June 8, 2016

Task Assignment 104
Control Number 16-0686

U.S. Department of Energy
Office of Legacy Management
ATTN: Jalena Dayvault
Site Manager
2597 Legacy Way
Grand Junction, CO 81503

SUBJECT: Contract No. DE-LM0000421, Navarro Research & Engineering, Inc. (Navarro)
Task Assignment 104 LTS&M-Nevada Off Sites and Monticello Site
Long-Term Surveillance and Maintenance Plan for the Gnome-Coach, New Mexico, Site

REFERENCE: Task Assignment 104, 1-104-1-04-617, Gnome-Coach, New Mexico, Site

Dear Ms. Dayvault:

Enclosed are five copies of the *Long-Term Surveillance and Maintenance Plan for the Gnome-Coach, New Mexico, Site* for distribution.

Please contact Rick Findlay at (970) 248-6419 if you have any questions.

Sincerely,

Kenneth E. Karp
LMS Task Assignment Manager

KEK/bkb

Enclosures

cc: (electronic)
Christina Pennal, DOE
Beverly Cook, Navarro
Richard Findlay, Navarro
Kenneth Karp, Navarro
Sam Marutzky, Navarro
File: GNO 505.15

LMS/GNO/S12934-0.0

Long-Term Surveillance and Maintenance Plan for the Gnome-Coach, New Mexico, Site

June 2016

Approved for public release; further dissemination unlimited

U.S. DEPARTMENT OF ENERGY | Legacy Management

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Abbreviations

amsl	above mean seal level
bgs	below ground surface
BLM	U.S. Bureau of Land Management
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DOE	U.S. Department of Energy
DRI	Desert Research Institute
EPA	U.S. Environmental Protection Agency
ft	feet (foot)
ICs	institutional controls
LM	Office of Legacy Management
LTHMP	Long-Term Hydrologic Monitoring Program
LTSMP	Long-Term Surveillance and Maintenance Plan
m/day	meters per day
NMED	New Mexico Environment Department
QSM	*Department of Defense (DoD) Department of Energy (DOE) Consolidated Quality Systems Manual (QSM) for Environmental Laboratories*
USGS	U.S. Geological Survey
WIPP	Waste Isolation Pilot Plant

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Executive Summary

The U.S. Department of Energy Office of Legacy Management (LM) prepared this Long-Term Surveillance and Maintenance Plan (LTSMP) for the Gnome-Coach, New Mexico, Site (the Gnome site). The Gnome site was the location of a 3-kiloton-yield underground nuclear test in 1961 and a groundwater tracer test that used four dissolved radionuclides as tracers in 1963. Site reclamation and remediation began after the underground testing and was conducted in several phases at the site. The New Mexico Environment Department issued a Conditional Certificate of Completion in September 2014, which documents that surface remediation activities have been completed in accordance with the Voluntary Remediation Program. This LTSMP documents LM's operational plan and commitment to long-term stewardship of the site. It summarizes the site's regulatory framework, geologic and hydrogeologic setting, operational and environmental restoration, and provides a surveillance and maintenance plan for future monitoring of the site.

The surveillance and maintenance plan is designed to ensure that institutional controls (ICs) provide long-term protectiveness of the site. It includes the plan for monitoring groundwater (radioisotope and hydraulic head), inspecting the site and maintaining the ICs, evaluating and reporting data, and documenting the records and data management processes for the site. Groundwater monitoring and site inspection results will be included in annual Groundwater Monitoring and Inspection Reports. These reports and other reports associated with the Gnome site will continue to be available on the LM public website at http://www.lm.doe.gov/gnome/Sites.aspx and copies distributed to stakeholders per the distribution list in Appendix F. Data collected during the monitoring events (analytical and water levels) will also continue to be available on the GEMS (Geospatial Environmental Mapping System) website at http://gems.lm.doe.gov/#site=GNO.

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1.0 Introduction

The U.S. Department of Energy (DOE) Office of Legacy Management (LM) prepared this Long-Term Surveillance and Maintenance Plan (LTSMP) for the Gnome-Coach, New Mexico, Site (the Gnome site). The Gnome site is approximately 25 miles east of Carlsbad in Eddy County, New Mexico (Figure 1). The site was the location of a 3-kiloton-yield underground nuclear test and radioisotope groundwater tracer test. The tests resulted in residual contamination and post-detonation features that require long-term oversight. Long-term responsibility for the site was transferred from the DOE National Nuclear Security Administration Nevada Site Office to LM on October 1, 2006. Responsibilities include surveillance, monitoring, and maintenance of institutional controls (ICs) as part of the long-term stewardship of the site. Long-term stewardship is designed to ensure protection of human health and the environment.

The U.S. Atomic Energy Commission (predecessor agency to DOE) acquired the site through a land withdrawal from the U.S. Bureau of Land Management (BLM) in the early 1960s for underground nuclear testing through the Plowshare Program (AEC 1962). The Plowshare Program was a research and development initiative started in 1957 to determine the technical and economic feasibility for peaceful applications of nuclear energy. The land was withdrawn by Public Land Order 2526, which was granted October 26, 1961, and published in the *Federal Register* (61-10429, November 1, 1961), which is provided as Appendix A. The withdrawal comprised two parcels of land containing approximately 680 acres. The larger parcel (640 acres) is where the underground nuclear test occurred and consists of Section 34, Township 23 South, Range 30 East. The smaller parcel (40 acres) was used for observation during the underground test and is in Section 10, Township 23 South, Range 30 East. The 40-acre parcel is in the process of being relinquished back to BLM. The focus of this LTSMP is the 640-acre parcel identified as the Gnome site, where the underground nuclear test and radioisotope tracer test occurred. Figure 1 shows the two parcels that compose the land withdrawal.

1.1 Purpose

This LTSMP 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 LTSMP includes the following:

- Communicate the operational plan for managing the site to stakeholders (this includes the New Mexico Environment Department [NMED], BLM, and DOE Carlsbad Field Office);
- Summarize the underground nuclear testing and status of environmental restoration activities (Sections 2.1 and 2.2);
- Document the ICs and land use for the site (Section 2.3);
- Describe the plan for monitoring, completing site inspections, and maintaining the ICs (Sections 3.1 and 3.2);
- Provide the process for evaluating and reporting site-specific information (Section 3.3); and
- Inform the public on the process for maintaining site records (Section 3.4).

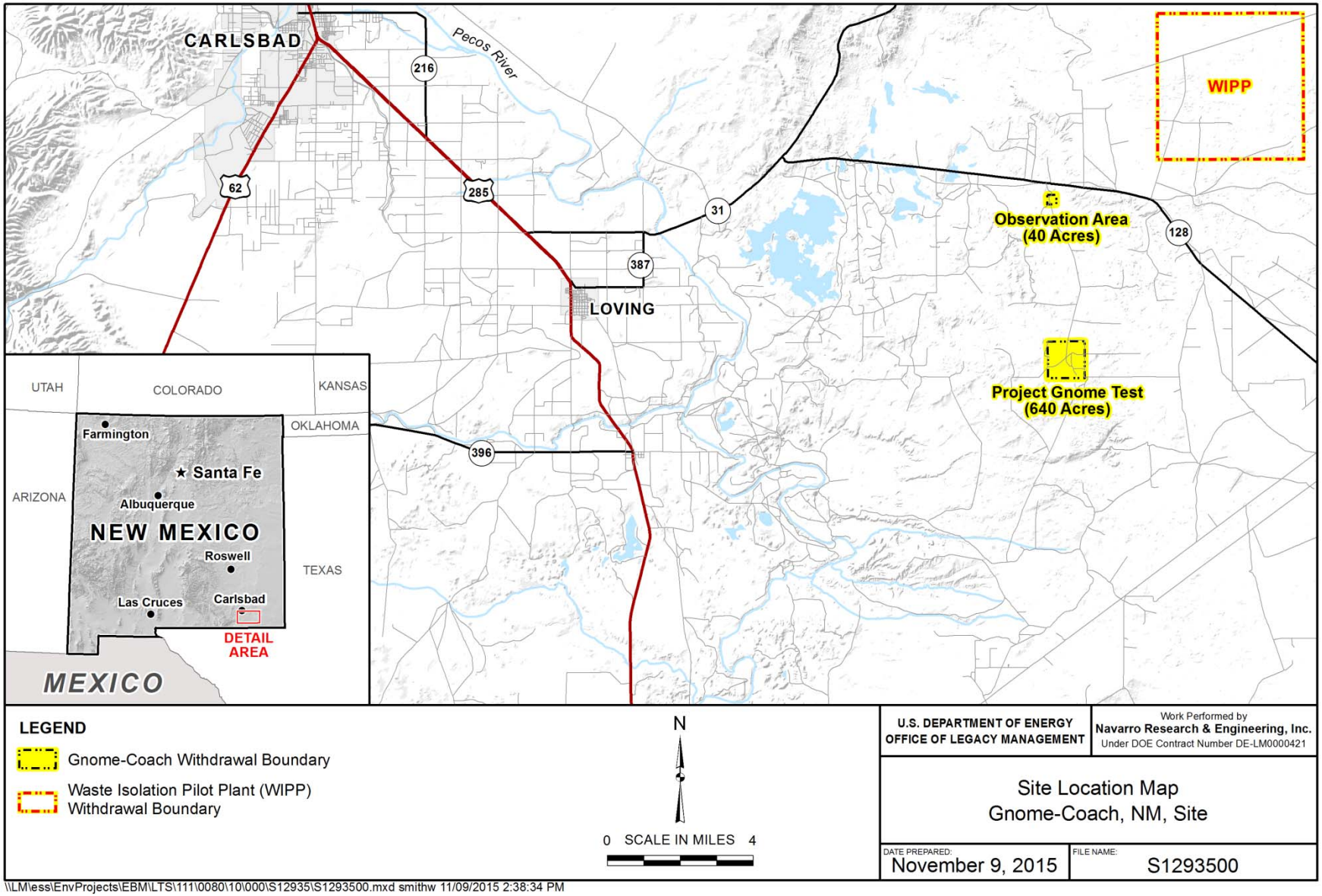

Figure 1. Location Map for the Gnome-Coach, New Mexico, Site

1.2 Regulatory Framework

Surface and subsurface contamination resulted from the underground nuclear test, post-test drilling, and groundwater tracer test performed at the Gnome site. DOE maintains responsibility for radioactive material at the site under authority of the Atomic Energy Act of 1954, as amended under Title 42 *United States Code* Section 2011 (42 USC 2011). DOE has conducted voluntary cleanup through a Voluntary Remediation Agreement with NMED. Section 2.2.1 provides information on cleanup actions completed under this agreement.

LM established a data-sharing arrangement with the DOE Carlsbad Field Office in 2010 to share data from the Gnome site and Waste Isolation Pilot Plant (WIPP) facility. The arrangement was established as a collaborative effort to enhance future monitoring at the sites. It includes sharing of well site data and support for future subsurface investigations at the Gnome site (DOE 2010).

1.3 Geologic and Hydrologic Setting

The Gnome site is in the northern part of the Delaware Basin, a deep, oval, sedimentary basin 75 miles wide and 135 miles long in southeastern New Mexico (USGS 1962). The geology and hydrology of this basin have been extensively studied because of oil and gas exploration, potash mining, and operation of the WIPP about 8.5 miles (measured from the approximate center of each withdrawal boundary) north-northeast of the site (Figure 1). The basin lithology is comprised of crystalline sedimentary rocks overlain by evaporites that were deposited during the late Permian Period when a warm shallow sea was blocked from seawater circulation. As the seawater evaporated, the transition from a deep marine environment (limestone and dolomite) to a shallow marine and later dry environment (gypsum, halite, anhydrite, and potassium salts [potash]) resulted in several thousand feet of deposits accumulating on the basin floor (USGS 1962). The basin deposits and the lithostratigraphic units they compose are almost flat to gently dipping to the east and southeast in the vicinity of the Gnome site (USGS 1962).

The lithostratigraphic units beneath the Gnome site were defined during the pretest drilling and mining of the emplacement shaft (Figure 2). Figure 3 is a cross section that shows these units with the emplacement shaft, drift, and cavity that resulted from the underground nuclear detonation. The Salado Formation, in which the detonation took place, is an approximately 1,500-foot (ft)-thick bed of halite with potassium minerals and minor amounts of sandstone, siltstone, shale, anhydrite, and gypsum that formed at the site during the Permian Period (USGS 1968). Overlying the Leached Member of the Salado Formation are five thinly bedded members of the Rustler Formation. In ascending order, these are the Lower Member (now referred to as Los Medanos Member), which primarily consists of clay and silt with some gypsum and anhydrite; the Culebra Dolomite Member; the Tamarisk Member, which consists of anhydrite and gypsum; the Magenta Member, which consists of silty dolomite; and the Forty-Niner Member, a mixture of gypsum and anhydrite (USGS 1968). The youngest Permian sequences in the site area are the thinly bedded siltstones of the Dewey Lake Redbeds Formation. Overlying the Dewey Lake Redbeds Formation are the Gatuna Formation, which was deposited after the Permian Period, and the alluvial sand deposits, which are Quaternary deposits (USGS 1968).

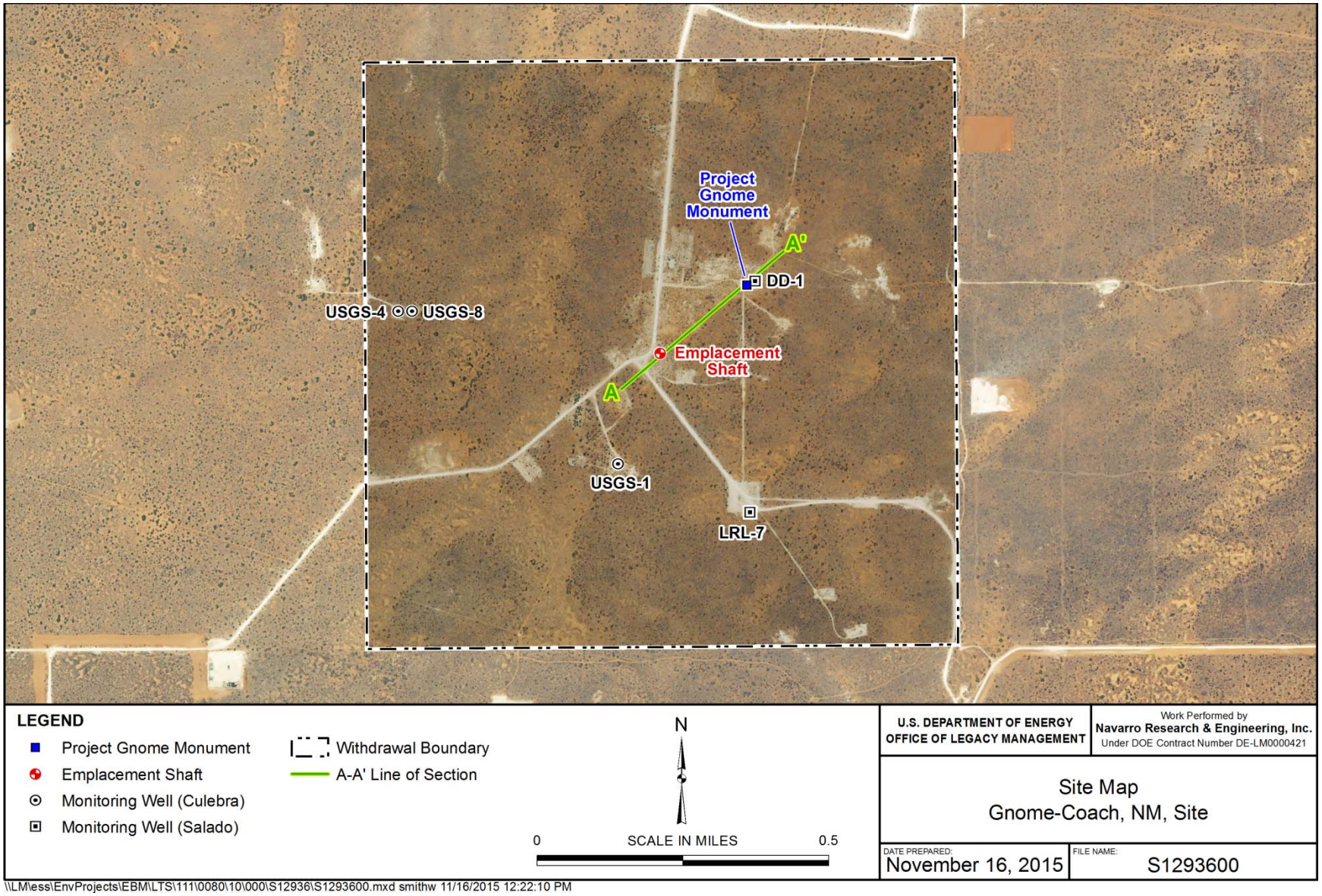

Figure 2. Features at the Gnome-Coach, New Mexico, Site

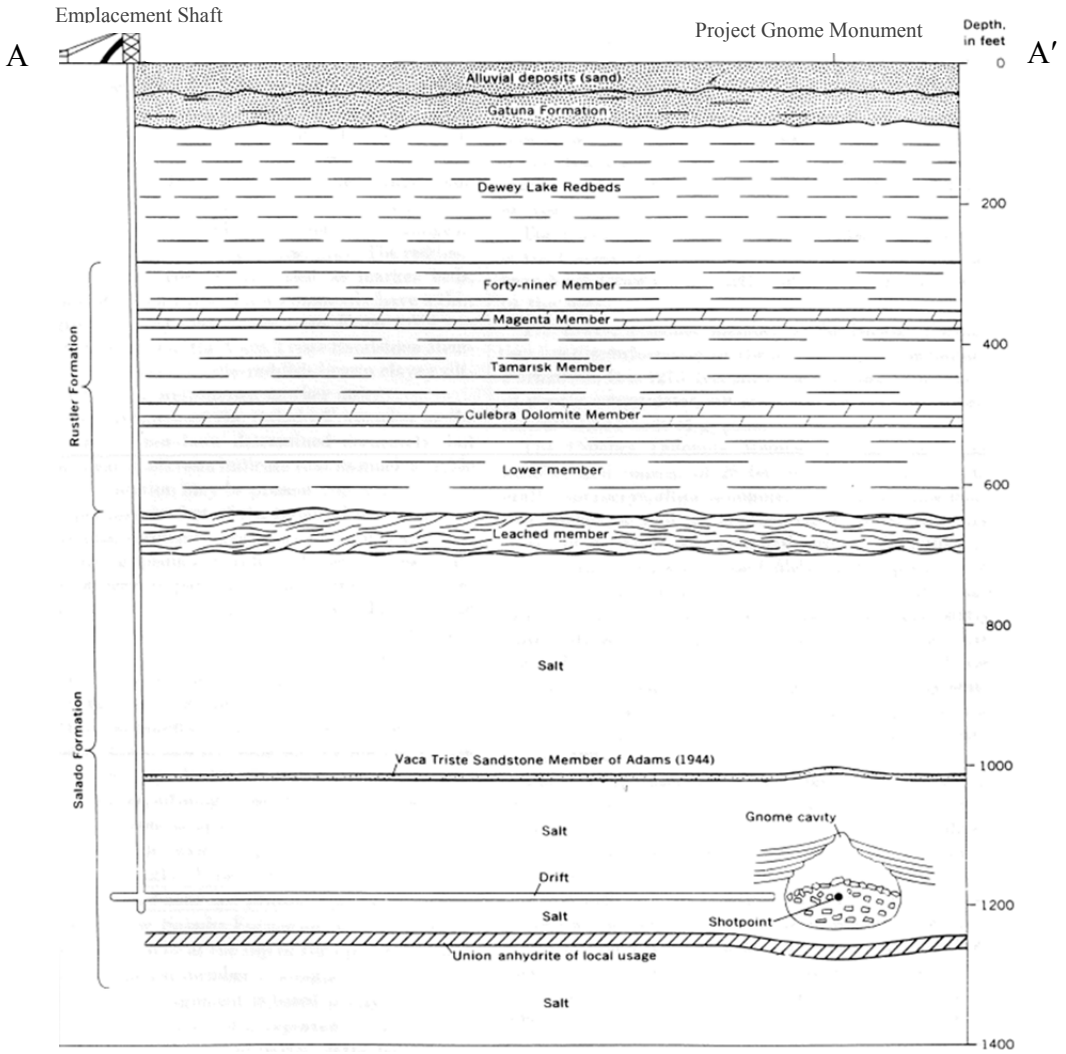

Figure 3. Stratigraphic Cross Section A-A' at the Gnome-Coach Site

The Culebra Dolomite Member of the Rustler Formation is a widespread, laterally continuous, fractured carbonate aquifer in which the radioisotope groundwater tracer test took place. It is approximately 30 ft thick and is present at depths ranging from approximately 460 to 515 ft below ground surface (bgs) at the site (Figure 3). The Culebra is the most prolific aquifer in the vicinity of the site; despite the poor water quality associated with high concentrations of dissolved solids (Mercer 1983), ranchers access it to provide water to their livestock throughout the area. Water level data collected from wells completed in the Culebra (Figure 2; USGS-1, USGS-4, and USGS-8) prior to and after the underground test indicate that the Culebra aquifer is confined (under artesian conditions) at the site. These data (historical and recent) also indicate that the aquifer is sensitive to pressure changes. Water level responses were seen in the observation wells (USGS-1 and USGS-4) immediately following the underground nuclear test (USGS 1962), and more recently, observation wells USGS-4 and USGS-8 responded to changes in the pumping of groundwater from well USGS-1 (DOE 2016). Groundwater within the Culebra moves through fractures in the dolomite, which is fairly permeable at the site, with hydraulic conductivities measuring approximately 4 meters per day (m/day) (USGS 1971). The hydraulic conductivity generally decreases to the northeast near the WIPP facility, ranging from 0.27 to

2.7×10^{-3} m/day (DOE 2012b). It is reported that groundwater flow within the Culebra near the WIPP facility is generally to the south (DOE 2012a).

The Salado Formation is characterized as a regional aquiclude because of the hydraulic properties of the bedded halite within the formation (DOE 2012b). The plastic nature of salt under pressure of its own weight and that of overlying units results in movement over time that closes openings (fractures and void spaces) within the deposit, making any continuous movement of water through the formation highly unlikely. Permeability testing conducted in the Salado Formation near the WIPP facility measured hydraulic conductivities that were less than 6.5×10^{-9} m/day (DOE 2012b). The low permeability, low porosity, and plastic nature of salt are characteristics that supported the determination that the bedded halite of the Salado Formation is an optimal geologic material to host a nuclear waste repository (SNL 1997). These same characteristics also limit the transport potential of any residual contamination associated with the Gnome site detonation cavity, and the assumption is that the detonation cavity and drifts will close over time. Fluids associated with the Salado Formation occur mainly as small fluid inclusions in the halite crystals and also occur between crystal boundaries (interstitial fluid) of the massive crystalline salt formation; fluids also occur in clay seams and anhydrite beds. Wastes were mixed with water and injected into the test cavity for disposal during surface cleanup activities (Section 2.2). Fluid levels in the detonation cavity are monitored by the re-entry well DD-1 and in the Coach drift by well LRL-7, both of which are in the Salado Formation. Hydraulic head data collected at the Gnome site from 2008 through 2015 are displayed as hydrographs in the *2015 Groundwater Monitoring and Inspection Report, Gnome-Coach, New Mexico, Site* (DOE 2016).

2.0 Site Information

The following sections summarize the underground nuclear testing (site operational history), decommissioning and environmental restoration activities, and long-term stewardship (ICs and land use) of the site. Table 1 provides a chronology of activities that are considered significant to the Gnome site history.

2.1 Underground Nuclear Testing (Site Operational History)

The purpose of the underground nuclear test, identified as Project Gnome, was to study the possibility of converting the energy from nuclear detonations into electricity, investigate the production and retrieval of radioisotopes, measure neutron activation cross sections of specific isotopes, collect data on the characteristics of nuclear explosions in salt formations, and collect data for use in future Plowshare programs (AEC 1962). Preparation for the test began in 1958 and involved multiple agencies. U.S. Geological Survey (USGS) installed several wells and boreholes to assess the geologic and hydrologic conditions at the site. The site was determined to be suitable for the experiment, and a 10 ft diameter vertical emplacement shaft was excavated to a depth of 1,216 ft bgs (Figure 2). A horizontal drift was mined, extending from the bottom of the shaft 1,116 ft to the northeast and ending in a hook shape. The hook shape was designed for placement of the nuclear device and was intended to be self-sealing following the detonation. The nuclear test was performed at a depth of 1,184 ft bgs in the Salado Formation on December 10, 1961 (Figure 3). The device had a reported yield of 3 kilotons, and immediately following the detonation, close-in stemming materials failed and gases from the detonation cavity vented to the atmosphere via the horizontal tunnel and emplacement shaft (AEC 1962). The cavity that resulted from the detonation has dimensions that are well documented because scientists entered the cavity 5 months after the test in May 1962. Post-test drilling operations and preparations for another underground nuclear test, identified as Project Coach, began shortly after the Gnome test. The emplacement shaft was restored and deepened to a depth of 1,284 ft bgs, and a second horizontal drift was mined 1,945 ft southeast from the shaft (AEC 1969). The Coach experiment was initially scheduled for 1963 but was canceled and never executed.

No additional underground nuclear detonations occurred at the site, but in February and March 1963, USGS conducted a groundwater tracer test, injecting four dissolved radionuclides—tritium, iodine-131, strontium-90, and cesium-137—into the Culebra Dolomite (Beetem and Angelo 1964). The purpose of the tracer test was to estimate the dispersion coefficient and effective porosity of the Culebra for use in evaluating the potential movement of radionuclides (Beetem and Angelo 1964). The tracer test was conducted between wells USGS-4 and USGS-8, which are approximately 3,100 ft west of the Project Gnome monument located at surface ground zero (Figure 2). The tracer test experiment was performed using USGS-4 as the extraction well and USGS-8 as the injection well. The extracted groundwater was mixed with the radioisotope tracer solution and injected into well USGS-8 at the same rate as the extraction to create a steady-state flow field between the wells. Samples were collected from the extraction well USGS-4 to obtain radioisotope concentrations over time to improve the understanding of the transport behavior of the radioisotopes in a fractured environment.

Table 1. Site Chronology with Document Reference

Date	Description of Activity	Document Reference
1958 to 1961	Project Gnome pretest activities were conducted.	AEC 1962
October 26, 1961	Withdrawal of Gnome-Coach site authorized in Public Land Order 2526 by U.S. Department of the Interior Bureau of Land Management.	FR 1961 (Appendix A of this LTSMP)
December 10, 1961	Project Gnome underground nuclear test is conducted, and immediately following the detonation, gases vent to the atmosphere through the emplacement shaft.	AEC 1962
December 1961 to July 1963	Post-test drilling activities, excavation of drifts, and rehabilitation of the emplacement shaft brought contaminated material (salt muck) to the surface. The detonation cavity was entered in May 1962.	AEC 1969
February and March 1963	USGS conducted a tracer test between wells USGS-4 and USGS-8 using four dissolved radionuclides as tracers.	Beetem and Angelo 1964
October 1963	Project Coach canceled and site placed on "Caretaker Standby Status."	AEC 1969
March 1968	Authorization provided to proceed with deactivation and site disposal.	AEC 1969
1968–1969	An initial site cleanup was conducted and included decommissioning, plugging wells, and restoration activities. The wells USGS-1, USGS-4, and USGS-8 were retained for groundwater monitoring.	AEC 1969
1972 to 1973	A site reconnaissance identified contaminated debris that had been exposed through weathering. Additional evaluations were conducted to reassess public safety and environmental conditions on and near the site.	REECO 1973
1972 to 2008	EPA conducts annual Long-Term Hydrological Monitoring Program.	EPA 1972
1977–1978	A second cleanup was conducted that included drilling well DD-1 into the cavity, removing temporary plugs from wells LRL-7 and SR-2A, and disposing contaminated material as a slurry into the cavity through reentry wells (SR-2A and DD-1).	REECO 1981
April 1988	A Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) preliminary assessment was conducted to determine CERCLA hazard ranking. The Hazard Ranking System score was not high enough for the site to be included on the National Priorities List.	DOE/NV 1988
June 1993	DOE conducted a Class III cultural resources survey, a floodplains and wetlands survey, and a sensitive species survey.	DOE/NV 1993
1992 to 1995	EPA and the Environmental Evaluation Group conducted independent sampling activities at the site and detected areas of elevated radioactivity.	EPA 1994
August 1994	*Scoping Calculations for Groundwater Transport of Tritium from the Gnome Site, New Mexico,* study conducted by Desert Research Institute (DRI).	DRI 1994
August 1996	*Evaluation of the Radionuclide Tracer Test Conducted at the Project Gnome Underground Nuclear Test Site, New Mexico,* study conducted by DRI.	DRI 1996a
September 1996	*Assessment of Hydrologic Transport of Radionuclides at the Project Gnome Underground Nuclear Test Site, New Mexico,* study conducted by DRI.	DRI 1996b
May 1998	*A Preliminary Human Health Risk Assessment of the Gnome Site, New Mexico,* study conducted by Sandia National Laboratories.	SNL 1998
2002–2003	A site characterization work plan was developed to assess the extent of any remaining contamination at the site. Field investigations focused on characterization and removal of contaminated soils at the surface and near surface (less than 20 ft bgs).	DOE/NNSA 2002
May 2004	The field characterization results were summarized in a Corrective Action Investigation Report for the surface that was submitted to NMED for comment.	DOE/NNSA 2004
December 2005	The Gnome site was approved for the Voluntary Remediation Program through a Voluntary Remediation Agreement with NMED in June 2005, and a Completion Report for the surface was submitted to NMED.	DOE/NNSA 2005
October 1, 2006	Gnome-Coach site was transferred from DOE Office of Environmental Management, National Nuclear Security Administration, to LM.	DOE 2007
2008 to present	LM evaluated the Long-Term Hydrologic Monitoring Program and the associated monitoring network. The annual monitoring focused on the onsite wells.	DOE 2011
December 2009	LM entered into an arrangement with the DOE Carlsbad Field Office to share data from the Gnome-Coach site and WIPP facility.	DOE 2010
February 2010	DRI completed an evaluation of the tracer test and summarized the results in a Value of Information Analysis report.	DRI 2010
April 2010	LM collected logs (borehole deviation, gamma ray, and video to assess condition of the well casing) from wells USGS-4, USGS-8, and USGS-1.	DOE 2011
February and March 2011	LM acquired seismic reflection data along seven lines on and near the site (totaling about 14 miles).	DOE 2013
September 25, 2014	LM received a Conditional Certificate of Completion for the surface and shallow subsurface of the Gnome-Coach site.	NMED 2014

2.2 Site Decommissioning and Environmental Restoration Activities

The site was on Caretaker Standby Status from October 1963 until March 1968, when planning began for the site decontamination and decommissioning that was conducted between 1968 and 1969 (AEC 1969). During this phase of the cleanup, liquid waste was pumped into the cavity through existing vent holes, contaminated material was dumped into the emplacement shaft and the Coach drift through existing drill holes, uncontaminated equipment was moved offsite, and drill holes were plugged except those retained for use as groundwater monitoring wells (AEC 1969). At the completion of the cleanup activities, the emplacement shaft was reinforced with a concrete plug to secure the shaft (REECO 1969).

In 1972, a reconnaissance of the area revealed contaminated material that remained from the post-test drilling operations and had become exposed through weathering (REECO 1973). Information from the reconnaissance was used to initiate a second cleanup from 1977 to 1979. This cleanup included excavating contaminated soils for disposal into the detonation cavity, performing general housekeeping activities, and conducting extensive post-cleanup sampling. The excavated material (approximately 35,890 cubic yards of soil and salt) was injected into the detonation cavity as a slurry through the reentry wells SR-2A and DD-1 (REECO 1981). Remaining contaminated material was transported to the Nevada National Security Site (formerly called the Nevada Test Site). Results from the post-cleanup sampling showed that radionuclide concentrations averaged over any area of 0.25 hectare (0.62 acre) did not exceed the established radiological release criteria (REECO 1981). All re-entry wells were plugged and abandoned except LRL-7 and DD-1, which were retained for monitoring (REECO 1981).

Two limited surveys were conducted after the site restoration was completed in 1979. In 1988, a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) preliminary assessment was completed for the site. The hazard ranking score indicated that the site was low risk and not eligible for listing on the National Priorities List (DOE/NV 1988). In 1993, in support of the National Environmental Policy Act process, DOE conducted a floodplains and wetlands survey, sensitive species survey, and a Class III cultural resources survey to identify potentially sensitive areas before conducting a field characterization effort. It was determined that the potential for adverse impacts to sensitive species, wetlands, or cultural resources at the site was low (DOE/NV 1993).

2.2.1 Surface

The surface is defined as surface and shallow subsurface soils (less than 20 ft bgs) that may have been impacted as a result of the underground nuclear test and post-test drilling activities. DOE conducted an additional characterization in 1992 to assess the extent of any radioactive contamination at the surface of the site (EPA 1994). This characterization included a radiological survey and soil sampling conducted by the U.S. Environmental Protection Agency (EPA) and the Environmental Evaluation Group in 1994 and 1995, respectively. The results identified areas where radioactivity exceeded background levels, but the data were too limited to adequately assess the surface conditions. A review of historical radiological data identified data gaps for shallow subsurface soils at several operational areas. It was also determined that the historical restoration efforts had not adequately defined the potential for, and extent of, chemical contamination in surface and shallow subsurface soils at the site (DOE/NNSA 2002).

The DOE National Nuclear Security Administration Nevada Site Office developed a Site Characterization Work Plan in 2002 to assess the extent of any remaining contamination at the site. The field activities were conducted from February through June 2002 and in May 2003, and focused on surface and near-surface soils (less than 20 ft bgs) at 16 operational areas and 21 drill pads used during and after the underground nuclear test. Radiological surveys were conducted to determine background conditions and identify areas of surface radiological contamination. Soil samples were also collected and analyzed to define the extent of any remaining contamination. Soils that were identified as exceeding the established action levels were excavated and removed for disposal. This included approximately 18 cubic yards of diesel-contaminated soil. The radiological surveys identified areas where radiological contaminants of potential concern (cesium-137, tritium, and strontium-90) were above background levels, but none of the concentrations exceeded the action levels determined to be safe for the public (DOE/NNSA 2004). Results of the field investigation are summarized in a Corrective Action Investigation Report (DOE/NNSA 2004). After discussions with the State of New Mexico, it was decided that the site would be administered by NMED under a Voluntary Remediation Agreement (NMED 2005). DOE prepared a Completion Report for the surface (DOE/NNSA 2005) in accordance with the Voluntary Remediation Program, and a Conditional Certificate of Completion documents that surface remediation has been successfully completed in accordance with the Voluntary Remediation Agreement (NMED 2014). The Conditional Certificate of Completion also specifies ongoing requirements that must be maintained (Section 3.2). Appendix B provides a copy of the Conditional Certificate of Completion.

2.2.2 Subsurface

The subsurface is defined as groundwater and subsurface materials (more than 20 ft bgs) impacted by the underground nuclear test, groundwater tracer test, and site decommissioning activities. The sources of contamination are remnant radionuclides in the Culebra Dolomite near the tracer test wells USGS-4 and USGS-8, and the detonation cavity, drifts, and emplacement shaft. DOE initiated subsurface activities in 1972 that included groundwater sampling and monitoring, which EPA implemented as part of the Long-Term Hydrologic Monitoring Program (LTHMP). Groundwater samples were collected annually from the onsite wells (USGS-1, USGS-4, USGS-8, and reentry wells LRL-7 and DD-1) and designated offsite locations during the LTHMP. The samples were analyzed for cesium-137, strontium-90, and tritium (using conventional and electrolytic enrichment methods) (EPA 1972). EPA summarized the results in an annual sampling and analysis report.

LM evaluated the LTHMP and associated monitoring network after assuming responsibility for the sampling in 2008. The purpose of the evaluation was to determine the effectiveness of the current monitoring network and determine future monitoring at the site. The evaluation considered potential transport pathways for contaminant migration from the detonation zone (cavity, drifts, and emplacement shaft) and tracer test to surrounding receptors. Analytical results from more than 30 years of monitoring indicate that groundwater at sample locations several miles outside the land withdrawal boundary were not impacted by nuclear-test-related or tracer-test-related contamination. For this reason, in 2010, locations several miles outside the land withdrawal were removed from the annual sampling (DOE 2011). The wells within the land withdrawal boundary continue to be monitored for the radioisotopes of interest (tritium, cesium-137, and strontium-90). Water level data indicated that pumping in well USGS-1

completed in the Culebra Dolomite influenced water levels in wells USGS-4 and USGS-8, also completed in the Culebra (DOE 2013). BLM has used well USGS-1 since the 1980s as a point of diversion to provide water for livestock belonging to area ranchers (water right C-01901). No radioisotopes of interest have been detected in well USGS-1 since monitoring began in 1972. Results from the annual groundwater monitoring (analytical and hydraulic head) have been summarized and included in annual Groundwater Monitoring Reports since 2009.

Wells USGS-1, USGS-4, and USGS-8 were logged in April 2010 to obtain borehole deviation data from wells USGS-1 and USGS-4, natural gamma data from wells USGS-4 and USGS-8, and downhole video logs from wells USGS-4 and USGS-8. The well logging results are summarized in the 2010 Groundwater Monitoring and Inspection Report (DOE 2011). A seismic reflection survey was conducted at the site in February and March 2011. Seven seismic reflection profiles totaling approximately 13.9 miles were acquired to assist in the interpretation of subsurface conditions (geology and hydrogeology) at and near the site. The seismic survey results are summarized in the 2012 Groundwater Monitoring and Inspection Report (DOE 2013).

2.3 Long-Term Stewardship (Institutional Controls and Land Use)

The term "institutional controls," or "ICs," is used to broadly define the instruments (documents) and mechanisms (physical features) that are maintained to ensure long-term protectiveness of a site (DOE 2015). ICs are part of the final remedy for the Gnome site, which was approved by NMED through a Conditional Certificate of Completion. Surface clean-up activities have been completed, but subsurface contamination (more than 20 ft bgs) remains in the emplacement shaft, drift, detonation cavity, and Culebra Dolomite near the trace test wells USGS-4 and USGS-8. The ICs are designed for the current land use and to minimize the potential exposure to any remaining contamination at the site. The restrictions associated with these ICs are provided in Table 2 and documented in the Conditional Certificate of Completion. Appendix B provides a copy of the Conditional Certificate of Completion.

Gnome site lands are under federal jurisdiction and administered by BLM. The site is withdrawn from all forms of appropriation associated with mining laws and leasing through Public Land Order 2526 (*Federal Register* 61-10429, November 1, 1961), which prohibits future oil and gas leasing or mineral claims at the site. The withdrawal is currently being used for livestock grazing, ranching, and recreation and is designated in BLM's Resource Management Plan as a special management area that has no other surface uses (BLM 1988, amended 1997). To maintain protectiveness of the site, the restrictions specific to ground-disturbing activities were provided to BLM, and to increase their visibility, were included in the Resource Management Plan currently being updated for the Carlsbad Field Office. These restrictions allow BLM to make surface improvements with provisions for avoiding surface features (emplacement shaft, buried debris/salt muck, and monitoring wells) that remain at the site. Table 2 provides the ICs in effect for the Gnome site. Appendix A provides a copy of the *Federal Register* Notice for Public Land Order 2526.

Table 2. Gnome Site Institutional Controls

Type	Instrument/Mechanism	Restriction	Implementation
Administrative	Public Land Order 2526 (Federal Land Withdrawal)	Prohibits oil and gas development and mining in Section 34	Public Land Order 2526
	Voluntary Remediation Agreement (Conditional Certificate of Completion)	Requires current land uses (livestock grazing, ranching, and recreation) be maintained for Section 34	LTSMP and BLM Resource Management Plan
		Prohibits drilling, excavating, or other activities at any depth within 40 lateral feet of the concrete cap that protects the emplacement shaft	
		Prohibits drilling, excavating, or other activities that would disturb materials deeper than 20 feet below surface of Section 34	
Physical	Signs and Monument[a]	Requires the public be notified that ground-disturbing activities are not allowed in Section 34 without permission from U.S. Government	LTSMP and BLM database[b]
	Concrete Cap Covering Shaft	Restricts access to buried material in the shaft	
	Monitoring Well Boxes	Restricts access to the wells and groundwater	
Informational[c]	BLM Resource Management Plan (Special Management Area Designation)	Withholds access to surface and subsurface resources, but allows public access to Section 34	BLM Resource Management Plan

[a] Signs installed around the emplacement shaft and perimeter of the site provide LM contact information (website and 24-hour telephone number). A photograph of a sign near the emplacement shaft is provided as Appendix C.
[b] Surface features that remain at the site (emplacement shaft, buried debris/salt muck, and wells) were provided to BLM (as shape files) for inclusion in their database to increase their visibility and prevent inadvertent intrusion.
[c] Informational ICs include the Gnome site fact sheet, site records, and the Geospatial Environmental Mapping System that are maintained on the LM public website, which is discussed in Section 3.3.

3.0 Surveillance and Maintenance Plan

The surveillance and maintenance plan is designed to ensure protection of human health and the environment. It includes the plan for monitoring groundwater (radioisotope and hydraulic head), inspecting the site and maintaining the ICs, evaluating and reporting data, and documenting the records/data management process for the site. This plan will be reviewed if site conditions change and will be revised if new data become available that changes the understanding of the site conditions.

3.1 Groundwater Monitoring (Sampling and Water Levels)

The monitoring well network consists of three wells completed in the Culebra Dolomite and two wells completed in the Salado Formation (Table 3). The well network is designed to monitor the sources of radionuclide contamination (underground nuclear test and tracer test) and the point of access (well USGS-1). The wells completed in the Culebra Dolomite (USGS-1, USGS-4, and USGS-8) will be sampled annually for the radioisotopes of interest (tritium, cesium-137, and strontium-90). Wells completed in the Salado Formation (LRL-7 and DD-1) will be sampled less frequently and at the discretion of LM. The frequency of the sampling is based on available data regarding current and expected future site conditions, an assessment of groundwater velocities for the monitored unit, and likelihood for potential access to the monitored unit. Since the Culebra Dolomite is the most likely access path and has the highest groundwater velocities, monitoring wells completed in the Culebra (USGS-1, USGS-4, and USGS-8) are sampled at an increased frequency relative to the wells completed in the low-permeability Salado Formation. Table 3 provides well location information, zone of completion (top and bottom) with elevations, and geologic unit monitored by wells in the monitoring network.

Table 3. Gnome Site Monitoring Well Network

Well Identification	Northing (ft)	Easting (ft)	TOC Elevation (ft amsl)	TSZ Elevation (ft amsl)	BSZ Elevation (ft amsl)	Screen/Open Interval Length (ft)	Formation/Unit Monitored
USGS-1	458072.04	643320.38	3,426.60	2,907	2,875	32	Culebra Dolomite
USGS-4	459450.73	641330.62	3,413.72	2,940	2,907	39	
USGS-8	459452.32	641455.76	3,411.25	2,947	2,915	32	
LRL-7	457635.64	644423.65	3,442.52	2,127[a]	2,117[a]	10	Salado Formation
DD-1	459722.57	644468.67	3,397.49	2,259[a]	NM	Unknown	

Notes:
Coordinate System: New Mexico East Zone State Plane Coordinate System with horizontal data based on the North American Datum of 1927 and the vertical data based on the National Geodetic Vertical Datum of 1929.

[a] Elevations for LRL-7 and DD-1 have not been corrected for true vertical depth because borehole deviation corrections are not available for these wells.

Abbreviations:
amsl = above mean sea level
BSZ = bottom of screen zone, uncased/open interval, or perforated interval in feet above mean sea level
NM = not measured or unknown
TOC = top of casing elevation in feet above mean sea level
TSZ = top of screen zone, uncased/open interval, or perforated interval in feet above mean sea level

Water levels will be measured manually using an electric water level tape at all wells in the monitoring network (Table 3) during the scheduled sampling events and site inspections. Water levels may also be monitored more frequently using pressure transducers installed in select wells at the site. The water level data will be converted to hydraulic head. Hydrographs of the hydraulic head data will be maintained and evaluated to monitor the groundwater flow system. Past and future water level measurements will provide a historical record from which changes in groundwater elevations can be interpreted to further the understanding of the groundwater flow system. Table 4 provides the specifications for the monitoring and the monitoring frequency.

Table 4. Gnome Site Monitoring Specifications with Frequency

Well Identification	Purpose for Monitoring	Formation/Unit Monitored	Monitoring Frequency	
			Sampling	Water Levels
USGS-1	Point of Access	Culebra Dolomite	Annual	Annual
USGS-4	Tracer Test (detection monitoring)			
USGS-8				
LRL-7	Coach Drift (detection monitoring)	Salado Formation	Periodic	
DD-1	Detonation Cavity (detection monitoring)			

Implementation of the annual groundwater monitoring program includes using trained and qualified personnel and following established procedures. Water quality data will be collected in accordance with procedures specified in the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites* (LMS/PRO/S04351, continually updated) which adheres to EPA and ASTM International standards. This Sampling and Analysis Plan specifies procedures for data validation and requirements for sample collection, quality control samples, analytical methods and reporting limits, and field instrument calibration. Long-term stewardship of the site and all activities related to the annual surveillance, monitoring, and maintenance of the site comply with DOE Order 414.1C, *Quality Assurance*; applicable requirements of Title 10 *Code of Federal Regulations* Part 830 Subpart A, "Quality Assurance Requirements"; and American National Standards Institute/American Society for Quality (ANSI/ASQ) E4-2004, *Quality Systems for Environmental Data and Technology Programs: Requirements with Guidance for Use*.

3.1.1 Laboratory Analyses/Methods and Quality Assurance

The analytical laboratory will analyze samples for the radioisotopes of interest (tritium, cesium-137, and strontium-90) in accordance with accepted procedures that are based on the specified methods (Table 5). The required minimum detectable concentrations for the radioisotopes being monitored are established in the LM Basic Ordering Agreement Implementation Requirements document and are provided in Table 5. Samples have been and will continue to be analyzed for gamma-emitting radionuclides (using high-resolution gamma spectrometry), tritium, and strontium-90 (using conventional methods). Additional samples may be collected from well USGS-1 for tritium analysis using the electrolytic enrichment method.

Table 5. Gnome Site Radioisotopes of Interest with Laboratory Detection Levels

Radioisotope of Interest	Half-Life (years)	Measurement Method	Laboratory MDC (pCi/L)
Tritium	12.3	Liquid Scintillation Counting (LSC)	400
		LSC—Enriched Method	3
Cesium-137	30.2	Gamma Spectrometry	10
Strontium-90	28.8	Gas-Flow Proportional Counting	1

MDC = minimum detectable concentration required by the laboratory
pCi/L = picocuries per liter

Commercial laboratories provide analytical services in accordance with the *Department of Defense (DoD) Department of Energy (DOE) Consolidated Quality Systems Manual (QSM) for Environmental Laboratories* (updated annually) to ensure that data are of known, documented quality (DoD and DOE 2013). The QSM provides specific technical requirements, clarifies DOE requirements, and conforms to DOE Order 414.1C, *Quality Assurance*. The QSM is based on Volume 1 of The NELAC [National Environmental Laboratory Accreditation Conference] Institute (TNI) standards (September 2009), which incorporates International Organization for Standardization/International Electrotechnical Commission (ISO/IEC) 17025:2005(E), *General Requirements for the Competence of Testing and Calibration Laboratories*. The QSM provides a framework for performing, controlling, documenting, and reporting laboratory analyses. Analytical data will be validated according to "Standard Practice for Validation of Environmental Data" in the *Environmental Procedures Catalog* (LMS/POL/S04325), which adheres to EPA and ASTM International standards. The validation results for the annual sampling events will be summarized in a Data Validation Package and made available to the public as specified in Section 3.3.

3.1.2 Waste Management and Disposal

Waste water generated during the sampling of wells USGS-4, USGS-8, LRL-7, and DD-1 will be contained and managed as investigation-derived waste. The contained purge water (typically less than 5 gallons) shall be transported back to the LM office in Grand Junction, Colorado, for determination of disposal options. If a field investigation program is implemented at the site that will generate investigation-derived waste other than what is typically generated during an annual sampling event, a plan shall be developed in consultation with the State of New Mexico to meet the state and federal requirements for managing and disposing of investigation-derived waste.

3.2 Site Inspection and Maintenance of Institutional Controls

Site inspections and maintenance of ICs are part of the surveillance and maintenance plan for the site. LM will inspect the site during the annual sampling events to assess the condition of the concrete cap that covers the emplacement shaft, monitoring well boxes, monument, site roads, and signs and confirm that ICs (Section 2.3, Table 2) remain in place and effective. The site inspectors will inspect the site for any evidence of land use changes or significant land disturbances. They will photo-document any unauthorized land use and any damage to the monitoring well network, site roads, signs, and monument at surface ground zero. If unauthorized land use is observed, LM will notify BLM and initiate any necessary corrective

actions. LM will work with BLM as a cooperating agency and will assist in any updates to the Resource Management Plan. Site inspection results will be documented in the annual Groundwater Monitoring and Inspection Report (Section 3.3). Appendix D provides a copy of the site inspection checklist, and Appendix E provides a copy of a photo log. The site inspection checklist and photo log may be modified or updated to improve documentation of site activities.

Routine site inspections provide a measure of oversight of ICs effectiveness and site protectiveness. The following activities will be completed prior to these inspections or at the frequency specified below:

- Contact the New Mexico Office of the State Engineer or access the website on a monthly basis to determine if any new groundwater wells have been permitted in the nine sections surrounding and including the site (Section 34).
- Contact the New Mexico Oil Conservation Division or access the website on a monthly basis to determine if any new oil and gas wells have been permitted in the nine sections surrounding and including the site (Section 34). The area surrounding the site has existing oil and gas leases and mineral claims with several oil and gas wells currently operating in the sections surrounding the site (Figure 4). These wells generally target and produce oil and gas at depths ranging from 7,600 to 10,500 ft bgs, which is much deeper than the depth of the underground nuclear test (1,184 ft bgs). Potash mining is also prevalent in the area, as many measured or indicated ore bodies have been identified near the site (Figure 4). LM monitors these activities to ensure they do not impact the Gnome site.
- Review and evaluate USGS notifications for any seismic events near the Gnome site. The USGS Earthquake Hazards Program provides the notifications via email, and the Legacy Management Support contractor will review these as they are received to determine any potential impact to the site.
- Notify BLM of any planned field activities and maintain involvement in any land management processes and updates to the Resource Management Plan that may affect the Gnome site.
- Review and maintain public information associated with the Gnome site on the LM website on a monthly basis (Section 3.3).

3.3 Data Evaluation and Reporting

The monitoring program will provide time-series data (analytical and hydraulic head) from the network of monitoring wells at the site. These data will be compared to past results and will continue to enhance knowledge and understanding of the groundwater flow system at the site. The results will be included in annual Groundwater Monitoring and Inspection Reports that will summarize results of the site inspections, provide a status on the ICs, and describe any change in resource use. The reports will be made available to stakeholders and to the public per the distribution list included as Appendix F.

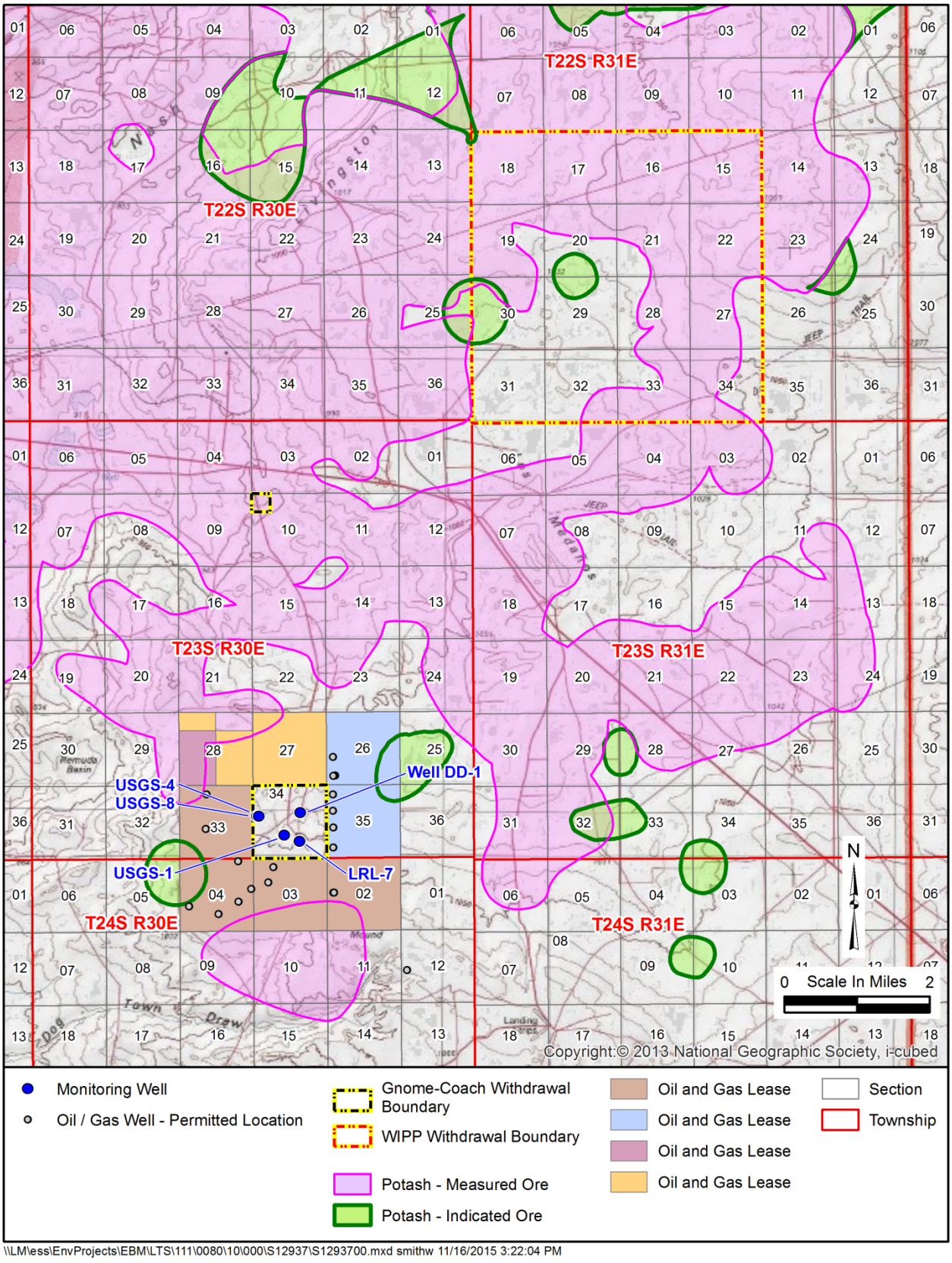

Figure 4. Gnome Site Withdrawal and Resource Map

The cleanup at DOE sites and plans for long-term management of the sites have benefited and are expected to continue to benefit from dialogue among state and federal regulators, stakeholder organizations, elected officials, and members of the general public. The reports, along with other reports developed for the site, will be maintained at the following locations:

- The LM website, http://www.lm.doe.gov/gnome/sites.aspx, contains specific information about the Gnome site. Information on this webpage includes site records, the fact sheet, and a link to the Geospatial Environmental Mapping System (http://gems.lm.doe.gov/#site=GNO) for the site.
- Reports will also be maintained on the Office of Science and Technical Information webpage that is accessible to the public at http://www.osti.gov/scitech/.
- Information about the Gnome site is also available by contacting Public Affairs at (970) 248-6363 or (970) 248-6000, or by sending an email request to public.affairs@lm.doe.gov.

3.4 Records and Data Management

LM maintains records that support the long-term stewardship of the Gnome site at the LM office in Grand Junction, Colorado, and at the LM Business Center in Morgantown, West Virginia. All LM records will be managed in accordance with the following requirements:

- 44 USC 29, "Records Management by the Archivist of the United States," available online at http://uscode.house.gov/browse/prelim@title44/chapter29&edition=prelim
- 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* Parts 1220–1239, Chapter 12, 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, Washington, DC, available online at http://energy.gov/sites/prod/files/2013/03/f0/DOE%20O%20243%201b_0.pdf
- LM Records Management Program procedures

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Appendix A

Federal Register Notice for Public Land Order 2526

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only when it is determined that one of the following conditions exists:

(i) As of the last day when sufficient time remained or remains to permit completion of the course within the 9-year period ending with his basic termination date, the veteran's physical or mental condition:

(*a*) Made or makes pursuit of training medically infeasible; or

(*b*) Requires a reduction in his scheduled hours of training; or

(*c*) Prevents an anticipated increase in his scheduled hours of training where the veteran is already pursuing training on a reduced-time basis.

(ii) Because of the veteran's physical or mental condition and, through no fault on his part, revaluation is necessary, and the objective selected will require training beyond his basic termination date. Where such veteran was in interrupted or discontinued status, except where his physical or mental condition prevented him from doing so, he must have made himself available for reentrance when there was sufficient time remaining before his basic termination date to complete the training which would have been required to attain the last established objective of record.

A Korean conflict veteran may not be entered or reentered into training which cannot be completed by his termination date except under this paragraph or paragraph (d) of this section.

* * * * *

2. Section 21.800 is revoked.

§ 21.800 Vocational rehabilitation for disabled veterans of World War II, who were prevented from timely entering or completing training. [Revoked]

(72 Stat. 1114; 38 U.S.C. 210)

This regulation is effective November 2, 1961.

[SEAL] W. J. DRIVER,
Deputy Administrator.

[F.R. Doc. 61-10439; Filed, Nov. 1, 1961; 8:48 a.m.]

Title 43—PUBLIC LANDS: INTERIOR

Chapter I—Bureau of Land Management, Department of the Interior

APPENDIX—PUBLIC LAND ORDERS

[Public Land Order 2526]

[New Mexico 094320]

NEW MEXICO

Withdrawing Lands for Use of the Atomic Energy Commission

By virtue of the authority vested in the President, and pursuant to Executive Order No. 10355 of May 26, 1952, it is ordered as follows:

1. Subject to valid existing rights, the following-described public lands are hereby withdrawn from all forms of appropriation under the public land laws, including the mining and mineral leasing laws, and disposals of materials under the Act of July 31, 1947 (61 Stat. 681; 30 U.S.C. 601-604) as amended, and reserved for use of the Atomic Energy Commission for experimental project purposes, and allied safety areas:

NEW MEXICO PRINCIPAL MERIDIAN

T. 23 S., R. 30 E.,
Sec. 10, NW¼NW¼;
Sec. 34.
(680 acres.)

JOHN A. CARVER, Jr.,
Assistant Secretary of the Interior.

OCTOBER 26, 1961.

[F.R. Doc. 61-10429; Filed, Nov. 1, 1961; 8:46 a.m.]

Title 47—TELECOMMUNICATION

Chapter I—Federal Communications Commission

[FCC 61-1260]

PART 1—PRACTICE AND PROCEDURE

Taking of Depositions in Hearing Proceedings

At a session of the Federal Communications Commission held at its offices in Washington, D.C., on the 25th day of October 1961;

The Commission having under consideration §§ 1.122 and 1.123 of its rules of practice and procedure, which pertain to the taking of depositions in hearing proceedings; and

It appearing, under these provisions, that the presiding officer has no opportunity to rule on the propriety of depositions unless a motion opposing the taking of depositions is filed by one of the parties or by the person to be examined, and that his authority to prevent the taking of depositions is severely restricted even in the event such a motion is filed; and

It further appearing that there are circumstances in which the taking of depositions is neither necessary nor desirable and in which a timely adverse ruling by the presiding officer will effect a saving of work, time, and expense, and will expedite the conduct of the hearing; and

It further appearing that the presiding officer is charged with controlling the course and conduct of the hearing and that, in effectively exercising this responsibility, he should be afforded an opportunity to prevent or restrict the taking of depositions; and

It further appearing that the amendments adopted herein pertain to matters of procedure and hence that section 4 of the Administrative Procedure Act is inapplicable; and

It further appearing that the amendments adopted herein are issued pursuant to authority contained in sections 4(i), 303(r), and 409 of the Communications Act of 1934, as amended;

It is ordered, effective November 2, 1961, except as notices of the taking of depositions may have been served upon the parties before that date, that Part 1, rules of practice and procedure, is amended as set forth below.

(Sec. 4, 48 Stat. 1066, as amended; 47 U.S.C. 154. Interprets or applies sec. 303, 48 Stat. 1082, as amended; 47 U.S.C. 303; sec. 409, 75 Stat. 422, as amended; 47 U.S.C. 409)

Released: October 27, 1961.

FEDERAL COMMUNICATIONS COMMISSION,
[SEAL] BEN F. WAPLE,
Acting Secretary.

1. Sections 1.122 and 1.123 are amended to read as follows:

§ 1.122 Notice of take depositions.

(a) A party to a hearing desiring to take the deposition of any person shall give reasonable notice in writing to every other party and to the person to be examined. An original and seven copies of the notice shall be filed with the Commission.

(b) The notice shall contain the following information:

(1) The name and address of each person to be examined, if known, and if the name is not known, a general description sufficient to identify him or the particular class or group to which he belongs.

(2) The time and place for taking the deposition of each person to be examined.

(3) The matters upon which each person will be examined.

(4) A statement of reasons supporting the need for eliciting testimony upon such matters by deposition rather than by direct testimony.

(5) A statement of reasons (where depositions on a single matter are to be taken from more than one person) for taking multiple depositions to establish the facts in question.

§ 1.123 Deposition orders.

(a) On his own motion or upon motion reasonably made by any party or by the person to be examined, the presiding officer may order:

(1) That the deposition shall not be taken.

(2) That it may be taken only at some designated time or place other than that stated in the notice.

(3) That it may be taken only on written interrogatories.

(4) That certain matters shall not be inquired into.

(5) That the scope of the examination shall be limited to certain matters.

(6) That the examination shall be held under such circumstances as will effectuate the ends of justice.

(7) That after being sealed the deposition shall be opened only by order of the presiding officer.

(b) Motions opposing the taking of depositions shall be served on all parties to the proceeding and on the person to be examined. No further pleadings may be filed unless specifically requested or authorized by the presiding officer. The presiding officer may in his discretion direct the parties or their attorneys to appear at a specified time and place for a conference to consider matters raised by the notice or the opposition.

(c) If a motion opposing the taking of depositions is not filed, and if no action is taken by the presiding officer on his own motion, within ten days after filing of the notice to take depositions,

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Appendix B

Conditional Certificate of Completion

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NEW MEXICO
ENVIRONMENT DEPARTMENT

Harold Runnels Building
1190 South St. Francis Drive (87505)
P.O. Box 5469, Santa Fe, New Mexico 87502-5469
Phone (505) 827-2900 Fax (505) 827-2965
www.nmenv.state.nm.us

SUSANA MARTINEZ
Governor
JOHN A. SANCHEZ
Lieutenant Governor

RYAN FLYNN
Cabinet Secretary
BUTCH TONGATE
Deputy Secretary

September 25, 2014

Jalena Dayvault, Site Manager
U.S. Department of Energy
Office of Legacy management
2597 Legacy Way
Grand Junction, CO 81503

RE: Issuance of the Conditional Certificate of Completion for the Gnome-Coach Site (Surface and Shallow Subsurface) near Carlsbad, NM, VRP Site No. 53043003

Dear Ms. Dayvault:

The New Mexico Environment Department (NMED) is pleased to provide you with a Conditional Certificate of Completion for the above referenced site. The Certificate documents that remediation activities have been successfully completed in accordance with the Voluntary Remediation Agreement for this site. It also specifies on-going requirements that must be fulfilled and maintained.

NMED congratulates you on the successful completion of this project, and has appreciated working with you through the Voluntary Remediation Program. If you have any further questions, please contact Pam Homer, Program Manager of the Remediation Oversight Section, at (505) 827-2754.

Sincerely,

Jerry Schoeppner, Chief
Ground Water Quality Bureau

Enclosures: Conditional Certificate of Completion, VRP Site No. 53043003

cc: Pam Homer, NMED-GWQB
Michelle Hunter, NMED-GWQB
VRP Chrono File

NEW MEXICO ENVIRONMENT DEPARTMENT
VOLUNTARY REMEDIATION PROGRAM

CONDITIONAL CERTIFICATE OF COMPLETION

Pursuant to NMSA 1978, §74-4G-1, *et seq.*, the Voluntary Remediation Act, and the Voluntary Remediation Regulations (20.6.3 NMAC), the New Mexico Environment Department (NMED) has determined that the participant, **U.S. Department of Energy – Office of Legacy Management** (DOE-LM), has successfully complied with the Voluntary Remediation Agreement and that site conditions meet applicable standards for the **Gnome-Coach Site – Surface and Shallow Subsurface**, **VRP Site No. 53043003**, as of the execution date of this Certificate for the tract of land and for the environmental conditions described in Exhibit A, attached hereto.

This Certificate remains valid only if the following requirements of post-completion monitoring, engineering controls, remediation systems, post-closure care, and/or affirmation of future non-residential use are satisfactorily implemented and maintained:

1. The land use shall remain restricted to ranching or to a land use posing an equivalent or lesser human exposure risk. NMED shall be notified of any proposed change in land use and provided documentation of the associated risk.
2. Drilling, excavating or other activities that would disturb materials deeper than 20 feet below the surface shall be prohibited, except for DOE-LM activities necessary for ground water investigation and remediation.
3. The integrity of the concrete cap over the Gnome-Coach shaft shall be maintained. No drilling or excavation at any depth within 40 lateral feet of the cap shall be permitted. Signs shall be posted around this area to warn against excavation and drilling.
4. The locations of buried debris and salt muck shall be provided to the federal agency responsible for surface administration of the site.
5. Signs shall be posted around the perimeter of the site and at road crossings to notify the public of site restrictions.
6. NMED and its representatives shall be provided reasonable access to the site and relevant records to evaluate whether the requirements specified herein are being satisfactorily maintained and continue to be effective.

DOE-LM shall incorporate specific actions into its Long-Term Surveillance and Maintenance Plan for the site to ensure that these requirements are implemented effectively. A copy of the Long-Term Surveillance and Maintenance Plan and any subsequent updates shall be provided to NMED.

NMED shall be notified prior to the termination of DOE-LM responsibility for the site so that the requirements of this Certificate may be reviewed and revised as appropriate for a changed ownership or management regime.

EXECUTED this 25th day of September, 2014

Secretary or Designee
New Mexico Environment Department

Attachment: Exhibit A, Legal Description and Environmental Conditions

STATE OF NEW MEXICO
COUNTY OF SANTA FE

BEFORE ME, on this 25th day of September, personally appeared Gerard A. Schreppner known to me to be the person and agent of said department whose name is subscribed to the foregoing instrument, and he acknowledged to me that he executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this 25th day of September, 2014

Dorothy M. Romero
Notary Public in and for the State of New Mexico

My commission expires: October 12, 2014

Conditional Certificate of Completion Exhibit A
Legal Description and Environmental Conditions

New Mexico Environment Department
Voluntary Remediation Program

Gnome-Coach Site – Surface and Shallow Subsurface
VRP Site No. 53043003

I. Legal Description

The Gnome-Coach site consists of approximately 640 acres comprising Township 23S, Range 30E, Section 34.

II. Environmental Conditions

The Conditional Certificate of Completion to which this exhibit is attached applies to the following environmental conditions:

Surface and subsurface soils to a depth of 20 feet.

In 1961 a 3-kiloton nuclear explosive was detonated at a depth of 1,184 feet below the surface at this site. A portion of the gases vented from the emplacement hole into the atmosphere and were carried in a northwest direction. Post-test drilling and removal of contaminated subsurface material resulted in contamination of surface and shallow subsurface soils by radionuclides, metals, and petroleum hydrocarbons. Surface cleanup activities occurred during 1968-69, 1977-1979, and 2003.

The surface and shallow subsurface environmental conditions are further described in the following documents:

U.S. Department of Energy, National Nuclear Security Administration, Nevada Site Office. *Surface Corrective Action Investigation Report for the Gnome-Coach Site, New Mexico.* May 2004.

U.S. Department of Energy, National Nuclear Security Administration, Nevada Site Office. *Voluntary Remediation Program Completion Report, Gnome-Coach Site, New Mexico.* December 2005.

Appendix C

Gnome Site Photographs (Notification Signs)

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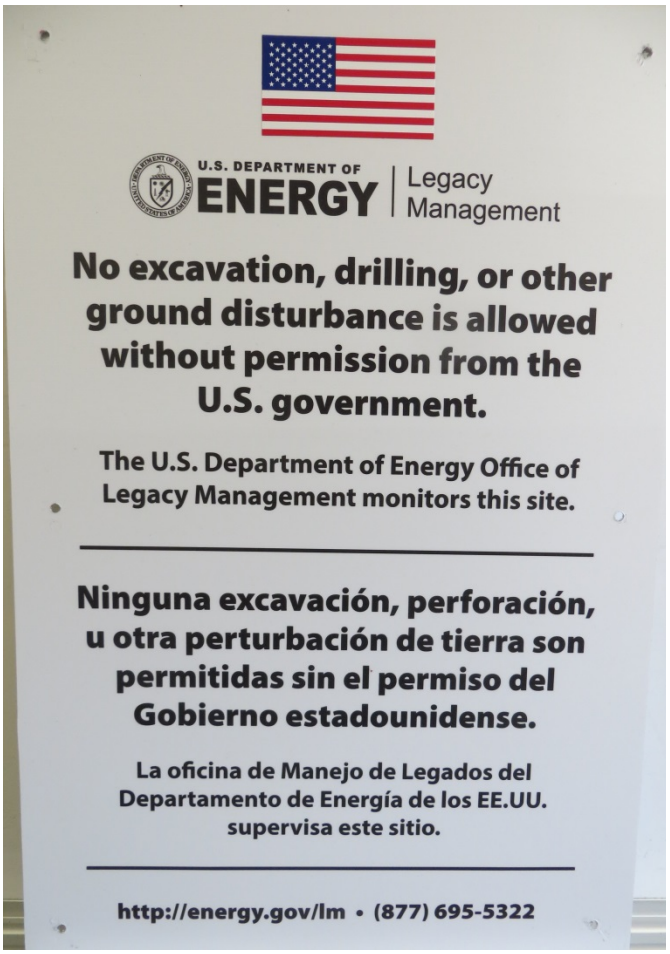
Photograph of a notification sign near the emplacement shaft.



Photograph of the notification sign that is at the site.

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Appendix D

Inspection Checklist

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Gnome Site – Inspection Readiness Checklist

Activity	Activities Description	☐
	Pre-Inspection Activities	
Verify and Maintain ICs	Review the New Mexico State Engineers Office website (on a monthly basis) to determine if any new groundwater wells have been permitted in the 9 sections surrounding and including the site (Section 34).	
	January _____	☐
	February _____	☐
	March _____	☐
	April _____	☐
	May _____	☐
	June _____	☐
	July _____	☐
	August _____	☐
	September _____	☐
	October _____	☐
	November _____	☐
	December _____	☐
	Review the New Mexico Oil Conservation Division website (on a monthly basis) to determine if any new oil and gas wells have been permitted in the 9 sections surrounding and including the site (Section 34).	
	January _____	☐
	February _____	☐
	March _____	☐
	April _____	☐
	May _____	☐
	June _____	☐
	July _____	☐
	August _____	☐
	September _____	☐
	October _____	☐
	November _____	☐
	December _____	☐
	Review the U. S. Geological Survey Earthquake Hazards Program (e-mail notifications) as they become available for any seismic events near the Gnome site. Notify LM of any unusual events.	
	Event (date and time) _____	☐
	Event (date and time) _____	☐
	Notify BLM of any planned field activities and maintain involvement in any BLM land management activities and updates to the Resource Management Plan that may affect the Gnome site. Provide shape files when needed of any changes to physical features at the site.	
	Event (date and time) _____	☐
	Event (date and time) _____	☐
	Maintain public information associated with the Gnome site on the LM website.	
	Event (date and time) _____	☐
	Event (date and time) _____	☐

Gnome Site – Inspection Readiness Checklist (continued)

Activity	Activities Description	☐
Inspection Notification and Planning Requirements	Provide a courtesy notification (e-mail or telephone call) to BLM and NDEP informing them of any planned field activities.	☐
	Meet with the inspection team and discuss inspection schedule (travel plans), inspection plan (based on inspection checklist), site-specific issues (technical, safety, etc.), and responsibilities.	☐
	Check weather forecast to plan travel routes and appropriate clothing (reschedule trip if necessary). If trip is rescheduled notify the required parties.	☐
On-site Inspection Activities		
Conduct Site Monitoring	Conduct annual sampling in accordance with the Environmental Sampling notification letter.	
	Collect Samples _____	☐
	Measure Water Levels and Download Transducers _____	☐
	Photograph the Flow Meter for Total Gallons Removed _____	☐
Conduct Site Inspection	Visually inspect all site features such as emplacement shaft concrete cap, site roads, monument at surface ground zero, signs, and monitoring well boxes. Note condition of all site features, and verify that they are performing as designed.	
	Emplacement Shaft (concrete cap) _____	☐
	Site Roads _____	☐
	Monument at SGZ _____	☐
	Signs _____	☐
	Well Boxes _____	☐
	Site Condition (unusual excavations or land disturbances) _____	☐
	Document evidence of vandalism, trespassing, or any other occurrence (e.g., activities by adjacent land users) that could adversely impact the site. Note changes from previous year's inspection reports.	☐
	Take photographs to document the condition of the site features and document the photograph file names with a description of the photo on a photograph log.	☐
Follow-Up Activities		
Provide Site Inspection Information	Notify BLM of any unauthorized land use and any damage to the monitoring network, site roads, signs, and monument at surface ground zero. water level data (hydrographs) to BLM	☐
	Distribute water level data (hydrographs) to BLM and DOE Carlsbad Field Office.	☐

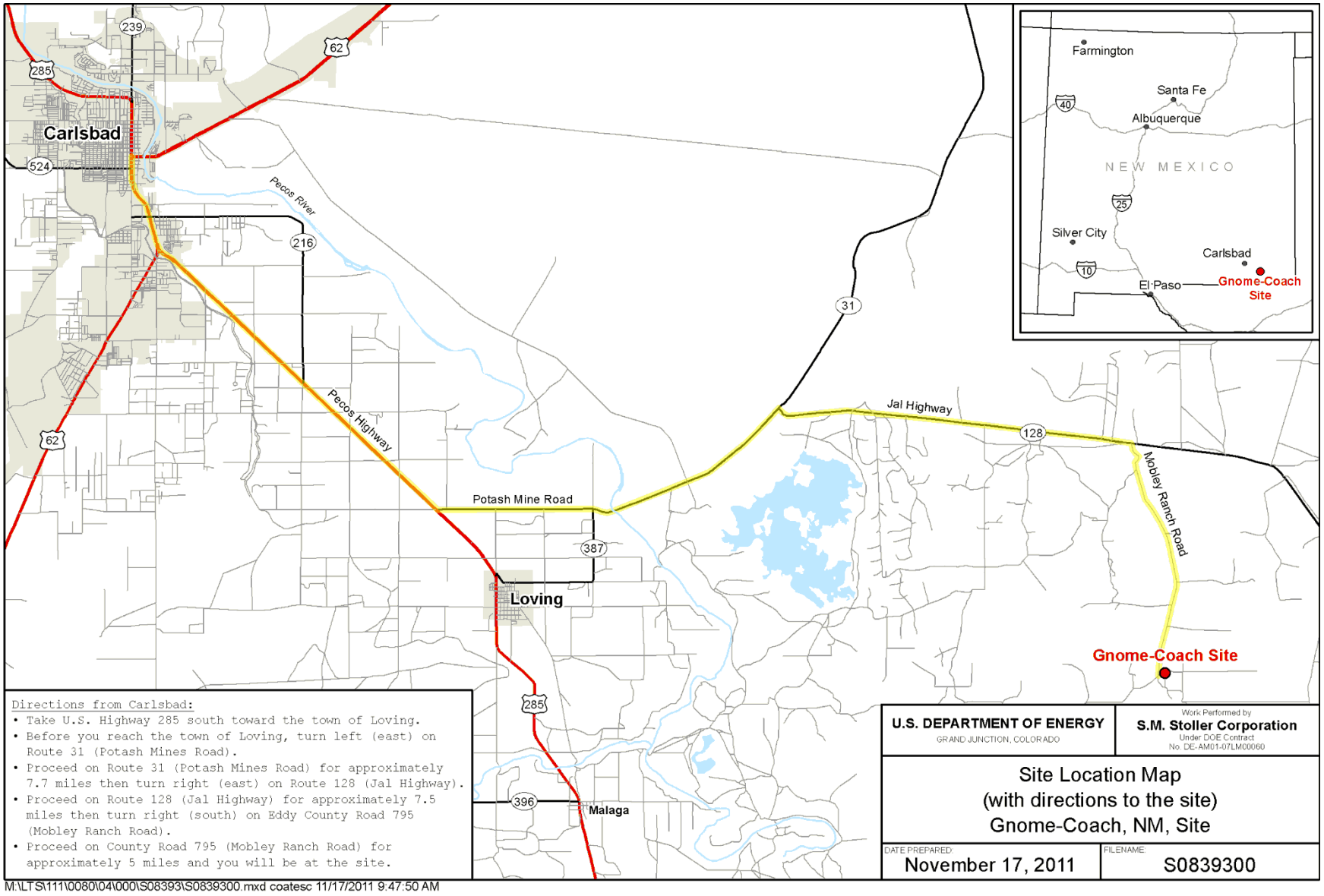

Figure 1. Site Location Map (With Directions to the Site)

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Appendix E

Example of Photo Log

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Site Inspection Photograph Log

Site: _____

Date of inspection: _____

File Name	Azimuth	Field Inspection Photo No.	Inspection Report PL* No.	Post on Web	Photo Caption

*Photo Location

Lead inspector/organization: _____

Assistant inspector/organization: _____

Other attendees/organizations: _____

Electronic file location: _____

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Appendix F

Report Distribution List

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Report Distribution List

Agency	Copies
U.S. Department of Energy Office of Scientific and Technical Information P.O. Box 62 Oak Ridge, TN 37831-0062 865-576-8401	1 (uncontrolled, electronic copy)
New Mexico Environment Department – GWQB Pamela E. Homer Program Manager 1190 South St. Francis Drive P.O. Box 5469 Santa Fe, NM 87502-5469	1 (uncontrolled)
U.S. Department of Energy Carlsbad Field Office George Basabilvazo and Anderson Ward 4021 National Parks Highway Carlsbad, NM 88220	1 (uncontrolled, electronic copy)
U.S. Bureau of Land Management George MacDonell and Steve Daly Field Manager and Soil Conservationist 620 E. Greene Street Carlsbad, NM 88220	2 (uncontrolled)

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