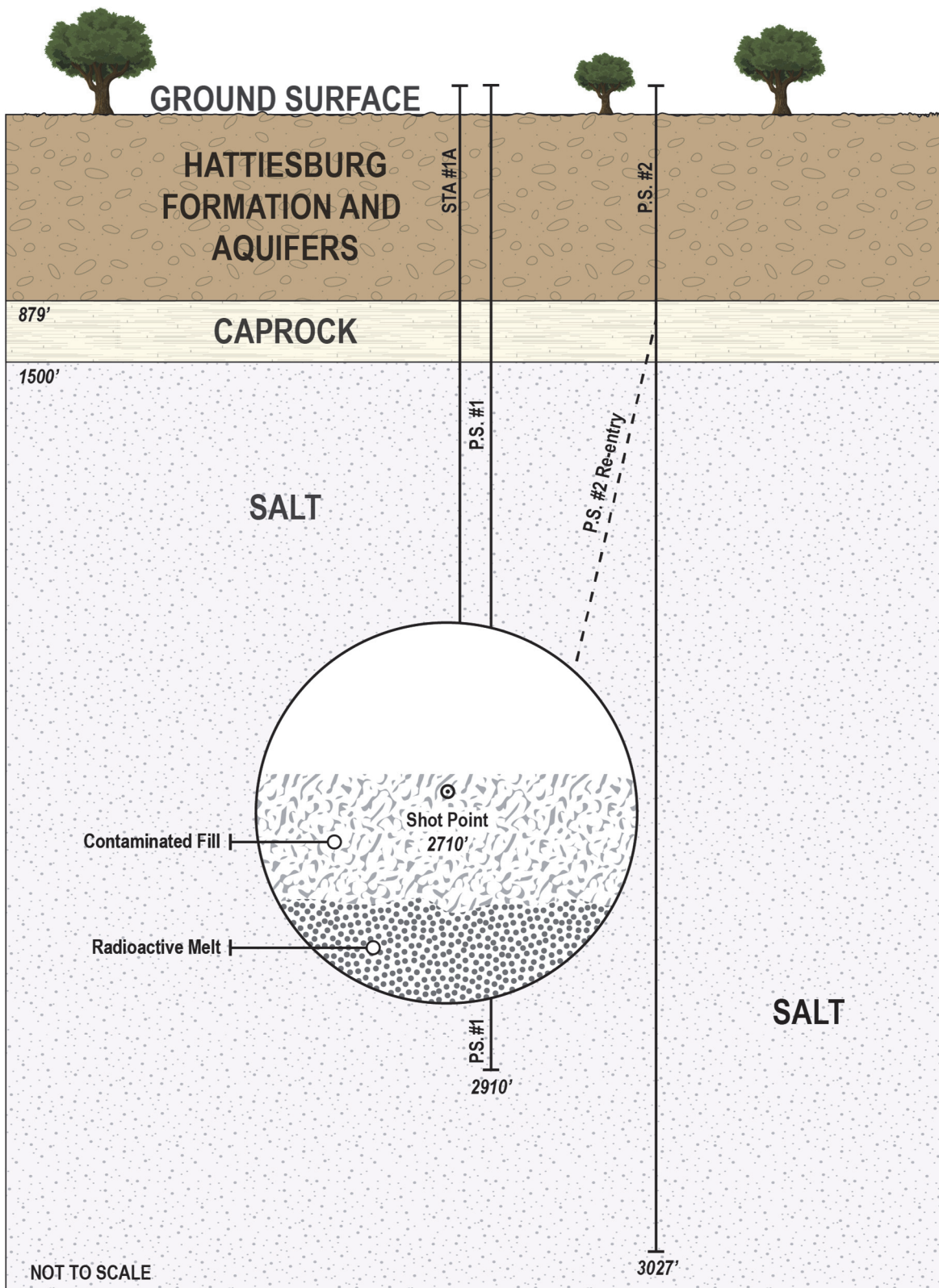


Figure 3. Cross-Sectional Depiction of the Shot Cavity After Surface Decommissioning

Radioactive wastes, including contaminated soil and water, were disposed of in the test cavity via reentry wells, which were subsequently plugged (DOE 1999). The HT-2 injection well (Figure 2) was used following the first nuclear test to dispose of radiologically contaminated liquid wastes in a deep saline formation (Aquifer 5). The HT-2 injection well, in the southwest corner of the site, was plugged during site cleanup operations.

Significant cleanup operations were conducted in 1972. During this cleanup, soil contaminated with drilling fluids from drill-back operations (e.g., mud pits) was converted to slurry and injected into the test cavity. Nonradioactive wastes were disposed of in pits at the site, which were subsequently covered with clean soil and graded. All test boreholes used for emplacement, drill-back, and injection, as well as other wells, were plugged and abandoned in accordance with State of Mississippi requirements.

An RI/feasibility study for the site was prepared in 1992 (DOE 1992). During the RI, the site was divided into six geographically distinct source areas (SAs) based on the historical activities conducted in the different areas of the site. A number of areas of concern (AOCs) were identified within each SA based on historical site activities. Additional investigations of the site were focused on identifying any residual contamination left at the AOCs within each SA.

Additional data were collected during the 1990s, and a subsequent RI report was prepared in 1999 (DOE 1999). As part of the 1999 RI, sampling of soil and groundwater was conducted across the site. Samples were analyzed for volatile organic compounds (VOCs), radionuclides, and metals. The 1999 RI discusses the site in terms of operable units (OUs), which were defined as geographical units with the same potential source of contamination that remained after site decommissioning. These residual sources of contamination are different from the historical SAs previously identified and are discussed below.

Three OUs were established in the 1999 RI based on three primary sources of residual site contamination. OU-1 includes the surface soil and shallow aquifer system that were affected mainly by drilling activities at the surface (e.g., mud pits, drill cuttings), primarily near SGZ. OU-2 includes the test cavity and the overlying aquifers, particularly those at intermediate depths, and includes constituents produced by the nuclear test itself and materials disposed of in the cavity during decommissioning. OU-3 includes the injection well (HT-2) and deep aquifers and liquid radioactive wastes that were disposed of in the deep subsurface following the first nuclear test. The monitoring approach discussed in this LTS&M Plan is organized generally according to the OUs established in the 1999 RI.

The RI and other supplemental studies confirmed that the cleanup (and decommissioning of the surface) resulted in conditions that are protective of human health and the environment. DOE's investigation concluded that the remaining near-surface residual contamination at the site does not "present a significant risk to existing and/or future land users, if surface ICs and subsurface restrictions are maintained." Although the test cavity is highly radioactive, the radioactivity is isolated and "cannot be economically remediated with existing technologies" (DOE 1999). The RI concluded that no radioactivity had leaked or was leaking from the test cavity, and the near-surface residual radioactive contamination at the two locations near SGZ was adequately contained (DOE 1999). Tritium contamination was confirmed in the shallow aquifer and at these two locations due to residual drilling mud. Some metals and VOCs—degreaser and drilling mud additives—were also present in groundwater near these two locations.

The *Salmon Site Restoration Plan, Rev. 1*, was issued in 2002, and Alternative 3, “Institutional Controls Remedial Action,” was ultimately selected for the site (DOE 2002). This alternative includes transfer of the site to the State of Mississippi with deed restrictions, implementation of a long-term hydrologic monitoring program, ICs (e.g., signs and postings), and a public awareness program (DOE 2002). All of these actions have been implemented. In addition, DOE provided funding to Lamar County to extend a potable water delivery system to nearby residents northeast of the site (MOU 1999; DOE 2002). This potable water system is included in sampling conducted by MDOH.

LM conducted annual sampling from 2007 through 2014. Starting in October 2014, sampling was conducted at 18-month sampling intervals to determine possible seasonal variations. Higher constituent concentrations were observed in shallow wells during the drier fall months, when the water table was lower. Following the October 2019 sampling event, the sampling frequency was changed to every 2 years. These biennial sampling events are conducted in the fall based on the results of the seasonal analysis. A chronology of the site’s operational history is provided as Table 1.

Table 1. Salmon Site Chronology

Date	Description of Activity	Reference
January 1, 1961– February, 1963	Site leased from the Tatum family.	Burke 2012
February 15, 1963	The U.S. attorney general reviewed all documents related to mineral rights and determined that the United States owns all surface and subsurface rights.	OAG 1963
October 22, 1964	Salmon underground nuclear test.	AEC 1966
1965	Began disposal of radioactive waste in Aquifer 5.	AEC 1966
December 3, 1966	Sterling nuclear test conducted in cavity created by the Salmon nuclear test.	LRL 1968
February 2, 1969	Diode Tube nonnuclear gas explosive test in the Salmon cavity.	DOE 1979
April 19, 1970	Humid Gas nonnuclear gas explosive test in the Salmon cavity.	DOE 1979
1971–1972	Site cleanup and decommissioning operations. All radioactive material disposed of in cavity through reentry holes or removed from site, except at two shallow locations near surface ground zero. Reentry holes plugged following cleanup activities.	AEC 1972
1972	Site returned to private landowner (Tatum family) through a memorandum of understanding (MOU). DOE retained access rights and some subsurface drilling rights.	DOE 1979
1972	Surface monument installed.	AEC 1972
1972–1992	Site leased from the Tatum family through two 10-year leases; some limited logging activity may have occurred on the site during this time.	DOE 2005c
1972–2007	U.S. Environmental Protection Agency (EPA) conducts annual Long-Term Hydrological Monitoring Program.	–
1979	Aquifer test pulls tritium from alluvial aquifer into local aquifer.	DOE 1980

Table 1. Salmon Site Chronology (continued)

Date	Description of Activity	Reference
1988	CERCLA preliminary assessment conducted. Hazard ranking score too low for inclusion on National Priorities List.	DOE 1988
1989	Tatum Dome added to the Federal Agency Hazardous Waste Compliance Docket via <i>Federal Register</i> .	EPA 1989
April 1990	MDEQ issues draft Administrative Order to DOE stipulating that an RI work plan be prepared. Terms of the agreement were never completed and signed.	MDEQ 1990
1992–1998	RI/feasibility study conducted. AOCs, SAs, and OUs established.	DOE 1992
December 2, 1994	DOE acquires Tract 100 of the Salmon site from Tatum Lumber Company.	Mississippi 1994
September 23, 1996	PL 104-201 requires state to use property as a wildlife refuge and demonstration forest (if transferred).	PL 104-201
1999	RI completed.	DOE 1999
1999	DOE provided funding to Lamar County to extend the water delivery system.	MOU 1999
July 1, 2000– June 30, 2005	AIP in effect between DOE and State of Mississippi for state oversight of DOE monitoring.	AIP 2000
2001	Remington Oil and Gas Company collected seismic data at the site to enhance oil and gas exploration of the area surrounding the Salmon site.	DOE 2005c
2002	DOE selects ICs as preferred remedy in <i>Salmon Site Restoration Plan</i> .	DOE 2002
April 19, 2004	Title opinion indicated federal government owns all surface and subsurface rights for the Salmon site.	Richland Title 2004
2004	DOE applied for the VEP.	Carlson 2004
2005	Completion Report and Stewardship Plan finalized and accepted by state. Stewardship plan states LM LTS&M Plan will supersede the document once prepared.	DOE 2005b, MDEQ 2005
2005	Only remaining activities required at Salmon site are related to long-term stewardship.	DOE 2005c
August 25, 2005	Deed restriction for the Salmon site is filed. This restricts excavation, drilling, and the removal of materials from the site, as well as other provisions. This document is the main IC for the Salmon site.	LCMCC 2010
October 1, 2006	Salmon site transferred from EM, National Nuclear Security Administration, to LM.	DOE 2006
December 20, 2006	Easement and right-of-way obtained for primary access route on the northeast side of the site.	Mississippi 2006
2008–2018	Surface and groundwater monitoring conducted by LM focuses on radionuclides, selected metals, and VOCs. Metals were recommended for elimination from the sampling program in the 2017 annual report.	–
March 1, 2009	Oil and gas lease for the Salmon site assigned to Alpine Gas.	BLM 2009

Table 1. Salmon Site Chronology (continued)

Date	Description of Activity	Reference
June 2010	Bridge repaired and recertified, and numerous culverts replaced by DOE before transfer of surface to state.	DOE 2011
December 20, 2010	Surface transferred to State of Mississippi; federal government retained subsurface real estate and site access rights. DOE also retained ownership of monitoring wells and site monuments.	LCMCC 2010
2013	Chlorine-36 monitoring starts as a potential replacement for tritium as tritium declines.	DOE 2014
September 2014	Additional wells drilled to investigate interaction between alluvial and local aquifers.	DOE 2018
February 23, 2017	Easement obtained for access to the secondary access route on the southwest side of the site. This agreement also provides an easement to Weyerhaeuser to access roads within the site.	Mississippi 2017

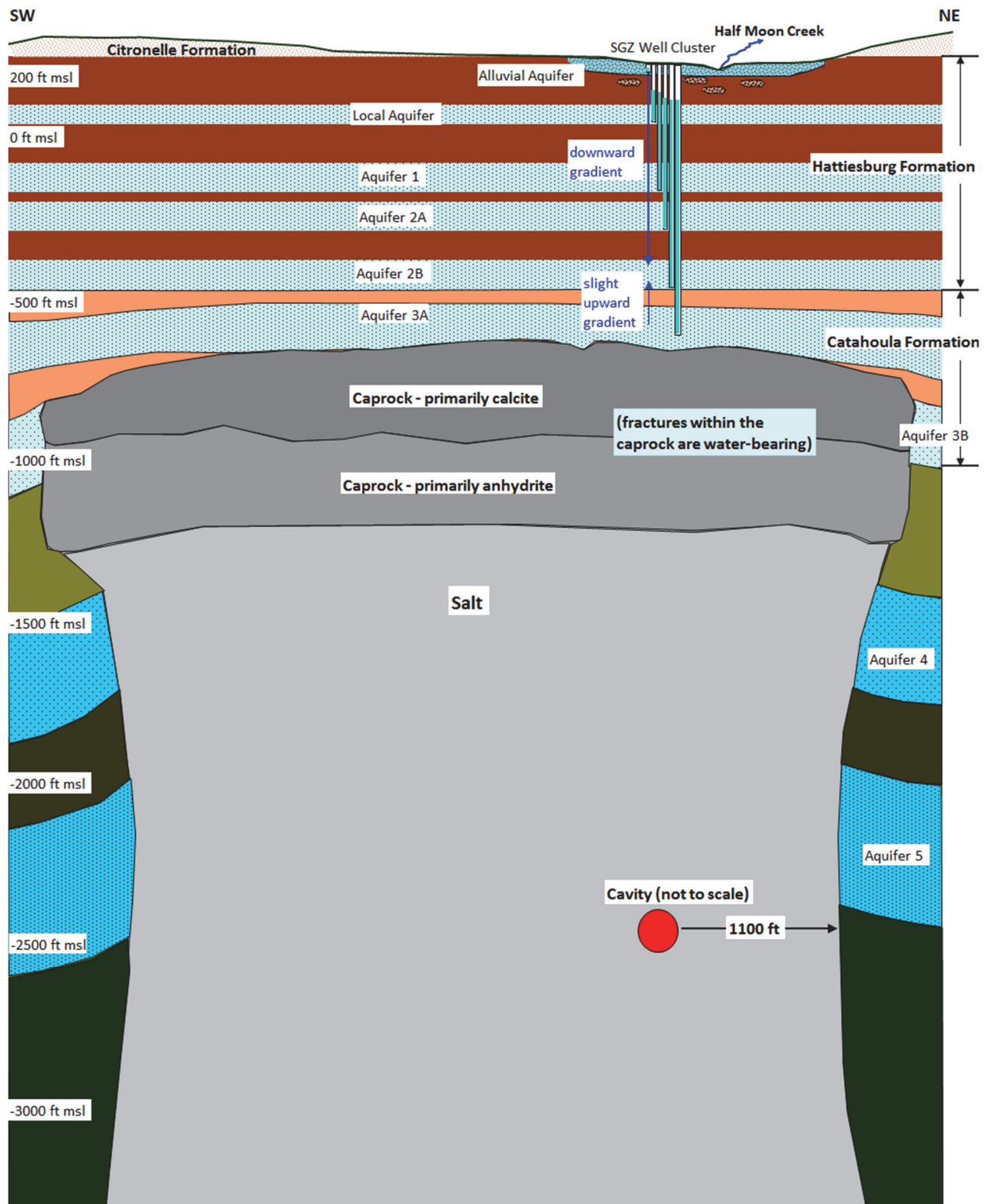
2.3 Geologic and Hydrologic Setting

2.3.1 Geologic Setting

Tatum Dome is a salt dome within the Mississippi Interior Salt Basin. The dome consists of a salt core overlain by caprock composed of limestone and anhydrite (Figure 4). The salt consists of roughly 90% halite (sodium chloride) and 10% anhydrite (calcium sulfate). The anhydrite caprock is 450 to 600 ft thick and extends upward to about 1000 ft bgs. The caprock is overlain by the Catahoula Sandstone of Oligocene age; the Catahoula is 100 to 200 ft thick and is overlain by the Pascagoula–Hattiesburg clays of Miocene age (Hattiesburg Formation), which crop out regionally in the lower stream valleys and also extend across the dome. The Hattiesburg Formation is 550 to 750 ft thick. The surficial material at the Salmon site consists of the Citronelle Formation, which is present in the highlands (Figure 4); sporadic terrace deposits on the slopes; and alluvium of Pliocene/Pleistocene/recent age in the lowlands. The terrace deposits and alluvium consist of interbedded gravels, sands, and silty clays about 150 ft thick. The Citronelle crops out on the slopes and tops of the hills in the site area. The Cook Mountain limestone and the overlying Vicksburg Group are stratigraphic units below the Catahoula Sandstone and are both pierced by the dome. The Tatum Dome appears to have no topographic expression.

2.3.2 Hydrologic Setting

Regionally, aquifers containing fresh water extend from near the surface to about 1400 ft below mean sea level (msl) in the Tatum Dome area; however, the salt dome has locally modified the water quality so that fresh water over the dome extends only to about 700 ft below msl (Figure 4). Thus, some aquifers that contain saline water over the dome contain fresh water away from the influence of the dome. There are multiple freshwater aquifers, including two surficial aquifers (the Alluvial Aquifer and surficial waters in the Citronelle Formation) and six deeper aquifers (Local, 1, 2A, 2B, 3A, and 3B Aquifers). These are underlain by one brackish aquifer (Aquifer 4) and at least one underlying saline aquifer (Aquifer 5) in the strata surrounding the Tatum Salt Dome (Figure 4). The oil industry has used Aquifer 5 for brine injection since 1950 at the Baxterville oil field located 6 miles southwest of the Salmon site.



Abbreviations:
 NE = northeast
 SW = southwest

Figure 4. Conceptual Model of the Relationship of the Dome, Shot Cavity, and SGZ Well Cluster at the Salmon Site

Fresh, brackish, and saline waters are defined as waters containing total dissolved solids concentrations of less than 1000 milligrams per liter (mg/L), 1000–5000 mg/L, and more than 5000 mg/L, respectively. The freshwater surficial aquifers and Local Aquifer are discontinuous. The deeper freshwater aquifers (1, 2A, 2B, 3A, and 3B) are horizontally extensive, although they may be locally offset or interrupted by faults near the dome (USGS 1971). Many water supply wells in Lamar County use groundwater from one or more of the deeper freshwater aquifers. Water is also present in fractures in the caprock and is referred to as the Caprock Aquifer.

Wells in the current monitoring network (Figure 2) monitor most of the freshwater aquifers as well as Aquifer 4 and the Caprock Aquifer. Thirteen monitoring wells are completed in the Alluvial Aquifer; 10 in the Local Aquifer; 1 in each of Aquifers 1, 2A, and 2B; 3 in Aquifer 3A; 2 in Aquifer 4; and 1 in the Caprock Aquifer. No monitoring wells are completed in Aquifer 5, Aquifer 3B, or the Citronelle Formation.

2.3.3 Site Conceptual Model and Monitoring Approach

Three primary contaminant source zones have been identified at the site based on the site history, results of previous site characterization, and monitoring results:

- The Alluvial and Local Aquifers near SGZ have areas of remnant contamination from surface operations and drill-back wastes temporarily stored in mud pits.
- The detonation cavity has contamination created by the nuclear tests and the injection of surface wastes.
- Aquifer 5, which was used for the disposal of liquid radioactive wastes.

The site monitoring program surveils for the potential migration of contaminants from these source zones. The primary long-term surveillance objective is to monitor water for fugitive radioactivity from the test cavity and Aquifer 5. The short-term monitoring objective is to track the natural attenuation of residual near-surface contamination.

Groundwater flows in response to water-level (head) gradients in site aquifers. There is a downward vertical gradient between aquifers near SGZ. The gradient decreases with depth to essentially no gradient, and then becomes a slight upward gradient from Aquifer 3 to Aquifer 2B. This is demonstrated by the water elevations in the group of SGZ wells that are screened in successively deeper aquifers (Figure 5 and Figure 6). The low permeability of the confining layers between aquifers at the site causes the head differences and effectively limits vertical migration.

Conduits, such as degrading cement around wellbores or unidentified sand lenses within the confining layers, increase the potential for vertical migration. The aquifer test conducted on HM-L (Local Aquifer well at SGZ) in 1979 pulled near-surface tritium contamination into the underlying Local Aquifer (DOE 1980). The travel path was assumed to be along the wellbore interfaces (casing/cement and cement/formation) of the multiple wells at SGZ that breach the confining layer that separates the Alluvial and Local Aquifers. The presence of previously unidentified sand lenses in the Local Aquifer confining unit was confirmed by well SA1-12-L (installed north of SGZ in 2014), which was screened in a sand lens above the Local Aquifer. The water elevations in SA1-12-L behave similarly to those screened in the Local Aquifer but are 15–20 ft higher than other Local Aquifer wells because of placement in the upper portion of

the Local Aquifer. The downward gradient from the shallow to the deeper aquifers would also impede upward migration from the cavity if water were to leak into the aquifers over the dome.

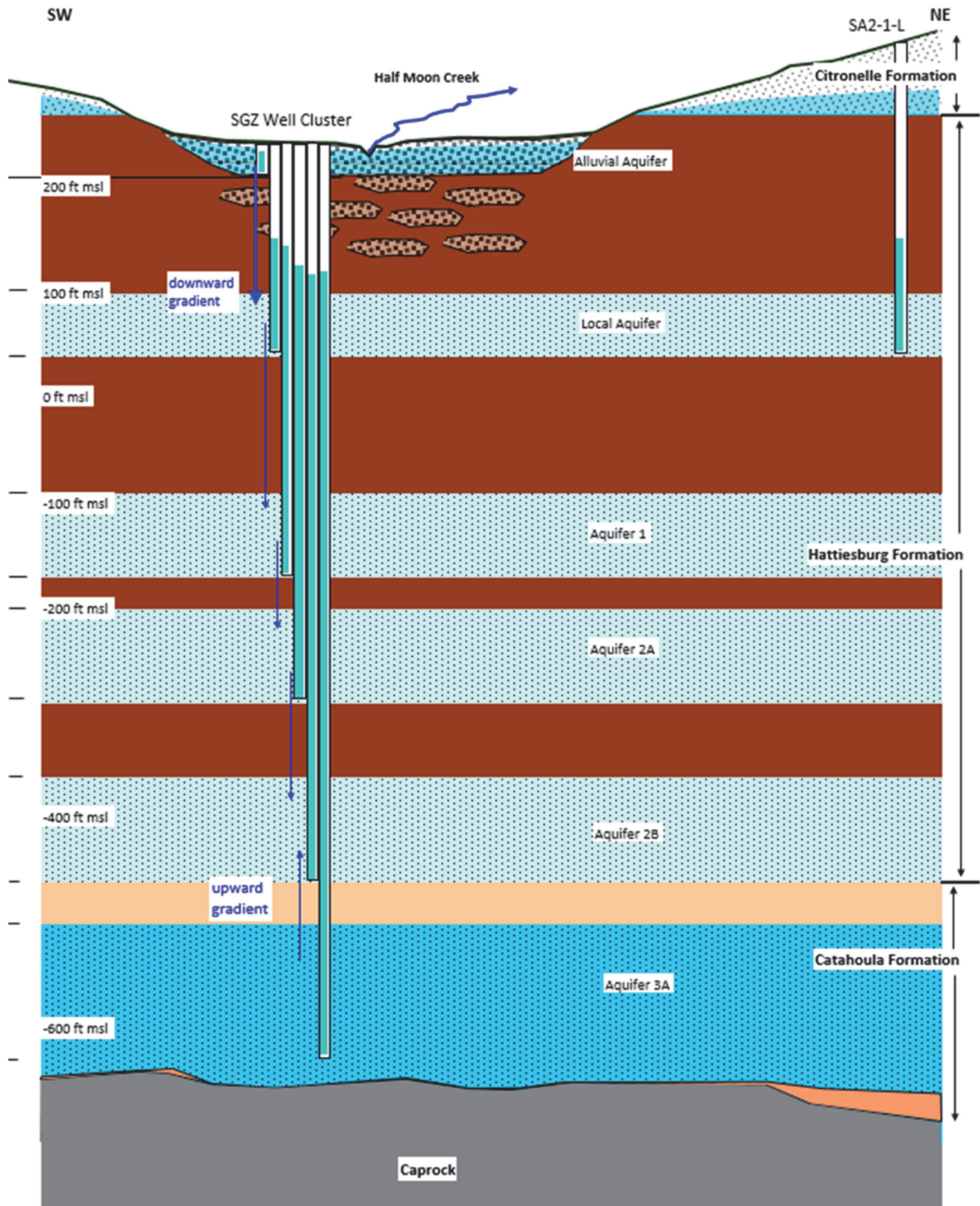
The largest head difference and strongest downward gradient is between the surficial Alluvial Aquifer and the underlying Local Aquifer, where there is an approximate 80 ft head difference across the intervening confining layer (average head of about 235 ft msl in the Alluvial Aquifer and about 155 ft msl in the underlying Local Aquifer). There is a 60 ft head difference between the Alluvial Aquifer and the sand lens above the Local Aquifer that SA1-12-L is screened across. The average head level in Aquifer 1 is about 148 ft; in Aquifer 2A it is 130 ft; and in Aquifer 2B and Aquifer 3 it is about 120 ft msl. The head level in Aquifer 4 (133 ft msl in the two wells 1.2 miles southwest of SGZ) is higher than the head level in Aquifer 3 by about 13 ft, implying that the upward vertical gradient at depth increases with depth. Aquifers below Aquifer 3 are not present over the dome (the Aquifer 4 wells are 1.2 miles southwest of SGZ), and there are no Aquifer 1, 2, or 3 wells off the dome.

The potential for lateral migration of contaminants is primarily dependent on horizontal gradients and permeability within an aquifer. The alluvial monitoring network consists of wells near and downgradient of SGZ and a surface water location downstream of where any plume would enter Half Moon Creek. The horizontal gradients in the Alluvial Aquifer range from 0.001 to 0.01, with the steepest gradients occurring near streams. The potentiometric map of the Alluvial Aquifer was constructed using October 2019 data and is shown in Figure 7. Water levels collected during the 2021 sampling event were from before and after a significant rainfall event, making them unusable for constructing a potentiometric surface due to rapid infiltration to the shallow Alluvial Aquifer. Groundwater flows from higher topographic areas toward the streams, past the SGZ source zone, and into Half Moon Creek. Surface water entering and exiting the site is also monitored for contamination (Figure 2). Water levels in Alluvial Aquifer wells typically vary up to 5 ft or more from lows in the fall to highs in the spring (Figure 8).

Horizontal gradients and flow directions in the Local Aquifer are difficult to determine with available data but appear to be low (<0.001) and toward SGZ (Figure 9). Three Local Aquifer wells and one Alluvial Aquifer well were installed in September 2014 to improve the water elevation dataset and to provide additional locations to monitor for any contamination in the Local Aquifer. As previously mentioned, SA1-12-L, classified as a Local Aquifer well, is actually screened in a sand lens just above the Local Aquifer, though water levels respond similarly to Local Aquifer wells.

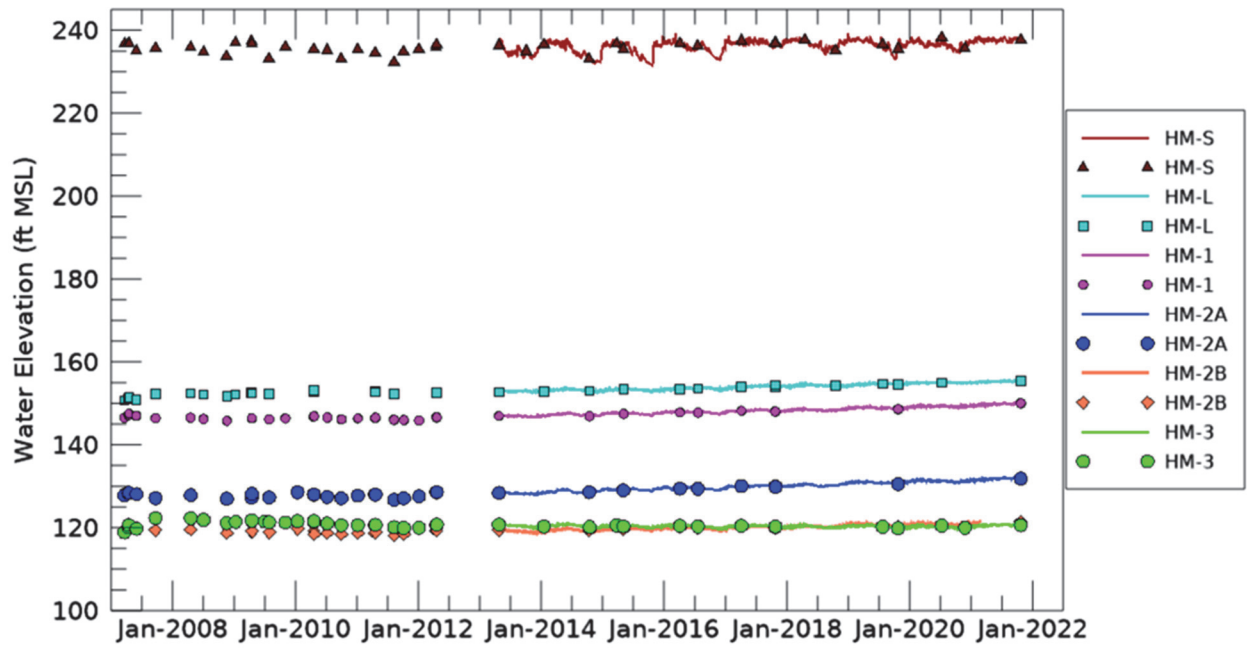
Four locations at the site now have both an Alluvial Aquifer and a Local Aquifer well, allowing aquifer interactions to be assessed. Water elevations in Local Aquifer wells respond quickly to changes in the Alluvial Aquifer. The 5 ft seasonal variability observed in the Alluvial Aquifer is transmitted to the Local Aquifer wells, though with a maximum magnitude of about 1 ft (Figure 8).

Water elevations in the three Aquifer 3 wells suggest there is a gentle 0.001 gradient from SGZ to the south. There are an insufficient number of wells in Aquifers 1, 2A, 2B, and 4 to calculate horizontal gradients in those aquifers.



Abbreviations:
 NE = northeast
 SW = southwest

Figure 5. Conceptual Model of the SGZ Well Cluster



Note: Discrete symbols are manual readings, and lines are from transducer data.

Figure 6. Water Elevations of Salmon Site SGZ Wells

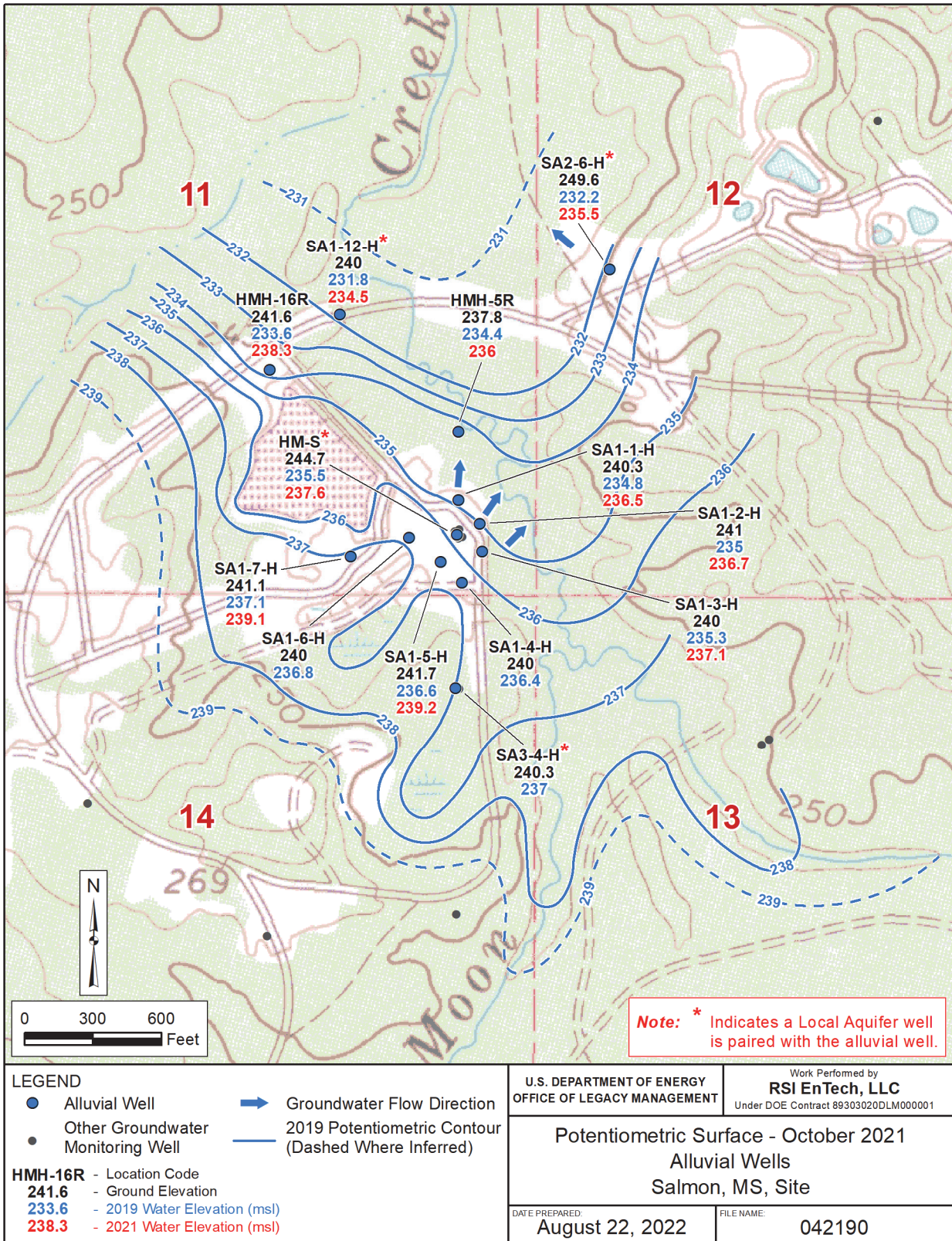


Figure 7. Alluvial Aquifer Potentiometric Surface, October 2019 (with 2021 Readings in Red for Comparison)

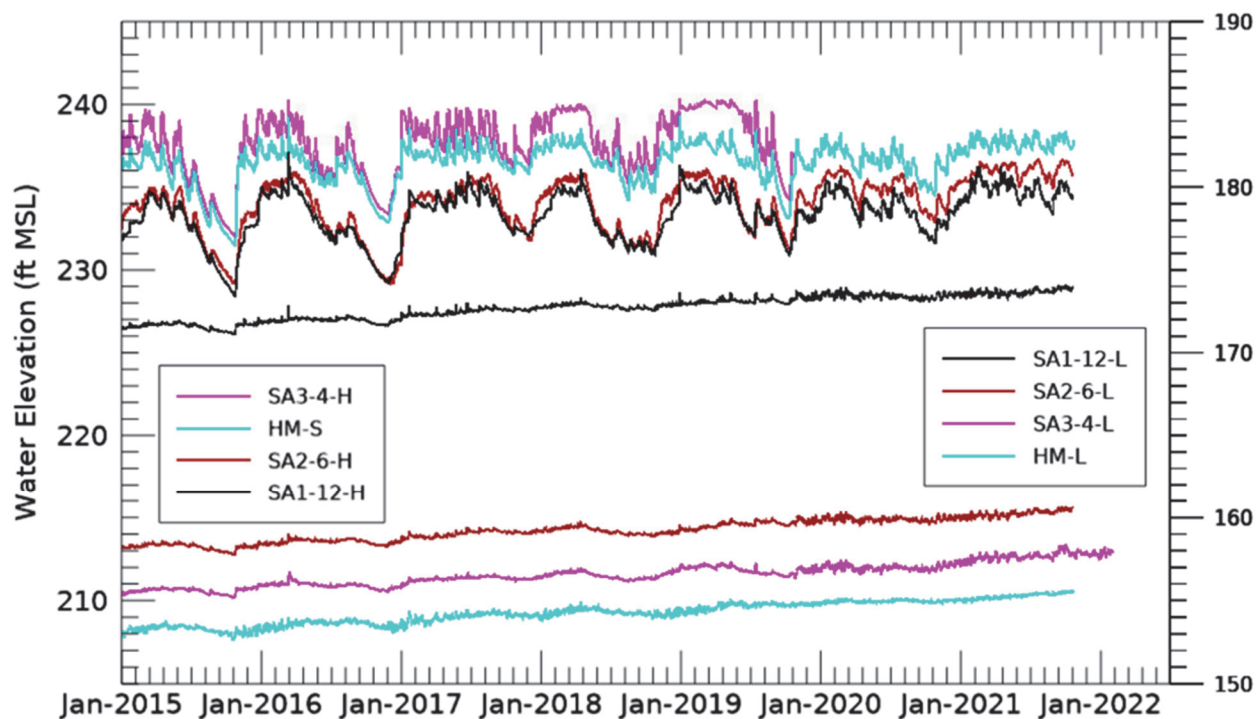


Figure 8. Water Elevations in Alluvial Aquifer (Indicated by Top Blue Bar and Primary Vertical Axis) and Local Aquifer Wells (Indicated by Lower Blue Bar and Secondary Vertical Axis) at the Same Location

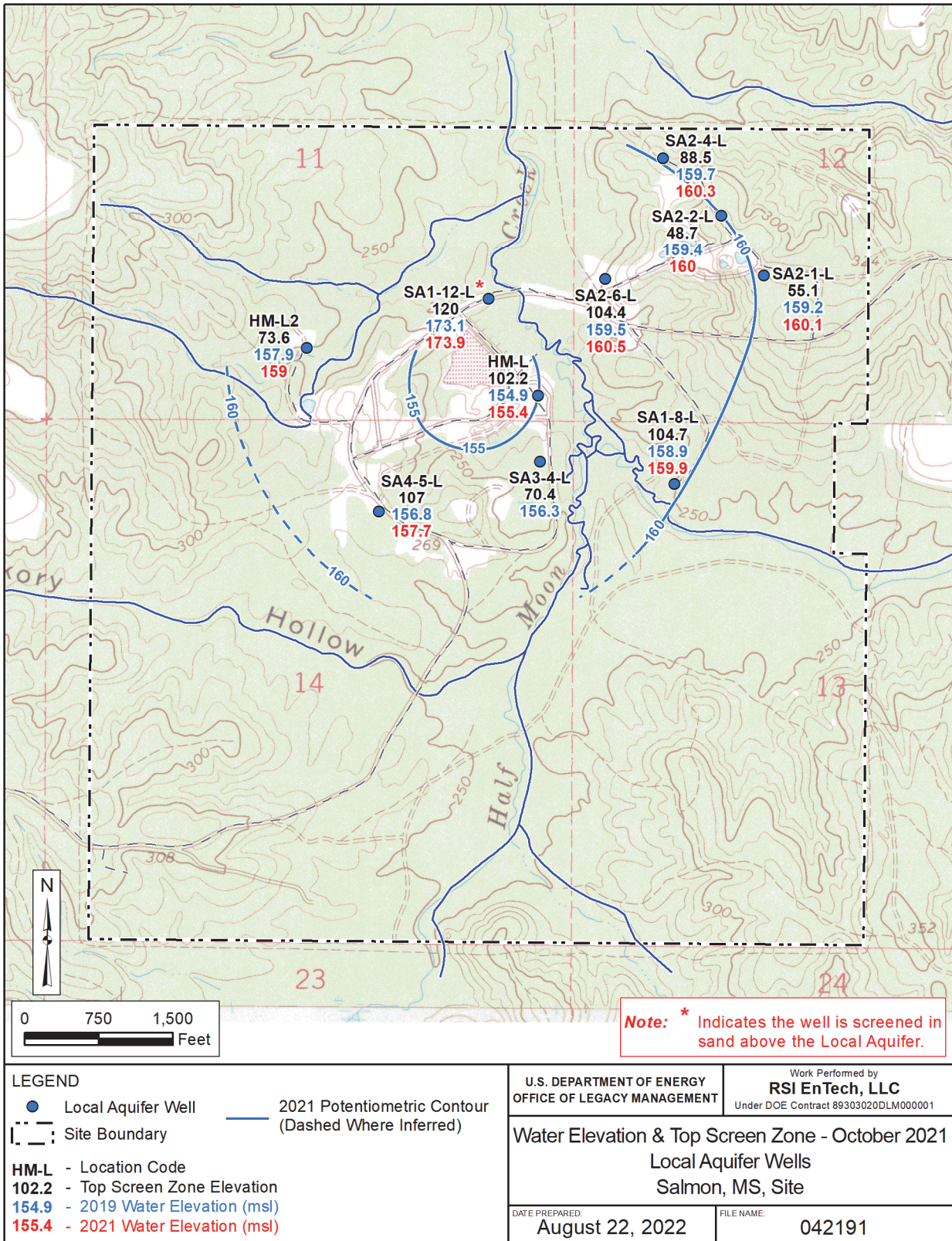


Figure 9. Local Aquifer Water Elevations, October 2021

The current monitoring well network effectively monitors the three source zones for potential contaminant migration. The contamination in the cavity is monitored by the six SGZ wells, which are screened successively in each aquifer above SGZ. The Aquifer 4 monitoring wells monitor for potential upward migration of radioactive wastes disposed of in Aquifer 5 southwest of the dome. The near-surface contamination that resulted from the reentry drilling at SGZ is monitored for lateral migration by Alluvial Aquifer wells and surface water locations surrounding the SGZ mud pits. The underlying Local Aquifer is monitored by wells surrounding the SGZ mud pits, in case near-surface contamination migrates downward.

2.4 Long-Term Monitoring Considerations

Long-term monitoring for movement of the radionuclides in the test cavity is expected to continue at the site indefinitely. However, the monitoring plan for the site may vary as there are changes in site conditions, technology, and policy. Aspects of the monitoring program that will need to be considered in the future are discussed below. Evaluation of these aspects will be conducted on an as-needed basis and may be addressed in future LTS&M Plan updates, monitoring reports, or other project documents as appropriate.

2.4.1 Well Maintenance

There are currently 32 active monitoring wells onsite. These wells have a finite lifespan and will need maintenance and replacement as they age. Well-field maintenance will be conducted to maintain the integrity of the wells in the monitoring network. The condition of the wells will be documented during scheduled sampling events and site visits. Well maintenance will be required for the bladder pumps and to paint or replace the wellhead protective casing and covers as they deteriorate. Replacement bladder pumps will be available during sampling events to replace any that are nonfunctional. In the moist environment at the site, the wellhead covers are prone to rust and should be either routinely painted or replaced with aluminum covers. The covers will be evaluated during every DOE sampling event and during State of Mississippi quarterly sampling events and site visits. Aluminum covers were used to protect the wells installed in 2014 and their degradation relative to the steel covers on other wells will be evaluated as to their efficacy as long-term replacements for the steel covers. As wells at the Salmon site fail and require replacement, they will be evaluated for need and whether there are more appropriate locations.

2.4.2 VOC Monitoring

Trichloroethene (TCE) and its degradation products *cis*-1,2-dichloroethene and vinyl chloride have been detected in wells HMH-5R and SA1-1-H. Concentrations of VOCs in the well monitoring network continue to trend downward, and only these two wells have VOC concentrations that exceed maximum contaminant levels (MCLs). VOC sampling will continue at selected locations until the TCE in well HMH-5R is below the MCL. TCE will likely remain above the MCL of 5 micrograms per liter ($\mu\text{g/L}$) until at least 2050. When these VOCs are below the MCL for two consecutive sampling events, VOC monitoring can be stopped.

2.4.3 Transducers

Transducers currently monitor water levels in 18 wells at the site. They collect water-level data every hour and are downloaded every 2 years, and the results are reported in the site monitoring report. They were installed to provide data on short-term and seasonal water-level fluctuations, interaction among aquifers, and the relative variability of each aquifer.

2.4.4 Chlorine-36 (³⁶Cl) Monitoring

Currently, tritium is being used as the main indicator constituent for monitoring potential radionuclide migration from the test cavity and Aquifer 5. However, because of the short half-life of tritium (12.3 years), it will only be a useful indicator for approximately the next 50–100 years as it continues to decay. A longer-lived radionuclide that is test related is needed for longer-term monitoring, and ³⁶Cl has been suggested as a promising candidate for this use (Phillips et al. 1990). The half-life of ³⁶Cl is 301,000 years. ³⁶Cl data are being collected during sampling events to determine if ³⁶Cl is a useful long-term indicator of radionuclide migration at the site. If it is determined that ³⁶Cl is not a useful indicator at the site, a substitute for long-term monitoring will need to be identified before tritium decays to low levels at the site. Cesium-137, strontium-90, or iodine-129 are currently used at other sites and may be evaluated for use at the Salmon site if needed.

2.5 Institutional Controls and Land Use

ICs are part of the final remedy for the Salmon site and are described in the following sections. ICs include legal instruments (such as land use restrictions), physical or engineering controls (such as fences, signs, and monument at SGZ), and methods for providing information to people about a site's cleanup history, including information on the remedy and current LTS&M activities.

2.5.1 Land Ownership and Restriction

The surface real estate with site access rights was conveyed to the State of Mississippi by the federal government in December 2010. The land transfer is subject to the condition that the state uses the conveyed property as a wildlife refuge and working demonstration forest and designates the land as the Jamie Whitten Forest Management Area. The action was authorized by Congress (PL 104-201). The federal government retained the subsurface real estate; ownership of monitoring wells, site monument, and bollards; the right of access by easement; and the right to install additional wells to the extent needed to monitor contaminant migration. The quitclaim transfer deed for the surface real estate is filed with the Lamar County chancery clerk (LCMCC 2010) and reproduced in Appendix A. Other current property agreements, including access agreements, can be found in Appendix A.

The deed restriction prohibits penetration into the surface, excavation onsite, and the removal of material from the site without prior approval from DOE. Angle drilling from outside the property boundaries is also precluded. MFC controls the surface at the Salmon site and is responsible for ensuring excavation or drilling does not occur at the site without DOE's permission (DOE 2005a). Should LM receive requests for excavation at the site, any excavation or removal of materials from areas where contamination is present will not be allowed (i.e., the REECo pits

and Postshot Mudpit 2 [see Figure 10]). Shallow excavations may be allowed in other areas of the site. Drilling for purposes other than monitoring should not be conducted anywhere on the site. The restriction also requires notice be given to LM before any change in zoning. The site is currently zoned “Agricultural/General Areas (Unzoned),” which indicates there are no zoning-related requirements at the site (SMPDD 2010). Mineral rights for the site are managed by BLM. Alpine Gas currently has an oil and gas lease at the site, but additional information regarding this lease is not available.

In 1999, DOE funded the expansion of the Lamar County public water system through a Memorandum of Understanding (MOU). As part of this agreement, Lamar County agreed not to drill or permit any domestic wells within an area designated in the agreement and to prevent inappropriate uses of groundwater in the area for up to 100 years (MOU 1999). The Salmon site is included within the area designated in the MOU. Lamar County is responsible for enforcing the terms of this agreement. LM does not track or verify county well permitting activities, and does not have any current actions or activities resulting from this agreement.

Maintenance of the land use designation of wildlife refuge and working demonstration forest, the deed restriction on penetration including angle drilling and excavation, and the prohibition on drilling for domestic water is expected to continue into the foreseeable future. If LM receives requests for changes to land use in the future, additional site characterization may be required.

2.5.2 Mineral, Water, and Subsurface Rights

The federal government owns all mineral rights beneath the 1470-acre site (Richland Title 2004). A summary of property rights is presented in Appendix A.

2.5.3 Easements and Access Rights

Site access via easement roads from the east and the west (shown in Figure 10) was conveyed with the transfer of the surface real estate. The federal government retained site access rights. Easements are in place for the primary and secondary access routes; both are in Appendix A.

3.0 Site Access, Maintenance, and Monitoring

3.1 Site Access

Driving directions from Purvis, Mississippi, to the site are provided in Table 2.

Table 2. Driving Directions to the Salmon Site

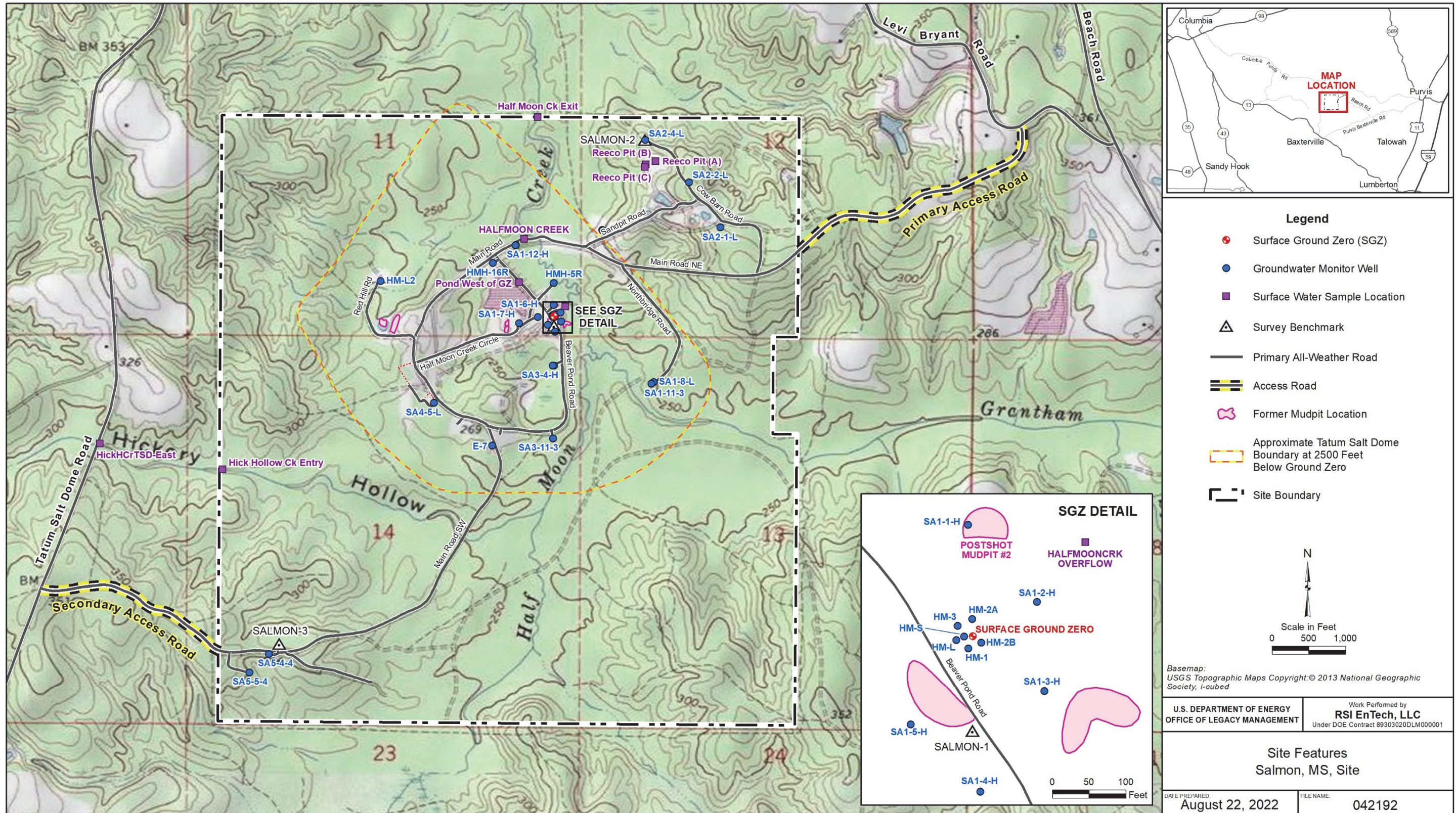
Mileage	Route
0.0	From Exit 51 on Interstate 59, take Mississippi Highway 589 west to U.S. Highway 11.
2.1	Turn south on U.S. Highway 11 to Shelby Speights Road and proceed through the town of Purvis.
2.4	Turn left on the Purvis Baxterville Road.
8.9	Turn right on Beach Road.
12.9	Turn left on Levi Bryant Road.
13.1	Turn left on improved gravel access road.
13.8	Site gate (primary access).
0.8	Proceed straight after passing through gate.
0.3	Turn left; there will be a pond on the right after turning. SGZ will be on the right after proceeding about 0.3 mile. SGZ is located at 31.142300 latitude, -89.570000 longitude NAD 27, State Plane.

MFC is responsible for maintaining roads, fences, and gates at the Salmon site. Approximately 1.7 miles of roads are used by LM to access the sample collection locations shown in Figure 10.

Site access is coordinated with MFC and Weyerhaeuser. LM typically arranges site visits with these contacts 2 to 3 weeks in advance. This includes verifying the site is accessible and obtaining combination for the locks or making other arrangements to open the gates at the primary and secondary site accesses. Additionally, MDOH is notified of site visits and may accompany LM while LM is onsite.

3.2 Roads and Drainage

Before transfer of the site to MFC, LM performed major maintenance and improvement projects, including grading and installing water bars at key locations to control erosion in 2007, replacing or repairing culverts in 2010, and repairing the bridge in 2010 (DOE 2008, DOE 2011). Culverts provide drainage from the pond to Half Moon Creek, preventing the pond from overflowing and flooding nearby wells. The 2010 culvert replacement was a result of beaver dam construction that had progressed until it limited flow through the culverts and restricted access due to flooding at wells SA1-7-H and HMM-16R (adjacent to the pond). Figure 11 shows the location of the pond as well as wetlands and floodplains at the site.



Abbreviations:
GZ = ground zero

Figure 10. Salmon Site Features

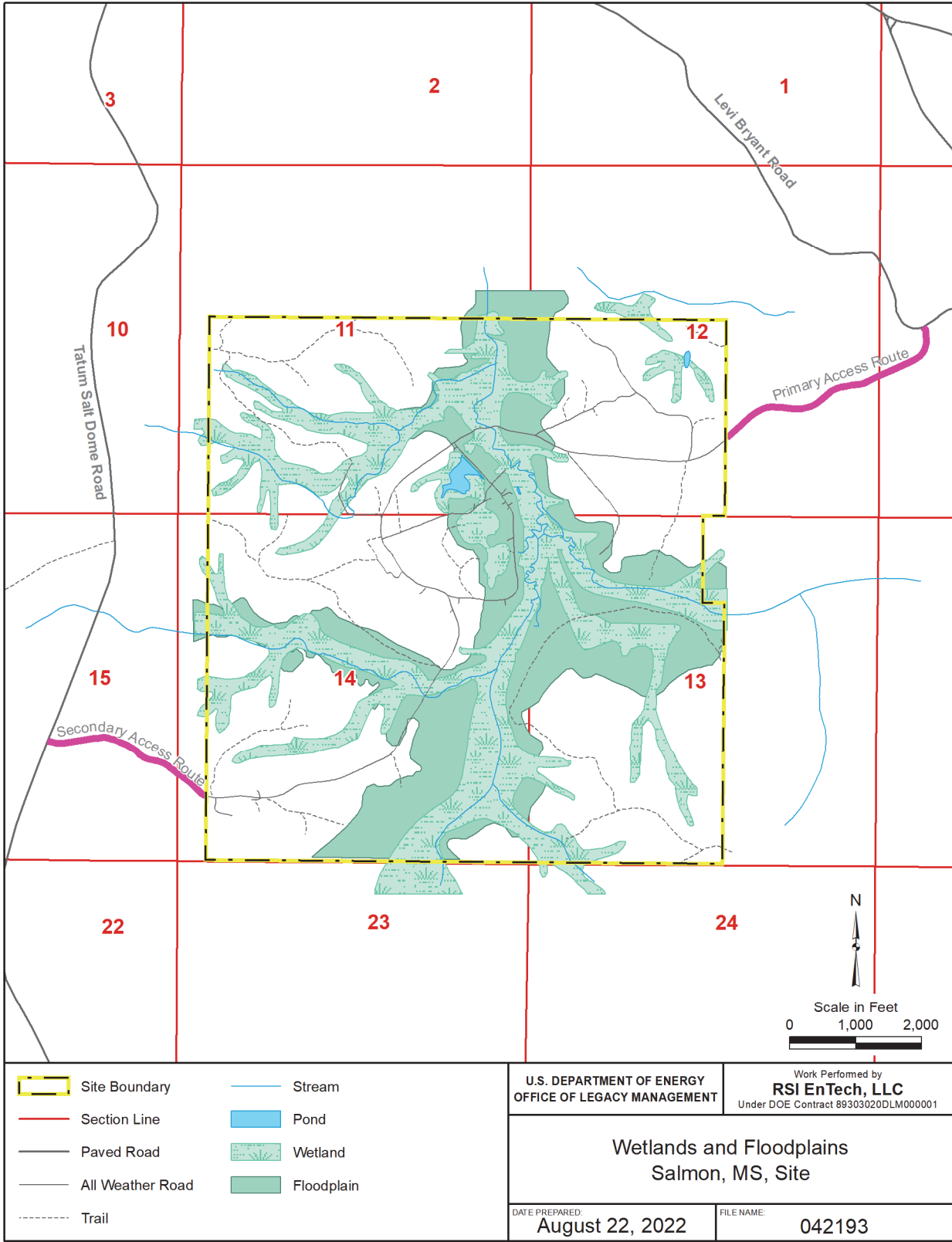


Figure 11. Salmon Site Wetlands and Floodplains

The 90-foot-long bridge spanning Half Moon Creek is constructed from two railroad flatcars laid side by side. The bridge was repaired in June 2010 and successfully passed inspection by a qualified bridge inspector (DOE 2011).³ The bridge is load rated HS-20, which is typical for an interstate highway bridge. MFC is responsible for maintenance of the road and drainage features.

Care should be taken when driving on the site to avoid gopher tortoises (*Gopherus polyphemus*), which are on the federal List of Threatened and Endangered Wildlife and have been documented at the Salmon site. An adult gopher tortoise can reach a length of 8–12 inches and height of 6–15 inches; a tortoise is shown next to a burrow in Figure 12.

3.3 Benchmarks and SGZ Monument

Three survey benchmarks onsite are labeled Salmon-1, -2, and -3 (see Figure 10). The SGZ monument (Figure A-1) sits atop the plugged Post Shot No. 1 well. The benchmarks may be used as control points for any surveys conducted in the future.

3.4 Monitoring Wells

There are 32 active monitoring wells onsite. Most wells are surrounded by a 25–50 ft buffer zone for visual location and safety. Well locations are shown in Figure 10. Each wellhead is surrounded by a locked, protective metal casing and identified with a metal tag. A concrete pad surrounds the protective casing at its base. Each corner of the concrete pad features a bollard, a 4-inch-diameter metal pipe filled with concrete and painted orange. Typically, there are four bollards per well.

Of the 32 wells, 30 have dedicated low-flow bladder pumps. In each well, the pump intake is within the well-screen zone. The two wells in Aquifer 4 monitor the potential for upward leakage from Aquifer 5. The Aquifer 4 wells have dedicated electric pumps with intakes about 20 ft above the well screen. Appendix B has additional information, including well locations.

Well pads are maintained by MFC; LM is charged a fee for this service. Brush clearing for access to hard-to-reach monitoring locations (e.g., Half Moon Ck Exit) can also be arranged through MFC.

³ A person who meets the minimum qualifications specified by the National Bridge Inspection Standards (Title 23 *Code of Federal Regulations* Section 650 Subpart C).



Figure 12. Gopher Tortoise and Burrow

3.5 Environmental Monitoring

The shallow aquifer is monitored for tritium and VOCs to observe (1) continued natural attenuation, (2) downgradient movement of contaminants, (3) any movement from the Alluvial Aquifer to the Local Aquifer, (4) any discharge from the Alluvial Aquifer to surface water, and (5) site periphery to make sure no unacceptable contamination is entering or leaving the site. The monitoring program for the Salmon site is summarized in Table 3. Changes can be made to the monitoring program at the discretion of LM with justification for the changes documented and submitted to the project file.

The monitoring approach for the deeper sources is designed to monitor for upward radionuclide migration. The wells at SGZ monitor near the emplacement well and drill-back well for upward migration from the cavity to the shallower aquifers. The deep wells 1.2 miles southwest of SGZ monitor Aquifer 4 for upward leakage of the radionuclide waste injected in underlying Aquifer 5.

Table 3. Monitoring Plan for Salmon Site

Source	Name	Aquifer	Total Depth (ft)	VOC	³⁶ Cl and Major Ions ^c	Tritium	Water Level ^a	
Shallow Sources	Wells							
	SA1-1-H	Alluvial	30	X	X	X	X	
	SA1-2-H	Alluvial	30	X		X	X	
	SA1-3-H	Alluvial	30	X		X	X	
	SA1-4-H	Alluvial	30	X		X	X	
	SA1-5-H	Alluvial	30	X		X	X	
	SA1-6-H	Alluvial	23	X		X	X	
	SA1-7-H	Alluvial	30	X		X	X	
	SA1-8-L	Local	195			X	XT	
	SA1-12-H	Alluvial	30	X		X	XT	
	SA1-12-L	Local	172	X		X	XT	
	SA2-1-L	Local	349			X	X	
	SA2-2-L	Local	340			X	XT	
	SA2-4-L	Local	250			X	XT	
	SA2-6-H	Alluvial	47	X		X	XT	
	SA2-6-L	Local	197	X		X	XT	
	SA3-4-H	Alluvial	30	X		X	XT	
	SA3-4-L	Local	197	X		X	XT	
	HMH-5R	Alluvial	30	X	X	X	X	
	HMH-16R	Alluvial	30	X		X	X	
	HM-S ^p	Alluvial	30	X	X	X	XT	
	HM-L ^b	Local	204	X	X	X	XT	
	HM-L2	Local	200			X	XT	
	SA4-5-L	Local	180			X	XT	
	Surface Water Locations							
		HALFMOON CREEK	NA	NA			X	NA
		HALFMOONCRKOVERFLOW	NA	NA			X	NA
		Pond West of GZ	NA	NA			X	NA
	Half Moon Cr Exit	NA	NA			X	NA	
	HMC-S	NA	NA			X	NA	
	HickHCrTSD-East	NA	NA			X	NA	
	GC-E (Grantham Cr East)	NA	NA			X	NA	
Test Cavity	HM-1	1	415		X	X	XT	
	HM-2A	2A	537		X	X	XT	
	HM-2B	2B	700		X	X	XT	
	HM-3	3A	875		X	X	XT	
	E-7	Caprock	934			X	X	

Table 3. Monitoring Plan for Salmon, Mississippi, Site (continued)

Source	Name	Aquifer	Total Depth (ft)	VOC	³⁶ Cl and Major Ions ^c	Tritium	Water Level ^a	
Aquifer 5	SA5-4-4	4	2099		X	X	XT	
	SA5-5-4	4	2081		X	X	X	
Other	Wells							
	SA1-11-3	3A	924			X	X	
	SA3-11-3	3A	861			X	X	
	Bx. City WLL #370007-04	NA	unknown		X			
	Well North Lumberton	NA	unknown		X			
	Purvis Cty Supply WL	NA	unknown		X			
	Surface Water Locations							
	REECO Pit (A)	NA	NA				X	
	REECO Pit (B)	NA	NA				X	
	REECO Pit (C)	NA	NA				X	

Notes:

^a "XT" in this column indicates this well has a transducer; data collection will be discontinued as transducer batteries are depleted.

^b Wells HM-S and HM-L are part of the SGZ well cluster, but current contamination is from a shallow surface source.

^c Sampling for major ions will be conducted as needed.

Abbreviation:

NA = not applicable

Federal drinking water standards listed in Table 4 are used in monitoring reports for comparison purposes only. The aquifers and surface water bodies at the site are not currently used as a source of drinking water. The standards are provided as conservative values for comparison to monitoring results for the site.

Table 4. Drinking Water Standards

Constituent	Concentrations	Drinking Water Standards
Trichloroethene	5.0 µg/L	MCL
<i>cis</i> -1,2-Dichloroethene	70.0 µg/L	MCL
<i>trans</i> -1,2-Dichloroethene	100 µg/L	MCL
Vinyl chloride	2.0 µg/L	MCL
Tritium	20,000 pCi/L	4 mrem/yr beta particle and photon activity MCL

Abbreviations:

mrem/yr = millirems per year

pCi/L = picocuries per liter

Sample results indicate that tritium and VOC levels at site locations that have exceeded the standards listed in Table 4 are decreasing or stable (DOE 2022). LM will notify MDOH and develop a response, which may include additional sampling if levels significantly increase for three consecutive sampling events. Increases in tritium concentrations in deeper aquifer monitoring wells at SGZ (HM-2A, HM-2B, or HM-3) could indicate leakage from the cavity. Additional sampling should be conducted if tritium levels are more than 3 times the detection limit (1000 picocuries per liter), even if the levels are below the drinking water standard. The

reports prepared following each sampling event will evaluate the need for collecting additional data. Trichloroethene and its degradation products found at the site continue to attenuate. A recommendation may be made to discontinue sampling when VOC levels have been detected below the MCL for two consecutive sampling events.

Water levels are measured in all 32 site monitoring wells during sampling events. These data are supplemented by measurements conducted by MDOH during quarterly sampling of selected wells. Pressure transducers that collect water levels every hour are installed in 18 site monitoring wells to assess short-term and seasonal variations, interaction between aquifers, and the relative variability of each aquifer. The transducers are installed in the six SGZ wells that are screened in each of the aquifers above the dome, nine Local Aquifer wells, the four Alluvial Aquifer wells paired at locations with Local Aquifer wells, and well SA5-4-4 screened in Aquifer 4. The water elevation data are used to confirm horizontal gradients and flow directions within the shallow aquifers and vertical gradients between all site aquifers.

3.6 Data Evaluation and Reporting

LM prepares monitoring reports following each sampling event that detail current and historical sampling results. At the time of writing, all radioactive contaminants of concern are currently below regulatory limits in monitoring wells at the site, and VOC levels in monitoring wells are declining. Monitoring reports also include an evaluation of water levels at the site.

The dialogue among state and federal regulators, stakeholder organizations, elected officials, and members of the public has been and is expected to continue to be beneficial for long-term management of LM sites. The monitoring reports, along with other reports developed for the site, will be maintained publicly at the following locations:

- The LM site-specific website, <https://www.energy.gov/lm/salmon-mississippi-site>, contains information about the Salmon site. Information on this webpage includes site records, the fact sheet, and a link to the Geospatial Environmental Mapping System (<https://gems.lm.doe.gov/#site=SAL>) for the site.
- Reports will also be maintained on the Office of Science and Technical Information webpage that is accessible to the public at <https://www.osti.gov/scitech/>.
- Information about the Salmon site is also available by sending an email request to public.affairs@lm.doe.gov or calling (970) 248-6327 or (970) 248-6000.

3.7 Records and Data Management

LM maintains records that support the long-term stewardship of the Salmon site at the LM Field Support Center at Grand Junction, Colorado, and the LM Business Center in Morgantown, West Virginia. All LM records will be stored in a records management system and managed in accordance with the following requirements:

- 44 USC 31, “Records Management by Federal Agencies,” available online at <http://uscode.house.gov/browse/prelim@title44/chapter31&edition=prelim>
- 44 USC 33, “Disposal of Records,” available online at <http://uscode.house.gov/browse/prelim@title44/chapter33&edition=prelim>

- Title 36 *Code of Federal Regulations* Part 1220–1239, Subchapter B, “Records Management,” available online at <http://www.ecfr.gov/cgi-bin/text-idx?SID=51b1edfb688256ad5eb309bb7604c08c&mc=true&tpl=/ecfrbrowse/Title36/36CXIIsubchapB.tpl>
- DOE Order 243.1, *Records Management Program*, U.S. Department of Energy, available online at <https://www.directives.doe.gov/directives-documents/200-series/0243.1-BOrder-c/@@images/file>
- LM-Policy-1-11-1.0, *Records and Information Management*

3.8 Requirements

The state considers the Salmon site an uncontrolled site because the site does not qualify under existing laws requiring state oversight.

VOCs and tritium levels present in surface and groundwater at the site are compared to drinking water standards; however, the aquifers and surface water bodies at the site may not have been formally classified for drinking water use. Section 3.5 discusses regulatory limits.

The site is not included in any state or federal cleanup programs. Because LM is ultimately responsible for residual contamination at the site, LM will continue to monitor radionuclides for the foreseeable future. Maintenance of the monitoring network in support of these sampling requirements is the responsibility of LM. Responsibility for site security, as well as maintenance of roads and surface features at the site, transferred to the State of Mississippi in 2010 (LCMCC 2010). Any repairs needed for components of the monitoring network would be identified during sampling events, so separate, formal inspections are not required. Table 5 provides a list of commitments and requirements specific to the Salmon site.

Table 5. LM Commitments and Requirements for the Salmon Site

Action	Frequency	Exit Plan	Source
Sample groundwater and surface water; report results	Biennial.	Monitoring for radionuclides will continue at the site for an indefinite period. VOC monitoring may be discontinued in the next 20–25 years as levels decrease.	LTS&M Plan
Maintain monument, wells, bollards, and survey markers	As needed.	None.	LCMCC 2010
Grant/deny permission for drilling, excavation, removal of material	As requested.	None.	DOE 2005a; LTS&M Plan
Maintain records and respond to inquiries	Maintain records per retention requirements. Respond to inquiries as requested.	Record disposition requirements.	Requirements detailed in Section 3.7
Provide funding to State of Mississippi for monitoring and other activities	Annual.	Reevaluate at each grant renewal.	Grant No. DE-FG01-06LM00079

4.0 References

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Appendix A

Property History and Institutional Controls

This appendix provides an overview of land ownership, property transfers, and ICs at the Salmon site.

Documents related to agreements that are currently active are provided as attachments. A brief summary of each document is provided below. Additional documents related to historical property issues are summarized in Table A-1, and the documents can be found in the project file.

A monument was erected at SGZ and is shown in Figure A-1.

Table A-1. Salmon Site Property Timeline

Date	Description of Activity	Reference
January 1, 1961– February 1963	Site leased from the Tatum family.	Burke 2012
February 15, 1963	The U.S. attorney general reviewed all documents related to mineral rights and determined that the United States owns all surface and subsurface rights.	OAG 1963
1972	Site returned to private landowner (Tatum family) through an MOU. DOE retained access rights and some subsurface drilling rights.	DOE 1979
1972	Surface monument installed.	AEC 1972
1972–1992	Site leased from the Tatum family through two 10-year leases; some limited logging activity may have occurred on the site during this time.	DOE 2005c
December 2, 1994	DOE acquired Tract 100 of the Salmon site from Tatum Lumber Company.	Mississippi 1994
September 23, 1996	PL 104-201 required State to use property as a wildlife refuge and demonstration forest (if transferred).	PL 104-201
April 19, 2004	Title opinion confirms federal government owns all surface and subsurface rights for the Salmon site.	Richland Title 2004
August 25, 2005	Deed restriction for the Salmon site is filed. This restricts excavation, drilling, and the removal of materials from the site, as well as other provisions. This document is the main IC for the Salmon Site.	LCMCC 2010
December 20, 2006	Easement and right-of-way obtained for primary access route on the northeast side of the site.	Mississippi 2006
March 1, 2009	Oil and gas lease for the Salmon site assigned to Alpine Gas.	BLM 2009
December 20, 2010	Surface transferred to State of Mississippi; the federal government retained the subsurface real estate and site access rights. DOE also retained ownership of the monitoring wells and site monuments.	LCMCC 2010
February 23, 2017	Easement obtained for access to the secondary access route on the southwest side of the site. This agreement also provides an easement to Weyerhaeuser to access roads within the site.	Mississippi 2017



Figure A-1. Monument Erected at SGZ, Salmon Site

The following appear as attachments:

Attachment A-1: U.S. Attorney General Letter Regarding Surface and Subsurface Rights, February 15, 1963

There are several documents related to the acquisition of the surface and mineral rights at the Salmon site, including a judgement dated December 19, 1962, that assigned mineral rights to the United States. Although this judgement is often cited, the copy on file at the Lamar County Recorder's Office is illegible and a legible copy of the document has not been located. This letter from the Office of the Attorney General provides a determination based on their review of the prior surface and mineral rights documents. The surface rights were later transferred through various agreements, but the mineral rights have belonged to the United States since February 1963.

Attachment A-2: Quitclaim Transfer Deed, December 20, 2010

This quitclaim transfer deed transfers the surface rights to the State of Mississippi and designates the area the Jaime Whitten Forest Management Area. The federal government retains subsurface property rights, right of access, ownership of existing monitoring wells and monuments, and the right to install monitoring wells if needed.

PL 104-201, effective September 23, 1996, authorizing the land conveyance to the State of Mississippi, and the August 25, 2005, deed restriction are included as exhibits. The deed restriction prevents excavation, drilling, and removal of material. It also requires that DOE be notified if there is any change in zoning.

Attachment A-3: Easement and Right-of-Way, Primary Access Route, December 20, 2006

This easement and right-of-way agreement is for the primary access route on the northeast side of the site.

Attachment A-4: Reciprocal Easement Agreement, Secondary Access Route, February 23, 2017

This easement agreement is for access to the secondary access route on the southwest side of the site. This agreement also provides an easement to Weyerhaeuser to access roads within the site.

Attachment A-1

**Office of the Attorney General Letter Regarding
Surface and Subsurface Rights, February 15, 1963**

Office of the Attorney General Letter Regarding
Surface and Subsurface Rights



Office of the Attorney General
Washington, D. C.

February 15, 1963

Honorable Glenn T. Seaborg
Chairman
Atomic Energy Commission
Washington 25, D. C.

My dear Mr. Chairman:

I have examined the complaint in condemnation, declaration of taking, and other related papers pertaining to the condemnation proceeding entitled United States of America v. 1,430 acres of land in Lamar County, Mississippi, Civil No. 1765 in the United States District Court for the Southern District of Mississippi, for the project Dribble of the Vela Uniform Underground Detection program.

The sum of \$32,235.00 was deposited into the registry of the court on December 19, 1962, as the estimated just compensation for the subject land.

I am of the opinion that the condemnation proceeding has been regularly conducted to date and pursuant to the provisions of an Act of Congress approved February 26, 1931 (46 Stat. 1421), the United States is vested with the title to all outstanding rights, title and interest in and to salt and all minerals, including but not limited to coal, oil, gas and other hydrocarbons, in and under the land as more particularly set forth in the declaration of taking.

Enclosed are certified copies of the complaint, order for delivery of possession, and clerk's receipt evidencing the deposit of the sum of \$32,235.00 into the registry of the court.

Sincerely yours,

Robert F. Kennedy
Attorney General

g. J. ...
JAL
1410.05

Attachment A-2

**Quitclaim Transfer Deed
December 20, 2010**

Quitclaim Transfer Deed (Cover Letter)



Department of Energy Office of Legacy Management

FEB 23 2011

Mr. Bruce Dawson
Field Manager
Jackson Field Office
Bureau of Land Management
U.S. Department of Interior
411 Briarwood Drive, Suite 404
Jackson, MS 39206

Subject: Quitclaim Deed Transfer for Salmon, Mississippi Site

Dear Mr. Dawson:

The U.S. Department of Energy, Office of Legacy Management (DOE-LM), transferred the Salmon Mississippi site surface real estate to the State of Mississippi on December 15, 2010. The quitclaim deed on the enclosed electronic file is intended for the Bureau of Land Management's land records database.

The Salmon site is located in Lamar County, Mississippi, and is known locally as the Tatum Salt Dome Test Site. The federal government retains ownership of the subsurface real estate, including the minerals therein and the residual radioactivity from two nuclear detonations conducted in the salt dome by the Atomic Energy Commission in the 1960s. DOE-LM is the subsurface steward.

The new surface steward is:

State Forester
Mississippi Forestry Commission
660 North Street, Suite 300
Jackson, MS 39202

The quitclaim deed with exhibits (A through D), was recorded by the Lamar County, Mississippi, Chancery Clerk, December 20, 2010. Exhibit D is a true copy of the current deed restriction. Prior approval by DOE-LM is required before there is any subsurface penetration and removal of material.

2597 B 3/4 Road, Grand Junction, CO 81503

1000 Independence Ave., S.W., Washington, DC 20585

10995 Hamilton-Cleves Highway, Harrison, OH 45030

232 Energy Way, N. Las Vegas, NV 89030

REPLY TO: Grand Junction Office

99 Research Park Road, Morgantown, WV 26505

11025 Dover St., Suite 1000, Westminster, CO 80021

955 Mound Road, Miamisburg, OH 45342

Kleinrath/Salmon/2-11-11 Salmon, MS Quitclaim Deed Transfer Dawson Ltr.doc

Quitclaim Transfer Deed (Cover Letter)

FEB 23 2011

Mr. Bruce Dawson

-2-

Please contact me at (937) 247-2237 or via e-mail at Art.Kleinrath@lm.doe.gov. You may also contact me by mail at:

Mr. Art Kleinrath
U.S. Department of Energy/LM-20
2597 B ¾ Road
Grand Junction, CO 81503

Sincerely,



Arthur W. Kleinrath
2011.02.14 17:19:04 -05'00'

Art Kleinrath
Site Manager

Enclosure

cc w/enclosure:

J. Dykes, BLM (e)
T. Pauling, DOE-LM (e)
S. Scheisswhol, DOE-LM (e)
M. Butherus, Stoller (e)
J. Duray, Stoller (e)
R. Hutton, Stoller (e)
File: SAL 1430.10 (B) (rc grand junction) (e)

Quitclaim Transfer Deed (Page 1 of 21)

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FILED
2010 DEC 20 PM 1 13
WAYNE SMITH
CHANCERY CLERK

DO NOT WRITE IN THE ABOVE SPACE	
<p>Document Prepared by</p> <p>Steven R. Schiesswohl U. S DOE, Office of Legacy Management 11025 Dover Street, Suite 100 Westminster, CO 80021 (720) 377-9683</p> <p><input checked="" type="checkbox"/> Not a Mississippi Attorney <input type="checkbox"/> Mississippi Attorney Bar No. _____</p>	<p>Return Original Document to</p> <p>Gerald McWhorter Assistant Secretary of State for Public Lands P. O. Box 136 Jackson, MS 39205-0136 (601) 359-6374</p> <p><i>If left blank, original document will be returned to document preparer.</i></p>
QUITCLAIM DEED	
<i>Use bold or underlined type for party names. The names of all parties must be listed in exactly the same form as they appear in the document.</i>	
<p>Grantor(s)</p> <p>United States of America, Department of Energy, Office of Legacy Management 2597 B 3/4 Road Grand Junction, Colorado 81503 (970) 248-6000</p>	<p>Grantee(s)</p> <p>State of Mississippi for the Mississippi Forestry Commission 660 North Street, Suite 300 Jackson, Mississippi 39202 (601) 359-1386</p>
<p>Indexing Instructions</p> <p><u>Township 2 North, Range 15 West</u> Section 7: NW ¼ SW ¼ and SW ¼ NW ¼</p> <p><u>Township 2 North, Range 16 West</u> Section 11: S ½ NE ¼, S ½ NW ¼, SW ¼ and SE 1/4 Section 12: SW ¼ NE ¼, S ½ NW ¼, SW ¼ and SE 1/4 Section 13: SW ¼ NE ¼, NW ¼, SW ¼, and W ½ SE ¼ Section 14: All Section 15: SE ¼</p>	
<p>This document contains <u>21</u> pages with the cover page(s) included as an integral part of the document. If there is not enough space for all required information on this page, continue to the next page.</p>	

Quitclaim Transfer Deed (Page 2 of 21)

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QUITCLAIM DEED

The United States of America, acting by and through the U.S. Department of Energy, Office of Legacy Management, 2597 B ¼ Road, Grand Junction, Colorado, 81503 (Grantor), for good and valuable consideration by these presents does hereby grant, give, remise, release, and quitclaim, unto the State of Mississippi, acting by and through the Secretary of State of the State of Mississippi (Grantee), 700 North Street, Jackson, Mississippi, 39202, its successors and assigns, all surface rights, title, and interests, including all timber rights, the Grantor has or may have in or to certain real property, commonly known as either the Tatum Salt Dome Test Site or the Salmon Site, (Property) described as follows:

Property Description

The Property is comprised of a 1,470 acre parcel, more or less, of fee land and an additional 8.77 acres, more or less of easements and rights-of-entry in Lamar County, Mississippi, and being more fully described on attached **Exhibit A** consisting of 4 pages.

Notwithstanding any term, limitation, condition, reservation or exception contained in this deed, it is agreed and understood by and between Grantor and Grantee that Grantee shall be vested with full ownership and title to all timber on said Property with all rights to manage, harvest, sell, plant, replant and regenerate timber and other forest products on said Property.

Grantee will receive all improvements on the property with the exception of the hereinafter reserved monitoring wells, site monument and bollards.

For the same consideration, the Grantor does hereby remise, release and quitclaim unto the Grantee and its assigns, all right, title and interest which the Grantor may have in the banks, beds and waters of any stream bordering the said land herein conveyed, and also all interest in alleys, roads, streets, ways, strips, gores or railroad rights-of-way abutting or adjoining said land.

The State of Mississippi, herein acting by and through the Secretary of State as Land Commissioner for the State of Mississippi, shall exercise all rights of use, possession and ownership herein granted in the Property, and shall operate the property in conjunction with the Mississippi Forestry Commission, an agency of the State of Mississippi. It is understood and agreed by and between Grantor and Grantee that such use and possession shall not be a limitation on the grant here and that there shall be no limitation on the right of the Grantee to assign or reassign use and possession of the Property to another agency of the State, or to otherwise dispose of the Property, provided that any such disposal, assignment or reassignment shall be expressly made subject to the terms, limitations, conditions and reservations set forth in this deed.

Statutory Authority

Grantor is acting pursuant to the powers and authority contained in Section 161g of the Atomic Energy Act of 1954, as amended (42 U.S.C. § 2201 (g)) and the National Defense Authorization Act of Fiscal Year 1997 (P.L. 104-201), Section 2851, Land Conveyance, Tatum

Quitclaim Transfer Deed (Page 3 of 21)

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Salt Dome Test Site, Mississippi. A true copy of Section 2851 is attached hereto as **Exhibit B** consisting of 2 pages.

Grantee is acting pursuant to the powers and authority contained in Section 29-1-1 Miss. Code Ann. (1972, as amended). A true copy of Section 29-1-1 Miss. Code Ann. is attached hereto as **Exhibit C** consisting of 2 pages.

Reservations and Exceptions

This conveyance is hereby expressly made by Grantor and accepted by Grantee subject to the following terms, conditions, limitations, reservations and exceptions:

Pursuant to said Section 2851(b) of the National Defense Authorization Act of Fiscal Year 1997 (P.L. 104-201), “[t]he conveyance . . . shall be subject to the condition that the State use the conveyed property as a wildlife refuge and working demonstration forest” and (c) “[t]he property to be conveyed is hereby designated as the ‘Jamie Whitten Forest Management Area’.” Pursuant to section (d), this conveyance is also subject to each of the following rights expressly reserved and retained by the United States:

- (1) Retention by the United States of subsurface estates below the property conveyed.
- (2) Retention by the United States of rights of access by easement or otherwise, for such purposes as the Secretary [of Energy] considers appropriate, including access to monitoring wells for sampling.
- (3) Retention by the United States of the right to install wells additional to those identified in the remediation plan for the property to the extent such additional wells are considered necessary by the Secretary [of Energy] to monitor potential pathways of contaminant migration. Such wells shall be in such locations as specified by the Secretary [of Energy].

The Property is conveyed subject to any and all existing reservations, easements, restrictions, covenants, and rights, recorded or unrecorded, including those for roads, highways, streets, railroads, power lines, telephone lines and equipment, pipelines, drainage, sewer and water mains and lines, public utilities, and rights-of-way, and including but not limited to, any specific easements, reservations, rights, and covenants described herein; any factual information that would be disclosed by a physical examination of the Property; any factual information that an accurate and adequate survey of the Property would disclose; and to any and all properly indexed matters of record.

The Property is conveyed subject to the terms and conditions of the Deed Restriction dated August 25, 2005, and recorded in Book 18-A at Page 212 of the Land Deed Records of the Chancery Clerk of Lamar County, Mississippi. A true copy of the Deed Restriction is attached hereto as **Exhibit D** consisting of 4 pages. This Deed Restriction imposes restrictions on excavation, drilling and/or removal of excavated material without prior approval from the Grantor on the Property. This Deed Restriction also includes angle or directional drilling from outside the Property to within the Property boundaries and requires notice to the Grantor of any zoning changes for the area containing the Property.

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The Property is taken subject to a right-of-way to Ray Massengale dated August 20, 1991 and recorded in Book 9-U at page 41 of the Land Deed Records of the Chancery Clerk of Lamar County, Mississippi, which affects the easement in Section 15, Township 2 North, Range 16 West.

Grantor retains ownership and responsibility for all substances, materials and by-products, whether hazardous or non-hazardous, produced, resulting from, or in any way connected with any and all nuclear and non-nuclear tests conducted in, on or under said Property by the United States Government (Site Substances).

Pursuant to the National Defense Authorization Act of Fiscal Year 1997 (P.L. 104-201, Section 2851), Grantor reserves ownership of all monitoring wells and the monument commemorating the nuclear test activities conducted on the Property as well as all bollards situated around said wells and monument. Grantor will be responsible for operation and maintenance of said existing test wells and any test wells installed by Grantor in the future. Grantor will be responsible for care and maintenance of said monument and all said bollards. Grantor reserves a limited right of use of the surface of said Property on which said wells, monument and bollards are situated for the continued existence of same. In the event that Grantor abandons any such well, bollard or monument the limited right of surface use shall terminate as to the abandoned well, bollard or monument.

Condition of Property

The Grantee, in accepting this Deed, acknowledges and attests that it has inspected, is aware of, and accepts the condition and state of repair of the Property. The Grantee, in accepting this Deed, acknowledges that the Grantor has not made any representation or warranty concerning the condition or state of repair of the Property that has not been fully set forth in this Deed.

Grantee will maintain the steel railroad flatcar bridge located on the major east west road crossing Half Moon Creek and all major site roads in serviceable condition to facilitate the Grantors future monitoring activities. However, nothing herein shall prevent Grantee from closing existing roads and opening other roads provided that Grantor is provided adequate access to and over the Property for future monitoring activities.

Long Term Surveillance and Monitoring Plan (LTSMP). The Grantee, in accepting this Deed, acknowledges and attests that the Property is subject to a LTSMP. A copy of said LTSMP is available from the U. S. Department of Energy, Office of Legacy Management.

CERCLA 120(h) Covenant. Grantor warrants that any remedial action necessary to protect human health and the environment has been taken before the date of this conveyance. Grantor covenants that any additional remedial action found to be necessary after the date of the transfer of the Property shall be conducted by the Grantor. Additional information about site activities and conditions can be obtained by contacting the Grantor at U.S. Department of Energy, Office of Legacy Management.

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This covenant shall not apply to the extent that any additional response action found to be necessary is the result of an act or failure to act of the Grantee, its successors and assigns, or any party in possession after the date of the conveyance that either: (i) results in a release or threatened release of a hazardous substance that was not located on the Property on the date of this conveyance; or, (ii) causes or exacerbates the release of a hazardous substance the existence and location of which was known and identified to the applicable regulatory authority as of the date of this conveyance. It is understood and agreed by and between the Grantor and Grantee that item (ii) immediately above shall not be interpreted or applied to limit Grantor's obligations under this covenant or to impose on the Grantee a duty to act to mitigate any condition resulting from the release of a hazardous substance except to the extent, and only to the extent, that the Grantee, its successors, assigns, or any party in possession under authority obtained from Grantee contributed to any such release.

In the event the Grantee, its successors or assigns, seeks to have Grantor conduct any additional response action, and, as a condition precedent to the Grantor incurring any additional cleanup obligation or related expenses, the Grantee, its successors or assigns, shall provide the Grantor at least 45 days written notice of such a claim. Notice should be sent to U.S. Department of Energy, Office of Legacy Management. In order for the 45 day period to commence, such notice must include credible evidence that: (a) the associated contamination existed prior to the date of the conveyance; and (b) the need to conduct any additional response action or part thereof was not the result of any act or failure of the Grantee, its successors or assigns, or any party in possession. For purposes of initiating such notice, a signed statement stating that "on information and belief, the associated contamination existed prior to the date of the conveyance and that the need for additional response action was not the result of the act or failure to act of the Grantee, its successors or assigns or any party in possession," shall be deemed credible evidence.

Reservation of Right of Access. Grantor hereby reserves and Grantee accepts on behalf of itself and its successors and assigns, the right of access to all portions of the Property for environmental investigation, remediation or other corrective action found to be necessary regarding Site Substances located on the Property as of the date of transfer. This reservation includes the right of access to and use of available utilities at reasonable cost to the Grantor. These rights shall be exercisable in any case in which access is necessary to carry out a remedial action, response action, or corrective actions on adjoining property. Pursuant to this reservation, the Grantor, and its respective officers, agents, employees, contractors and subcontractors shall have the right to enter upon the Property and conduct investigations and surveys, to include drilling, borings, data compilation, and other activities related to environmental investigation, and to carry out remedial or removal actions as required or necessary, including but not limited to the installation and operation of monitoring wells, pumping wells, and treatment facilities, and use of other actions deemed necessary by the Grantor to comply with all Federal and State statutes, regulations or any court order. Grantee acknowledges that the removal of contamination may necessitate destruction of improvements on the Property and agrees to enter into negotiations with the Grantor to determine appropriate and reasonable reparations.

In the event the Grantee, its successors or assigns, seeks to excavate, drill and/or remove any excavated material from the Property or change the zoning of the Property the Grantee, its

Quitclaim Transfer Deed (Page 6 of 21)

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successors or assigns, shall provide the Grantor at least 45 days written notice of such proposed action.

Grantee acknowledges that the removal of contamination may necessitate destruction of timber on the Property and agrees to enter into negotiations with the Grantor to determine appropriate and reasonable reparations. Nevertheless, it is understood and agreed by and between Grantor and Grantee that Grantor shall have no responsibility to pay for any timber that was standing and growing on the Property as of the date of this deed.

Miscellaneous Provisions

Notices. All notices specified by this instrument shall be in writing and sent by registered or certified mail, postage prepaid to the following addresses or hand-delivered in person, delivered by facsimile or otherwise to the following persons. By written notice, either party may change the persons or addresses to whom notice shall be sent.

To Grantor:

U.S. Department of Energy, Realty Officer
Office of Legacy Management
2597 B ¼ Road
Grand Junction, Colorado
(970) 248-6070
Fax # (970) 248-6040

To Grantee:

State Forester
Mississippi Forestry Commission
660 North St., Suite 300
Jackson, Mississippi 39202
(601) 359-1386
Fax # (601) 359-1349

With Copy to:

Assistant Secretary of State for Public Lands
Post Office Box 136
Jackson, Mississippi 39205-0136
(601) 359-1350
Fax # (601) 359-1461

Hold Harmless. To the extent permitted by law, Grantee covenants to hold harmless the Grantor for any liability associated with disruption of any public purpose venture on the Property conveyed by this Deed, the disruption of any improvement on said Property made by the Grantee, its successors and assigns, and any temporary or permanent limitations to the use of the

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Property, should the Grantor be required to perform additional surface remedial activities on the Property conveyed by this Deed pursuant to the CERCLA 120(h) covenant or other terms and provisions of this deed.

Applicable Law. Both the Grantor and the Grantee acknowledge and agree that all actions have been and will continue to be taken in compliance with all applicable Federal and State laws.

Objects Affecting Navigable Airspace. Pursuant to the requirements of the House Report Number 95-1053 entitled "FAA Determinations of 'No Hazard' For Structures Near Airports", it has been determined that there are no airports within six (6) nautical miles of the Property.

Interpretation. The parties to this Deed acknowledge that they have freely entered into this Deed and any ambiguities shall not be construed against a single party.

Covenants Running with the Land. All of the covenants, conditions, restrictions, reservations and obligations described in this Deed run with the Property and are binding upon the Grantor and Grantee and their successors and assigns. Grantor's execution and Grantee's acceptance of this Deed are an acknowledgement that they are bound by all such covenants, conditions, restrictions, reservations and obligations.

Entire Agreement. Any prior understanding or representation of any kind preceding the date of this Deed shall not be binding upon either party except to the extent incorporated in this Deed. This Deed contains Exhibits A through D, which are attached to this Deed and represent the entirety of the agreement between the Grantor and Grantee.

TO HAVE AND TO HOLD the Property with all privileges and appurtenances, subject to the exceptions, reservation, restrictions, covenants, and conditions is hereby deeded to the Grantee.

U.S. DEPARTMENT OF ENERGY
OFFICE OF LEGACY MANAGEMENT
WESTMINSTER OFFICE



STEVEN R. SCHIESSWOHL
Realty Officer

12-15-2010

Date

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STATE OF MISSISSIPPI

C. Delbert Hosemann, Jr.
C. DELBERT HOSEMANN, JR.
Secretary of State
December 15, 2010
Date

APPROVED:

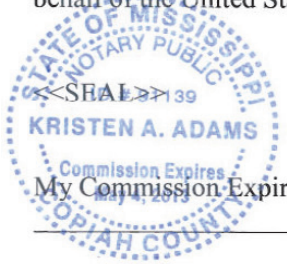
[Signature]
HALEY BARBOUR, GOVERNOR
Date 12/15/10



ACKNOWLEDGEMENTS

STATE OF Mississippi
COUNTY OF Copiah

Personally appeared before me, the undersigned authority in and for the said county and state, on this the 15th day of December, 2010, within my jurisdiction, the within named, **STEVEN R. SCHIESSWOHL**, who acknowledged that he is Realty Officer for the **U.S. DEPARTMENT OF ENERGY, OFFICE OF LEGACY MANAGEMENT, WESTMINSTER OFFICE** and that in said representative capacity he executed the above and forgoing instrument for and on behalf of the United States of America, after first having been duly authorized so to do.



Kristen Adams
NOTARY PUBLIC

My Commission Expires: _____

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STATE OF MISSISSIPPI
COUNTY OF HINDS

Personally appeared before me, the undersigned authority in and for the said county and state, on this the 15th day of December, 2010, within my jurisdiction, the within named, **C. DELBERT HOSEMANN, JR.**, who acknowledged that he is **SECRETARY OF STATE OF THE STATE OF MISSISSIPPI** and that in said representative capacity he executed the above and forgoing instrument for and on behalf of the State of Mississippi, after first having been duly authorized so to do.



Kristen Adams
NOTARY PUBLIC

STATE OF MISSISSIPPI
COUNTY OF HINDS

Personally appeared before me, the undersigned authority in and for the said county and state, on this the 15th day of December, 2010 within my jurisdiction, the within named, **HALEY BARBOUR**, who acknowledged that he is **GOVERNOR OF THE STATE OF MISSISSIPPI** and that in said representative capacity he executed the above and forgoing instrument for and on behalf of the State of Mississippi, after first having been duly authorized so to do.



Bethany J. Bryant
NOTARY PUBLIC

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TRACT 100

All that tract or parcel of land lying and being in Sections 11, 12, 13 and 14, Township 2 North, Range 16 West, St. Stephens Meridian, Lamar County, Mississippi, being more particularly described as follows:

Commencing at the Southwest corner of said Section 11;
Thence East along the South line of said Section 11 a distance of 450 feet, more or less, to the POINT OF BEGINNING;
Thence North along a line parallel to the West line of said Section 11 a distance of 2,970 feet, more or less, to a point 330 feet, more or less, North of the North line of the S 1/2 of said - Section 11;
Thence East along a line parallel with the North line of the S 1/2 of said Section 11 and subsequently along a line parallel with the North line of S 1/2 of said Section 12 a distance of 7,800 feet, more or less, to a point which is 330 feet, more or less, more or less East of the West line of the E 1/2 of said Section 12;
Thence South along a line parallel with the West line of the E 1/2 of said Section 12 a distance of 2,970 feet, more or less, to a point on the South line of said Section;
Thence west along the South line of said Section 12 a distance of 330 feet, more or less, to the West line of the E 1/2 of said Section;
Thence south along the West line of the E 1/2 of said Section 13 a distance of 1,320 feet, more or less, to the Southwest corner of the NW 1/4 of the NE 1/4 of said Section;
Thence East along the South line of the NW 1/4 of the NE 1/4 of said Section 13 a distance of 330 feet, more or less;
Thence South along a line parallel with the West line of the E 1/2 of said Section 13 a distance of 3,960 feet, more or less, to the South line of said Section;
Thence West along the South line of said Section 13 and subsequently along the South line of said Section 14 a distance of 7,800 feet, more or less, to a point which is 450 feet, more or less, East of the West line of said Section 14;
Thence North along a line parallel with the West line of said Section 14 a distance of 5,280 feet, more or less, to the Point of Beginning.
Containing 1,470 acres, more or less, and designated as Tract 100 of the Project Salmon Site (previously named Tatum Dome Site.)

The above-described property is conveyed subject to existing easements for public roads and highways, public utilities, railroads and pipelines.

And for the same consideration, the Grantor does hereby grant, bargain, sell and convey unto the Grantee and its assigns a nonexclusive, perpetual and assignable easement and right-of-entry in, on, over and across the following described land (Tracts 100-E-1, 100-E-2, 101-E, and 102-E) for location, construction, operation, maintenance, alteration and replacement of a road and appurtenances thereto, to-wit:

EXHIBIT A, PAGE 1

Quitclaim Transfer Deed (Page 11 of 21)

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TRACT 100-E-1

A right-of-way 40 feet wide lying and being in Sections 14 and 15, Township 2 North, Range 16 West, St. Stephens Meridian, Lamar County, Mississippi, and lying 20 feet, more or less, on each side of a centerline, being more particularly described as follows:

Beginning at a point in the center of an existing gravel road, which is 1,810 feet, more or less, North of the South line and 1,920 feet, more or less, West of the East line of said Section 15, and at plane coordinate position North 6,519.52 and East 2,693.47 feet;
Thence S 68 degrees 14' 13" E 124.19 feet, more or less;
Thence N 81 degrees 43' 55" E 796.28 feet, more or less;
Thence S 58 degrees 16' 06" E 351.16 feet, more or less;
Thence S 59 degrees 49' 13" E 306.38 feet, more or less;
Thence S 82 degrees 14' 28" E 409.02 feet, more or less;
Thence S 43 degrees 44' 13" E 238.79 feet, more or less;
Thence S 43 degrees 24' 13" E 252.78 feet, more or less;
Thence S 47 degrees 25' 58" E 225 feet, more or less, to a point 450 feet East of the West line of said Section 14.
Containing 2.6 acres, more or less, and being designated as Tract 100-E-1 of the Project Salmon Site (previously named Tatum Dome Site.)

TRACT 100-E-2

A right-of-way 70 feet wide lying and being in Section 12, Township 2 North, Range 16 West, St. Stephens Meridian, Lamar County, Mississippi, and lying 20 feet Northerly and 50 feet Southerly of a line, more particularly described as follows:

Commencing at the Southwest corner of the SE 1/4 of said Section 12;
Thence South 89 degrees 55' 57" E along the South line of the SE 1/4 of said Section 12 a distance of 330.00 feet, more or less,;
Thence N 00 degrees 26' 05" W along a line parallel with the West line of the E 1/2 of said Section 12 a distance of 1,171.59 feet, more or less, to the POINT OF BEGINNING;
Thence N 44 degrees 30' 00" E 459.42 feet, more or less;
Thence Northeasterly along a curve to the right with a radius of 600 feet, more or less, an arc distance of 538.43 feet, more or less, the chord of which bears N 70 degrees 13' E 520.6 feet, more or less;
Thence S 84 degrees 05' 00" E 226.48 feet, more or less;
Thence Northeasterly along a curve to the left with a radius of 550 feet, more or less, an arc distance of 470:37 feet, the chord of which bears N 71 degrees 25' E 456.17 feet, more or less;
Thence N 46 degrees 55' 00" E 64.15 feet, more or less;
Thence Northeasterly along a curve to the right with a radius of 600 feet, an arc distance of 346.45 feet, more or less, the chord of which bears N 63 degrees 28' E 341.66 feet;
Thence N 80 degrees 00' 00" E 153.15 feet, more or less;

EXHIBIT A, PAGE 2

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Thence Northeasterly along a curve to the left with a radius of 1,000 feet, an arc distance of 261.80 feet, more or less, the chord of which bears N 72 degrees 30' E 261.06 feet, more or less;

Thence N 65 degrees 00' 00" E 136.93 feet, more or less, to a point on the East line of said Section 12, said point being 2,173.87 feet, more or less, N 00 degrees 27' 48" E from the Southeast corner of said Section 12;

Containing 4.28 acres, more or less, and being designated as Tract 100-E-2 of the Project Salmon Site (previously named Tatum Dome Site.)

TRACT 101-E

A right-of-way 70 feet wide lying and being in the Section 7, Township 2 North, Range 15 West, St. Stephens Meridian, Lamar County, Mississippi, and lying 20 feet Northerly of and 50 feet Southerly of a line more particularly described as follows:

Commencing at the Southwest corner of said Section 7;

Thence N 00° 27' 48" E along the West line of said Section 7 a distance of 2,173.9 feet, more or less, to a point in the center of an existing road, and the POINT OF BEGINNING;

Thence N 65° 00' E 587.2 feet;

Thence Northeasterly along a curve to the left with a radius of 300 feet, an arc distance of 324.68 feet, the chord of which bears N 34° 00' E 309.06 feet, to a point on the North line of the SW ¼ of said Section 7, said point being 700.92 feet S 88° 52' 18" E from the Northwest corner of the SW ¼ of said section.

Containing 1.46 acres, more or less, and being designated as Tract 101-E of the Project Salmon Site (previously named Tatum Dome Site).

TRACT 102-E

A right-of-way 70 feet wide lying and being in the Northwest ¼ of Section 7, Township 2 North, Range 15 West, St. Stephens Meridian, Lamar County, Mississippi, and lying 20 feet Westerly of and 50 feet Easterly of a line more particularly described as follows:

Commencing at a point which is at the southwest corner of the Northwest ¼ of said Section 7 and at a corner of a tract of land now or formerly owned by A. T. Tatum, et al;

Thence East along the south line of the Northwest ¼ of said section which is along the boundary of said Tatum tract a distance of 700.92 feet to the Point of Beginning;

Thence northerly along a curve to the left with a radius of 300 feet, an arc distance of 18.64 feet, the chord of which bears N 01° 12' 20" E a distance of 18.58 feet;

Containing 0.43 of an acre, more or less, and designated as Tract 102-E of the Project Salmon Site (previously named Tatum Salt Dome Site.)

Tracts 100, 100-E-1, 100-E-2, 101-E, and 102-E contain in the aggregate 1,478.77 acres, more or less. (A stamped, sealed copy of the survey is attached to this Exhibit A.)

EXHIBIT A, PAGE 3

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110 STAT. 2800

PUBLIC LAW 104-201—SEPT. 23, 1996

at Holloman Air Force Base, New Mexico. The disposal may include the chimpanzees owned by the Air Force that are housed at or managed from the primate research complex. The disposal shall not include the underlying real property on which the primate research complex is located. The disposal of the primate research complex shall be at no cost to the Air Force.

(b) **COMPETITIVE, NEGOTIATED DISPOSAL PROCESS REQUIRED.**—The Secretary shall select the persons or entities to which the primate research complex and chimpanzees are to be disposed of under subsection (a) using a competitive, negotiated process.

(c) **STANDARDS TO BE USED IN SOLICITATION OF BIDS.**—The Secretary shall develop standards for the care and use of the primate research complex, and of the chimpanzees, to be used in soliciting bids for the disposal authorized by subsection (a). The Secretary shall develop such standards in consultation with the Secretary of Agriculture and the Director of the National Institutes of Health.

(d) **CONDITIONS OF DISPOSAL.**—The disposal authorized by subsection (a) shall be subject to the following conditions:

(1) That a recipient of any chimpanzees—

(A) utilize such chimpanzees only for scientific research or medical research purposes; or

(B) retire and provide adequate care for such chimpanzees.

(2) That any recipient of chimpanzees, or the primate research complex, take such chimpanzees, or the primate research complex, subject to any existing leases or other encumbrances at the time of the disposal.

(e) **DESCRIPTION OF COMPLEX AND CHIMPANZEES.**—The exact legal description of the primate research complex and chimpanzees to be disposed of under subsection (a) shall be determined by a survey or other means satisfactory to the Secretary. The cost of any survey or other services performed at the direction of the Secretary under the authority in the preceding sentence shall be borne by the recipient of the property concerned.

(f) **ADDITIONAL TERMS AND CONDITIONS.**—The Secretary may require such additional terms and conditions in connection with the disposal under subsection (a) as the Secretary considers appropriate to protect the interests of the United States.

PART IV—OTHER CONVEYANCES

SEC. 2851. LAND CONVEYANCE, TATUM SALT DOME TEST SITE, MISSISSIPPI.

(a) **CONVEYANCE AUTHORIZED.**—The Secretary of Energy may convey, without compensation, to the State of Mississippi (in this section referred to as the “State”) the property known as the Tatum Salt Dome Test Site, as generally depicted on the map of the Department of Energy numbered 301913.104.02 and dated June 25, 1993.

(b) **CONDITION ON CONVEYANCE.**—The conveyance under this section shall be subject to the condition that the State use the conveyed property as a wildlife refuge and working demonstration forest.

(c) **DESIGNATION.**—The property to be conveyed is hereby designated as the “Jamie Whitten Forest Management Area”.

EXHIBIT B, PAGE 1

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PUBLIC LAW 104-201—SEPT. 23, 1996

110 STAT. 2801

(d) **RETAINED RIGHTS.**—The conveyance under this section shall be subject to each of the following rights to be retained by the United States:

(1) Retention by the United States of subsurface estates below the property conveyed.

(2) Retention by the United States of rights of access, by easement or otherwise, for such purposes as the Secretary considers appropriate, including access to monitoring wells for sampling.

(3) Retention by the United States of the right to install wells additional to those identified in the remediation plan for the property to the extent such additional wells are considered necessary by the Secretary to monitor potential pathways of contaminant migration. Such wells shall be in such locations as specified by the Secretary.

(e) **ADDITIONAL TERMS AND CONDITIONS.**—The Secretary may require such additional terms and conditions in connection with the conveyance under this section as the Secretary considers appropriate to protect the interests of the United States.

SEC. 2852. LAND CONVEYANCE, WILLIAM LANGER JEWEL BEARING PLANT, ROLLA, NORTH DAKOTA.

(a) **CONVEYANCE AUTHORIZED.**—The Administrator of General Services may convey, without consideration, to the Job Development Authority of the City of Rolla, North Dakota (in this section referred to as the “Authority”), all right, title, and interest of the United States in and to a parcel of real property, with improvements thereon and all associated personal property, consisting of approximately 9.77 acres and comprising the William Langer Jewel Bearing Plant in Rolla, North Dakota.

(b) **CONDITION OF CONVEYANCE.**—The conveyance authorized under subsection (a) shall be subject to the condition that the Authority—

(1) use the real and personal property and improvements conveyed under that subsection for economic development relating to the jewel bearing plant;

(2) enter into an agreement with an appropriate public or private entity or person to lease such property and improvements to that entity or person for such economic development; or

(3) enter into an agreement with an appropriate public or private entity or person to sell such property and improvements to that entity or person for such economic development.

(c) **PREFERENCE FOR DOMESTIC DISPOSAL OF JEWEL BEARINGS.**—

(1) In offering to enter into agreements pursuant to any provision of law for the disposal of jewel bearings from the National Defense Stockpile, the President shall give a right of first refusal on all such offers to the Authority or to the appropriate public or private entity or person with which the Authority enters into an agreement under subsection (b).

President.

(2) For the purposes of this section, the term “National Defense Stockpile” means the stockpile provided for in section 4 of the Strategic and Critical Materials Stock Piling Act (50 U.S.C. 98(c)).

(d) **AVAILABILITY OF FUNDS FOR MAINTENANCE AND CONVEYANCE OF PLANT.**—Notwithstanding any other provision of law, funds available under the Department of Defense Appropriations Act, 1995 (Public Law 103-335), in fiscal year 1995 for the maintenance

EXHIBIT B, PAGE 2

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Miss. Code Ann. §29-1-1 (1972, as amended)

29-1-1. (1) Except as otherwise provided in subsections (7), (8) and (9) of this section, the title to all lands held by any agency of the State of Mississippi shall appear on all deeds and land records under the name of the "State of Mississippi." A deed may also recite the name of the agency for whose benefit and use the land is acquired, but the recital shall not be deemed or construed to be a limitation on the grant or an impairment of title held by the State of Mississippi. Use and possession of the land may be reassigned by act of the Legislature or by interagency conveyance where each agency has statutory authority to acquire and dispose of land. For the purpose of this section, the term "agency" shall be defined as set forth in Section 31-7-1(a). The provisions of this section shall not affect the authority of any agency to use any land held by the agency. No assets or property of the Public Employees' Retirement System of Mississippi shall be transferred in violation of Section 272A of the Mississippi Constitution of 1890. Each state agency shall inventory any state-held lands which are titled in the name of the agency. The agency shall execute quitclaim deeds and any other necessary documents to transfer the name and title of the property to the State of Mississippi. State agencies shall furnish to the Secretary of State certified copies of the quitclaim deeds and all other deeds whereby the state agency acquires or disposes of state-held land.

(2) The Secretary of State, under the general direction of the Governor and as authorized by law, shall sell and convey the public lands in the manner and on the terms provided herein for the several classes thereof; he shall perform all the administrative and executive duties appertaining to the selection, location, surveying, platting, listing, and registering these lands or otherwise concerning them; and he shall investigate the status of the various "percent" funds accrued and accruing to the state from the sale of lands by the United States, and shall collect and pay the funds into the Treasury in the manner provided by law. The Secretary of State, with the approval of the Governor, acting on behalf of the state, may accept gifts or donations of land to the State of Mississippi.

(3) In accordance with Sections 7-11-11 and 7-11-13, the Secretary of State shall be required to sign all conveyances of all state-held land. For purposes of this section, the term "conveyance" shall mean any sale or purchase of land by the State of Mississippi for use by any agency, board or commission thereof. Failure to obtain legislative approval pursuant to subsection (4) of this section and the signature of the Secretary of State on any conveyance regarding the sale or purchase of lands for the state including any agency, board or commission thereof, shall render the attempted sale or purchase of the lands void. Nothing in this section shall be construed to authorize any state agency, board, commission or public official to convey any state-held land unless this authority is otherwise granted by law. The Secretary of State shall not withhold arbitrarily his signature from any purchase or sale authorized by the Mississippi State Legislature. Except for those lands forfeited to the state for the nonpayment of taxes, conveyed to another state agency or entity as provided in subsection (11) of this section or acquired by the Mississippi Transportation Commission under Section 65-1-123, no state-held land shall be sold for less than the fair market value as determined by two (2) professional appraisers selected by the State Department of Finance and Administration, who are certified general appraisers of the State of Mississippi. The proceeds from any sale by an agency, board, commission or public official of state-held lands shall be deposited into the State General Fund unless otherwise provided by law.

(4) Before any state-held land is sold to any individual or private entity, thirty (30) days' advance notice of the intended sale shall be provided by the Secretary of State to the State Legislature and to all state agencies for the purpose of ascertaining whether an agency has a need for the land and for the purpose of ascertaining whether the sale of the land was authorized by law. If no agency of the state expresses in writing to the Secretary of State by the end of the thirty-day period a desire to use the land, then the Secretary of State, with the prior approval of the Mississippi Legislature to sell the state-held land, may offer the land for sale to any individual or private entity. Such notice to state agencies is given in aid of internal management of the real property inventory of the state, and this notice requirement shall not be applied to challenge or defeat any title heretofore or hereafter granted by the state under any law authorized by the Mississippi Legislature providing for the sale or disposal of property.

EXHIBIT C, PAGE 1

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(5) A cultural resources survey may be performed on any state-held land before the disposition of the land if the State Department of Archives and History deems this survey necessary. The cost of the survey and any archaeological studies deemed necessary by the State Department of Archives and History shall be paid by the selling agency and recouped from the proceeds of the sale.

(6) Before any land may be purchased by the state for the benefit of any state agency, the Secretary of State, or his designee, shall search and examine all state land records to determine whether the state owns any land that may fit the particular need of the agency. The Secretary of State, or his designee, shall notify the agency if it is determined that any state-held land is available for use by the agency. The agency shall determine if such land accommodates its needs and shall determine whether to make an official request to the proper authorities to have the use of the land.

(7) This section shall not apply to: (a) any lands purchased or acquired for construction and maintenance of highways or highway rights-of-way by the Mississippi Department of Transportation, or (b) any lands acquired by the state by forfeiture for nonpayment of ad valorem taxes and heretofore or hereafter sold under authority of any other section of Chapter 1, Title 29, specifically relating to tax forfeited lands.

(8) This section shall not apply to any lands purchased solely by the use of federal funds or lands for which authority to transfer or dispose of these lands is governed by federal law or federal regulations insofar as the application of this section limits or impairs the ability of the Secretary of State to acquire or dispose of the land. However, any state agency acquiring or disposing of land exempted from the application of this section by this subsection shall furnish the Secretary of State certified copies of all deeds executed for those transfers or disposals.

(9) Any lands purchased by the Mississippi Major Economic Impact Authority for a "project" as defined in Section 57-75-5 shall be excluded from the provisions of this section.

(10) The Secretary of State may recover from any agency, corporation, board, commission, entity or individual any cost that is incurred by his office for the record-keeping responsibilities regarding the sale or purchase of any state-held lands.

(11) Subsections (4), (5) and (6) of this section shall not apply to sales or purchases of land when the Legislature expressly authorizes or directs a state agency to sell, purchase or lease-purchase a specifically described property. However, when the Legislature authorizes a state agency to sell or otherwise convey specifically described real property to another state agency or other entity such as a county, municipality, economic development district created under Section 19-5-99 or similar entity, without providing that the conveyance may not be made for less than the fair market value of the property, then the state agency authorized to convey such property must make the following determinations before conveying the property:

- (a) That the state agency or other entity to which the proposed conveyance is to be made has an immediate need for the property;
- (b) That there are quantifiable benefits that will inure to the state agency or other entity to which the proposed conveyance is to be made which outweigh any quantifiable costs to the state agency authorized to make the conveyance; and
- (c) That the state agency or other entity to which the proposed conveyance is to be made lacks available funds to pay fair market value for the property. If the state agency authorized to convey such property fails to make such determinations, then it shall not convey the property for less than the fair market value of the property.

(12) This section shall not apply to the donation and conveyance of the Nanih Waiya State Park to the Mississippi Band of Choctaw Indians.

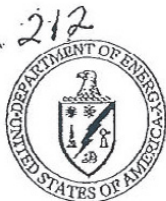
House Bill 1447, 2010 Regular Session, Effective July 1, 2010

EXHIBIT C, PAGE 2

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545215



Department of Energy
National Nuclear Security Administration
Nevada Site Office
P.O. Box 98518
Las Vegas, NV 89193-8518

FILED
2005 NOV 22 AM 9 45
WYLLIE SMITH
CHANCELLERY CLERK

Lamar County
Chancery Clerk's Office
P.O. Box 1240
Purvis, Mississippi 39475-1240

AUG 25 2005

DBBD RESTRICTION

The U. S. Department of Energy, Nevada Site Office (DOE/NSO), hereby requests that this document be recorded as part of the deed to the property identified below, and become public record for future inquiries regarding ownership, history and property restrictions of said parcel.

1. The United States of America possesses the lands described below and shown on attached map as Tract 100 In Warranty Deed Conveying Fee and Easement recorded December 2nd 1994 further described as follows:

Tract 100:

All that tract or parcel of land lying and being in Sections 11, 12, 13, and 14, Township 2 North, Range 16 West, St. Stephens Meridian, Lamar County, Mississippi, being more particularly described as follows:

Commencing at the Southwest corner of said Section 11;

Thence East along the South line of said Section 11 a distance of 450 feet to the POINT OF BEGINNING;

Thence North along a line parallel to the West line of said Section 11 a distance of 2,970 feet, more or less, to a point 330 feet North of the North line of the S 1/2 of said Section 11;

Thence East along a line parallel with the North line of the S 1/2 of the section 11 and subsequently along a line parallel with the North line of S 1/2 of said Section 12 a distance of 7,800 feet, more or less, to a point which is 330 feet East of the West line of the E 1/2 of said Section 12;

Thence South along a line parallel with the West line of the E 1/2 of said Section 12 a distance of 2,970 feet, more or less, to a point on the South line of said Section;

Thence West along the South line of said Section 12 a distance of 330 feet, more or less, to the West line of the E 1/2 of said Section;

Thence South along the West line of the E 1/2 of said Section 13 a distance of 1,320 feet, more or less, to the Southwest corner of the NW 1/4 of the NE 1/4 said Section;

EXHIBIT D, PAGE 1

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Lamar County

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AUG 25 2005

Thence East along the South line of the NW ¼ of the NE ¼ of said Section 13 a distance of 330 feet;

Thence South along a line parallel with the West line of the E ½ of said Section 13 a distance of 3,960 feet, more or less, to the South line of said Section;

Thence West along the South line of said Section 13 and subsequently along the South line of said Section 14 a distance of 7,800 feet, more or less, to a point which is 450 feet East of the West line of said Section 14;

Thence North along a line parallel with the West line of said Section 14 a distance of 5,280 feet, more or less, to the Point of Beginning.

Containing 1,470 acres, more or less, and designated as Tract 100 of the Project Salmon Site (previously named Tatum Dome Site.)

(See map of Salmon Site location)

2. Two underground nuclear tests conducted by DOB during the 1960's, resulted in contamination of the land parcel.
3. Due to the contamination cited above (#2), the following restrictions apply to the land parcel:
 - No excavation, drilling, and/or removal of material is permitted without prior approval from DOE on the 595-hectar (1,470-acre) tract identified above (#1). Any angle drilling from outside the property boundaries to within the property boundaries is also precluded.
 - Prior to any change in zoning for the area containing the land parcel, notice shall be given to DOE.
4. Any and all future users/purchasers of this land should inform themselves of the requirements of the regulations and ascertain the amount and nature of contamination on this described property.

EXHIBIT D, PAGE 2

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Lamar County

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AUG 25 2005

5. DOE/NSO has submitted the Salmon Site Completion Report and Long-Term Stewardship Plan (Salmon Completion Report) (DOE/NV-917) to the State of Mississippi, Department of Environmental Quality (MDEQ), which includes information on contamination issues and future long-term monitoring requirements.

Charles W. Montana Jr.

Charles W. Montana Jr.
DOE/NSO Realty Officer

STATE OF NEVADA, CLARK COUNTY

I hereby certify that this instrument was acknowledged before me on August 25, 2005
by Charles W. Montana Jr.

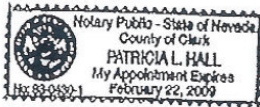
Patricia L. Hall

Notary Signature

8/25/05

Date

NOTARY SEAL:



CERTIFICATE OF FILING AND RECORDING
STATE OF MISSISSIPPI - LAMAR COUNTY
WAYNE SMITH - CHANCERY CLERK

h-D BOOK 21-M PAGE 239-259

EXHIBIT D, PAGE 3

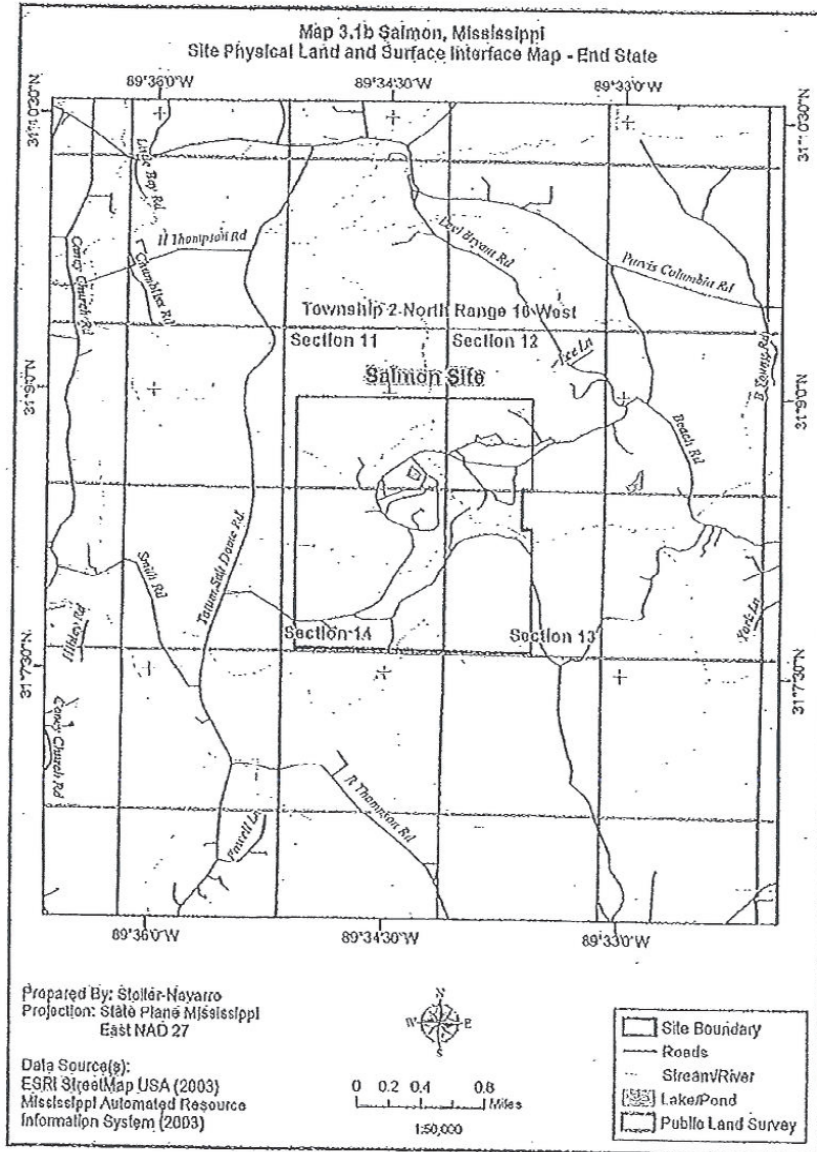
INDEXED RECORDED ABSTRACTED
Sharon Herrin D.C.

Quitclaim Transfer Deed (Page 21 of 21)

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Final - Salmon Site Environmental Management End State Vision - January 2005



CERTIFICATE OF FILING AND RECORDING
 STATE OF MISSISSIPPI • LAMAR COUNTY
 WAYNE SMITH • CHANCERY CLERK
 hD BOOK 18-A PAGE 212
 INDEXED RECORDED ABSTRACTED
 Sharon Newum D.C.



EXHIBIT D, PAGE 4

Attachment A-3

**Easement and Right-of-Way, Primary Access Route,
December 20, 2006**

Easement and Right-of-Way, Primary Access Route (Page 1 of 4)

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STATE OF MISSISSIPPI	FILED	PROJECT SALMON SITE
2006 DEC 20 PM 12 29		
COUNTY OF LAMAR	WAYNE SMITH	TRACT NO. 102-E
	CHANCERY CLERK	

WARRANTY DEED CONVEYING EASEMENT

KNOW ALL MEN BY THESE PRESENTS, that we, PERRY T. LEE, JR. and EVONE H. LEE, husband and wife, hereinafter referred to as the GRANTORS, for and in consideration of the sum of ONE THOUSAND DOLLARS (\$1000.00), the receipt and sufficiency of which are hereby acknowledged, do hereby GRANT, BARGAIN, SELL, WARRANT, REMISE, RELEASE, CONVEY and CONFIRM a non-exclusive, perpetual and assignable easement and right-of-way in, on, over and across the following described land for the location, construction, operation, maintenance, alteration and replacement of a road and appurtenances thereto, unto the UNITED STATES OF AMERICA and its assigns, hereinafter referred to as the GRANTEE, whose address and telephone number are c/o United States Army Corps of Engineers, Post Office Box 2288, Mobile, Alabama 36628-0001, (251) 690-3295, the following described real property situate in Lamar County, Mississippi:

TRACT 102-E

A right-of-way 70 feet wide lying and being in the Northwest ¼ of Section 7, Township 2 North, Range 15 West, St. Stephens Meridian, Lamar County, Mississippi, and lying 20 feet westerly of and 50 feet easterly of a line more particularly described as follows:

Commencing at a point which is at the southwest corner of the Northwest ¼ of said Section 7 and at a corner of a tract of land now or formerly owned by A. T. Tatum, et al;

Easement and Right-of-Way, Primary Access Route (Page 2 of 4)

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Thence East along the south line of the Northwest $\frac{1}{4}$ of said section which is along the boundary of said Tatum tract a distance of 700.92 feet to the Point of Beginning;

Thence northerly along a curve to the left with a radius of 300 feet, an arc distance of 18.64 feet, the chord of which bears N $01^{\circ} 12' 20''$ E a distance of 18.58 feet;

Thence N $00^{\circ} 34' 07''$ W a distance of 246.17 feet, more or less, to the center of an existing county road.

Containing 0.43 of an acre, more or less, and designated as Tract 102-E of the Project Salmon Site (previously named Tatum Salt Dome Site.) This easement is acquired for the use and benefit of the United States Department of Energy.

Together with the right to trim, cut, fell and remove therefrom all trees, underbrush, obstructions and other vegetation, structures, or obstacles within the limits of the right-of-way; subject, however, to existing for public roads and highways, public utilities, railroads and pipelines. The Grantor, their heirs and assigns specifically reserve the right to cross over or under the right-of-way as access to their adjoining land.

And we, the said Grantors, for ourselves, our heirs, personal representatives, executors, administrators, successors, and assigns, do hereby covenant with the said UNITED STATES OF AMERICA and its assigns, that we are seized of an indefeasible estate in fee simple in and to said above-described property, that it is free from all liens and encumbrances, that we are in quiet and peaceable possession of said property, and we have a good and lawful right to sell and convey same, and that we will forever warrant and defend the title to the same and the possession thereof unto the UNITED STATES OF AMERICA and its assigns against the lawful claims and demands of all persons, whomever.

TO HAVE AND TO HOLD the above-described easement unto the said UNITED

Easement and Right-of-Way, Primary Access Route (Page 3 of 4)

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STATES OF AMERICA and its assigns in fee simple forever.

IN WITNESS WHEREOF, the Grantors have signed and sealed these presents on this the 13 day of December, 2006.

Perry T. Lee, Jr.
PERRY T. LEE, JR.

Evone H. Lee
EVONE H. LEE

STATE OF MISSISSIPPI
COUNTY OF LAMAR

ACKNOWLEDGMENT

Personally appeared before me, the undersigned authority in and for said County and State, on this 13 day of December, 2006, within my jurisdiction, the within named PERRY T. LEE, JR., , who acknowledged that, with full knowledge of its contents, he voluntarily executed the above Warranty Deed Conveying Easement.

Signature: Leddie Wilson
Notary Public



My Commission expires: 1-6-2008

Easement and Right-of-Way, Primary Access Route (Page 4 of 4)

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STATE OF MISSISSIPPI

COUNTY OF LAMAR

ACKNOWLEDGMENT

Personally appeared before me, the undersigned authority in and for said County and State, on this 13 day of December, 2006, within my jurisdiction, the within named EVONE H. LEE, who acknowledged that, with full knowledge of its contents, she voluntarily executed the above Warranty Deed Conveying Basement.



Signature: Leslie Wilson
Notary Public

My Commission expires: 1-6-2008



CERTIFICATE OF FILING AND RECORDING
STATE OF MISSISSIPPI - LAMAR COUNTY
WAYNE SMITH - CHANCERY CLERK
LD BOOK 18-X PAGE 220
INDEXED RECORDED ABSTRACTED
Sharon Hewitt D.C.

Prepared By:
Flora Thompson
Assistant District Counsel
U. S. Army Corps of Engineers
Post Office Box 2288
Mobile, Alabama 36628
(251) 690-3295

Please Index In:
The NW1/4 of Section 7
Township 2 North
Range 15 West
Lamar County, Mississippi

Grantor:
Perry T. and Evone H. Lee
30 Lee Lane
Lumberton, Mississippi 39455
(601) 794-6624

Attachment A-4

**Reciprocal Easement Agreement, Secondary Access Route,
February 23, 2017**

Reciprocal Easement, Secondary Access Route (Page 1 of 16)

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STATE OF MISSISSIPPI

COUNTY OF LAMAR

ACKNOWLEDGMENT

Personally appeared before me, the undersigned authority in and for said County and State, on this 13 day of December, 2006, within my jurisdiction, the within named EVONE H. LEE, who acknowledged that, with full knowledge of its contents, she voluntarily executed the above Warranty Deed Conveying Easement.

Signature: Leetic Wilson
Notary Public



My Commission expires: 1-6-2008



CERTIFICATE OF FILING AND RECORDING
STATE OF MISSISSIPPI - LAMAR COUNTY
WAYNE SMITH - CHANCERY CLERK
LD BOOK 18-X PAGE 220
INDEXED RECORDED ABSTRACTED
Sharon Herwin D.C.

Prepared By:
Flora Thompson
Assistant District Counsel
U. S. Army Corps of Engineers
Post Office Box 2288
Mobile, Alabama 36628
(251) 690-3295

Please Index In:
The NW1/4 of Section 7
Township 2 North
Range 15 West
Lamar County, Mississippi

Grantor:
Perry T. and Evone H. Lee
30 Lee Lane
Lumberton, Mississippi 39455
(601) 794-6624

Reciprocal Easement, Secondary Access Route (Page 2 of 16)

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RECIPROCAL EASEMENT AGREEMENT

This Reciprocal Easement Agreement (this "**Agreement**") is effective as of the 23rd day of February, 2017, (the "**Effective Date**") by and between WEYERHAEUSER COMPANY, a Washington corporation, ("**Weyerhaeuser**"), and THE STATE OF MISSISSIPPI ("**Grantee**").

RECITALS

Weyerhaeuser owns certain real property located in Lamar County, Mississippi, and more particularly described in the attached Exhibit A ("**Weyerhaeuser's Property**").

Grantee owns certain real property located in Lamar County, Mississippi, and more particularly described in the attached Exhibit B ("**Grantee's Property**").

Weyerhaeuser desires to grant Grantee a perpetual, non-exclusive easement over an existing road located on Weyerhaeuser's Property that provides access to Grantee's Property.

Grantee desires to grant Weyerhaeuser a perpetual, non-exclusive easement over an existing road located on Grantee's Property that provides access to Weyerhaeuser's Property.

NOW, THEREFORE, in consideration of the mutual covenants of Weyerhaeuser and Grantee (individually, a "**Party**," and collectively, the "**Parties**") set forth in this Agreement, and other good and valuable consideration, the receipt and adequacy of which are hereby acknowledged, the Parties, intending to be legally bound, agree as follows:

AGREEMENT

1. Grant of Easements.

- a. Subject to the terms hereof, Weyerhaeuser, for and in consideration of the reciprocal easement granted in subsection (b) below, hereby grants and conveys to Grantee a private, perpetual, non-exclusive right of way easement ("**Grantee's Easement**") thirty (30) feet in width, being fifteen (15) feet on either side of the center line of the existing road located upon Weyerhaeuser's Property (the "**Weyerhaeuser's Road**"), which Grantee's Easement and Weyerhaeuser's Road are located approximately as shown on the map attached hereto as Exhibit C. Grantee's Easement shall be subject and subordinate to all liens, leases, easements, servitudes, rights-of-way, prescriptive rights, reservations, conveyances and any and all other matters of record or apparent encumbering Weyerhaeuser's Property (the "**Weyerhaeuser's Permitted Encumbrances**"), it being distinctly understood and agreed by the Parties that Weyerhaeuser, by this grant, grants no greater rights than it is permitted to grant in view of any of the Weyerhaeuser's Permitted Encumbrances.

Page 1 of 16

Reciprocal Easement, Secondary Access Route (Page 3 of 16)

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- b. Subject to the terms hereof, Grantee, for and in consideration of the reciprocal easement granted in subsection (a) above, hereby grants and conveys to Weyerhaeuser a private, perpetual, non-exclusive right of way easement ("Weyerhaeuser's Easement") thirty (30) feet in width, being fifteen (15) feet on either side of the center line of the existing road located upon Grantee's Property (the "Grantee's Road"), which Weyerhaeuser's Easement and Grantee's Road are located approximately as shown on the map attached hereto as Exhibit D. Weyerhaeuser's Easement and Grantee's Easement are sometimes hereinafter collectively referred to as the "Easements" and Weyerhaeuser's Road and Grantee's Road are sometime hereinafter collectively referred to as the "Roads". Weyerhaeuser's Easement shall be subject and subordinate to all liens, leases, easements, servitudes, rights-of-way, prescriptive rights, reservations, conveyances and any and all other matters of record or apparent encumbering Grantee's Property (the "Grantee's Permitted Encumbrances"), it being distinctly understood and agreed by the Parties that Grantee, by this grant, grants no greater rights than it is permitted to grant in view of any of the Grantee's Permitted Encumbrances.

2. **Purpose of Easements.** Grantee's Easement is conveyed by Weyerhaeuser for the purpose of providing Grantee vehicular ingress and egress to and from Weyerhaeuser's Property solely for the purpose of forest management, harvest and property protection purposes only and specifically excludes access for recreational use of Weyerhaeuser's Road. Weyerhaeuser's Easement is conveyed by Grantee for the purpose of providing Weyerhaeuser vehicular ingress and egress to and from Grantee's Property solely for the purpose of forest management, harvest and property protection purposes only and specifically excludes access for recreational use of Grantee's Road.

3. **Reservation of Rights.** The Parties reserve for themselves and their respective employees, contractors, agents, invitees, licensees, successors and assigns (collectively, the "Permittees") the right at all times for any purpose, to cross and recross their respective Roads in any manner that will not unreasonably interfere with the rights of the other Party.

4. **Nonexclusive Easement.** The Parties may grant to third parties including (without limitation) their respective Permittees, upon such terms and the Parties choose in reasonable discretion, the rights to use the Roads for the purpose contemplated in Section 2 above, provided that use of the Roads by such third parties and Permittees shall not unreasonably interfere with the rights granted to the Parties in this Agreement.

Reciprocal Easement, Secondary Access Route (Page 4 of 16)

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5. **Parties Responsibilities.** The Parties shall:
- a. Take all reasonable precaution to prevent unauthorized persons from using the Roads;
 - b. Keep all existing gates, and any that may be installed on the Roads in the future, closed and locked; provided, however, that the Parties may, from time to time leave gates (if any) on the Roads open for reasonable extended periods during regular business hours in order to facilitate active timber harvest and other commercial operations of the Parties;
 - c. Not drive with excessive speed upon the Roads;
 - d. Immediately report to each other any dangerous or defective condition with respect to any portion of the Roads;
 - e. Ensure that each Party and their respective Permittees comply with all applicable local, state and federal laws, rules and regulations (collectively, "**Applicable Laws**") with respect to the use of the Roads; and
 - f. Comply with all reasonable road rules, regulations and restrictions ("**Road Rules**") that each Party may, from time to time, promulgate in its sole and absolute discretion, including (without limitation) restrictions on weight, speed and use during adverse weather or fire conditions reasonably necessary to protect the Roads and adjacent timber, provided that the other Party is given a prior written notice of such Road Rules and such Road Rules do not materially impair the other Party's use of the Roads.

6. **Road Maintenance.** The cost of road maintenance and resurfacing shall be allocated between the Parties on the basis of respective uses of the Roads. When any Party uses one or both Roads, that Party shall perform or cause to be performed, or contribute or cause to be contributed, that share of maintenance and resurfacing occasioned by such use as hereinafter provided. During periods when the Roads or portions thereof are solely used by one Party, such Party shall maintain all or portions of said Roads so used to the standards existing at the time use is commenced. During periods when more than one Party is using the Roads or portions thereof, the Parties hereto shall meet and establish necessary maintenance provisions. Such provisions shall include, but shall not be limited to (a) the appointment of a maintainer, which may be one of the Parties hereto or any third party, who will perform or cause to be performed at a reasonable and agreed upon rate the maintenance and resurfacing of the Roads or portions thereof being used; and (b) a method of payment by which each Party using said Roads or portions thereof, shall pay its pro rata share of the cost incurred by said maintainer in maintaining or resurfacing said Roads or portion thereof. For purposes of this Agreement, maintenance is defined as the work normally necessary to preserve and keep the roadway, road structure and road facilities as nearly as possible in their present condition or as hereafter improved.

7. **Road Damage.** Each Party using any portion of the Roads shall repair, or cause to be

Reciprocal Easement, Secondary Access Route (Page 5 of 16)

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repaired, at its sole cost and expense, that damage to the Roads occasioned by it which is in excess of that which it would cause through normal and prudent usage of said Roads. Should inordinate damage to the Roads occur which is not caused by an authorized user of said Roads, the Parties hereto shall meet to agree upon the cost of replacement, the Party to undertake the replacement, and the shares of replacement cost to be borne by each user of said Roads. Unless the Parties hereto agree in writing to share the cost of improvements in advance of such improvements being made, such improvements shall be solely for the account of the improver. If any dispute arises between the Parties over maintenance or repair responsibility under this Section, then the matter shall be resolved by arbitration. The Party desiring arbitration shall give notice requesting arbitration and appointing as an arbitrator an independent consulting forester (which shall not be a forester regularly employed by either Party) regularly engaged in logging and road building activities in the area in which the Road is located. The other Party shall within thirty (30) days after receipt of the notice appoint an arbitrator having similar qualifications. The two arbitrators so selected shall meet and attempt to resolve the matter in dispute by coming to agreement. If they fail to do so within thirty (30) days, then they shall select a third arbitrator having similar qualifications. A decision of two of the three arbitrators shall be binding upon the Parties. The arbitration shall proceed in accordance with the Mississippi statutes on arbitration and the arbitrators shall have the powers set forth therein. Each Party shall pay its own attorneys' fees in connection with the arbitration, but the Parties shall share costs and fees of the arbitrators equally. If either Party should fail to appoint an arbitrator within the time required, or if the two arbitrators shall fail to appoint a third, then application may be made to the Presiding Judge of the State Court serving the county in which the Easement Area is located, who shall have authority to appoint the necessary arbitrator or arbitrators.

8. **Timber.** Each Party reserves to itself all timber now on or hereafter growing within the portion of the Easements located on their respective properties.

9. **Gate Keys and Combinations.** Each Party shall provide another with combination to any gate that must be opened to access the Roads by entering a combination. Should the locks to the gate require a key, each Party shall provide another with a key to such a gate. Each Party may change the gate combinations or key locks at any time, for any reason; provided, however, that prior to changing the combinations or keys each Party shall notify another of the new combination or the need to obtain a new key.

Reciprocal Easement, Secondary Access Route (Page 6 of 16)

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10. **Insurance.** Weyerhaeuser shall maintain for themselves and their respective Permittees, policies of insurance with companies maintaining an AM Best Rating of A-VII or better in the following minimum amounts:

Automobiles

Bodily Injury	\$1,000,000 Each Occurrence
Property Damage	\$1,000,000 Each Occurrence

Commercial General Liability

Bodily Injury	\$1,000,000 Each Occurrence- \$2,000,000 Aggregate
Property Damage	\$1,000,000 Each Occurrence \$2,000,000 Aggregate

Or Combined Single Limits \$1,000,000 Each Occurrence

Grantee's insurance is that which is provided through the operation of the State Tort Claims Act. Minimum amounts of insurance shall be subject to such other limits as the Parties hereto may agree upon in writing from time to time. Commercial general liability insurance shall include coverage for: operations and completed operations; independent contractors; blanket contractual liability (including liability assumed under the indemnification paragraph of this Agreement); and automobile liability insurance covering owned, hired and non-owned vehicles (including, if applicable, the "pollution from autos endorsement," 150 Form No. CA 99 48). Each Party shall also maintain at all times State or private industrial accident insurance covering such Party and their respective Permittees which shall fully comply with State and Federal employment and workers' compensation laws. Each Party shall deliver to another a certificate or certificates (as applicable) from their respective insurer or insurers stating that all applicable insurance required hereunder is in full force and effect, and that the insurer or insurers (as applicable) will give to another Party thirty (30) days written notice prior to any cancellation or modification of the applicable insurance together with evidence that all owned, non-owned vehicles to be used by a Party are covered by such insurance. The aggregate limits shall be specific to this Agreement. A one million dollar (\$1,000,000) Umbrella Policy may be used in lieu of per project aggregate. Upon the request of either Party, the road user shall deliver to the requesting Party certificates from the road user's insurance carrier evidencing the insurance coverage required under this Section. Prior to permitting its Permittees to exercise any rights granted herein for commercial purposes, each Party agrees it will require its Permittees to first obtain, and maintain at all times while operating under this Agreement, insurance coverage in the amounts not less than described above. Each Party further agrees it will require its Permittees to have available upon request a certificate from the insurer evidencing that such coverage is in force and that, in the event of cancellation or modification of such coverage, the insurer will give each Party at least ten (10) days' written notice prior to any cancellation or modification of such coverage.

Reciprocal Easement, Secondary Access Route (Page 7 of 16)

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11. **Assignment.** Neither Party may assign its rights and obligations under this Agreement without the prior written consent of the other Party, which consent may not be unreasonably withheld, conditioned or delayed. Any such permitted assignment shall provide that the assignee will assume all obligations of the assigning Party from and after the effective date thereof. Consent to assign shall not be unreasonably withheld upon transfer of title of lands owned by the Parties.

12. **Indemnity.** To the extent allowed by law, each Party agrees to defend, indemnify, save, protect and hold harmless the other Party for, from and against all causes of action, litigation, cost, loss, liability, damage and expense (including attorneys' fees) for injury or death to persons, whomsoever, and damage to or loss of property, to whomsoever belonging, including (without limitation) the Parties' respective Permittees, arising out of or in any way connected with the use of the Easements or Roads by such Party and its Permittees; unless such causes of actions, litigation, cost, loss, liability, damage and expense results from the sole negligence of the other Party.

13. **Environmental Matters.** The Parties are prohibited from managing, using, transporting, generating and disposing of any Hazardous Substance in violation of Environmental Laws or substances deemed illegal under Applicable Laws on the Easements, Roads, or the Parties' respective properties. For purposes of this Agreement, the term "**Environmental Laws**" means any federal, state, local law, statute, ordinance, regulation or order and all amendments thereto pertaining to human health, environmental conditions or Hazardous Substances applicable to Weyerhaeuser's Property and Grantee's Property, including (without limitation) the Endangered Species Act, 16 U.S.C. § 1531-1544 (1998) and any Amendments thereto (the "ESA"). For purposes of this Agreement, the term "**Hazardous Substance**" shall mean any hazardous or toxic substances, materials or wastes, or pollutants or contaminants as defined, listed or regulated by any Environmental Laws or by common law decision including, without limitation, chlorinated solvents; petroleum products or by-products; asbestos; and polychlorinated biphenyl. In addition to all other indemnities set forth herein, to the extent allowed by law, each Party shall save, protect, defend, indemnify, and hold harmless the other Party, its respective property and Permittees, from and against any and all loss, damage, cost, expense, or liability (including reasonable attorney fees) and the reasonable costs of repairs and improvements necessary to return the Easements, Roads, the respective property or any other lands owned by such Party to the physical condition existing prior to undertaking any activity related to any Hazardous Substance to the extent arising out of or attributable to the indemnifying Party's use, manufacture, storage, release, or disposal of a Hazardous Substance or other illegal substance thereupon in violating Applicable Laws, including (without limitation) Environmental Laws. This indemnity shall survive the expiration or earlier termination of this Agreement.

Reciprocal Easement, Secondary Access Route (Page 9 of 16)

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16. **Waiver.** No failure of either Party to exercise any power given hereunder or to insist upon strict compliance with any obligations specified herein, and no custom or practice at variance with the terms hereof, shall constitute a waiver of any Party's right to demand strict compliance with the terms hereof; provided, however, that any Party may, at its sole option, waive any requirement, covenant or condition herein established for the benefit of such Party without affecting any of the other provisions of this Agreement.

17. **Fire Suppression and Control.** Each Party warrants, represents and covenants that it shall:

- a. Maintain as part of its operation in good and useable condition all the tools and equipment necessary to prevent and suppress fires as required by all Applicable Laws;
- b. Dispose of all slashings and debris created by a Party on the Roads or their respective properties in a commercially reasonable manner;
- c. Maintain the Roads free of inflammable debris; and
- d. Upon discovery of fire in the vicinity of the Roads or a Party's operations, immediately notify the other Party and the nearest official forest officer in charge of forest fire control.

18. **Independent Contractor.** It is agreed that neither Party hereto is the agent, servant, or employee of the other Party for any purpose whatsoever.

19. **Subordination.** Any mortgage or deed of trust affecting any portion of the Weyerhaeuser's Easement or the Grantee's Easement shall at all times be subject and subordinate to the terms and conditions of this Agreement, and any party foreclosing any such mortgage or deed of trust, or acquiring title by deed in lieu of foreclosure or trustee's sale, shall acquire title subject to all the terms and conditions of this Agreement.

20. **Entire Agreement; Construction.** This Agreement sets forth the entire and complete agreement between the Parties with respect to the subject matter hereof. Any prior agreements, commitments, or representations, express or implied, between the Parties are superseded by this Agreement. This Agreement may be altered, amended, or repealed only by a written instrument executed by both Parties. No provisions of this Agreement shall be construed against or interpreted to the disadvantage of any Party hereto by any court or governmental or jurisdictional authority by reason of such Party having been deemed to have structured, written, drafted or dictated such provisions. The Recitals to this Agreement and the Exhibits attached to this Agreement are incorporated herein by this reference. The captions and headings of this Agreement are for convenience only and shall not define, limit, or describe the applicability, scope, meaning, or intent of any provision of this Agreement. Capitalized terms which are

Reciprocal Easement, Secondary Access Route (Page 10 of 16)

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defined in the recitals hereof shall have the meaning given.

21. **Attorneys' Fees.** In the event any arbitration, action, suit or legal proceeding is instituted by either Party to this Agreement, to the extent allowed by law, the prevailing Party shall be entitled to recover from the non-prevailing Party both reasonable attorney fees and reasonable expert witness fees as determined by the court or arbitration panel, both at trial and on appeal or review and in bankruptcy, whether or not the matter in dispute involves an issue peculiar to federal bankruptcy law. Attorney fees and expert witness fees shall be in addition to other costs and disbursements allowed by law. "**Prevailing Party**" shall be determined by the arbitrator, or any court, as the true prevailing party (not statutorily prevailing party) after taking into consideration any settlement offers made by the Parties and the number and importance of issues to be determined.

22. **Governing Law; Venue.** This Agreement shall be governed by, and construed in accordance with, the laws of the State of Mississippi. In addition, the Parties agree that in the event of any dispute concerning this Agreement, venue for any cause of action arising out of, or having to do with, this Agreement shall be, and is, in State or Federal Court in the county in which the Weyerhaeuser's Property is located.

23. **Amendment; Successors and Assigns.** This Agreement may be modified or amended only by a written agreement signed by the Parties, or their applicable permitted successors or assigns. All terms, conditions, representations, and covenants of this Agreement shall be binding upon and inure to the benefit of the Parties, their heirs, successors and assigns. The rights of Grantee hereunder shall be appurtenant to and for the benefit of the Grantee's Property and any conveyance of the Grantee's Property shall include a conveyance of the Grantee's Easement, regardless of whether the Grantee's Easement is specifically identified in the instrument of conveyance. The rights of Weyerhaeuser hereunder shall be appurtenant to and for the benefit of the Weyerhaeuser's Property and any conveyance of the Grantee's Property shall include a conveyance of the Weyerhaeuser's Easement, regardless of whether the Weyerhaeuser's Easement is specifically identified in the instrument of conveyance.

24. **No Third Party Beneficiaries.** Nothing in this Agreement, express or implied, is intended to confer on any person other than the Parties hereto and their respective successors and permitted assigns any rights, remedies, obligations or liabilities under or by reason of this Agreement.

25. **Force Majeure.** The Parties shall be free from any liability to one another for delays in delivery or failure to perform due to the failure, fault, or bankruptcy of a third party, acts of God, acts of default of any carrier, acts of any governmental authority, terrorism, suspension of any shipping facility, wars, riots, revolutions, strikes and other labor disputes, port congestion, fires, floods, perils of the sea, sabotage, nuclear incidents, earthquakes, storms, epidemics, or any other contingency of any similar nature beyond the control of either Party. The foregoing shall apply even though any of such causes exist as of the date of this Agreement or occurs after

Reciprocal Easement, Secondary Access Route (Page 11 of 16)

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performance is delayed for other causes.

IN WITNESS WHEREOF, this Agreement is executed on the date of the acknowledgment below but shall be effective for all purposes as of the Effective Date.

WEYERHAEUSER

GRANTEE

WEYERHAEUSER COMPANY, a
Washington corporation

STATE OF MISSISSIPPI

By: Kristy Harkan

By: Charlie Morgan

Name: Kristy Harkan

Name: Charlie Morgan

Title: Senior Vice President

Title: State Forester

Exhibits

- A - Weyerhaeuser's Property
- B - Grantee's Property
- C - Grantee's Easement and Weyerhaeuser's Road
- D - Weyerhaeuser's Easement and Grantee's Road



Reciprocal Easement, Secondary Access Route (Page 12 of 16)

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STATE OF WASHINGTON)
)
COUNTY OF KING)

On this 23rd day of February, 2017, before me personally appeared Keisty Haalam to me known to be the Senior Vice President of WEYERHAEUSER COMPANY, the corporation that executed the within and foregoing instrument, and acknowledged said instrument to be the free and voluntary act and deed of said corporation, for the uses and purposes therein mentioned, and on oath stated that s/he is authorized to execute said instrument and that the seal affixed is the corporate seal of said corporation.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year first above mentioned.



[Signature]
Notary Public in and for the State of Washington
My appointment expires: 07/15/2020

STATE OF Mississippi)
)
COUNTY OF Madison)

On this 14th day of February, 2017, before me personally appeared Charlie Morgan to me known to be the State Forester of STATE OF MISSISSIPPI, the party that executed the within and foregoing instrument, and acknowledged said instrument to be the free and voluntary act and deed of said party, for the uses and purposes therein mentioned, and on oath stated that s/he is authorized to execute said instrument and that the seal affixed is the seal of said party.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year first above mentioned.



Lacie Wilkerson
Notary Public in and for the State of Mississippi
My appointment expires: February 26, 2019

Reciprocal Easement, Secondary Access Route (Page 13 of 16)

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EXHIBIT A

Weyerhaeuser's Property

LAMAR COUNTY, STATE OF MISSISSIPPI

IN TOWNSHIP 2 NORTH, RANGE 16 WEST, ST. STEPHENS MERIDIAN:

Section 14: A strip of land 450 feet wide uniformly off of the West side of the $W\frac{1}{2}SW\frac{1}{4}$

Section 15: That portion of the $NW\frac{1}{4}SE\frac{1}{4}$ lying East of Tatum Salt Dome Road

Reciprocal Easement, Secondary Access Route (Page 14 of 16)

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EXHIBIT B

Grantee's Property

LAMAR COUNTY, STATE OF MISSISSIPPI

IN TOWNSHIP 1 NORTH, RANGE 16 WEST, ST. STEPHENS MERIDIAN;

**Section 26: SE $\frac{1}{4}$ NE $\frac{1}{4}$
N $\frac{1}{2}$ NW $\frac{1}{4}$
SE $\frac{1}{4}$ NW $\frac{1}{4}$
NW $\frac{1}{4}$ SE $\frac{1}{4}$**

Reciprocal Easement, Secondary Access Route (Page 15 of 16)

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EXHIBIT C
Grantee's Easement and Weyerhaeuser's Road
Map of the Easement Area and the Road

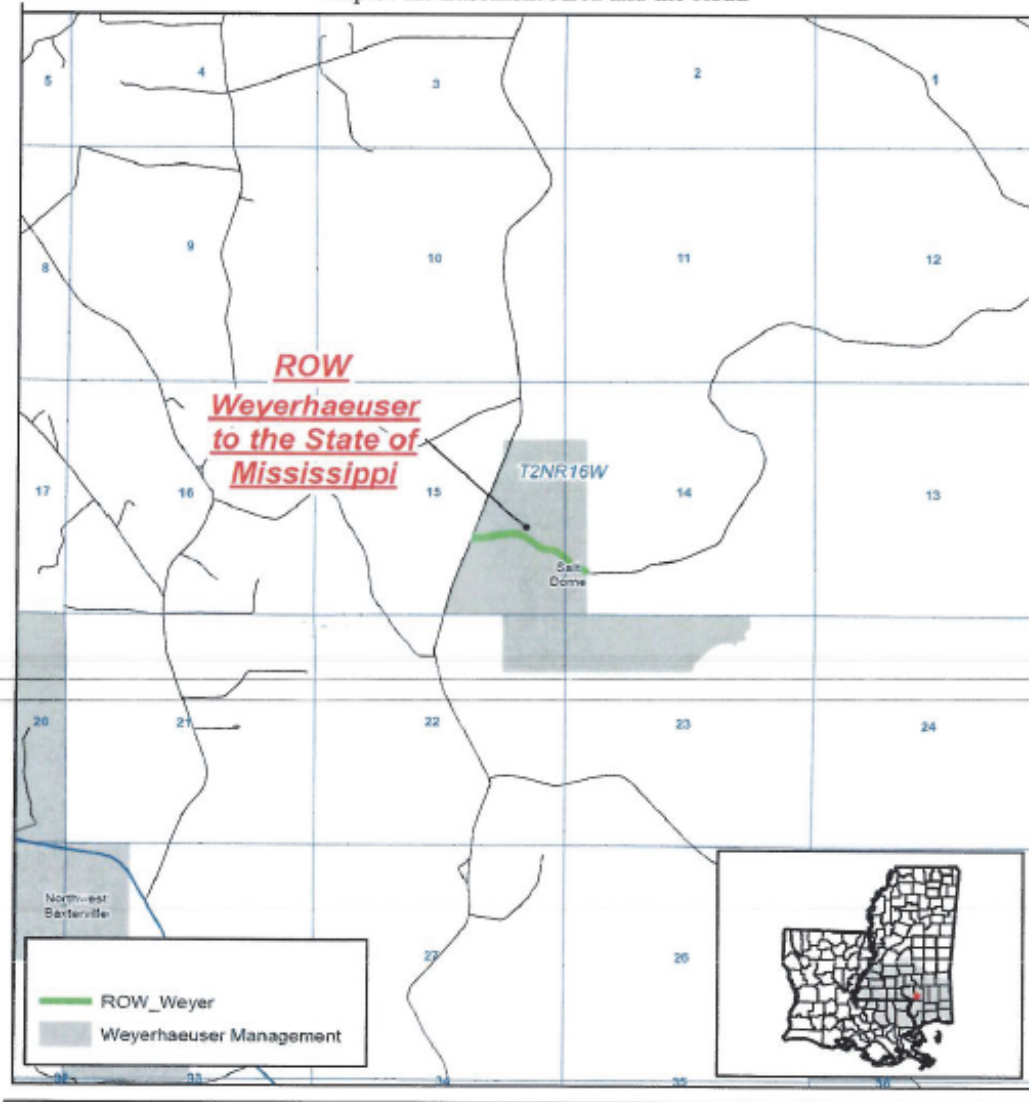


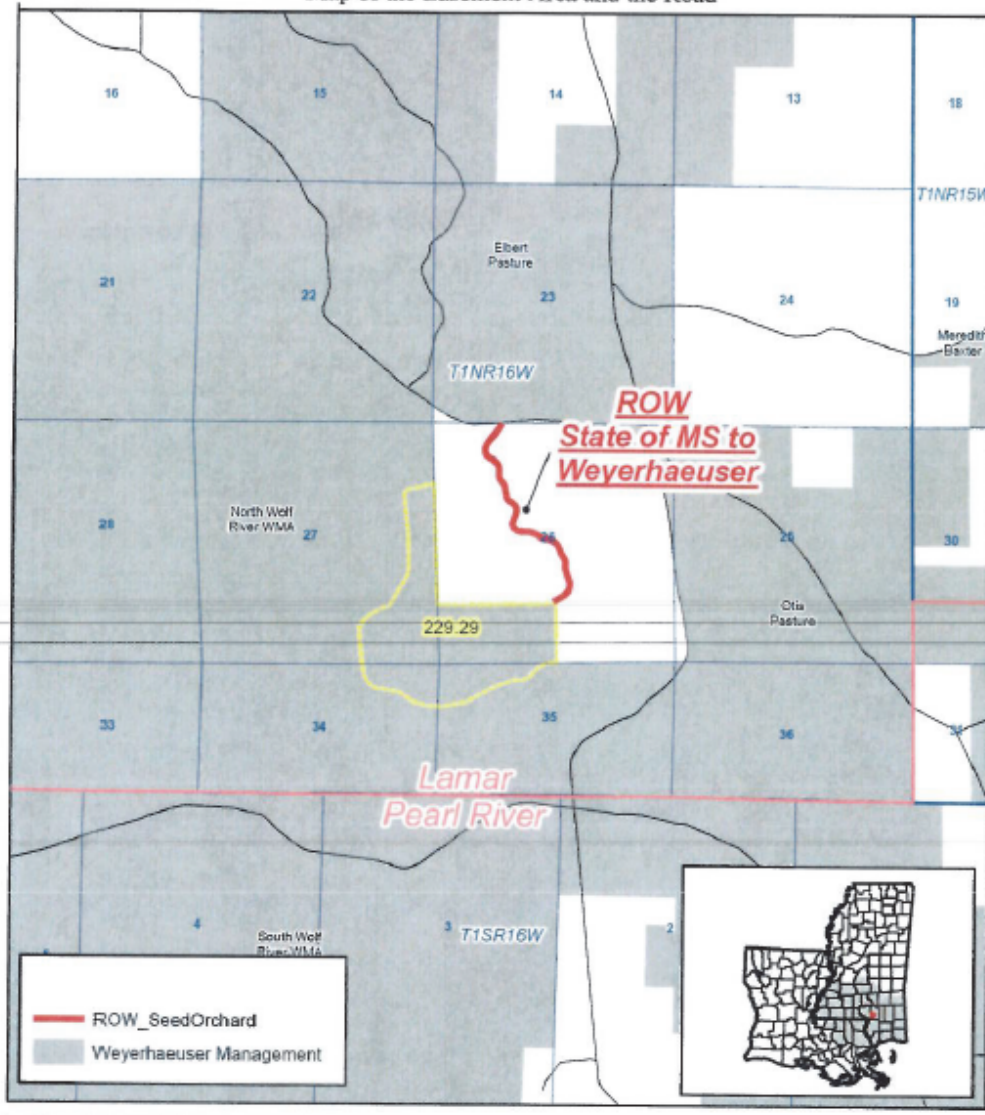
EXHIBIT C: GRANTEE'S EASEMENT AND WEYERHAEUSER'S ROAD

Reciprocal Easement, Secondary Access Route (Page 16 of 16)

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EXHIBIT D

Weyerhaeuser's Easement and Grantee's Road
Map of the Easement Area and the Road



CERTIFICATE OF FILING AND RECORDING
STATE OF MISSISSIPPI
LAMAR COUNTY

Wayne Smith, Chancery Clerk

LD Book 25-4 Page 121

Indexed Recorded Abstracted

Sharon Ferrin D.C.

Appendix B

Wells

Table B-1 provides information for wells that are currently active and Figure B-1 shows their locations. Table B-2 provides information for wells that have been closed and abandoned at the site and Figure B-2 shows their locations.

Table B-1 Monitoring Well Information

Aquifer	Well	Well		Well Screen		Elevation (msl ^a)			
		Depth (feet bgs)	Diameter (inches)	Top (feet bgs)	Bottom (feet bgs)	TOC (feet)	Pad ^b (feet)	TSZ (feet)	BSZ (feet)
Alluvial	HMH-5R	30.0	4	20	29	239.68	237.78	217.78	208.38
	HMH-16R	30.0	4	15	25	243.58	241.56	226.56	216.66
	HM-S	30.0	7	20	30	244.40	242.07	222.07	212.07
	SA1-1-H	30.0	5	10	30	242.03	240.34	230.34	210.84
	SA1-2-H	30.0	5	10	30	242.99	240.99	230.99	211.49
	SA1-3-H	30.0	5	10	30	241.93	239.95	229.95	210.45
	SA1-4-H	30.0	5	10	30	242.33	240.03	230.03	210.53
	SA1-5-H	30.0	5	13	30	243.66	241.65	221.65	212.15
	SA1-6-H	23.0	5	3	23	241.91	240.03	237.03	217.53
	SA1-7-H	30.0	5	10	30	243.16	241.12	231.12	211.62
	SA1-12-H	30.0	4	22	30	241.46	240.00	218	210.5
	SA3-4-H	30.0	5	10	30	242.34	240.26	230.4	210.9
	SA2-6-H	47	4	35	42.8	251.76	249.57	214.57	206.76
Local	SA2-6-L	197	4	145	192.2	252.19	249.39	104.39	57.19
	SA3-4-L	195	4	170	187.4	242.92	240.36	70.36	52.92
	SA1-12-L	172.4	4	120	167.6	242.47	240.03	120.03	72.47
	SA4-5-L	180.0	5	160	170	267.63	267.03	107.03	97.03
	SA1-8-L	195.0	4	145	185	251.29	249.71	104.71	64.71
	HM-L2	200.0	NA	178	188	253.62	252.49	64	54
	HM-L	204.0	8.625	140	204	244.38	242.15	102.15	38.15
	SA2-4-L	250.4	4	200	240	290.70	288.51	88.51	48.51
	SA2-2-L	340.0	4	275	335	325.91	323.74	48.74	11.26
SA2-1-L	348.5	4	278	338	335.76	333.20	55.1	4.9	
1	HM-1	415.0	8.625	330	415	243.64	242.25	87.75	172.75
2A	HM-2A	537.0	8.625	440	537	243.41	241.96	198.04	295.04
2B	HM-2B	700.0	8.625	600	700	243.52	242.11	357.89	457.89
3	HM-3	873.0	8.625	740	873	243.57	242.33	497.67	630.67
3	SA3-11-3	860.7	7	736	840	253.40	252.68	483.3	586.8
3	SA1-11-3	923.5	7	843	903	250.01	249.03	594.17	654.17
4	SA5-4-4	2098.8	7	1799	2078	302.90	301.19	1497.31	1777.21
4	SA5-5-4	2080.5	7	1800	2040	301.31	300.64	1498.86	1739.46
Caprock	E-7	934.0	9.625	934	934	260.33	259.90	674.1	674.1

Notes:

^a Relative to mean sea level.

^b Assume 3-inch concrete pad thickness.

Abbreviations:

BSZ = bottom of screen zone

NA = not available

TOC = top of well casing

TSZ = top of screen zone

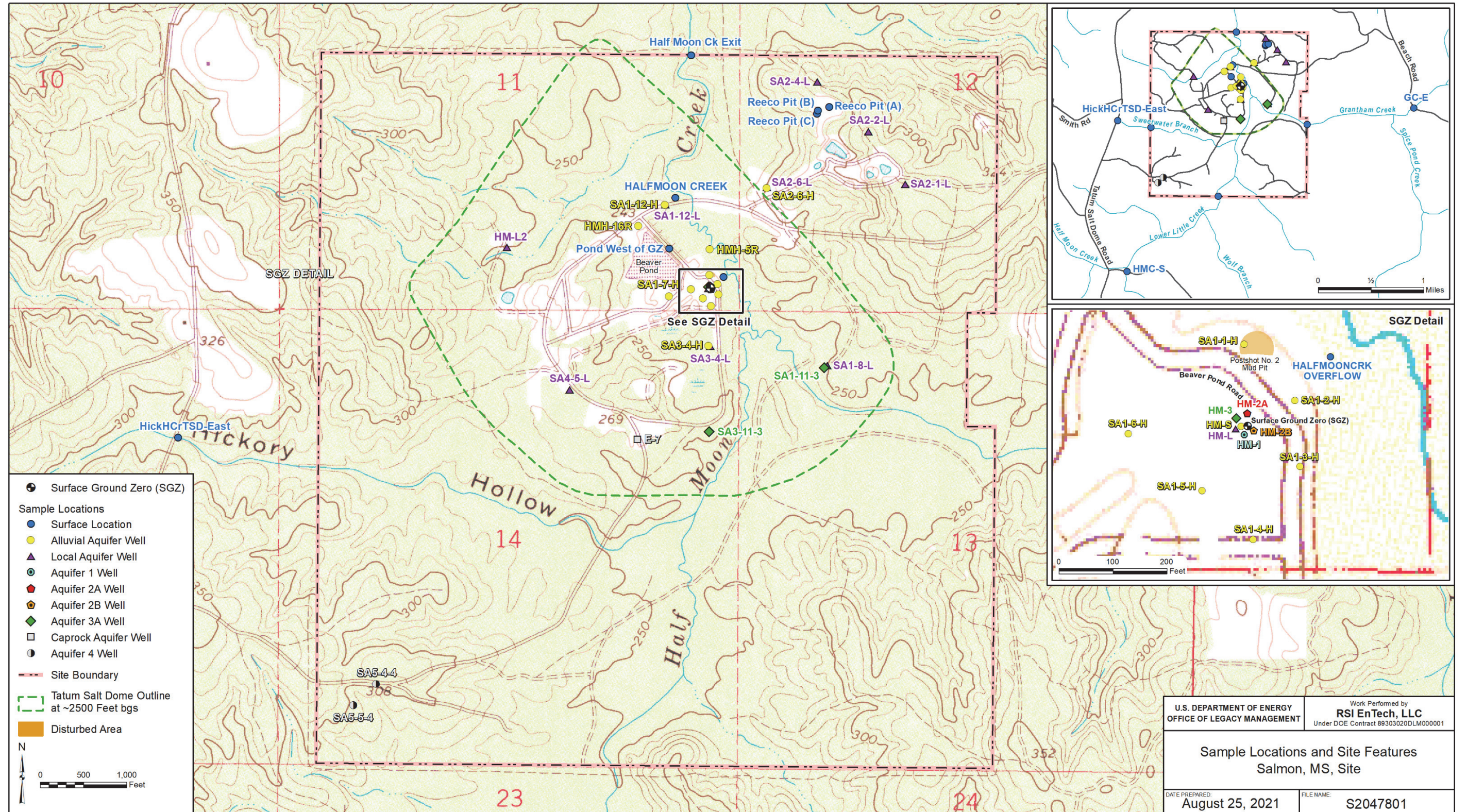


Figure B-1. Salmon Site Features and Monitoring Locations

Table B-2. Closed and Abandoned Wells at the Salmon Site

Location Code	Easting	Northing	Well Depth	Decommissioned Date
Columbia City Well 6	191960	573873	NA	4/19/1999
E-1	267507	536241	NA	7/10/1971
E-11	267586	536857	NA	7/12/1971
E-12	267624	537332	NA	7/14/1971
E-13	268099	537048	NA	8/9/1971
E-14	269007	537199	NA	7/9/1971
E-14B	269035	537125	NA	7/5/1971
E-14C	268993	537293	NA	7/9/1971
E-14T	268985	537200	NA	7/9/1971
E-15	269491	537415	NA	8/21/1964
E-16	269592	537414	NA	7/29/1964
E-2	268669	535590	NA	7/19/1971
E-3	270831	536398	NA	8/24/1971
E-4	270426	537915	NA	8/19/1971
E-5	267162	537879	NA	8/6/1971
E-6	268732	538049	NA	8/2/1971
E-9	270913	536393	NA	8/7/1971
HM-5	269530	537354	NA	NA
HMH-1	269542	537312	NA	2/26/2002
HMH-10	269558	537401	NA	2/26/2002
HMH-11	269589	537279	NA	2/26/2002
HMH-12	269111	538320	NA	2/26/2002
HMH-13	269108	538312	NA	2/26/2002
HMH-14	268998	538293	NA	2/26/2002
HMH-15	268886	538250	NA	2/26/2002
HMH-16	268730	538151	NA	2/26/2002
HMH-2	269562	537298	NA	2/26/2002
HMH-3	269068	537208	NA	2/26/2002
HMH-4	269160	537787	NA	2/26/2002
HMH-5	269551	537840	NA	2/26/2002
HMH-6	269300	537853	NA	2/26/2002
HMH-7	269398	537006	NA	10/17/2014
HMH-8	269600	536914	NA	2/26/2002
HT-1	272678	539334	2613	NA
HT-1A	272414	539481	NA	7/10/1971
HT-1B	271892	539772	NA	7/10/1971
HT-2	265454	532676	NA	7/26/1971
HT-2A	265831	532559	NA	7/9/1971
HT-2B	266382	532321	NA	7/8/1971
HT-2C	265680	532686	366	3/5/2002
HT-2M	265816	532816	NA	NA

Table B-2. Closed and Abandoned Wells at the Salmon Site (continued)

Location Code	Easting	Northing	Well Depth	Decommissioned Date
HT-3	268734	535797	NA	7/7/1971
HT-4	269507	535078	441	3/6/2002
HT-5	269507	535078	684	3/6/2002
HT-6	268783	535788	NA	7/8/1971
HT-7	268751	535750	NA	7/29/1971
MTH-3	272835	533407	NA	8/30/1971
OW-1	267102	537878	NA	NA
OW-2	268350	535750	195	2/28/2002
P.S. 1	269535	537362	NA	3/14/1972
P.S. 2	269536	537462	NA	3/19/1970
P.S. 3	269553	537371	NA	6/18/1979
SA1-10-2B	270857	536461	843	3/8/2002
SA1-9-2A	270928	536420	719	3/7/2002
SA2-3-L	271175	539628	NA	2/28/2002
SA2-5-L	270143	538418	NA	2/28/2002
SA3-10-2B	269482	535721	710	3/4/2002
SA3-1-M	268919	536100	40	2/26/2002
SA3-2-C	268734	536040	NA	NA
SA3-3-M	268878	536351	50	2/26/2002
SA3-5-H	269578	536526	30	2/26/2002
SA3-6-H	269427	535704	NA	NA
SA3-8-1	269525	535731	385	3/1/2002
SA3-9-2A	269620	535760	NA	1/14/1997
SA4-1-M	267373	537496	50	2/27/2002
SA4-2-C	267100	537376	NA	NA
SA4-3-C	267175	537515	NA	NA
SA5-1-M	265726	532915	35	2/27/2002
SA5-2-M	265782	532509	35	2/27/2002
SA5-3-M	265316	532618	40	2/27/2002
SB1-1	268995	537179	NA	NA
SB1-2	269507	537217	NA	NA
SB1-3	269468	537582	NA	NA
SB2-1	270135	538416	NA	NA
SB2-2	270881	538634	NA	NA
SB2-3	270557	538925	NA	NA
SB2-4	270286	538463	NA	NA
SB3-1	268620	535650	NA	NA
SB3-2	268655	535565	NA	NA
SB3-3	268750	536113	NA	NA
SB3-4	268778	536224	NA	NA
SB4-1	267195	537876	NA	NA
SB4-2	267199	537273	NA	NA

Table B-2. Closed and Abandoned Wells at the Salmon Site (continued)

Location Code	Easting	Northing	Well Depth	Decommissioned Date
SB4-3	267121	537176	NA	NA
SB4-4	267381	537352	NA	NA
SB5-1	265560	532519	NA	NA
SBE 3-1	270913	536518	NA	NA
SBE 3-2	270839	536503	NA	NA
STA 1	269541	537328	NA	9/21/1971
STA 1A	269540	537357	NA	2/3/1972
STA 3	267591	537271	NA	3/14/1972
STA 3V	267551	537171	NA	3/14/1972
STA 4	269167	536279	NA	7/27/1971
Well Shell No. 1	268202	534844	NA	9/18/2007
WP-1	267949	537263	NA	8/12/1971
WP-4	269173	536304	NA	7/27/1971
WSF Tatum 1	268548	534865	1594	NA
WSF Tatum 10	266854	537560	1299	NA
WSF Tatum 2	266962	534475	2037	NA
WSF Tatum 3	268089	536937	1548	NA
WSF Tatum 4	269561	537546	1049	NA
WSF Tatum 5	268256	538493	1103	NA
WSF Tatum 6	266968	535861	1550	NA
WSF Tatum 7	270871	535017	2095	NA
WSF Tatum 8	270127	536076	1223	NA
WSF Tatum 9	268139	539156	1570	NA

Note:

Coordinates are in NAD 1927 State Plane Mississippi East

Abbreviation:

NA = not available

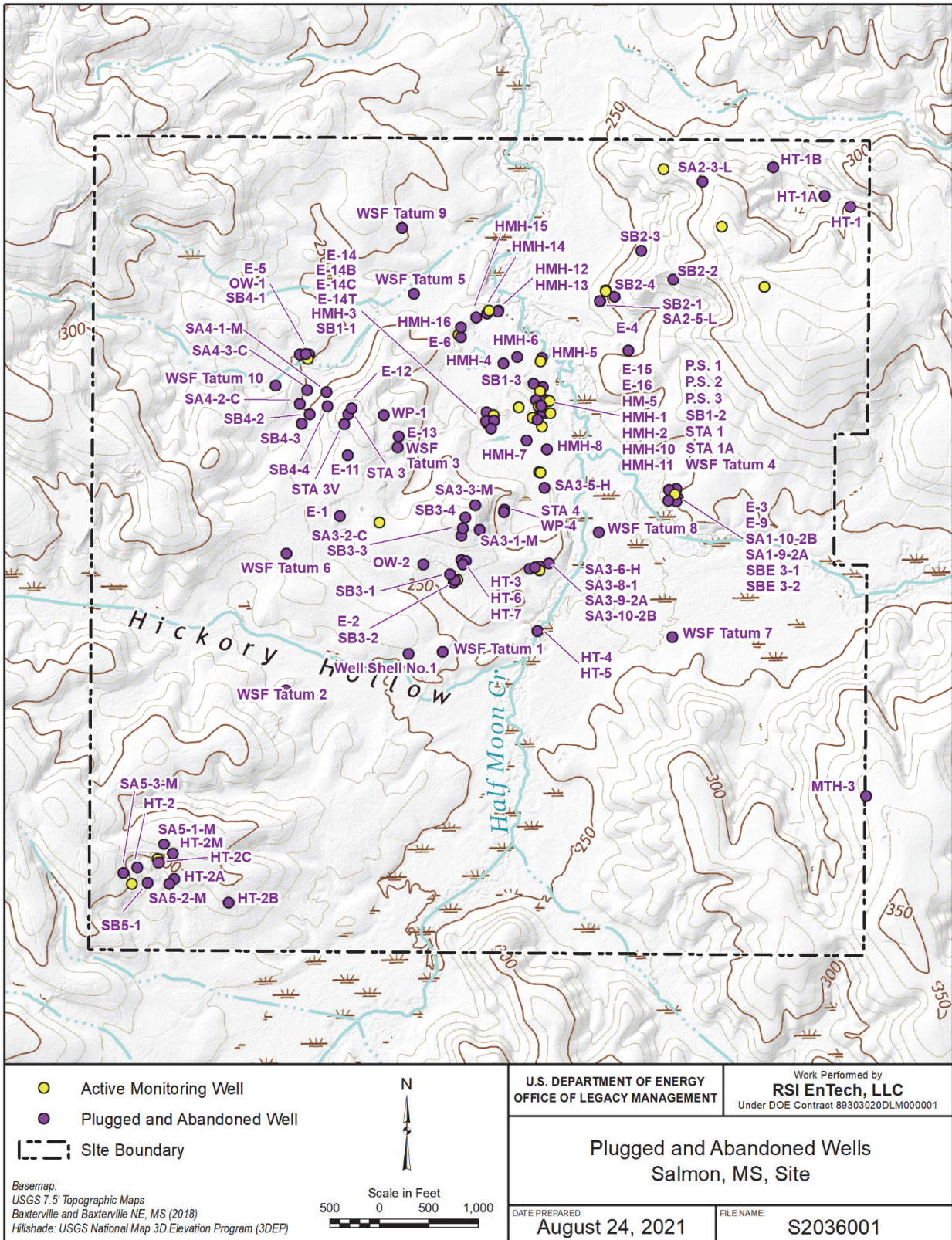


Figure B-2. Plugged and Abandoned Wells on the Salmon Site