3-2023

Request for Modification No. 23-024 to Resource Conservation and Recovery Act (RCRA) Facility Operating Permit, Sandia National Laboratories, New Mexico, Environmental Protection Agency Identification Number NM5890110518, March 2023

Sandia National Laboratories/NM

NNSA-2023-002420

Department of Energy
National Nuclear Security Administration
Sandia Field Office
P.O. Box 5400
Albuquerque, NM 87185

MAR 2 7 2023

Mr. Dave Cobrain
Acting Chief, Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Bldg. 1
Santa Fe, New Mexico 87505

Subject: Request for Modification No. 23-024 to Resource Conservation and Recovery Act (RCRA) Facility Operating Permit, Sandia National Laboratories, New Mexico, Environmental Protection Agency Identification Number NM5890110518

Dear Mr. Cobrain:

The Department of Energy, National Nuclear Security Administration, Sandia Field Office (DOE/NNSA SFO) and National Technology & Engineering Solutions of Sandia, LLC (NTESS) are proposing modifications to the Sandia National Laboratories/New Mexico (SNL/NM) RCRA Facility Operating Permit (Permit). The changes are discussed below and are presented in the enclosures to this letter, as required by the New Mexico Administrative Code (NMAC), Title 20, Chapter 4, Part 1, Subpart IX, (20.4.1.900 NMAC) incorporating Title 40 of the Code of Federal Regulations, Part 270.42 (40 C.F.R. § 270.42).

The requested modifications consist of revisions to the Mixed Waste Landfill (MWL) Long-Term Monitoring and Maintenance Plan (LTMMP), which is incorporated by reference into Permit Attachment M, "Long-Term Monitoring and Maintenance Plan for Solid Waste Management Units and Areas of Concern Granted Corrective Action Complete with Controls." The MWL is also known as Solid Waste Management Unit 76.

Groundwater monitoring well MWL-MW4 was drilled and installed in late 1992/early 1993. As documented in the MWL LTMMP, MWL-MW4 was retained for informational purposes and has been used only to obtain periodic groundwater elevation measurements to support the preparation of MWL potentiometric surface maps presented in annual reports. NTESS proposes to decommission groundwater monitoring well MWL-MW4 by plugging and abandoning the well in place because the well is no longer needed for compliance monitoring, is not needed for establishing the potentiometric surface of the Regional Aquifer and may potentially act as a conduit for the downward movement of volatile organic compound soil vapor beneath the site. This change was previously discussed with members of your staff.

MAR 2 7 2023

There are six enclosures to this letter:

- Enclosure 1 includes the certification statement.
- Enclosure 2 includes a table summarizing the MWL LTMMP modifications and rationale for each change.
- Enclosure 3 includes the rationale for decommissioning groundwater monitoring well MWL-MW4.
- Enclosure 4 includes revised pages of the MWL LTMMP with the proposed revisions shown in redline/strikeout format.
- Enclosure 5 includes revised pages of the MWL LTMMP with the text and figure revisions in final form.
- Enclosure 6 includes the Decommissioning Plan for Groundwater Monitoring Well MWL-MW4.

These modifications do not substantially alter the conditions in the Permit (see 20.4.1.900 NMAC/40 C.F.R. § 270.42(d)(2)(i)) and do not reduce the capacity of the DOE/NNSA SFO and NTESS to protect human health and the environment. If you have questions, please contact me at (505) 845-6036, or have your staff contact Dr. Adria Bodour of our staff at (505) 845-6930 or adria.bodour@nnsa.doe.gov and/or Dr. Linda Tello of our staff at (505) 845-6706 or linda.tello@nnsa.doe.gov.

Sincerely,

Daryl J. Hauck, Ph.D.
Manager

6 Enclosures:

1. Request Mod 23-024 to Permit LTMMP for MWL Certification Statement
2. Summary of Changes to Permit LTMMP for MWL Mod 23-024
3. Rationale for Decommissioning Groundwater Monitoring Well MWL-MW4 LTMMP for MWL Mod 23-024
4. Revisions to Permit LTMMP for MWL Redline Strikeout Format Mod 23-024
5. Final Revisions to Permit LTMMP for MWL Mod 23-024
6. Decommissioning Plan for Groundwater Monitoring Well MWL-MW4 LTMMP for MWL Mod 23-024

MAR 2 7 2023

cc w/enclosure:
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SFO Waste Management File

cc w/o enclosure:
Amy Blumberg, SNL/NM
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Enclosure 1

Certification Statement
Revisions to RCRA Facility Operating Permit
Long-Term Monitoring and Maintenance Plan for the Mixed Waste Landfill
Permit Modification 23-024

Sandia National Laboratories
EPA ID NM5890110518

Request for Modification 23-024
to
Resource Conservation and Recovery Act Facility Operating Permit
Long-Term Monitoring and Maintenance Plan for the Mixed Waste Landfill

Sandia National Laboratories / New Mexico
EPA ID No. NM5890110518

CERTIFICATION STATEMENT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment for knowing violations.

David Stuhan, Director
National Technology & Engineering Solutions of Sandia, LLC
Albuquerque, New Mexico
Operator

03/20/2023
Date Signed

Dr. Daryl Hauck, Manager
U.S. Department of Energy
National Nuclear Security Administration
Sandia Field Office
Owner

3/27/2023
Date Signed

Enclosure 2

Summary of Changes to RCRA Facility Operating Permit
Long-Term Monitoring and Maintenance Plan for the Mixed Waste Landfill
Permit Modification 23-024

Sandia National Laboratories
EPA ID NM5890110518

Enclosure 2
Summary of Revisions to RCRA Facility Operating Permit, Long-Term Monitoring and Maintenance Plan for the Mixed Waste Landfill, Permit Modification 23-024

Item	Permit Location(s)	Current Language	Proposed Language	Explanation for Change	Modification Class Rationale
1	Long-Term Monitoring and Maintenance Plan (LTMMP) Cover	**LONG-TERM MONITORING AND MAINTENANCE PLAN FOR THE MIXED WASTE LANDFILL MARCH 2012 Revision 1 December 2021** United States Department of Energy Sandia Field Office Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA-0003525.	**LONG-TERM MONITORING AND MAINTENANCE PLAN FOR THE MIXED WASTE LANDFILL MARCH 2012 Revision 2 – March 2023 ~~1 December 2021~~** United States Department of Energy Sandia Field Office Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA-0003525.	Revise date to show date of revisions in this requested modification.	*Class 1 modification.* Administrative and informational change 20.4.1.900 NMAC, 40 CFR 270.42 Appendix I, Modification A.1

Enclosure 2
Summary of Revisions to RCRA Facility Operating Permit, Long-Term Monitoring and Maintenance Plan for the Mixed Waste Landfill, Permit Modification 23-024

Item	Permit Location(s)	Current Language	Proposed Language	Explanation for Change	Modification Class Rationale
2	LTMMP List of Tables	3.5.1-1 Monitoring Well Construction Details and Recent Water Levels, Mixed Waste Landfill, Sandia National Laboratories, New Mexico	3.5.1-1 Active Monitoring Well Network Construction Details and ~~Recent~~2011 Water Levels, Mixed Waste Landfill, Sandia National Laboratories, New Mexico	Revise to reflect the revised groundwater monitoring network.	*Class 1 modification.* Administrative and informational change 20.4.1.900 NMAC, 40 CFR 270.42 Appendix I, Modification A.1
3	LTMMP Section 3.1 Table 3.1-1, Page 3-3 first row (Groundwater), Last column (Comments)	**Comments** Monitoring wells MWL–MW4, MWL-MW5, and MWL-MW6 will be retained for information only.	**Comments** Monitoring wells ~~MWL–MW4,~~ MWL-MW5~~,~~ and MWL-MW6 will be retained for information only.	Revise list of wells retained for information purposes to reflect active wells and decommission MWL-MW4. The rationale for this change is discussed in Enclosure 3. The plan for decommissioning the well is provided in Enclosure 6. Revising this information does not substantially alter the LTMMP conditions or reduce the capacity of the Permittees to protect human health and the environment during long-term monitoring and maintenance of the MWL.	*Class 2 modification.* Change to number of wells of the groundwater monitoring system 20.4.1.900 NMAC, 40 CFR 270.42 Appendix I, Modification C.1

Enclosure 2
Summary of Revisions to RCRA Facility Operating Permit, Long-Term Monitoring and Maintenance Plan for the Mixed Waste Landfill, Permit Modification 23-024

Item	Permit Location(s)	Current Language	Proposed Language	Explanation for Change	Modification Class Rationale
4	LTMMP Section 3.5.1, Page 3-16, 1st Paragraph	The MWL groundwater monitoring well network was modified in 2008 (SNL/NM May 2009). Due to declining water levels, four monitoring wells (MWL-BW1, MWL-MW1, MWL-MW2, and MWL-MW3) were plugged and abandoned, and four new monitoring wells (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9) were installed. The monitoring wells and installation reports were approved by NMED (Bearzi October 2008b and January 2009). The MWL monitoring well network (Figure 3.5.1-1) consists of seven wells completed within interfingering, fine-grained alluvial fan deposits and coarse grained Ancestral Rio Grande deposits (Goering et al. December 2002, SNL/NM June 2010). This network includes one background well (MWL-BW2), one on-site well (MWL-MW4), and five downgradient wells (MWL-MW5, MWL MW6, MWL-MW7, MWL-MW8, and MWL-MW9). All seven wells are constructed of 5-inch, Schedule 80 polyvinyl chloride (PVC) casing and slotted well screens. Table 3.5.1-1 presents well construction information and recent water levels measured in existing monitoring wells. Well database summary sheets showing monitoring well completion diagrams are presented in Appendix H.	The MWL groundwater monitoring well network was modified in 2008 (SNL/NM May 2009). Due to declining water levels, four monitoring wells (MWL-BW1, MWL-MW1, MWL-MW2, and MWL-MW3) were plugged and abandoned, and four new monitoring wells (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9) were installed. The monitoring wells and installation reports were approved by NMED (Bearzi October 2008b and January 2009). The MWL monitoring well network (Figure 3.5.1-1) consists of ~~seven~~six wells completed within interfingering, fine-grained alluvial fan deposits and coarse grained Ancestral Rio Grande deposits (Goering et al. December 2002, SNL/NM June 2010). This network includes one background well (MWL-BW2)~~, one on-site well (MWL-MW4),~~ and five downgradient wells (MWL-MW5, MWL-MW6, MWL-MW7, MWL-MW8, and MWL-MW9). All ~~seven~~six wells are constructed of 5-inch, Schedule 80 polyvinyl chloride (PVC) casing and slotted well screens. Table 3.5.1-1 presents well construction information and recent water levels measured in existing monitoring wells. Well database summary sheets showing monitoring well completion diagrams are presented in Appendix H.	Revise number of and the list of wells retained for information purposes to reflect active wells and decommission MWL-MW4. The rationale for this change is discussed in Enclosure 3. The plan for decommissioning the well is provided in Enclosure 6. Revising this information does not substantially alter the LTMMP conditions or reduce the capacity of the Permittees to protect human health and the environment during long-term monitoring and maintenance of the MWL.	*Class 2 modification.* Change to number of wells of the groundwater monitoring system 20.4.1.900 NMAC, 40 CFR 270.42 Appendix I, Modification C.1

Enclosure 2
Summary of Revisions to RCRA Facility Operating Permit, Long-Term Monitoring and Maintenance Plan for the Mixed Waste Landfill, Permit Modification 23-024

Item	Permit Location(s)	Current Language	Proposed Language	Explanation for Change	Modification Class Rationale
5	LTMMP Section 3.5.1, Page 3-16, 2nd Paragraph	Monitoring well MWL-MW4 was installed in 1993 directly beneath a disposal trench and completed at an angle of 6 degrees from vertical, with two discrete well screen intervals 20 feet apart to evaluate various aquifer parameters with depth. An inflatable packer separates the screened intervals, and pressure is maintained in the packer to prevent the mixing of water from the two screened sections of the aquifer. Monitoring wells MWL-MW5 and MWL-MW6 were installed in 2000 with their respective screen intervals in the Ancestral Rio Grande sediments, below the top of the regional aquifer water table. While these three wells will be retained for information purposes (water levels, water quality parameters, other data as needed), they are not part of the MWL compliance network for long-term groundwater monitoring required analytes.	Monitoring well MWL-MW4 was installed in 1993 directly beneath a disposal trench and completed at an angle of 6 degrees from vertical, with two discrete well screen intervals 20 feet apart to evaluate various aquifer parameters with depth. An inflatable packer ~~separates~~separated the screened intervals, and pressure ~~is~~was maintained in the packer to prevent the mixing of water from the two screened sections of the aquifer. Monitoring well MWL-MW4 was approved for decommissioning and removal from the monitoring network in 2023. Monitoring wells MWL-MW5 and MWL-MW6 were installed in 2000 with their respective screen intervals in the Ancestral Rio Grande sediments, below the top of the regional aquifer water table. While these ~~three~~two wells ~~will be~~are retained for information purposes (water levels, water quality parameters, other data as needed), they are not part of the MWL compliance network for long-term groundwater monitoring required analytes.	Revise to update the MWL-MW4 information and to update the number of wells retained for information purposes. The rationale for this change is discussed in Enclosure 3. The plan for decommissioning the well is provided in Enclosure 6. Revising this information does not substantially alter the LTMMP conditions or reduce the capacity of the Permittees to protect human health and the environment during long-term monitoring and maintenance of the MWL.	*Class 2 modification.* Change to number of wells of the groundwater monitoring system 20.4.1.900 NMAC, 40 CFR 270.42 Appendix I, Modification C.1

Enclosure 2
Summary of Revisions to RCRA Facility Operating Permit, Long-Term Monitoring and Maintenance Plan for the Mixed Waste Landfill, Permit Modification 23-024

Item	Permit Location(s)	Current Language	Proposed Language	Explanation for Change	Modification Class Rationale
6	LTMMP Section 3.5.1, Figure 3.5.1-1, Page 3-17	Mixed Waste Landfill Groundwater Monitoring Wells	*Revised figure*	Figure revised to remove MWL-MW4.	*Class 2 modification.* Change to number of wells of the groundwater monitoring system 20.4.1.900 NMAC, 40 CFR 270.42 Appendix I, Modification C.1
7	LTMMP Section 3.5.1 Table 3.5.1-1, Page 3-18, Title	Monitoring Well Construction Details and Recent Water Levels Mixed Waste Landfill, Sandia National Laboratories, New Mexico	Active Monitoring Well Network Construction Details and ~~Recent~~2011 Water Levels Mixed Waste Landfill, Sandia National Laboratories, New Mexico	Revise to reflect the revised groundwater monitoring well network.	*Class 2 modification.* Change to number of wells of the groundwater monitoring system 20.4.1.900 NMAC, 40 CFR 270.42 Appendix I, Modification C.1
8	LTMMP Section 3.5.1 Table 3.5.1-1, Page 3-18, Rows 8 and 9	Row 6: **Information Only Wells** Row 7: MWL-MW4[b] (upper) Row 8: MWL-MW4[b] (lower)	Row 6: **Information Only Wells** ~~Row 7: MWL-MW4[b] (upper)~~ ~~Row 8: MWL-MW4[b] (lower)~~	Revise to remove rows with MWL-MW4 data. The rationale for this change is discussed in Enclosure 3. The plan for decommissioning the well is provided in Enclosure 6. Revising this information does not substantially alter the LTMMP conditions or reduce the capacity of the Permittees to protect human health and the environment during long-term monitoring and maintenance of the MWL.	*Class 2 modification.* Change to number of wells of the groundwater monitoring system 20.4.1.900 NMAC, 40 CFR 270.42 Appendix I, Modification C.1

Enclosure 2
Summary of Revisions to RCRA Facility Operating Permit, Long-Term Monitoring and Maintenance Plan for the Mixed Waste Landfill, Permit Modification 23-024

Item	Permit Location(s)	Current Language	Proposed Language	Explanation for Change	Modification Class Rationale
9	LTMMP Section 3.5.1 Table 3.5.1-1, Page 3-18, Footnotes	[a]Top of inner casing is the measurement point for the well. [b]Well MWL-MW4 is screened at two intervals and is angled 6 degrees from vertical. All measurements and elevations not corrected for the 6 degree angle of the borehole except the October 2011 groundwater elevation. [c]Well depth based on approximate depth (feet below ground surface) to top of the inflatable packer separating the upper and lower screen intervals. [d]Groundwater elevation for MWL-MW4 is adjusted/corrected for the 6 degree angle of the monitoring well/borehole.	[a]Top of inner casing is the measurement point for the well. ~~[b]Well MWL-MW4 is screened at two intervals and is angled 6 degrees from vertical. All measurements and elevations not corrected for the 6 degree angle of the borehole except the October 2011 groundwater elevation.~~ ~~[c]Well depth based on approximate depth (feet below ground surface) to top of the inflatable packer separating the upper and lower screen intervals.~~ ~~[d]Groundwater elevation for MWL-MW4 is adjusted/corrected for the 6 degree angle of the monitoring well/borehole.~~	Revise to remove MWL-MW4 information. The rationale for this change is discussed in Enclosure 3. The plan for decommissioning the well is provided in Enclosure 6. Revising this information does not substantially alter the LTMMP conditions or reduce the capacity of the Permittees to protect human health and the environment during long-term monitoring and maintenance of the MWL.	*Class 2 modification.* Change to number of wells of the groundwater monitoring system 20.4.1.900 NMAC, 40 CFR 270.42 Appendix I, Modification C.1
10	LTMMP Appendix H Mixed Waste Landfill Well Database Summary Sheets	*Cover pages and well diagram*	*Cover pages and well diagram*	Revised to remove references to MWL-MW4.	*Class 2 modification.* Change to number of wells of the groundwater monitoring system 20.4.1.900 NMAC, 40 CFR 270.42 Appendix I, Modification C.1

Enclosure 3

Rationale for Decommissioning Groundwater Monitoring Well MWL-MW4 Long-Term Monitoring and Maintenance Plan for the Mixed Waste Landfill Permit Modification 23-024

Sandia National Laboratories
EPA ID NM5890110518

Enclosure 3
Rationale for Decommissioning Groundwater Monitoring Well MWL-MW4
Long-Term Monitoring and Maintenance Plan for the Mixed Waste Landfill
Permit Modification 23-024

Enclosure 2 contains a summary of proposed revisions to the New Mexico Environment Department (NMED)-approved Mixed Waste Landfill (MWL) Long-Term Monitoring and Maintenance Plan (LTMMP) (SNL/NM March 2012 and Blaine January 2014) to decommission groundwater monitoring well MWL-MW4. The MWL LTMMP is incorporated by reference in Attachment M of the Resource Conservation Recovery Act (RCRA) Facility Operating Permit. Section 3.5.2 of the NMED-approved MWL LTMMP (SNL/NM March 2012 and subsequent revisions) provides guidance on the plugging and abandonment of groundwater monitoring wells.

> *"Requirements for monitoring well replacement are presented in the Consent Order (NMED April 2004). MWL monitoring wells will be plugged and abandoned when they are no longer required in the monitoring network, no longer provide representative groundwater samples because of declining water levels or insufficient productivity, or become damaged beyond repair. The goal of well abandonment is to seal the well in such a manner that it cannot act as a conduit for the migration of contaminants from the ground surface to the saturated zone. Well P&A plans will be prepared for any wells that meet these criteria and will be submitted to the NMED for approval as a permit modification. No groundwater monitoring wells at the MWL will be abandoned without prior written approval of the NMED."*

This **Enclosure 3** describes the rationale to decommission groundwater monitoring well MWL-MW4.

Background Information

The current MWL compliance groundwater monitoring well network (MWL-BW2, MWL-MW7 through MW9) was installed in 2008; the wells are located and constructed to determine the potentiometric surface and monitor groundwater quality of the uppermost part of the Regional Aquifer in the vicinity of the MWL. These four wells replaced the previous compliance monitoring network (MWL-BW1, MWL-MW1, MWL-MW2, and MWL-MW3) that were installed in 1988 through 1989 (SNL/NM April 2008 and Bearzi October 2008; SNL/NM September 2008 and Bearzi January 2009). MWL-MW4 is a holdover from the original monitoring network that was retained for "informational purposes only" (Table 3.1-1 of SNL/NM March 2012).

Groundwater monitoring well MWL-MW4 was drilled and installed as part of the MWL Phase 2 RCRA Facility Investigation (Phase 2 RFI) from December 1992 to February 1993. It was located in the northern unclassified area of the MWL to sample soil, soil vapor, and groundwater beneath Trench D. A total of 212 soil samples were collected from the MWL-MW4 borehole, which was continuously cored to a depth of 552 feet below ground surface. Groundwater monitoring well MWL-MW4 was drilled and completed at an angle of six degrees from vertical

with two discrete 20-foot screen intervals, 20 feet apart, to evaluate groundwater quality, the vertical potentiometric gradient, and changes in aquifer parameters with depth. The uppermost screen (488.4 to 508.4 feet below ground surface) is set across the upper surface of the Regional Aquifer located in the unconsolidated, fine-grained alluvial-fan deposits of the Santa Fe Group. The lower screen (528.4 to 548.4 feet below ground surface) is set in the more transmissive, coarser grained Ancestral Rio Grande sediments of the Santa Fe Group. The well was constructed with Schedule 80 polyvinyl chloride casing and screens and is equipped with an inflatable packer to hydraulically isolate the two screens. Aquifer pump tests were conducted in 1994 to measure the hydraulic conductivity of the aquifer at each of the two screened intervals. MWL-MW4 was an important Phase 2 RFI characterization borehole/well that helped define the nature and extent of contamination and provided hydraulic data characterizing the Regional Aquifer beneath the MWL (Peace et al. September 2002).

After the Phase 2 RFI (December 1992 to February 1993), MWL-MW4 groundwater samples were collected and analyzed from 1993 through 2014 to monitor groundwater quality. The 21 years of groundwater monitoring results from MWL-MW4, along with groundwater monitoring results from other MWL groundwater monitoring wells spanning 32 years, indicates the Regional Aquifer has not been impacted by historical waste disposal at the MWL (SNL/NM June 2022).

Because of the angled orientation and the need for a packer to isolate the two screens, it was very difficult to deploy any type of sampling equipment and maintain packer operation at MWL-MW4. To enable purging and the collection of groundwater samples through 2014, a dedicated groundwater sampling system (i.e., one that remains in the well between sampling events) was installed by directly attaching the sampling pump to the packer deployment system. The dedicated sampling system included a Bennett™ stainless-steel sampling pump, connecting rods, mounting bracket, lifting cable, and tubing. Machined stainless-steel pipe connected the bottom of the stainless-steel sampling pump to the packer, and the entire assembly was secured by one-inch diameter metal rods. MWL-MW4 is the only MWL monitoring well that has contained a packer and dedicated stainless-steel sampling equipment. The dedicated sampling system was removed in December 2014 due to corrosion of the stainless-steel sampling pump (SNL/NM January 2015 and Keiling March 2015). To continue isolating the two screens and to allow for continued measurement of the potentiometric surface, the packer deployment system was reinstalled and remains in-place.

In January 2014, the NMED Hazardous Waste Bureau approved the MWL LTMMP that defines all controls associated with the 2005 NMED-selected remedy (i.e., a vegetative soil cover with a biointrusion layer), including groundwater monitoring requirements (Blaine January 2014). As documented in the MWL LTMMP, MWL-MW4 was retained for informational purposes and has been used only to obtain periodic groundwater elevation measurements to support the preparation of MWL potentiometric surface maps presented in Annual Long-Term Monitoring and Maintenance Reports.

Enclosure 3
Rationale for Decommissioning Groundwater Monitoring Well MWL-MW4
Long-Term Monitoring and Maintenance Plan for the Mixed Waste Landfill
Permit Modification 23-024

Decommissioning Rationale

The Department of Energy, National Nuclear Security Administration Sandia Field Office and National Technology & Engineering Solutions of Sandia, LLC propose to decommission groundwater monitoring well MWL-MW4 because this well is no longer needed for compliance monitoring; is not needed for establishing the potentiometric surface of the Regional Aquifer; and it could potentially act as a conduit for the downward movement of contamination (e.g., volatile organic compound soil vapor) beneath the site. Both the age of the well and the unique construction contribute to concerns regarding the integrity of the well and its potential to act as a conduit for contaminant migration.

Based upon nine years of groundwater elevation monitoring under the LTMMP, the ongoing measurement of groundwater elevation in MWL-MW4 is not needed to construct accurate MWL potentiometric surface maps. Due to the angled orientation and unique construction, MWL-MW4 groundwater elevation measurements have greater accuracy uncertainty relative to the elevation data obtained from the compliance groundwater monitoring network. Replacement is not recommended, as additional groundwater elevation data is not needed, and replacement would require installation through the vegetative soil cover with biointrusion layer. In addition, the potential exists for this well to act as a conduit for contaminant migration based upon the age, angled orientation, and unique construction. The existing monitoring networks and multi-media (e.g., groundwater, soil vapor, and soil) monitoring program at the MWL meet all the LTMMP requirements. Groundwater monitoring well MWL-MW4 is no longer required in the monitoring network, as summarized below.

1. Groundwater monitoring well MWL-MW4 is not used for ongoing groundwater sampling and analysis under the MWL LTMMP.

2. Groundwater monitoring well MWL-MW4 is not needed to establish the potentiometric surface elevation of the Regional Aquifer.

3. Groundwater monitoring well MWL-MW4 was installed 29 years ago; all MWL wells of a similar-age have been decommissioned (i.e., MWL-BW1, MWL-MW1, MWL-MW2, and MWL-MW3).

Groundwater monitoring well MWL-MW4 is no longer required in the MWL monitoring network. Throughout many years of service, groundwater monitoring well MWL-MW4 has provided important characterization data for the Phase 2 RFI and 21 years of groundwater monitoring results for the Regional Aquifer beneath the MWL. The newer groundwater monitoring wells (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9) comprise the current compliance groundwater monitoring network and provide the necessary groundwater quality and elevation data to meet MWL LTMMP requirements and to assure conditions remain protective of human health and the environment.

In accordance with Section 3.5.2 of the MWL LTMMP, a well decommissioning plan describing the plugging and abandonment of MWL-MW4 is being submitted as Enclosure 6 of this modification request. If approved, all permitting and notification requirements will be addressed and the decommissioning field work will be implemented. After completion, a Decommissioning Report will be prepared and submitted to the NMED for approval.

References

Bearzi J.P. (New Mexico Environment Department), October 2008. Letter to P. Wagner (U.S. Department of Energy) and F. Nimick (Sandia Corporation), "Notice of Approval, Summary Report for the Mixed Waste Landfill Monitoring Well Plug and Abandonment and Installation – Decommissioning of Groundwater Monitoring Well MWL-BW1, Installation of Groundwater Monitoring Well MWL-BW2, April 2008, Sandia National Laboratories NM5890110518, HWB-SNL-08-015," October 31, 2008.

Bearzi J.P. (New Mexico Environment Department), January 2009. Letter to P. Wagner (U.S. Department of Energy) and F. Nimick (Sandia Corporation), "Notice of Approval, Summary Report for the Mixed Waste Landfill Monitoring Well Plug and Abandonment and Installation – Decommissioning of Groundwater Monitoring Wells MWL-MW1, MWL-MW2, and MWL-MW3, Installation of Groundwater Monitoring Well MWL-MW7, MWL-MW8, and MWL-MW9, September 2008, Sandia National Laboratories NM5890110518, HWB-SNL-08-020," January 15, 2009.

Blaine, T. (New Mexico Environment Department), January 2014. Letter to G. Beausoleil (U.S. Department of Energy NNSA/Sandia Site Office) and S.A. Orrell (Sandia National Laboratories, New Mexico), "Approval, Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan, March 2012, Sandia National Laboratories EPA ID#NM5890110518, HWB-SNL-12-007," January 8, 2014.

Kieling, J. E. (New Mexico Environment Department), March 2015. Letter to G. Beausoleil (U.S. Department of Energy NNSA/Sandia Site Office) and P. B. Davies (Sandia National Laboratories, New Mexico), "Approval, Mixed Waste Landfill Groundwater Monitoring Report, Monitoring Well MWL-MW4 Metals Data, September 2014 Pumping and Sampling, January 2015, Sandia National Laboratories EPA ID#NM5890110518, HWB-SNL-15-004," March 10, 2015.

New Mexico Environment Department (NMED), April 2004. "Compliance Order on Consent Pursuant to the New Mexico Hazardous Waste Act § 74-4-10: Sandia National Laboratories Consent Order," NMED Hazardous Waste Bureau, Santa Fe, New Mexico, April 29, 2004.

Peace, J.L., T.J. Goering, and M.D. McVey, September 2002. "Report of the Mixed Waste Landfill Phase 2 RCRA Facility Investigation, Sandia National Laboratories, Albuquerque, New Mexico, SAND ReportSAND2002-2997," prepared by Sandia National Laboratories,

Albuquerque, New Mexico for the U.S. Department of Energy under Contract DE-AC04-94AL85000.

Sandia National Laboratories/New Mexico (SNL/NM), April 2008. “Summary Report for Mixed Waste Landfill Monitoring Well Plug and Abandonment and Installation; Decommissioning of Well MWL-BW1 and Installation of Well MWL-BW2,” Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), September 2008. “Summary Report for Mixed Waste Landfill Monitoring Well Plug and Abandonment and Installation; Decommissioning of Wells MWL-MW1, MWL-MW2, and MWL-MW3, Installation of Wells MWL-MW7, MWL-MW8, and MWL-MW9,” Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), March 2012. “Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan,” Sandia National Laboratories, Albuquerque, New Mexico.

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Sandia National Laboratories, New Mexico (SNL/NM), June 2022. “Mixed Waste Landfill Annual Long-Term Monitoring and Maintenance Report, April 2021 – March 2022,” Sandia National Laboratories, Albuquerque, New Mexico.

Enclosure 4

Revisions to RCRA Facility Operating Permit
Long-Term Monitoring and Maintenance Plan for the Mixed Waste Landfill
Redline/Strikeout Format
Permit Modification 23-024

Sandia National Laboratories
EPA ID NM5890110518

Sandia National Laboratories

Sandia National Laboratories/New Mexico Environmental Restoration Operations

LONG-TERM MONITORING AND MAINTENANCE PLAN FOR THE MIXED WASTE LANDFILL

MARCH 2012
Revision 2 – March 2023~~1 December 2021~~

United States Department of Energy
Sandia Field Office

Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA-0003525.

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Mixed Waste Landfill, Sandia National Laboratories, New Mexico

Sampling Media	Monitoring Parameters[a]/ Constituents of Concern	Monitoring Frequency[a]	Number of Samples Per Event	Locations	Monitoring Method	Comments
Groundwater	VOCs, metals, tritium, radon, gamma-emitting radionuclides (short list), and gross alpha/beta activity	Semiannual	4	MWL compliance groundwater monitoring well network: MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9	Sampling and Analysis per Appendix F. Table 3.5.4-1 lists specific analytes and EPA Methods[b]	Monitoring wells ~~MWL-MW4,~~ MWL-MW5~~,~~ and MWL-MW6 will be retained for information only.
Biota – Surface Soil	RCRA Metals plus Cu, Ni, V, Zn, Co, and Be; and gamma-emitting radionuclides (short list)	Annual	Up to 4 (2 each, if they exist)	Variable - ant hills and animal burrows on the MWL ET Cover located during ET Cover inspections, if present	Grab sampling and analysis of surface soil at animal burrow and/or ant hill feature per Appendix G	Soil sampling will be performed in August or September to evaluate potential for mobilization of contaminants by biota. If no features are identified, no samples will be collected.
Biota – Cover Vegetation	Gamma-emitting radionuclides (short list) in vegetation	Annual	Up to 2 if they exist	Variable - potentially deep-rooted vegetation overlying former disposal areas located during ET Cover inspections, if present	Grab sampling and analysis of vegetation, including the plant and root system per Appendix G	Vegetation sampling will be performed in August or September to evaluate potential for mobilization of contaminants by plants. If no potentially deep-rooted plants are present, no samples will be collected.

[a]Monitoring parameters and frequency will be reevaluated every five years in the Five-Year Reevaluation Report, and a permit modification will be requested, as necessary.
[b]EPA November 1986.

bgs = Below ground surface.
EPA = U.S. Environmental Protection Agency.
ET = Evapotranspirative.
FLUTe™ = Flexible Liner Underground Technologies.
ft = Foot (feet).
MWL = Mixed Waste Landfill.
RCRA = Resource Conservation and Recovery Act.
TBD = To be determined.
TO-15 = EPA Method TO-15 (EPA January 1999).
VOC = Volatile organic compound.

3.5 Groundwater Monitoring

Since 1990, groundwater in the area of the MWL has been extensively characterized for major ion chemistry, VOCs, semivolatile organic compounds, nitrate, metals, radionuclides, and perchlorate. Data collected indicate that groundwater has not been contaminated by releases from the MWL (Goering et al. December 2002; SNL/NM November 2001, January 2002, April 2002, July 2002, October 2002, April 2003, September 2003, April 2004; Lyon and Goering April 2005; SNL/NM November 2006, January 2008, May 2009, June 2010, and September 2011). The following sections present information on the MWL groundwater monitoring network, plug and abandonment (P&A), well replacement, and monitoring parameters and frequency.

3.5.1 MWL Monitoring Well Network

The MWL groundwater monitoring well network was modified in 2008 (SNL/NM May 2009). Due to declining water levels, four monitoring wells (MWL-BW1, MWL-MW1, MWL-MW2, and MWL-MW3) were plugged and abandoned, and four new monitoring wells (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9) were installed. The monitoring wells and installation reports were approved by NMED (Bearzi October 2008b and January 2009). The MWL monitoring well network (Figure 3.5.1-1) consists of ~~seven~~six wells completed within interfingering, fine-grained alluvial fan deposits and coarse-grained Ancestral Rio Grande deposits (Goering et al. December 2002, SNL/NM June 2010). This network includes one background well (MWL-BW2)~~, one on-site well (MWL-MW4),~~ and five downgradient wells (MWL-MW5, MWL-MW6, MWL-MW7, MWL-MW8, and MWL-MW9). All ~~seven~~six wells are constructed of 5-inch, Schedule 80 polyvinyl chloride (PVC) casing and slotted well screens. Table 3.5.1-1 presents well construction information and recent water levels measured in existing monitoring wells. Well database summary sheets showing monitoring well completion diagrams are presented in Appendix H.

Monitoring well MWL-MW4 was installed in 1993 directly beneath a disposal trench and completed at an angle of 6 degrees from vertical, with two discrete well screen intervals 20 feet apart to evaluate various aquifer parameters with depth. An inflatable packer ~~separates~~separated the screened intervals, and pressure ~~is~~was maintained in the packer to prevent the mixing of water from the two screened sections of the aquifer. Monitoring well MWL-MW4 was approved for decommissioning and removal from the monitoring network in 2023.

Monitoring wells MWL-MW5 and MWL-MW6 were installed in 2000 with their respective screen intervals in the Ancestral Rio Grande sediments, below the top of the regional aquifer water table. While these ~~three~~two wells ~~will be~~are retained for information purposes (water levels, water quality parameters, other data as needed), they are not part of the MWL compliance network for long-term groundwater monitoring required analytes.

The long-term groundwater monitoring compliance network consists of the four wells installed in 2008 screened across the uppermost part of the regional aquifer: MWL-BW2 (upgradient background well) and MWL-MW7, MWL-MW8, and MWL-MW9 (downgradient wells). The point-of-compliance is defined as the three downgradient wells (MWL-MW7, MWL-MW8, and MWL-MW9) located along the western MWL boundary at the toe of the ET Cover.

Table 3.5.1-1
Active Monitoring Well Network Construction Details and ~~Recent~~2011 Water Levels
Mixed Waste Landfill, Sandia National Laboratories, New Mexico

Monitoring Well	Top of Inner Casing[a] (FAMSL)	Ground Surface Elevation (FAMSL)	Well Depth (FBGS)	Top of Well Screen (FBGS)	Bottom of Well Screen (FBGS)	Bottom of Well Screen (FAMSL)	October 2011 Measured Depth to Water (FBGS)	October 2011 Water Level (FAMSL)	Screened Lithology	Comments
Compliance Wells										
MWL-BW2	5391.02	5388.70	502.0	467.0	497.0	4891.70	478.64	4912.38	Alluvial Fan	Screen intervals are across the upper surface of the regional aquifer.
MWL-MW7	5383.30	5380.90	498.80	464.7	494.0	4886.90	489.35	4893.95	Alluvial Fan	
MWL-MW8	5384.67	5382.40	500.00	465.0	495.0	4887.40	490.98	4893.69	Alluvial Fan	
MWL-MW9	5381.91	5379.30	500.00	465.0	495.0	4884.30	491.60	4890.31	Alluvial Fan	
Information Only Wells										
~~MWL-MW4[b] (upper)~~	~~5391.70~~	~~5390.20~~	~~511.09[c]~~	~~488.4~~	~~508.4~~	~~4879.11~~	~~501.02~~	~~4893.42[d]~~	~~Alluvial Fan~~	~~Well contains two screens 20 feet apart, hydraulically separated by a pneumatic packer.~~
~~MWL-MW4[b] (lower)~~	~~5391.70~~	~~5390.20~~	~~553.9~~	~~528.4~~	~~548.4~~	~~4841.80~~	~~NM~~	~~NM~~	~~Alluvial Fan/ Ancestral Rio Grande~~	
MWL-MW5	5382.56	5380.40	521.50	496.5	516.5	4863.90	493.29	4889.27	Alluvial Fan/ Ancestral Rio Grande	Screen intervals are below the top of the regional aquifer.
MWL-MW6	5375.31	5372.70	530.50	505.5	525.5	4847.20	487.22	4888.09	Ancestral Rio Grande	

[a]Top of inner casing is the measurement point for the well.
~~[b]Well MWL-MW4 is screened at two intervals and is angled 6 degrees from vertical. All measurements and elevations not corrected for the 6-degree angle of the borehole except the October 2011 groundwater elevation.~~
~~[c]Well depth based on approximate depth (feet below ground surface) to top of the inflatable packer separating the upper and lower screen intervals.~~
~~[d]Groundwater elevation for MWL-MW4 is adjusted/corrected for the 6-degree angle of the monitoring well/borehole.~~
BW = Background well.
FAMSL = Feet above mean sea level.
FBGS = Feet below ground surface.
MW = Monitoring well.
MWL = Mixed Waste Landfill.
NM = Not measured.

APPENDIX H
Mixed Waste Landfill Well Database Summary Sheets

Compliance Groundwater Monitoring Wells
MWL-BW2
MWL-MW7
MWL-MW8
MWL-MW9

Information Only Groundwater Monitoring Wells
~~**MWL-MW4**~~
MWL-MW5
MWL-MW6

Information Only Groundwater Monitoring Wells

~~**MWL-MW4**~~

MWL-MW5

MWL-MW6

Well Name: MWL-MW4
Project Name: MIXED WASTE LANDFILL
NMOSE Well File Code: RG-90065, Point of Diversion: 38
Owner Name: SNL/NM
Date Drilling Started: 12/16/1992
Date Well Dev. Completed: 2/10/1993

Drilling Contractor: WATER DEVELOPMENT CORP.
Drilling Method: SONIC/DRY
Borehole Depth (FBGS): 558.4
Casing Depth (FBGS): 553.9
Geo Location: TA III
Completion Zone: FINE MEDIUM SAND/GRAVELLY SAND
Completion Formation: SANTA FE GROUP

Survey Data

Survey Date: 11/12/2009
Surveyed By: SURVEYING CONTROL, INC.

State Plane Coordinates: NAD 83
(X) Easting: 1551853.59
(Y) Northing: 1452629.08

Surveyed Evaluations (FAMSL) NAVD 88

Protective Casing: 5392.67
Top of Inner Well Casing: 5391.70
Concrete Pad: 5390.77
Ground Surface: 5390.2

Calculated Depths and Elevations

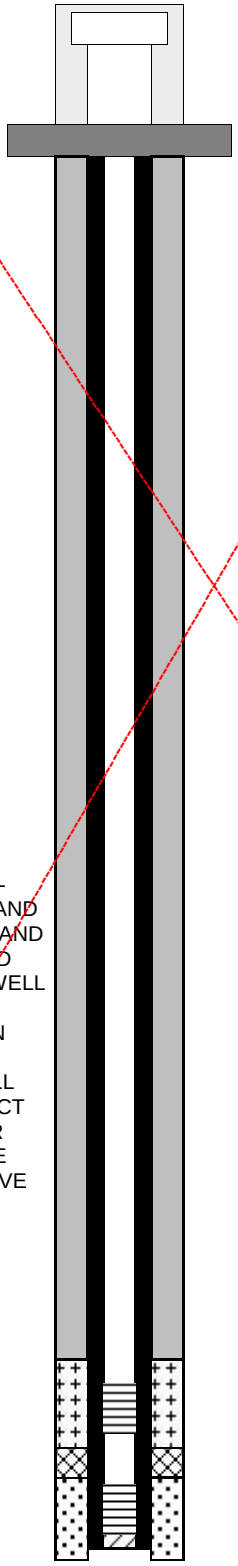
Initial Depth to Water (FBGS): 487.00
Date Intiial Depth Measured:
Last Measured Water Elevation (FAMSL): 4890.68
Date Last Measured: 10/4/2011

Miscellaneous Information

Screen Slot Size (in.): 0.01
Date Updated: 16-FEB-12
Date Printed from EDMS: 2/16/2012 2:21:07 PM

Comments:

MWL-MW4 IS AN ANGLE WELL, INSTALLED AT A 6-DEGREE ANGLE FROM VERTICAL. THE DEPTHS AND ELEVATIONS OF WELL COMPLETION INTERVALS AND WATER LEVELS ARE NOT ADJUSTED/CORRECTED FOR THE 6 DEGREE ANGLE OF THE BOREHOLE/WELL ON THIS FORM. 2 SCREENED INTERVALS EXIST. WELL PVC & PROTECTIVE CASING EXTENDED ON 5/27/09 AND RE-SURVEYED 11/12/09. NEW N, E IS TOP CENTER OF PVC CASING. DEPTHS OF WELL MATERIALS AND SCREENS ADJUSTED TO REFLECT 5.9' RISE IN GROUND ELEVATION TO MWL COVER CONSTRUCTION. 1/1/11 - ORIGINAL STATE PLANE FEET NAD27/NGVD29 SURVEY COORDINATES HAVE BEEN RE-PROJECTED IN STATE PLANE FEET NAD83/NAVD88 COORDINATES.



Completion Data Measured Depths (FBGS)

Casing Stickup: 1.5

Interval	Material	Start	Stop	Length	ID / OD (in.)
BOREHOLE		0	558.4	558.4	/ 11
CASING	SCH 80 PVC	0	553.9	553.9	4.768 / 5.56
GROUT/BACKFILL	VOLCLAY/CONCRETE	0	478.9	478.9	
SECONDARY PACK	40/60 MESH	478.9	513.9	35	
SCREEN		488.4	508.4	20	
SEAL	VOLCLAY/BENTONITE	508.9	525.9	17	
PRIMARY PACK	40/60 MESH	525.9	558.4	32.5	
SCREEN		528.4	548.4	20	
SUMP		548.4	553.9	5.5	

Enclosure 5

Final Revisions to RCRA Facility Operating Permit
Long-Term Monitoring and Maintenance Plan for the Mixed Waste Landfill
Permit Modification 23-024

Sandia National Laboratories
EPA ID NM5890110518

Sandia National Laboratories

Sandia National Laboratories/New Mexico Environmental Restoration Operations

LONG-TERM MONITORING AND MAINTENANCE PLAN FOR THE MIXED WASTE LANDFILL

MARCH 2012
Revision 2 – March 2023

United States Department of Energy
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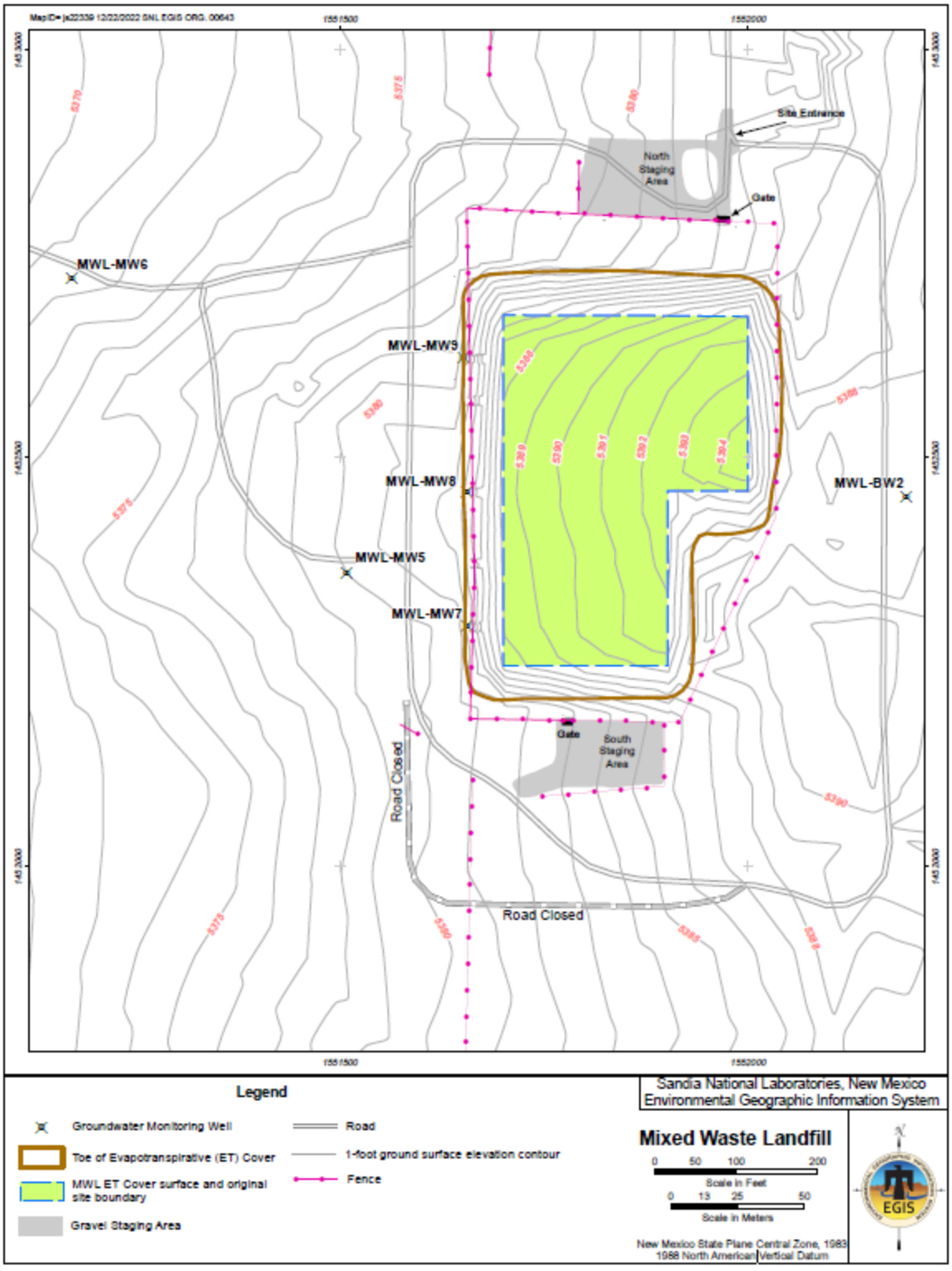

Figure 3.5.1-1
Mixed Waste Landfill Groundwater Monitoring Wells

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MWL-MW7
MWL-MW8
MWL-MW9

Information Only Groundwater Monitoring Wells
MWL-MW5
MWL-MW6

Information Only Groundwater Monitoring Wells
MWL-MW5
MWL-MW6

Enclosure 6

Decommissioning Plan for Groundwater Monitoring Well MWL-MW4
Long-Term Monitoring and Maintenance Plan for the Mixed Waste Landfill
Permit Modification 23-024

Sandia National Laboratories
EPA ID NM5890110518

Sandia National Laboratories, New Mexico
Long-Term Stewardship Program

Decommissioning Plan for
Groundwater Monitoring Well MWL-MW4

Mixed Waste Landfill
Solid Waste Management Unit 76

March 2023

United States Department of Energy
National Nuclear Security Administration
Sandia Field Office

Sandia National Laboratories is a multi-mission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA-0003525.

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Acronyms and Abbreviations

AOP	Administrative Operating Procedure
bgs	below ground surface
CSSP	Contract-Specific Safety Plan
DS	drilling subcontractor
DOE	U. S. Department of Energy
ET	evapotranspirative
FOP	Field Operating Procedure
ft	feet
HASP	Health and Safety Plan
HWB	Hazardous Waste Bureau
LTMMP	Long-Term Monitoring and Maintenance Plan
MWL	Mixed Waste Landfill
NMED	New Mexico Environment Department
NMOSE	New Mexico Office of the State Engineer
NNSA	National Nuclear Security Administration
NTESS	National Technology & Engineering Solutions of Sandia, LLC
P&A	plugging and abandonment
Permit	RCRA Facility Operating Permit for Sandia National Laboratories, EPA ID No. NM5890110518
pH	potential of hydrogen (negative logarithm of the hydrogen ion concentration)
PVC	polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
SFO	Sandia Field Office
SNL/NM	Sandia National Laboratories/New Mexico
TA-III	Technical Area-III
WMP	Waste Management

1.0 PROJECT AND SITE INFORMATION

This Decommissioning Plan for Groundwater Monitoring Well MWL-MW4 (Work Plan) was prepared by National Technology & Engineering Solutions of Sandia, LLC (NTESS) for the U.S. Department of Energy/National Nuclear Security Administration/Sandia Field Office (DOE/NNSA/SFO). It describes the decommissioning of a groundwater monitoring well associated with the Sandia National Laboratories/New Mexico (SNL/NM) Mixed Waste Landfill (MWL), Solid Waste Management Unit 76, located in Technical Area-III (TA-III). SNL/NM is owned by the DOE and operated by NTESS under a Management and Operating Contract administered by DOE/NNSA/SFO.

This Work Plan outlines the activities and procedures that will be used to decommission one groundwater monitoring well, MWL-MW4. This Work Plan is being provided to the New Mexico Environment Department (NMED) Hazardous Waste Bureau (HWB) as an SNL/NM Resource Conservation and Recovery Act (RCRA) Facility Operating Permit (Permit) (NMED January 2015) modification request. Upon NMED's approval, this work plan will be provided to the New Mexico Office of the State Engineer (NMOSE) with a plug and abandon (P&A) form/plan for the well (NMOSE WD-08 Form).

Task Description:	SNL/NM personnel will decommission one existing groundwater monitoring well by P&A. Upon completion, a P&A Report will be prepared and submitted to the NMED HWB for review and approval.
Scheduled Start Date:	The start of field work is contingent upon NMED HWB approval of this Work Plan and associated Permit modification request and NMOSE approval of the P&A form/plan (NMOSE WD-08). Field work will begin as soon as these approvals are obtained and contracting is completed.
Estimated Completion Date:	Field activities will be completed within approximately 30 days of the start date. The drilling subcontractor (DS) will submit a plugging record to the NMOSE within 30 days of the completion of work. Submittal of the P&A Report to NMED HWB will be completed within 90 days of field work completion.

2.0 REGULATORY CRITERIA

The NMED HWB enforces RCRA requirements for the well network at the MWL. On March 13, 2016, the second MWL NMED Final Order (NMED February 2016) became effective (Kieling February 2016), granting Corrective Action Complete with Controls status to the MWL and incorporating the MWL Long-Term Monitoring and Maintenance Plan (LTMMP) into the Permit (NMED January 2015). All controls required for the MWL, including groundwater monitoring, are defined in the MWL LTMMP (SNL/NM March 2012 and subsequent revisions). Section 3.5.2 of the MWL LTMMP discusses well abandonment:

> *"Requirements for monitoring well replacement are presented in the Consent Order (NMED April 2004). MWL monitoring wells will be plugged and abandoned when they are no longer required in the monitoring network, no longer provide representative groundwater samples because of declining water levels or insufficient productivity, or become damaged beyond repair. The goal of well abandonment is to seal the well in such a manner that it cannot act as a conduit for the migration of contaminants from the ground surface to the saturated zone. Well P&A plans will be prepared for any wells that meet these criteria and will be submitted to the NMED for approval as a permit modification. No groundwater monitoring wells at the MWL will be abandoned without prior written approval of the NMED."*

Further regulatory requirements for well P&A procedures can be found in the NMOSE "Well Plugging Handbook" (NMOSE June 2020):

> *"For all wells, the well sealant shall be placed from the bottom of the well upwards to ground surface using a tremie; keeping the tremie pipe submerged in the sealant during the entire process. Any deviation from this process requires an approved variance from the OSE."*

The NMOSE regulations (New Mexico Administrative Code 19.27.4.30(c)(2)(3)) also state that:

> *"Wells encountering contaminated water or soil may require coordination between the office of the state engineer and the New Mexico environment department (or other authorized agency or department) prior to the plugging of the well."*

And,

> *"A well driller shall keep a record of each plugging activity as the work progresses. The well driller shall file a complete plugging record with the state engineer and the permit holder no later than 30 days after completion of the plugging. The plugging record shall be on a form prescribed by the state engineer . . ."*

To meet these regulatory requirements, the following tasks will be completed:

- Submit this Work Plan to NMED HWB requesting approval to decommission well MWL-MW4.
- Submit well plugging plan of operation form (NMOSE WD-08) and this Work Plan to NMOSE after approval of the Work Plan by NMED HWB.
- Use a NMOSE-licensed well driller to P&A the existing well using materials and methods in accordance with NMED HWB and NMOSE regulations.
- Upon completion of the P&A activities, submit the well plugging record (NMOSE WD-11) to NMOSE and submit a P&A Report to NMED HWB and NMOSE.

3.0 PRE-FIELD ACTIVITIES

Upon approval of this Work Plan by NMED HWB and NMOSE approval of the WD-08 P&A plan/form, the most pertinent pre-field activities that will be completed prior to drilling operations include the preparation, review, and approval of the following items.

- Drilling contract Statement of Work
- SNL/NM National Environmental Policy Act checklist identified requirements
- SNL/NM site-specific Health and Safety Plan (HASP)
- DS's Contract-Specific Safety Plan (CSSP)
- NMOSE form/plan (NMOSE WD-08) to decommission the monitoring well
- SNL/NM Site-Specific Waste Management Plan (WMP)
- SNL/NM excavation permit
- SNL/NM Eco Ticket
- SNL/NM Field Work Checklist (punch list)
- SNL/NM Work Readiness Review

Field activities are contingent upon approval by NMED HWB and NMOSE; however, some pre-field activities will begin prior to NMED HWB/NMOSE approval to facilitate timely project initiation.

4.0 HEALTH AND SAFETY

All field personnel will perform field activities safely in accordance with the HASP and CSSP. Level D personal protective equipment is anticipated for all well P&A operations. Training records associated with the field personnel will be maintained on site and will be available at the commencement of P&A activities. The field personnel will operate under both the HASP and CSSP and will have SNL/NM-required training, including 40-hour Occupational Safety and Health Administration Hazardous Waste Operations and Emergency Response training and a current 8-hour annual refresher course.

The MWL is designated as an Underground Radioactive Materials Area under DOE requirements. The MWL-MW4 P&A work scope does not involve removal of or exposure to any material that was in contact with buried waste. Worker health and safety requirements for access to the MWL will be addressed in the HASP and CSSP.

Daily inspections for the P&A support equipment shall be documented by the DS and the records maintained on site. Noticeable drips of hydraulic oil, fuel, or other fluids will be contained by plastic sheeting or similar protective materials placed under the DS's equipment at the MWL-MW4 location. The leaks will either be repaired immediately at the site, the equipment will be removed from the site for required repairs, or the DS will provide substitute equipment.

Prior to the start of drilling operations, SNL/NM Facilities Engineering will complete an Excavation Permit for the MWL-MW4 location. SNL/NM personnel will mark on the ground surface the buried utilities that may be present at the well location. This process will be followed as a best practice and in accordance with SNL/NM requirements but is not applicable to the MWL-MW4 location. There are no buried utilities or overhead power lines at/on the MWL Evapotranspirative (ET) Cover where well MWL-MW4 is located. Only minor vegetation and surface soil disturbance will occur when removing the existing well bollards, concrete pad, surface casing, and installing the final P&A concrete pad with brass marker. Any repairs needed to the ET Cover vegetation will be addressed through the regularly scheduled inspections conducted under the MWL LTMMP.

5.0 EQUIPMENT DECONTAMINATION

The equipment used for P&A work (e.g., development rig, tremie pipe) will be decontaminated with a pressure washer or steam cleaner prior to use. The decontamination work will be conducted at the SNL/NM decontamination pad at Building 9925 - Environmental Resources Field Operations. Decontamination waste (water) will be contained in polyethylene drums and placed on spill control pallets. The waste will be managed in accordance with the site-specific WMP. The P&A equipment will be decontaminated after completion of the field work and prior to leaving SNL/NM property.

6.0 EXISTING WELL INFORMATION

Groundwater monitoring well MWL-MW4 is proposed for decommissioning in this Work Plan. This well is located in TA-III, inside the fenced area of the MWL, on DOE-controlled property within Kirtland Air Force Base property (Figures 1 and 2). The well completion diagram for this monitoring well is provided in Attachment 1 and the pertinent well completion information is summarized in Table 1 below.

Table 1. Completion Specifications of Existing Well MWL-MW4

Well	Total Depth of Well (ft bgs[1])	Screened Interval(ft bgs[1])	Depth to Water Table April 2022 (ft bgs[1])	Completion Zone of Both Screen Intervals
MWL-MW4	553.9	488.4 – 508.4 [upper interval] 528.4 – 548.4 [lower interval]	502.49	Regional Aquifer of the Tertiary Santa Fe Group

[1] ft bgs = feet below ground surface

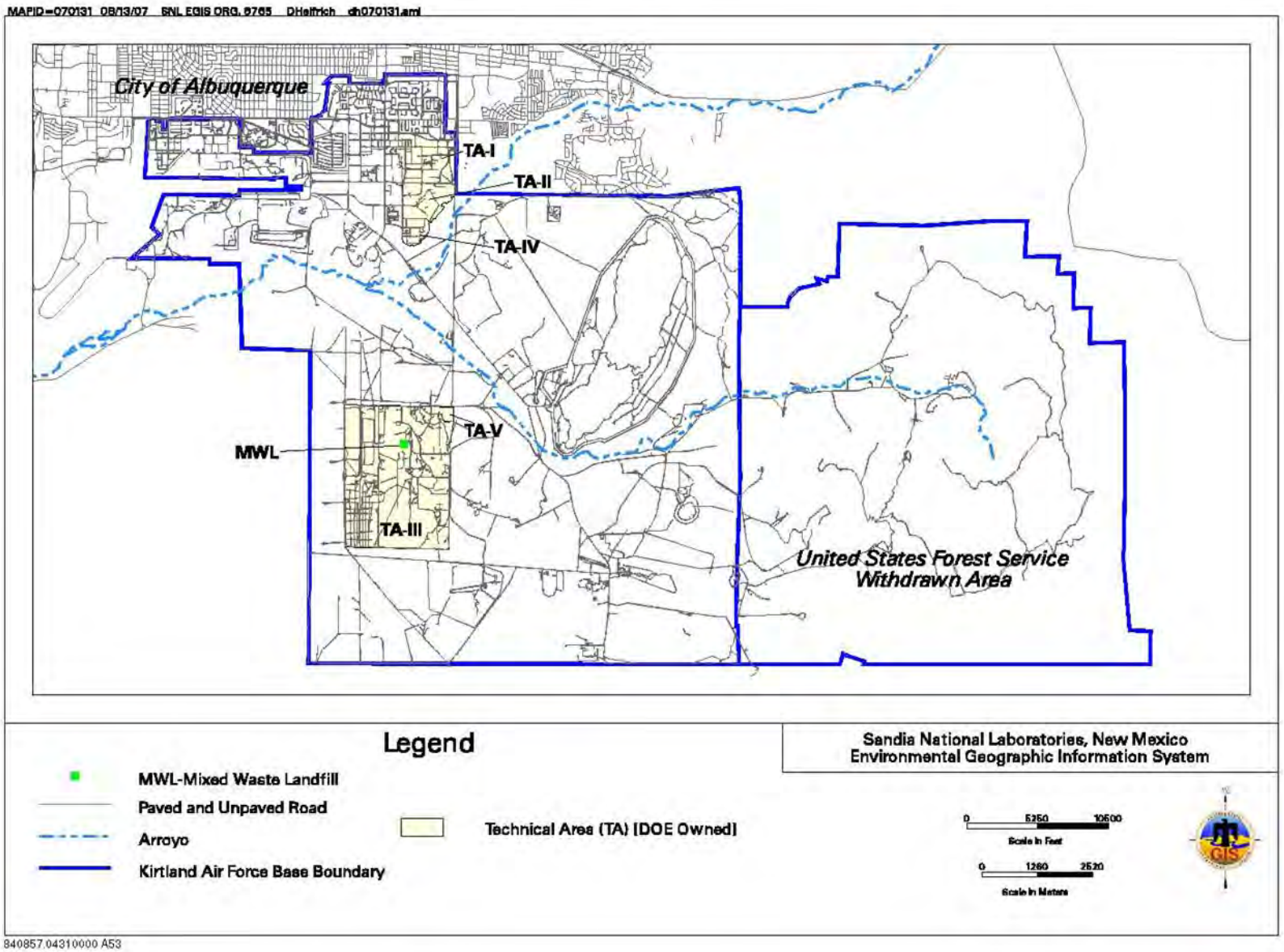


Figure 1. Location of Sandia National Laboratories/New Mexico, Technical Area-III, and the Mixed Waste Landfill.

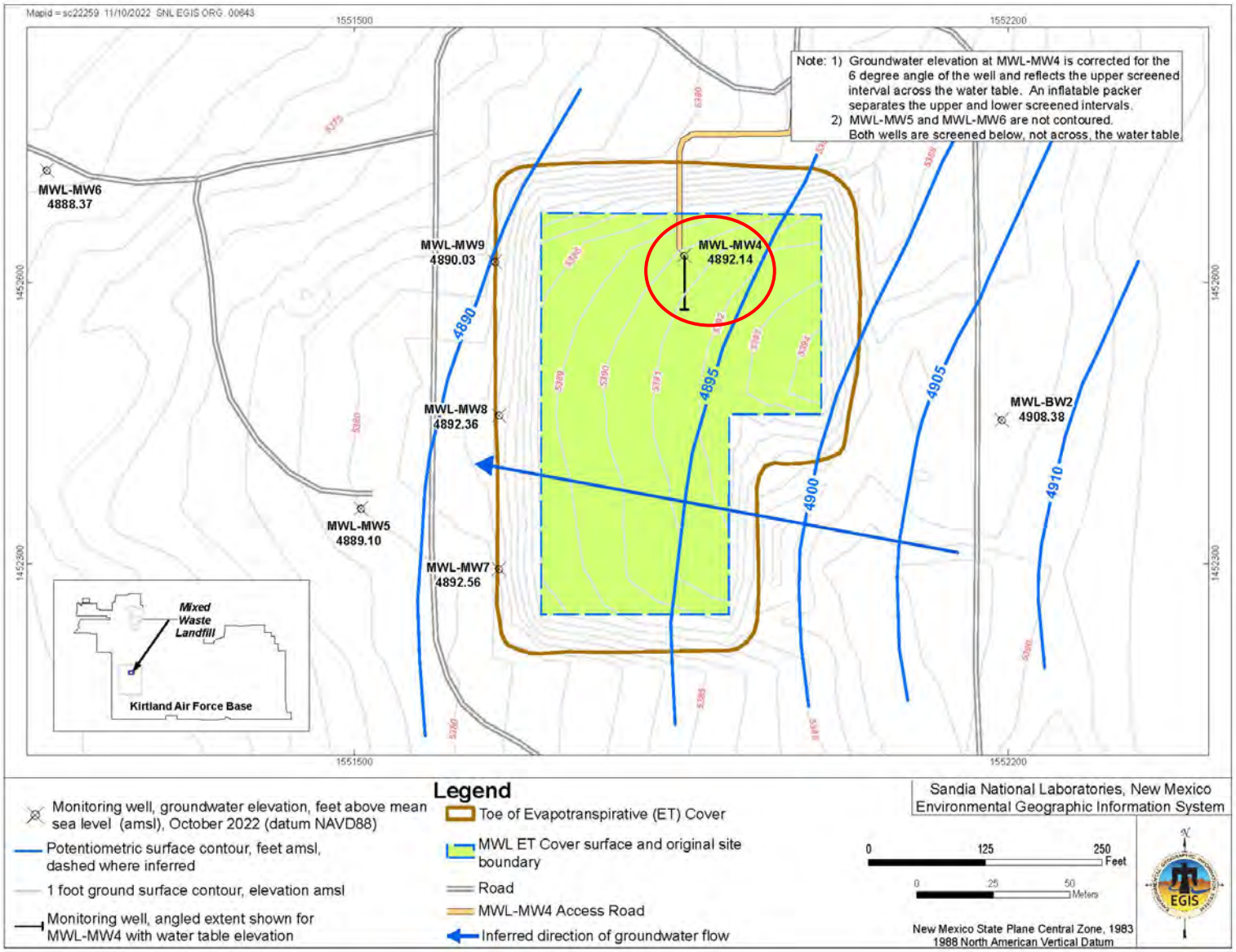


Figure 2. Mixed Waste Landfill Groundwater Well Locations and Potentiometric Surface Map
Monitoring well MWL-MW4 is proposed for decommissioning and circled in red.

MWL-MW4 is a groundwater monitoring well that was installed using the sonic drilling method between December 1992 and February 1993 to sample soil, soil vapor, and groundwater directly beneath Trench D as part of the MWL Phase 2 RCRA Facility Investigation. A total of 212 soil samples were collected from the MWL-MW4 borehole, which was continuously cored to a depth of 552 feet below ground surface (ft bgs). Monitoring well MWL-MW4 was completed at an angle of 6 degrees from vertical with two discrete 20-foot screen intervals, 20 feet apart, to evaluate groundwater quality, the vertical potentiometric gradient, and changes in aquifer parameters with depth. Both well screens are completed in the Regional Aquifer of the Santa Fe Group. Completion details are provided in Table 1, Attachments 1 and 2, and below:

- Construction materials: Schedule 80 polyvinyl chloride (PVC) casing with PVC screen (5-inch internal diameter), carbon-steel protective surface casing, and a concrete well pad.
- Current water level: 502.49 ft bgs (April 2022).
- Water-bearing strata: unconsolidated silt, sand, and gravel (alluvium) of the Santa Fe Group.
    - Upper screen is set across the upper surface of the Regional Aquifer located in the unconsolidated, fine-grained alluvial-fan deposits of the Santa Fe Group.
    - Lower screen interval is set below the Regional Aquifer upper surface and partially across the more transmissive, coarser-grained Ancestral Rio Grande sediments of the Santa Fe Group.

The well was surveyed using down-hole video equipment to inspect for damage in December 2014 at the end of a multi-purge and sampling effort conducted in September 2014. No structural damage was observed (SNL/NM January 2015).

7.0 REASON FOR DECOMMISSIONING WELL MWL MW4

Section 2.0 of this Work Plan presents regulatory criteria for decommissioning MWL groundwater monitoring wells. In accordance with Section 3.5.2 of the MWL LTMMP, well MWL-MW4 is no longer required in the monitoring network and should be decommissioned.

8.0 PLUGGING AND ABANDONMENT

Groundwater monitoring well MWL-MW4 will be decommissioned in accordance with guidelines and requirements established by the NMED HWB and NMOSE. The applicable SNL/NM Field Operating

Procedures (FOPs) and Administrative Operating Procedures (AOPs) will be used. The requirements of this Work Plan will take precedence over any FOPs and AOPs.

The well materials and annular seal are not believed to pose a threat to groundwater; therefore, the well will be backfilled in place with proper sealing materials. The grouting technique and grout mixtures used during decommissioning will minimize grout intrusion into the native formation through the well screen.

General activities for the implementation of the P&A field activity include:

- remove the inflatable packer from the monitoring well (no special equipment required),
- remove all monitoring well surface completion features,
- backfill the casing with well-plugging materials, and
- construct a new surface pad/monument at the former well location.

SNL/NM personnel and the DS will remove all surface completion features, such as the steel bollards, concrete well pad, and surface protective well casing. Care will be taken to minimize disturbance to the ET Cover during P&A field work. The surface protective steel casing will be cut at or slightly below ground surface; complete removal is not feasible without substantial disturbance to the ET Cover due to the length of protective casing extending into the subsurface (i.e., more than 6 ft of steel casing extends below the current ET Cover surface). Prior to ET Cover construction, the surface protective casing and well casing were extended to accommodate the additional height of the ET Cover (approximately 5.9 ft at the MWL-MW4 location – see Attachment 2). Care will be taken to prevent materials from falling down the well casing and possibly causing a downhole obstruction. MWL-MW4 will be abandoned with casing left in place. The aboveground casing will be detached at the extension coupling approximately 4 ft bgs by twisting the casing. If the casing doesn't detach it will be cut off at or slightly below the ground surface to allow a new concrete pad to be installed flush or slightly above the ground surface after P&A is complete.

The well screens and casing will be sealed by lowering a tremie pipe to the base of the well casing (below the base of the lower screen) and injecting the plugging material (bentonite grout) using a pump system. The tremie pipe will be progressively raised as grout is pumped into the casing. The tremie pipe will be removed after grout reaches approximately 10 ft bgs. If the level of the plugging material in the well casing settles over several hours, additional bentonite grout will be added to again reach 10 ft bgs. Concrete will be used from 10 ft bgs to ground surface to provide structural strength near the ground surface. Detailed information related to the sealant materials and the amount of material required to seal the well will be provided in the NMOSE Plugging Plan of Operations by the DS.

Once the well has been properly plugged, the decommissioning process will be completed by installing a concrete slab on the surface of the abandoned well location. The concrete pad will be approximately 1 ft thick with a 2 ft by 2 ft area. A brass marker containing the well name and date of decommissioning will be set in the concrete pad.

9.0 RECORDS MANAGEMENT AND REPORTING

The field activities associated with decommissioning monitoring well MWL-MW4 will be documented in accordance with the requirements established by the NMED HWB, NMOSE and SNL/NM procedures.

All decommissioning field activities will be documented in a field logbook per guidance in SNL/NM FOPs. Upon completion of decommissioning of the well, the P&A Report will be prepared and document field activities and final as-built decommissioning information. The following list of documents and records that are generated as part of the decommissioning process will be submitted and maintained in the SNL/NM

Customer-Funded Records Center.

- Monitoring Well Plugging and Abandonment Request (NMOSE WD-08 Form)
- Monitoring Well Plugging and Abandonment Record (NMOSE WD-11 Form)
- Well P&A Work Plan
- Well P&A Report
- Plugging and Abandonment Documentation and Approval Checklist
- Site-specific WMP
- Field Logbook

All decommissioning activities performed at SNL/NM will be accurately documented and presented in a final P&A Report that will be submitted to the NMED HWB and the NMOSE within 90 days after the completion of all related field work. The P&A Report will contain a brief narrative describing actual work performed at the MWL and any variances to this Work Plan. Information to be contained in the P&A Report includes: (1) daily field activity notes, (2) all materials used, (3) final as-built P&A conditions, and (4) documentation of notification to the appropriate regulatory agencies (NMED HWB and NMOSE) and the SNL/NM Geographic Information System group.

Additional P&A records are required by the NMOSE (NMOSE June 2020). SNL/NM personnel will work with the licensed DS who will submit a plugging record (NMOSE WD-11 Form) to the NMOSE no later than 30 days after completion of P&A. The completed record/form will include all the required information and be included in the final P&A Report.

10.0 SCHEDULE

Initiation of field work is dependent upon NMED HWB approval of this Work Plan and the associated Permit modification request, as well as NMOSE approval of the WD-08 P&A form/plan. Pre-field activities will commence prior to NMED HWB approval to expedite the P&A schedule, but actual well P&A will not be initiated until approvals are received. Monitoring well MWL-MW4 will be decommissioned as soon as possible after approval of this Work Plan. Consistent with the requirements of the Compliance Order on Consent, DOE/NNSA/SFO and SNL/NM personnel will notify NMED HWB in writing, by e-mail, or by fax a minimum of 15 days prior to commencing field work. After completion of the decommissioning field work the DS will submit the WD-11 plugging record to the NMOSE within 30 days and SNL/NM personnel will submit the P&A Report to the NMED HWB and NMOSE within 90 days.

11.0 REFERENCES

Kieling, J.E. (New Mexico Environment Department), February 2016. Letter to J.P. Harrell (U.S. Department of Energy NNSA/Sandia Field Office) and P.B. Davies (Sandia National Laboratories, New Mexico), “Approval, Final Decision on Proposal to Grant Corrective Action Complete with Controls Status for Mixed Waste Landfill, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-14-014,” February 18, 2016.

New Mexico Environment Department (NMED) April 2004, “Compliance Order on Consent Pursuant tothe New Mexico Hazardous Waste Act 74-4-10: Sandia National Laboratories Consent Order,” New Mexico Environment Department, Santa Fe, New Mexico.

New Mexico Environment Department (NMED), January 2015 with all approved modifications. “Resource Conservation and Recovery Act Facility Operating Permit EPA ID Number NM5890110518 Issued to the U.S. Department of Energy/Sandia Corporation for the Sandia National Laboratories Hazardous and Mixed Waste Treatment and Storage Units and Post-Closure Care of the Corrective Action Management Unit,” January 27, 2015.

New Mexico Environment Department (NMED), February 2016. “Final Order No. HWB 15-18 (P), State of New Mexico Before the Secretary of the Environment in the Matter of Proposed Permit Modification for Sandia National Laboratories, EPA ID #5890110518, To Determine Corrective Action Complete with Controls at the Mixed Waste Landfill,” New Mexico Environment Department, Santa Fe, New Mexico, February 12, 2016.

New Mexico Office of the State Engineer (NMOSE) June 2020, “Well Plugging Handbook,” New Mexico Office of the State Engineer, Santa Fe, New Mexico.

Sandia National Laboratories, New Mexico (SNL/NM), March 2012. “Long-Term Monitoring and Maintenance Plan for the Mixed Waste Landfill,” Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories, New Mexico (SNL/NM), January 2015. “Mixed Waste Landfill Groundwater Monitoring Report, Monitoring Well MWL-MW4 Metals Data, September 2014 Pumping and Sampling Data,” Environmental Restoration Operations, Sandia National Laboratories, Albuquerque, New Mexico.

Attachment 1 Monitoring Well Completion Diagram for MWL-MW4

Well Name:	MWL-MW4
Project Name:	MIXED WASTE LANDFILL
NMOSE Well File Code:	RG-90065, Point of Diversion: 3B
Owner Name:	SNL/NM
Date Drilling Started:	12/16/1992
Date Well Dev. Completed:	2/10/1993

Drilling Contractor:	WATER DEVELOPMENT CORP.
Drilling Method:	SONIC/DRY
Borehole Depth (FBGS):	558.4
Casing Depth (FBGS):	553.9
Geo Location:	TA III
Completion Zone:	FINE MEDIUM SAND/GRAVELLY SAND
Completion Formation:	SANTA FE GROUP

Survey Data

Survey Date:	11/12/2009
Surveyed By:	SURVEYING CONTROL, INC.

State Plane Coordinates: NAD 83

(X) Easting:	1551853.59
(Y) Northing:	1452629.08

Surveyed Evaluations (FAMSL) NAVD 88

Protective Casing:	5392.67
Top of Inner Well Casing:	5391.70
Concrete Pad:	5390.77
Ground Surface:	5390.2

Calculated Depths and Elevations

Initial Depth to Water (FBGS):	487.00
Date Intiial Depth Measured:	
Last Measured Water Elevation (FAMSL):	4890.68
Date Last Measured:	10/4/2011

Miscellaneous Information

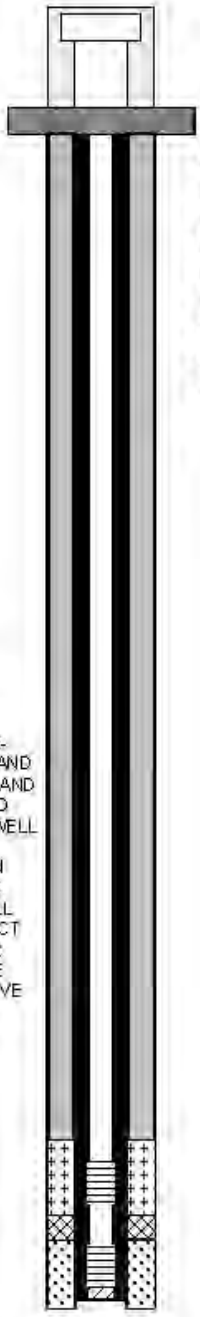
Screen Slot Size (in.): 0.01

Date Updated: 16-FEB-12

Date Printed from EDMS: 2/16/2012 2:21:07 PM

Comments:

MWL-MW4 IS AN ANGLE WELL, INSTALLED AT A 6-DEGREE ANGLE FROM VERTICAL. THE DEPTHS AND ELEVATIONS OF WELL COMPLETION INTERVALS AND WATER LEVELS ARE NOT ADJUSTED/CORRECTED FOR THE 6 DEGREE ANGLE OF THE BOREHOLE/WELL ON THIS FORM. 2 SCREENED INTERVALS EXIST. WELL PVC & PROTECTIVE CASING EXTENDED ON 5/27/09 AND RE-SURVEYED 11/12/09. NEW N, E IS TOP CENTER OF PVC CASING. DEPTHS OF WELL MATERIALS AND SCREENS ADJUSTED TO REFLECT 5.9' RISE IN GROUND ELEVATION TO MWL COVER CONSTRUCTION. 1/1/11 - ORIGINAL STATE PLANE FEET NAD27/NGVD29 SURVEY COORDINATES HAVE BEEN RE-PROJECTED IN STATE PLANE FEET NAD83/NAVD88 COORDINATES.



Completion Data Measured Depths (FBGS)

Casing Stickup: 1.5

Interval	Material	Start	Stop	Length	ID/OD(in.)
BOREHOLE		0	558.4	558.4	7.11
CASING	SCH 80 PVC	0	553.9	553.9	4.768 / 5.56
GROUT/BACKFILL	VOLCLAY/CONCRETE	0	478.9	478.9	
SECONDARY PACK	40/60 MESH	478.9	513.9	35	
SCREEN		488.4	508.4	20	
SEAL	VOLCLAY/BENTONITE	508.9	525.9	17	
PRIMARY PACK	40/60 MESH	525.9	558.4	32.5	
SCREEN		528.4	548.4	20	
SUMP		548.4	553.9	5.5	

Attachment 2 Monitoring Well Surface Completion Diagram for MWL-MW4